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I

(Legislative acts)

REGULATIONS

REGULATION (EU) 2018/1999 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 11 December 2018

on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council

(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 192(1) and Article 194(2) thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee ⁽¹⁾,

Having regard to the opinion of the Committee of the Regions ⁽²⁾,

Acting in accordance with the ordinary legislative procedure ⁽³⁾,

Whereas:

- (1) This Regulation sets out the necessary legislative foundation for reliable, inclusive, cost-efficient, transparent and predictable governance of the Energy Union and Climate Action (governance mechanism), which ensures the achievement of the 2030 and long-term objectives and targets of the Energy Union in line with the 2015 Paris Agreement on climate change following the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change (the 'Paris Agreement'), through complementary, coherent and ambitious efforts by the Union and its Member States, while limiting administrative complexity.
- (2) The Energy Union should cover five dimensions: energy security; the internal energy market; energy efficiency; decarbonisation; and research, innovation and competitiveness.
- (3) The goal of a resilient Energy Union with an ambitious climate policy at its core is to give Union consumers, including households and businesses, secure, sustainable, competitive and affordable energy, and to foster research and innovation by means of attracting investment, which requires a fundamental transformation of Europe's energy system. Such a transformation is also closely linked to the need to preserve, protect and improve the quality of the environment and to promote the prudent and rational utilisation of natural resources,

⁽¹⁾ OJ C 246, 28.7.2017, p. 34.

⁽²⁾ OJ C 342, 12.10.2017, p. 111.

⁽³⁾ Position of the European Parliament of 13 November 2018 (not yet published in the Official Journal) and Decision of the Council of 4 December 2018.

in particular through the promotion of energy efficiency and energy savings and the development of new and renewable forms of energy. That goal can be achieved only through coordinated action, combining both legislative and non-legislative acts at Union, regional, national and local level.

- (4) A fully functional and resilient Energy Union would convert the Union into a leading region for innovation, investment, growth and social and economic development, in turn providing a good example of how pursuing high ambitions in terms of climate change mitigation is intertwined with measures to foster innovation, investment and growth.
- (5) Parallel to this Regulation, the Commission has developed and adopted a series of initiatives in sectoral energy policy, in particular with regard to renewable energy, energy efficiency, including on the energy performance of buildings, and market design. Those initiatives form a package under the overarching theme of energy efficiency first, the Union's global leadership in renewables, and a fair deal for energy consumers, including by addressing energy poverty and promoting fair competition in the internal market.
- (6) In its conclusions of 23 and 24 October 2014, the European Council endorsed a 2030 Framework for Energy and Climate for the Union based on four key Union-level targets: a reduction of at least 40 % in economy-wide greenhouse gas (GHG) emissions, an indicative target of improvement in energy efficiency of at least 27 %, to be reviewed by 2020 with a view to increasing the level to 30 %, a share of renewable energy consumed in the Union of at least 27 %, and electricity interconnection of at least 15 %. It specified that the target for renewable energy is binding at Union level and that it will be fulfilled through Member States' contributions guided by the need to deliver collectively the Union target. A recast of Directive 2009/28/EC of the European Parliament and of the Council ⁽¹⁾ has introduced a new, binding, renewable energy target for the Union for 2030 of at least 32 %, including a provision for a review with a view to increasing the Union-level target by 2023. Amendments to Directive 2012/27/EU of the European Parliament and of the Council ⁽²⁾ have set the Union-level target for improvements in energy efficiency in 2030 to at least 32,5 %, including a provision for a review with a view to increasing the Union-level targets.
- (7) The binding target of at least a 40 % domestic reduction in economy-wide GHG emissions by 2030 compared to 1990 was formally approved as the Intended Nationally Determined Contribution of the Union and its Member States to the Paris Agreement at the Environment Council meeting on 6 March 2015. The Paris Agreement was ratified by the Union on 5 October 2016 ⁽³⁾ and entered into force on 4 November 2016. It replaces the approach taken under the 1997 Kyoto Protocol, which was approved by the Union by Council Decision 2002/358/EC ⁽⁴⁾ and which will not be continued beyond 2020. The Union's system for monitoring and reporting emissions and removals should be updated accordingly.
- (8) The Paris Agreement increased the level of global ambition on climate change mitigation and sets out a long-term goal in line with the objective to keep the global average temperature increase to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1,5 °C above pre-industrial levels.
- (9) In pursuit of the temperature goals in the Paris Agreement, the Union should aim to achieve a balance between anthropogenic GHG emissions by sources and removals by sinks as early as possible and, as appropriate, achieve negative emissions thereafter.
- (10) For the climate system the cumulative total anthropogenic emissions over time are relevant for the total concentration of GHGs in the atmosphere. Various scenarios for the Union's contribution to long-term objectives, inter alia a scenario on achieving net zero GHG emissions in the Union by 2050 and negative emissions thereafter, and the implications of those scenarios on the remaining global and Union carbon budget should be analysed by the Commission. The Commission should prepare an analysis for the purposes of a long-term Union strategy for

⁽¹⁾ Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (OJ L 140, 5.6.2009, p. 16).

⁽²⁾ Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (OJ L 315, 14.11.2012, p. 1).

⁽³⁾ Council Decision (EU) 2016/1841 of 5 October 2016 on the conclusion, on behalf of the European Union, of the Paris Agreement adopted under the United Nations Framework Convention on Climate Change (OJ L 282, 19.10.2016, p. 1).

⁽⁴⁾ Council Decision 2002/358/EC of 25 April 2002 concerning the approval, on behalf of the European Community, of the Kyoto Protocol to the United Nations Framework Convention on Climate Change and the joint fulfilment of commitments thereunder (OJ L 130, 15.5.2002, p. 1).

the Union's contribution to the commitments of the Paris Agreement of holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1,5 °C above pre-industrial levels, including various scenarios, inter alia a scenario on achieving net zero GHG emissions within the Union by 2050 and negative emissions thereafter and their implications on the global and Union carbon budget.

- (11) Although the Union pledged to deliver ambitious cuts in GHG emissions by 2030, the threat of climate change is a global issue. The Union and its Member States should therefore work with their international partners in order to ensure a high level of ambition by all Parties in line with the long-term goals of the Paris Agreement.
- (12) In its conclusions of 23 and 24 October 2014, the European Council also agreed that a reliable and transparent governance mechanism without any unnecessary administrative burden and with sufficient flexibility for Member States should be developed to help ensure that the Union meets its energy policy goals, while fully respecting Member States' freedom to determine their energy mix. It emphasised that such a governance mechanism should build on existing building blocks, such as national climate programmes, national plans for renewable energy and energy efficiency as well as the need to streamline and bring together separate planning and reporting strands. It also agreed to step up the role and rights of consumers, transparency and predictability for investors, inter alia by systematic monitoring of key indicators for an affordable, safe, competitive, secure and sustainable energy system and to facilitate coordination of national climate and energy policies and foster regional cooperation between Member States.
- (13) In its communication of 25 February 2015 on A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy, the Commission refers to the need for an integrated governance mechanism to ensure that energy-related actions at Union, regional, national and local level all contribute to the Energy Union's objectives, thereby broadening the scope of governance — beyond the 2030 Framework for Climate and Energy — to all five dimensions of the Energy Union.
- (14) In its communication of 18 November 2015 on the State of the Energy Union, the Commission further specified that integrated national energy and climate plans, addressing all five dimensions of the Energy Union, are necessary tools for a more strategic energy and climate policy planning. As part of that communication, the Commission Guidance to Member States on integrated national energy and climate plans provided the basis for Member States to start developing national plans for the period 2021 to 2030 and set out the main pillars of the governance mechanism. The communication also specified that such governance should be anchored in law.
- (15) In its conclusions of 26 November 2015 on the governance system of the Energy Union, the Council recognised that governance of the Energy Union will be an essential tool for the efficient and effective construction of the Energy Union and the achievement of its objectives. The Council underlined that the governance mechanism should be based on the principles of integration of strategic planning and reporting on the implementation of climate and energy policies and coordination between actors responsible for energy and climate policy, at Union, regional and national level. It also underlined that the governance mechanism should ensure that the agreed energy and climate targets for 2030 are met and should monitor the Union's collective progress towards the achievement of the policy objectives across the five dimensions of the Energy Union.
- (16) The European Parliament's resolution of 15 December 2015 entitled 'Towards a European Energy Union' called for the governance mechanism of the Energy Union to be ambitious, reliable, transparent, democratic and fully inclusive of the European Parliament and to ensure that the 2030 climate and energy targets are achieved.
- (17) The European Council has repeatedly stressed the need to take urgent measures in order to ensure the achievement of a minimum target of 10 % of electricity interconnections. In its conclusions of 23 and 24 October 2014, the European Council decided that the Commission supported by the Member States will take urgent measures in order to ensure the achievement of a minimum target of 10 % of electricity interconnections, as a matter of urgency, and no later than 2020 at least for Member States which have not yet attained a minimum level of integration in the internal energy market. The communication of the Commission of 23 November 2017 on strengthening Europe's energy networks assesses progress towards achieving the 10 % interconnection target and suggests ways in which to operationalise the 15 % interconnection target for 2030.

- (18) The main objective of the governance mechanism should therefore be to enable the achievement of the objectives of the Energy Union and in particular the targets of the 2030 Framework for Climate and Energy, in the field of GHG emission reduction, energy from renewable sources and energy efficiency. Those objectives and targets stem from the Union policy on energy and from the need to preserve, protect and improve the quality of the environment and to promote the prudent and rational utilisation of natural resources, as provided for in the EU Treaties. None of those objectives, which are indissociably linked, can be regarded as secondary to the other. This Regulation is therefore linked to sectoral law implementing the 2030 targets for energy and climate. While Member States need flexibility to choose policies that are best-matched to their national energy mix and preferences, that flexibility should be compatible with further market integration, increased competition, the attainment of climate and energy objectives and the gradual shift towards a sustainable low-carbon economy.
- (19) A socially acceptable and just transition to a sustainable low-carbon economy requires changes in investment behaviour, as regards both public and private investment, and incentives across the entire policy spectrum, taking into consideration citizens on whom and regions on which the transition to a low-carbon economy could have adverse impacts. Achieving GHG emission reductions requires a boost to efficiency and innovation in the European economy and in particular should also create sustainable jobs, including in high-tech sectors, and lead to improvements of air quality and public health.
- (20) In view of the international commitments in the Paris Agreement, Member States should report on actions that they undertake to phase out energy subsidies, in particular for fossil fuels. When reporting, Member States may choose to base themselves on existing definitions for fossil fuel subsidies used internationally.
- (21) As GHGs and air pollutants largely derive from common sources, policy designed to reduce GHGs can have co-benefits for public health and air quality, in particular in urban areas, that could offset the near-term costs of GHG mitigation. As data reported under Directive (EU) 2016/2284 of the European Parliament and of the Council ⁽¹⁾ represent an important input for the compilation of the GHG inventory and the national plans, the importance of compilation and reporting of consistent data between Directive (EU) 2016/2284 and the GHG inventory should be recognised.
- (22) The experience gained in implementing Regulation (EU) No 525/2013 of the European Parliament and the Council ⁽²⁾ indicated the need for synergies and coherence with reporting under other legal instruments, in particular with Directive 2003/87/EC of the European Parliament and of the Council ⁽³⁾, Regulation (EC) No 166/2006 of the European Parliament and of the Council ⁽⁴⁾, Regulation (EC) No 1099/2008 of the European Parliament and of the Council ⁽⁵⁾ and Regulation (EC) No 517/2014 of the European Parliament and of the Council ⁽⁶⁾. The use of consistent data to report GHG emissions is essential to ensuring the quality of emissions reporting.
- (23) In line with the Commission's strong commitment to better regulation and consistent with a policy that promotes research, innovation and investment, the governance mechanism should result in a significant reduction of administrative burden and complexity for the Member States and relevant stakeholders, the Commission and other Union institutions. It should also help to ensure coherence and adequacy of policies and measures at Union and national level with regard to the transformation of the energy system towards a sustainable low-carbon economy.

⁽¹⁾ Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC (OJ L 344, 17.12.2016, p. 1).

⁽²⁾ Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC (OJ L 165, 18.6.2013, p. 13).

⁽³⁾ Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (OJ L 275, 25.10.2003, p. 32).

⁽⁴⁾ Regulation (EC) No 166/2006 of the European Parliament and of the Council of 18 January 2006 concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC (OJ L 33, 4.2.2006, p. 1).

⁽⁵⁾ Regulation (EC) No 1099/2008 of the European Parliament and of the Council of 22 October 2008 on energy statistics (OJ L 304, 14.11.2008, p. 1).

⁽⁶⁾ Regulation (EU) No 517/2014 of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006 (OJ L 150, 20.5.2014, p. 195).

- (24) The achievement of the Energy Union objectives and targets should be ensured through a combination of Union initiatives and coherent national policies set out in integrated national energy and climate plans. Sectoral Union law in the energy and climate fields sets out planning requirements, which have been useful tools to drive change at the national level. Their introduction at different times has led to overlaps and insufficient consideration of synergies and interactions between policy areas, to the detriment of cost-efficiency. Current separate planning, reporting and monitoring in the climate and energy fields should therefore as far as possible be streamlined and integrated.
- (25) The integrated national energy and climate plans should cover ten-year periods and should provide an overview of the current energy system and policy situation. They should set out national objectives for each of the five dimensions of the Energy Union and corresponding policies and measures to meet those objectives and have an analytical basis. The integrated national energy and climate plans covering the first period from 2021 to 2030 should pay particular attention to the 2030 targets for GHG emission reductions, renewable energy, energy efficiency and electricity interconnection. Member States should aim to ensure that the integrated national energy and climate plans are consistent with, and contribute to, achieving the United Nations Sustainable Development Goals. In their integrated national energy and climate plans, Member States may build upon existing national strategies or plans. For the first draft and final integrated national energy and climate plan, a different deadline is provided as compared to subsequent plans, in order to provide Member States with adequate preparation time for their first plans after the adoption of this Regulation. Nevertheless, Member States are encouraged to provide their first draft integrated national energy and climate plans as early as possible in 2018, in order to allow proper preparation, in particular for the facilitative dialogue to be convened in 2018 in accordance with Decision 1/CP.21 of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC).
- (26) In their integrated national energy and climate plans, Member States should assess the number of households in energy poverty, taking into account the necessary domestic energy services needed to guarantee basic standards of living in the relevant national context, existing social policy and other relevant policies, as well as Commission indicative guidance on relevant indicators, including geographical dispersion, that are based on a common approach for energy poverty. In the event that a Member State finds that it has a significant number of households in energy poverty, it should include in its plan a national indicative objective to reduce energy poverty.
- (27) A mandatory template for the integrated national energy and climate plans should be established to ensure that all national plans are sufficiently comprehensive and to facilitate comparison and aggregation of national plans, while at the same time ensuring sufficient flexibility for Member States to set out the details of national plans reflecting national preferences and specificities.
- (28) The implementation of policies and measures in the areas of energy and climate has an impact on the environment. Member States should therefore ensure that the public is given early and effective opportunities to participate in and to be consulted on the preparation of the integrated national energy and climate plans in accordance, where applicable, with the provisions of Directive 2001/42/EC of the European Parliament and of the Council⁽¹⁾ and the United Nations Economic Commission for Europe (UNECE) Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters of 25 June 1998 (the 'Aarhus convention'). Member States should also ensure involvement of social partners in the preparation of the integrated national energy and climate plans, and aim to limit administrative complexity when fulfilling their obligations with regard to public consultation.
- (29) When carrying out public consultations, and in line with the Aarhus Convention, Member States should aim to ensure equal participation, that the public is informed by public notices or other appropriate means such as electronic media, that the public is able to access all relevant documents, and that practical arrangements related to the public's participation are put in place.
- (30) Each Member State should establish a permanent multi-level energy dialogue, bringing together local authorities, civil society organisations, the business community, investors and other relevant stakeholders to discuss the different options envisaged for energy and climate policies. It should be possible for the Member State's integrated

⁽¹⁾ Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment (OJ L 197, 21.7.2001, p. 30).

national energy and climate plan as well as its long-term strategy to be discussed within the framework of that dialogue. The dialogue may take place by means of any national structure, such as a website, public consultation platform or another interactive communication tool.

- (31) Regional cooperation is key to ensuring the effective achievement of the objectives of the Energy Union in a cost-optimal manner. The Commission should facilitate such cooperation between the Member States. Member States should get the opportunity to comment on other Member States' integrated national energy and climate plans before they are finalised to avoid inconsistencies and potential negative impacts on other Member States and ensure that common objectives are met collectively. Regional cooperation in elaborating and finalising integrated national energy and climate plans as well as in their subsequent implementation should be essential to improving the effectiveness and efficiency of measures and fostering market integration and energy security.
- (32) Where they cooperate in the framework of this Regulation, Member States should take into consideration existing regional cooperation fora, such as the Baltic Energy Market Interconnection Plan (BEMIP), Central and South-Eastern Europe Connectivity (CESEC), Central-West Regional Energy Market (CWREM), the North Seas Countries' Offshore Grid Initiative (NSCOGI), the Pentilateral Energy Forum, Interconnections for South-West Europe and the Euro-Mediterranean Partnership. Member States are encouraged to envisage cooperation with signatories to the Energy Community, third-country members of the European Economic Area and, where appropriate, with other relevant third countries. Moreover, the Commission may, with a view to promoting market integration, cost-efficient policies, effective cooperation, partnerships and consultations, identify further opportunities for regional cooperation covering one or more of the five dimensions of the Energy Union in accordance with this Regulation, with a long-term vision and based on existing market conditions.
- (33) The Commission may undertake discussions with relevant third countries in order to explore the possibility to extend towards them the application of provisions established under this Regulation, in particular those related to regional cooperation.
- (34) Integrated national energy and climate plans should be stable to ensure the transparency and predictability of national policies and measures in order to ensure investment certainty. National plans should however be updated once during the ten-year period covered to give Member States the opportunity to adapt to significant changing circumstances. For the plans covering the period 2021 to 2030, Member States should update their plans by 30 June 2024. Objectives, targets and contributions should only be modified to reflect an increased overall ambition in particular as regards the 2030 targets for energy and climate. As part of the updates, Member States should make efforts to mitigate any adverse environmental impacts that become apparent as part of the integrated reporting.
- (35) Stable long-term strategies are crucial to contribute towards economic transformation, jobs, growth and the achievement of broader sustainable development goals, as well as to move in a fair and cost-effective manner towards the long-term goal set by the Paris Agreement. Furthermore, Parties to the Paris Agreement are invited to communicate, by 2020, their mid-century, long-term low GHG emission development strategies. In that context, the European Council invited the Commission on 22 March 2018 to present, by the first quarter of 2019, a proposal for a strategy for long-term Union GHG emission reductions in accordance with the Paris Agreement, taking into account the integrated national energy and climate plans.
- (36) Member States should develop long-term strategies with a perspective of at least 30 years contributing to the fulfilments of the Member States' commitments under the UNFCCC and the Paris Agreement, in the context of the objective of the Paris Agreement of holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1,5 °C above pre-industrial levels and achievement of long-term GHG emission reductions and enhancements of removals by sinks in all sectors in line with the Union's objective. Member States should develop their strategies in an open and transparent manner and should ensure effective opportunities for the public to participate in their preparation. Their integrated national energy and climate plans and the long-term strategies should be consistent with each other.
- (37) The land use, land use change and forestry (LULUCF) sector is highly exposed and very vulnerable to climate change. At the same time, the sector has huge potential to provide for long-term climate benefits and to contribute significantly to the achievement of Union and international long-term climate goals. It can contribute to climate change mitigation in several ways, in particular by reducing emissions, maintaining and enhancing

sinks and carbon stocks, and providing bio-materials that can substitute fossil or carbon-intensive materials. Long-term strategies underpinning sustainable investment aiming to increase effective carbon sequestration, sustainable resource management, and long-term stability and adaptability of carbon pools, are essential.

- (38) When developing further interconnections, it is important to make a complete assessment of the costs and benefits, including the full technical, socio-economic and environmental impacts thereof as required by Regulation (EU) No 347/2013 of the European Parliament and of the Council ⁽¹⁾ and take into account the positive externalities of interconnections, such as the integration of renewables, security of supply and increased competition in the internal market.
- (39) As is the case for planning, sectoral Union law in the energy and climate fields sets out reporting requirements, many of which have been useful tools to drive change at the national level, complementary to market reforms, but those requirements have been introduced at different times, leading to overlaps and cost-inefficiency, as well as insufficient consideration of synergies and interactions between policy areas such as GHG mitigation, renewable energy, energy efficiency and market integration. To strike the right balance between the need to ensure a proper follow-up of the implementation of the integrated national energy and climate plans and the need to reduce administrative complexity, Member States should establish biennial progress reports on the implementation of the plans and other developments in the energy system. Some reporting however, particularly with regard to reporting requirements in the climate field stemming from the UNFCCC and Union law, would still be necessary on an annual basis.
- (40) Member States' integrated national energy and climate progress reports should mirror the elements set out in the template for the integrated national energy and climate plans. A template for the integrated national energy and climate progress reports should be detailed in subsequent implementing acts given their technical nature and the fact that the first progress reports are due in 2023. The progress reports should be carried out in order to ensure transparency towards the Union, other Member States, regional and local authorities, market actors including consumers, any other relevant stakeholders and the general public. They should be comprehensive across the five dimensions of the Energy Union and, for the first period, at the same time put emphasis on areas covered by the targets of the 2030 Climate and Energy Framework.
- (41) Under the UNFCCC, the Union and its Member States are required to develop, regularly update, publish and report to the Conference of the Parties national inventories of anthropogenic emissions by sources and removals by sinks of all GHGs using comparable methodologies agreed by the Conference of the Parties. The GHG inventories are key to enabling the tracking of progress with the implementation of the decarbonisation dimension and for assessing compliance with the legislative acts in the field of climate, in particular Regulation (EU) 2018/842 of the European Parliament and of the Council ⁽²⁾ and Regulation (EU) 2018/841 of the European Parliament and of the Council ⁽³⁾.
- (42) Decision 1/CP.16 of the Conference of the Parties to the UNFCCC requires the establishment of national arrangements to estimate anthropogenic emissions by sources and removals by sinks of all GHGs. This Regulation should enable the establishment of those national arrangements.
- (43) Experience in the implementation of Regulation (EU) No 525/2013 has demonstrated the importance of transparency, accuracy, consistency, completeness and comparability of information. Building on that experience, this Regulation should ensure that Member States use robust and consistent data and assumptions across the five dimensions and make publicly available comprehensive information concerning the assumptions, parameters and methodologies used for the final scenarios and projections taking into account statistical restrictions, commercially sensitive data, and compliance with the data protection rules, and report on their policies and measures, and projections as a key component of the progress reports. The information in those reports should

⁽¹⁾ Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009 (OJ L 115, 25.4.2013, p. 39).

⁽²⁾ Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013 (OJ L 156, 19.6.2018, p. 26).

⁽³⁾ Regulation (EU) 2018/841 of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU (OJ L 156, 19.6.2018, p. 1).

be essential for demonstrating the timely implementation of commitments under Regulation (EU) 2018/842. Operating and continuously improving systems at Union and Member State level coupled with better guidance on reporting should significantly contribute towards an ongoing strengthening of the information necessary in order to track progress in the decarbonisation dimension.

- (44) This Regulation should ensure reporting by Member States on adaptation to climate change and the provision of financial, technological and capacity-building support to developing countries, thereby facilitating the implementation of the Union's commitments under the UNFCCC and Paris Agreement. Furthermore, information on national adaptation actions and support is also important in the context of the integrated national energy and climate plans, especially as regards adaptation to those adverse effects of climate change related to the security of the Union's energy supply such as the availability of cooling water for power plants and biomass availability for energy, and information on support relevant to the external dimension of the Energy Union.
- (45) The Paris Agreement reaffirms that the Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights and gender equality. Member States should therefore adequately integrate the dimensions of human rights and gender equality in their integrated national energy and climate plans and long-term strategies. Through their biennial progress reports they should report information on how the implementation of their integrated national energy and climate plans contributes to the promotion of both human rights and gender equality.
- (46) In order to limit administrative burden on Member States and the Commission, the latter should establish an online platform (e-platform) to facilitate communication, promote cooperation and facilitate public access to information. That should facilitate timely submission of reports as well as improved transparency on national reporting. The e-platform should complement, build on and benefit from existing reporting processes, databases and e-tools, such as those of the European Environment Agency, Eurostat, the Joint Research Centre and the experience gained from the Union's Eco-Management and Audit Scheme.
- (47) The Commission should ensure that the final integrated national energy and climate plans are publicly available online. The e-platform, once operational, should be used by the Commission to host and make publicly available the final integrated national energy and climate plans, the updates thereof, the long-term strategies and other relevant reporting information provided by Member States. Before the e-platform becomes operational, the Commission will use its own websites to facilitate public online access to the final integrated national energy and climate plans.
- (48) As concerns data to be provided to the Commission by means of national planning and reporting, information from Member States should not duplicate data and statistics which have already been made available via Eurostat in the context of Regulation (EC) No 223/2009 of the European Parliament and of the Council⁽¹⁾ in the same form as under the planning and reporting obligations laid down in this Regulation and are still available from the Commission (Eurostat) with the same values. Where available and appropriate in terms of timing, reported data and projections provided in the integrated national energy and climate plans should build on and be consistent with Eurostat data and the methodology used for reporting European statistics in accordance with Regulation (EC) No 223/2009.
- (49) In view of the collective achievement of the objectives of the Energy Union Strategy, in particular the creation of a fully functional and resilient Energy Union, it will be essential for the Commission to assess the draft integrated national energy and climate plans, the integrated national energy and climate plans and, based on progress reports, their implementation. For the first ten-year period, this concerns in particular the achievement of the Union's 2030 targets for energy and climate and national contributions to those targets. Such assessment should be undertaken on a biennial basis, and on an annual basis only where necessary, and should be consolidated in the Commission's State of the Energy Union reports.
- (50) With due respect to the Commission's right of initiative, the ordinary legislative procedure, and the institutional balance of power, the European Parliament and the Council should address, on an annual basis, the progress achieved by the Energy Union on all dimensions of Energy and Climate policies.

⁽¹⁾ Regulation (EC) No 223/2009 of the European Parliament and of the Council of 11 March 2009 on European statistics and repealing Regulation (EC, Euratom) No 1101/2008 of the European Parliament and of the Council on the transmission of data subject to statistical confidentiality to the Statistical Office of the European Communities, Council Regulation (EC) No 322/97 on Community Statistics, and Council Decision 89/382/EEC, Euratom establishing a Committee on the Statistical Programmes of the European Communities (OJ L 87, 31.3.2009, p. 164).

- (51) The Commission should assess the overall impact of the policies and measures of the integrated national energy and climate plans on the operation of the Union climate and energy policy measures, in particular with regard to the need for additional Union policies and measures in view of the necessary increase in GHG emission reduction and removals in the Union in line with the Paris Agreement commitments.
- (52) Aviation has impacts on the global climate as a result of the release of CO₂ as well as of other emissions, including nitrogen oxides emissions, and mechanisms, such as cirrus cloud enhancement. In the light of the rapidly developing scientific understanding of those impacts, an updated assessment of the non-CO₂ impacts of aviation on the global climate is already provided for in Regulation (EU) No 525/2013. The modelling used in this respect should be adapted to scientific progress. Based on its assessments of such impacts, the Commission should, by 1 January 2020, present an updated analysis of the non-CO₂ effects of aviation, accompanied, where appropriate, by a proposal on how best to address those effects.
- (53) In accordance with the current UNFCCC GHG reporting guidelines, the calculation and reporting of methane emissions is based on global warming potentials (GWP) relating to a 100-year time horizon. Given the high GWP and relatively short atmospheric lifetime of methane, leading to a significant impact on the climate in the short and middle term, the Commission should analyse the implications for implementing policies and measures for the purpose of reducing the short- and middle-term impact of methane emissions on Union GHG emissions. The Commission should consider policy options for rapidly addressing methane emissions and should put forward a Union strategic plan for methane as an integral part of the Union's long-term strategy.
- (54) To help ensure coherence between national and Union policies and objectives of the Energy Union, there should be an ongoing dialogue between the Commission and the Member States and, where appropriate, between the Member States. As appropriate, the Commission should issue recommendations to Member States, including on the level of ambition of the draft integrated national energy and climate plans, on the subsequent implementation of policies and measures of the notified integrated national energy and climate plans, and on other national policies and measures of relevance for the implementation of the Energy Union. Whereas recommendations have no binding force, as set out in Article 288 of the Treaty on the Functioning of the European Union (TFEU), Member States should nevertheless take due account of such recommendations and explain in subsequent progress reports how they have done so. With regard to renewable energy, the Commission assessment is to be based on the objective criteria. If the Commission issues a recommendation with regard to a Member State's draft national plan, it should do so as quickly as possible, having regard, on the one hand, to the need for the Commission to add up certain quantified planned contributions of all Member States in order to assess the ambition at Union level, and, on the other, the need to provide adequate time for the Member State concerned to take due consideration of the Commission's recommendations before finalising its national plan, and the need to avoid the risk of delay of the Member State's national plan.
- (55) Cost-effective deployment of renewable energy is one of the key objective criteria for assessing Member States' contributions. The cost structure of deploying renewable energy is complex and varies significantly between Member States. It includes not only the costs of support schemes, but, inter alia, the connection costs of installations, system backup, providing system security and costs that need to be borne when complying with environmental restrictions. Thus, when comparing Member States based on that criterion, all costs related to deployment, whether they are borne by the Member State, final consumers or project developers, should be accounted for. The Commission's recommendations with regard to the Member States' renewable ambitions should be based on a formula set out in this Regulation which is based on objective criteria. Thus, the assessment of the renewable energy ambition of the Member States should indicate the relative effort made by the Member States, while also taking into consideration relevant circumstances affecting the renewable energy development. The assessment should also include data originating from independent quantitative or qualitative data sources.
- (56) Should the ambition of integrated national energy and climate plans or their updates be insufficient for the collective achievement of the Energy Union objectives and, for the first period, in particular the 2030 targets for renewable energy and energy efficiency, the Commission should take measures at Union level in order to ensure the collective achievement of those objectives and targets (thereby closing any 'ambition gap'). Should progress made by the Union towards those objectives and targets be insufficient for their delivery, the Commission should, in addition to issuing recommendations, propose measures and exercise its powers at Union level or Member States should take additional measures in order to ensure achievement of these objectives and targets (thereby

closing any 'delivery gap'). Such measures should also take into account early efforts made by Member States towards the 2030 target for renewable energy by reaching in or before 2020 a share of energy from renewable sources above its national binding target, or by making early progress towards its national binding 2020 target or in the implementation of its contribution to the Union's binding target of at least 32 % of renewable energy in 2030. In the area of renewable energy, such measures can also include voluntary financial contributions by Member States to a Union renewable energy financing mechanism managed by the Commission, which would be used to contribute to the most cost-efficient renewable energy projects across the Union, thus providing the Member States with the option to contribute to the Union target achievement at the lowest possible cost. Member States' national renewable energy targets for 2020 should serve as baseline shares of renewable energy from 2021 onwards and should be maintained throughout the period. In the area of energy efficiency, additional measures can, in particular, aim to improve the energy efficiency of products, buildings and transport.

- (57) Member States' national renewable energy targets for 2020 as set out in Annex I to Directive (EU) 2018/2001 of the European Parliament and of the Council ⁽¹⁾ should serve as the starting point for their national indicative trajectory for the period 2021 to 2030, unless a Member State voluntarily decides to set a higher starting point. In addition, they should constitute for this period a mandatory baseline share that forms equally part of Directive (EU) 2018/2001. Consequently, in that period the share of energy from renewable sources in each Member State's gross final consumption of energy should not be lower than its baseline share.
- (58) If a Member State does not maintain its baseline share as measured over a one-year period, it should, within one year, take additional measures to cover this gap to its baseline scenario. Where a Member State has effectively taken such necessary measures and fulfilled its obligation to cover the gap, it should be deemed to comply with the mandatory requirements of its base-line scenario as from the moment in time when the gap in question occurred and both under this Regulation and under Directive (EU) 2018/2001.
- (59) In order to enable adequate monitoring and early corrective action by Member States and the Commission, and in order to avoid the 'free rider' effect, the indicative trajectories of all Member States and, as a result, also the indicative trajectory of the Union should reach, in 2022, 2025 and 2027 at least certain minimum percentages of the total increase in renewable energy foreseen for 2030, as set out in this Regulation. The achievement of these 'reference points' in 2022, 2025 and 2027 will be assessed by the Commission on the basis, inter alia, of the Member States' integrated national energy and climate progress reports that Member States should present. Member States below their reference points should explain in their next progress report how they will cover the gap. If the indicative reference points of the Union are not met, Member States below their reference points should cover the gap by implementing additional measures.
- (60) The Union and the Member States should strive to provide the most up-to-date information on their GHG emissions and removals. This Regulation should enable such estimates to be prepared in the shortest timeframes possible by using statistical and other information, such as, where appropriate, space-based data provided by the Copernicus Programme established by Regulation (EU) No 377/2014 of the European Parliament and of the Council ⁽²⁾ and by other satellite systems.
- (61) Under Regulation (EU) 2018/842, the approach of the annual commitment cycle taken in Decision No 406/2009/EC of the European Parliament and of the Council ⁽³⁾ should continue. That approach requires a comprehensive review of Member States' GHG inventories to enable the assessment of compliance and the application of corrective action, where necessary. A review process at Union level of the GHG inventories submitted by Member States is necessary to ensure that compliance with Regulation (EU) 2018/842 is assessed in a credible, consistent, transparent and timely manner.

⁽¹⁾ Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (see page 82 of this Official Journal).

⁽²⁾ Regulation (EU) No 377/2014 of the European Parliament and of the Council of 3 April 2014 establishing the Copernicus Programme and repealing Regulation (EU) No 911/2010 (OJ L 122, 24.4.2014, p. 44).

⁽³⁾ Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020 (OJ L 140, 5.6.2009, p. 136).

- (62) Member States and the Commission should ensure close cooperation on all matters relating to the implementation of the Energy Union, with close involvement of the European Parliament on matters related to this Regulation. The Commission should as appropriate assist Member States in implementing this Regulation, particularly with regard to the establishment of the integrated national energy and climate plans and associated capacity building, including by mobilising internal resources from internal modelling capacity and, where appropriate, external expertise.
- (63) Member States should ensure that their integrated national energy and climate plans take into consideration the latest country-specific recommendations issued in the context of the European Semester.
- (64) Member States should use the energy efficiency first principle, which means to consider, before taking energy planning, policy and investment decisions, whether cost-efficient, technically, economically and environmentally sound alternative energy efficiency measures could replace in whole or in part the envisaged planning, policy and investment measures, whilst still achieving the objectives of the respective decisions. This includes, in particular, the treatment of energy efficiency as a crucial element and a key consideration in future investment decisions on energy infrastructure in the Union. Such cost-efficient alternatives include measures to make energy demand and energy supply more efficient, in particular by means of cost-effective end-use energy savings, demand response initiatives and more efficient conversion, transmission and distribution of energy. Member States should also encourage the spread of that principle in regional and local government, as well as in the private sector.
- (65) The European Environment Agency should assist the Commission, as appropriate and in accordance with its annual work programme, with assessment, monitoring and reporting work.
- (66) The power to adopt acts in accordance with Article 290 TFEU should be delegated to the Commission in order to amend the general framework for the integrated national energy and climate plans template for the purpose of adapting the template to amendments to the Union Energy and Climate policy framework that are directly and specifically related to the Union's contributions under the UNFCCC and the Paris Agreement, take account of changes in the GWPs and internationally agreed inventory guidelines, and set substantive requirements for the Union inventory system and set up the registries. It is of particular importance that the Commission carry out appropriate consultations during its preparatory work, including at expert level, and that those consultations be conducted in accordance with the principles laid down in the Interinstitutional Agreement of 13 April 2016 on Better Law-Making ⁽¹⁾. In particular, to ensure equal participation in the preparation of delegated acts, the European Parliament and the Council should receive all documents at the same time as Member States' experts, and their experts systematically have access to meetings of Commission expert groups dealing with the preparation of delegated acts. It should also take into account, where necessary, decisions adopted under the UNFCCC and the Paris Agreement.
- (67) In order to ensure uniform conditions for the implementation of this Regulation, in particular with regard to; integrated national energy and climate progress reports; integrated reporting on national adaptation actions, financial and technology support provided to developing countries and auctioning revenues; annual reporting on approximated GHG inventories, GHG inventories and accounted GHG emissions and removals; the Union renewable energy financing mechanism, national inventory systems; the inventory review; the Union and national systems for policies and measures and projections; and reporting on GHG policies and measures and projections, implementing powers should be conferred on the Commission. Those powers should be exercised in accordance with Regulation (EU) No 182/2011 ⁽²⁾.
- (68) In order to exercise the implementing powers laid down in this Regulation, the Commission should be assisted in its tasks under this Regulation by a Climate Change Committee which reinstates the existing Climate Change Committee established by Article 8 of Decision 93/389/EEC, Article 9 of Decision 280/2004/EC and Article 26 of Regulation (EU) No 525/2013 and by an Energy Union Committee. In order to ensure consistency of policies and aim at maximising synergies between sectors, both climate and energy experts should be invited to the meetings of both committees when implementing this Regulation.

⁽¹⁾ OJ L 123, 12.5.2016, p. 1.

⁽²⁾ Regulation (EU) No 182/2011 of the European Parliament and of the Council of 16 February 2011 laying down the rules and general principles concerning mechanisms for control by Member States of the Commission's exercise of implementing powers (OJ L 55, 28.2.2011, p. 13).

- (69) The Commission should review the implementation of this Regulation in 2024 and every five years thereafter and make amending proposals as appropriate to ensure the proper implementation thereof and the achievement of its objectives. Those reviews should take into account developments and should be informed by the results of the global stocktake of the Paris Agreement.
- (70) This Regulation should integrate, amend, replace and withdraw certain planning, reporting and monitoring obligations currently contained in sectoral energy and climate Union legislative acts to ensure a streamlined and integrated approach to the main planning, reporting and monitoring strands. The following legislative acts should therefore be amended accordingly:
- Directive 94/22/EC of the European Parliament and of the Council ⁽¹⁾,
 - Directive 98/70/EC of the European Parliament and of the Council ⁽²⁾,
 - Directive 2009/31/EC of the European Parliament and of the Council ⁽³⁾,
 - Regulation (EC) No 663/2009 of the European Parliament and of the Council ⁽⁴⁾,
 - Regulation (EC) No 715/2009 of the European Parliament and of the Council ⁽⁵⁾,
 - Directive 2009/73/EC of the European Parliament and of the Council ⁽⁶⁾,
 - Council Directive 2009/119/EC ⁽⁷⁾,
 - Directive 2010/31/EU of the European Parliament and of the Council ⁽⁸⁾,
 - Directive 2012/27/EU,
 - Directive 2013/30/EU of the European Parliament and of the Council ⁽⁹⁾,
 - Council Directive (EU) 2015/652 ⁽¹⁰⁾.
- (71) For reasons of coherence and legal certainty, nothing in this Regulation should prevent the application of the derogations pursuant to the relevant Union sectoral law in the area of electricity and electricity risk preparedness.
- (72) This Regulation should also integrate in full the provisions of Regulation (EU) No 525/2013. As a consequence, Regulation (EU) No 525/2013 should be repealed from 1 January 2021. However, in order to ensure that the implementation of Decision No 406/2009/EC continues under Regulation (EU) No 525/2013 and that certain aspects linked to the implementation of the Kyoto Protocol remain enshrined in law, it is necessary that certain provisions remain applicable after that date.
- (73) Since the objectives of this Regulation cannot be sufficiently achieved by the Member States alone and can therefore, by reason of the scale and effects of the proposed action, be better achieved at Union level, the Union may adopt measures, in accordance with the principle of subsidiarity as set out in Article 5 of the Treaty on European Union. In accordance with the principle of proportionality, as set out in that article, this Regulation does not go beyond what is necessary to achieve those objectives,

⁽¹⁾ Directive 94/22/EC of the European Parliament and of the Council of 30 May 1994 on the conditions for granting and using authorizations for the prospecting, exploration and production of hydrocarbons (OJ L 164, 30.6.1994, p. 3).

⁽²⁾ Directive 98/70/EC of the European Parliament and of the Council of 13 October 1998 relating to the quality of petrol and diesel fuels and amending Council Directive 93/12/EEC (OJ L 350, 28.12.1998, p. 58).

⁽³⁾ Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 (OJ L 140, 5.6.2009, p. 114).

⁽⁴⁾ Regulation (EC) No 663/2009 of the European Parliament and of the Council of 13 July 2009 establishing a programme to aid economic recovery by granting Community financial assistance to projects in the field of energy (OJ L 200, 31.7.2009, p. 31).

⁽⁵⁾ Regulation (EC) No 715/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the natural gas transmission networks and repealing Regulation (EC) No 1775/2005 (OJ L 211, 14.8.2009, p. 36).

⁽⁶⁾ Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC (OJ L 211, 14.8.2009, p. 94).

⁽⁷⁾ Council Directive 2009/119/EC of 14 September 2009 imposing an obligation on Member States to maintain minimum stocks of crude oil and/or petroleum products (OJ L 265, 9.10.2009, p. 9).

⁽⁸⁾ Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (OJ L 153, 18.6.2010, p. 13).

⁽⁹⁾ Directive 2013/30/EU of the European Parliament and of the Council of 12 June 2013 on safety of offshore oil and gas operations and amending Directive 2004/35/EC (OJ L 178, 28.6.2013, p. 66).

⁽¹⁰⁾ Council Directive (EU) 2015/652 of 20 April 2015 laying down calculation methods and reporting requirements pursuant to Directive 98/70/EC of the European Parliament and of the Council relating to the quality of petrol and diesel fuels (OJ L 107, 25.4.2015, p. 26).

HAVE ADOPTED THIS REGULATION:

CHAPTER 1

General provisions

Article 1

Subject matter and scope

1. This Regulation establishes a governance mechanism to:
 - (a) implement strategies and measures designed to meet the objectives and targets of the Energy Union and the long-term Union greenhouse gas emissions commitments consistent with the Paris Agreement, and for the first ten-year period, from 2021 to 2030, in particular the Union's 2030 targets for energy and climate;
 - (b) stimulate cooperation between Member States, including, where appropriate, at regional level, designed to achieve the objectives and targets of the Energy Union;
 - (c) ensure the timeliness, transparency, accuracy, consistency, comparability and completeness of reporting by the Union and its Member States to the UNFCCC and Paris Agreement secretariat;
 - (d) contribute to greater regulatory certainty as well as contribute to greater investor certainty and help take full advantage of opportunities for economic development, investment stimulation, job creation and social cohesion.

The governance mechanism is based on long-term strategies, integrated national energy and climate plans covering ten-year periods starting from 2021 to 2030, corresponding integrated national energy and climate progress reports by the Member States and integrated monitoring arrangements by the Commission. The governance mechanism ensures effective opportunities for the public to participate in the preparation of those national plans and those long-term strategies. It comprises a structured, transparent, iterative process between the Commission and Member States for the purpose of the finalisation of the integrated national energy and climate plans and their subsequent implementation, including with regard to regional cooperation, and corresponding Commission action.

2. This Regulation applies to the five dimensions of the Energy Union, which are closely related and mutually reinforcing:
 - (a) energy security;
 - (b) internal energy market;
 - (c) energy efficiency;
 - (d) decarbonisation; and
 - (e) research, innovation and competitiveness.

Article 2

Definitions

The following definitions apply:

- (1) 'policies and measures' means all instruments which contribute to meeting the objectives of the integrated national energy and climate plans and/or to implement commitments under points (a) and (b) of Article 4(2) of the UNFCCC, which may include those that do not have the limitation and reduction of greenhouse gas emissions or change in the energy system as a primary objective;
- (2) 'existing policies and measures' means implemented policies and measures and adopted policies and measures;
- (3) 'implemented policies and measures' means policies and measures for which one or more of the following applies at the date of submission of the integrated national energy and climate plan or of the integrated national energy and climate progress report: directly applicable Union or national law is in force, one or more voluntary agreements have been established, financial resources have been allocated, human resources have been mobilised;

- (4) 'adopted policies and measures' means policies and measures for which an official government decision has been made by the date of submission of the integrated national energy and climate plan or of the integrated national energy and climate progress report and there is a clear commitment to proceed with implementation;
- (5) 'planned policies and measures' means options that are under discussion and that have a realistic chance of being adopted and implemented after the date of submission of the integrated national energy and climate plan or of the integrated national energy and climate progress report;
- (6) 'system for policies and measures and projections' means a system of institutional, legal and procedural arrangements established for reporting policies and measures and projections relating to anthropogenic emissions by sources and removals by sinks of greenhouse gases and to the energy system, inter alia as required by Article 39;
- (7) 'projections' means forecasts of anthropogenic greenhouse gas emissions by sources and removals by sinks or developments of the energy system, including at least quantitative estimates for a sequence of four future years ending with 0 or 5 immediately following the reporting year;
- (8) 'projections without measures' means projections of anthropogenic greenhouse gas emissions by sources and removals by sinks that exclude the effects of all policies and measures which are planned, adopted or implemented after the year chosen as the starting point for the relevant projection;
- (9) 'projections with measures' means projections of anthropogenic greenhouse gas emissions by sources and removals by sinks that encompass the effects, in terms of greenhouse gas emission reductions or developments of the energy system, of policies and measures that have been adopted and implemented;
- (10) 'projections with additional measures' means projections of anthropogenic greenhouse gas emissions by sources and removals by sinks or developments of the energy system that encompass the effects, in terms of greenhouse gas emission reductions, of policies and measures which have been adopted and implemented to mitigate climate change or meet energy objectives, as well as policies and measures which are planned for that purpose;
- (11) 'the Union's 2030 targets for energy and climate' means the Union-wide binding target of at least 40 % domestic reduction in economy-wide greenhouse gas emissions as compared to 1990 to be achieved by 2030, the Union-level binding target of at least 32 % for the share of renewable energy consumed in the Union in 2030, the Union-level headline target of at least 32,5 % for improving energy efficiency in 2030, and the 15 % electricity interconnection target for 2030 or any subsequent targets in this regard agreed by the European Council or by the European Parliament and by the Council for 2030;
- (12) 'national inventory system' means a system of institutional, legal and procedural arrangements established within a Member State for estimating anthropogenic emissions by sources and removals by sinks of greenhouse gases, and for reporting and archiving inventory information;
- (13) 'indicator' means a quantitative or qualitative factor or variable that contributes to better understanding progress in implementing;
- (14) 'key indicators' mean the indicators for the progress made with regard to the five dimensions of the Energy Union as proposed by the Commission;
- (15) 'technical corrections' means adjustments to the national greenhouse gas inventory estimates made in the context of the review carried out pursuant to Article 38 when the submitted inventory data are incomplete or are prepared in a way that is not consistent with relevant international or Union rules or guidelines and that are intended to replace originally submitted estimates;
- (16) 'quality assurance' means a planned system of review procedures to ensure that data quality objectives are met and that the best possible estimates and information are reported to support the effectiveness of the quality control programme and to assist Member States;
- (17) 'quality control' means a system of routine technical activities to measure and control the quality of the information and estimates compiled with the purpose of ensuring data integrity, correctness and completeness, identifying and addressing errors and omissions, documenting and archiving data and other material used, and recording all quality assurance activities;

- (18) 'energy efficiency first' means taking utmost account in energy planning, and in policy and investment decisions, of alternative cost-efficient energy efficiency measures to make energy demand and energy supply more efficient, in particular by means of cost-effective end-use energy savings, demand response initiatives and more efficient conversion, transmission and distribution of energy, whilst still achieving the objectives of those decisions;
- (19) 'SET-Plan' means the Strategic Energy Technology Plan as set out in the Commission communication of 15 September 2015, entitled, 'Towards an Integrated Strategic Energy Technology (SET) Plan: Accelerating the European Energy System Transformation';
- (20) 'early efforts' means:
- (a) in the context of the assessment of a potential gap between the Union's 2030 target for energy from renewable sources and the collective contributions of Member States, a Member State's achievement of a share of energy from renewable sources above its national binding target for 2020 as set out in Annex I to Directive (EU) 2018/2001 or a Member State's early progress towards its national binding target for 2020;
 - (b) in the context of Commission recommendations based on the assessment pursuant to point (b) of Article 29(1) with regard to energy from renewable sources, a Member State's early implementation of its contribution to the Union's binding target of at least 32 % of renewable energy in 2030 as measured against its national reference points for renewable energy;
- (21) 'regional cooperation' means cooperation between two or more Member States engaged in a partnership covering one or more of the five dimensions of the Energy Union;
- (22) 'energy from renewable sources' or 'renewable energy' means energy from renewable sources or renewable energy as defined in point (1) of Article 2 of Directive (EU) 2018/2001;
- (23) 'gross final consumption of energy' means gross final consumption of energy as defined in point (4) of Article 2 of Directive (EU) 2018/2001;
- (24) 'support scheme' means support scheme as defined in point (5) of Article 2 of Directive (EU) 2018/2001;
- (25) 'repowering' means repowering as defined in point (10) of Article 2 of Directive (EU) 2018/2001;
- (26) 'renewable energy community' means renewable energy community as defined in point (16) of Article 2 of Directive (EU) 2018/2001;
- (27) 'district heating' or 'district cooling' means district heating or district cooling as defined in point (19) of Article 2 of Directive (EU) 2018/2001;
- (28) 'waste' means waste as defined in point (23) of Article 2 of Directive (EU) 2018/2001;
- (29) 'biomass' means biomass as defined in point (24) of Article 2 of Directive (EU) 2018/2001;
- (30) 'agricultural biomass' means agricultural biomass as defined in point (25) of Article 2 of Directive (EU) 2018/2001;
- (31) 'forest biomass' means forest biomass as defined in point (26) of Article 2 of Directive (EU) 2018/2001;
- (32) 'biomass fuels' means biomass fuels as defined in point (27) of Article 2 of Directive (EU) 2018/2001;
- (33) 'biogas' means biogas as defined in point (28) of Article 2 of Directive (EU) 2018/2001;
- (34) 'bioliquids' means bioliquids as defined in point (32) of Article 2 of Directive (EU) 2018/2001;
- (35) 'biofuels' means biofuels as defined in point (33) of Article 2 of Directive (EU) 2018/2001;
- (36) 'advanced biofuels' means advanced biofuels as defined in point (34) of Article 2 of Directive (EU) 2018/2001;
- (37) 'recycled carbon fuels' means recycled carbon fuels as defined in point (35) of Article 2 of Directive (EU) 2018/2001;
- (38) 'starch-rich crops' means starch-rich crops as defined in point (39) of Article 2 of Directive (EU) 2018/2001;
- (39) 'food and feed crops' means food and feed crops as defined in point (40) of Article 2 of Directive (EU) 2018/2001;

- (40) 'ligno-cellulosic material' means ligno-cellulosic material as defined in point (41) of Article 2 of Directive (EU) 2018/2001;
- (41) 'residue' means residue as defined in point (43) of Article 2 of Directive (EU) 2018/2001;
- (42) 'primary energy consumption' means primary energy consumption as defined in point (2) of Article 2 of Directive 2012/27/EU;
- (43) 'final energy consumption' means final energy consumption as defined in point (3) of Article 2 of Directive 2012/27/EU;
- (44) 'energy efficiency' means energy efficiency as defined in point (4) of Article 2 of Directive 2012/27/EU;
- (45) 'energy savings' means energy savings as defined in point (5) of Article 2 of Directive 2012/27/EU;
- (46) 'energy efficiency improvement' means energy efficiency improvement as defined in point (6) of Article 2 of Directive 2012/27/EU;
- (47) 'energy service' means energy service as defined in point (7) of Article 2 of Directive 2012/27/EU;
- (48) 'total useful floor area' means total useful floor area as defined in point (10) of Article 2 of Directive 2012/27/EU;
- (49) 'energy management system' means energy management system as defined in point (11) of Article 2 of Directive 2012/27/EU;
- (50) 'obligated party' means obligated party as defined in point (14) of Article 2 of Directive 2012/27/EU;
- (51) 'implementing public authority' means implementing public authority as defined in point (17) of Article 2 of Directive 2012/27/EU;
- (52) 'individual action' means individual action as defined in point (19) of Article 2 of Directive 2012/27/EU;
- (53) 'energy distributor' means energy distributor as defined in point (20) of Article 2 of Directive 2012/27/EU;
- (54) 'distribution system operator' means 'distribution system operator' as defined in point (6) of Article 2 of Directive 2009/72/EC and in point (6) of Article 2 of Directive 2009/73/EC;
- (55) 'retail energy sales company' means retail energy sales company as defined in point (22) of Article 2 of Directive 2012/27/EU;
- (56) 'energy service provider' means energy service provider as defined in point (24) of Article 2 of Directive 2012/27/EU;
- (57) 'energy performance contracting' means energy performance contracting as defined in point (27) of Article 2 of Directive 2012/27/EU;
- (58) 'cogeneration' means cogeneration as defined in point (30) of Article 2 of Directive 2012/27/EU;
- (59) 'building' means a building as defined in point (1) of Article 2 of Directive 2010/31/EU;
- (60) 'nearly zero-energy building' means a nearly zero-energy building as defined in point (2) of Article 2 of Directive 2010/31/EU;
- (61) 'heat pump' means heat pump as defined in point (18) of Article 2 of Directive 2010/31/EU;
- (62) 'fossil fuel' means non-renewable carbon-based energy sources such as solid fuels, natural gas and oil.

CHAPTER 2

Integrated national energy and climate plans

Article 3

Integrated national energy and climate plans

1. By 31 December 2019, and subsequently by 1 January 2029 and every ten years thereafter, each Member State shall notify to the Commission an integrated national energy and climate plan. The plans shall contain the elements set out in paragraph 2 of this Article and in Annex I. The first plan shall cover the period from 2021 to 2030, taking into account the longer term perspective. The subsequent plans shall cover the ten-year period immediately following the end of the period covered by the previous plan.

2. The integrated national energy and climate plans shall consist of the following main sections:
- (a) an overview of the process followed for establishing the integrated national energy and climate plan consisting of an executive summary, a description of the public consultation and involvement of stakeholders and their results, and of regional cooperation with other Member States in preparing the plan, as established in Articles 10, 11 and 12 and in point 1 of Section A of Part I of Annex I;
 - (b) a description of national objectives, targets and contributions relating to the dimensions of the Energy Union, as set out in Article 4 and Annex I;
 - (c) a description of the planned policies and measures in relation to the corresponding objectives, targets and contributions set out under point (b) as well as a general overview of the investment needed to meet the corresponding objectives, targets and contributions;
 - (d) a description of the current situation of the five dimensions of the Energy Union, including with regard to the energy system and greenhouse gas emissions and removals as well as projections with regard to the objectives referred to in point (b) with already existing policies and measures;
 - (e) where applicable, a description of the regulatory and non-regulatory barriers and hurdles to delivering the objectives, targets or contributions related to renewable energy and energy efficiency;
 - (f) an assessment of the impacts of the planned policies and measures to meet the objectives referred to in point (b), including their consistency with the long-term greenhouse gas emission reduction objectives under the Paris Agreement and the long-term strategies as referred to in Article 15;
 - (g) a general assessment of the impacts of the planned policies and measures on competitiveness linked to the five dimensions of the Energy Union;
 - (h) an annex, drawn up in accordance with the requirements and structure laid down in Annex III to this Regulation, setting out the Member State's methodologies and policy measures for achieving the energy savings requirement in accordance with Article 7 of Directive 2012/27/EU and Annex V thereto.
3. With regard to their integrated national energy and climate plans, Member States shall:
- (a) limit administrative complexity and costs for all relevant stakeholders;
 - (b) take into account the interlinkages between the five dimensions of the Energy Union, in particular the energy efficiency first principle;
 - (c) use robust and consistent data and assumptions across the five dimensions where relevant;
 - (d) assess the number of households in energy poverty taking into account the necessary domestic energy services needed to guarantee basic standards of living in the relevant national context, existing social policy and other relevant policies, as well as indicative Commission guidance on relevant indicators for energy poverty.

In the event that a Member State finds, pursuant to point (d) of the first subparagraph, that it has a significant number of households in energy poverty, on the basis of its assessment of verifiable data, it shall include in its plan a national indicative objective to reduce energy poverty. The Member States concerned shall outline in their integrated national energy and climate plans, the policies and measures, which address energy poverty, if any, including social policy measures and other relevant national programmes.

4. Each Member State shall make its integrated national energy and climate plan submitted to the Commission pursuant to this Article publicly available.

5. The Commission is empowered to adopt delegated acts in accordance with Article 43 in order to amend points 2.1.1 and 3.1.1 of Section A and points 4.1 and 4.2.1 of Section B of Part 1, and point 3 of Part 2 of Annex I, for the purpose of adapting them to amendments to the Union Energy and Climate policy framework that are directly and specifically related to the Union's contributions under the UNFCCC and the Paris Agreement.

Article 4

National objectives, targets and contributions for the five dimensions of the Energy Union

Each Member State shall set out in its integrated national energy and climate plan the following main objectives, targets and contributions, as specified in point 2 of section A of Annex I:

- (a) as regards the dimension 'Decarbonisation':
 - (1) with respect to greenhouse gas emissions and removals and with a view to contributing to the achievement of the economy wide Union greenhouse gas emission reduction target:
 - (i) the Member State's binding national target for greenhouse gas emissions and the annual binding national limits pursuant to Regulation (EU) 2018/842;

- (ii) the Member State's commitments pursuant to Regulation (EU) 2018/841;
- (iii) where applicable to meet the objectives and targets of the Energy Union and the long-term Union greenhouse gas emissions commitments consistent with the Paris Agreement, other objectives and targets, including sector targets and adaptation goals.

(2) with respect to renewable energy:

With a view to achieving the Union's binding target of at least 32 % renewable energy in 2030 as referred to in Article 3 of Directive (EU) 2018/2001, a contribution to that target in terms of the Member State's share of energy from renewable sources in gross final consumption of energy in 2030, with an indicative trajectory for that contribution from 2021 onwards. By 2022, the indicative trajectory shall reach a reference point of at least 18 % of the total increase in the share of energy from renewable sources between that Member State's binding 2020 national target, and its contribution to the 2030 target. By 2025, the indicative trajectory shall reach a reference point of at least 43 % of the total increase in the share of energy from renewable sources between that Member State's binding 2020 national target and its contribution to the 2030 target. By 2027, the indicative trajectory shall reach a reference point of at least 65 % of the total increase in the share of energy from renewable sources between that Member State's binding 2020 national target and its contribution to the 2030 target.

By 2030, the indicative trajectory shall reach at least the Member State's planned contribution. If a Member State expects to surpass its binding 2020 national target, its indicative trajectory may start at the level it is projected to achieve. The Member States' indicative trajectories, taken together, shall add up to the Union reference points in 2022, 2025 and 2027 and to the Union's binding target of at least 32 % renewable energy in 2030. Separately from its contribution to the Union target and its indicative trajectory for the purposes of this Regulation, a Member State shall be free to indicate higher ambitions for national policy purposes;

(b) as regards the dimension 'Energy Efficiency':

- (1) the indicative national energy efficiency contribution to achieving the Union's energy efficiency targets of at least 32,5 % in 2030 as referred to in Article 1(1) and Article 3(5) of Directive 2012/27/EU, based on either primary or final energy consumption, primary or final energy savings, or energy intensity.

Member States shall express their contribution in terms of absolute level of primary energy consumption and final energy consumption in 2020, and in terms of absolute level of primary energy consumption and final energy consumption in 2030, with an indicative trajectory for that contribution from 2021 onwards. They shall explain their underlying methodology and the conversion factors used;

- (2) the cumulative amount of end-use energy savings to be achieved over the period 2021-2030 under point (b) of Article 7(1) on the energy saving obligations pursuant to Directive 2012/27/EU;
- (3) the indicative milestones of the long-term strategy for the renovation of the national stock of residential and non-residential buildings, both public and private, the roadmap with domestically established measurable progress indicators, an evidence-based estimate of expected energy savings and wider benefits, and the contributions to the Union's energy efficiency targets pursuant to Directive 2012/27/EU in accordance with Article 2a of Directive 2010/31/EU;
- (4) the total floor area to be renovated or equivalent annual energy savings to be achieved from 2021 to 2030 under Article 5 of Directive 2012/27/EU on the exemplary role of public bodies' buildings;

(c) as regards the dimension 'Energy Security':

- (1) national objectives with regard to:

- increasing the diversification of energy sources and supply from third countries, the purpose of which may be to reduce energy import dependency,
- increasing the flexibility of the national energy system, and
- addressing constrained or interrupted supply of an energy source, for the purpose of improving the resilience of regional and national energy systems, including a timeframe for when the objectives should be met;

- (d) as regards the dimension 'Internal Energy Market':
- (1) the level of electricity interconnectivity that the Member State aims for in 2030 in consideration of the electricity interconnection target for 2030 of at least 15 %, with a strategy with the level from 2021 onwards defined in close cooperation with the Member States affected, taking into account the 2020 interconnection target of 10 % and the indicators of the urgency of action based on price differential in the wholesale market, nominal transmission capacity of interconnectors in relation to peak load and to installed renewable generation capacity as set out in point 2.4.1 of Section A of Part I of Annex I. Each new interconnector shall be subject to a socioeconomic and environmental cost-benefit analysis and implemented only if the potential benefits outweigh the costs;
 - (2) key electricity and gas transmission infrastructure projects, and, where relevant, modernisation projects, that are necessary for the achievement of objectives and targets under the five dimensions of the Energy Union;
 - (3) national objectives related to other aspects of the internal energy market such as: increasing system flexibility, in particular through policies and measures related to market-based price formation in compliance with applicable law; market integration and coupling, aiming to increase the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment and real-time price signals, including a timeframe for when the objectives should be met, and other national objectives related to the internal energy market as set out in point 2.4.3 of Section A of Part I of Annex I;
- (e) as regards the dimension 'Research, Innovation and Competitiveness':
- (1) national objectives and funding targets for public and, where available, private research and innovation relating to the Energy Union, including, where appropriate, a timeframe for when the objectives should be met; reflecting the priorities of the Energy Union Strategy and, where relevant, of the SET-Plan. In setting out its objectives, targets and contributions, the Member State may build upon existing national strategies or plans that are compatible with Union law;
 - (2) where available, national 2050 objectives related to the promotion of clean energy technologies.

Article 5

Member States' contribution setting process in the area of renewable energy

1. In its contribution for its share of energy from renewable sources in gross final consumption of energy in 2030 and the last year of the period covered for the subsequent national plans, pursuant to point (a)(2) of Article 4, each Member State shall take into account all of the following:
- (a) the measures provided for in Directive (EU) 2018/2001;
 - (b) the measures adopted to reach the energy efficiency target adopted pursuant to Directive 2012/27/EU;
 - (c) any other existing measures to promote renewable energy within the Member State and, where relevant, at Union level;
 - (d) the binding 2020 national target of energy from renewable sources in its gross final consumption of energy set out in Annex I to Directive (EU) 2018/2001;
 - (e) any relevant circumstances affecting renewable energy deployment, such as:
 - (i) equitable distribution of deployment across the Union;
 - (ii) economic conditions and potential, including GDP per capita;
 - (iii) potential for cost-effective renewable energy deployment;
 - (iv) geographical, environmental and natural constraints, including those of non-interconnected areas and regions;
 - (v) the level of power interconnection between Member States;
 - (vi) other relevant circumstances, in particular early efforts.

With regard to point (e) of the first subparagraph, each Member State shall indicate in its integrated national energy and climate plan which relevant circumstances affecting renewable energy deployment it has taken into account.

2. Member States shall collectively ensure that the sum of their contributions amounts to at least 32 % of energy from renewable sources in gross final energy consumption at Union level by 2030.

Article 6

Member States' contribution setting process in the area of energy efficiency

1. In its indicative national energy efficiency contribution for 2030 and for the last year of the period covered for the subsequent national plans pursuant to point (b)(1) of Article 4, each Member State shall take into account that, in accordance with Article 3 of Directive 2012/27/EU, the Union's 2020 energy consumption is to be no more than 1 483 Mtoe of primary energy or no more than 1 086 Mtoe of final energy and the Union's 2030 energy consumption is to be no more than 1 273 Mtoe of primary energy and/or no more than 956 Mtoe of final energy.

In addition, each Member State shall take into account:

(a) the measures provided for in Directive 2012/27/EU;

(b) other measures to promote energy efficiency within the Member State and at Union level.

2. In its contribution referred to in paragraph 1, each Member State may take into account national circumstances affecting primary and final energy consumption, such as:

(a) remaining cost-effective energy-saving potential;

(b) evolution and forecast of gross domestic product;

(c) changes of energy imports and exports;

(d) changes in the energy mix and the development of carbon capture and storage; and

(e) early actions.

With regard to the first subparagraph, each Member State shall indicate in its integrated national energy and climate plan which relevant circumstances affecting primary and final energy consumption it has taken into account, if any.

Article 7

National policies and measures for each of the five dimensions of the Energy Union

Member States shall describe, in accordance with Annex I, in their integrated national energy and climate plan, the main existing and planned policies and measures to achieve in particular the objectives set out in the national plan, including, where applicable, measures providing for regional cooperation and appropriate financing at national and regional level, including mobilisation of Union programmes and instruments.

Member States shall provide a general overview of the investment needed to achieve the objectives, targets and contributions set out in the national plan, as well as a general assessment on the sources of that investment.

Article 8

Analytical basis of the integrated national energy and climate plans

1. Member States shall describe, in accordance with the structure and format specified in Annex I, the current situation for each of the five dimensions of the Energy Union, including of the energy system and greenhouse gas emissions and removals at the time of submission of the integrated national energy and climate plan or on the basis of the latest available information. Member States shall also set out and describe projections for each of the five dimensions of the Energy Union, for at least the duration of that plan, expected to result from existing policies and measures. Member States shall endeavour to describe additional longer term perspectives for the five dimensions beyond the duration of the integrated national energy and climate plan, where relevant and possible.

2. Member States shall describe in their integrated national energy and climate plan their assessment, at national and, where applicable, regional level, of:
- (a) the impacts on the development of the energy system and greenhouse gas emissions and removals for the duration of the plan and for a period of ten years following the latest year covered by the plan, under the planned policies and measures or groups of measures, including a comparison with the projections based on existing policies and measures or groups of measures as referred to in paragraph 1;
 - (b) the macroeconomic and, to the extent feasible, the health, environmental, skills and social impact of the planned policies and measures or groups of measures referred to in Article 7 and further specified in Annex I, for the first ten-year period at least until the year 2030, including a comparison with the projections based on existing policies and measures or groups of measures as referred to in paragraph 1 of this Article. The methodology used to assess those impacts shall be made public;
 - (c) interactions between existing policies and measures or groups of measures and planned policies and measures or groups of measures within a policy dimension and between existing policies and measures or groups of measures and planned policies and measures or groups of measures of different dimensions for the first ten-year period at least until the year 2030. Projections concerning security of supply, infrastructure and market integration shall be linked to robust energy efficiency scenarios;
 - (d) the manner in which existing policies and measures and planned policies and measures are to attract the investment necessary for their implementation.
3. Member States shall make available to the public comprehensive information concerning the assumptions, parameters and methodologies used for the final scenarios and projections, taking into account statistical restrictions, commercially sensitive data, and compliance with the data protection rules.

Article 9

Draft integrated national energy and climate plans

1. By 31 December 2018, and subsequently by 1 January 2028 and every ten years thereafter, each Member State shall prepare and submit to the Commission a draft of the integrated national energy and climate plan in accordance with Article 3(1) and Annex I.
2. The Commission shall assess the draft integrated national energy and climate plans and may issue country-specific recommendations to Member States in accordance with Article 34 no later than six months before the deadline for submitting those integrated national energy and climate plans. Those recommendations may, in particular, address:
- (a) the level of ambition of objectives, targets and contributions with a view to collectively achieving the Energy Union objectives and, in particular, the Union's 2030 targets for renewable energy and energy efficiency as well as the level of electricity interconnectivity that the Member State aims for in 2030 as referred to in point (d) of Article 4, taking due account of relevant circumstances affecting the deployment of renewable energy and energy consumption, as indicated by the Member State concerned in the draft integrated national energy and climate plan and the indicators of the urgency of action for interconnectivity established in point 2.4.1 of Section A of Part 1 of Annex I;
 - (b) policies and measures relating to Member State- and Union-level objectives and other policies and measures of potential cross-border relevance;
 - (c) any additional policies and measures that might be required in the integrated national energy and climate plans;
 - (d) interactions between and consistency of existing and planned policies and measures included in the integrated national energy and climate plan within one dimension and among different dimensions of the Energy Union.
3. Each Member State shall take due account of any recommendations from the Commission in its integrated national energy and climate plan. If the Member State concerned does not address a recommendation or a substantial part thereof, that Member State shall provide and make public its reasons.
4. In the context of the public consultation as referred to in Article 10, each Member State shall make available to the public its draft integrated national energy and climate plan.

*Article 10***Public consultation**

Without prejudice to any other Union law requirements, each Member State shall ensure that the public is given early and effective opportunities to participate in the preparation of the draft integrated national energy and climate plan — as regards the plans for the 2021 to 2030 period, in the preparation of the final plan well before its adoption — as well as of the long-term strategies referred to in Article 15. Each Member State shall attach to the submission of such documents to the Commission a summary of the public's views or provisional views. In so far as Directive 2001/42/EC is applicable, consultations undertaken on the draft in accordance with that Directive shall be deemed to satisfy the obligations to consult the public under this Regulation.

Each Member State shall ensure that the public is informed. Each Member State shall set reasonable timeframes allowing sufficient time for the public to be informed, to participate and express its views.

Each Member State shall limit administrative complexity when implementing this Article.

*Article 11***Multilevel climate and energy dialogue**

Each Member State shall establish a multilevel climate and energy dialogue pursuant to national rules, in which local authorities, civil society organisations, business community, investors and other relevant stakeholders and the general public are able actively to engage and discuss the different scenarios envisaged for energy and climate policies, including for the long term, and review progress, unless it already has a structure which serves the same purpose. Integrated national energy and climate plans may be discussed within the framework of such a dialogue.

*Article 12***Regional cooperation**

1. Member States shall cooperate with each other, taking account of all existing and potential forms of regional cooperation, to meet the objectives, targets and contributions set out in their integrated national energy and climate plan effectively.

2. Each Member State shall, well before submitting its draft integrated national energy and climate plan to the Commission pursuant to Article 9(1) — as regards the plans for the 2021 to 2030 period, in the preparation of the final plan well before its adoption — identify opportunities for regional cooperation and consult neighbouring Member States, including in regional cooperation fora. If deemed to be appropriate by the Member State authoring the plan, that Member State may consult other Member States or third countries that have expressed an interest. Insular Member States without energy interconnections to other Member States shall carry out such consultations with neighbouring Member States with maritime borders. The Member States consulted should be given a reasonable time within which to react. Each Member State shall set out in its draft integrated national energy and climate plan — as regards the plans for the 2021-2030 period, in its final national energy and climate plan — at least the provisional results of such regional consultations, including, where applicable, how the comments of the Member States or third countries consulted have been taken into account.

3. Member States may engage in voluntary joint drafting of parts of their integrated national energy and climate plans and progress reports, including in regional cooperation fora. If they do so, the result shall replace the equivalent parts of their integrated national energy and climate plan and progress reports. Upon a request by two or more Member States, the Commission shall facilitate that exercise.

4. In order to facilitate market integration and cost-efficient policies and measures, Member States shall, in the period between the deadline for submission of their draft integrated national energy and climate plans and the deadline for submission of their final plans, present the relevant parts of their draft integrated national energy and climate plan in relevant regional cooperation fora with a view to their finalisation. Where necessary, the Commission shall facilitate such cooperation and consultation among the Member States, and if it identifies opportunities for further regional cooperation, it may provide Member States with indicative guidance in order to facilitate the effective cooperation and consultation process.

5. Member States shall consider the comments received from other Member States pursuant to paragraphs 2 and 3 in their final integrated national energy and climate plan, and explain in those plans how such comments have been considered.
6. For the purposes referred to in paragraph 1, Member States shall continue to cooperate at regional level, and, as appropriate, in regional cooperation fora, when implementing the relevant policies and measures of their integrated national energy and climate plans.
7. Member States may also envisage cooperation with signatories to the Energy Community and with third-country members of the European Economic Area.
8. In so far as the provisions of Directive 2001/42/EC are applicable, transboundary consultation undertaken on the draft in accordance with Article 7 of that Directive shall be deemed to satisfy the obligations on regional cooperation pursuant to this Regulation, provided that the requirements of this Article are complied with.

Article 13

Assessment of the integrated national energy and climate plans

On the basis of the integrated national energy and climate plans and their updates as notified pursuant to Articles 3 and 14, the Commission shall assess, in particular, whether:

- (a) the objectives, targets and contributions are sufficient for the collective achievement of the Energy Union objectives and, for the first ten-year period in particular, the targets of the Union's 2030 Climate and Energy Framework;
- (b) the plans comply with requirements of Articles 3 to 12 and Member States have taken due account of the Commission recommendations issued pursuant to Article 34.

Article 14

Update of the integrated national energy and climate plan

1. By 30 June 2023, and subsequently by 1 January 2033 and every 10 years thereafter, each Member State shall submit to the Commission a draft update of the latest notified integrated national energy and climate plan or shall provide the Commission with reasons justifying why the plan does not require updating.
2. By 30 June 2024, and subsequently by 1 January 2034 and every 10 years thereafter, each Member State shall submit to the Commission an update of its latest notified integrated national energy and climate plan, unless they have provided reasons why the plan does not require updating pursuant to paragraph 1.
3. In the update referred to in paragraph 2, each Member State shall modify its national objective, target or contribution with regard to any of the quantified Union objectives, targets or contributions set out in point (a)(1) of Article 4 in order to reflect an increased ambition as compared to that set out in its latest notified integrated national energy and climate plan. In the update referred to in paragraph 2, each Member State shall modify its national objective, target, or contribution with regard to any of the quantified Union objectives, targets or contributions set out in points (a)(2) and (b) of Article 4 only in order to reflect an equal or increased ambition as compared to that set out in its latest notified integrated national energy and climate plan.
4. Member States shall make efforts to mitigate in their updated integrated national energy and climate plan any adverse environmental impacts that become apparent as part of the integrated reporting pursuant to Articles 17 to 25.
5. In its updates referred to in paragraph 2, Member States shall take into consideration the latest country-specific recommendations issued in the context of the European Semester as well as obligations deriving from the Paris Agreement.
6. The procedures laid down in Article 9(2) and Articles 10 and 12 shall apply to the preparation and assessment of the updated integrated national energy and climate plans.

7. This Article is without prejudice to the right of Member States to make changes and adaptations in national policies set out or referred to in their integrated national energy and climate plans at any time, provided such changes and adaptations are included in the integrated national energy and climate progress report.

CHAPTER 3

Long-term strategies

Article 15

Long-term strategies

1. By 1 January 2020, and subsequently by 1 January 2029 and every 10 years thereafter, each Member State shall prepare and submit to the Commission its long-term strategy with a perspective of at least 30 years. Member States should, where necessary, update those strategies every five years.

2. In aiming to achieve the overall climate objectives referred to in paragraph 3, the Commission shall, by 1 April 2019, adopt a proposal for a Union long-term strategy for greenhouse gas emissions reduction in accordance with the Paris Agreement, taking into account the Member States' draft integrated national energy and climate plans. The long-term strategy referred to in this paragraph shall include an analysis covering at least:

- (a) various scenarios for the Union's contribution towards the objectives set out in paragraph 3 inter alia a scenario on achieving net zero greenhouse gas emissions within the Union by 2050 and negative emissions thereafter;
- (b) the implications of the scenarios referred to in point (a) on the remaining global and Union carbon budget in order to inform a discussion about cost efficiency, effectiveness and fairness of greenhouse gas emission reduction.

3. The Member States' and the Union's long-term strategies shall contribute to:

- (a) fulfilling the Union's and the Member States' commitments under the UNFCCC and the Paris Agreement to reduce anthropogenic greenhouse gas emissions and enhance removals by sinks and to promote increased carbon sequestration;
- (b) fulfilling the objective of the Paris Agreement of holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1,5 °C above pre-industrial levels;
- (c) achieving long-term greenhouse gas emission reductions and enhancements of removals by sinks in all sectors in accordance with the Union's objective, in the context of necessary reductions according to the Intergovernmental Panel on Climate Change (IPCC) to reduce the Union's greenhouse gas emissions in a cost-effective manner and enhance removals by sinks in pursuit of the temperature goals in the Paris Agreement so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases within the Union as early as possible and, as appropriate, achieve negative emissions thereafter;
- (d) a highly energy efficient and highly renewables-based energy system within the Union.

4. Member States' long-term strategies should contain the elements set out in Annex IV. Furthermore, the Member States' and the Union's long-term strategies shall cover:

- (a) total greenhouse gas emission reductions and enhancements of removals by sinks;
- (b) emission reductions and enhancements of removals in individual sectors, including electricity, industry, transport, the heating and cooling and buildings sector (residential and tertiary), agriculture, waste and land use, land-use change and forestry (LULUCF);
- (c) expected progress on transition to a low greenhouse gas emission economy, including greenhouse gas intensity, CO₂ intensity of gross domestic product, related estimates of long-term investment, and strategies for related research, development and innovation;
- (d) to the extent feasible, expected socio-economic effect of the decarbonisation measures, including, inter alia, aspects related to macro-economic and social development, health risks and benefits and environmental protection;
- (e) links to other national long-term objectives, planning and other policies and measures, and investment.

5. The Commission is empowered to adopt delegated acts in accordance with Article 43 in order to amend Annex IV for the purpose of adapting it to the developments in the Union long-term strategy or in the Union Energy and Climate policy framework that are directly and specifically related to the relevant decisions adopted under the UNFCCC and, in particular, under the Paris Agreement.
6. The integrated national energy and climate plans shall be consistent with the long-term strategies referred to in this Article.
7. Member States and the Commission shall inform and make available to the public forthwith their respective long-term strategies and any updates thereof, including by means of the e-platform referred in Article 28. Member States and the Commission shall make relevant data of the final results available to the public, taking into account commercially sensitive data and compliance with the data protection rules.
8. The Commission shall support Member States in the preparation of their long-term strategies by providing information on the state of the underlying scientific knowledge and opportunities for sharing knowledge and best practices, including, where relevant, guidance for Member States during the development and implementation phase of their strategies.
9. The Commission shall assess whether the national long-term strategies are adequate for the collective achievement of the objectives and targets of the Energy Union set out in Article 1 and shall provide information on any remaining collective gap.

Article 16

Strategic plan for methane

Given the high global warming potential and relatively short atmospheric lifetime of methane, the Commission shall analyse the implications for implementing policies and measures for the purpose of reducing the short- and middle-term impact of methane emissions on Union greenhouse gas emissions. Taking into account the circular economy objectives as appropriate, the Commission shall consider policy options for rapidly addressing methane emissions and shall put forward a Union strategic plan for methane as an integral part of the Union's long-term strategy referred to in Article 15.

CHAPTER 4

Reporting

Section 1

Biennial progress reports and their follow up

Article 17

Integrated national energy and climate progress reports

1. Without prejudice to Article 26, by 15 March 2023, and every two years thereafter, each Member State shall report to the Commission on the status of implementation of its integrated national energy and climate plan by means of an integrated national energy and climate progress report covering all five dimensions of the Energy Union.
2. The integrated national energy and climate progress report shall cover the following elements:
 - (a) information on the progress accomplished towards reaching the objectives, targets and contributions set out in the integrated national energy and climate plan, and towards financing and implementing the policies and measures necessary to meet them, including a review of actual investment against initial investment assumptions;
 - (b) where applicable, information on the progress in establishing the dialogue referred to in Article 11;
 - (c) the information referred to in Articles 20 to 25 and, where appropriate, updates on policies and measures, in accordance with those articles;
 - (d) information on adaptation in accordance with point (a)(1) of Article 4;
 - (e) as far as possible quantification of the impact of the policies and measures in the integrated national energy and climate plan on air quality and on emissions of air pollutants.

The Union and the Member States shall submit biennial reports in accordance with Decision 2/CP.17 of the Conference of the Parties to the UNFCCC, and national communications in accordance with Article 12 of the UNFCCC to the UNFCCC Secretariat.

3. The integrated national energy and climate progress report shall cover the information contained in the annual reports referred to in Article 26(3) and the information on policies and measures and projections of anthropogenic greenhouse gas emissions by sources and removals by sinks contained in the reports referred to in Article 18.

4. The Commission, assisted by the Energy Union Committee referred to in point (b) of Article 44(1), shall adopt implementing acts to set out the structure, format, technical details and process for the information referred to in paragraphs 1 and 2 of this Article.

Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 44(6).

5. The frequency and scale of the information and updates referred to in point (c) of paragraph 2 shall be balanced against the need to ensure sufficient certainty for investors.

6. Where the Commission has issued recommendations pursuant to Article 32(1) or (2), the Member State concerned shall include in its integrated national energy and climate progress report information on the policies and measures adopted, or intended to be adopted and implemented, to address those recommendations. Where applicable, such information shall include a detailed timetable for implementation.

Where the Member State concerned decides not to address a recommendation or a substantial part thereof, it shall provide its reasoning.

7. Member States shall make available to the public the reports submitted to the Commission pursuant to this Article.

Article 18

Integrated reporting on greenhouse gas policies and measures and on projections

1. By 15 March 2021, and every two years thereafter, Member States shall report to the Commission information on:

- (a) their national policies and measures or group of measures as set out in Annex VI; and
- (b) their national projections of anthropogenic greenhouse gas emissions by sources and removals by sinks, organised by gas or group of gases (Hydrofluorocarbons and Perfluorocarbons) listed in Part 2 of Annex V. National projections shall take into consideration any policies and measures adopted at Union level and shall include the information set out in Annex VII.

2. Member States shall report the most up-to-date projections available. Where a Member State does not submit complete projection estimates by 15 March every second year, and the Commission has established that gaps in the estimates cannot be filled by that Member State once identified through the Commission's quality assurance or quality control procedures, the Commission may prepare estimates as required to compile Union projections, in consultation with the Member State concerned.

3. A Member State shall communicate to the Commission any substantial changes to the information reported pursuant to paragraph 1 during the first year of the reporting period, by 15 March of the year following the previous report.

4. Member States shall make available to the public, in electronic form, their national projections pursuant to paragraph 1 and any relevant assessment of the costs and effects of national policies and measures on the implementation of Union policies relevant for limiting greenhouse gas emissions along with any relevant underpinning technical reports. Those projections and assessments should include descriptions of the models and methodological approaches used, definitions and underlying assumptions.

Article 19

Integrated reporting on national adaptation actions, financial and technology support provided to developing countries and auctioning revenues

1. By 15 March 2021, and every two years thereafter, Member States shall report to the Commission information on their national climate change adaptation planning and strategies, outlining their implemented and planned actions to facilitate adaptation to climate change, including the information specified in Part 1 of Annex VIII and in accordance with the reporting requirements agreed upon under the UNFCCC and the Paris Agreement.

2. By 31 July 2021 and every year thereafter (year X), Member States shall report to the Commission information on the use of revenues generated by the Member State by auctioning allowances pursuant to Article 10(1) and Article 3d(1) or (2) of Directive 2003/87/EC, including the information specified in Part 3 of Annex VIII.
3. By 30 September 2021 and every year thereafter (year X), Member States shall report to the Commission information on support to developing countries, including the information specified in Part 2 of Annex VIII and in accordance with the relevant reporting requirements agreed upon under the UNFCCC and the Paris Agreement.
4. Member States shall make available to the public the reports submitted to the Commission pursuant to this Article, with the exception of the information specified in point (b) of Part 2 of Annex VIII.
5. The Commission, assisted by the Climate Change Committee referred to in point (a) of Article 44(1), shall adopt implementing acts to set out the structure, format and submission processes for Member States' reporting of information pursuant to this Article.

Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 44(6).

Article 20

Integrated reporting on renewable energy

Member States shall include in the integrated national energy and climate progress reports information:

- (a) on the implementation of the following trajectories and objectives:
 - (1) indicative national trajectory for the overall share of renewable energy in gross final energy consumption from 2021 to 2030;
 - (2) estimated trajectories for the sectoral share of renewable energy in final energy consumption from 2021 to 2030 in the electricity, heating and cooling and transport sector;
 - (3) estimated trajectories per renewable energy technology to achieve the overall and sectoral trajectories for renewable energy from 2021 to 2030, including total expected gross final energy consumption per technology and sector in Mtoe and total planned installed capacity per technology and sector in MW;
 - (4) trajectories on bioenergy demand, disaggregated between heat, electricity and transport, and on biomass supply, by feedstock and origin (distinguishing between domestic production and imports). For forest biomass, an assessment of its source and impact on the LULUCF sink;
 - (5) where applicable, other national trajectories and objectives, including those that are long-term and sectoral (such as share of electricity produced from biomass without the utilisation of heat, share of renewable energy in district heating, renewable energy use in buildings, renewable energy produced by cities, renewable energy communities and renewables self-consumers), energy recovered from the sludge acquired through the treatment of wastewater;
- (b) on the implementation of the following policies and measures:
 - (1) implemented, adopted and planned policies and measures to achieve the national contribution to the 2030 binding Union target for renewable energy as indicated in point (a)(2) of Article 4 of this Regulation, including sector- and technology-specific measures, with a specific review of the implementation of measures laid down in Articles 23 to 28 of Directive (EU) 2018/2001;
 - (2) where available, specific measures for regional cooperation;
 - (3) without prejudice to Articles 107 and 108 TFEU, specific measures on financial support, including Union support and the use of Union funds, for the promotion of the use of energy from renewable sources in electricity, heating and cooling, and transport;
 - (4) when applicable, the assessment of the support for electricity from renewable sources that Member States are to carry out pursuant to Article 6(4) of Directive (EU) 2018/2001;
 - (5) specific measures to fulfil the requirements of Articles 15 to 18 of Directive (EU) 2018/2001;
 - (6) where applicable, specific measures to assess, make transparent and reduce the need for must-run capacity that can lead to curtailment of energy from renewable sources;

- (7) a summary of the policies and measures under the enabling framework Member States are to put in place pursuant to Article 21(6) and Article 22(5) of Directive (EU) 2018/2001 to promote and facilitate the development of renewables self-consumption and renewable energy communities;
 - (8) measures promoting the use of energy from biomass, especially for new biomass mobilisation taking into account biomass, including sustainable biomass availability as well as measures for the sustainability of biomass produced and used;
 - (9) measures in place to increase the share of renewable energy in the heating and cooling and transport sector;
 - (10) policies and measures facilitating the uptake of power purchase agreements;
- (c) as set out in Part 1 of Annex IX.

Article 21

Integrated reporting on energy efficiency

Member States shall include in the integrated national energy and climate progress reports information:

- (a) on the implementation of the following national trajectories, objectives and targets:
 - (1) the indicative trajectory for primary and final annual energy consumption from 2021 to 2030 as the national energy savings contribution to achieving the Union-level 2030 target, including the underlying methodology;
 - (2) the indicative milestones of the long-term strategy for the renovation of the national stock of residential and non-residential buildings, both public and private, and the contributions to the Union's energy efficiency targets pursuant to Directive 2012/27/EU in accordance with Article 2a of Directive 2010/31/EU;
 - (3) where applicable, an update of other national objectives set out in the national plan;
- (b) on the implementation of the following policies and measures:
 - (1) implemented, adopted and planned policies, measures and programmes to achieve the indicative national energy efficiency contribution for 2030 as well as other objectives referred to in Article 6, including planned measures and instruments (also of a financial nature) to promote the energy performance of buildings, measures to utilise energy efficiency potentials of gas and electricity infrastructure and other measures to promote energy efficiency;
 - (2) where applicable, market-based instruments that incentivise energy efficiency improvements, including but not limited to energy taxes, levies and allowances;
 - (3) national energy efficiency obligation scheme and alternative measures pursuant to Article 7a and 7b of Directive 2012/27/EU and in accordance with Annex III to this Regulation;
 - (4) long-term renovation strategies in accordance with Article 2a of Directive 2010/31/EU;
 - (5) policy and measures to promote energy services in the public sector and measures to remove regulatory and non-regulatory barriers that impede the uptake of energy performance contracting and other energy efficiency service models;
 - (6) regional cooperation in the area of energy efficiency, where applicable;
 - (7) without prejudice to Articles 107 and 108 TFEU, financing measures, including Union support and the use of Union funds, in the area of energy efficiency at national level, where applicable;
- (c) as set out in Part 2 of Annex IX.

Article 22

Integrated reporting on energy security

Member States shall include in the integrated national energy and climate progress reports information on the implementation of:

- (a) national objectives for the diversification of energy sources and supply;
- (b) where applicable, national objectives with regard to reducing energy import dependency from third countries;

- (c) national objectives for the development of the ability to cope with constrained or interrupted supply of an energy source, including gas and electricity;
- (d) national objectives with regard to increasing the flexibility of the national energy system, in particular by means of deploying domestic energy sources, demand response and energy storage;
- (e) implemented, adopted and planned policies and measures to achieve the objectives referred to in points (a) to (d);
- (f) regional cooperation in implementing the objectives and policies referred to in points (a) to (d);
- (g) without prejudice to Articles 107 and 108 TFEU, financing measures, including Union support and the use of Union funds, in this area at national level, where applicable.

Article 23

Integrated reporting on the internal energy market

1. Member States shall include in their integrated national energy and climate progress reports information on the implementation of the following objectives and measures:

- (a) the level of electricity interconnectivity that the Member State aims for in 2030 in consideration of the electricity interconnection target for 2030 of at least 15 % and the indicators set out in point 2.4.1 of Section A of Part I of Annex I, as well as measures for the implementation of the strategy for the achievement of this level, including those relating to the granting of authorisations;
- (b) key electricity and gas transmission infrastructure projects that are necessary for the achievement of objectives and targets under the five dimensions of the Energy Union;
- (c) where applicable, main infrastructure projects envisaged other than Projects of Common Interest, including infrastructure projects involving third countries, and, to the extent feasible, a general assessment of their compatibility with, and contribution to, the aims and targets of the Energy Union;
- (d) national objectives related to other aspects of the internal energy market such as increasing system flexibility, market integration and coupling, aiming to increase the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment, real-time price signals;
- (e) where applicable, national objectives and measures related to the non-discriminatory participation of renewable energy, demand response and storage, including via aggregation, in all energy markets;
- (f) where applicable, national objectives and measures with regard to ensuring that consumers participate in the energy system and benefits from self-generation and new technologies, including smart meters;
- (g) measures with regard to ensuring electricity system adequacy;
- (h) implemented, adopted and planned policies and measures to achieve the objectives referred to in points (a) to (g);
- (i) regional cooperation in implementing the objectives and policies referred to in points (a) to (h);
- (j) without prejudice to Articles 107 and 108 TFEU, financing measures at national level, including Union support and the use of Union funds, in the area of the internal energy market, including for the electricity interconnection target, where applicable;
- (k) measures to increase the flexibility of the energy system with regard to renewable energy production, including the roll-out of intraday market coupling and cross-border balancing markets.

2. The information provided by Member States under paragraph 1 shall be consistent with and as appropriate be based on the report by the national regulators referred to in point (e) of Article 37(1) of Directive 2009/72/EC and point (e) of Article 41(1) of Directive 2009/73/EC.

Article 24

Integrated Reporting on Energy Poverty

Where the second subparagraph of point (d) of Article 3(3) applies, the Member State concerned shall include in its integrated national energy and climate progress report:

- (a) information on progress towards the national indicative objective to reduce the number of households in energy poverty; and

- (b) quantitative information on the number of households in energy poverty, and, where available, information on policies and measures addressing energy poverty.

The Commission shall share data communicated by Member States pursuant to this Article with the European Energy Poverty Observatory.

Article 25

Integrated reporting on research, innovation and competitiveness

Member States shall include in their integrated national energy and climate progress reports information on the implementation of the following objectives and measures:

- (a) where applicable, national objectives and policies translating to a national context the SET Plan objectives and policies;
- (b) national objectives for total public and, where available, private spending in research and innovation relating to clean energy technologies as well as for technology cost and performance development;
- (c) where appropriate, national objectives, including long-term targets for 2050 for the deployment of technologies for decarbonising energy- and carbon-intensive industrial sectors and, where applicable, for related carbon transport, use, and storage infrastructure;
- (d) national objectives to phase out energy subsidies, in particular for fossil fuels;
- (e) implemented, adopted and planned policies and measures to achieve the objectives referred to in points (b) and (c);
- (f) cooperation with other Member States in implementing the objectives and policies referred to in points (b) to (d), including coordination of policies and measures in the context of the SET Plan, such as alignment of research programmes and common programmes;
- (g) financing measures, including Union support and the use of Union funds, in this area at national level, where applicable.

Section 2

Annual reporting

Article 26

Annual Reporting

1. By 15 March 2021, and every year thereafter (year X), Member States shall report to the Commission:
 - (a) the information referred to in Article 6(2) of Directive 2009/119/EC;
 - (b) the information referred to in point 3 of Annex IX of Directive 2013/30/EU, in accordance with Article 25 of that Directive.
2. By 31 July 2021, and every year thereafter (year X), Member States shall report to the Commission their approximated greenhouse gas inventories for the year X-1.

For the purposes of this paragraph, the Commission shall, on the basis of the Member States' approximated greenhouse gas inventories or, if a Member State has not communicated its approximated inventories by that date, on the basis of its own estimates, annually compile a Union approximated greenhouse gas inventory. The Commission shall make that information available to the public by 30 September every year.

3. From 2023, Member States shall determine and report to the Commission final greenhouse gas inventory data by 15 March each year (year X) and preliminary data by 15 January each year, including the greenhouse gases and the inventory information listed in Annex V. The report on the final greenhouse gas inventory data shall also include a complete and up-to-date national inventory report. Within three months of receiving the reports, the Commission shall make the information referred to in point (n) of Part I of Annex V available to the Climate Change Committee referred to in point (a) of Article 44(1).
4. Member States shall submit to the UNFCCC Secretariat national inventories containing the information submitted to the Commission on the final greenhouse gas inventory data in accordance with paragraph 3 by 15 April each year. The Commission shall, in cooperation with the Member States, annually compile a Union greenhouse gas inventory and prepare a Union greenhouse gas inventory report and shall submit them to the UNFCCC Secretariat by 15 April each year.

5. Member States shall report to the Commission the preliminary and the final national inventory data, by 15 January and 15 March respectively in the years 2027 and 2032, prepared for their LULUCF accounts for the purpose of the compliance reports in accordance with Article 14 of Regulation (EU) 2018/841.

6. The Commission is empowered to adopt delegated acts in accordance with Article 43 in order to:

- (a) amend Part 2 of Annex V by adding or deleting substances in the list of greenhouse gases, in accordance with relevant decisions adopted by the bodies of the UNFCCC or of the Paris Agreement;
- (b) supplement this Regulation by adopting values for global warming potentials and specifying the inventory guidelines applicable in accordance with relevant decisions adopted by the bodies of the UNFCCC or of the Paris Agreement.

7. The Commission, assisted by the Climate Change Committee referred to in point (a) of Article 44(1), shall adopt implementing acts to set out the structure, technical details, format and processes for the Member States' submission of approximated greenhouse gas inventories pursuant to paragraph 2 of this Article, greenhouse gas inventories pursuant to paragraph 3 of this Article and accounted greenhouse gas emissions and removals in accordance with Articles 5 and 14 of Regulation (EU) 2018/841.

In proposing such implementing acts the Commission shall take into account the UNFCCC or Paris Agreement timetables for the monitoring and reporting of that information and the relevant decisions adopted by the bodies of the UNFCCC or of the Paris Agreement in order to ensure compliance by the Union with its reporting obligations as a Party to the UNFCCC and the Paris Agreement. Those implementing acts shall also specify the timescales for cooperation and coordination between the Commission and the Member States in preparing the Union greenhouse gas inventory report.

Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 44(6).

Article 27

Reporting on the 2020 targets

By 30 April 2022, each Member State shall report to the Commission on the achievement of its 2020 energy efficiency national target established pursuant to Article 3(1) of Directive 2012/27/EU by providing the information set out in Part 2 of Annex IX to this Regulation, and of the national overall targets for the share of energy from renewable sources in 2020 as set out in Annex I to Directive 2009/28/EC in the version in force on 31 December 2020 by providing the following information:

- (a) the sectoral (electricity, heating and cooling, and transport) and overall shares of energy from renewable sources in 2020;
- (b) the measures taken to achieve the 2020 national renewable energy targets, including measures related to support schemes, guarantees of origin and simplification of administrative procedures;
- (c) the share of energy from biofuels and bioliquids produced from cereal and other starch-rich crops, sugars and oil crops in energy consumption in transport;
- (d) the share of energy from biofuels and biogas for transport produced from feedstocks and of other fuels listed in Part A of Annex IX to Directive 2009/28/EC in the version in force on 31 December 2020 in energy consumption in transport.

Section 3

Reporting platform

Article 28

E-platform

1. The Commission shall establish an online platform (e-platform) to facilitate communication between the Commission and Member States, to promote cooperation among Member States and to facilitate public access to information.

2. Member States shall use the e-platform for the purposes of submitting to the Commission the reports referred to in this Chapter once it becomes operational.

3. The e-platform shall become operational by 1 January 2020. The Commission shall use the e-platform to facilitate public online access to the reports referred to in this Chapter, the final integrated national energy and climate plans, the updates thereof, and the long-term strategies referred to in Article 15, taking into account commercially sensitive data and compliance with the data protection rules.

CHAPTER 5

Aggregate assessment of progress and policy response to ensure Union targets achievement — Commission monitoring

Article 29

Assessment of progress

1. By 31 October 2021 and every two years thereafter, the Commission shall assess, in particular on the basis of the integrated national energy and climate progress reports, of other information reported under this Regulation, of the indicators and of European statistics and data where available:

- (a) the progress made at Union level towards meeting the objectives of the Energy Union, including for the first ten-year period the Union's 2030 targets for energy and climate, in particular for the purpose of avoiding any gaps to the Union's 2030 targets for renewable energy and energy efficiency;
- (b) the progress made by each Member State towards meeting its objectives, targets and contributions and implementing the policies and measures set out in its integrated national energy and climate plan;
- (c) the overall impact of aviation on the global climate, including through non-CO₂ emissions or effects, based on the emission data provided by Member States pursuant to Article 26, and improve that assessment by reference to scientific advancements and air traffic data, as appropriate;
- (d) the overall impact of the policies and measures of the integrated national energy and climate plans on the operation of the Union climate and energy policy measures;
- (e) the overall impact of the policies and measures included in the integrated national energy and climate plans on the operation of the European Union's emission trading system (EU ETS) and on the supply-demand balance of allowances in the European carbon market.

2. In the area of renewable energy, as part of its assessment referred to in paragraph 1, the Commission shall assess the progress made in the share of energy from renewable sources in the Union's gross final consumption on the basis of an indicative Union trajectory that starts from 20 % in 2020, reaches reference points of at least 18 % in 2022, 43 % in 2025 and 65 % in 2027 of the total increase in the share of energy from renewable sources between the Union's 2020 renewable energy target and the Union's 2030 renewable energy target, and reaches the Union's 2030 renewable energy target of at least 32 % in 2030.

3. In the area of energy efficiency, as part of its assessment referred to in paragraph 1, the Commission shall assess progress towards collectively achieving a maximum energy consumption at Union level of 1 273 Mtoe of primary energy and 956 Mtoe of final energy in 2030 in accordance with Article 3(5) of Directive 2012/27/EU.

In carrying out its assessment, the Commission shall take the following steps:

- (a) consider whether the Union's milestone of no more than 1 483 Mtoe of primary energy and no more than 1 086 Mtoe of final energy in 2020 is achieved;
- (b) assess whether Member States' progress indicates that the Union as a whole is on track towards the level of energy consumption in 2030 as referred to in the first subparagraph, taking into account the assessment of information provided by Member States in their integrated national energy and climate progress reports;
- (c) use results from modelling exercises in relation to future trends in energy consumption at Union level and national level and use other complementary analysis;
- (d) take due account of relevant circumstances affecting primary and final energy consumption indicated by the Member States in their integrated national energy and climate plans, in accordance with Article 6(2).

4. In the area of the internal energy market, as part of its assessment referred to in paragraph 1, the Commission shall assess the progress made towards the level of electricity interconnectivity that the Member State aims for in 2030.

5. By 31 October 2021 and every year thereafter, the Commission shall assess, in particular on the basis of the information reported pursuant to this Regulation, whether the Union and its Member States have made sufficient progress towards meeting the following requirements:

- (a) commitments under Article 4 of the UNFCCC and under Article 3 of the Paris Agreement as set out in decisions adopted by the Conference of the Parties to the UNFCCC, or by the Conference of the Parties to the UNFCCC serving as the meeting of the Parties to the Paris Agreement;
- (b) obligations set out in Article 4 of Regulation (EU) 2018/842 and in Article 4 of Regulation (EU) 2018/841;
- (c) the objectives set out in the integrated national energy and climate plan with a view to achieving the Energy Union objectives and for the first ten-year period with a view to fulfilling the 2030 targets for energy and climate.

6. In its assessment the Commission should take into consideration the latest country-specific recommendations issued in the context of the European Semester.

7. The Commission shall report on its assessment in accordance with this Article as part of the State of the Energy Union report referred to in Article 35.

Article 30

Inconsistencies with overarching Energy Union objectives and targets under Regulation (EU) 2018/842

1. Based on the assessment pursuant to Article 29, the Commission shall issue recommendations to a Member State pursuant to Article 34 if policy developments in that Member State show inconsistencies with the overarching objectives of the Energy Union.

2. A Member State that intends to use the flexibility pursuant to Article 7 of Regulation (EU) 2018/842 shall, as that information becomes available, include in the integrated national energy and climate plan the level of intended use and the planned policies and measures to fulfil the requirements laid down in Article 4 of Regulation (EU) 2018/841 for the period from 2021 to 2030.

Article 31

Response to insufficient ambition of integrated national energy and climate plans

1. Where, on the basis of its assessment of the draft integrated national energy and climate plans pursuant to Article 9 or its assessment of the draft updates of the final plans pursuant to Article 14, and as part of the iterative process, the Commission concludes that the objectives, targets and contributions of the Member States are insufficient for the collective achievement of the Energy Union objectives and in particular, for the first ten-year period, for the Union's binding 2030 target for renewable energy and the Union's 2030 target for energy efficiency, it shall — as regards the Union's target for renewable energy — and may — as regards the other Energy Union objectives — issue recommendations to Member States whose contributions it deems insufficient to increase their ambition in order to ensure a sufficient level of collective ambition.

2. Where a gap between the Union's 2030 target and the collective contributions of Member States occurs in the area of renewable energy, the Commission shall base its assessment on the formula set out in Annex II which is based on the objective criteria listed in point (e)(i) to (v) of the first subparagraph of Article 5(1), whilst having due regard to relevant circumstances affecting renewable energy deployment as indicated by the Member State in accordance with the second subparagraph of Article 5(1).

Where a gap between the Union's 2030 target and the sum of the national contributions occurs in the area of energy efficiency, the Commission shall, in particular, evaluate the relevant circumstances listed in Article 6(2), information provided by Member States in their integrated national energy and climate plans, results from modelling exercises in relation to future trends in energy consumption and other complementary analysis as appropriate.

Without prejudice to the other provisions of this Article, and for the sole purpose of assessing whether a gap between the Union's 2030 target and the collective contributions of Member States occurs, the Commission shall, in its assessment, assume a national contribution of the Member States which did not submit their draft integrated national energy and climate plans in accordance with Article 9(1).

In its assumption, in the area of renewable energy, the Commission shall take into account the Member State's national binding target for 2020 as set out in Annex I to Directive (EU) 2018/2001, results from modelling exercises on renewable energy development and the results from the formula set out in Annex II to this Regulation. In the area of energy efficiency, it shall take into account modelling exercises in relation to future trends in energy consumption and other complementary analysis as appropriate.

In its assessment of the renewable energy contributions, based on the formula set out in Annex II, the Commission shall take into consideration any potential negative impacts on the security of supply and grid stability in small or isolated energy systems or in Member States' systems where there may be significant implications due to the change of synchronous area.

In its assessment of the energy efficiency contributions, the Commission shall take into consideration the potential impact on electricity system operation and grid stability in Member States where there may be significant implications due to the change of synchronous area.

3. Where, on the basis of its assessment of the integrated national energy and climate plans and their updates pursuant to Article 14, the Commission concludes that the objectives, targets and contributions of the integrated national energy and climate plans or their updates are insufficient for the collective achievement of the Energy Union objectives and, in particular, for the first ten-year period, for the Union's 2030 targets for renewable energy and energy efficiency, it shall propose measures and exercise its powers at Union level in order to ensure the collective achievement of those objectives and targets. With regard to renewable energy, such measures shall take into consideration the level of ambition of contributions to the Union's 2030 target by Member States set out in the integrated national energy and climate plans and their updates.

Article 32

Response to insufficient progress towards the Union's energy and climate objectives and targets

1. Where, on the basis of its assessment pursuant to point (b) of Article 29(1), the Commission concludes that insufficient progress is made by a Member State towards meeting its objectives, targets and contributions, its reference points for renewable energy, or in implementing the policies and measures set out in its integrated national climate and energy plan, it shall issue recommendations to the Member State concerned pursuant to Article 34.

In its recommendations in the area of renewable energy, the Commission shall take into consideration the relevant circumstances indicated by the Member State in accordance with the second subparagraph of Article 5(1). The Commission shall also take into consideration renewable energy projects for which a final investment decision has been taken, provided that those projects become operational in the period 2021 to 2030 and have a significant impact on a Member State's national contribution.

In its recommendations in the area of energy efficiency, the Commission shall take due account of the objective criteria listed in points (a) and (b) of Article 6(1) and the relevant national circumstances indicated by the Member State in accordance with Article 6(2).

2. Where, on the basis of its aggregate assessment of Member States' integrated national energy and climate progress reports pursuant to point (a) of Article 29(1), and supported by other information sources, as appropriate, the Commission concludes that the Union is at risk of not meeting the objectives of the Energy Union and, in particular, for the first ten-year period, the targets of the Union's 2030 Framework for Climate and Energy, it may issue recommendations to all Member States pursuant to Article 34 to mitigate such a risk.

In the area of renewable energy, the Commission shall assess if the national measures provided for in paragraph 3 are sufficient to achieve the Union's renewable energy targets. In the case of insufficient national measures, the Commission shall, as appropriate, propose measures and exercise its power at Union level in addition to those recommendations in order to ensure, in particular, the achievement of the Union's 2030 target for renewable energy.

In the area of energy efficiency, the Commission shall as appropriate, propose measures and exercise its powers at Union level in addition to those recommendations in order to ensure, in particular, the achievement of the Union's 2030 target for energy efficiency.

In the area of energy efficiency, such additional measures may in particular improve the energy efficiency of:

- (a) products, pursuant to Directive 2009/125/EC of the European Parliament and of the Council ⁽¹⁾ and Regulation (EU) 2017/1369 of the European Parliament and of the Council ⁽²⁾;
- (b) buildings, pursuant to Directives 2010/31/EU and 2012/27/EU; and
- (c) transport.

3. Where, in the area of renewable energy the Commission concludes, based on its assessment pursuant to Article 29(1) and (2), that one or more of the reference points of the indicative Union trajectory in 2022, 2025 and 2027 referred to in Article 29(2) were not met, Member States that have fallen below one or more of their national reference points in 2022, 2025 and 2027 as referred to in point (a)(2) of Article 4 shall ensure that additional measures are implemented within one year following the date of reception of the Commission's assessment in order to cover the gap compared to their national reference point, such as:

- (a) national measures to increase deployment of renewable energy;
- (b) adjusting the share of renewable energy in the heating and cooling sector set out in Article 23(1) of Directive (EU) 2018/2001;
- (c) adjusting the share of renewable energy in the transport sector set out in Article 25(1) of Directive (EU) 2018/2001;
- (d) making a voluntary financial payment to the Union renewable energy financing mechanism set up at Union level, contributing to renewable energy projects and managed directly or indirectly by the Commission as set out in Article 33;
- (e) using cooperation mechanisms set out in Directive (EU) 2018/2001.

Such measures shall take into account the Commission's considerations as set out in the second subparagraph of paragraph 1 of this Article. The Member States concerned shall include those measures as part of their integrated national energy and climate progress report.

4. From 1 January 2021 onwards, the share of energy from renewable sources in each Member State's gross final consumption of energy shall not be lower than a baseline share that is equal to its mandatory national overall target for the share of energy from renewable sources in 2020 set out in Article 3(4) of Directive (EU) 2018/2001. If a Member State does not maintain its baseline share as measured over a one-year period, the Member State concerned shall take, within one year, additional measures such as those as set out in points (a) to (e) of the first subparagraph of paragraph 3 of this Article sufficient to cover the gap within one year.

Member States fulfilling the obligation to cover the gap to the baseline shall be deemed to be in compliance with the obligations set out in the first sentence of the first subparagraph of this paragraph and in Article 3(4) of Directive (EU) 2018/2001 throughout the period where the gap occurred.

For the purposes of point (d) of the first subparagraph of paragraph 3 of this Article, Member States may use their revenues from annual emission allowances under Directive 2003/87/EC.

5. Where a Member State's share of energy from renewable sources falls below one or more of its national reference points in 2022, 2025 and 2027 as referred to in point (a)(2) of Article 4, it shall include in the next integrated report submitted to the Commission pursuant to Article 17 an explanation of how it will cover the gap compared to its national reference points.

6. Where, in the area of energy efficiency, without prejudice to other measures at Union level pursuant to the third subparagraph of paragraph 2 of this Article, the Commission concludes, based on its assessment pursuant to Article 29(1) and (3), carried out by the years 2022, 2025 and 2027 that progress towards collectively achieving the Union's energy efficiency targets referred to in the first subparagraph of Article 29(3) is insufficient, it shall propose measures and exercise its power at Union level in addition to those set out in Directive 2010/31/EU and Directive 2012/27/EU to ensure that the Union's 2030 energy efficiency targets are met.

7. Each Member State concerned referred to in paragraph 3 of this Article shall detail the additional implemented, adopted and planned measures as part of its following progress report referred to in Article 17.

⁽¹⁾ Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products (OJ L 285, 31.10.2009, p. 10).

⁽²⁾ Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU (OJ L 198, 28.7.2017, p. 1).

8. Where, in the area of interconnections, the Commission concludes, based on its assessment pursuant to Article 29(1) and (4), in the year 2025 that progress is insufficient, the Commission shall cooperate with the Member States concerned by the year 2026 with the aim of addressing the circumstances encountered.

Article 33

Union renewable energy financing mechanism

1. By 1 January 2021, the Commission shall establish the Union renewable energy financing mechanism referred to in point (d) of Article 32(3) to tender support for new renewable energy projects in the Union with the aim of covering a gap in the indicative Union trajectory. Support may be provided, inter alia, in the form of a premium additional to market prices, and shall be allocated to projects bidding at the lowest cost or premium.

2. Without prejudice to paragraph 1 of this Article, the financing mechanism shall contribute to the enabling framework pursuant to Article 3(4) of Directive (EU) 2018/2001 with the aim of supporting renewable energy deployment across the Union irrespectively of a gap to the indicative Union trajectory. To that end:

- (a) payments from Member States referred to in Article 32 may be complemented by additional sources, such as Union funds, private sector contributions or additional payments by Member States in order to contribute to the achievement of the Union target;
- (b) the financing mechanism may, inter alia, provide support in the form of low-interest loans, grants, or a mix of both and may support, inter alia, joint projects between Member States in accordance with Article 9 of Directive (EU) 2018/2001 and Member States' participation in joint projects with third countries referred to in Article 11 of that Directive.

3. Member States shall retain the right to decide whether, and if so, under which conditions, they allow installations located on their territory to receive support from the financing mechanism.

4. The Commission, assisted by the Energy Union Committee referred to in point (b) of Article 44(1), may adopt implementing acts to set out the necessary provisions for the establishment and functioning of the financing mechanism, in particular:

- (a) the methodology for the calculation of the maximum level of the premium for each tender;
- (b) the tender design to be applied, including conditions for delivery and associated penalties;
- (c) the methodology for the calculation of the payments of Member States and the resulting statistical benefits for the contributing Member States;
- (d) minimum requirements for Member States' participation, having regard to the need to ensure both continuity of the mechanism by means of a sufficient duration of the Member State payment, as well as the maximum amount of flexibility for Member States' participation;
- (e) provisions ensuring the participation and/or approval of hosting Member States, and where necessary provisions relating to additional system cost charges.

Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 44(6).

5. Every year, renewable energy generated by installations financed by the financing mechanism shall be statistically attributed to the participating Member States, reflecting their relative payments. Projects supported by this financing mechanism that are financed by other sources than Member States payments shall not count towards Member States' national contributions but towards the Union binding target pursuant to Article 3(1) of Directive (EU) 2018/2001.

Article 34

Commission recommendations to Member States

1. The Commission shall as appropriate issue recommendations to Member States to ensure the achievement of the objectives of the Energy Union. The Commission shall make such recommendations publicly available forthwith.

2. Where reference in this Regulation is made to this Article the following principles shall apply:
- (a) the Member State concerned shall take due account of the recommendation in a spirit of solidarity between Member States and the Union and between Member States;
 - (b) the Member State shall set out, in its integrated national energy and climate progress report made in the year following the year the recommendation was issued, how it has taken due account of the recommendation. If the Member State concerned decides not to address a recommendation or a substantial part thereof, that Member State shall provide its reasoning;
 - (c) the recommendations should be complementary to the latest country-specific recommendations issued in the context of the European Semester.

Article 35

State of the Energy Union report

1. By 31 October of every year, the Commission shall submit to the European Parliament and to the Council a State of the Energy Union report.
2. The State of the Energy Union report shall include the following elements:
- (a) the assessment carried out pursuant to Article 29;
 - (b) where appropriate, recommendations pursuant to Article 34;
 - (c) the report on the functioning of the carbon market referred to in Article 10(5) of Directive 2003/87/EC, including information on the application of that Directive in accordance with Article 21(2) thereof;
 - (d) biennially, from 2023, a report on Union bioenergy sustainability, containing the information specified in Annex X;
 - (e) biennially, a report on voluntary schemes in respect of which the Commission has adopted a decision pursuant to Article 30(4) of Directive (EU) 2018/2001, containing the information specified in Annex XI to this Regulation;
 - (f) an overall progress report on the application of Directive 2009/72/EC;
 - (g) an overall progress report on the application of Directive 2009/73/EC pursuant to Article 52 of that Directive;
 - (h) an overall progress report on energy efficiency obligation schemes and alternative policy measures as referred to in Articles 7a and 7b of Directive 2012/27/EU;
 - (i) biennially, an overall progress report on the renovation of the national stock of residential and non-residential buildings, both public and private, in line with the roadmaps set out in the long-term renovation strategies that each Member State shall establish in accordance with Article 2a of Directive 2010/31/EU;
 - (j) every four years, an overall progress report on Member States' increase in the number of nearly zero-energy buildings in accordance with Article 9(5) of Directive 2010/31/EU;
 - (k) an overall progress report on Member States' progress in creating a complete and operational energy market;
 - (l) actual fuel quality in the different Member States and geographical coverage of fuels with a maximum sulphur content of 10 mg/kg aiming to provide an overview of the fuels quality data in the different Member States as reported pursuant to Directive 98/70/EC;
 - (m) a progress report on competitiveness;
 - (n) Member States' progress towards phasing out energy subsidies, in particular for fossil fuels;
 - (o) other issues of relevance to the implementation of the Energy Union, including public and private support;
 - (p) by 31 October 2019 and every four years thereafter, an assessment of the implementation of Directive 2009/31/EC.

Article 36

Monitoring of the governance mechanism

In the context of the State of the Energy Union as referred to in Article 35, the Commission shall inform the European Parliament and the Council on the implementation of the integrated national energy and climate plans. The European Parliament and the Council shall, on an annual basis, address the progress achieved by the Energy Union on all dimensions of Energy and Climate policies.

CHAPTER 6

Union and national systems on greenhouse gas emissions and removals by sinks

Article 37

Union and national inventory systems

1. By 1 January 2021, Member States shall establish, operate and seek to continuously improve national inventory systems to estimate anthropogenic emissions by sources and removals by sinks of greenhouse gases listed in Part 2 of Annex V and to ensure the timeliness, transparency, accuracy, consistency, comparability and completeness of their greenhouse gas inventories.

2. Member States shall ensure that their competent inventory authorities have access to the information specified in Annex XII to this Regulation, make use of reporting systems established pursuant to Article 20 of Regulation (EU) No 517/2014 to improve the estimate of fluorinated gases in the national greenhouse gas inventories and are able to undertake the annual consistency checks referred to in points (i) and (j) of Part 1 of Annex V to this Regulation.

3. A Union inventory system to ensure the timeliness, transparency, accuracy, consistency, comparability and completeness of national inventories with regard to the Union greenhouse gas inventory is hereby established. The Commission shall manage, maintain and seek to continuously improve that system which shall include the setting of a quality assurance and quality control programme, setting quality objectives and drafting an inventory quality assurance and quality control plan, procedures for completing emission estimates to compile the Union inventory pursuant to paragraph 5 of this Article and the reviews referred to in Article 38.

4. The Commission shall perform an initial check of the accuracy of the preliminary greenhouse gas inventory data to be submitted by Member States pursuant to Article 26(3). It shall send the results of that check to Member States within six weeks of the submission deadline. Member States shall respond to any relevant questions raised by the initial check by 15 March, together with the final inventory submission for the year X-2.

5. Where a Member State does not submit the inventory data required to compile the Union inventory by 15 March, the Commission may prepare estimates to complete the data submitted by the Member State, in consultation and close cooperation with the Member State concerned. The Commission shall use, for that purpose, the guidelines applicable for preparing the national greenhouse gas inventories.

6. The Commission, assisted by the Climate Change Committee referred to in point (a) of Article 44(1), shall adopt implementing acts in order to set out rules on the structure, format and submission process of the information relating to national inventory systems and requirements on the establishment, operation and functioning of national inventory systems.

In proposing such implementing acts, the Commission shall take into account any relevant decisions adopted by the bodies of the UNFCCC or of the Paris Agreement.

Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 44(6).

7. The Commission shall adopt delegated acts in accordance with Article 43 in order to supplement this Regulation by setting out rules concerning the requirements on the establishment, operation and functioning of the Union inventory system. In proposing such delegated acts, the Commission shall take into account any relevant decisions adopted by the bodies of the UNFCCC or of the Paris Agreement.

Article 38

Inventory review

1. With a view to monitoring Member States' greenhouse gas emission reductions or limitations pursuant to Articles 4, 9 and 10 of Regulation (EU) 2018/842 and their reduction of emissions and enhancement of removals by sinks pursuant to Articles 4 and 14 of Regulation (EU) 2018/841 and any other greenhouse gas emission reduction or limitation targets set out in Union law, the Commission shall, in 2027 and 2032, carry out a comprehensive review of the national inventory data submitted by Member States pursuant to Article 26(4) of this Regulation. Member States shall participate fully in that process.

2. The comprehensive review referred to in paragraph 1 shall include:

(a) checks to verify the transparency, accuracy, consistency, comparability and completeness of information submitted;

- (b) checks to identify cases where inventory data are prepared in a manner which is inconsistent with UNFCCC guidance documentation or Union rules;
- (c) checks to identify cases where LULUCF accounting is carried out in a manner which is inconsistent with UNFCCC guidance documentation or Union rules, and
- (d) where appropriate, calculating the resulting technical corrections necessary, in consultation with the Member States.

3. The Commission, assisted by the Climate Change Committee referred to in point (a) of Article 44(1), shall adopt implementing acts to determine the timing and the procedure for carrying out the comprehensive review, including the tasks set out in paragraph 2 of this Article, and ensuring due consultation of the Member States with regard to the conclusions of the reviews.

Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 44(6).

4. The Commission shall, by means of an implementing act, determine the total sum of emissions for the relevant years arising from the corrected inventory data for each Member State upon completion of the review split between emission data relevant for Article 9 of Regulation (EU) 2018/842 and emission data referred to in point (c) of Part 1 of Annex V to this Regulation and also determine the total sum of emissions and removals relevant for Article 4 of Regulation (EU) 2018/841.

5. The data for each Member State as recorded in the registries set up pursuant to Article 15 of Regulation (EU) 2018/841 four months following the date of publication of an implementing act adopted pursuant to paragraph 4 of this Article, shall be used for the compliance check with Article 4 of Regulation (EU) 2018/841, including changes to such data arising as a result of that Member State making use of the flexibilities pursuant to Article 11 of Regulation (EU) 2018/841.

6. The data for each Member State as recorded in the registries set up pursuant to Article 12 of Regulation (EU) 2018/842 two months following the compliance check date with Regulation (EU) 2018/841 referred to in paragraph 5 of this Article, shall be used for the compliance check pursuant to Article 9 of Regulation (EU) 2018/842 for the years 2021 and 2026. The compliance check pursuant to Article 9 of Regulation (EU) 2018/842 for each of the years 2022 to 2025 and 2027 to 2030 shall be performed at a date falling one month following the date of the compliance check for the previous year. This check shall include changes to such data arising as a result of that Member State making use of the flexibilities pursuant to Articles 5, 6 and 7 of Regulation (EU) 2018/842.

Article 39

Union and national systems for policies and measures and projections

1. By 1 January 2021, Member States and the Commission shall operate and seek to continuously improve national and Union systems respectively, for reporting on policies and measures and for reporting on projections of anthropogenic greenhouse gas emissions by sources and removals by sinks. Those systems shall include the relevant institutional, legal and procedural arrangements established within a Member State and the Union for evaluating policy and making projections of anthropogenic greenhouse gas emissions by sources and removals by sinks.

2. Member States and the Commission shall aim to ensure the timeliness, transparency, accuracy, consistency, comparability and completeness of the information reported on policies and measures and projections of anthropogenic greenhouse gas emissions by sources and removals by sinks, as referred to in Article 18, including the use and application of data, methods and models, and the implementation of quality assurance and quality control activities and sensitivity analysis.

3. The Commission, assisted by the Climate Change Committee referred to in point (a) of Article 44(1), shall adopt implementing acts to set out the structure, format and submission process of information on national and Union systems for policies and measures and projections pursuant to paragraphs 1 and 2 of this Article and to Article 18.

In proposing such implementing acts, the Commission shall take into account the relevant decisions adopted by the bodies of the UNFCCC or of the Paris Agreement, including internationally agreed reporting requirements as well as timetables for monitoring and reporting of that information.

Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 44(6).

*Article 40***Establishment and operation of registries**

1. The Union and the Member States shall set up and maintain registries to accurately account for the nationally determined contribution pursuant to Article 4(13) of the Paris Agreement and for internationally transferred mitigation outcomes pursuant to Article 6 of that Agreement.
2. The Union and the Member States may maintain their registries in a consolidated system, together with one or more other Member States.
3. The data in the registries referred to in paragraph 1 of this Article shall be made available to the central administrator designated pursuant to Article 20 of Directive 2003/87/EC.
4. The Commission shall adopt delegated acts in accordance with Article 43 in order to supplement this Regulation by setting up the registries referred to in paragraph 1 of this Article and in order to give effect, by means of the registries of the Union and of the Member States, to the necessary technical implementation of relevant decisions of the UNFCCC or the Paris Agreement bodies, in accordance with paragraph 1 of this Article.

*CHAPTER 7****Cooperation and support****Article 41***Cooperation between the Member States and the Union**

1. The Member States shall cooperate and coordinate fully with each other and with the Union in relation to obligations under this Regulation, in particular concerning:
 - (a) the process for preparing, adopting, notifying and assessing the integrated national energy and climate plans pursuant to Articles 9 to 13;
 - (b) the process for preparing, adopting, notifying and assessing the integrated national energy and climate progress report pursuant to Article 17 and annual reporting pursuant to Article 26;
 - (c) the process related to the Commission recommendations and addressing those recommendations pursuant to Article 9(2) and (3), Article 17(6), Article 30(1), Article 31(1) and Article 32(1) and (2);
 - (d) compiling the Union greenhouse gas inventory and preparing the Union greenhouse gas inventory report, pursuant to Article 26(4);
 - (e) preparing the Union national communication pursuant to Article 12 of the UNFCCC and the Union biennial report pursuant to Decision 2/CP.17 or subsequent relevant decisions adopted by the bodies of the UNFCCC;
 - (f) review and compliance procedures under the UNFCCC and the Paris Agreement in accordance with any applicable decision under the UNFCCC as well as the Union's procedure to review Member States greenhouse gas inventories referred to in Article 38;
 - (g) any adjustments following the review process referred to in Article 38 or other changes to inventories and inventory reports submitted, or to be submitted, to the UNFCCC Secretariat;
 - (h) compiling the Union approximated greenhouse gas inventory, pursuant to Article 26(2).
2. The Commission may provide technical support to the Member States in relation to obligations under this Regulation upon request from a Member State.

*Article 42***Role of the European Environment Agency**

The European Environment Agency shall assist the Commission in its work as regards the decarbonisation and energy efficiency dimensions to comply with Articles 15 to 21, 26, 28, 29, 35, 37, 38, 39 and 41 in accordance with its annual work programme. That shall include assistance, as required, with:

- (a) compiling the information reported by Member States on policies and measures and projections;
- (b) performing quality assurance and quality control procedures on the information reported by Member States on projections and policies and measures;

- (c) preparing estimates or complementing those available to the Commission for data on projections not reported by the Member States;
- (d) compiling data, wherever available taken from European statistics and appropriate in terms of timing, as required for the State of the Energy Union report to the European Parliament and to the Council prepared by the Commission;
- (e) disseminating information collected under this Regulation, including maintaining and updating a database on Member States' mitigation policies and measures and the European Climate Adaptation Platform relating to impacts, vulnerabilities and adaptation to climate change;
- (f) performing quality assurance and quality control procedures in the preparation of the Union greenhouse gas inventory;
- (g) compiling the Union greenhouse gas inventory and preparing the Union greenhouse gas inventory report;
- (h) preparing estimates for data not reported in the national greenhouse gas inventories;
- (i) conducting the review referred to in Article 38;
- (j) compiling the Union approximated greenhouse gas inventory.

CHAPTER 8

Final provisions

Article 43

Exercise of the delegation

1. The power to adopt delegated acts is conferred on the Commission subject to the conditions laid down in this Article.
2. The power to adopt delegated acts referred to in Articles 3(5), Article 15(5), Article 26(6), Article 37(7) and Article 40(4) shall be conferred on the Commission for a period of five years from 24 December 2018. The Commission shall draw up a report in respect of the delegation of power not later than nine months before the end of the five-year period. The delegation of power shall be tacitly extended for periods of an identical duration, unless the European Parliament or the Council opposes such extension not later than three months before the end of each period.
3. The delegation of power referred to in Article 3(5), Article 15(5), Article 26(6), Article 37(7) and Article 40(4) may be revoked at any time by the European Parliament or by the Council. A decision to revoke shall put an end to the delegation of the power specified in that decision. It shall take effect the day following the publication of the decision in the *Official Journal of the European Union* or at a later date specified therein. It shall not affect the validity of any delegated acts already in force.
4. Before adopting a delegated act, the Commission shall consult experts designated by each Member State in accordance with the principles laid down in the Interinstitutional Agreement of 13 April 2016 on Better Law-Making.
5. As soon as it adopts a delegated act, the Commission shall notify it simultaneously to the European Parliament and to the Council.
6. A delegated act adopted pursuant to Article 3(5), Article 15(5), Article 26(6), Article 37(7) and Article 40(4) shall enter into force only if no objection has been expressed either by the European Parliament or the Council within a period of two months of notification of that act to the European Parliament and to the Council or if, before the expiry of that period, the European Parliament and the Council have both informed the Commission that they will not object. That period shall be extended by two months at the initiative of the European Parliament or of the Council.

Article 44

Committees

1. The Commission shall be assisted by:
 - (a) a Climate Change Committee with regard to the implementation of the issues referred to in Article 19(5), Article 26(7), Article 37(6), Article 38(3) and Article 39(3); and
 - (b) an Energy Union Committee with regard to the implementation of issues referred to in Article 17(4) and Article 33(4).

2. Those committees shall be committees within the meaning of Regulation (EU) No 182/2011.
3. The Climate Change Committee referred to in point (a) of paragraph 1 of this Article replaces the committee established in Article 26 of Regulation (EU) No 525/2013.
4. When either of the committees referred to in paragraph 1 considers horizontal issues and common actions, it shall inform the other committee referred to in paragraph 1 accordingly, in order to ensure consistency of policies and to maximise synergies between sectors.
5. Each Member State shall appoint its representative(s) to the Climate Change Committee and the Energy Union Committee. The representatives of each committee shall be invited to the meetings of the other.
6. Where reference is made to this Article, Article 5 of Regulation (EU) No 182/2011 shall apply.

Article 45

Review

The Commission shall report to the European Parliament and to the Council within six months of each global stocktake agreed under Article 14 of the Paris Agreement on the operation of this Regulation, its contribution to governance of the Energy Union, its contribution to the long-term goals of the Paris Agreement, progress towards the achievement of the 2030 climate and energy targets, additional Energy Union objectives and the conformity of the planning, reporting and monitoring provisions laid down in this Regulation with other Union law or decisions relating to the UNFCCC and the Paris Agreement. The Commission reports may be accompanied by legislative proposals where appropriate.

Article 46

Amendments to Directive 94/22/EC

Directive 94/22/EC is amended as follows:

- (1) in Article 8, paragraph 2 is deleted;
- (2) Article 9 is deleted.

Article 47

Amendments to Directive 98/70/EC

Directive 98/70/EC is amended as follows:

- (1) Article 7a is amended as follows:
 - (a) in the third subparagraph of paragraph 1, point (a) is replaced by the following:

‘(a) the total volume of each type of fuel or energy supplied; and’;
 - (b) in paragraph 2, the introductory wording is replaced by the following:

‘2. Member States shall require suppliers to reduce as gradually as possible life cycle greenhouse gas emissions per unit of energy from fuel and energy supplied by up to 10 % by 31 December 2020, compared with the fuel baseline standard set out in Annex II to Council Directive (EU) 2015/652. That reduction shall consist of:’;
- (2) in Article 8, paragraph 4 is replaced by the following:

‘4. The Commission shall ensure that the information submitted pursuant to paragraph 3 is promptly made available by appropriate means.’.

Article 48

Amendments to Directive 2009/31/EC

Directive 2009/31/EC is amended as follows:

- (1) in Article 27, paragraph 1 is replaced by the following:

‘Every four years the Member States shall submit to the Commission a report on the implementation of this Directive, including the register referred to in point (b) of Article 25(1). The first report shall be sent to the

Commission by 30 June 2011. The report shall be drawn up on the basis of a questionnaire or outline adopted by the Commission in the form of implementing acts. Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 30(2). The questionnaire or outline shall be sent to Member States at least six months before the deadline for the submission of the report.’;

(2) in Article 38, paragraph 1 is deleted.

Article 49

Amendments to Regulation (EC) No 663/2009

Regulation (EC) No 663/2009 is amended as follows:

- (1) in Article 27, paragraphs 1 and 3 are deleted;
- (2) Article 28 is deleted.

Article 50

Amendment to Regulation (EC) No 715/2009

In Regulation (EC) No 715/2009, Article 29 is deleted.

Article 51

Amendments to Directive 2009/73/EC

Directive 2009/73/EC is amended as follows:

- (1) Article 5 is deleted;
- (2) Article 52 is replaced by the following:

‘Article 52

Reporting

The Commission shall monitor and review the application of this Directive and submit an overall progress report to the European Parliament and to the Council as an annex to the State of the Energy Union Report referred to in Article 35 of Regulation (EU) 2018/1999 of the European Parliament and of the Council (*).

(*) Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council (OJ L 328, 21.12.2018, p. 1).’.

Article 52

Amendment to Council Directive 2009/119/EC

In Article 6 of Directive 2009/119/EC, paragraph 2 is replaced by the following:

‘2. By 15 March each year, each Member State shall send the Commission a summary copy of the stock register referred to in paragraph 1 showing at least the quantities and nature of the emergency stocks included in the register on the last day of the preceding calendar year.’.

Article 53

Amendments to Directive 2010/31/EU

Directive 2010/31/EU is amended as follows:

(1) Article 2a is amended as follows:

(a) in paragraph 1, the introductory wording is replaced by the following:

‘1. Each Member State shall establish a long-term renovation strategy to support the renovation of the national stock of residential and non-residential buildings, both public and private, into a highly energy efficient and decarbonised building stock by 2050, facilitating the cost-effective transformation of existing buildings into nearly zero-energy buildings. Each long-term renovation strategy shall encompass:’;

(b) the following paragraph is added:

‘8. Each Member State’s long-term renovation strategy shall be submitted to the Commission as part of its final integrated national energy and climate plan referred to in Article 3 of Regulation (EU) 2018/1999 of the European Parliament and of the Council (*). As a derogation from Article 3(1) of that Regulation, the first long-term renovation strategy under paragraph 1 of this Article shall be submitted to the Commission by 10 March 2020.

(*) Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council (OJ L 328, 21.12.2018, p. 1).’;

(2) in the second subparagraph of Article 5(2), the sentence ‘The report may be included in the Energy Efficiency Action Plans referred to in Article 14(2) of Directive 2006/32/EC’ is deleted;

(3) in Article 9, paragraph 5 is replaced by the following:

‘5. As part of its State of the Energy Union report referred to in Article 35 of Regulation (EU) 2018/1999, the Commission shall report every four years to the European Parliament and to the Council on the progress of Member States in increasing the number of nearly zero-energy buildings. On the basis of this reported information the Commission shall, where necessary, develop an action plan and propose recommendations and measures in accordance with Article 34 of Regulation (EU) 2018/1999 to increase the number of those buildings and encourage best practices as regards the cost-effective transformation of existing buildings into nearly zero-energy buildings.’;

(4) in Article 10, paragraphs 2 and 3 are deleted;

(5) in Article 14(3), the third subparagraph is replaced by the following:

‘Such a report shall be submitted to the Commission as part of the Member States’ integrated national energy and climate plans referred to in Article 3 of Regulation (EU) 2018/1999’;

(6) in Article 15(3), the third subparagraph is replaced by the following:

‘Such a report shall be submitted to the Commission as part of the Member States’ integrated national energy and climate plans referred to in Article 3 of Regulation (EU) 2018/1999’.

Article 54

Amendments to Directive 2012/27/EU

Directive 2012/27/EU is amended as follows:

(1) Article 4 is deleted;

(2) in Article 18(1), point (e) is deleted;

- (3) Article 24 is amended as follows:
- (a) paragraphs 1, 3, 4 and 11, are deleted;
 - (b) paragraph 2 is deleted;
- (4) Annex XIV is deleted.

Article 55

Amendment to Directive 2013/30/EU

In Article 25 of Directive 2013/30/EU, paragraph 1 is replaced by the following:

‘1. Member States shall report annually to the Commission, as part of the annual reporting referred to in Article 26 of Regulation (EU) 2018/1999 of the European Parliament and of the Council (*), the information specified in point 3 of Annex IX.

(*) Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council (OJ L 328, 21.12.2018, p. 1).’

Article 56

Amendments to Directive (EU) 2015/652

Directive (EU) 2015/652 is amended as follows:

- (1) in Article 5, paragraph 1 is replaced by the following:

‘1. Each year by 31 December Member States shall provide the Commission with data for the preceding calendar year related to compliance with Article 7a of Directive 98/70/EC, as defined in Annex III to this Directive.’;

- (2) in Annex I, Part 2, points 1(h), 2, 3, 4 and 7 are deleted.

- (3) Annex III is amended as follows:

- (a) point 1 is replaced by the following:

‘1. Member States are to report the data listed in point 3. Those data must be reported for all fuel and energy placed on the market in each Member State. Where multiple biofuels are blended with fossil fuels, the data for each biofuel must be provided.’;

- (b) in point 3, points (e) and (f) are deleted;

- (4) Annex IV is amended as follows:

- (a) the following templates for reporting information for consistency of the reported data are deleted:

- Origin — Single Suppliers
- Origin — Joint Suppliers
- Place of Purchase;

- (b) in the format notes, points 8 and 9 are deleted.

Article 57

Repeal

Regulation (EU) No 525/2013 shall be repealed with effect from 1 January 2021, subject to the transitional provisions laid down in Article 58 of this Regulation, with the exception of Article 26(1) of Regulation (EU) No 525/2013 which shall be repealed with effect from 24 December 2018. References to the repealed Regulation shall be construed as references to this Regulation and shall be read in accordance with the correlation table in Annex XIII.

*Article 58***Transitional provisions**

By way of derogation from Article 57 of this Regulation, Article 7 and points (a) and (d) of Article 17(1) of Regulation (EU) No 525/2013 shall continue to apply to the reports containing the data required under those articles for the years 2018, 2019 and 2020.

Article 11(3) of Regulation (EU) No 525/2013 shall continue to apply as regards the second commitment period of the Kyoto Protocol.

Article 19 of Regulation (EU) No 525/2013 shall continue to apply to the reviews of the greenhouse gas inventory data for the years 2018, 2019 and 2020.

Article 22 of Regulation (EU) No 525/2013 shall continue to apply to the submission of the report required under that article.

For the purpose of coherence and legal certainty, nothing in this Regulation prevents the application of the derogations pursuant to the relevant Union sectoral law in the area of electricity and electricity risk preparedness.

*Article 59***Entry into force**

This Regulation shall enter into force on the third day following that of its publication in the *Official Journal of the European Union*.

Article 40, Article 53(2), (3) and (4), point (a) of Article 54(3), Article 54(4), and Article 55 shall apply from 1 January 2021.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Strasbourg, 11 December 2018.

For the European Parliament

The President

A. TAJANI

For the Council

The President

J. BOGNER-STRAUSS

ANNEX I

GENERAL FRAMEWORK FOR INTEGRATED NATIONAL ENERGY AND CLIMATE PLANS

Part 1

General framework

SECTION A: NATIONAL PLAN

1. OVERVIEW AND PROCESS FOR ESTABLISHING THE PLAN

1.1. Executive summary

- i. Political, economic, environmental, and social context of the plan
- ii. Strategy relating to the five dimensions of the Energy Union
- iii. Overview table with key objectives, policies and measures of the plan

1.2. Overview of current policy situation

- i. National and Union energy system and policy context of the national plan
- ii. Current energy and climate policies and measures relating to the five dimensions of the Energy Union
- iii. Key issues of cross-border relevance
- iv. Administrative structure of implementing national energy and climate policies

1.3. Consultations and involvement of national and Union entities and their outcome

- i. Involvement of the national parliament
- ii. Involvement of local and regional authorities
- iii. Consultations of stakeholders, including the social partners, and engagement of civil society and the general public
- iv. Consultations of other Member States
- v. Iterative process with the Commission

1.4. Regional cooperation in preparing the plan

- i. Elements subject to joint or coordinated planning with other Member States
- ii. Explanation of how regional cooperation is considered in the plan

2. NATIONAL OBJECTIVES AND TARGETS

2.1. Dimension decarbonisation

2.1.1. GHG emissions and removals ⁽¹⁾

- i. The elements set out in point (a)(1) of Article 4
- ii. Where applicable, other national objectives and targets consistent with the Paris Agreement and the existing long-term strategies. Where applicable for the contribution to the overall Union commitment of reducing the GHG emissions, other objectives and targets, including sector targets and adaptation goals, if available

2.1.2. Renewable energy

- i. The elements set out in point (a)(2) of Article 4

⁽¹⁾ Consistency to be ensured with long-term strategies pursuant to Article 15.

-
- ii. Estimated trajectories for the sectoral share of renewable energy in final energy consumption from 2021 to 2030 in the electricity, heating and cooling, and transport sector
 - iii. Estimated trajectories by renewable energy technology that the Member State projects to use to achieve the overall and sectoral trajectories for renewable energy from 2021 to 2030, including expected total gross final energy consumption per technology and sector in Mtoe and total planned installed capacity (divided by new capacity and repowering) per technology and sector in MW
 - iv. Estimated trajectories on bioenergy demand, disaggregated between heat, electricity and transport, and on biomass supply by feedstocks and origin (distinguishing between domestic production and imports). For forest biomass, an assessment of its source and impact on the LULUCF sink
 - v. Where applicable, other national trajectories and objectives, including those that are long term or sectoral (e.g. share of renewable energy in district heating, renewable energy use in buildings, renewable energy produced by cities, renewable energy communities and renewables self-consumers, energy recovered from the sludge acquired through the treatment of wastewater)
-

2.2. Dimension energy efficiency

- i. The elements set out in point (b) of Article 4
 - ii. The indicative milestones for 2030, 2040 and 2050, the domestically established measurable progress indicators, an evidence-based estimate of expected energy savings and wider benefits, and their contributions to the Union's energy efficiency targets as included in the roadmaps set out in the long-term renovation strategies for the national stock of residential and non-residential buildings, both public and private, in accordance with Article 2a of Directive 2010/31/EU
 - iii. Where applicable, other national objectives, including long-term targets or strategies and sectoral targets, and national objectives in areas such as energy efficiency in the transport sector and with regard to heating and cooling
-

2.3. Dimension energy security

- i. The elements set out in point (c) of Article 4
 - ii. National objectives with regard to increasing: the diversification of energy sources and supply from third countries for the purpose of increasing the resilience of regional and national energy systems
 - iii. Where applicable, national objectives with regard to reducing energy import dependency from third countries, for the purpose of increasing the resilience of regional and national energy systems
 - iv. National objectives with regard to increasing the flexibility of the national energy system, in particular by means of deploying domestic energy sources, demand response and energy storage
-

2.4. Dimension internal energy market

2.4.1. Electricity interconnectivity

- i. The level of electricity interconnectivity that the Member State aims for in 2030 in consideration of the electricity interconnection target for 2030 of at least 15 %, with a strategy with the level from 2021 onwards defined in close cooperation with affected Member States, taking into account the 2020 interconnection target of 10 % and the following indicators of the urgency of action:
 - (1) Price differential in the wholesale market exceeding an indicative threshold of EUR 2/MWh between Member States, regions or bidding zones;
 - (2) Nominal transmission capacity of interconnectors below 30 % of peak load;
 - (3) Nominal transmission capacity of interconnectors below 30 % of installed renewable generation.

Each new interconnector shall be subject to a socioeconomic and environmental cost-benefit analysis and implemented only if the potential benefits outweigh the costs

2.4.2. Energy transmission infrastructure

- i. Key electricity and gas transmission infrastructure projects, and, where relevant, modernisation projects, that are necessary for the achievement of objectives and targets under the five dimensions of the Energy Union Strategy
- ii. Where applicable, main infrastructure projects envisaged other than Projects of Common Interest (PCIs) ⁽¹⁾

2.4.3. Market integration

- i. National objectives related to other aspects of the internal energy market such as increasing system flexibility, in particular related to the promotion of competitively determined electricity prices in line with relevant sectoral law, market integration and coupling, aimed at increasing the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment, and real-time price signals, including a timeframe for when the objectives shall be met
- ii. Where applicable, national objectives related to the non-discriminatory participation of renewable energy, demand response and storage, including via aggregation, in all energy markets, including a timeframe for when the objectives are to be met
- iii. Where applicable, national objectives with regard to ensuring that consumers participate in the energy system and benefit from self-generation and new technologies, including smart meters;
- iv. National objectives with regard to ensuring electricity system adequacy, as well as for the flexibility of the energy system with regard to renewable energy production, including a timeframe for when the objectives are to be met
- v. Where applicable, national objectives to protect energy consumers and improve the competitiveness of the retail energy sector

2.4.4. Energy poverty

Where applicable, national objectives with regard to energy poverty, including a timeframe for when the objectives are to be met

2.5. Dimension research, innovation and competitiveness

- i. National objectives and funding targets for public and, where available, private research and innovation relating to the Energy Union, including, where appropriate, a timeframe for when the objectives are to be met
- ii. Where available, national 2050 objectives related to the promotion of clean energy technologies and, where appropriate, national objectives, including long-term targets (2050) for deployment of low-carbon technologies, including for decarbonising energy and carbon-intensive industrial sectors and, where applicable, for related carbon transport and storage infrastructure
- iii. Where applicable, national objectives with regard to competitiveness

3. POLICIES AND MEASURES

3.1. Dimension decarbonisation

3.1.1. GHG emissions and removals

- i. Policies and measures to achieve the target set under Regulation (EU) 2018/842 as referred in point 2.1.1 and policies and measures to comply with Regulation (EU) 2018/841, covering all key emitting sectors and sectors for the enhancement of removals, with an outlook to the long-term vision and goal to become a low emission economy and achieving a balance between emissions and removals in accordance with the Paris Agreement
- ii. Where relevant, regional cooperation in this area
- iii. Without prejudice to the applicability of State aid rules, financing measures, including Union support and the use of Union funds, in this area at national level, where applicable

⁽¹⁾ In accordance with Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009 (OJ L 115, 25.4.2013, p. 39).

3.1.2. Renewable energy

- i. Policies and measures to achieve the national contribution to the binding 2030 Union target for renewable energy and trajectories as referred to in point (a)(2) Article 4, and, where applicable or available, the elements referred to in point 2.1.2 of this Annex, including sector- and technology-specific measures ⁽¹⁾
- ii. Where relevant, specific measures for regional cooperation, as well as, as an option, the estimated excess production of energy from renewable sources which could be transferred to other Member States in order to achieve the national contribution and trajectories referred to in point 2.1.2
- iii. Specific measures on financial support, where applicable, including Union support and the use of Union funds, for the promotion of the production and use of energy from renewable sources in electricity, heating and cooling, and transport
- iv. Where applicable, the assessment of the support for electricity from renewable sources that Member States are to carry out pursuant to Article 6(4) of Directive (EU) 2018/2001
- v. Specific measures to introduce one or more contact points, streamline administrative procedures, provide information and training, and facilitate the uptake of power purchase agreements

Summary of the policies and measures under the enabling framework Member States have to put in place pursuant to Article 21(6) and Article 22(5) of Directive (EU) 2018/2001 to promote and facilitate the development of self-consumption and renewable energy communities

- vi. Assessment of the necessity to build new infrastructure for district heating and cooling produced from renewable sources
- vii. Where applicable, specific measures on the promotion of the use of energy from biomass, especially for new biomass mobilisation taking into account:
 - biomass availability, including sustainable biomass: both domestic potential and imports from third countries
 - other biomass uses by other sectors (agriculture and forest-based sectors); as well as measures for the sustainability of biomass production and use

3.1.3. Other elements of the dimension

- i. Where applicable, national policies and measures affecting the EU ETS sector and assessment of the complementarity and impacts on the EU ETS
- ii. Policies and measures to achieve other national targets, where applicable
- iii. Policies and measures to achieve low emission mobility (including electrification of transport)
- iv. Where applicable, national policies, timelines and measures planned to phase out energy subsidies, in particular for fossil fuels

3.2. Dimension energy efficiency

Planned policies, measures and programmes to achieve the indicative national energy efficiency contributions for 2030 as well as other objectives referred to in point 2.2, including planned measures and instruments (also of a financial nature) to promote the energy performance of buildings, in particular with regard to the following:

- i. Energy efficiency obligation schemes and alternative policy measures under Articles 7a and 7b and Article 20(6) of Directive 2012/27/EU and to be prepared in accordance with Annex III to this Regulation
- ii. Long-term renovation strategy to support the renovation of the national stock of residential and non-residential buildings, both public and private ⁽²⁾, including policies, measures and actions to stimulate cost-effective deep renovation and policies and actions to target the worst performing segments of the national building stock, in accordance with Article 2a of Directive 2010/31/EU

⁽¹⁾ When planning those measures, Member States shall take into account the end of life of existing installations and the potential for repowering.

⁽²⁾ In accordance with Article 2a of Directive 2010/31/EU.

-
- iii. Description of policy and measures to promote energy services in the public sector and measures to remove regulatory and non-regulatory barriers that impede the uptake of energy performance contracting and other energy efficiency service models ⁽¹⁾
 - iv. Other planned policies, measures and programmes to achieve the indicative national energy efficiency contributions for 2030 as well as other objectives referred to in point 2.2 (for example measures to promote the exemplary role of public buildings and energy-efficient public procurement, measures to promote energy audits and energy management systems ⁽²⁾, consumer information and training measures ⁽³⁾, and other measures to promote energy efficiency ⁽⁴⁾)
 - v. Where applicable, a description of policies and measures to promote the role of local renewable energy communities in contributing to the implementation of policies and measures in points i, ii, iii and iv
 - vi. Description of measures to develop measures to utilise energy efficiency potentials of gas and electricity infrastructure ⁽⁵⁾
 - vii. Regional cooperation in this area, where applicable
 - viii. Financing measures, including Union support and the use of Union funds, in the area at national level
-

3.3. Dimension energy security ⁽⁶⁾

- i. Policies and measures related to the elements set out in point 2.3 ⁽⁷⁾
 - ii. Regional cooperation in this area
 - iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds
-

3.4. Dimension internal energy market ⁽⁸⁾

3.4.1. Electricity infrastructure

- i. Policies and measures to achieve the targeted level of interconnectivity as set out in point (d) of Article 4
- ii. Regional cooperation in this area ⁽⁹⁾
- iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

3.4.2. Energy transmission infrastructure

- i. Policies and measures related to the elements set out in point 2.4.2, including, where applicable, specific measures to enable the delivery of Projects of Common Interest (PCIs) and other key infrastructure projects
- ii. Regional cooperation in this area ⁽¹⁰⁾
- iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

3.4.3. Market integration

- i. Policies and measures related to the elements set out in point 2.4.3

⁽¹⁾ In accordance with Article 18 of Directive 2012/27/EU.

⁽²⁾ In accordance with Article 8 of Directive 2012/27/EU.

⁽³⁾ In accordance with Articles 12 and 17 of Directive 2012/27/EU.

⁽⁴⁾ In accordance with Article 19 of Directive 2012/27/EU.

⁽⁵⁾ In accordance with Article 15(2) of Directive 2012/27/EU.

⁽⁶⁾ Policies and measures shall reflect the energy efficiency first principle.

⁽⁷⁾ Consistency shall be ensured with the preventive action and emergency plans under Regulation (EU) 2017/1938 of the European Parliament and of the Council of 25 October 2017 concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010 (OJ L 280, 28.10.2017, p. 1) as well as the risk preparedness plans under Regulation (EU) 2018/2001 [as proposed by COM(2016) 862 on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC].

⁽⁸⁾ Policies and measures shall reflect the energy efficiency first principle.

⁽⁹⁾ Other than the PCI Regional Groups established under Regulation (EU) No 347/2013.

⁽¹⁰⁾ Other than the PCI Regional Groups established under Regulation (EU) No 347/2013.

-
- ii. Measures to increase the flexibility of the energy system with regard to renewable energy production such as smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment, real-time price signals, including the roll-out of intraday market coupling and cross-border balancing markets
 - iii. Where applicable, measures to ensure the non-discriminatory participation of renewable energy, demand response and storage, including via aggregation, in all energy markets
 - iv. Policies and measures to protect consumers, especially vulnerable and, where applicable, energy poor consumers, and to improve the competitiveness and contestability of the retail energy market
 - v. Description of measures to enable and develop demand response, including those addressing tariffs to support dynamic pricing ⁽¹⁾

3.4.4. Energy poverty

- i. Where applicable, policies and measures to achieve the objectives set out in point 2.4.4
-

3.5. Dimension research, innovation and competitiveness

- i. Policies and measures related to the elements set out in point 2.5
 - ii. Where applicable, cooperation with other Member States in this area, including, where appropriate, information on how the SET Plan objectives and policies are being translated to a national context
 - iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds
-

SECTION B: ANALYTICAL BASIS ⁽²⁾

4. CURRENT SITUATION AND PROJECTIONS WITH EXISTING POLICIES AND MEASURES ⁽³⁾ ⁽⁴⁾

4.1. Projected evolution of main exogenous factors influencing energy system and GHG emission developments

- i. Macroeconomic forecasts (GDP and population growth)
 - ii. Sectoral changes expected to impact the energy system and GHG emissions
 - iii. Global energy trends, international fossil fuel prices, EU ETS carbon price
 - iv. Technology cost developments
-

4.2. Dimension Decarbonisation

4.2.1. GHG emissions and removals

- i. Trends in current GHG emissions and removals in the EU ETS, effort sharing and LULUCF sectors and different energy sectors
- ii. Projections of sectoral developments with existing national and Union policies and measures at least until 2040 (including for the year 2030)

⁽¹⁾ In accordance with Article 15(8) of Directive 2012/27/EU.

⁽²⁾ See Part 2 for a detailed list of parameters and variables to be reported in Section B of the Plan.

⁽³⁾ Current situation shall reflect the date of submission of the national plan (or latest available date). Existing policies and measures encompass implemented and adopted policies and measures. Adopted policies and measures are those for which an official government decision has been made by the date of submission of the national plan and there is a clear commitment to proceed with implementation. Implemented policies and measures are those for which one or more of the following applies at the date of submission of the integrated national energy and climate plan or the integrated national energy and climate progress report: directly applicable European legislation or national legislation is in force, one or more voluntary agreements have been established, financial resources have been allocated, human resources have been mobilised.

⁽⁴⁾ The selection of exogenous factors may be based on the assumptions made in the EU Reference Scenario 2016 or other subsequent policy scenarios for the same variables. Besides, Member States specific results of the EU Reference Scenario 2016 as well as results of subsequent policy scenarios may also be a useful source of information when developing national projections with existing policies and measures and impact assessments.

4.2.2. Renewable energy

- i. Current share of renewable energy in gross final energy consumption and in different sectors (heating and cooling, electricity and transport) as well as per technology in each of these sectors
 - ii. Indicative projections of development with existing policies for the year 2030 (with an outlook to the year 2040)
-

4.3. Dimension Energy efficiency

- i. Current primary and final energy consumption in the economy and per sector (including industry, residential, service and transport)
 - ii. Current potential for the application of high-efficiency cogeneration and efficient district heating and cooling ⁽¹⁾
 - iii. Projections considering existing energy efficiency policies, measures and programmes as described in point 1.2.(ii) for primary and final energy consumption for each sector at least until 2040 (including for the year 2030) ⁽²⁾
 - iv. Cost-optimal levels of minimum energy performance requirements resulting from national calculations, in accordance with Article 5 of Directive 2010/31/EU
-

4.4. Dimension energy security

- i. Current energy mix, domestic energy resources, import dependency, including relevant risks
 - ii. Projections of development with existing policies and measures at least until 2040 (including for the year 2030)
-

4.5. Dimension internal energy market

4.5.1. Electricity interconnectivity

- i. Current interconnection level and main interconnectors ⁽³⁾
- ii. Projections of interconnector expansion requirements (including for the year 2030) ⁽⁴⁾

4.5.2. Energy transmission infrastructure

- i. Key characteristics of the existing transmission infrastructure for electricity and gas ⁽⁵⁾
- ii. Projections of network expansion requirements at least until 2040 (including for the year 2030) ⁽⁶⁾

4.5.3. Electricity and gas markets, energy prices

- i. Current situation of electricity and gas markets, including energy prices
 - ii. Projections of development with existing policies and measures at least until 2040 (including for the year 2030)
-

4.6. Dimension research, innovation and competitiveness

- i. Current situation of the low-carbon-technologies sector and, to the extent possible, its position on the global market (that analysis is to be carried out at Union or global level)
 - ii. Current level of public and, where available, private research and innovation spending on low-carbon-technologies, current number of patents, and current number of researchers
 - iii. Breakdown of current price elements that make up the main three price components (energy, network, taxes/levies)
 - iv. Description of energy subsidies, including for fossil fuels
-

⁽¹⁾ In accordance with Article 14(1) of Directive 2012/27/EU.

⁽²⁾ This reference business as usual projection shall be the basis for the 2030 final and primary energy consumption target which is described in 2.3 and conversion factors.

⁽³⁾ With reference to overviews of existing transmission infrastructure by Transmission System Operators (TSOs).

⁽⁴⁾ With reference to national network development plans and regional investment plans of TSOs.

⁽⁵⁾ With reference to overviews of existing transmission infrastructure by TSOs.

⁽⁶⁾ With reference to national network development plans and regional investment plans of TSOs.

5. IMPACT ASSESSMENT OF PLANNED POLICIES AND MEASURES ⁽¹⁾

- 5.1. Impacts of planned policies and measures described in section 3 on energy system and GHG emissions and removals, including comparison to projections with existing policies and measures (as described in section 4).
- i. Projections of the development of the energy system and GHG emissions and removals as well as, where relevant of emissions of air pollutants in accordance with Directive (EU) 2016/2284 under the planned policies and measures at least until ten years after the period covered by the plan (including for the last year of the period covered by the plan), including relevant Union policies and measures.
 - ii. Assessment of policy interactions (between existing policies and measures and planned policies and measures within a policy dimension and between existing policies and measures and planned policies and measures of different dimensions) at least until the last year of the period covered by the plan, in particular to establish a robust understanding of the impact of energy efficiency / energy savings policies on the sizing of the energy system and to reduce the risk of stranded investment in energy supply
 - iii. Assessment of interactions between existing policies and measures and planned policies and measures, and between those policies and measures and Union climate and energy policy measures
-
- 5.2. Macroeconomic and, to the extent feasible, the health, environmental, employment and education, skills and social impacts, including just transition aspects (in terms of costs and benefits as well as cost-effectiveness) of the planned policies and measures described in section 3 at least until the last year of the period covered by the plan, including comparison to projections with existing policies and measures
-
- 5.3. Overview of investment needs
- i. existing investment flows and forward investment assumptions with regard to the planned policies and measures
 - ii. sector or market risk factors or barriers in the national or regional context
 - iii. analysis of additional public finance support or resources to fill identified gaps identified under point ii
-
- 5.4. Impacts of planned policies and measures described in section 3 on other Member States and regional cooperation at least until the last year of the period covered by the plan, including comparison to projections with existing policies and measures
- i. Impacts on the energy system in neighbouring and other Member States in the region to the extent possible
 - ii. Impacts on energy prices, utilities and energy market integration
 - iii. Where relevant, impacts on regional cooperation
-

Part 2

List of parameters and variables to be reported in Section B of National Plans ⁽²⁾ ⁽³⁾ ⁽⁴⁾ ⁽⁵⁾

The following parameters, variables, energy balances and indicators are to be reported in Section B 'Analytical Basis' of the National Plans, if used:

1. General parameters and variables

(1) Population [million]

⁽¹⁾ Planned policies and measures are options under discussion and having a realistic chance of being adopted and implemented after the date of submission of the national plan. The resulting projections under section 5.1.i shall therefore include not only implemented and adopted policies and measures (projections with existing policies and measures), but also planned policies and measures.

⁽²⁾ For the plan covering the period from 2021 to 2030: For each parameter/variable in the list, trends over the years 2005-2040 (2005-2050 where appropriate) including for the year 2030 in five-year intervals shall be reported both in Section 4 and 5. Parameter based on exogenous assumptions v modelling output shall be indicated.

⁽³⁾ As far as possible, reported data and projections shall build on and be consistent with Eurostat data and methodology used for reporting European statistics in the relevant sectoral law, as European statistics are the primary source of statistical data used for reporting and monitoring, in accordance with Regulation (EC) No 223/2009 on European statistics.

⁽⁴⁾ Note: all projections are to be performed on the basis of constant prices (2016 prices used as base year)

⁽⁵⁾ The Commission will provide recommendations for key parameters for projections, at least covering oil, gas, and coal import prices as well as EU ETS carbon prices.

- (2) GDP [euro million]
- (3) Sectoral gross value added (including main industrial, construction, services, and agriculture sectors) [euro million]
- (4) Number of households [thousands]
- (5) Household size [inhabitants/households]
- (6) Disposable income of households [euro]
- (7) Number of passenger-kilometres: all modes, i.e. split between road (cars and buses separated if possible), rail, aviation and domestic navigation (when relevant) [million pkm]
- (8) Freight transport tonnes-kilometres: all modes excluding international maritime, i.e. split between road, rail, aviation, domestic navigation (inland waterways and national maritime) [million tkm]
- (9) International oil, gas and coal fuel import prices [EUR/GJ or euro/toe] based on the Commission's recommendations
- (10) EU-ETS carbon price [EUR/EUA] based on the Commission's recommendations
- (11) Exchange rates to EUR and to USD (where applicable) assumptions [euro/currency and USD/currency]
- (12) Number of Heating Degree Days (HDD)
- (13) Number of Cooling Degree Days (CDD)
- (14) Technology cost assumptions used in modelling for main relevant technologies

2. Energy balances and indicators

2.1. Energy supply

- (1) Indigenous Production by fuel type (all energy products that are produced in significant quantities) [ktoe]
- (2) Net imports by fuel type (including electricity and split into intra- and extra EU net imports) [ktoe]
- (3) Import dependency from third countries [%]
- (4) Main import sources (countries) for main energy carriers (including gas and electricity)
- (5) Gross Inland Consumption by fuel type source (including solids, all energy products: coal, crude oil and petroleum products, natural gas, nuclear energy, electricity, derived heat, renewables, waste) [ktoe]

2.2. Electricity and heat

- (1) Gross electricity generation [GWh]
- (2) Gross electricity generation by fuel (all energy products) [GWh]
- (3) Share of combined heat and power generation in total electricity and heat generation [%]
- (4) Capacity electricity generation by source, including retirements and new investment [MW]
- (5) Heat generation from thermal power generation
- (6) Heat generation from combined heat and power plants, including industrial waste heat
- (7) Cross-border interconnection capacities for gas and electricity [Definition for electricity in line with outcome of ongoing discussions on basis for 15 % interconnection target] and their projected usage rates

2.3. Transformation sector

- (1) Fuel inputs to thermal power generation (including solids, oil, gas) [ktoe]
- (2) Fuel inputs to other conversion processes [ktoe]

2.4. Energy consumption

- (1) Primary and final energy consumption [ktoe]
- (2) Final energy consumption by sector (including industry, residential, tertiary, agriculture and transport (including split between passenger and freight transport, when available)) [ktoe]
- (3) Final energy consumption by fuel (all energy products) [ktoe]
- (4) Final non-energy consumption [ktoe]
- (5) Primary energy intensity of the overall economy (primary energy consumption per GDP [toe/euro])
- (6) Final energy intensity by sector (including industry, residential, tertiary and transport (including split between passenger and freight transport, when available))

2.5. Prices

- (1) Electricity prices by type of using sector (residential, industry, tertiary)
- (2) National retail fuel prices (including taxes, per source and sector) [euro/ktoe]

2.6. Investment

Investment costs in energy transformation, supply, transmission and distribution sectors

2.7. Renewables

- (1) Gross final consumption of energy from renewable sources and share of renewable energy in gross final energy consumption and by sector (electricity, heating and cooling, transport) and by technology
- (2) Electricity and heat generation from renewable energy in buildings; this shall include, where available, disaggregated data on energy produced, consumed and injected into the grid by solar photovoltaic systems, solar thermal systems, biomass, heat pumps, geothermal systems, as well as all other decentralised renewables systems
- (3) Where applicable, other national trajectories, including those that are long-term or sectoral the share of food-based and advanced biofuels, the share of renewable energy in district heating, as well as the renewable energy produced by cities and renewable energy communities.

3. GHG emissions and removals related indicators

- (1) GHG emissions by policy sector (EU ETS, effort sharing and LULUCF)
- (2) GHG emissions by IPCC sector and by gas (where relevant, split into EU ETS and effort sharing sectors) [tCO₂eq]
- (3) Carbon Intensity of the overall economy [tCO₂eq/GDP]
- (4) CO₂ emission related indicators
 - (a) GHG intensity of domestic power and heat generation [tCO₂eq/MWh]
 - (b) GHG intensity of final energy consumption by sector [tCO₂eq/toe]
- (5) Non-CO₂ emission related parameters
 - (a) Livestock: dairy cattle [1 000 heads], non-dairy cattle [1 000 heads], sheep [1 000 heads], pig [1 000 heads], poultry [1 000 heads]
 - (b) Nitrogen input from application of synthetic fertilisers [kt nitrogen]
 - (c) Nitrogen input from application of manure [kt nitrogen]
 - (d) Nitrogen fixed by N-fixing crops [kt nitrogen]

- (e) Nitrogen in crop residues returned to soils [kt nitrogen]
 - (f) Area of cultivated organic soils [hectares]
 - (g) Municipal solid waste (MSW) generation
 - (h) Municipal solid waste (MSW) going to landfills
 - (i) Share of CH₄ recovery in total CH₄ generation from landfills [%]
-

ANNEX II

NATIONAL CONTRIBUTIONS FOR THE SHARE OF ENERGY FROM RENEWABLE SOURCES IN GROSS FINAL CONSUMPTION OF ENERGY IN 2030

1. The following indicative formula represents the objective criteria listed in points (e)(i) to (v) of Article 5(1), each expressed in percentage points:
 - (a) the Member State's national binding target for 2020 as set out in the third column of the table Annex I to Directive (EU) 2018/2001;
 - (b) a flat rate contribution (C_{Flat});
 - (c) a GDP-per-capita based contribution (C_{GDP});
 - (d) a potential-based contribution ($C_{\text{Potential}}$);
 - (e) a contribution reflecting the interconnection level of the Member State (C_{Interco}).
 2. C_{Flat} shall be the same for each Member State. All Member States' C_{Flat} shall together contribute 30 % of the difference between the Union's targets for 2030 and 2020.
 3. C_{GDP} shall be allocated between Member States based on Eurostat's GDP per capita index to the Union average over the 2013 to 2017 period, expressed in purchasing power standard, where for each Member State individually the index is capped at 150 % of the Union average. All Member States' C_{GDP} shall together contribute 30 % of the difference between the Union's targets for 2030 and 2020.
 4. $C_{\text{Potential}}$ shall be allocated between Member States based on the difference between a Member State's RES share in 2030 as shown in PRIMES scenario and its national binding target for 2020. All Member States' $C_{\text{Potential}}$ shall together contribute 30 % of the difference between the Union's targets for 2030 and 2020.
 5. C_{Interco} shall be allocated between Member States based on an electricity interconnection share index to Union average in 2017, measured by the net transfer capacity over total installed generation capacity, where for each Member State individually the interconnection share index is capped at 150 % of the Union average. All Member States' C_{Interco} shall together contribute 10 % of the difference between the Union's targets for 2030 and 2020.
-

ANNEX III

NOTIFICATION OF MEMBER STATES' MEASURES AND METHODOLOGIES TO IMPLEMENT ARTICLE 7 OF DIRECTIVE 2012/27/EU

Member States shall notify to the Commission their proposed detailed methodology pursuant to point 5 of Annex V to Directive 2012/27/EU for the operation of the energy efficiency obligation schemes and alternative policy measures referred to in Articles 7a and 7b and Article 20(6) of that Directive.

1. Calculation of the level of the energy savings requirement to be achieved over the whole period from 1 January 2021 to 31 December 2030, showing how the following elements are taken into account:
 - (a) the annual final energy consumption, averaged over the most recent three-year period prior to 1 January 2019 [in ktoe];
 - (b) the total cumulative amount of end-use energy savings to be achieved [in ktoe] in accordance with point (b) of Article 7(1) of Directive 2012/27/EU;
 - (c) data used in the calculation of final energy consumption and sources of such data, including justification for the use of alternative statistical sources and any differences of the resulting quantities (if other sources than Eurostat are used);
2. Member States that decide to use any of the possibilities under Article 7(2) of Directive 2012/27/EU shall also notify their calculation of the level of the energy savings requirement to be achieved over the whole period from 1 January 2021 to 31 December 2030, showing how the following elements are taken also into account:
 - (a) their own annual savings rate;
 - (b) their own calculation baseline and energy used in transport, in whole or in part, excluded from the calculation [in ktoe];
 - (c) calculated cumulative amount of energy savings over the whole period from 1 January 2021 to 31 December 2030 (before application of the options referred to in points (b) to (g) of Article 7(4) of Directive 2012/27/EU) [in ktoe];
 - (d) application of the options referred to in points (b) to (g) of Article 7(4) of Directive 2012/27/EU:
 - (i) final energy consumption in industrial activities [in ktoe] listed in Annex I to Directive 2003/87/EC excluded from the calculation, in accordance with point (b) of Article 7(4) of Directive 2012/27/EU;
 - (ii) amount of energy savings [in ktoe] achieved in the energy transformation, distribution and transmission sectors, including efficient district heating and cooling infrastructure, in accordance with point (c) of Article 7(4) of Directive 2012/27/EU;
 - (iii) amount of energy savings [in ktoe] resulting from individual actions newly implemented since 31 December 2008 that continue to have an impact in 2020 and beyond, in accordance with point (d) of Article 7(4) of Directive 2012/27/EU;
 - (iv) amount of energy savings [in ktoe] that stem from policy measures, provided it can be demonstrated that those policy measures result in individual actions carried out from 1 January 2018 and until 31 December 2020, which deliver savings after 31 December 2020, in accordance with point (e) of Article 7(4) of Directive 2012/27/EU;
 - (v) amount of energy generated [in ktoe] on or in buildings for own use as a result of policy measures promoting new installation of renewable energy technologies, in accordance with point (f) of Article 7(4) of Directive 2012/27/EU;
 - (vi) amount of energy savings [in ktoe] that exceed the cumulative energy savings required in the period from 1 January 2014 to 31 December 2020, which Member States count towards the period from 1 January 2021 to 31 December 2030 in accordance with point (g) of Article 7(4) of Directive 2012/27/EU;
 - (e) total cumulative amount of energy savings (after application of the options referred to in points (b) to (g) of Article 7(4) of Directive 2012/27/EU).

3. Policy measures in view of the achievement of the savings requirement referred to in Article 7(1) of Directive 2012/27/EU:
 - 3.1. Energy efficiency obligation schemes referred to in Article 7a of Directive 2012/27/EU:
 - (a) description of the energy efficiency obligation scheme;
 - (b) expected cumulative and annual amount of savings and duration of the obligation period(s);
 - (c) obligated parties and their responsibilities;
 - (d) target sectors;
 - (e) eligible actions provided for under the measure;
 - (f) information on the application of the following provisions of Directive 2012/27/EU:
 - (i) where applicable, specific actions, share of savings to be achieved in households affected by energy poverty in accordance with Article 7(11);
 - (ii) savings achieved by energy service providers or other third parties in accordance with point (a) of Article 7a(6);
 - (iii) 'banking and borrowing' in accordance with point (b) of Article 7a(6);
 - (g) where relevant, information on trading of energy savings.
 - 3.2 Alternative measures referred to in Article 7b and Article 20(6) of Directive 2012/27/EU (except taxation):
 - (a) type of policy measure;
 - (b) brief description of the policy measure, including the design features per each policy measure notified;
 - (c) expected total cumulative and annual amount of savings per each measure and/ or amount of energy savings in relation to any intermediate periods;
 - (d) implementing public authorities, participating or entrusted parties and their responsibilities for implementing the policy measure(s);
 - (e) target sectors;
 - (f) eligible actions provided for under the measure;
 - (g) where applicable, specific policy measures or individual actions targeting energy poverty.
 - 3.3. Information on taxation measures:
 - (a) brief description of taxation measure;
 - (b) duration of taxation measure;
 - (c) implementing public authority;
 - (d) expected cumulative and annual amount of savings per measure;
 - (e) target sectors and segment of taxpayers;
 - (f) calculation methodology, including which price elasticities are used and how they have been established, in accordance with point (4) of Annex V to Directive 2012/27/EU.
4. Calculation methodology for measures notified under Articles 7a and 7b and Article 20(6) of Directive 2012/27/EU (except for taxation measures):
 - (a) measurement methods used referred to in point 1 of Annex V to Directive 2012/27/EU;
 - (b) method to express the energy savings (primary or final energy savings);
 - (c) lifetimes of measures, rate at which the savings decline over time and approach used to take into account the lifetime of savings;
 - (d) brief description of the calculation methodology, including how additionality and materiality of savings are ensured and which methodologies and benchmarks are used for deemed and scaled savings;

- (e) information on how the possible overlaps between the measures and individual actions are addressed to avoid double counting of energy savings;
- (f) where relevant, climatic variations and approach used.

5. Monitoring and verification

- (a) brief description of the monitoring and verification system and the process of the verification;
 - (b) implementing public authority and its main responsibilities in charge of monitoring and verification system in relation to the energy efficiency obligation scheme or alternative measures;
 - (c) independence of monitoring and verification from the obligated, participating or entrusted parties;
 - (d) statistically significant proportion of energy efficiency improvement measures and proportion and criteria used to define and select a representative sample;
 - (e) reporting obligations for obligated parties (savings achieved by each obligated party, or each sub-category of obligated party, and in total under the scheme).
 - (f) publication of energy savings achieved (each year) under the energy efficiency obligation scheme and alternative measures;
 - (g) information on Member State law on penalties to be applied in the case of non-compliance;
 - (h) Information on policy measures provided for in the event that progress is not satisfactory.
-

ANNEX IV

GENERAL FRAMEWORK FOR LONG-TERM STRATEGIES

1. OVERVIEW AND PROCESS FOR DEVELOPING THE STRATEGIES

- 1.1. Executive summary
- 1.2. Legal and policy context
- 1.3. Public consultation

2. CONTENT

2.1. TOTAL GHG EMISSION REDUCTIONS AND ENHANCEMENTS OF REMOVALS BY SINKS

- 2.1.1. Projected emission reductions and enhancement of removals by 2050
- 2.1.2. National target for 2030 and beyond, if available, and indicative milestones for 2040 and 2050
- 2.1.3. Adaptation policies and measures

2.2. RENEWABLE ENERGY

- 2.2.1. To the extent feasible, the estimated likely share of renewable energy in final energy consumption by 2050

2.3. ENERGY EFFICIENCY

- 2.3.1. To the extent feasible, the estimated likely energy consumption by 2050

2.4. SECTOR-SPECIFIC RELATED CONTENT

2.4.1. Energy system

- 2.4.1.1. Intended or likely future emissions trajectory or range
- 2.4.1.2. General description of main drivers for energy efficiency, demand-side flexibility and energy consumption and their evolution from 2021 and beyond

2.4.2. Industry

- 2.4.2.1. Expected emission reductions by sector and energy demands
- 2.4.2.2. General overview of the policies, existing plans and measures for decarbonisation as described in point 2.1 of Section A of Part I of Annex I

2.4.3. Transport

- 2.4.3.1. Expected emissions and energy sources by transport type (e.g. cars and vans, heavy duty road transport, shipping, aviation, rail)
- 2.4.3.2. Decarbonisation options

2.4.4. Agriculture and land use, land-use change and forestry (LULUCF)

- 2.4.4.1. To the extent feasible, expected emissions by sources and by individual GHGs
- 2.4.4.2. Emission reduction options envisaged
- 2.4.4.3. Links to agricultural and rural development policies

3. FINANCING

- 3.1. Estimates of investment needed
- 3.2. Policies and measures for related research, development and innovation

4. IMPACT ASSESSMENT OF THE SOCIO-ECONOMIC ASPECTS

5. ANNEXES (as necessary)

5.1. Details on modelling (including assumptions) and/or analysis, indicators, etc.

ANNEX V

GHG INVENTORIES INFORMATION

Part 1

Information to be included in the reports referred to in Article 26(3):

- (a) their anthropogenic emissions of GHGs listed in Part 2 of this Annex and the anthropogenic emissions of GHGs referred to in Article 2(1) of Regulation (EU) 2018/842 for the year X-2;
- (b) data on their anthropogenic emissions of carbon monoxide (CO), sulphur dioxide (SO₂), nitrogen oxides (NO_x) and volatile organic compounds, consistent with data already reported pursuant to Article 8 of Directive (EU) 2016/2284 for the year X-2;
- (c) their anthropogenic GHG emissions by sources and removals of CO₂ by sinks resulting from LULUCF, for the year X-2, in accordance with the methodologies specified in Part 3 of this Annex. This data shall also be relevant for the compliance report under Article 14 of Regulation (EU) 2018/841;
- (d) any changes to the information referred to in points (a), (b) and (c) for the years between the relevant base year or period and the year X-3, indicating the reasons for those changes;
- (e) information on indicators, as set out in Part 4 of this Annex, for the year X-2;
- (f) summary information on concluded transfers pursuant to Article 5 of Regulation (EU) 2018/842 and Articles 12 and 13 of Regulation (EU) 2018/841 for the year X-1;
- (g) information on the steps taken to improve inventory estimates, in particular in areas of the inventory that have been subject to adjustments or recommendations following expert reviews;
- (h) the actual or estimated allocation of the verified emissions reported by installation operators under Directive 2003/87/EC to the source categories of the national GHG inventory and the ratio of those verified emissions to the total reported GHG emissions in those source categories, for the year X-2;
- (i) where relevant, the results of the checks performed on the consistency of the emissions reported in the GHG inventories, for the year X-2, with the verified emissions reported under Directive 2003/87/EC;
- (j) where relevant, the results of the checks performed on the consistency of the data used to estimate emissions in preparation of the GHG inventories, for the year X-2, with:
 - (i) the data used to prepare inventories of air pollutants pursuant to Directive (EU) 2016/2284;
 - (ii) the data reported pursuant to Article 19(1) of, and Annex VII to, Regulation (EU) No 517/2014;
 - (iii) the energy data reported pursuant to Article 4 of, and Annex B to, Regulation (EC) No 1099/2008;
- (k) a description of changes to their national inventory system, if any;
- (l) a description of changes to the national registry, if any;
- (m) information on their quality assurance and quality control plans, a general uncertainty assessment, a general assessment of completeness and, any other elements of the national GHG inventory report needed to prepare the Union GHG inventory report;
- (n) information of the Member State's intentions to make use of the flexibilities in Article 5(4) and (5) and Article 7(1) of Regulation (EU) 2018/842 and of the use of revenues under Article 5(6) of that Regulation.

A Member State may request to be granted a derogation by the Commission from point (c) of the first paragraph to apply a different methodology from that specified in Part 3 of this Annex where the methodology improvement required cannot be achieved in time for the improvement to be taken into account in the GHG inventories for the period from 2021 to 2030, or where the cost of the methodology improvement would be disproportionately high compared to the benefits of applying such methodology to improve accounting for emissions and removals due to the low significance of the emissions and removals from the carbon pools concerned. Member States wishing to benefit from this derogation shall submit a reasoned request to the Commission by 31 December 2020, indicating by which time the methodology improvement could be implemented, the alternative methodology proposed or both, and an assessment of the potential impacts on the accuracy of accounting. The Commission may request additional information to be submitted within a specific, reasonable time period. Where the Commission considers that the request is justified, it shall grant the derogation. If the Commission rejects the request, it shall give reasons for its decision.

Part 2

The GHGs to be covered are:

Carbon dioxide (CO₂)

Methane (CH₄)

Nitrous Oxide (N₂O)

Sulphur hexafluoride (SF₆)

Nitrogen trifluoride (NF₃)

Hydrofluorocarbons (HFCs):

- HFC-23 CHF₃
- HFC-32 CH₂F₂
- HFC-41 CH₃F
- HFC-125 CHF₂CF₃
- HFC-134 CHF₂CHF₂
- HFC-134a CH₂FCF₃
- HFC-143 CH₂FCHF₂
- HFC-143a CH₃CF₃
- HFC-152 CH₂FCH₂F
- HFC-152a CH₃CHF₂
- HFC-161 CH₃CH₂F
- HFC-227ea CF₃CHF₂CF₃
- HFC-236cb CF₃CF₂CH₂F
- HFC-236ea CF₃CHFCHF₂
- HFC-236fa CF₃CH₂CF₃
- HFC-245fa CHF₂CH₂CF₃
- HFC-245ca CH₂FCF₂CHF₂
- HFC-365mfc CH₃CF₂CH₂CF₃
- HFC-43-10mee CF₃CHFCH₂CF₂CF₃ or (C₅H₂F₁₀)

Perfluorocarbons (PFCs):

- PFC-14, Perfluoromethane, CF₄
- PFC-116, Perfluoroethane, C₂F₆
- PFC-218, Perfluoropropane, C₃F₈
- PFC-318, Perfluorocyclobutane, c-C₄F₈
- Perfluorocyclopropane c-C₃F₆
- PFC-3-1-10, Perfluorobutane, C₄F₁₀
- PFC-4-1-12, Perfluoropentane, C₅F₁₂
- PFC-5-1-14, Perfluorohexane, C₆F₁₄
- PFC-9-1-18, C₁₀F₁₈

Part 3**Methodologies for monitoring and reporting in the LULUCF sector**

Geographically explicit land-use conversion data in accordance with the 2006 IPCC Guidelines for national GHG inventories.

Tier 1 methodology in accordance with the 2006 IPCC guidelines for national GHG inventories.

For emissions and removals for a carbon pool that accounts for at least 25-30 % of emissions or removals in a source or sink category which is prioritised within a Member State's national inventory system because its estimate has a significant influence on a country's total inventory of GHGs in terms of the absolute level of emissions and removals, the trend in emissions and removals, or the uncertainty in emissions and removals in the land-use categories, at least Tier 2 methodology in accordance with the 2006 IPCC guidelines for national GHG inventories.

Member States are encouraged to apply Tier 3 methodology, in accordance with the 2006 IPCC guidelines for national GHG inventories.

Part 4

Inventory indicators

Indicator title	Indicator
TRANSFORMATION B0	Specific CO ₂ emissions of public and auto-producer power plants, t/T) CO ₂ emissions from public and auto-producer thermal power stations, kt divided by all products — output by public and auto-producer thermal power stations, PJ
TRANSFORMATION E0	Specific CO ₂ emissions of auto-producer plants t/T) CO ₂ emissions from auto-producers, kt divided by All products output by auto-producer thermal power stations, PJ
INDUSTRY A1.1	Total CO ₂ intensity — iron and steel industry, t/million euro Total CO ₂ emissions from iron and steel, kt divided by gross value added — iron and steel industry
INDUSTRY A1.2	Energy-related CO ₂ intensity — chemical industry, t/million euro Energy-related CO ₂ emissions chemical industries, kt divided by gross value added — chemical industry
INDUSTRY A1.3	Energy-related CO ₂ intensity — glass, pottery and building materials industry, t/million euro Energy-related CO ₂ emissions glass, pottery and building materials, kt divided by gross value added — glass, pottery and buildings material industry
INDUSTRY A1.4	Energy-related CO ₂ intensity — food, drink and tobacco industry, t/million euro Energy-related CO ₂ emissions from food, drink and tobacco industry, kt divided by gross value-added — food, drink and tobacco industry, million euro (EC95)
INDUSTRY A1.5	Energy-related CO ₂ intensity — paper and printing industry, t/million euro Energy-related CO ₂ emissions paper and printing, kt — Gross value-added — paper and printing industry, million euro (EC95)
HOUSEHOLDS A0	Specific CO ₂ emissions of households for space heating, t/m ² CO ₂ emissions of households for space heating divided by surface area of permanently occupied dwellings, million m ²
SERVICES B0	Specific CO ₂ emissions of commercial and institutional sector for space heating, kg/m ² CO ₂ emissions from space heating in commercial and institutional, kt divided by Surface area of services buildings, million m ²
TRANSPORT B0	Specific diesel related CO ₂ emissions of passenger cars, g/100 km
TRANSPORT B0	Specific petrol related CO ₂ emissions of passenger cars, g/100 km

ANNEX VI

POLICIES AND MEASURES INFORMATION IN THE AREA OF GHG EMISSIONS

Information to be included in the reports referred to in Article 18:

- (a) a description of their national system for reporting on policies and measures, or groups of measures, and for reporting on projections of anthropogenic GHG emissions by sources and removals by sinks pursuant to Article 39(1) or information on any changes made to that system where such a description has already been provided;
 - (b) updates relevant to their long-term strategies referred to in Article 15 and progress in implementing those strategies;
 - (c) information on national policies and measures, or groups of measures, and on implementation of Union policies and measures, or groups of measures, that limit or reduce GHG emissions by sources or enhance removals by sinks, presented on a sectoral basis and organised by gas or group of gases (HFCs and PFCs) listed in Part 2 of Annex V. That information shall refer to applicable and relevant national or Union policies and shall include:
 - (i) the objective of the policy or measure and a short description of the policy or measure;
 - (ii) the type of policy instrument;
 - (iii) the status of implementation of the policy or measure or group of measures;
 - (iv) indicators used to monitor and evaluate progress over time;
 - (v) where available, quantitative estimates of the effects on emissions by sources and removals by sinks of GHGs broken down into:
 - the results of *ex ante* assessments of the effects of individual or groups of policies and measures on the mitigation of climate change. Estimates shall be provided for a sequence of four future years ending with 0 or 5 immediately following the reporting year, with a distinction between GHG emissions covered by Directive 2003/87/EC, Regulation (EU) 2018/842 and Regulation (EU) 2018/841,
 - the results of *ex post* assessments of the effects of individual or groups of policies and measures on the mitigation of climate change where available, with a distinction between GHG emissions covered by Directive 2003/87/EC, Regulation (EU) 2018/842 and Regulation (EU) 2018/841;
 - (vi) available estimates of the projected costs and benefits of policies and measures, as well as estimates of the realised costs and benefits of policies and measures;
 - (vii) all existing references to the assessments of the costs and effects of national policies and measures, to information in the implementation of Union policies and measures that limit or reduce GHG emissions by sources or enhance removals by sinks and to the underpinning technical reports;
 - (viii) an assessment of the contribution of the policy or measure to the achievement of the long-term strategy referred to in Article 15;
 - (d) information on planned additional national policies and measures, or groups of measures, envisaged with a view to limiting GHG emissions beyond their commitments under Regulation (EU) 2018/842 and Regulation (EU) 2018/841;
 - (e) information regarding the links between the different policies and measures, or groups of measures, reported pursuant to point (c) and the way such policies and measures, or groups of measures, contribute to different projection scenarios.
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ANNEX VII

PROJECTIONS INFORMATION IN THE AREA OF GHG EMISSIONS

Information to be included in the reports referred to in Article 18:

- (a) projections without measures where available, projections with measures, and, where available, projections with additional measures;
 - (b) total GHG projections and separate estimates for the projected GHG emissions for the emission sources covered by Directive 2003/87/EC and by Regulation (EU) 2018/842 and the projected emissions by sources and removals by sinks under the Regulation (EU) 2018/841;
 - (c) the impact of policies and measures identified pursuant to point (a) of Article 18(1). Where such policies and measures are not included, this shall be clearly stated and explained;
 - (d) results of the sensitivity analysis performed for the projections and information on the models and parameters used;
 - (e) all relevant references to the assessment and the technical reports that underpin the projections referred to in Article 18(4).
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ANNEX VIII

INFORMATION ON NATIONAL ADAPTATION ACTIONS, FINANCIAL AND TECHNOLOGY SUPPORT PROVIDED TO DEVELOPING COUNTRIES AND AUCTIONING REVENUES**Part 1****Reporting on adaptation actions**

Information to be included in the reports referred to in Article 19(1):

- (a) the main goals, objectives and institutional framework for adaptation;
- (b) climate change projections, including weather extremes, climate-change impacts, assessment of climate vulnerability and risks and key climate hazards;
- (c) adaptive capacity;
- (d) adaptation plans and strategies;
- (e) monitoring and evaluation framework;
- (f) progress made in implementation, including good practices and changes to governance.

Part 2**Reporting on support provided to developing countries**

Information to be included in the reports referred to in Article 19(3):

- (a) information on financial support committed and provided to developing countries for the year X-1, including:
 - (i) quantitative information on public and mobilised financial resources by the Member State. The information on financial flows is to be based on the so-called 'Rio markers' for climate change mitigation-related support and climate change adaptation-related support and other tracking systems introduced by the OECD Development Assistance Committee;
 - (ii) qualitative methodological information explaining the method used to calculate the quantitative information, including an explanation of methodology for quantifying their data, and, where relevant, other information on the definitions and methodologies used to determine any figures, in particular for information reported on mobilised financial flows;
 - (iii) available information on activities by the Member State related to public-funded technology transfer projects and capacity-building projects for developing countries under the UNFCCC, including whether the technology transferred or capacity-building project was used for mitigating or adapting to the effects of climate change, the recipient country, where possible the amount of support provided, and the type of technology transferred or capacity-building project;
- (b) available information for the year X and subsequent years on the planned provision of support, including information on planned activities related to public-funded technology transfer projects or capacity building projects for developing countries under the UNFCCC and on technologies to be transferred and capacity-building projects, including whether the technology transferred or capacity-building project is intended for mitigating or adapting to the effects of climate change, the recipient country, where possible the amount of support to be provided, and the type of technology transferred or capacity-building project.

Part 3**Reporting on auctioning revenues**

Information to be included in the reports referred to in Article 19(2):

- (a) information on the use of revenues during the year X-1 generated by the Member State by auctioning allowances pursuant to Article 10(1) of Directive 2003/87/EC, including information on such revenue that has been used for one or more of the purposes specified in Article 10(3) of that Directive, or the equivalent in financial value of that revenue, and the actions taken pursuant to that article;

- (b) information on the use, as determined by the Member State, of all revenue generated by the Member State by auctioning aviation allowances pursuant to Article 3d(1) or (2) of Directive 2003/87/EC, which shall be provided in accordance with Article 3d(4) of that Directive;

Auctioning revenues not disbursed at the time a Member State submits a report to the Commission pursuant to Article 19(2) shall be quantified and reported in reports for subsequent years.

ANNEX IX

ADDITIONAL REPORTING OBLIGATIONS

Part 1

Additional reporting obligations in the area of renewable energy

The following additional information shall, unless otherwise stated, be included pursuant to point (c) of Article 20:

- (a) the functioning of the system of guarantees of origin for electricity, gas and heating and cooling from renewable sources, the levels of issuance and cancellation of guarantees of origin and the resulting annual national renewable energy consumption, as well as the measures taken to ensure the reliability and protection against fraud of the system;
- (b) amounts of biofuels, biogas renewable transport fuels of non-biological origin, recycled carbon fuels and renewable electricity consumed in the transport sector and, where relevant, their greenhouse saving performance, distinguishing between fuels produced from different types of food and feed crops and each type of feedstock listed in Annex IX to Directive (EU) 2018/2001;
- (c) developments in the availability, origin and use of biomass resources for energy purposes;
- (d) changes in commodity prices and land use within the Member State associated with its increased use of biomass and other forms of energy from renewable sources;
- (e) the estimated excess production of energy from renewable sources which could be transferred to other Member States so that these comply with Article 3(3) of Directive (EU) 2018/2001 and achieve the national contributions and trajectories referred to in point (a)(2) of Article 4 of this Regulation;
- (f) where applicable, the estimated demand for energy from renewable sources to be satisfied by means other than domestic production until 2030, including imported biomass feedstock;
- (g) the technological development and deployment of biofuels made from feedstocks listed in Annex IX to Directive (EU) 2018/2001;
- (h) where available, the estimated impact of the production or use of biofuels, bioliquids and biomass fuels on biodiversity, water resources, water availability and quality, soils and air quality within the Member State;
- (i) observed cases of fraud in the chain of custody of biofuels, bioliquids and biomass fuels;
- (j) information on how the share of biodegradable waste in waste used for producing energy has been estimated, and what steps have been taken to improve and verify such estimates;
- (k) electricity and heat generation from renewable energy in buildings, including disaggregated data on energy produced, consumed and injected into the grid by solar photovoltaic systems, solar thermal systems, biomass, heatpumps, geothermal systems, as well as all other decentralised renewables systems;
- (l) where applicable, the share of renewable energy in district heating, as well as the renewable energy produced by cities and renewable energy communities;
- (m) primary supply of solid biomass (in 1 000 m³, except with regard to point (1)(b)(iii), which will be provided in tonnes)
 - (1) Forest biomass used for energy production (domestic production and import)
 - (a) Primary biomass from forest used directly for energy production
 - (i) Where available, branches and tree tops (reporting is voluntary)
 - (ii) Where applicable, stumps (reporting is voluntary)
 - (iii) Round wood (split into industrial roundwood and fuelwood)
 - (b) Where applicable, forest-based industry co-products used directly for energy
 - (i) Where applicable, bark
 - (ii) Chips, sawdust and other wood particles
 - (iii) Where applicable, black liquor and crude tall oil

- (c) Where available, post-consumer wood used directly for energy production
- (d) Processed wood-based fuel, produced from feedstocks not accounted under point (1)(a), (b) or (c):
 - (i) Where applicable, wood charcoal
 - (ii) Wood pellets and wood briquettes
- (2) Where available, agricultural biomass used for energy production (domestic production, import and export)
 - (a) Energy crops for electricity or heat (including short rotation coppice)
 - (b) Agricultural crop residues for electricity or heat
- (3) Where available, organic waste biomass for energy production (domestic production, import and export)
 - (a) Organic fraction of industrial waste
 - (b) Organic fraction of municipal waste
 - (c) Waste sludges
- (n) final energy consumption of solid biomass (amount of solid biomass used for energy production in the following sectors):
 - (1) Energy sector
 - (a) Electricity
 - (b) Combined heat and power
 - (c) Heat
 - (2) Industry sector internal (consumed and autoproduced electricity, CHP and heat)
 - (3) Direct final consumption residential
 - (4) Other

Part 2

Additional reporting obligations in the area of energy efficiency

In the area of energy efficiency, the following additional information shall be included pursuant to point (c) of Article 21:

- (a) major legislative and non-legislative policies, measures, financing measures and programmes implemented in year X-2 and X-1 (with X as the year when the report is due) to achieve their objectives referred to in point (b) of Article 4 which promote energy service markets, improve the energy performance of buildings, measures to utilise energy efficiency potentials of gas and electricity infrastructure and heating and cooling, improve information and qualification, other measures to promote energy efficiency;
- (b) the cumulative amount of energy savings achieved through Article 7 of Directive 2012/27/EU in years X-3 and X-2;
- (c) the amount of savings achieved by policy measures aimed at alleviation of energy poverty in line with Article 7(11) of Directive 2012/27/EU;
- (d) where applicable, the amount of savings achieved in accordance with point (c) of Article 7(4) of Directive 2012/27/EU;
- (e) progress in each sector and reasons why energy consumption remained stable or was growing in year X-3 and X-2 in final energy consumption sectors;
- (f) total building floor area of the buildings with a total useful floor area over 250 m² owned and occupied by the Member States' central government that, on 1 January in year X-2 and X-1, which did not meet the energy performance requirements referred to in Article 5(1) of Directive 2012/27/EU;
- (g) total building floor area of heated and/or cooled buildings owned and occupied by the Member States' central government that was renovated in year X-3 and X-2 referred to in Article 5(1) of the Directive 2012/27/EU or the amount of energy savings in eligible buildings owned and occupied by their central government as referred to in Article 5(6) of Directive 2012/27/EU;
- (h) number of energy audits carried out in in year X-3 and X-2. In addition, the total estimated number of large companies in their territory to which Article 8(4) of Directive 2012/27/EU is applicable and the number of energy audits carried out in those enterprises in the year X-3 and X-2;

- (i) applied national primary energy factor for electricity and a justification if this is different from the default coefficient referred to in footnote (3) of Annex IV to Directive 2012/27/EU;
 - (j) number and floor area of new and renovated nearly zero-energy buildings in year X-2 and X-1, as provided in Article 9 of the Directive 2010/31/EU, where necessary based on statistical sampling;
 - (k) the internet link to the website where the list or the interface of energy services providers referred to in point (c) of Article 18(1) of Directive 2012/27/EU can be accessible.
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ANNEX X

UNION BIOENERGY SUSTAINABILITY REPORT

The EU bioenergy sustainability report on energy from biomass to be adopted biennially by the Commission together with the State of the Energy Union report pursuant to point (d) of Article 35(2), shall contain as a minimum the following information:

- (a) the relative environmental benefits and costs of different biofuels, bioliquids and biomass fuels, the effects of the Union's import policies thereon, the security of supply implications and the ways of achieving a balanced approach between domestic production and imports;
- (b) the impact of the production and use of biomass on sustainability in the Union and in third countries, including impacts on biodiversity;
- (c) data and analysis of current and projected sustainable biomass availability and demand, including the impact of increased demand for biomass on biomass using sectors;
- (d) the technological development and deployment of biofuels made from feedstocks listed in Annex IX to Directive (EU) 2018/2001, and an assessment of the feedstock availability and resource competition taking into account the principles of the circular economy and the waste hierarchy established in Directive 2008/98/EC;
- (e) information on, and analysis of, the available scientific research results regarding indirect land-use change in relation to all production pathways, accompanied by an assessment of whether the range of uncertainty identified in the analysis underlying the estimations of indirect land-use change emissions may be narrowed and the possible impact of Union policies, such as environment, climate and agricultural policies, may be factored in;
- (f) in respect of both third countries and Member States that are a significant source of biofuels, bioliquids and biomass fuels consumed within the Union, on national measures taken to respect the sustainability criteria and GHG saving criteria set out in Article 29(2) to (7) and (10), of Directive (EU) 2018/2001, for soil, water and air protection; and
- (g) aggregated information from the database referred in Article 28(2) of Directive (EU) 2018/2001.

In reporting on GHG emission savings from the use of biomass, the Commission shall use the amounts reported by Member States in accordance with point (b) of Part 1 of Annex IX to this Regulation, including the provisional mean values of the estimated indirect land-use change emissions and the associated range derived from the sensitivity analysis as set out in Annex VIII to Directive (EU) 2018/2001. The Commission shall make data on the provisional mean values of the estimated indirect land-use change emissions and the associated range derived from the sensitivity analysis publicly available. In addition, the Commission shall evaluate whether and how the estimate for direct emission savings would change if co-products were accounted for using the substitution approach

ANNEX XI

**VOLUNTARY SCHEMES IN RESPECT OF WHICH THE COMMISSION HAS ADOPTED A DECISION
PURSUANT TO ARTICLE 30(4) OF DIRECTIVE (EU) 2018/2001**

The report on voluntary schemes in respect of which the Commission has adopted a decision pursuant to Article 30(4) of Directive (EU) 2018/2001, to be adopted biennially by the Commission together with the State of the Energy Union report pursuant to point (e) of Article 35(2) of this Regulation, shall contain the Commission's assessment of, as a minimum, the following:

- (a) the independence, modality and frequency of audits, both in relation to what is stated on those aspects in the scheme documentation, at the time the scheme concerned was approved by the Commission, and in relation to industry best practices;
 - (b) the availability of, and experience and transparency in the application of, methods for identifying and dealing with non-compliance, with particular regard to dealing with situations or allegations of serious wrongdoing on the part of members of the scheme;
 - (c) transparency, particularly in relation to the accessibility of the scheme, the availability of translations in the applicable languages of the countries and regions from which raw materials originate, the accessibility of a list of certified operators and relevant certificates, and the accessibility of auditor reports;
 - (d) stakeholder involvement, particularly as regards the consultation of indigenous and local communities prior to decision making during the drafting and reviewing of the scheme as well as during audits and the response to their contributions;
 - (e) the overall robustness of the scheme, particularly in light of rules on the accreditation, qualification and independence of auditors and relevant scheme bodies;
 - (f) where available, market updates of the scheme, the amount of feedstocks and biofuels certified, by country of origin and type, the number of participants;
 - (g) the ease and effectiveness of implementing a system that tracks the proofs of conformity with the sustainability criteria that the scheme gives to its member(s), such a system intended to serve as a means of preventing fraudulent activity with a view, in particular, to the detection, treatment and follow-up of suspected fraud and other irregularities and where appropriate, number of cases of fraud or irregularities detected;
 - (h) options for entities to be authorised to recognise and monitor certification bodies;
 - (i) criteria for the recognition or accreditation of certification bodies;
 - (j) rules on how the monitoring of the certification bodies is to be conducted;
 - (k) ways to facilitate or improve the promotion of best practices.
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ANNEX XII

NATIONAL INVENTORY SYSTEMS

Information referred to in Article 37 includes the following:

- (a) data and methods reported for activities and installations under Directive 2003/87/EC for the purpose of preparing national GHG inventories in order to ensure consistency of the reported GHG emissions under the EU ETS and in the national GHG inventories;
 - (b) data collected through the reporting systems on fluorinated gases in the relevant sectors established pursuant to Article 20 of Regulation (EU) No 517/2014 for the purpose of preparing national GHG inventories;
 - (c) emissions, underlying data and methodologies reported by facilities under Regulation (EC) No 166/2006 for the purpose of preparing national GHG inventories;
 - (d) data reported under Regulation (EC) No 1099/2008;
 - (e) data collected via the geographical tracking of land areas in the context of existing Union and Member State programmes and surveys, including the LUCAS Land Use Cover Area frame Survey and the Copernicus Programme.
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ANNEX XIII

CORRELATION TABLE

Regulation (EU) No 525/2013	This Regulation
Article 1	Article 1(1)
Article 2	—
Article 3	—
Article 4	Article 15
Article 5	Article 37(1), (2) and(6); Annex XII
Article 6	Article 37(3) and (7)
Article 7	Article 26(3), (4), (6) and (7); Annex V
Article 8	Article 26(2) and (7)
Article 9	Article 37(4) and (5)
Article 10	Article 40
Article 11	—
Article 12	Article 39
Article 13	Article 18(1)(a) and Article 18(3) and (4); Annex VI
Article 14	Article 18(1)(b) and Article (2), (3) and (4); Annex VII
Article 15	Article 19(1); Annex VIII, Part 1
Article 16	Article 19(3) and Annex VIII, Part 2
Article 17	Article 19(2), (4) and (5); Annex VIII, Part 3
Article 18	the second subparagraph of Article 17(2)
Article 19	—
Article 20	—
Article 21	Article 29(1)(c) and Article 29(5) and (7)
Article 22	—
Article 23	Article 41(1)(d), (e), (f), (g) and (h)
Article 24	Article 42
Article 25	—
Article 26	Article 44(1)(a) and Article 44(2), (3) and (6)
Article 27	—
Article 28	Article 57
Article 29	—

REGULATION (EU) 2018/2000 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 12 December 2018

amending Regulation (EU) No 516/2014 of the European Parliament and of the Council, as regards the recommitment of the remaining amounts committed to support the implementation of Council Decisions (EU) 2015/1523 and (EU) 2015/1601 or the allocation of those amounts to other actions under the national programmes

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 78(2) and Article 79(2) and (4) thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Acting in accordance with the ordinary legislative procedure ⁽¹⁾,

Whereas:

- (1) The purpose of this Regulation is to enable the recommitment of the remaining amounts committed to support the implementation of Council Decisions (EU) 2015/1523 ⁽²⁾ and (EU) 2015/1601 ⁽³⁾ provided for under Regulation (EU) No 516/2014 of the European Parliament and the Council ⁽⁴⁾ or the allocation of those amounts to other actions under the national programmes in line with Union priorities and Member States' needs in specific areas of asylum and migration. It is also to ensure that such recommitment or allocation occurs in a transparent manner.
- (2) The Commission committed funding to Member States' national programmes under the Asylum, Migration and Integration Fund to support the implementation of Decisions (EU) 2015/1523 and (EU) 2015/1601. Decision (EU) 2015/1601 was amended by Council Decision (EU) 2016/1754 ⁽⁵⁾. Those Decisions have now ceased to apply.
- (3) Part of the funding allocated under Decisions (EU) 2015/1523 and (EU) 2015/1601 in 2016 and in some cases 2017 remains available in the Member States' national programmes.
- (4) It should be possible for Member States to use the remaining amounts to continue to implement relocation by recommitting them to the same action under the national programmes. Member States should recommit or transfer at least 20 % of those amounts to actions in national programmes, for the transfer of applicants for international protection or of beneficiaries of international protection, for resettlement or other ad hoc humanitarian admissions, as well as for preparatory measures for the transfer of applicants for international protection following their arrival in the Union, including by sea, or for the transfer of beneficiaries of international protection. Such measures should comprise only those measures referred to in points (a), (b), (e) and (f) of the second subparagraph of Article 5(1) of Regulation (EU) No 516/2014.
- (5) Where duly justified in the revision of Member States' national programmes, it should be possible for Member States to use up to 80 % of those amounts to address other challenges in the areas of asylum and migration, in line with Regulation (EU) No 516/2014. Member States' needs in those areas remain significant. Recommitments of the remaining amounts to the same action, or their transfer to other actions under the national programme should be possible only once and with the approval of the Commission. Member States should ensure that the

⁽¹⁾ Position of the European Parliament of 11 December 2018 (not yet published in the Official Journal) and decision of the Council of 11 December 2018.

⁽²⁾ Council Decision (EU) 2015/1523 of 14 September 2015 establishing provisional measures in the area of international protection for the benefit of Italy and of Greece (OJ L 239, 15.9.2015, p. 146).

⁽³⁾ Council Decision (EU) 2015/1601 of 22 September 2015 establishing provisional measures in the area of international protection for the benefit of Italy and Greece (OJ L 248, 24.9.2015, p. 80).

⁽⁴⁾ Regulation (EU) No 516/2014 of the European Parliament and of the Council of 16 April 2014 establishing the Asylum, Migration and Integration Fund, amending Council Decision 2008/381/EC and repealing Decisions No 573/2007/EC and No 575/2007/EC of the European Parliament and of the Council and Council Decision 2007/435/EC (OJ L 150, 20.5.2014, p. 168).

⁽⁵⁾ Council Decision (EU) 2016/1754 of 29 September 2016 amending Decision (EU) 2015/1601 establishing provisional measures in the area of international protection for the benefit of Italy and Greece (OJ L 268, 1.10.2016, p. 82).

allocation of funds takes place in a manner that fully respects the principles set out in Regulation (EU, Euratom) 2018/1046 of the European Parliament and of the Council ⁽¹⁾, in particular the principles of efficiency and transparency.

- (6) The target group eligible for transfer, as well as the number of Member States from which transfers take place, should be expanded to give more flexibility to Member States in carrying out transfers, taking into account the specific needs of unaccompanied minors, or other vulnerable applicants, and the specific situation of family members of beneficiaries of international protection. The specific provisions concerning lump sums for resettlement and transfer of beneficiaries of international protection from one Member State to another should reflect that expansion.
- (7) Member States and the Commission should have sufficient time to revise the national programmes to accommodate the relevant changes provided for by this Regulation. Therefore, a derogation from Article 50(1) of Regulation (EU) No 514/2014 of the European Parliament and of the Council ⁽²⁾ should be applied to the remaining amounts committed to support the implementation of Decisions (EU) 2015/1523 and (EU) 2015/1601, extending the deadline for decommitment by six months with a view to completing the procedure for the revision of the national programmes, as referred to in Article 14 of Regulation (EU) No 514/2014.
- (8) Member States should also have sufficient time to use the amounts recommitted to the same action or transferred to other actions prior to the decommitment of those amounts. Therefore, when such commitments or transfers of amounts under the national programme are approved by the Commission, the amounts concerned should be considered to have been committed in the year of the revision of the national programme that approves the recommitment or the transfer concerned.
- (9) The Commission should report annually to the European Parliament and to the Council as regards the implementation of resources for the transfer of applicants for international protection and of beneficiaries of international protection, in particular as regards transfers of amounts to other actions under the national programme as provided for in this Regulation.
- (10) This Regulation does not affect the funding available under Article 17 of Regulation (EU) No 516/2014.
- (11) The objectives of this Regulation are pursued without prejudice to the ongoing negotiations on the reform of Regulation (EU) No 604/2013 of the European Parliament and of the Council ⁽³⁾.
- (12) In accordance with Articles 1 and 2 and Article 4a(1) of Protocol No 21 on the position of the United Kingdom and Ireland in respect of the area of freedom, security and justice, annexed to the Treaty on European Union (TEU) and to the Treaty on the Functioning of the European Union (TFEU), and without prejudice to Article 4 of that Protocol, the United Kingdom is not taking part in the adoption of this Regulation and is not bound by it or subject to its application.
- (13) In accordance with Article 3 and Article 4a(1) of Protocol No 21 on the position of the United Kingdom and Ireland in respect of the area of freedom, security and justice, annexed to the TEU and to the TFEU, Ireland has notified, by letter of 7 December 2018, its wish to take part in the adoption and application of this Regulation.
- (14) In accordance with Articles 1 and 2 of Protocol No 22 on the position of Denmark, annexed to the TEU and to the TFEU, Denmark is not taking part in the adoption of this Regulation and is not bound by it or subject to its application.
- (15) In view of the need to avoid decommitment of the remaining amounts committed to support the implementation of Decisions (EU) 2015/1523 and (EU) 2015/1601, this Regulation should enter into force on the day of its publication in the *Official Journal of the European Union*.

⁽¹⁾ Regulation (EU, Euratom) 2018/1046 of the European Parliament and of the Council of 18 July 2018 on the financial rules applicable to the general budget of the Union, amending Regulations (EU) No 1296/2013, (EU) No 1301/2013, (EU) No 1303/2013, (EU) No 1304/2013, (EU) No 1309/2013, (EU) No 1316/2013, (EU) No 223/2014, (EU) No 283/2014, and Decision No 541/2014/EU and repealing Regulation (EU, Euratom) No 966/2012 (OJ L 193, 30.7.2018, p. 1).

⁽²⁾ Regulation (EU) No 514/2014 of the European Parliament and of the Council of 16 April 2014 laying down general provisions on the Asylum, Migration and Integration Fund and on the instrument for financial support for police cooperation, preventing and combating crime, and crisis management (OJ L 150, 20.5.2014, p. 112).

⁽³⁾ Regulation (EU) No 604/2013 of the European Parliament and of the Council of 26 June 2013 establishing the criteria and mechanisms for determining the Member State responsible for examining an application for international protection lodged in one of the Member States by a third-country national or a stateless person (OJ L 180, 29.6.2013, p. 31).

- (16) If Regulation (EU) No 516/2014 is not amended before the end of 2018, the relevant funding will no longer be available for Member States' use under the national programmes supported by the Asylum, Migration and Integration Fund. In view of the urgency of amending Regulation (EU) No 516/2014, it was considered to be appropriate to provide for an exception to the eight-week period referred to in Article 4 of Protocol No 1 on the role of national Parliaments in the European Union, annexed to the TEU, to the TFEU and to the Treaty establishing the European Atomic Energy Community.
- (17) Regulation (EU) No 516/2014 should therefore be amended accordingly,

HAVE ADOPTED THIS REGULATION:

Article 1

Regulation (EU) No 516/2014 is amended as follows:

(1) Article 18 is amended as follows:

(a) the heading is replaced by the following:

'Resources for the transfer of applicants for international protection or of beneficiaries of international protection';

(b) in paragraph 1, the words 'beneficiary of international protection' are replaced by the words 'applicant for international protection or beneficiary of international protection';

(c) paragraph 3 is replaced by the following:

'3. The additional amounts referred to in paragraph 1 of this Article shall be allocated to the Member States for the first time in the individual financing decisions approving their national programme in accordance with the procedure laid down in Article 14 of Regulation (EU) No 514/2014 and later in a financing decision to be annexed to the decision approving their national programme. Recommitments of those amounts to the same action under the national programme or transfers of those amounts to other actions under the national programme shall be possible where duly justified in the revision of the relevant national programme. An amount may only be recommitted or transferred once. The Commission shall approve the recommitment or transfer through the revision of the national programme.

In respect of amounts stemming from the provisional measures established by Council Decisions (EU) 2015/1523 (*) and (EU) 2015/1601 (**), with a view to enhancing solidarity and in accordance with Article 80 TFEU, Member States shall allocate at least 20 % of those amounts to actions under the national programmes for the transfer of applicants for international protection or of beneficiaries of international protection, for resettlement or other ad hoc humanitarian admissions, as well as for preparatory measures for the transfer of applicants for international protection following their arrival in the Union, including arrival by sea, or for the transfer of beneficiaries of international protection. Such measures shall not include any measures related to detention. Where a Member State recommits or transfers resources below that minimum percentage, it shall not be possible to transfer the difference between the recommitted or transferred amount and the minimum percentage to other actions under the national programme.

(*) Council Decision (EU) 2015/1523 of 14 September 2015 establishing provisional measures in the area of international protection for the benefit of Italy and of Greece (OJ L 239, 15.9.2015, p. 146).

(**) Council Decision (EU) 2015/1601 of 22 September 2015 establishing provisional measures in the area of international protection for the benefit of Italy and Greece (OJ L 248, 24.9.2015, p. 80).;

(d) the following paragraphs are inserted:

'3a. For the purpose of Article 50(1) of Regulation (EU) No 514/2014, where amounts stemming from the provisional measures established by Decisions (EU) 2015/1523 and (EU) 2015/1601 are recommitted to the same action under the national programme or transferred to other actions under the national programme in accordance with paragraph 3 of this Article, the amounts concerned shall be considered to have been committed in the year of the revision of the national programme that approves the recommitment or transfer in question.

3b. By way of derogation from Article 50(1) of Regulation (EU) No 514/2014, the deadline for the decommitment of the amounts referred to in paragraph 3a of this Article shall be extended by a period of six months.

3c. The Commission shall report annually to the European Parliament and to the Council on the application of this Article.;

(e) paragraph 4 is replaced by the following:

‘4. To effectively pursue the objectives of solidarity and fair sharing of responsibility between the Member States referred to in Article 80 TFEU, and within the limits of available resources, the Commission shall be empowered to adopt delegated acts in accordance with Article 26 of this Regulation to adjust the lump sum referred to in paragraph 1 of this Article, taking into account in particular the current rates of inflation, relevant developments in the field of transfer of applicants for international protection and of beneficiaries of international protection from one Member State to another and in the field of resettlement and other ad hoc humanitarian admission, as well as factors which can optimise the use of the financial incentive brought by the lump sums.’;

(2) in the heading and the introductory wording of Article 25, the words ‘beneficiaries of international protection’ are replaced by the words ‘applicants for international protection or of beneficiaries of international protection’.

Article 2

This Regulation shall enter into force on the day of its publication in the *Official Journal of the European Union*.

This Regulation shall be binding in its entirety and directly applicable in the Member States in accordance with the Treaties.

Done at Strasbourg, 12 December 2018.

For the European Parliament

The President

A. TAJANI

For the Council

The President

J. BOGNER-STRAUSS

DIRECTIVES

DIRECTIVE (EU) 2018/2001 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 11 December 2018

on the promotion of the use of energy from renewable sources

(recast)

(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 194(2) thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee ⁽¹⁾,

Having regard to the opinion of the Committee of the Regions ⁽²⁾,

Acting in accordance with the ordinary legislative procedure ⁽³⁾,

Whereas:

- (1) Directive 2009/28/EC of the European Parliament and of the Council ⁽⁴⁾ has been substantially amended several times ⁽⁵⁾. Since further amendments are to be made, that Directive should be recast in the interests of clarity.
- (2) In accordance with Article 194(1) of the Treaty on the Functioning of the European Union (TFEU), promoting renewable forms of energy is one of the goals of the Union energy policy. That goal is pursued by this Directive. The increased use of energy from renewable sources or 'renewable energy' constitutes an important part of the package of measures needed to reduce greenhouse gas emissions and comply with the Union's commitment under the 2015 Paris Agreement on Climate Change following the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change (the 'Paris Agreement'), and with the Union 2030 energy and climate framework, including the Union's binding target to cut emissions by at least 40 % below 1990 levels by 2030. The Union's binding renewable energy target for 2030 and Member States' contributions to that target, including their baseline shares in relation to their national overall targets for 2020, are among the elements which have an overarching importance for the Union's energy and environmental policy. Other such elements are contained in the framework set out in this Directive, for instance, for the development of renewable heating and cooling and the development of renewable transport fuels.
- (3) The increased use of energy from renewable sources also has a fundamental part to play in promoting the security of energy supply, sustainable energy at affordable prices, technological development and innovation as well as technological and industrial leadership while providing environmental, social and health benefits as well as major opportunities for employment and regional development, especially in rural and isolated areas, in regions or territories with low population density or undergoing partial deindustrialisation.

⁽¹⁾ OJ C 246, 28.7.2017, p. 55.

⁽²⁾ OJ C 342, 12.10.2017, p. 79.

⁽³⁾ Position of the European Parliament of 13 November 2018 (not yet published in the Official Journal) and decision of the Council of 4 December 2018.

⁽⁴⁾ Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (OJ L 140, 5.6.2009, p. 16).

⁽⁵⁾ See Annex X, Part A.

- (4) In particular, reducing energy consumption, increasing technological improvements, incentives for the use and expansion of public transport, the use of energy efficiency technologies and the promotion of the use of renewable energy in the electricity sector, the heating and cooling sector and the transport sector are effective tools, together with energy efficiency measures, for reducing greenhouse gas emissions in the Union and the Union's energy dependence.
- (5) Directive 2009/28/EC established a regulatory framework for the promotion of the use of energy from renewable sources which set binding national targets on the share of renewable energy in energy consumption and in the transport sector to be met by 2020. The Commission Communication of 22 January 2014 entitled 'A policy framework for climate and energy in the period from 2020 to 2030', established a framework for future Union energy and climate policies and promoted a common understanding of how to develop those policies after 2020. The Commission proposed that the Union 2030 target for the share of renewable energy consumed in the Union should be at least 27 %. That proposal was endorsed by the European Council in its conclusions of 23 and 24 October 2014, which indicated that Member States should be able to set their own, more ambitious, national targets in order to deliver their planned contributions to the Union 2030 target and exceed them.
- (6) In its resolutions of 5 February 2014 entitled 'A 2030 framework for climate and energy policies' and of 23 June 2016 entitled 'The renewable energy progress report', the European Parliament went further than the Commission proposal or the European Council conclusions, stressing that, in light of the Paris Agreement and the recent renewable technology cost reductions, it was desirable to be significantly more ambitious.
- (7) The ambition set out in the Paris Agreement as well as technological developments, including cost reductions for investments in renewable energy, should therefore be taken into account.
- (8) It is thus appropriate to establish a binding Union target of a share of at least 32 % of renewable energy. Moreover, the Commission should assess whether that target should be reviewed upwards in light of substantial cost reductions in the production of renewable energy, the Union's international commitments for decarbonisation, or in the case of a significant decrease in energy consumption in the Union. Member States should establish their contribution to the achievement of that target as part of their integrated national energy and climate plans pursuant to the governance process laid down in Regulation (EU) 2018/1999 of the European Parliament and of the Council ⁽¹⁾.
- (9) The establishment of a binding Union renewable energy target for 2030 would continue to encourage the development of technologies which produce renewable energy and provide certainty for investors. A target defined at Union level would leave greater flexibility for Member States to meet their greenhouse gas reduction targets in the most cost-effective manner in accordance with their specific circumstances, energy mix and capacity to produce renewable energy.
- (10) In order to ensure consolidation of the results achieved under Directive 2009/28/EC, the national targets set for 2020 should constitute Member States' minimum contributions to the new 2030 framework. Under no circumstances should the national shares of renewable energy fall below those contributions. If they do, the relevant Member States should take appropriate measures as provided for in Regulation (EU) 2018/1999 to ensure that that baseline share is regained. If a Member State does not maintain its baseline share over a 12-month period, it should, within 12 months of the end of that period, take additional measures to regain that baseline share. Where a Member State has effectively taken such additional measures and has fulfilled its obligation to regain the baseline share, it should be deemed to have complied with the mandatory baseline share requirements under this Directive and under Regulation (EU) 2018/1999 for the entire period in question. The Member State in question cannot therefore be considered to have failed to fulfil its obligation to maintain its baseline share for the period in time where the gap occurred. Both the 2020 and 2030 frameworks serve the environmental and energy policy objectives of the Union.
- (11) Member States should take additional measures in the event that the share of renewable energy at Union level does not meet the Union trajectory towards the renewable energy target of at least 32 %. Under Regulation (EU) 2018/1999 the Commission may take measures at Union level in order to ensure achievement of the target if an ambition gap is identified by the Commission during the assessment of the integrated national energy and

⁽¹⁾ Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council (see page 1 of this Official Journal).

climate plans. If the Commission identifies a delivery gap during its assessment of the integrated national energy and climate progress reports, Member States should apply the measures provided for in Regulation (EU) 2018/1999 to close that gap.

- (12) In order to support Member States' ambitious contributions to the Union target, a financial framework aiming to facilitate investments in renewable energy projects in those Member States should be established, including through the use of financial instruments.
- (13) The Commission should focus the allocation of funds on the reduction of the cost of capital of renewable energy projects since such cost has a material impact on the cost of renewable energy projects and on their competitiveness, as well as on the development of essential infrastructure for an enhanced technically feasible and economically affordable uptake of renewable energy such as transmission and distribution grid infrastructure, intelligent networks and interconnections.
- (14) The Commission should facilitate the exchange of best practices between the competent national or regional authorities or bodies, for instance through regular meetings, to find a common approach to promote a higher uptake of cost-efficient renewable energy projects. The Commission should also encourage investments in new, flexible and clean technologies, and establish an adequate strategy to manage the retirement of technologies which do not contribute to the reduction of emissions or deliver sufficient flexibility, based on transparent criteria and reliable market price signals.
- (15) Regulation (EC) No 1099/2008 of the European Parliament and of the Council ⁽¹⁾, Directives 2001/77/EC ⁽²⁾ and 2003/30/EC ⁽³⁾ of the European Parliament and of the Council, and Directive 2009/28/EC established definitions for different types of energy from renewable sources. Union law on the internal market for energy establishes definitions for the electricity sector in general. In the interests of clarity and legal certainty it is appropriate to apply those definitions in this Directive.
- (16) Support schemes for electricity from renewable sources or 'renewable electricity' have been demonstrated to be an effective way of fostering deployment of renewable electricity. If and when Member States decide to implement support schemes, such support should be provided in a form that is as non-distortive as possible for the functioning of electricity markets. To that end, an increasing number of Member States allocate support in a form by means of which support is granted in addition to market revenues and introduce market-based systems to determine the necessary level of support. Together with steps by which to make the market fit for increasing shares of renewable energy, such support is a key element of increasing the market integration of renewable electricity, while taking into account the different capabilities of small and large producers to respond to market signals.
- (17) Small-scale installations can be of great benefit to increase public acceptance and to ensure the rollout of renewable energy projects, in particular at local level. In order to ensure participation of such small-scale installations, specific conditions, including feed-in tariffs, might therefore still be necessary to ensure a positive cost-benefit ratio, in accordance with Union law relating to the electricity market. The definition of small-scale installations for the purposes of obtaining such support is important to provide legal certainty for investors. State aid rules contain definitions of small-scale installations.
- (18) Pursuant to Article 108 TFEU, the Commission has exclusive competence to assess the compatibility of State aid measures with the internal market which the Member States may put in place for deployment of energy from renewable sources. That assessment is carried out on the basis of Article 107(3) TFEU and in accordance with the relevant provisions and guidelines which the Commission may adopt to that effect. This Directive is without prejudice to the Commission's exclusive competence granted by the TFEU.
- (19) Electricity from renewable sources should be deployed at the lowest possible cost to consumers and taxpayers. When designing support schemes and when allocating support, Member States should seek to

⁽¹⁾ Regulation (EC) No 1099/2008 of the European Parliament and of the Council of 22 October 2008 on energy statistics (OJ L 304, 14.11.2008, p. 1).

⁽²⁾ Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market (OJ L 283, 27.10.2001, p. 33).

⁽³⁾ Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport (OJ L 123, 17.5.2003, p. 42).

minimise the overall system cost of deployment along the decarbonisation pathway towards the objective of a low-carbon economy by the year 2050. Market-based mechanisms, such as tendering procedures, have been demonstrated to reduce support cost effectively in competitive markets in many circumstances. However, in specific circumstances, tendering procedures may not necessarily lead to efficient price discovery. Balanced exemptions may therefore need to be considered to ensure cost-effectiveness and minimise overall support cost. In particular, Member States should be allowed to grant exemptions from tendering procedures and direct marketing to small-scale installations and demonstration projects in order to take into account their more limited capabilities. Since the Commission assesses the compatibility of support for renewable energy with the internal market on a case-by-case basis, such exemptions should comply with the relevant thresholds set out in the latest Commission Guidelines on State aid for environmental protection and energy. In the Guidelines for 2014 to 2020, those thresholds are set at 1 MW (and 6 MW or 6 generation units for wind energy) and 500 kW (and 3 MW or 3 generation units for wind energy) in terms of exemptions from, respectively, tendering procedures and direct marketing. To increase the effectiveness of tendering procedures to minimise overall support costs, tendering procedures should, in principle, be open to all producers of electricity from renewable sources on a non-discriminatory basis. While Member States develop their support schemes, they may limit tendering procedures to specific technologies where this is needed to avoid sub-optimal results with regard to network constraints and grid stability, system integration costs, the need to achieve diversification of the energy mix, and the long-term potential of technologies.

- (20) In its conclusions of 23 and 24 October 2014 on the '2030 Climate and Energy Policy Framework', the European Council stressed the importance of a more interconnected internal energy market and the need for sufficient support to integrate ever increasing levels of variable renewable energy and thus allow the Union to fulfil its leadership ambitions for the energy transition. It is therefore important and urgent to increase the level of interconnection and to make progress towards the European Council's objectives, in order to maximise the Energy Union's full potential.
- (21) When developing support schemes for renewable sources of energy, Member States should consider the available sustainable supply of biomass and take due account of the principles of the circular economy and of the waste hierarchy established in Directive 2008/98/EC of the European Parliament and of the Council⁽¹⁾ in order to avoid unnecessary distortions of raw materials markets. Waste prevention and recycling of waste should be the priority option. Member States should avoid creating support schemes which would be counter to targets on treatment of waste and which would lead to the inefficient use of recyclable waste.
- (22) Member States have different renewable energy potentials and operate different support schemes at national level. The majority of Member States apply support schemes that grant benefits solely to energy from renewable sources that is produced on their territory. For the proper functioning of national support schemes, it is vital that Member States continue to be able to control the effect and costs of their national support schemes in accordance with their different potentials. One important means by which to achieve the aim of this Directive remains to guarantee the proper functioning of national support schemes under Directives 2001/77/EC and 2009/28/EC, in order to maintain investor confidence and allow Member States to design effective national measures for their respective contributions to the Union's 2030 target for renewable energy and for the national targets that they have set for themselves. This Directive should facilitate cross-border support for renewable energy without affecting national support schemes in a disproportionate manner.
- (23) The opening of support schemes to cross-border participation limits negative impacts on the internal energy market and can, under certain conditions, help Member States achieve the Union target more cost-efficiently. Cross-border participation is also the natural corollary to the development of the Union renewable energy policy, fostering convergence and cooperation to contribute to the Union's binding target. It is therefore appropriate to encourage Member States to open support to projects located in other Member States, and define several ways in which such progressive opening may be implemented, ensuring compliance with the TFEU, in particular Articles 30, 34 and 110 thereof. As electricity flows cannot be traced, it is appropriate to link the opening of support schemes to cross-border participation to shares representing an aspiration towards actual levels of physical interconnection and to allow Member States to restrict their open support schemes to Member States with which they have a direct network connection as a practical proxy for demonstrating the existence of physical flows between the Member States. This should not, however, in any way affect the cross-zonal or cross-border functioning of the electricity markets.

⁽¹⁾ Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (OJ L 312, 22.11.2008, p. 3).

- (24) In order to ensure that the opening of support schemes is reciprocal and brings mutual benefits, cooperation agreements should be signed between participating Member States. Member States should retain control over the pace of deployment of renewable electricity capacity on their territory in order, in particular, to take account of associated integration costs and required grid investments. Member States should thus be allowed to limit the participation of installations located on their territory to tenders opened to them by other Member States. Those cooperation agreements should address all relevant aspects, such as accounting for costs relating to a project built by one Member State on the territory of another, including the expenditure relating to strengthening networks, energy transfer, storage and back-up capacity, as well as possible congestions in the network. In those agreements Member States should also take into account measures that may allow for the cost-effective integration of such additional renewable electricity capacity, whether they are of a regulatory nature (for instance related to market design) or provide for additional investments in various sources of flexibility (for instance interconnections, storage, demand response or flexible generation).
- (25) Member States should avoid distortive situations resulting in the extensive importation of resources from third countries. A life-cycle approach should be considered and promoted in that respect.
- (26) Member States should ensure that renewable energy communities can participate in available support schemes on an equal footing with large participants. To that end, Member States should be allowed to take measures, such as providing information, providing technical and financial support, reducing administrative requirements, including community-focused bidding criteria, creating tailored bidding windows for renewable energy communities, or allowing renewable energy communities to be remunerated through direct support where they comply with requirements of small installations.
- (27) The planning of the infrastructure needed for the production of electricity from renewable sources should take into account policies relating to the participation of those affected by the projects, in particular local populations.
- (28) Consumers should be provided with comprehensive information, including information on the energy performance of heating and cooling systems and on the lower running costs of electric vehicles, to allow them to make individual consumer choices with regard to renewable energy and avoid technology lock-in.
- (29) Without prejudice to Articles 107 and 108 TFEU, policies supporting renewable energy should be predictable and stable and should avoid frequent or retroactive changes. Policy unpredictability and instability have a direct impact on capital financing costs, on the costs of project development and therefore on the overall cost of deploying renewable energy in the Union. Member States should prevent the revision of any support granted to renewable energy projects from having a negative impact on their economic viability. In that context, Member States should promote cost-effective support policies and ensure their financial sustainability. Moreover, a long-term indicative schedule covering the main aspects of the expected support should be published, without affecting the ability of Member States to decide on budget allocation in the years covered by the schedule.
- (30) Member States' obligations to draft renewable energy action plans and progress reports and the Commission's obligation to report on Member States' progress are essential in order to increase transparency, provide clarity to investors and consumers and allow for effective monitoring. Regulation (EU) 2018/1999 integrates those obligations in the Energy Union governance system, where planning, reporting and monitoring obligations in the energy and climate fields are streamlined. The transparency platform on renewable energy is also integrated in the broader e-platform established in that Regulation.
- (31) It is necessary to provide for transparent and unambiguous rules for calculating the share of energy from renewable sources and for defining those sources.
- (32) In calculating the contribution of hydropower and wind power for the purposes of this Directive, the effects of climatic variation should be smoothed through the use of a normalisation rule. Further, electricity produced in pumped storage units from water that has previously been pumped uphill should not be considered to be renewable electricity.

- (33) In order to function, heat pumps enabling the use of ambient and geothermal energy at a useful temperature level or systems providing cooling need electricity or other auxiliary energy. The energy used to drive those systems should therefore be deducted from the total usable energy or energy removed from the area. Only heating and cooling systems where the output or energy removed from an area significantly exceeds the primary energy needed to drive them should be taken into account. Cooling systems contribute to energy use in Member States and it is therefore appropriate that the calculation methods take into account the share of renewable energy used in such systems in all end-use sectors.
- (34) Passive energy systems use building design to harness energy. This is considered to be saved energy. To avoid double counting, energy harnessed in this way should not be taken into account for the purposes of this Directive.
- (35) Some Member States have a large share of aviation in their gross final consumption of energy. In view of the current technological and regulatory constraints that prevent the commercial use of biofuels in aviation, it is therefore appropriate to provide those Member States with a partial exemption within the calculation of the gross final consumption of energy in the national air transport sector in order to allow them to exclude from that calculation the amount by which they exceed one-and-a-half times the Union average gross final consumption of energy in aviation in 2005, as assessed by Eurostat, namely, 6,18 %. Due to their insular and peripheral character, Cyprus and Malta rely in particular on aviation as a mode of transport, which is essential for their citizens and their economy. As a result, their gross final consumption of energy in the national air transport sector is disproportionately high, namely, more than three times the Union average in 2005. They are thus disproportionately affected by the current technological and regulatory constraints. It is therefore appropriate to provide that they benefit from an exemption covering the amount by which they exceed the Union average gross final consumption of energy in aviation in 2005 as assessed by Eurostat, namely, 4,12 %.
- (36) The communication of the Commission of 20 July 2016 entitled 'A European Strategy for Low-Emission Mobility', highlighted the particular importance, in the medium term, of advanced biofuels and renewable liquid and gaseous fuels of non-biological origin for aviation.
- (37) In order to ensure that the list of feedstock to produce advanced biofuels, other biofuels and biogas, as set out in an annex to this Directive, takes into account the principles of the waste hierarchy established in Directive 2008/98/EC, the Union sustainability criteria, and the need to ensure that that annex does not create additional demand for land while promoting the use of wastes and residues, the Commission, when regularly evaluating that annex, should consider the inclusion of additional feedstock that does not cause significant distortive effects on markets for (by-)products, wastes or residues.
- (38) To create opportunities for reducing the cost of meeting the Union target laid down in this Directive and to give flexibility to Member States to comply with their obligation not to fall below their 2020 national targets after 2020, it is appropriate both to facilitate the consumption in Member States of energy produced from renewable sources in other Member States, and to enable Member States to count energy from renewable sources consumed in other Member States towards their own renewable energy share. For that reason, the Commission should put in place a Union renewable development platform ('URDP'), enabling trading renewable energy shares between Member States, in addition to bilateral cooperation agreements. The URDP is intended to complement the voluntary opening of support schemes to projects located in other Member States. The agreements between Member States include statistical transfers, joint projects between Member States or joint support schemes.
- (39) Member States should be encouraged to pursue all appropriate forms of cooperation in relation to the objectives set out in this Directive and to inform citizens about the benefits stemming from the use of cooperation mechanisms. Such cooperation can take place at all levels, bilaterally or multilaterally. Apart from the mechanisms which have an effect on target renewable energy share calculation and target compliance, and which are exclusively provided for in this Directive, namely statistical transfers between Member States –whether put in place bilaterally or through the URDP – joint projects and joint support schemes, cooperation can also take the form of, for example, exchanges of information and best practices, as provided for, in particular, in the e-platform established by Regulation (EU) 2018/1999, and other voluntary coordination between all types of support schemes.

- (40) It should be possible for imported electricity produced from renewable sources outside the Union to count towards Member States' renewable energy shares. In order to guarantee an adequate effect of renewable energy replacing non-renewable energy in the Union as well as in third countries, it is appropriate to ensure that such imports can be tracked and accounted for in a reliable way. Agreements with third countries concerning the organisation of such trade in renewable electricity will be considered. If, by virtue of a decision taken under the Energy Community Treaty ⁽¹⁾ to that effect, the contracting parties thereto are bound by the relevant provisions of this Directive, the measures of cooperation between Member States provided for in this Directive should be applicable to them.
- (41) When Member States undertake joint projects with one or more third countries regarding the production of renewable electricity, it is appropriate that those joint projects relate only to newly constructed installations or to installations with newly increased capacity. This will help ensure that the proportion of energy from renewable sources in the third country's total energy consumption is not reduced due to the importation of energy from renewable sources into the Union.
- (42) In addition to establishing a Union framework for the promotion of energy from renewable sources, this Directive also contributes to the potential positive impact which the Union and the Member States can have in boosting the development of the renewable energy sector in third countries. The Union and the Member States should promote research, development and investment in the production of renewable energy in developing and other partner countries while fully respecting international law, thereby strengthening their environmental and economic sustainability and their export capacity of renewable energy.
- (43) The procedure used for the authorisation, certification and licensing of renewable energy plants should be objective, transparent, non-discriminatory and proportionate when applying the rules to specific projects. In particular, it is appropriate to avoid any unnecessary burden that could arise by classifying renewable energy projects under installations which represent a high risk to health.
- (44) For the benefit of the rapid deployment of energy from renewable sources and in view of their overall high sustainable and environmental beneficial quality, Member States should, when applying administrative rules or planning structures and legislation which are designed for licensing installations with respect to pollution reduction and control of industrial plants, for combating air pollution, or for the prevention or minimisation of the discharge of dangerous substances in the environment, take into account the contribution of energy from renewable sources towards meeting environmental and climate change objectives, in particular when compared to non-renewable energy installations.
- (45) The coherence between the objectives of this Directive and the Union's other environmental law should be ensured. In particular, during assessment, planning or licensing procedures for renewable energy installations, Member States should take account of all Union environmental law and the contribution made by energy from renewable sources towards meeting environmental and climate change objectives, in particular when compared to non-renewable energy installations.
- (46) Geothermal energy is an important local renewable energy source which usually has considerably lower emissions than fossil fuels, and certain types of geothermal plants produce near-zero emission. However, depending on the geological characteristics of an area, the production of geothermal energy may release greenhouse gases and other substances from underground fluids, and other subsoil geological formations, which are harmful for health and the environment. The Commission should therefore facilitate only the deployment of geothermal energy with a low environmental impact and resulting in greenhouse gas emissions savings compared to non-renewable sources.
- (47) At national, regional and where applicable local level, rules and obligations for minimum requirements for the use of energy from renewable sources in new and renovated buildings have led to considerable increases in the use of energy from renewable sources. Those measures should be encouraged in a wider Union context, while promoting the use of more energy-efficient applications of energy from renewable sources in combination with energy-savings and energy-efficiency measures through building regulations and codes.

⁽¹⁾ OJ L 198, 20.7.2006, p. 18.

- (48) In order to facilitate and accelerate the setting of minimum levels for the use of energy from renewable sources in buildings, the calculation of those minimum levels in new and existing buildings subject to major renovation should provide a sufficient basis for assessing whether the inclusion of minimum levels of renewable energy is technically, functionally and economically feasible. Member States should allow, *inter alia*, the use of efficient district heating and cooling or, where district heating and cooling systems are not available, other energy infrastructure to fulfil those requirements.
- (49) To ensure that national measures for developing renewable heating and cooling are based on comprehensive mapping and analysis of the national renewable and waste energy potential and that such measures provide for increased integration of renewable energy, by supporting, *inter alia*, innovative technologies such as heat pumps, geothermal and solar thermal technologies, and waste heat and cold, it is appropriate to require that Member States carry out an assessment of their potential of energy from renewable sources and the use of waste heat and cold in the heating and cooling sector, in particular to promote energy from renewable sources in heating and cooling installations and promote competitive and efficient district heating and cooling. To ensure consistency with energy efficiency requirements for heating and cooling and reduce administrative burden, that assessment should be included in the comprehensive assessments carried out and notified in accordance with Article 14 of Directive 2012/27/EU of the European Parliament and of the Council ⁽¹⁾.
- (50) The lack of transparent rules and coordination between the different authorisation bodies has been shown to hinder the deployment of energy from renewable sources. Providing guidance to applicants throughout their administrative permit application and granting processes by means of an administrative contact point is intended to reduce complexity for project developers and increase efficiency and transparency, including for renewables self-consumers and renewable energy communities. Such guidance is to be provided at an appropriate level of governance, taking into account the specificities of Member States. The single contact points should guide the applicant and facilitate through the entire administrative process so that the applicant is not obliged to contact other administrative bodies in order to complete the permit-granting process, unless the applicant prefers to do so.
- (51) Lengthy administrative procedures constitute a major administrative barrier and are costly. The simplification of administrative permit granting processes, and clear time-limits for decisions to be taken by the authorities competent for issuing the authorisation for the electricity generation installation on the basis of a completed application, should stimulate a more efficient handling of procedures, thereby reducing administrative costs. A manual of procedures should be made available to facilitate the understanding of procedures for project developers and citizens wishing to invest in renewable energy. In order to foster the uptake of renewable energy by microenterprises and small and medium-sized enterprises (SMEs) and individual citizens, in accordance with the objectives set out in this Directive, a simple-notification procedure for grid connections to the competent body should be established for small renewable energy projects, including those that are decentralised, such as rooftop solar installations. In order to respond to the increasing need for the repowering of existing renewable energy plants, streamlined permit-granting procedures should be provided for. This Directive, in particular the provisions on the organisation and duration of the administrative permit granting process, should apply without prejudice to international and Union law, including provisions to protect the environment and human health. Where duly justified on the grounds of extraordinary circumstances, it should be possible to extend the initial timeframes by up to one year.
- (52) Information and training gaps, especially in the heating and cooling sector, should be removed in order to encourage the deployment of energy from renewable sources.
- (53) In so far as the access or pursuit of the profession of installer is a regulated profession, the preconditions for the recognition of professional qualifications are laid down in Directive 2005/36/EC of the European Parliament and of the Council ⁽²⁾. This Directive therefore applies without prejudice to Directive 2005/36/EC.

⁽¹⁾ Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (OJ L 315, 14.11.2012, p. 1).

⁽²⁾ Directive 2005/36/EC of the European Parliament and of the Council of 7 September 2005 on the recognition of professional qualifications (OJ L 255, 30.9.2005, p. 22).

- (54) While Directive 2005/36/EC lays down requirements for the mutual recognition of professional qualifications, including for architects, there is also a need to ensure that planners and architects properly consider an optimal combination of renewable energy and high-efficiency technologies in their plans and designs. Member States should therefore provide clear guidance in that regard. This should be done without prejudice to that Directive and in particular Articles 46 and 49 thereof.
- (55) Guarantees of origin issued for the purposes of this Directive have the sole function of showing to a final customer that a given share or quantity of energy was produced from renewable sources. A guarantee of origin can be transferred, independently of the energy to which it relates, from one holder to another. However, with a view to ensuring that a unit of renewable energy is disclosed to a customer only once, double counting and double disclosure of guarantees of origin should be avoided. Energy from renewable sources in relation to which the accompanying guarantee of origin has been sold separately by the producer should not be disclosed or sold to the final customer as energy from renewable sources. It is important to distinguish between green certificates used for support schemes and guarantees of origin.
- (56) It is appropriate to allow the consumer market for renewable electricity to contribute to the development of energy from renewable sources. Member States should therefore require electricity suppliers who disclose their energy mix to final customers pursuant to Union law on the internal market for electricity, or who market energy to consumers with a reference to the consumption of energy from renewable sources, to use guarantees of origin from installations producing energy from renewable sources.
- (57) It is important to provide information on how supported electricity is allocated to final customers. In order to improve the quality of that information to consumers, Member States should ensure that guarantees of origin are issued for all units of renewable energy produced, except where they decide not to issue guarantees of origin to producers that also receive financial support. If Member States decide to issue guarantees of origin to producers that also receive financial support or not to issue guarantees of origin directly to producers, they should be able to choose by which means and mechanisms to take into account the market value of those guarantees of origin. Where renewable energy producers also receive financial support, the market value of the guarantees of origin for the same production should be appropriately taken into account in the relevant support scheme.
- (58) Directive 2012/27/EU provides for guarantees of origin for proving the origin of electricity produced from high-efficiency cogeneration plants. However, no use is specified for such guarantees of origin, so their use may also be enabled when disclosing the use of energy from high-efficiency cogeneration.
- (59) Guarantees of origin which are currently in place for renewable electricity should be extended to cover renewable gas. Extending the guarantees of origin system to energy from non-renewable sources should be an option for Member States. This would provide a consistent means of proving to final customers the origin of renewable gas such as biomethane and would facilitate greater cross-border trade in such gas. It would also enable the creation of guarantees of origin for other renewable gas such as hydrogen.
- (60) There is a need to support the integration of energy from renewable sources into the transmission and distribution grid and the use of energy storage systems for integrated variable production of energy from renewable sources, in particular as regards the rules regulating dispatch and access to the grid. The framework for the integration of renewable electricity is provided for in other Union law relating to the internal electricity market. However, that framework does not include provisions on the integration of gas from renewable sources into the gas grid. It is therefore necessary to include such provisions in this Directive.
- (61) The opportunities for establishing economic growth through innovation and a sustainable competitive energy policy have been recognised. Production of energy from renewable sources often depends on local or regional SMEs. The opportunities for local business development, sustainable growth and high-quality employment that investments in regional and local production of energy from renewable sources bring about in the Member States and their regions are important. The Commission and the Member States should therefore foster and support

national and regional development measures in those areas, encourage the exchange of best practices in production of energy from renewable sources between local and regional development initiatives and enhance the provision of technical assistance and training programmes, in order to strengthen regulatory, technical and financial expertise and foster knowledge on available funding possibilities, including a more targeted use of Union funds, such as the use of cohesion policy funding in that area.

- (62) Regional and local authorities often set more ambitious renewable targets that exceed national targets. Regional and local commitments to stimulating development of renewable energy and energy efficiency are currently supported through networks, such as the Covenant of Mayors, Smart Cities or Smart Communities initiatives, and the development of sustainable energy action plans. Such networks are essential and should be expanded, as they raise awareness and facilitate exchanges of best practices and available financial support. In that context, the Commission should support interested innovative regions and local authorities to work across borders by assisting in setting up cooperation mechanisms, such as the European Grouping of Territorial Cooperation, which enables public authorities of various Member States to collaborate and deliver joint services and projects, without requiring a prior international agreement to be signed and ratified by national parliaments. Other innovative measures to attract more investment into new technologies, such as energy-performance contracts and standardisation processes in public financing, should also be considered.
- (63) When favouring the development of the market for energy from renewable sources, it is necessary to take into account the positive impact on regional and local development opportunities, export prospects, social cohesion and employment opportunities, in particular as concerns SMEs and independent energy producers, including renewables self-consumers and renewable energy communities.
- (64) The specific situation of the outermost regions is recognised in Article 349 TFEU. The energy sector in the outermost regions is often characterised by isolation, limited supply and dependence on fossil fuels while those regions benefit from significant local renewable sources of energy. The outermost regions could thus serve as examples of the application of innovative energy technologies for the Union. It is therefore necessary to promote the uptake of renewable energy in order to achieve a higher degree of energy autonomy for those regions and recognise their specific situation in terms of renewable energy potential and public support needs. Provision should be made for a derogation of limited local impact that allows Member States to adopt specific criteria in order to ensure eligibility for financial support for the consumption of certain biomass fuels. Member States should be able to adopt such specific criteria for installations using biomass fuels and located in an outermost region as referred to in Article 349 TFEU, as well as for biomass that is used as fuel in such installations and that does not comply with the harmonised sustainability, energy efficiency and greenhouse gas emissions saving criteria set out in this Directive. Such specific criteria for biomass fuels should apply irrespective of whether the place of origin of that biomass is a Member State or a third country. Moreover, any specific criteria should be objectively justified on the grounds of energy independence of the outermost region concerned and of ensuring a smooth transition to the sustainability criteria, the energy efficiency criteria and the greenhouse gas emissions saving criteria for biomass fuels of this Directive in such an outermost region.

Considering that the energy mix for electricity generation for the outermost regions is made up to a large extent of fuel oil, it is necessary to allow an appropriate consideration of greenhouse gas emissions saving criteria in those regions. It would therefore be appropriate to provide for a specific fossil fuel comparator for the electricity produced in the outermost regions. Member States should ensure effective compliance with their specific criteria. Finally, Member States should, without prejudice to support granted in accordance with support schemes in accordance with this Directive, not refuse to take into account, on other sustainability grounds, biofuels and bioliquids obtained in accordance with this Directive. This prohibition is intended to ensure that biofuels and bioliquids that comply with the harmonised criteria provided for in this Directive continue to benefit from the trade facilitation objectives of this Directive, including as regards the outermost regions concerned.

- (65) It is appropriate to allow for the development of decentralised renewable energy technologies and storage under non-discriminatory conditions and without hampering the financing of infrastructure investments. The move towards decentralised energy production has many benefits, including the utilisation of local energy sources, increased local security of energy supply, shorter transport distances and reduced energy transmission losses. Such decentralisation also fosters community development and cohesion by providing income sources and creating jobs locally.

- (66) With the growing importance of self-consumption of renewable electricity, there is a need for a definition of 'renewables self-consumers' and of 'jointly acting renewables self-consumers'. It is also necessary to establish a regulatory framework which would empower renewables self-consumers to generate, consume, store, and sell electricity without facing disproportionate burdens. Citizens living in apartments for example should be able to benefit from consumer empowerment to the same extent as households in single family homes. However, Member States should be allowed to differentiate between individual renewables self-consumers and jointly acting renewables self-consumers due to their different characteristics to the extent that any such differentiation is proportionate and duly justified.
- (67) Empowering jointly acting renewables self-consumers also provides opportunities for renewable energy communities to advance energy efficiency at household level and helps fight energy poverty through reduced consumption and lower supply tariffs. Member States should take appropriate advantage of that opportunity by, *inter alia*, assessing the possibility to enable participation by households that might otherwise not be able to participate, including vulnerable consumers and tenants.
- (68) Renewables self-consumers should not face discriminatory or disproportionate burdens or costs and should not be subject to unjustified charges. Their contribution to the achievement of the climate and energy target and the costs and benefits that they bring about in the wider energy system should be taken into account. Member States should therefore generally not apply charges to electricity produced and consumed within the same premises by renewables self-consumers. However, Member States should be allowed to apply non-discriminatory and proportionate charges to such electricity if necessary to ensure the financial sustainability of the electricity system, to limit the support to what is objectively needed and to make efficient use of their support schemes. At the same time, Member States should ensure that renewables self-consumers contribute in a balanced and adequate way to the overall cost-sharing system of producing, distributing and consuming electricity, when electricity is fed into the grid.
- (69) To that end, Member States should as a general principle not apply charges to electricity individually produced and consumed by renewables self-consumers within the same premises. However, in order to prevent that incentive from affecting the financial stability of support schemes for renewable energy, that incentive could be limited to small installations with an electrical capacity of 30 kW or less. In certain cases, Member States should be allowed to apply charges to renewables self-consumers for self-consumed electricity, where they make efficient use of their support schemes and apply non-discriminatory and effective access to their support schemes. Member States should also be able to apply partial exemptions from charges, levies, or a combination thereof and support, up to the level needed to ensure the economic viability of such projects.
- (70) The participation of local citizens and local authorities in renewable energy projects through renewable energy communities has resulted in substantial added value in terms of local acceptance of renewable energy and access to additional private capital which results in local investment, more choice for consumers and greater participation by citizens in the energy transition. Such local involvement is all the more crucial in a context of increasing renewable energy capacity. Measures to allow renewable energy communities to compete on an equal footing with other producers also aim to increase the participation of local citizens in renewable energy projects and therefore increase acceptance of renewable energy.
- (71) The specific characteristics of local renewable energy communities in terms of size, ownership structure and the number of projects can hamper their competition on an equal footing with large-scale players, namely competitors with larger projects or portfolios. Therefore, it should be possible for Member States to choose any form of entity for renewable energy communities, provided that such an entity may, acting in its own name, exercise rights and be subject to obligations. To avoid abuse and to ensure broad participation, renewable energy communities should be capable of remaining autonomous from individual members and other traditional market actors that participate in the community as members or shareholders, or who cooperate through other means such as investment. Participation in renewable energy projects should be open to all potential local members based on objective, transparent and non-discriminatory criteria. Measures to offset the disadvantages relating to the specific characteristics of local renewable energy communities in terms of size, ownership structure and the number of projects include enabling renewable energy communities to operate in the energy system and easing their market integration. Renewable energy communities should be able to share between themselves energy that is produced by their community-owned installations. However, community members should not be exempt from

relevant costs, charges, levies and taxes that would be borne by final consumers who are not community members, producers in a similar situation, or where public grid infrastructure is used for those transfers.

- (72) Household consumers and communities engaging in renewables self-consumption should maintain their rights as consumers, including the rights to have a contract with a supplier of their choice and to switch supplier.
- (73) Representing around half of the final energy consumption of the Union, the heating and cooling sector is considered to be a key sector in accelerating the decarbonisation of the energy system. Moreover, it is also a strategic sector in terms of energy security, as around 40 % of the renewable energy consumption by 2030 is projected to come from renewable heating and cooling. However, the absence of a harmonised strategy at Union level, the lack of internalisation of external costs and the fragmentation of heating and cooling markets have, to date, led to relatively slow progress in the sector.
- (74) Several Member States have implemented measures in the heating and cooling sector to reach their 2020 renewable energy target. However, in the absence of binding national targets post-2020, the remaining national incentives may not be sufficient to reach the long-term decarbonisation goals for 2030 and 2050. In order to meet such goals, reinforce investor certainty and foster the development of a Union-wide renewable heating and cooling market, while respecting the energy efficiency first principle, it is appropriate to encourage the efforts of Member States in the supply of renewable heating and cooling to contribute to the progressive increase of the share of renewable energy. Given the fragmented nature of some heating and cooling markets, it is of utmost importance to ensure flexibility in designing such an effort. It is also important to ensure that a potential uptake of renewable heating and cooling does not have detrimental environmental side-effects or lead to disproportionate overall costs. In order to minimise that risk, the increase of the share of renewable energy in the heating and cooling sector should take into account the situation of those Member States where the share is already very high, or where waste heat and cold is not used, such as in Cyprus and Malta.
- (75) District heating and cooling currently represents around 10 % of the heat demand across the Union, with large discrepancies between Member States. The Commission's heating and cooling strategy has recognised the potential for decarbonisation of district heating through increased energy efficiency and renewable energy deployment.
- (76) The Energy Union strategy also recognised the role of the citizen in the energy transition, where citizens take ownership of the energy transition, benefit from new technologies to reduce their bills, and participate actively in the market.
- (77) The potential synergies between an effort to increase the uptake of renewable heating and cooling and the existing schemes under Directive 2010/31/EU of the European Parliament and of the Council⁽¹⁾ and Directive 2012/27/EU should be emphasised. Member States should, to the extent possible, have the possibility to use existing administrative structures to implement such effort, in order to mitigate the administrative burden.
- (78) In the area of district heating, it is therefore crucial to enable the fuel-switching to energy from renewable sources and prevent regulatory and technology lock-in and technology lock-out through reinforced rights for renewable energy producers and final consumers, and bring the tools to final consumers to facilitate their choice between the highest energy-performance solutions that take into account future heating and cooling needs in accordance with expected building performance criteria. Final consumers should be given transparent and reliable information on the efficiency of district heating and cooling systems and the share of energy from renewable sources in their specific heating or cooling supply.
- (79) In order to protect consumers of district heating and cooling systems that are not efficient district heating and cooling systems and to allow them to produce their heating or cooling from renewable sources and with significantly better energy performance, consumers should be entitled to disconnect and thus discontinue the heating or cooling service from non-efficient district heating and cooling systems at a whole building level by terminating their contract or, where the contract covers several buildings, by modifying the contract with the district heating or cooling operator.

⁽¹⁾ Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (OJ L 153, 18.6.2010, p. 13).

- (80) To prepare for the transition towards advanced biofuels and minimise the overall direct and indirect land-use change impacts, it is appropriate to limit the amount of biofuels and bioliquids produced from cereal and other starch-rich crops, sugars and oil crops that can be counted towards the targets laid down in this Directive, without restricting the overall possibility of using such biofuels and bioliquids. The establishment of a limit at Union level should not prevent Member States from providing for lower limits to the amount of biofuels and bioliquids produced from cereal and other starch-rich crops, sugars and oil crops that can be counted at national level towards the targets laid down in this Directive, without restricting the overall possibility of using such biofuels and bioliquids.
- (81) Directive 2009/28/EC introduced a set of sustainability criteria, including criteria protecting land with high biodiversity value and land with high-carbon stock, but did not cover the issue of indirect land-use change. Indirect land-use change occurs when the cultivation of crops for biofuels, bioliquids and biomass fuels displaces traditional production of crops for food and feed purposes. Such additional demand increases the pressure on land and can lead to the extension of agricultural land into areas with high-carbon stock, such as forests, wetlands and peatland, causing additional greenhouse gas emissions. Directive (EU) 2015/1513 of the European Parliament and of the Council ⁽¹⁾ recognises that the magnitude of greenhouse gas emissions-linked indirect land-use change is capable of negating some or all greenhouse gas emissions savings of individual biofuels, bioliquids or biomass fuels. While there are risks arising from indirect land-use change, research has shown that the scale of the effect depends on a variety of factors, including the type of feedstock used for fuel production, the level of additional demand for feedstock triggered by the use of biofuels, bioliquids and biomass fuels, and the extent to which land with high-carbon stock is protected worldwide.

While the level of greenhouse gas emissions caused by indirect land-use change cannot be unequivocally determined with the level of precision required to be included in the greenhouse gas emission calculation methodology, the highest risks of indirect land-use change have been identified for biofuels, bioliquids and biomass fuels produced from feedstock for which a significant expansion of the production area into land with high-carbon stock is observed. It is therefore appropriate, in general, to limit food and feed crops-based biofuels, bioliquids and biomass fuels promoted under this Directive and, in addition, to require Member States to set a specific and gradually decreasing limit for biofuels, bioliquids and biomass fuels produced from food and feed crops for which a significant expansion of the production area into land with high-carbon stock is observed. Low indirect land-use change-risk biofuels, bioliquids and biomass fuels should be exempt from the specific and gradually decreasing limit.

- (82) Yield increases in agricultural sectors by means of improved agricultural practices, investments in better machinery and knowledge transfer, beyond levels which would have prevailed in the absence of productivity-promoting schemes for food and feed crop-based biofuels, bioliquids and biomass fuels, as well as the cultivation of crops on land not previously used for the cultivation of crops, can mitigate indirect land-use change. Where there is evidence that such measures have led to an increase of production going beyond the expected increase in productivity, biofuels, bioliquids and biomass fuels produced from such additional feedstock should be considered to be low indirect land-use change-risk biofuels, bioliquids and biomass fuels. Annual yield fluctuations should be taken into account in that context.
- (83) Directive (EU) 2015/1513 called on the Commission to submit, without delay, a comprehensive proposal for a cost-effective and technology-neutral post-2020 policy in order to create a long-term perspective for investment in sustainable biofuels with a low risk of causing indirect land-use change with a headline target of decarbonising the transport sector. An obligation on Member States to require fuel suppliers to deliver an overall share of fuels from renewable sources can provide certainty for investors and encourage the continuous development of alternative renewable transport fuels including advanced biofuels, renewable liquid and gaseous transport fuels of non-biological origin, and renewable electricity in the transport sector. Since renewable alternatives might not be available or cost-efficient to all fuel suppliers, it is appropriate to allow Member States to distinguish between fuel

⁽¹⁾ Directive (EU) 2015/1513 of the European Parliament and of the Council of 9 September 2015 amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable sources (OJ L 239, 15.9.2015, p. 1).

suppliers and to exempt, if necessary, particular types of fuel supplier from the obligation. As transport fuels are traded easily, fuel suppliers in Member States with low supplies of the relevant resources are likely easily to obtain renewable fuels from other sources.

- (84) A Union database should be put in place to ensure transparency and traceability of renewable fuels. While Member States should be allowed to continue to use or establish national databases, those national databases should be linked to the Union database, in order to ensure instant data transfers and harmonisation of data flows.
- (85) Advanced biofuels and other biofuels and biogas produced from feedstock listed in an annex to this Directive, renewable liquid and gaseous transport fuels of non-biological origin, and renewable electricity in the transport sector can contribute to low carbon emissions, stimulating the decarbonisation of the Union transport sector in a cost-effective manner, and improving, *inter alia*, energy diversification in the transport sector while promoting innovation, growth and jobs in the Union economy and reducing reliance on energy imports. An obligation on Member States to require fuel suppliers to ensure a minimum share of advanced biofuels and certain biogases, is intended to encourage continuous development of advanced fuels, including biofuels. It is important to ensure that that obligation also promotes improvements in the greenhouse gas performance of the fuels supplied to meet it. The Commission should assess the greenhouse gas performance, technical innovation and sustainability of those fuels.
- (86) With regard to Intelligent Transport, it is important to increase the development and deployment of electric mobility for road, as well as to accelerate the integration of advanced technologies into innovative rail.
- (87) Electromobility is expected to constitute a substantial part of the renewable energy in the transport sector by the year 2030. Further incentives should be provided considering the swift development of electromobility and the potential of that sector in terms of growth and jobs in the Union. Multipliers for renewable electricity supplied for the transport sector should be used for the promotion of renewable electricity in the transport sector and in order to reduce the comparative disadvantage in energy statistics. Since it is not possible to account for all electricity supplied for road vehicles in statistics through dedicated metering, such as charging at home, multipliers should be used in order to ensure that the positive impacts of electrified renewable energy-based transport are properly accounted for. Options should be explored to ensure that the new demand for electricity in the transport sector is met with additional generation capacity of energy from renewable sources.
- (88) In light of climatic constraints that limit the possibility of consuming certain types of biofuels due to environmental, technical or health concerns, and due to the size and structure of their fuel markets, it is appropriate that Cyprus and Malta, for the purposes of demonstrating compliance with national renewable energy obligations placed on fuel suppliers, be allowed to take into account those inherent limitations.
- (89) The promotion of recycled carbon fuels can contribute towards the policy objectives of energy diversification and decarbonisation of the transport sector where they fulfil the appropriate minimum greenhouse gas emissions savings threshold. It is therefore appropriate to include those fuels in the obligation on fuel supplier, whilst giving Member States the option not to consider those fuels in the obligation if they do not wish to do so. Since those fuels are not renewable, they should not be counted towards the overall Union target for energy from renewable sources.
- (90) Renewable liquid and gaseous transport fuels of non-biological origin are important to increase the share of renewable energy in sectors that are expected to rely on liquid fuels in the long term. To ensure that renewable fuels of non-biological origin contribute to greenhouse gas reduction, the electricity used for the fuel production should be of renewable origin. The Commission should develop, by means of delegated acts, a reliable Union methodology to be applied where such electricity is taken from the grid. That methodology should ensure that there is a temporal and geographical correlation between the electricity production unit with which the producer has a bilateral renewables power purchase agreement and the fuel production. For example, renewable fuels of non-biological origin cannot be counted as fully renewable if they are produced when the contracted renewable generation unit is not generating electricity. Another example is the case of electricity grid congestion, where fuels can be counted as fully renewable only when both the electricity generation and the fuel production plants

are located on the same side in respect of the congestion. Furthermore, there should be an element of additionality, meaning that the fuel producer is adding to the renewable deployment or to the financing of renewable energy.

- (91) Feedstock which has low indirect land-use change impacts when used for biofuels, should be promoted for its contribution to the decarbonisation of the economy. Feedstock for advanced biofuels and biogas for transport, for which technology is more innovative and less mature and therefore needs a higher level of support, should, in particular, be included in an annex to this Directive. In order to ensure that it is updated in accordance with the latest technological developments while avoiding unintended negative effects, the Commission should review that annex in order to assess whether new feedstock should be added.
- (92) The costs of connecting new producers of gas from renewable sources to the gas grids should be based on objective, transparent and non-discriminatory criteria and due account should be taken of the benefit that embedded local producers of gas from renewable sources bring to the gas grids.
- (93) In order to exploit the full potential of biomass, which does not include peat or material embedded in geological formations and/or transformed to fossil, to contribute to the decarbonisation of the economy through its uses for materials and energy, the Union and the Member States should promote greater sustainable mobilisation of existing timber and agricultural resources and the development of new forestry and agriculture production systems, provided that sustainability and greenhouse gas emissions saving criteria are met.
- (94) Biofuels, bioliquids and biomass fuels should always be produced in a sustainable manner. Biofuels, bioliquids and biomass fuels used for compliance with the Union target laid down in this Directive, and those which benefit from support schemes, should therefore be required to fulfil sustainability and greenhouse gas emissions saving criteria. The harmonisation of those criteria for biofuels and bioliquids is essential for the achievement of the energy policy objectives of the Union as set out in Article 194(1) TFEU. Such harmonisation ensures the functioning of the internal energy market and thus facilitates, especially with regard to the obligation of Member States not to refuse to take into account, on other sustainability grounds, biofuels and bioliquids obtained in accordance with this Directive, trade between Member States in compliant biofuels and bioliquids. The positive effects of the harmonisation of those criteria on the smooth functioning of the internal energy market and on the avoidance of distortion of competition in the Union cannot be frustrated. For biomass fuels, Member States should be allowed to establish additional sustainability and greenhouse gas emissions saving criteria.
- (95) The Union should take appropriate steps in the context of this Directive, including the promotion of sustainability and greenhouse gas emissions saving criteria for biofuels, and for bioliquids and biomass fuels.
- (96) The production of agricultural raw material for biofuels, bioliquids and biomass fuels, and the incentives provided for in this Directive to promote their use, should not have the effect of encouraging the destruction of biodiverse lands. Such finite resources, recognised in various international instruments to be of universal value, should be preserved. It is therefore necessary to provide sustainability and greenhouse gas emissions saving criteria ensuring that biofuels, bioliquids and biomass fuels qualify for the incentives only where it is guaranteed that agricultural raw material does not originate from biodiverse areas or, in the case of areas designated for nature protection purposes or for the protection of rare, threatened or endangered ecosystems or species, the relevant competent authority demonstrates that the production of the agricultural raw material does not interfere with such purposes.
- (97) Forests should be considered to be biodiverse in accordance with the sustainability criteria where they are primary forests in accordance with the definition used by the Food and Agriculture Organisation of the United Nations (FAO) in its Global Forest Resource Assessment, or where they are protected by national nature protection law. Areas where the collection of non-wood forest products occurs should be considered to be biodiverse forests, provided that the human impact is small. Other types of forest as defined by the FAO, such as modified natural forests, semi-natural forests and plantations, should not be considered to be primary

forests. Having regard, furthermore, to the highly biodiverse nature of certain grasslands, both temperate and tropical, including highly biodiverse savannahs, steppes, scrublands and prairies, biofuels, bioliquids and biomass fuels made from agricultural raw materials originating in such lands should not qualify for the incentives provided for by this Directive. In order to establish appropriate criteria to define such highly biodiverse grassland in accordance with the best available scientific data and relevant international standards, implementing powers should be conferred on the Commission.

- (98) Land should not be converted to accommodate the production of agricultural raw material for biofuels, bioliquids and biomass fuels if its carbon stock loss upon conversion could not, within a reasonable period, taking into account the urgency of tackling climate change, be compensated for by the greenhouse gas emission savings resulting from the production and use of biofuels, bioliquids and biomass fuels. This would prevent unnecessary, burdensome research by economic operators and the conversion of high-carbon-stock land that are demonstrated to be ineligible for producing agricultural raw materials for biofuels, bioliquids and biomass fuels. Inventories of worldwide carbon stocks indicate that wetlands and continuously forested areas with a canopy cover of more than 30 % should be included in that category.
- (99) In the framework of the Common Agricultural Policy, Union farmers should comply with a comprehensive set of environmental requirements in order to receive direct support. Compliance with those requirements can be most effectively verified in the context of agricultural policy. Including those requirements in the sustainability scheme is not appropriate as the sustainability criteria for bioenergy should set out rules that are objective and apply globally. Verification of compliance under this Directive would also risk causing an unnecessary administrative burden.
- (100) Agricultural feedstock for the production of biofuels, bioliquids and biomass fuels should be produced using practices that are consistent with the protection of soil quality and soil organic carbon. Soil quality and soil carbon should therefore be included in monitoring systems of operators or national authorities.
- (101) It is appropriate to introduce Union-wide sustainability and greenhouse gas emissions saving criteria for biomass fuels used in the electricity sector and in the heating and cooling sector, in order to continue to ensure high greenhouse gas emissions savings compared to fossil fuel alternatives, to avoid unintended sustainability impacts, and to promote the internal market. The outermost regions should be able to use the potential of their resources in order to increase the production of renewable energy and their energy independence.
- (102) To ensure that, despite the growing demand for forest biomass, harvesting is carried out in a sustainable manner in forests where regeneration is ensured, that special attention is given to areas explicitly designated for the protection of biodiversity, landscapes and specific natural elements, that biodiversity resources are preserved and that carbon stocks are tracked, woody raw material should emanate only from forests that are harvested in accordance with the principles of sustainable forest management that are developed under international forest processes such as Forest Europe and that are implemented through national law or the best management practices at sourcing area level. Operators should take the appropriate steps in order to minimise the risk of using unsustainable forest biomass for the production of bioenergy. To that end, operators should put in place a risk-based approach. In this context, it is appropriate for the Commission to develop operational guidance on the verification of compliance with the risk-based approach by means of implementing acts, after consulting the Committee on the Sustainability of Biofuels, Bioliquids and Biomass fuels.
- (103) Harvesting for energy purposes has increased and is expected to continue to grow, resulting in higher imports of raw materials from third countries as well as an increase of the production of those materials within the Union. It should be ensured that harvesting is sustainable.
- (104) In order to minimise the administrative burden, the Union sustainability and greenhouse gas emissions saving criteria should apply only to electricity and heating from biomass fuels produced in installations with a total rated thermal input equal to or exceeding 20 MW.

- (105) Biomass fuels should be converted into electricity and heat in an efficient way in order to maximise energy security and greenhouse gas emissions savings, as well as to limit emissions of air pollutants and minimise the pressure on limited biomass resources.
- (106) The minimum greenhouse gas emissions savings threshold for biofuels, bioliquids and biogas for transport produced in new installations should be increased in order to improve their overall greenhouse gas balance and to discourage further investments in installations with a low greenhouse gas emission savings performance. That increase provides investment safeguards for biofuels, bioliquids and biogas for transport production capacity.
- (107) Based on experience in the practical implementation of the Union sustainability criteria, it is appropriate to strengthen the role of voluntary international and national certification schemes for verification of compliance with the sustainability criteria in a harmonised manner.
- (108) It is in the interests of the Union to encourage the development of voluntary international or national schemes that set standards for the production of sustainable biofuels, bioliquids and biomass fuels and that certify that the production of biofuels, bioliquids and biomass fuels meets those standards. For that reason, provision should be made for schemes to be recognised as providing reliable evidence and data where they meet adequate standards of reliability, transparency and independent auditing. In order to ensure that compliance with the sustainability and greenhouse gas emissions saving criteria is verified in a robust and harmonised manner and in particular to prevent fraud, the Commission should be empowered to adopt detailed implementing rules, including adequate standards of reliability, transparency and independent auditing to be applied by the voluntary schemes.
- (109) Voluntary schemes play an increasingly important role in providing evidence of compliance with the sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids and biomass fuels. It is therefore appropriate for the Commission to require voluntary schemes, including those already recognised by the Commission, to report regularly on their activity. Such reports should be made public in order to increase transparency and to improve supervision by the Commission. Furthermore, such reporting would provide the necessary information for the Commission to report on the operation of the voluntary schemes with a view to identifying best practices and submitting, if appropriate, a proposal to further promote such best practices.
- (110) To facilitate the functioning of the internal market, evidence regarding the sustainability and greenhouse gas emissions criteria for biofuels, bioliquids and biomass fuels that have been obtained in accordance with a scheme that has been recognised by the Commission should be accepted in all Member States. Member States should contribute towards ensuring the correct implementation of the certification principles of voluntary schemes by supervising the operation of certification bodies that are accredited by the national accreditation body and by informing the voluntary schemes about relevant observations.
- (111) In order to avoid a disproportionate administrative burden, a list of default values should be laid down for common biofuel, bioliquid and biomass fuel production pathways and that list should be updated and expanded when further reliable data are available. Economic operators should always be entitled to claim the level of greenhouse gas emissions savings for biofuels, bioliquids and biomass fuels established by that list. Where the default value for greenhouse gas emissions savings from a production pathway lies below the required minimum level of greenhouse gas emissions savings, producers wishing to demonstrate their compliance with that minimum level should be required to show that the actual greenhouse gas emissions from their production process are lower than those that were assumed when calculating the default values.
- (112) It is necessary to lay down clear rules based on objective and non-discriminatory criteria, for the calculation of greenhouse gas emissions savings from biofuels, bioliquids and biomass fuels and their fossil fuel comparators.
- (113) In accordance with current technical and scientific knowledge, the greenhouse gas emissions accounting methodology should take into account the transformation of solid and gaseous biomass fuels into final energy in order to be consistent with the calculation of renewable energy for the purposes of counting towards the Union target laid down in this Directive. The allocation of greenhouse gas emissions to co-products, as distinct from wastes and residues, should also be reviewed in cases where electricity or heating and cooling are produced in co-generation or multi-generation plants.

- (114) If land with high stocks of carbon in its soil or in its vegetation is converted for the cultivation of raw materials for biofuels, bioliquids and biomass fuels, some of the stored carbon will generally be released into the atmosphere, leading to the formation of carbon dioxide (CO₂). The resulting negative greenhouse gas impact can offset the positive greenhouse gas impact of the biofuels, bioliquids or biomass fuels, in some cases by a wide margin. The full carbon effects of such conversion should therefore be taken into account in calculating the greenhouse gas emissions savings of particular biofuels, bioliquids and biomass fuels. This is necessary to ensure that the greenhouse gas emissions saving calculation takes into account the totality of the carbon effects of the use of biofuels, bioliquids and biomass fuels.
- (115) In calculating the greenhouse gas impact of land conversion, economic operators should be able to use actual values for the carbon stocks associated with the reference land use and the land use after conversion. They should also be able to use standard values. The methodology of the Intergovernmental Panel on Climate Change (IPCC) is the appropriate basis for such standard values. That work is not currently expressed in a form that is immediately applicable by economic operators. The Commission should therefore revise its guidelines of 10 June 2010 for the calculation of land carbon stocks for the purposes of the rules for calculating the greenhouse gas impact of biofuels, bioliquids and their fossil fuel comparators, which are set out in an annex to this Directive, while ensuring consistency with Regulation (EU) No 525/2013 of the European Parliament and of the Council ⁽¹⁾.
- (116) Co-products from the production and use of fuels should be taken into account in the calculation of greenhouse gas emissions. The substitution method is appropriate for the purposes of policy analysis, but not for the regulation of individual economic operators and individual consignments of transport fuels. In those cases, the energy allocation method is the most appropriate method, as it is easy to apply, is predictable over time, minimises counter-productive incentives and produces results that are generally comparable with those produced by the substitution method. For the purposes of policy analysis, the Commission should also, in its reporting, present results using the substitution method.
- (117) Co-products are different from residues and agricultural residues, as they are the primary aim of the production process. It is therefore appropriate to clarify that agricultural crop residues are residues and not co-products. This has no implications on the existing methodology but clarifies the existing provisions.
- (118) The established method of using energy allocation as a rule for dividing greenhouse gas emissions between co-products has worked well and should be continued. It is appropriate to align the methodology for calculating greenhouse gas emissions coming from the use of combined heat and power (CHP) when the CHP is used in processing biofuels, bioliquids and biomass fuels to the methodology applied to a CHP being the end-use.
- (119) The methodology takes into account the reduced greenhouse gas emissions arising from the use of CHP, compared to the use of electricity plants and heat-only plants, by taking into account the utility of heat compared to electricity, and the utility of heat at different temperatures. It follows that higher temperature should bear a larger part of the total greenhouse gas emissions than heat at low temperature, when the heat is co-produced with electricity. The methodology takes into account the whole pathway to final energy, including conversion to heat or electricity.
- (120) It is appropriate for the data used in the calculation of the default values to be obtained from independent, scientifically expert sources and to be updated as appropriate as those sources progress their work. The Commission should encourage those sources to address, when they update their work, emissions from cultivation, the effects of regional and climatological conditions, the effects of cultivation using sustainable agricultural and organic farming methods, and the scientific contributions of producers in the Union and in third countries, and civil society.

⁽¹⁾ Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC (OJ L 165, 18.6.2013, p. 13).

- (121) Global demand for agricultural commodities is growing. Part of that increase in demand is likely to be met through an increase in the amount of land devoted to agriculture. The restoration of land that has been severely degraded and therefore cannot otherwise be used for agricultural purposes is a way of increasing the amount of land available for cultivation. The sustainability scheme should promote the use of such restored land because the promotion of biofuels, bioliquids and biomass fuels will contribute to the growth in demand for agricultural commodities.
- (122) In order to ensure the harmonised implementation of the greenhouse gas emissions calculation methodology and to align to the latest scientific evidence, implementing powers should be conferred on the Commission to adapt the methodological principles and values necessary for assessing whether greenhouse gas emissions saving criteria have been fulfilled and to assess whether reports submitted by Member States and third countries contain accurate data on cultivation emissions of feedstock.
- (123) European gas grids are becoming more integrated. The promotion of the production and use of biomethane, its injection into a natural gas grid and cross-border trade create a need to ensure proper accounting of renewable energy as well as avoiding double incentives resulting from support schemes in different Member States. The mass balance system related to verification of bioenergy sustainability and the new Union database are intended to help address those issues.
- (124) The achievement of the objectives of this Directive requires that the Union and Member States dedicate a significant amount of financial resources to research and development in relation to renewable energy technologies. In particular, the European Institute of Innovation and Technology should give high priority to the research and development of renewable energy technologies.
- (125) The implementation of this Directive should, where relevant, reflect the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, in particular as implemented through Directive 2003/4/EC of the European Parliament and of the Council ⁽¹⁾.
- (126) In order to amend or supplement non-essential elements of this Directive, the power to adopt acts in accordance with Article 290 TFEU should be delegated to the Commission in respect of establishing the methodology for calculating the quantity of renewable energy used for cooling and district cooling and amending the methodology for calculating energy from heat pumps; establishing the URDP and setting the conditions for finalising transactions of statistical transfer between Member States via the URDP; establishing appropriate minimum thresholds for greenhouse gas emissions savings of recycled carbon fuels; adopting, and if appropriate amending, the criteria for certification of low indirect land-use change-risk biofuels, bioliquids and biomass fuels and for determining the high indirect land-use change-risk feedstock for which significant expansion of the production into land with high-carbon stock is observed and the gradual decrease in their contribution to the targets laid down in this Directive; adapting the energy content of transport fuels to scientific and technical progress; establishing the Union methodology for setting the rules by which economic operators are to comply with the requirements for counting electricity as fully renewable when used for the production of renewable liquid and gaseous transport fuels of non-biological origin or when taken from the grid; specifying the methodology by which to determine the share of biofuel, and biogas for transport, resulting from biomass being processed with fossil fuels in a common process and the methodology by which to assess the greenhouse gas emissions savings from renewable liquid and gaseous transport fuels of non-biological origin and from recycled carbon fuels in order to ensure that credits from greenhouse gas emissions savings are given only once; amending by adding to, but not removing from, the lists of feedstock for the production of advanced biofuels and other biofuels and biogas; and supplementing or amending the rules for calculating the greenhouse gas impact of biofuels, bioliquids and their fossil fuel comparators. It is of particular importance that the Commission carry out appropriate consultations during its preparatory work, including at expert level, and that those consultations be conducted in

⁽¹⁾ Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC (OJ L 41, 14.2.2003, p. 26).

accordance with the principles laid down in the Interinstitutional Agreement of 13 April 2016 on Better Law-Making ⁽¹⁾. In particular, to ensure equal participation in the preparation of delegated acts, the European Parliament and the Council receive all documents at the same time as Member States' experts, and their experts systematically have access to meetings of Commission expert groups dealing with the preparation of delegated acts.

- (127) The measures necessary for the implementation of this Directive should be adopted in accordance with Regulation (EU) No 182/2011 of the European Parliament and of the Council ⁽²⁾.
- (128) Since the objective of this Directive, namely to achieve a share of at least 32 % of energy from renewable sources in the Union's gross final consumption of energy by 2030, cannot be sufficiently achieved by the Member States but can rather, by reason of the scale of the action, be better achieved at Union level, the Union may adopt measures, in accordance with the principle of subsidiarity as set out in Article 5 of the Treaty on European Union. In accordance with the principle of proportionality, as set out in that Article, this Directive does not go beyond what is necessary in order to achieve that objective.
- (129) In accordance with the Joint Political Declaration of 28 September 2011 of Member States and the Commission on explanatory documents ⁽³⁾, Member States have undertaken to accompany, in justified cases, the notification of their transposition measures with one or more documents explaining the relationship between the components of a directive and the corresponding parts of national transposition instruments. With regard to this Directive, the legislator considers the transmission of such documents to be justified.
- (130) The obligation to transpose this Directive into national law should be confined to those provisions which represent a substantive amendment as compared to Directive 2009/28/EC. The obligation to transpose provisions which are unchanged arises under that Directive.
- (131) This Directive should be without prejudice to the obligations of the Member States relating to the time-limit for the transposition into national law of Council Directive 2013/18/EU ⁽⁴⁾ and Directive (EU) 2015/1513,

HAVE ADOPTED THIS DIRECTIVE:

Article 1

Subject matter

This Directive establishes a common framework for the promotion of energy from renewable sources. It sets a binding Union target for the overall share of energy from renewable sources in the Union's gross final consumption of energy in 2030. It also lays down rules on financial support for electricity from renewable sources, on self-consumption of such electricity, on the use of energy from renewable sources in the heating and cooling sector and in the transport sector, on regional cooperation between Member States, and between Member States and third countries, on guarantees of origin, on administrative procedures and on information and training. It also establishes sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids and biomass fuels.

Article 2

Definitions

For the purposes of this Directive, the relevant definitions in Directive 2009/72/EC of the European Parliament and of the Council ⁽⁵⁾ apply.

⁽¹⁾ OJ L 123, 12.5.2016, p. 1.

⁽²⁾ Regulation (EU) No 182/2011 of the European Parliament and of the Council of 16 February 2011 laying down the rules and general principles concerning mechanisms for control by Member States of the Commission's exercise of implementing powers (OJ L 55, 28.2.2011, p. 13).

⁽³⁾ OJ C 369, 17.12.2011, p. 14.

⁽⁴⁾ Council Directive 2013/18/EU of 13 May 2013 adapting Directive 2009/28/EC of the European Parliament and of the Council on the promotion of the use of energy from renewable sources, by reason of the accession of the Republic of Croatia (OJ L 158, 10.6.2013, p. 230).

⁽⁵⁾ Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC (OJ L 211, 14.8.2009, p. 55).

The following definitions also apply:

- (1) 'energy from renewable sources' or 'renewable energy' means energy from renewable non-fossil sources, namely wind, solar (solar thermal and solar photovoltaic) and geothermal energy, ambient energy, tide, wave and other ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas, and biogas;
- (2) 'ambient energy' means naturally occurring thermal energy and energy accumulated in the environment with constrained boundaries, which can be stored in the ambient air, excluding in exhaust air, or in surface or sewage water;
- (3) 'geothermal energy' means energy stored in the form of heat beneath the surface of solid earth;
- (4) 'gross final consumption of energy' means the energy commodities delivered for energy purposes to industry, transport, households, services including public services, agriculture, forestry and fisheries, the consumption of electricity and heat by the energy branch for electricity, heat and transport fuel production, and losses of electricity and heat in distribution and transmission;
- (5) 'support scheme' means any instrument, scheme or mechanism applied by a Member State, or a group of Member States, that promotes the use of energy from renewable sources by reducing the cost of that energy, increasing the price at which it can be sold, or increasing, by means of a renewable energy obligation or otherwise, the volume of such energy purchased, including but not restricted to, investment aid, tax exemptions or reductions, tax refunds, renewable energy obligation support schemes including those using green certificates, and direct price support schemes including feed-in tariffs and sliding or fixed premium payments;
- (6) 'renewable energy obligation' means a support scheme requiring energy producers to include a given share of energy from renewable sources in their production, requiring energy suppliers to include a given share of energy from renewable sources in their supply, or requiring energy consumers to include a given share of energy from renewable sources in their consumption, including schemes under which such requirements may be fulfilled by using green certificates;
- (7) 'financial instrument' means a financial instrument as defined in point (29) of Article 2 of Regulation (EU, Euratom) 2018/1046 of the European Parliament and of the Council ⁽¹⁾;
- (8) 'SME' means a micro, small or medium-sized enterprise as defined in Article 2 of the Annex to Commission Recommendation 2003/361/EC ⁽²⁾;
- (9) 'waste heat and cold' means unavoidable heat or cold generated as by-product in industrial or power generation installations, or in the tertiary sector, which would be dissipated unused in air or water without access to a district heating or cooling system, where a cogeneration process has been used or will be used or where cogeneration is not feasible;
- (10) 'repowering' means renewing power plants that produce renewable energy, including the full or partial replacement of installations or operation systems and equipment for the purposes of replacing capacity or increasing the efficiency or capacity of the installation;
- (11) 'distribution system operator' means an operator as defined in point (6) of Article 2 of Directive 2009/72/EC and in point (6) of Article 2 of Directive 2009/73/EC of the European Parliament and of the Council ⁽³⁾;
- (12) 'guarantee of origin' means an electronic document which has the sole function of providing evidence to a final customer that a given share or quantity of energy was produced from renewable sources;

⁽¹⁾ Regulation (EU, Euratom) 2018/1046 of the European Parliament and of the Council of 18 July 2018 on the financial rules applicable to the general budget of the Union, amending Regulations (EU) No 1296/2013, (EU) No 1301/2013, (EU) No 1303/2013, (EU) No 1304/2013, (EU) No 1309/2013, (EU) No 1316/2013, (EU) No 223/2014, (EU) No 283/2014, and Decision No 541/2014/EU and repealing Regulation (EU, Euratom) No 966/2012 (OJ L 193, 30.7.2018, p. 1).

⁽²⁾ Commission Recommendation 2003/361/EC of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises (OJ L 124, 20.5.2003, p. 36).

⁽³⁾ Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC (OJ L 211, 14.8.2009, p. 94).

- (13) 'residual energy mix' means the total annual energy mix for a Member State, excluding the share covered by cancelled guarantees of origin;
- (14) 'renewables self-consumer' means a final customer operating within its premises located within confined boundaries or, where permitted by a Member State, within other premises, who generates renewable electricity for its own consumption, and who may store or sell self-generated renewable electricity, provided that, for a non-household renewables self-consumer, those activities do not constitute its primary commercial or professional activity;
- (15) 'jointly acting renewables self-consumers' means a group of at least two jointly acting renewables self-consumers in accordance with point (14) who are located in the same building or multi-apartment block;
- (16) 'renewable energy community' means a legal entity:
- (a) which, in accordance with the applicable national law, is based on open and voluntary participation, is autonomous, and is effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects that are owned and developed by that legal entity;
 - (b) the shareholders or members of which are natural persons, SMEs or local authorities, including municipalities;
 - (c) the primary purpose of which is to provide environmental, economic or social community benefits for its shareholders or members or for the local areas where it operates, rather than financial profits;
- (17) 'renewables power purchase agreement' means a contract under which a natural or legal person agrees to purchase renewable electricity directly from an electricity producer;
- (18) 'peer-to-peer trading' of renewable energy means the sale of renewable energy between market participants by means of a contract with pre-determined conditions governing the automated execution and settlement of the transaction, either directly between market participants or indirectly through a certified third-party market participant, such as an aggregator. The right to conduct peer-to-peer trading shall be without prejudice to the rights and obligations of the parties involved as final customers, producers, suppliers or aggregators;
- (19) 'district heating' or 'district cooling' means the distribution of thermal energy in the form of steam, hot water or chilled liquids, from central or decentralised sources of production through a network to multiple buildings or sites, for the use of space or process heating or cooling;
- (20) 'efficient district heating and cooling' means efficient district heating and cooling as defined in point (41) of Article 2 of Directive 2012/27/EU;
- (21) 'high-efficiency cogeneration' means high-efficiency cogeneration as defined in point (34) of Article 2 of Directive 2012/27/EU;
- (22) 'energy performance certificate' means energy performance certificate as defined in point (12) of Article 2 of Directive 2010/31/EU;
- (23) 'waste' means waste as defined in point (1) of Article 3 of Directive 2008/98/EC, excluding substances that have been intentionally modified or contaminated in order to meet this definition;
- (24) 'biomass' means the biodegradable fraction of products, waste and residues from biological origin from agriculture, including vegetal and animal substances, from forestry and related industries, including fisheries and aquaculture, as well as the biodegradable fraction of waste, including industrial and municipal waste of biological origin;
- (25) 'agricultural biomass' means biomass produced from agriculture;
- (26) 'forest biomass' means biomass produced from forestry;
- (27) 'biomass fuels' means gaseous and solid fuels produced from biomass;
- (28) 'biogas' means gaseous fuels produced from biomass;

- (29) 'biowaste' means biowaste as defined in point (4) of Article 3 of Directive 2008/98/EC;
- (30) 'sourcing area' means the geographically defined area from which the forest biomass feedstock is sourced, from which reliable and independent information is available and where conditions are sufficiently homogeneous to evaluate the risk of the sustainability and legality characteristics of the forest biomass;
- (31) 'forest regeneration' means the re-establishment of a forest stand by natural or artificial means following the removal of the previous stand by felling or as a result of natural causes, including fire or storm;
- (32) 'bioliquids' means liquid fuel for energy purposes other than for transport, including electricity and heating and cooling, produced from biomass;
- (33) 'biofuels' means liquid fuel for transport produced from biomass;
- (34) 'advanced biofuels' means biofuels that are produced from the feedstock listed in Part A of Annex IX;
- (35) 'recycled carbon fuels' means liquid and gaseous fuels that are produced from liquid or solid waste streams of non-renewable origin which are not suitable for material recovery in accordance with Article 4 of Directive 2008/98/EC, or from waste processing gas and exhaust gas of non-renewable origin which are produced as an unavoidable and unintentional consequence of the production process in industrial installations;
- (36) 'renewable liquid and gaseous transport fuels of non-biological origin' means liquid or gaseous fuels which are used in the transport sector other than biofuels or biogas, the energy content of which is derived from renewable sources other than biomass;
- (37) 'low indirect land-use change-risk biofuels, bioliquids and biomass fuels' means biofuels, bioliquids and biomass fuels, the feedstock of which was produced within schemes which avoid displacement effects of food and feed-crop based biofuels, bioliquids and biomass fuels through improved agricultural practices as well as through the cultivation of crops on areas which were previously not used for cultivation of crops, and which were produced in accordance with the sustainability criteria for biofuels, bioliquids and biomass fuels laid down in Article 29;
- (38) 'fuel supplier' means an entity supplying fuel to the market that is responsible for passing fuel through an excise duty point or, in the case of electricity or where no excise is due or where duly justified, any other relevant entity designated by a Member State;
- (39) 'starch-rich crops' means crops comprising mainly cereals, regardless of whether the grains alone or the whole plant, such as in the case of green maize, are used; tubers and root crops, such as potatoes, Jerusalem artichokes, sweet potatoes, cassava and yams; and corm crops, such as taro and cocoyam;
- (40) 'food and feed crops' means starch-rich crops, sugar crops or oil crops produced on agricultural land as a main crop excluding residues, waste or ligno-cellulosic material and intermediate crops, such as catch crops and cover crops, provided that the use of such intermediate crops does not trigger demand for additional land;
- (41) 'ligno-cellulosic material' means material composed of lignin, cellulose and hemicellulose, such as biomass sourced from forests, woody energy crops and forest-based industries' residues and wastes;
- (42) 'non-food cellulosic material' means feedstock mainly composed of cellulose and hemicellulose, and having a lower lignin content than ligno-cellulosic material, including food and feed crop residues, such as straw, stover, husks and shells; grassy energy crops with a low starch content, such as ryegrass, switchgrass, miscanthus, giant cane; cover crops before and after main crops; ley crops; industrial residues, including from food and feed crops after vegetal oils, sugars, starches and protein have been extracted; and material from biowaste, where ley and cover crops are understood to be temporary, short-term sown pastures comprising grass-legume mixture with a low starch content to obtain fodder for livestock and improve soil fertility for obtaining higher yields of arable main crops;
- (43) 'residue' means a substance that is not the end product(s) that a production process directly seeks to produce; it is not a primary aim of the production process and the process has not been deliberately modified to produce it;

- (44) 'agricultural, aquaculture, fisheries and forestry residues' means residues that are directly generated by agriculture, aquaculture, fisheries and forestry and that do not include residues from related industries or processing;
- (45) 'actual value' means the greenhouse gas emissions savings for some or all of the steps of a specific biofuel, bioliquid or biomass fuel production process, calculated in accordance with the methodology laid down in Part C of Annex V or Part B of Annex VI;
- (46) 'typical value' means an estimate of the greenhouse gas emissions and greenhouse gas emissions savings for a particular biofuel, bioliquid or biomass fuel production pathway, which is representative of the Union consumption;
- (47) 'default value' means a value derived from a typical value by the application of pre-determined factors and that may, in circumstances specified in this Directive, be used in place of an actual value.

Article 3

Binding overall Union target for 2030

1. Member States shall collectively ensure that the share of energy from renewable sources in the Union's gross final consumption of energy in 2030 is at least 32 %. The Commission shall assess that target with a view to submitting a legislative proposal by 2023 to increase it where there are further substantial costs reductions in the production of renewable energy, where needed to meet the Union's international commitments for decarbonisation, or where a significant decrease in energy consumption in the Union justifies such an increase.

2. Member States shall set national contributions to meet, collectively, the binding overall Union target set in paragraph 1 of this Article as part of their integrated national energy and climate plans in accordance with Articles 3 to 5 and 9 to 14 of Regulation (EU) 2018/1999. In preparing their draft integrated national energy and climate plans, Member States may consider the formula referred to in Annex II to that Regulation.

If, on the basis of the assessment of the draft integrated national energy and climate plans submitted pursuant to Article 9 of Regulation (EU) 2018/1999, the Commission concludes that the national contributions of the Member States are insufficient for the collective achievement of the binding overall Union target, it shall follow the procedure laid down in Articles 9 and 31 of that Regulation.

3. Member States shall ensure that their national policies, including the obligations deriving from Articles 25 to 28 of this Directive, and their support schemes, are designed with due regard to the waste hierarchy as set out in Article 4 of Directive 2008/98/EC to aim to avoid undue distortive effects on the raw material markets. Member States shall grant no support for renewable energy produced from the incineration of waste if the separate collection obligations laid down in that Directive have not been complied with.

4. From 1 January 2021, the share of energy from renewable sources in each Member State's gross final consumption of energy shall not be lower than the baseline share shown in the third column of the table in Part A of Annex I to this Directive. Member States shall take the necessary measures to ensure compliance with that baseline share. If a Member State does not maintain its baseline share as measured over any one-year period, the first and second subparagraphs of Article 32(4) of Regulation (EU) 2018/1999 shall apply.

5. The Commission shall support the high ambition of Member States through an enabling framework comprising the enhanced use of Union funds, including additional funds to facilitate a just transition of carbon intensive regions towards increased shares of renewable energy, in particular financial instruments, especially for the following purposes:

- (a) reducing the cost of capital for renewable energy projects;
- (b) developing projects and programmes for integrating renewable sources into the energy system, for increasing flexibility of the energy system, for maintaining grid stability and for managing grid congestions;
- (c) developing transmission and distribution grid infrastructure, intelligent networks, storage facilities and interconnections, with the objective of arriving at a 15 % electricity interconnection target by 2030, in order to increase the technically feasible and economically affordable level of renewable energy in the electricity system;

(d) enhancing regional cooperation between Member States and between Member States and third countries, through joint projects, joint support schemes and the opening of support schemes for renewable electricity to producers located in other Member States.

6. The Commission shall establish a facilitative platform in order to support Member States that use cooperation mechanisms to contribute to the binding overall Union target set in paragraph 1.

Article 4

Support schemes for energy from renewable sources

1. In order to reach or exceed the Union target set in Article 3(1), and each Member State's contribution to that target set at a national level for the deployment of renewable energy, Member States may apply support schemes.

2. Support schemes for electricity from renewable sources shall provide incentives for the integration of electricity from renewable sources in the electricity market in a market-based and market-responsive way, while avoiding unnecessary distortions of electricity markets as well as taking into account possible system integration costs and grid stability.

3. Support schemes for electricity from renewable sources shall be designed so as to maximise the integration of electricity from renewable sources in the electricity market and to ensure that renewable energy producers are responding to market price signals and maximise their market revenues.

To that end, with regard to direct price support schemes, support shall be granted in the form of a market premium, which could be, *inter alia*, sliding or fixed.

Member States may exempt small-scale installations and demonstration projects from this paragraph, without prejudice to the applicable Union law on the internal market for electricity.

4. Member States shall ensure that support for electricity from renewable sources is granted in an open, transparent, competitive, non-discriminatory and cost-effective manner.

Member States may exempt small-scale installations and demonstration projects from tendering procedures.

Member States may also consider establishing mechanisms to ensure the regional diversification in the deployment of renewable electricity, in particular to ensure cost-efficient system integration.

5. Member States may limit tendering procedures to specific technologies where opening support schemes to all producers of electricity from renewable sources would lead to a suboptimal result, in view of:

- (a) the long-term potential of a particular technology;
- (b) the need to achieve diversification;
- (c) grid integration costs;
- (d) network constraints and grid stability;
- (e) for biomass, the need to avoid distortions of raw materials markets.

6. Where support for electricity from renewable sources is granted by means of a tendering procedure, Member States shall, in order to ensure a high project realisation rate:

- (a) establish and publish non-discriminatory and transparent criteria to qualify for the tendering procedure and set clear dates and rules for delivery of the project;
- (b) publish information about previous tendering procedures, including project realisation rates.

7. In order to increase the generation of energy from renewable sources in the outermost regions and small islands, Member States may adapt financial support schemes for projects located in those regions in order to take into account the production costs associated with their specific conditions of isolation and external dependence.

8. By 31 December 2021 and every three years thereafter, the Commission shall report to the European Parliament and to the Council on the performance of support for electricity from renewable sources granted by means of tendering procedures in the Union, analysing in particular the ability of tendering procedures to:

- (a) achieve cost-reduction;
- (b) achieve technological improvement;
- (c) achieve high realisation rates;
- (d) provide non-discriminatory participation of small actors and, where applicable, local authorities;
- (e) limit environmental impact;
- (f) ensure local acceptability;
- (g) ensure security of supply and grid integration.

9. This Article shall apply without prejudice to Articles 107 and 108 TFEU.

Article 5

Opening of support schemes for electricity from renewable sources

1. Member States shall have the right, in accordance with Articles 7 to 13 of this Directive, to decide to which extent they support electricity from renewable sources which is produced in another Member State. However, Member States may open participation in support schemes for electricity from renewable sources to producers located in other Member States, subject to the conditions laid down in this Article.

When opening participation in support schemes for electricity from renewable sources, Member States may provide that support for an indicative share of the newly-supported capacity, or of the budget allocated thereto, in each year is open to producers located in other Member States.

Such indicative shares may, in each year, amount to at least 5 % from 2023 to 2026 and at least 10 % from 2027 to 2030, or, where lower, to the level of interconnectivity of the Member State concerned in any given year.

In order to acquire further implementation experience, Member States may organise one or more pilot schemes where support is open to producers located in other Member States.

2. Member States may require proof of physical import of electricity from renewable sources. To that end, Member States may limit participation in their support schemes to producers located in Member States with which there is a direct connection via interconnectors. However, Member States shall not change or otherwise affect cross-zonal schedules and capacity allocation due to producers participating in cross-border support schemes. Cross-border electricity transfers shall be determined only by the outcome of capacity allocation pursuant to Union law on the internal market in electricity.

3. If a Member State decides to open participation in support schemes to producers located in other Member States, the relevant Member States shall agree on the principles of such participation. Such agreements shall cover at least the principles of allocation of renewable electricity that is the subject of cross-border support.

4. The Commission shall, upon the request of the relevant Member States, assist them throughout the negotiation process with the setting up of cooperation arrangements by providing information and analysis, including quantitative and qualitative data on the direct and indirect costs and benefits of cooperation, as well as with guidance and technical expertise. The Commission may encourage or facilitate the exchange of best practices and may develop templates for cooperation agreements in order to facilitate the negotiation process. The Commission shall assess, by 2025, the costs and benefits of the deployment of electricity from renewable sources in the Union pursuant to this Article.

5. By 2023, the Commission shall carry out an evaluation of the implementation of this Article. That evaluation shall assess the need to introduce an obligation on Member States partially to open participation in their support schemes for electricity from renewable sources to producers located in other Member States with a view to a 5 % opening by 2025 and a 10 % opening by 2030.

*Article 6***Stability of financial support**

1. Without prejudice to adaptations necessary to comply with Articles 107 and 108 TFEU, Member States shall ensure that the level of, and the conditions attached to, the support granted to renewable energy projects are not revised in a way that negatively affects the rights conferred thereunder and undermines the economic viability of projects that already benefit from support.
2. Member States may adjust the level of support in accordance with objective criteria, provided that such criteria are established in the original design of the support scheme.
3. Member States shall publish a long-term schedule anticipating the expected allocation of support, covering, as a reference, at least the following five years, or, in the case of budgetary planning constraints, the following three years, including the indicative timing, the frequency of tendering procedures where appropriate, the expected capacity and budget or maximum unitary support expected to be allocated, and the expected eligible technologies, if applicable. That schedule shall be updated on an annual basis or, where necessary, to reflect recent market developments or expected allocation of support.
4. Member States shall, at least every five years, assess the effectiveness of their support schemes for electricity from renewable sources and their major distributive effects on different consumer groups, and on investments. That assessment shall take into account the effect of possible changes to the support schemes. The indicative long-term planning governing the decisions of the support and design of new support shall take into account the results of that assessment. Member States shall include the assessment in the relevant updates of their integrated national energy and climate plans and progress reports in accordance with Regulation (EU) 2018/1999.

*Article 7***Calculation of the share of energy from renewable sources**

1. The gross final consumption of energy from renewable sources in each Member State shall be calculated as the sum of:
 - (a) gross final consumption of electricity from renewable sources;
 - (b) gross final consumption of energy from renewable sources in the heating and cooling sector; and
 - (c) final consumption of energy from renewable sources in the transport sector.

With regard to point (a), (b), or (c) of the first subparagraph, gas, electricity and hydrogen from renewable sources shall be considered only once for the purposes of calculating the share of gross final consumption of energy from renewable sources.

Subject to the second subparagraph of Article 29(1), biofuels, bioliquids and biomass fuels that do not fulfil the sustainability and greenhouse gas emissions saving criteria laid down in Article 29(2) to (7) and (10) shall not be taken into account.

2. For the purposes of point (a) of the first subparagraph of paragraph 1, gross final consumption of electricity from renewable sources shall be calculated as the quantity of electricity produced in a Member State from renewable sources, including the production of electricity from renewables self-consumers and renewable energy communities and excluding the production of electricity in pumped storage units from water that has previously been pumped uphill.

In multi-fuel plants using renewable and non-renewable sources, only the part of electricity produced from renewable sources shall be taken into account. For the purposes of that calculation, the contribution of each energy source shall be calculated on the basis of its energy content.

The electricity generated by hydropower and wind power shall be accounted for in accordance with the normalisation rules set out in Annex II.

3. For the purposes of point (b) of the first subparagraph of paragraph 1, gross final consumption of energy from renewable sources in the heating and cooling sector shall be calculated as the quantity of district heating and cooling produced in a Member State from renewable sources, plus the consumption of other energy from renewable sources in industry, households, services, agriculture, forestry and fisheries, for heating, cooling and processing purposes.

In multi-fuel plants using renewable and non-renewable sources, only the part of heating and cooling produced from renewable sources shall be taken into account. For the purposes of that calculation, the contribution of each energy source shall be calculated on the basis of its energy content.

Ambient and geothermal energy used for heating and cooling by means of heat pumps and district cooling systems shall be taken into account for the purposes of point (b) of the first subparagraph of paragraph 1, provided that the final energy output significantly exceeds the primary energy input required to drive the heat pumps. The quantity of heat or cold to be considered to be energy from renewable sources for the purposes of this Directive shall be calculated in accordance with the methodology set out in Annex VII and shall take into account energy use in all end-use sectors.

Thermal energy generated by passive energy systems, under which lower energy consumption is achieved passively through building design or from heat generated by energy from non-renewable sources, shall not be taken into account for the purposes of point (b) of the first subparagraph of paragraph 1.

By 31 December 2021, the Commission shall adopt delegated acts in accordance with Article 35 to supplement this Directive by establishing a methodology for calculating the quantity of renewable energy used for cooling and district cooling and to amend Annex VII.

That methodology shall include minimum seasonal performance factors for heat pumps operating in reverse mode.

4. For the purposes of point (c) of the first subparagraph of paragraph 1, the following requirements shall apply:

(a) Final consumption of energy from renewable sources in the transport sector shall be calculated as the sum of all biofuels, biomass fuels and renewable liquid and gaseous transport fuels of non-biological origin consumed in the transport sector. However, renewable liquid and gaseous transport fuels of non-biological origin that are produced from renewable electricity shall be considered to be part of the calculation pursuant to point (a) of the first subparagraph of paragraph 1 only when calculating the quantity of electricity produced in a Member State from renewable sources.

(b) For the calculation of final consumption of energy in the transport sector, the values regarding the energy content of transport fuels, as set out in Annex III, shall be used. For the determination of the energy content of transport fuels not included in Annex III, Member States shall use the relevant European Standards Organisation (ESO) standards in order to determine the calorific values of fuels. Where no ESO standard has been adopted for that purpose, Member States shall use the relevant International Organization for Standardisation (ISO) standards.

5. The share of energy from renewable sources shall be calculated as the gross final consumption of energy from renewable sources divided by the gross final consumption of energy from all energy sources, expressed as a percentage.

For the purposes of the first subparagraph of this paragraph, the sum referred to in the first subparagraph of paragraph 1 of this Article shall be adjusted in accordance with Articles 8, 10, 12 and 13.

In calculating a Member State's gross final consumption of energy for the purposes of measuring its compliance with the targets and indicative trajectory laid down in this Directive, the amount of energy consumed in aviation shall, as a proportion of that Member State's gross final consumption of energy, be considered to be no more than 6,18 %. For Cyprus and Malta the amount of energy consumed in aviation shall, as a proportion of those Member States' gross final consumption of energy, be considered to be no more than 4,12 %.

6. The methodology and definitions used in the calculation of the share of energy from renewable sources shall be those provided for in Regulation (EC) No 1099/2008.

Member States shall ensure coherence of the statistical information used in calculating those sectoral and overall shares and of the statistical information reported to the Commission pursuant to that Regulation.

*Article 8***Union renewable development platform and statistical transfers between Member States**

1. Member States may agree on the statistical transfer of a specified amount of energy from renewable sources from one Member State to another Member State. The transferred quantity shall be:
 - (a) deducted from the amount of energy from renewable sources that is taken into account in calculating the renewable energy share of the Member State making the transfer for the purposes of this Directive; and
 - (b) added to the amount of energy from renewable sources that is taken into account in calculating the renewable energy share of the Member State accepting the transfer for the purposes of this Directive.
2. In order to facilitate the achievement of the Union target set in Article 3(1) of this Directive and of each Member State's contribution to that target in accordance with Article 3(2) of this Directive, and to facilitate statistical transfers in accordance with paragraph 1 of this Article, the Commission shall establish a Union renewable development platform ('URDP'). Member States may, on a voluntary basis, submit to the URDP annual data on their national contributions to the Union target or any benchmark set for monitoring progress in Regulation (EU) 2018/1999, including the amount by which they expect to fall short of or exceed their contribution, and an indication of the price at which they would accept to transfer any excess production of energy from renewable sources from or to another Member State. The price of those transfers shall be set on a case-by-case basis based on the URDP demand-and-supply matching mechanism.
3. The Commission shall ensure that the URDP is able to match the demand for and supply of the amounts of energy from renewable sources that are taken into account in the calculation of the renewable energy share of a Member State based on prices or other criteria specified by the Member State accepting the transfer.

The Commission is empowered to adopt delegated acts in accordance with Article 35 to supplement this Directive by establishing the URDP and setting the conditions for the finalisation of transfers as referred to in paragraph 5 of this Article.

4. The arrangements referred to in paragraphs 1 and 2 may have a duration of one or more calendar years. Such arrangements shall be notified to the Commission or finalised on the URDP not later than 12 months after the end of each year in which they have effect. The information sent to the Commission shall include the quantity and price of the energy involved. For transfers finalised on the URDP, the parties involved and the information on the particular transfer shall be disclosed to the public.
5. Transfers shall become effective after all Member States involved in the transfer have notified the transfer to the Commission or after all clearing conditions are met on the URDP, as applicable.

*Article 9***Joint projects between Member States**

1. Two or more Member States may cooperate on all types of joint projects with regard to the production of electricity, heating or cooling from renewable sources. Such cooperation may involve private operators.
2. Member States shall notify the Commission of the proportion or amount of electricity, heating or cooling from renewable sources produced by any joint project in their territory that became operational after 25 June 2009, or by the increased capacity of an installation that was refurbished after that date, which is to be regarded as counting towards the renewable energy share of another Member State for the purposes of this Directive.
3. The notification referred to in paragraph 2 shall:
 - (a) describe the proposed installation or identify the refurbished installation;

- (b) specify the proportion or amount of electricity or heating or cooling produced from the installation which is to be regarded as counting towards the renewable energy share of the other Member State;
 - (c) identify the Member State in whose favour the notification is being made; and
 - (d) specify the period, in whole calendar years, during which the electricity or heating or cooling produced by the installation from renewable sources is to be regarded as counting towards the renewable energy share of the other Member State.
4. The duration of a joint project as referred to in this Article may extend beyond 2030.
5. A notification made under this Article shall not be varied or withdrawn without the joint agreement of the Member State making the notification and the Member State identified in accordance with point (c) of paragraph 3.
6. The Commission shall, upon the request of the Member States concerned, facilitate the establishment of joint projects between Member States, in particular via dedicated technical assistance and project development assistance.

Article 10

Effects of joint projects between Member States

1. Within three months of the end of each year falling within the period referred to in point (d) of Article 9(3), the Member State that made the notification under Article 9 shall issue a letter of notification stating:
- (a) the total amount of electricity or heating or cooling produced from renewable sources during that year by the installation which was the subject of the notification under Article 9; and
 - (b) the amount of electricity or heating or cooling produced from renewable sources during that year by that installation which is to count towards the renewable energy share of another Member State in accordance with the terms of the notification.
2. The notifying Member State shall submit the letter of notification to the Member State in whose favour the notification was made and to the Commission.
3. For the purposes of this Directive, the amount of electricity or heating or cooling from renewable sources notified in accordance with point (b) of paragraph 1 shall be:
- (a) deducted from the amount of electricity or heating or cooling from renewable sources that is taken into account in calculating the renewable energy share of the Member State issuing the letter of notification pursuant to paragraph 1; and
 - (b) added to the amount of electricity or heating or cooling from renewable sources that is taken into account in calculating the renewable energy share of the Member State receiving the letter of notification pursuant to paragraph 2.

Article 11

Joint projects between Member States and third countries

1. One or more Member States may cooperate with one or more third countries on all types of joint projects with regard to the production of electricity from renewable sources. Such cooperation may involve private operators and shall take place in full respect of international law.
2. Electricity from renewable sources produced in a third country shall be taken into account for the purposes of calculating the renewable energy shares of the Member States only where the following conditions are met:
- (a) the electricity is consumed in the Union, which is deemed to be met where:
 - (i) an equivalent amount of electricity to the electricity accounted for has been firmly nominated to the allocated interconnection capacity by all responsible transmission system operators in the country of origin, the country of destination and, if relevant, each third country of transit;

- (ii) an equivalent amount of electricity to the electricity accounted for has been firmly registered in the schedule of balance by the responsible transmission system operator on the Union side of an interconnector; and
 - (iii) the nominated capacity and the production of electricity from renewable sources by the installation referred to in point (b) refer to the same period of time;
- (b) the electricity is produced by an installation that became operational after 25 June 2009 or by the increased capacity of an installation that was refurbished after that date, under a joint project as referred to in paragraph 1;
- (c) the amount of electricity produced and exported has not received support from a support scheme of a third country other than investment aid granted to the installation; and
- (d) the electricity has been produced in accordance with international law, in a third country that is a signatory to the Council of Europe Convention for the Protection of Human Rights and Fundamental Freedoms, or other international conventions or treaties on human rights.
3. For the purposes of paragraph 4, Member States may apply to the Commission for account to be taken of electricity from renewable sources produced and consumed in a third country, in the context of the construction of an interconnector with a very long lead-time between a Member State and a third country where the following conditions are met:
- (a) construction of the interconnector started by 31 December 2026;
 - (b) it is not possible for the interconnector to become operational by 31 December 2030;
 - (c) it is possible for the interconnector to become operational by 31 December 2032;
 - (d) after it becomes operational, the interconnector will be used for the export to the Union, in accordance with paragraph 2, of electricity from renewable sources;
 - (e) the application relates to a joint project that fulfils the criteria set out in points (b) and (c) of paragraph 2 and that will use the interconnector after it becomes operational, and to a quantity of electricity that is no greater than the quantity that will be exported to the Union after the interconnector becomes operational.
4. The proportion or amount of electricity produced by any installation in the territory of a third country, which is to be regarded as counting towards the renewable energy share of one or more Member States for the purposes of this Directive, shall be notified to the Commission. When more than one Member State is concerned, the distribution between Member States of that proportion or amount shall be notified to the Commission. The proportion or amount shall not exceed the proportion or amount actually exported to, and consumed in, the Union, shall correspond to the amount referred to in point (a)(i) and (ii) of paragraph 2 and shall meet the conditions set out in point (a) of that paragraph. The notification shall be made by each Member State towards whose overall national target the proportion or amount of electricity is to count.
5. The notification referred to in paragraph 4 shall:
- (a) describe the proposed installation or identify the refurbished installation;
 - (b) specify the proportion or amount of electricity produced from the installation which is to be regarded as counting towards the renewable energy share of a Member State as well as, subject to confidentiality requirements, the corresponding financial arrangements;
 - (c) specify the period, in whole calendar years, during which the electricity is to be regarded as counting towards the renewable energy share of the Member State; and
 - (d) include a written acknowledgement of points (b) and (c) by the third country in whose territory the installation is to become operational and an indication of the proportion or amount of electricity produced by the installation which will be used domestically by that third country.
6. The duration of a joint project as referred to in this Article may extend beyond 2030.
7. A notification made under this Article shall be varied or withdrawn only where there is a joint agreement between the Member State making the notification and the third country that has acknowledged the joint project in accordance with point (d) of paragraph 5.

8. Member States and the Union shall encourage the relevant bodies of the Energy Community to take, in conformity with the Energy Community Treaty, the measures necessary to allow the Contracting Parties to apply the provisions on cooperation between Member States laid down in this Directive.

Article 12

Effects of joint projects between Member States and third countries

1. Within 12 months of the end of each year falling within the period specified under point (c) of Article 11(5), the notifying Member State shall issue a letter of notification stating:

- (a) the total amount of electricity produced from renewable sources during that year by the installation which was the subject of the notification under Article 11;
- (b) the amount of electricity produced from renewable sources during that year by that installation which is to count towards its renewable energy share in accordance with the terms of the notification under Article 11; and
- (c) evidence of compliance with the conditions laid down in Article 11(2).

2. The Member State referred to in paragraph 1 shall submit the letter of notification to the Commission and to the third country that has acknowledged the project in accordance with point (d) of Article 11(5).

3. For the purposes of calculating the renewable energy shares under this Directive, the amount of electricity from renewable sources notified in accordance with point (b) of paragraph 1 shall be added to the amount of energy from renewable sources that is taken into account in calculating the renewable energy shares of the Member State issuing the letter of notification.

Article 13

Joint support schemes

1. Without prejudice to the obligations of Member States under Article 5, two or more Member States may decide, on a voluntary basis, to join or partly coordinate their national support schemes. In such cases, a certain amount of energy from renewable sources produced in the territory of one participating Member State may count towards the renewable energy share of another participating Member State, provided that the Member States concerned:

- (a) make a statistical transfer of specified amounts of energy from renewable sources from one Member State to another Member State in accordance with Article 8; or
- (b) set up a distribution rule agreed by participating Member States that allocates amounts of energy from renewable sources between the participating Member States.

A distribution rule as referred to in point (b) of the first subparagraph shall be notified to the Commission not later than three months after the end of the first year in which it takes effect.

2. Within three months of the end of each year, each Member State that has made a notification under the second subparagraph of paragraph 1 shall issue a letter of notification stating the total amount of electricity or heating or cooling from renewable sources produced during the year which is to be the subject of the distribution rule.

3. For the purposes of calculating the renewable energy shares under this Directive, the amount of electricity or heating or cooling from renewable sources notified in accordance with paragraph 2 shall be reallocated between the Member States concerned in accordance with the notified distribution rule.

4. The Commission shall disseminate guidelines and best practices, and, upon the request of the Member States concerned, facilitate the establishment of joint support schemes between Member States.

*Article 14***Capacity increases**

For the purposes of Article 9(2) and point (b) of Article 11(2), units of energy from renewable sources imputable to an increase in the capacity of an installation shall be treated as if they were produced by a separate installation becoming operational at the moment at which the increase of capacity occurred.

*Article 15***Administrative procedures, regulations and codes**

1. Member States shall ensure that any national rules concerning the authorisation, certification and licensing procedures that are applied to plants and associated transmission and distribution networks for the production of electricity, heating or cooling from renewable sources, to the process of transformation of biomass into biofuels, bioliquids, biomass fuels or other energy products, and to renewable liquid and gaseous transport fuels of non-biological origin are proportionate and necessary and contribute to the implementation of the energy efficiency first principle.

Member States shall, in particular, take the appropriate steps to ensure that:

- (a) administrative procedures are streamlined and expedited at the appropriate administrative level and predictable timeframes are established for the procedures referred to in the first subparagraph;
- (b) rules concerning authorisation, certification and licensing are objective, transparent and proportionate, do not discriminate between applicants and take fully into account the particularities of individual renewable energy technologies;
- (c) administrative charges paid by consumers, planners, architects, builders and equipment and system installers and suppliers are transparent and cost-related; and
- (d) simplified and less burdensome authorisation procedures, including a simple-notification procedure, are established for decentralised devices, and for producing and storing energy from renewable sources.

2. Member States shall clearly define any technical specifications which are to be met by renewable energy equipment and systems in order to benefit from support schemes. Where European standards exist, including eco-labels, energy labels and other technical reference systems established by the European standardisation bodies, such technical specifications shall be expressed in terms of those standards. Such technical specifications shall not prescribe where the equipment and systems are to be certified and shall not impede the proper functioning of the internal market.

3. Member States shall ensure that their competent authorities at national, regional and local level include provisions for the integration and deployment of renewable energy, including for renewables self-consumption and renewable energy communities, and the use of unavoidable waste heat and cold when planning, including early spatial planning, designing, building and renovating urban infrastructure, industrial, commercial or residential areas and energy infrastructure, including electricity, district heating and cooling, natural gas and alternative fuel networks. Member States shall, in particular, encourage local and regional administrative bodies to include heating and cooling from renewable sources in the planning of city infrastructure where appropriate, and to consult the network operators to reflect the impact of energy efficiency and demand response programs as well as specific provisions on renewables self-consumption and renewable energy communities, on the infrastructure development plans of the operators.

4. Member States shall introduce appropriate measures in their building regulations and codes in order to increase the share of all kinds of energy from renewable sources in the building sector.

In establishing such measures or in their support schemes, Member States may take into account, where applicable, national measures relating to substantial increases in renewables self-consumption, in local energy storage and in energy efficiency, relating to cogeneration and relating to passive, low-energy or zero-energy buildings.

Member States shall, in their building regulations and codes or by other means with equivalent effect, require the use of minimum levels of energy from renewable sources in new buildings and in existing buildings that are subject to major renovation in so far as technically, functionally and economically feasible, and reflecting the results of the cost-optimal calculation carried out pursuant to Article 5(2) of Directive 2010/31/EU, and in so far as this does not negatively affect indoor air quality. Member States shall permit those minimum levels to be fulfilled, *inter alia*, through efficient district heating and cooling using a significant share of renewable energy and waste heat and cold.

The requirements laid down in the first subparagraph shall apply to the armed forces only to the extent that its application does not cause any conflict with the nature and primary aim of the activities of the armed forces and with the exception of material used exclusively for military purposes.

5. Member States shall ensure that new public buildings, and existing public buildings that are subject to major renovation, at national, regional and local level, fulfil an exemplary role in the context of this Directive from 1 January 2012. Member States may, *inter alia*, allow that obligation to be fulfilled by complying with nearly zero-energy building provisions as required in Directive 2010/31/EU, or by providing for the roofs of public or mixed private-public buildings to be used by third parties for installations that produce energy from renewable sources.

6. With respect to their building regulations and codes, Member States shall promote the use of renewable heating and cooling systems and equipment that achieve a significant reduction of energy consumption. To that end, Member States shall use energy or eco-labels or other appropriate certificates or standards developed at national or Union level, where these exist, and ensure the provision of adequate information and advice on renewable, highly energy efficient alternatives as well as eventual financial instruments and incentives available in the case of replacement, with a view to promoting an increased replacement rate of old heating systems and an increased switch to solutions based on renewable energy in accordance with Directive 2010/31/EU.

7. Member States shall carry out an assessment of their potential of energy from renewable sources and of the use of waste heat and cold in the heating and cooling sector. That assessment shall, where appropriate, include spatial analysis of areas suitable for low-ecological-risk deployment and the potential for small-scale household projects and shall be included in the second comprehensive assessment required pursuant to Article 14(1) of Directive 2012/27/EU for the first time by 31 December 2020 and in the subsequent updates of the comprehensive assessments.

8. Member States shall assess the regulatory and administrative barriers to long-term renewables power purchase agreements, and shall remove unjustified barriers to, and facilitate the uptake of, such agreements. Member States shall ensure that those agreements are not subject to disproportionate or discriminatory procedures or charges.

Member States shall describe policies and measures facilitating the uptake of renewables power purchase agreements in their integrated national energy and climate plans and progress reports pursuant to Regulation (EU) 2018/1999.

Article 16

Organisation and duration of the permit-granting process

1. Member States shall set up or designate one or more contact points. Those contact points shall, upon request by the applicant, guide through and facilitate the entire administrative permit application and granting process. The applicant shall not be required to contact more than one contact point for the entire process. The permit-granting process shall cover the relevant administrative permits to build, repower and operate plants for the production of energy from renewable sources and assets necessary for their connection to the grid. The permit-granting process shall comprise all procedures from the acknowledgment of the receipt of the application to the transmission of the outcome of the procedure referred to in paragraph 2.

2. The contact point shall guide the applicant through the administrative permit application process in a transparent manner up to the delivery of one or several decisions by the responsible authorities at the end of the process, provide the applicant with all necessary information and involve, where appropriate, other administrative authorities. Applicants shall be allowed to submit relevant documents also in digital form.

3. The contact point shall make available a manual of procedures for developers of renewable energy production projects and shall provide that information also online, addressing distinctly also small-scale projects and renewables self-consumers projects. The online information shall indicate the contact point relevant to the applicant's application. If a Member State has more than one contact point, the online information shall indicate the contact point relevant to the applicant's application.

4. Without prejudice to paragraph 7, the permit-granting process referred to in paragraph 1 shall not exceed two years for power plants, including all relevant procedures of competent authorities. Where duly justified on the grounds of extraordinary circumstances, that two-year period may be extended by up to one year.

5. Without prejudice to paragraph 7, the permit-granting process shall not exceed one year for installations with an electrical capacity of less than 150 kW. Where duly justified on the grounds of extraordinary circumstances, that one-year period may be extended by up to one year.

Member States shall ensure that applicants have easy access to simple procedures for the settlement of disputes concerning the permit-granting process and the issuance of permits to build and operate renewable energy plants, including, where applicable, alternative dispute resolution mechanisms.

6. Member States shall facilitate the repowering of existing renewable energy plants by ensuring a simplified and swift permit-granting process. The length of that process shall not exceed one year.

Where duly justified on the grounds of extraordinary circumstances, such as on grounds of overriding safety reasons where the repowering project impacts substantially on the grid or the original capacity, size or performance of the installation, that one-year period may be extended by up to one year.

7. The deadlines established in this Article shall apply without prejudice to obligations under applicable Union environmental law, to judicial appeals, remedies and other proceedings before a court or tribunal, and to alternative dispute resolution mechanisms, including complaints procedures, non-judicial appeals and remedies, and may be extended for the duration of such procedures.

8. Member States may establish a simple-notification procedure for grid connections for repowering projects as referred to in Article 17(1). Where Member States do so, repowering shall be permitted following notification to the relevant authority where no significant negative environmental or social impact is expected. That authority shall decide within six months of receipt of a notification whether this is sufficient.

Where the relevant authority decides that a notification is sufficient, it shall automatically grant the permit. Where that authority decides that the notification is not sufficient, it shall be necessary to apply for a new permit and the time-limits referred to in paragraph 6 shall apply.

Article 17

Simple-notification procedure for grid connections

1. Member States shall establish a simple-notification procedure for grid connections whereby installations or aggregated production units of renewables self-consumers and demonstration projects, with an electrical capacity of 10,8 kW or less, or equivalent for connections other than three-phase connections, are to be connected to the grid following a notification to the distribution system operator.

The distribution system operator may, within a limited period following the notification, reject the requested grid connection or propose an alternative grid connection point on justified grounds of safety concerns or technical incompatibility of the system components. In the case of a positive decision by the distribution system operator, or in the absence of a decision by the distribution system operator within one month following the notification, the installation or aggregated production unit may be connected.

2. Member States may allow a simple-notification procedure for installations or aggregated production units with an electrical capacity of above 10,8 kW and up to 50 kW, provided that grid stability, grid reliability and grid safety are maintained.

*Article 18***Information and training**

1. Member States shall ensure that information on support measures is made available to all relevant actors, such as consumers including low-income, vulnerable consumers, renewables self-consumers, renewable energy communities, builders, installers, architects, suppliers of heating, cooling and electricity equipment and systems, and suppliers of vehicles compatible with the use of renewable energy and of intelligent transport systems.
2. Member States shall ensure that information on the net benefits, cost and energy efficiency of equipment and systems for the use of heating, cooling and electricity from renewable sources is made available either by the supplier of the equipment or system or by the competent authorities.
3. Member States shall ensure that certification schemes or equivalent qualification schemes are available for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps. Those schemes may take into account existing schemes and structures as appropriate, and shall be based on the criteria laid down in Annex IV. Each Member State shall recognise the certification awarded by other Member States in accordance with those criteria.
4. Member States shall make information on certification schemes or equivalent qualification schemes as referred to in paragraph 3 available to the public. Member States may also make the list of installers who are qualified or certified in accordance with paragraph 3 available to the public.
5. Member States shall ensure that guidance is made available to all relevant actors, in particular to planners and architects so that they are able properly to consider the optimal combination of energy from renewable sources, of high-efficiency technologies, and of district heating and cooling when planning, designing, building and renovating industrial, commercial or residential areas.
6. Member States, where appropriate with the participation of local and regional authorities, shall develop suitable information, awareness-raising, guidance or training programmes in order to inform citizens of how to exercise their rights as active customers, and of the benefits and practicalities, including technical and financial aspects, of developing and using energy from renewable sources, including by renewables self-consumption or in the framework of renewable energy communities.

*Article 19***Guarantees of origin for energy from renewable sources**

1. For the purposes of demonstrating to final customers the share or quantity of energy from renewable sources in an energy supplier's energy mix and in the energy supplied to consumers under contracts marketed with reference to the consumption of energy from renewable sources, Member States shall ensure that the origin of energy from renewable sources can be guaranteed as such within the meaning of this Directive, in accordance with objective, transparent and non-discriminatory criteria.
2. To that end, Member States shall ensure that a guarantee of origin is issued in response to a request from a producer of energy from renewable sources, unless Member States decide, for the purposes of accounting for the market value of the guarantee of origin, not to issue such a guarantee of origin to a producer that receives financial support from a support scheme. Member States may arrange for guarantees of origin to be issued for energy from non-renewable sources. Issuance of guarantees of origin may be made subject to a minimum capacity limit. A guarantee of origin shall be of the standard size of 1 MWh. No more than one guarantee of origin shall be issued in respect of each unit of energy produced.

Member States shall ensure that the same unit of energy from renewable sources is taken into account only once.

Member States shall ensure that when a producer receives financial support from a support scheme, the market value of the guarantee of origin for the same production is taken into account appropriately in the relevant support scheme.

It shall be presumed that the market value of the guarantee of origin has been taken into account appropriately in any of the following cases:

- (a) where the financial support is granted by way of a tendering procedure or a tradable green certificate system;
- (b) where the market value of the guarantees of origin is administratively taken into account in the level of financial support; or
- (c) where the guarantees of origin are not issued directly to the producer but to a supplier or consumer who buys the energy from renewable sources either in a competitive setting or in a long-term renewables power purchase agreement.

In order to take into account the market value of the guarantee of origin, Member States may, *inter alia*, decide to issue a guarantee of origin to the producer and immediately cancel it.

The guarantee of origin shall have no function in terms of a Member State's compliance with Article 3. Transfers of guarantees of origin, separately or together with the physical transfer of energy, shall have no effect on the decision of Member States to use statistical transfers, joint projects or joint support schemes for compliance with Article 3 or on the calculation of the gross final consumption of energy from renewable sources in accordance with Article 7.

3. For the purposes of paragraph 1, guarantees of origin shall be valid for 12 months after the production of the relevant energy unit. Member States shall ensure that all guarantees of origin that have not been cancelled expire at the latest 18 months after the production of the energy unit. Member States shall include expired guarantees of origin in the calculation of their residual energy mix.

4. For the purposes of disclosure referred to in paragraphs 8 and 13, Member States shall ensure that energy companies cancel guarantees of origin at the latest six months after the end of the validity of the guarantee of origin.

5. Member States or designated competent bodies shall supervise the issuance, transfer and cancellation of guarantees of origin. The designated competent bodies shall not have overlapping geographical responsibilities, and shall be independent of production, trade and supply activities.

6. Member States or the designated competent bodies shall put in place appropriate mechanisms to ensure that guarantees of origin are issued, transferred and cancelled electronically and are accurate, reliable and fraud-resistant. Member States and designated competent bodies shall ensure that the requirements they impose comply with the standard CEN - EN 16325.

7. A guarantee of origin shall specify at least:

- (a) the energy source from which the energy was produced and the start and end dates of production;
- (b) whether it relates to:
 - (i) electricity;
 - (ii) gas, including hydrogen; or
 - (iii) heating or cooling;
- (c) the identity, location, type and capacity of the installation where the energy was produced;
- (d) whether the installation has benefited from investment support and whether the unit of energy has benefited in any other way from a national support scheme, and the type of support scheme;
- (e) the date on which the installation became operational; and
- (f) the date and country of issue and a unique identification number.

Simplified information may be specified on guarantees of origin from installations of less than 50 kW.

8. Where an electricity supplier is required to demonstrate the share or quantity of energy from renewable sources in its energy mix for the purposes of point (a) of Article 3(9) of Directive 2009/72/EC, it shall do so by using guarantees of origin except:

- (a) as regards the share of its energy mix corresponding to non-tracked commercial offers, if any, for which the supplier may use the residual mix; or
- (b) where a Member State decides not to issue guarantees of origin to a producer that receives financial support from a support scheme.

Where Member States have arranged to have guarantees of origin for other types of energy, suppliers shall use for disclosure the same type of guarantees of origin as the energy supplied. Likewise, guarantees of origin created pursuant to Article 14(10) of Directive 2012/27/EU may be used to substantiate any requirement to demonstrate the quantity of electricity produced from high-efficiency cogeneration. For the purposes of paragraph 2 of this Article, where electricity is generated from high-efficiency cogeneration using renewable sources, only one guarantee of origin specifying both characteristics may be issued.

9. Member States shall recognise guarantees of origin issued by other Member States in accordance with this Directive exclusively as evidence of the elements referred to in paragraph 1 and points (a) to (f) of the first subparagraph of paragraph 7. A Member State may refuse to recognise a guarantee of origin only where it has well-founded doubts about its accuracy, reliability or veracity. The Member State shall notify the Commission of such a refusal and its justification.

10. If the Commission finds that a refusal to recognise a guarantee of origin is unfounded, the Commission may adopt a decision requiring the Member State in question to recognise it.

11. Member States shall not recognise guarantees of origins issued by a third country except where the Union has concluded an agreement with that third country on mutual recognition of guarantees of origin issued in the Union and compatible guarantees of origin systems established in that third country, and only where there is direct import or export of energy.

12. A Member State may, in accordance with Union law, introduce objective, transparent and non-discriminatory criteria for the use of guarantees of origin in accordance with the obligations laid down in Article 3(9) of Directive 2009/72/EC.

13. The Commission shall adopt a report assessing options to establish a Union-wide green label with a view to promoting the use of renewable energy coming from new installations. Suppliers shall use the information contained in guarantees of origin to demonstrate compliance with the requirements of such a label.

Article 20

Access to and operation of the grids

1. Where relevant, Member States shall assess the need to extend existing gas network infrastructure to facilitate the integration of gas from renewable sources.

2. Where relevant, Member States shall require transmission system operators and distribution system operators in their territory to publish technical rules in accordance with Article 8 of Directive 2009/73/EC, in particular regarding network connection rules that include gas quality, gas odoration and gas pressure requirements. Member States shall also require transmission and distribution system operators to publish the connection tariffs to connect gas from renewable sources based on objective, transparent and non-discriminatory criteria.

3. Subject to their assessment included in the integrated national energy and climate plans in accordance with Annex I to Regulation (EU) 2018/1999 on the necessity to build new infrastructure for district heating and cooling from renewable sources in order to achieve the Union target set in Article 3(1) of this Directive, Member States shall, where relevant, take the necessary steps with a view to developing a district heating and cooling infrastructure to accommodate the development of heating and cooling from large biomass, solar energy, ambient energy and geothermal energy facilities and from waste heat and cold.

Article 21

Renewables self-consumers

1. Member States shall ensure that consumers are entitled to become renewables self-consumers, subject to this Article.
2. Member States shall ensure that renewables self-consumers, individually or through aggregators, are entitled:
 - (a) to generate renewable energy, including for their own consumption, store and sell their excess production of renewable electricity, including through renewables power purchase agreements, electricity suppliers and peer-to-peer trading arrangements, without being subject:
 - (i) in relation to the electricity that they consume from or feed into the grid, to discriminatory or disproportionate procedures and charges, and to network charges that are not cost-reflective;
 - (ii) in relation to their self-generated electricity from renewable sources remaining within their premises, to discriminatory or disproportionate procedures, and to any charges or fees;
 - (b) to install and operate electricity storage systems combined with installations generating renewable electricity for self-consumption without liability for any double charge, including network charges, for stored electricity remaining within their premises;
 - (c) to maintain their rights and obligations as final consumers;
 - (d) to receive remuneration, including, where applicable, through support schemes, for the self-generated renewable electricity that they feed into the grid, which reflects the market value of that electricity and which may take into account its long-term value to the grid, the environment and society.
3. Member States may apply non-discriminatory and proportionate charges and fees to renewables self-consumers, in relation to their self-generated renewable electricity remaining within their premises in one or more of the following cases:
 - (a) if the self-generated renewable electricity is effectively supported via support schemes, only to the extent that the economic viability of the project and the incentive effect of such support are not undermined;
 - (b) from 1 December 2026, if the overall share of self-consumption installations exceeds 8 % of the total installed electricity capacity of a Member State, and if it is demonstrated, by means of a cost-benefit analysis performed by the national regulatory authority of that Member State, which is conducted by way of an open, transparent and participatory process, that the provision laid down in point (a)(ii) of paragraph 2 either results in a significant disproportionate burden on the long-term financial sustainability of the electric system, or creates an incentive exceeding what is objectively needed to achieve cost-effective deployment of renewable energy, and that such burden or incentive cannot be minimised by taking other reasonable actions; or
 - (c) if the self-generated renewable electricity is produced in installations with a total installed electrical capacity of more than 30 kW.
4. Member States shall ensure that renewables self-consumers located in the same building, including multi-apartment blocks, are entitled to engage jointly in activities referred to in paragraph 2 and that they are permitted to arrange sharing of renewable energy that is produced on their site or sites between themselves, without prejudice to the network charges and other relevant charges, fees, levies and taxes applicable to each renewables self-consumer. Member States may differentiate between individual renewables self-consumers and jointly acting renewables self-consumers. Any such differentiation shall be proportionate and duly justified.
5. The renewables self-consumer's installation may be owned by a third party or managed by a third party for installation, operation, including metering and maintenance, provided that the third party remains subject to the renewables self-consumer's instructions. The third party itself shall not be considered to be a renewables self-consumer.

6. Member States shall put in place an enabling framework to promote and facilitate the development of renewables self-consumption based on an assessment of the existing unjustified barriers to, and of the potential of, renewables self-consumption in their territories and energy networks. That enabling framework shall, *inter alia*:

- (a) address accessibility of renewables self-consumption to all final customers, including those in low-income or vulnerable households;
- (b) address unjustified barriers to the financing of projects in the market and measures to facilitate access to finance;
- (c) address other unjustified regulatory barriers to renewables self-consumption, including for tenants;
- (d) address incentives to building owners to create opportunities for renewables self-consumption, including for tenants;
- (e) grant renewables self-consumers, for self-generated renewable electricity that they feed into the grid, non-discriminatory access to relevant existing support schemes as well as to all electricity market segments;
- (f) ensure that renewables self-consumers contribute in an adequate and balanced way to the overall cost sharing of the system when electricity is fed into the grid.

Member States shall include a summary of the policies and measures under the enabling framework and an assessment of their implementation respectively in their integrated national energy and climate plans and progress reports pursuant to Regulation (EU) 2018/1999.

7. This Article shall apply without prejudice to Articles 107 and 108 TFEU.

Article 22

Renewable energy communities

1. Member States shall ensure that final customers, in particular household customers, are entitled to participate in a renewable energy community while maintaining their rights or obligations as final customers, and without being subject to unjustified or discriminatory conditions or procedures that would prevent their participation in a renewable energy community, provided that for private undertakings, their participation does not constitute their primary commercial or professional activity.

2. Member States shall ensure that renewable energy communities are entitled to:

- (a) produce, consume, store and sell renewable energy, including through renewables power purchase agreements;
- (b) share, within the renewable energy community, renewable energy that is produced by the production units owned by that renewable energy community, subject to the other requirements laid down in this Article and to maintaining the rights and obligations of the renewable energy community members as customers;
- (c) access all suitable energy markets both directly or through aggregation in a non-discriminatory manner.

3. Member States shall carry out an assessment of the existing barriers and potential of development of renewable energy communities in their territories.

4. Member States shall provide an enabling framework to promote and facilitate the development of renewable energy communities. That framework shall ensure, *inter alia*, that:

- (a) unjustified regulatory and administrative barriers to renewable energy communities are removed;
- (b) renewable energy communities that supply energy or provide aggregation or other commercial energy services are subject to the provisions relevant for such activities;

- (c) the relevant distribution system operator cooperates with renewable energy communities to facilitate energy transfers within renewable energy communities;
 - (d) renewable energy communities are subject to fair, proportionate and transparent procedures, including registration and licensing procedures, and cost-reflective network charges, as well as relevant charges, levies and taxes, ensuring that they contribute, in an adequate, fair and balanced way, to the overall cost sharing of the system in line with a transparent cost-benefit analysis of distributed energy sources developed by the national competent authorities;
 - (e) renewable energy communities are not subject to discriminatory treatment with regard to their activities, rights and obligations as final customers, producers, suppliers, distribution system operators, or as other market participants;
 - (f) the participation in the renewable energy communities is accessible to all consumers, including those in low-income or vulnerable households;
 - (g) tools to facilitate access to finance and information are available;
 - (h) regulatory and capacity-building support is provided to public authorities in enabling and setting up renewable energy communities, and in helping authorities to participate directly;
 - (i) rules to secure the equal and non-discriminatory treatment of consumers that participate in the renewable energy community are in place.
5. The main elements of the enabling framework referred to in paragraph 4, and of its implementation, shall be part of the updates of the Member States' integrated national energy and climate plans and progress reports pursuant to Regulation (EU) 2018/1999.
6. Member States may provide for renewable energy communities to be open to cross-border participation.
7. Without prejudice to Articles 107 and 108 TFEU, Member States shall take into account specificities of renewable energy communities when designing support schemes in order to allow them to compete for support on an equal footing with other market participants.

Article 23

Mainstreaming renewable energy in heating and cooling

1. In order to promote the use of renewable energy in the heating and cooling sector, each Member State shall endeavour to increase the share of renewable energy in that sector by an indicative 1,3 percentage points as an annual average calculated for the periods 2021 to 2025 and 2026 to 2030, starting from the share of renewable energy in the heating and cooling sector in 2020, expressed in terms of national share of final energy consumption and calculated in accordance with the methodology set out in Article 7, without prejudice to paragraph 2 of this Article. That increase shall be limited to an indicative 1,1 percentage points for Member States where waste heat and cold is not used. Member States shall, where appropriate, prioritise the best available technologies.
2. For the purposes of paragraph 1, when calculating its share of renewable energy in the heating and cooling sector and its average annual increase in accordance with that paragraph, each Member State:
- (a) may count waste heat and cold, subject to a limit of 40 % of the average annual increase;
 - (b) where its share of renewable energy in the heating and cooling sector is above 60 %, may count any such share as fulfilling the average annual increase; and
 - (c) where its share of renewable energy in the heating and cooling sector is above 50 % and up to 60 %, may count any such share as fulfilling half of the average annual increase.

When deciding which measures to adopt for the purposes of deploying energy from renewable sources in the heating and cooling sector, Member States may take into account cost-effectiveness reflecting structural barriers arising from the high share of natural gas or cooling, or from a dispersed settlement structure with low population density.

Where those measures would result in a lower average annual increase than that referred to in paragraph 1 of this Article, Member States shall make it public, for instance by the means of their integrated national energy and climate progress reports pursuant to Article 20 of Regulation (EU) 2018/1999, and provide the Commission with reasons, including of choice of measures as referred to the second subparagraph of this paragraph.

3. On the basis of objective and non-discriminatory criteria, Member States may establish and make public a list of measures and may designate and make public the implementing entities, such as fuel suppliers, public or professional bodies, which are to contribute to the average annual increase referred to in paragraph 1.

4. Member States may implement the average annual increase referred to in paragraph 1 by means, *inter alia*, of one or more of the following options:

- (a) physical incorporation of renewable energy or waste heat and cold in the energy and energy fuel supplied for heating and cooling;
- (b) direct mitigation measures such as the installation of highly efficient renewable heating and cooling systems in buildings, or the use of renewable energy or waste heat and cold in industrial heating and cooling processes;
- (c) indirect mitigation measures covered by tradable certificates proving compliance with the obligation laid down in paragraph 1 through support to indirect mitigation measures, carried out by another economic operator such as an independent renewable technology installer or energy service company providing renewable installation services;
- (d) other policy measures, with an equivalent effect, to reach the average annual increase referred to in paragraph 1, including fiscal measures or other financial incentives.

When adopting and implementing the measures referred to in the first subparagraph, Member States shall aim to ensure the accessibility of measures to all consumers, in particular those in low-income or vulnerable households, who would not otherwise possess sufficient up-front capital to benefit.

5. Member States may use the structures established under the national energy savings obligations set out in Article 7 of Directive 2012/27/EU to implement and monitor the measures referred to in paragraph 3 of this Article.

6. Where entities are designated under paragraph 3, Member States shall ensure that the contribution by those designated entities is measurable and verifiable and that the designated entities report annually on:

- (a) the total amount of energy supplied for heating and cooling;
- (b) the total amount of renewable energy supplied for heating and cooling;
- (c) the amount of waste heat and cold supplied for heating and cooling;
- (d) the share of renewable energy and waste heat and cold in the total amount of energy supplied for heating and cooling; and
- (e) the type of renewable energy source.

Article 24

District heating and cooling

1. Member States shall ensure that information on the energy performance and the share of renewable energy in their district heating and cooling systems is provided to final consumers in an easily accessible manner, such as on the suppliers' websites, on annual bills or upon request.

2. Member States shall lay down the necessary measures and conditions to allow customers of district heating or cooling systems which are not efficient district heating and cooling systems, or which are not such a system by 31 December 2025 on the basis of a plan approved by the competent authority, to disconnect by terminating or modifying their contract in order to produce heating or cooling from renewable sources themselves.

Where the termination of a contract is linked to physical disconnection, such a termination may be made conditional on compensation for the costs directly incurred as a result of the physical disconnection and for the undepreciated portion of assets needed to provide heat and cold to that customer.

3. Member States may restrict the right to disconnect by terminating or modifying a contract in accordance with paragraph 2 to customers who can demonstrate that the planned alternative supply solution for heating or cooling results in a significantly better energy performance. The energy-performance assessment of the alternative supply solution may be based on the energy performance certificate.

4. Member States shall lay down the necessary measures to ensure that district heating and cooling systems contribute to the increase referred to in Article 23(1) of this Directive by implementing at least one of the two following options:

(a) Endeavour to increase the share of energy from renewable sources and from waste heat and cold in district heating and cooling by at least one percentage point as an annual average calculated for the period 2021 to 2025 and for the period 2026 to 2030, starting from the share of energy from renewable sources and from waste heat and cold in district heating and cooling in 2020, expressed in terms of share of final energy consumption in district heating and cooling, by implementing measures that can be expected to trigger that average annual increase in years with normal climatic conditions.

Member States with a share of energy from renewable sources and from waste heat and cold in district heating and cooling above 60 % may count any such share as fulfilling the average annual increase referred to in the first subparagraph of this point.

Member States shall lay down the necessary measures to implement the average annual increase referred to in the first subparagraph of this point in their integrated national energy and climate plans pursuant to Annex I to Regulation (EU) 2018/1999.

(b) Ensure that operators of district heating or cooling systems are obliged to connect suppliers of energy from renewable sources and from waste heat and cold or are obliged to offer to connect and purchase heat or cold from renewable sources and from waste heat and cold from third-party suppliers based on non-discriminatory criteria set by the competent authority of the Member State concerned, where they need to do one or more of the following:

- (i) meet demand from new customers;
- (ii) replace existing heat or cold generation capacity;
- (iii) expand existing heat or cold generation capacity.

5. Where a Member State exercises the option referred to in point (b) of paragraph 4, an operator of a district heating or cooling system may refuse to connect and to purchase heat or cold from a third-party supplier where:

- (a) the system lacks the necessary capacity due to other supplies of waste heat and cold, of heat or cold from renewable sources or of heat or cold produced by high-efficiency cogeneration;
- (b) the heat or cold from the third-party supplier does not meet the technical parameters necessary to connect and ensure the reliable and safe operation of the district heating and cooling system; or
- (c) the operator can demonstrate that providing access would lead to an excessive heat or cold cost increase for final customers compared to the cost of using the main local heat or cold supply with which the renewable source or waste heat and cold would compete.

Member States shall ensure that, when an operator of a district heating or cooling system refuses to connect a supplier of heating or cooling pursuant to the first subparagraph, information on the reasons for the refusal, as well as the conditions to be met and measures to be taken in the system in order to enable the connection, is provided by that operator to the competent authority in accordance with paragraph 9.

6. Where a Member State exercises the option referred to in point (b) of paragraph 4, it may exempt operators of the following district heating and cooling systems from the application of that point:

- (a) efficient district heating and cooling;
- (b) efficient district heating and cooling that exploits high-efficiency cogeneration;

- (c) district heating and cooling that, on the basis of a plan approved by the competent authority, is efficient district heating and cooling by 31 December 2025;
 - (d) district heating and cooling with a total rated thermal input below 20 MW.
7. The right to disconnect by terminating or modifying a contract in accordance with paragraph 2 may be exercised by individual customers, by joint undertakings formed by customers or by parties acting on behalf of customers. For multi-apartment blocks, such disconnection may be exercised only at a whole building level in accordance with the applicable housing law.
8. Member States shall require electricity distribution system operators to assess at least every four years, in cooperation with the operators of district heating or cooling systems in their respective area, the potential for district heating or cooling systems to provide balancing and other system services, including demand response and storing of excess electricity from renewable sources, and whether the use of the identified potential would be more resource- and cost-efficient than alternative solutions.
9. Member States shall ensure that the rights of consumers and the rules for operating district heating and cooling systems in accordance with this Article are clearly defined and enforced by the competent authority.
10. A Member State shall not be required to apply paragraphs 2 to 9 of this Article where:
- (a) its share of district heating and cooling is less than or equal to 2 % of the overall consumption of energy in heating and cooling on 24 December 2018;
 - (b) its share of district heating and cooling is increased above 2 % by developing new efficient district heating and cooling based on its integrated national energy and climate plan pursuant to Annex I to Regulation (EU) 2018/1999 or the assessment referred to in Article 15(7) of this Directive; or
 - (c) its share of systems referred to in paragraph 6 of this Article constitutes over 90 % of total sales of its district heating and cooling.

Article 25

Mainstreaming renewable energy in the transport sector

1. In order to mainstream the use of renewable energy in the transport sector, each Member State shall set an obligation on fuel suppliers to ensure that the share of renewable energy within the final consumption of energy in the transport sector is at least 14 % by 2030 (minimum share) in accordance with an indicative trajectory set by the Member State and calculated in accordance with the methodology set out in this Article and in Articles 26 and 27. The Commission shall assess that obligation, with a view to submitting, by 2023, a legislative proposal to increase it in the event of further substantial costs reductions in the production of renewable energy, where necessary to meet the Union's international commitments for decarbonisation, or where justified on the grounds of a significant decrease in energy consumption in the Union.

Member States may exempt, or distinguish between, different fuel suppliers and different energy carriers when setting the obligation on the fuel suppliers, ensuring that the varying degrees of maturity and the cost of different technologies are taken into account.

For the calculation of the minimum share referred to in the first subparagraph, Member States:

- (a) shall take into account renewable liquid and gaseous transport fuels of non-biological origin also when they are used as intermediate products for the production of conventional fuels; and
- (b) may take into account recycled carbon fuels.

Within the minimum share referred to in the first subparagraph, the contribution of advanced biofuels and biogas produced from the feedstock listed in Part A of Annex IX as a share of final consumption of energy in the transport sector shall be at least 0,2 % in 2022, at least 1 % in 2025 and at least 3,5 % in 2030.

Member States may exempt fuel suppliers supplying fuel in the form of electricity or renewable liquid and gaseous transport fuels of non-biological origin from the requirement to comply with the minimum share of advanced biofuels and biogas produced from the feedstock listed in Part A of Annex IX with respect to those fuels.

When setting the obligation referred to in the first and fourth subparagraphs to ensure the achievement of the share set out therein, Member States may do so, *inter alia*, by means of measures targeting volumes, energy content or greenhouse gas emissions, provided that it is demonstrated that the minimum shares referred to in the first and fourth subparagraphs are achieved.

2. The greenhouse gas emissions savings from the use of renewable liquid and gaseous transport fuels of non-biological origin shall be at least 70 % from 1 January 2021.

By 1 January 2021, the Commission shall adopt a delegated act in accordance with Article 35 to supplement this Directive by establishing appropriate minimum thresholds for greenhouse gas emissions savings of recycled carbon fuels through a life-cycle assessment that takes into account the specificities of each fuel.

Article 26

Specific rules for biofuels, bioliquids and biomass fuels produced from food and feed crops

1. For the calculation of a Member State's gross final consumption of energy from renewable sources referred to in Article 7 and the minimum share referred to in the first subparagraph of Article 25(1), the share of biofuels and bioliquids, as well as of biomass fuels consumed in transport, where produced from food and feed crops, shall be no more than one percentage point higher than the share of such fuels in the final consumption of energy in the road and rail transport sectors in 2020 in that Member State, with a maximum of 7 % of final consumption of energy in the road and rail transport sectors in that Member State.

Where that share is below 1 % in a Member State, it may be increased to a maximum of 2 % of the final consumption of energy in the road and rail transport sectors.

Member States may set a lower limit and may distinguish, for the purposes of Article 29(1), between different biofuels, bioliquids and biomass fuels produced from food and feed crops, taking into account best available evidence on indirect land-use change impact. Member States may, for example, set a lower limit for the share of biofuels, bioliquids and biomass fuels produced from oil crops.

Where the share of biofuels and bioliquids, as well as of biomass fuels consumed in transport, produced from food and feed crops in a Member State is limited to a share lower than 7 % or a Member State decides to limit the share further, that Member State may reduce the minimum share referred to in the first subparagraph of Article 25(1) accordingly, by a maximum of 7 percentage points.

2. For the calculation of a Member State's gross final consumption of energy from renewable sources referred to in Article 7 and the minimum share referred to in the first subparagraph of Article 25(1), the share of high indirect land-use change-risk biofuels, bioliquids or biomass fuels produced from food and feed crops for which a significant expansion of the production area into land with high-carbon stock is observed shall not exceed the level of consumption of such fuels in that Member State in 2019, unless they are certified to be low indirect land-use change-risk biofuels, bioliquids or biomass fuels pursuant to this paragraph.

From 31 December 2023 until 31 December 2030 at the latest, that limit shall gradually decrease to 0 %.

By 1 February 2019, the Commission shall submit to the European Parliament and to the Council a report on the status of worldwide production expansion of the relevant food and feed crops.

By 1 February 2019, the Commission shall adopt a delegated act in accordance with Article 35 to supplement this Directive by setting out the criteria for certification of low indirect land-use change-risk biofuels, bioliquids and biomass fuels and for determining the high indirect land-use change-risk feedstock for which a significant expansion of the production area into land with high-carbon stock is observed. The report and the accompanying delegated act shall be based on the best available scientific data.

By 1 September 2023, the Commission shall review the criteria laid down in the delegated act referred to in the fourth subparagraph based on the best available scientific data and shall adopt delegated acts in accordance with Article 35 to amend such criteria, where appropriate, and to include a trajectory to gradually decrease the contribution to the Union target set in Article 3(1) and to the minimum share referred to in the first subparagraph of Article 25(1), of high indirect land-use change-risk biofuels, bioliquids and biomass fuels produced from feedstock for which a significant expansion of the production into land with high-carbon stock is observed.

Article 27

Calculation rules with regard to the minimum shares of renewable energy in the transport sector

1. For the calculation of the minimum shares referred to in the first and fourth subparagraphs of Article 25(1), the following provisions shall apply:

- (a) for the calculation of the denominator, that is the energy content of road- and rail- transport fuels supplied for consumption or use on the market, petrol, diesel, natural gas, biofuels, biogas, renewable liquid and gaseous transport fuels of non-biological origin, recycled carbon fuels and electricity supplied to the road and rail transport sectors, shall be taken into account;
- (b) for the calculation of the numerator, that is the amount of energy from renewable sources consumed in the transport sector for the purposes of the first subparagraph of Article 25(1), the energy content of all types of energy from renewable sources supplied to all transport sectors, including renewable electricity supplied to the road and rail transport sectors, shall be taken into account. Member States may also take into account recycled carbon fuels.

For the calculation of the numerator, the share of biofuels and biogas produced from the feedstock listed in Part B of Annex IX shall, except for in Cyprus and Malta, be limited to 1,7 % of the energy content of transport fuels supplied for consumption or use on the market. Member States may, where justified, modify that limit, taking into account the availability of feedstock. Any such modification shall be subject to approval by the Commission;

- (c) for the calculation of both numerator and denominator, the values regarding the energy content of transport fuels set out in Annex III shall be used. For the determination of the energy content of transport fuels not included in Annex III, the Member States shall use the relevant ESO standards for the determination of the calorific values of fuels. Where no ESO standard has been adopted for that purpose, the relevant ISO standards shall be used. The Commission is empowered to adopt delegated acts in accordance with Article 35 to amend this Directive by adapting the energy content of transport fuels, as set out in Annex III, in accordance with scientific and technical progress.

2. For the purposes of demonstrating compliance with the minimum shares referred to in Article 25(1):

- (a) the share of biofuels and biogas for transport produced from the feedstock listed in Annex IX may be considered to be twice its energy content;
- (b) the share of renewable electricity shall be considered to be four times its energy content when supplied to road vehicles and may be considered to be 1,5 times its energy content when supplied to rail transport;
- (c) with the exception of fuels produced from food and feed crops, the share of fuels supplied in the aviation and maritime sectors shall be considered to be 1,2 times their energy content.

3. For the calculation of the share of renewable electricity in the electricity supplied to road and rail vehicles for the purposes of paragraph 1 of this Article, Member States shall refer to the two-year period before the year in which the electricity is supplied in their territory.

By way of derogation from the first subparagraph of this paragraph, to determine the share of electricity for the purposes of paragraph 1 of this Article, in the case of electricity obtained from a direct connection to an installation generating renewable electricity and supplied to road vehicles, that electricity shall be fully counted as renewable.

In order to ensure that the expected increase in demand for electricity in the transport sector beyond the current baseline is met with additional renewable energy generation capacity, the Commission shall develop a framework on additionality in the transport sector and shall develop different options with a view to determining the baseline of Member States and measuring additionality.

For the purposes of this paragraph, where electricity is used for the production of renewable liquid and gaseous transport fuels of non-biological origin, either directly or for the production of intermediate products, the average share of electricity from renewable sources in the country of production, as measured two years before the year in question, shall be used to determine the share of renewable energy.

However, electricity obtained from direct connection to an installation generating renewable electricity may be fully counted as renewable electricity where it is used for the production of renewable liquid and gaseous transport fuels of non-biological origin, provided that the installation:

- (a) comes into operation after, or at the same time as, the installation producing the renewable liquid and gaseous transport fuels of non-biological origin; and
- (b) is not connected to the grid or is connected to the grid but evidence can be provided that the electricity concerned has been supplied without taking electricity from the grid.

Electricity that has been taken from the grid may be counted as fully renewable provided that it is produced exclusively from renewable sources and the renewable properties and other appropriate criteria have been demonstrated, ensuring that the renewable properties of that electricity are claimed only once and only in one end-use sector.

By 31 December 2021, the Commission shall adopt a delegated act in accordance with Article 35 to supplement this Directive by establishing a Union methodology setting out detailed rules by which economic operators are to comply with the requirements laid down in the fifth and sixth subparagraphs of this paragraph.

Article 28

Other provisions on renewable energy in the transport sector

1. With a view to minimising the risk of single consignments being claimed more than once in the Union, Member States and the Commission shall strengthen cooperation among national systems and between national systems and voluntary schemes and verifiers established pursuant to Article 30, including, where appropriate, the exchange of data. Where the competent authority of one Member State suspects or detects a fraud, it shall, where appropriate, inform the other Member States.

2. The Commission shall ensure that a Union database is put in place to enable the tracing of liquid and gaseous transport fuels that are eligible for being counted towards the numerator referred to in point (b) of Article 27(1) or that are taken into account for the purposes referred to in points (a), (b), and (c) of the first subparagraph of Article 29(1). Member States shall require the relevant economic operators to enter into that database information on the transactions made and the sustainability characteristics of those fuels, including their life-cycle greenhouse gas emissions, starting from their point of production to the fuel supplier that places the fuel on the market. A Member State may set up a national database that is linked to the Union database ensuring that information entered is instantly transferred between the databases.

Fuel suppliers shall enter the information necessary to verify compliance with the requirements laid down in the first and fourth subparagraphs of Article 25(1) into the relevant database.

3. By 31 December 2021, Member States shall take measures to ensure the availability of fuels from renewable sources for transport including with regard to publicly accessible high-power recharging points and other refuelling infrastructure as provided for in their national policy frameworks in accordance with Directive 2014/94/EU.

4. Member States shall have access to the Union database referred to in paragraph 2 of this Article. They shall take measures to ensure that economic operators enter accurate information into the relevant database. The Commission shall require the schemes that are the subject of a decision pursuant to Article 30(4) of this Directive to verify compliance with that requirement when checking compliance with the sustainability criteria for biofuels, bioliquids and biomass fuels. It shall publish, every two years, aggregated information from the Union database pursuant to Annex VIII to Regulation (EU) 2018/1999.

5. By 31 December 2021, the Commission shall adopt delegated acts in accordance with Article 35 to supplement this Directive by specifying the methodology to determine the share of biofuel, and biogas for transport, resulting from biomass being processed with fossil fuels in a common process, and by specifying the methodology for assessing greenhouse gas emissions savings from renewable liquid and gaseous transport fuels of non-biological origin and from recycled carbon fuels, which shall ensure that credit for avoided emissions is not given for CO₂ the capture of which has already received an emission credit under other provisions of law.

6. By 25 June 2019 and every two years thereafter, the Commission shall review the list of feedstock set out in Parts A and B of Annex IX with a view to adding feedstock in accordance with the principles set out in the third subparagraph.

The Commission is empowered to adopt delegated acts in accordance with Article 35 to amend the list of feedstock set out in Parts A and B of Annex IX by adding, but not removing, feedstock. Feedstock that can be processed only with advanced technologies shall be added to Part A of Annex IX. Feedstock that can be processed into biofuels, or biogas for transport, with mature technologies shall be added to Part B of Annex IX.

Such delegated acts shall be based on an analysis of the potential of the raw material as feedstock for the production of biofuels and biogas for transport, taking into account all of the following:

- (a) the principles of the circular economy and of the waste hierarchy established in Directive 2008/98/EC;
- (b) the Union sustainability criteria laid down in Article 29(2) to (7);
- (c) the need to avoid significant distortive effects on markets for (by-)products, wastes or residues;
- (d) the potential for delivering substantial greenhouse gas emissions savings compared to fossil fuels based on a life-cycle assessment of emissions;
- (e) the need to avoid negative impacts on the environment and biodiversity;
- (f) the need to avoid creating an additional demand for land.

7. By 31 December 2025, in the context of the biennial assessment of progress made pursuant to Regulation (EU) 2018/1999, the Commission shall assess whether the obligation relating to advanced biofuels and biogas produced from feedstock listed in Part A of Annex IX laid down in the fourth subparagraph of Article 25(1) effectively stimulates innovation and ensures greenhouse gas emissions savings in the transport sector. The Commission shall analyse in that assessment whether the application of this Article effectively avoids double accounting of renewable energy.

The Commission shall, if appropriate, submit a proposal to amend the obligation relating to advanced biofuels and biogas produced from feedstock listed in Part A of Annex IX laid down in the fourth subparagraph of Article 25(1).

Article 29

Sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids and biomass fuels

1. Energy from biofuels, bioliquids and biomass fuels shall be taken into account for the purposes referred to in points (a), (b) and (c) of this subparagraph only if they fulfil the sustainability and the greenhouse gas emissions saving criteria laid down in paragraphs 2 to 7 and 10:

- (a) contributing towards the Union target set in Article 3(1) and the renewable energy shares of Member States;

- (b) measuring compliance with renewable energy obligations, including the obligation laid down in Article 25;
- (c) eligibility for financial support for the consumption of biofuels, bioliquids and biomass fuels.

However, biofuels, bioliquids and biomass fuels produced from waste and residues, other than agricultural, aquaculture, fisheries and forestry residues, are required to fulfil only the greenhouse gas emissions saving criteria laid down in paragraph 10 in order to be taken into account for the purposes referred to in points (a), (b) and (c) of the first subparagraph. This subparagraph shall also apply to waste and residues that are first processed into a product before being further processed into biofuels, bioliquids and biomass fuels.

Electricity, heating and cooling produced from municipal solid waste shall not be subject to the greenhouse gas emissions saving criteria laid down in paragraph 10.

Biomass fuels shall fulfil the sustainability and greenhouse gas emissions saving criteria laid down in paragraphs 2 to 7 and 10 if used in installations producing electricity, heating and cooling or fuels with a total rated thermal input equal to or exceeding 20 MW in the case of solid biomass fuels, and with a total rated thermal input equal to or exceeding 2 MW in the case of gaseous biomass fuels. Member States may apply the sustainability and greenhouse gas emissions saving criteria to installations with lower total rated thermal input.

The sustainability and the greenhouse gas emissions saving criteria laid down in paragraphs 2 to 7 and 10 shall apply irrespective of the geographical origin of the biomass.

2. Biofuels, bioliquids and biomass fuels produced from waste and residues derived not from forestry but from agricultural land shall be taken into account for the purposes referred to in points (a), (b) and (c) of the first subparagraph of paragraph 1 only where operators or national authorities have monitoring or management plans in place in order to address the impacts on soil quality and soil carbon. Information about how those impacts are monitored and managed shall be reported pursuant to Article 30(3).

3. Biofuels, bioliquids and biomass fuels produced from agricultural biomass taken into account for the purposes referred to in points (a), (b) and (c) of the first subparagraph of paragraph 1 shall not be made from raw material obtained from land with a high biodiversity value, namely land that had one of the following statuses in or after January 2008, whether or not the land continues to have that status:

- (a) primary forest and other wooded land, namely forest and other wooded land of native species, where there is no clearly visible indication of human activity and the ecological processes are not significantly disturbed;
- (b) highly biodiverse forest and other wooded land which is species-rich and not degraded, or has been identified as being highly biodiverse by the relevant competent authority, unless evidence is provided that the production of that raw material did not interfere with those nature protection purposes;

(c) areas designated:

- (i) by law or by the relevant competent authority for nature protection purposes; or
- (ii) for the protection of rare, threatened or endangered ecosystems or species recognised by international agreements or included in lists drawn up by intergovernmental organisations or the International Union for the Conservation of Nature, subject to their recognition in accordance with the first subparagraph of Article 30(4),

unless evidence is provided that the production of that raw material did not interfere with those nature protection purposes;

(d) highly biodiverse grassland spanning more than one hectare that is:

- (i) natural, namely grassland that would remain grassland in the absence of human intervention and that maintains the natural species composition and ecological characteristics and processes; or
- (ii) non-natural, namely grassland that would cease to be grassland in the absence of human intervention and that is species-rich and not degraded and has been identified as being highly biodiverse by the relevant competent authority, unless evidence is provided that the harvesting of the raw material is necessary to preserve its status as highly biodiverse grassland.

The Commission may adopt implementing acts further specifying the criteria by which to determine which grassland are to be covered by point (d) of the first subparagraph of this paragraph. Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 34(3).

4. Biofuels, bioliquids and biomass fuels produced from agricultural biomass taken into account for the purposes referred to in points (a), (b) and (c) of the first subparagraph of paragraph 1 shall not be made from raw material obtained from land with high-carbon stock, namely land that had one of the following statuses in January 2008 and no longer has that status:

- (a) wetlands, namely land that is covered with or saturated by water permanently or for a significant part of the year;
- (b) continuously forested areas, namely land spanning more than one hectare with trees higher than five metres and a canopy cover of more than 30 %, or trees able to reach those thresholds *in situ*;
- (c) land spanning more than one hectare with trees higher than five metres and a canopy cover of between 10 % and 30 %, or trees able to reach those thresholds *in situ*, unless evidence is provided that the carbon stock of the area before and after conversion is such that, when the methodology laid down in Part C of Annex V is applied, the conditions laid down in paragraph 10 of this Article would be fulfilled.

This paragraph shall not apply if, at the time the raw material was obtained, the land had the same status as it had in January 2008.

5. Biofuels, bioliquids and biomass fuels produced from agricultural biomass taken into account for the purposes referred to in points (a), (b) and (c) of the first subparagraph of paragraph 1 shall not be made from raw material obtained from land that was peatland in January 2008, unless evidence is provided that the cultivation and harvesting of that raw material does not involve drainage of previously undrained soil.

6. Biofuels, bioliquids and biomass fuels produced from forest biomass taken into account for the purposes referred to in points (a), (b) and (c) of the first subparagraph of paragraph 1 shall meet the following criteria to minimise the risk of using forest biomass derived from unsustainable production:

- (a) the country in which forest biomass was harvested has national or sub-national laws applicable in the area of harvest as well as monitoring and enforcement systems in place ensuring:
 - (i) the legality of harvesting operations;
 - (ii) forest regeneration of harvested areas;
 - (iii) that areas designated by international or national law or by the relevant competent authority for nature protection purposes, including in wetlands and peatlands, are protected;
 - (iv) that harvesting is carried out considering maintenance of soil quality and biodiversity with the aim of minimising negative impacts; and
 - (v) that harvesting maintains or improves the long-term production capacity of the forest;
- (b) when evidence referred to in point (a) of this paragraph is not available, the biofuels, bioliquids and biomass fuels produced from forest biomass shall be taken into account for the purposes referred to in points (a), (b) and (c) of the first subparagraph of paragraph 1 if management systems are in place at forest sourcing area level ensuring:
 - (i) the legality of harvesting operations;
 - (ii) forest regeneration of harvested areas;
 - (iii) that areas designated by international or national law or by the relevant competent authority for nature protection purposes, including in wetlands and peatlands, are protected unless evidence is provided that the harvesting of that raw material does not interfere with those nature protection purposes;
 - (iv) that harvesting is carried out considering the maintenance of soil quality and biodiversity with the aim of minimising negative impacts; and
 - (v) that harvesting maintains or improves the long-term production capacity of the forest.

7. Biofuels, bioliquids and biomass fuels produced from forest biomass taken into account for the purposes referred to in points (a), (b) and (c) of the first subparagraph of paragraph 1 shall meet the following land-use, land-use change and forestry (LULUCF) criteria:

- (a) the country or regional economic integration organisation of origin of the forest biomass:
 - (i) is a Party to the Paris Agreement;
 - (ii) has submitted a nationally determined contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC), covering emissions and removals from agriculture, forestry and land use which ensures that changes in carbon stock associated with biomass harvest are accounted towards the country's commitment to reduce or limit greenhouse gas emissions as specified in the NDC; or
 - (iii) has national or sub-national laws in place, in accordance with Article 5 of the Paris Agreement, applicable in the area of harvest, to conserve and enhance carbon stocks and sinks, and providing evidence that reported LULUCF-sector emissions do not exceed removals;
- (b) where evidence referred to in point (a) of this paragraph is not available, the biofuels, bioliquids and biomass fuels produced from forest biomass shall be taken into account for the purposes referred to in points (a), (b) and (c) of the first subparagraph of paragraph 1 if management systems are in place at forest sourcing area level to ensure that carbon stocks and sinks levels in the forest are maintained, or strengthened over the long term.

8. By 31 January 2021, the Commission shall adopt implementing acts establishing the operational guidance on the evidence for demonstrating compliance with the criteria laid down in paragraphs 6 and 7 of this Article. Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 34(3).

9. By 31 December 2026, the Commission shall assess whether the criteria laid down in paragraphs 6 and 7 effectively minimise the risk of using forest biomass derived from unsustainable production and address LULUCF criteria, on the basis of the available data.

The Commission shall, if appropriate, submit a legislative proposal to amend the criteria laid down in paragraphs 6 and 7 for the period after 2030.

10. The greenhouse gas emission savings from the use of biofuels, bioliquids and biomass fuels taken into account for the purposes referred to in paragraph 1 shall be:

- (a) at least 50 % for biofuels, biogas consumed in the transport sector, and bioliquids produced in installations in operation on or before 5 October 2015;
- (b) at least 60 % for biofuels, biogas consumed in the transport sector, and bioliquids produced in installations starting operation from 6 October 2015 until 31 December 2020;
- (c) at least 65 % for biofuels, biogas consumed in the transport sector, and bioliquids produced in installations starting operation from 1 January 2021;
- (d) at least 70 % for electricity, heating and cooling production from biomass fuels used in installations starting operation from 1 January 2021 until 31 December 2025, and 80 % for installations starting operation from 1 January 2026.

An installation shall be considered to be in operation once the physical production of biofuels, biogas consumed in the transport sector and bioliquids, and the physical production of heating and cooling and electricity from biomass fuels has started.

The greenhouse gas emission savings from the use of biofuels, biogas consumed in the transport sector, bioliquids and biomass fuels used in installations producing heating, cooling and electricity shall be calculated in accordance with Article 31(1).

11. Electricity from biomass fuels shall be taken into account for the purposes referred to in points (a), (b) and (c) of the first subparagraph of paragraph 1 only if it meets one or more of the following requirements:

- (a) it is produced in installations with a total rated thermal input below 50 MW;
- (b) for installations with a total rated thermal input from 50 to 100 MW, it is produced applying high-efficiency cogeneration technology, or, for electricity-only installations, meeting an energy efficiency level associated with the best available techniques (BAT-AEELs) as defined in Commission Implementing Decision (EU) 2017/1442 ⁽¹⁾;
- (c) for installations with a total rated thermal input above 100 MW, it is produced applying high-efficiency cogeneration technology, or, for electricity-only installations, achieving a net-electrical efficiency of at least 36 %;
- (d) it is produced applying Biomass CO₂ Capture and Storage.

For the purposes of points (a), (b) and (c) of the first subparagraph of paragraph 1 of this Article, electricity-only-installations shall be taken into account only if they do not use fossil fuels as a main fuel and only if there is no cost-effective potential for the application of high-efficiency cogeneration technology according to the assessment in accordance with Article 14 of Directive 2012/27/EU.

For the purposes of points (a) and (b) of the first subparagraph of paragraph 1 of this Article, this paragraph shall apply only to installations starting operation or converted to the use of biomass fuels after 25 December 2021. For the purposes of point (c) of the first subparagraph of paragraph 1 of this Article, this paragraph shall be without prejudice to support granted under support schemes in accordance with Article 4 approved by 25 December 2021.

Member States may apply higher energy efficiency requirements than those referred in the first subparagraph to installations with lower rated thermal input.

The first subparagraph shall not apply to electricity from installations which are the object of a specific notification by a Member State to the Commission based on the duly substantiated existence of risks for the security of supply of electricity. Upon assessment of the notification, the Commission shall adopt a decision taking into account the elements included therein.

12. For the purposes referred to in points (a), (b) and (c) of the first subparagraph of paragraph 1 of this Article, and without prejudice to Articles 25 and 26, Member States shall not refuse to take into account, on other sustainability grounds, biofuels and bioliquids obtained in compliance with this Article. This paragraph shall be without prejudice to public support granted under support schemes approved before 24 December 2018.

13. For the purposes referred to in point (c) of the first subparagraph of paragraph 1 of this Article, Member States may derogate, for a limited period of time, from the criteria laid down in paragraphs 2 to 7 and 10 and 11 of this Article by adopting different criteria for:

- (a) installations located in an outermost region as referred to in Article 349 TFEU to the extent that such facilities produce electricity or heating or cooling from biomass fuels; and
- (b) biomass fuels used in the installations referred to in point (a) of this subparagraph, irrespective of the place of origin of that biomass, provided that such criteria are objectively justified on the grounds that their aim is to ensure, for that outermost region, a smooth phase-in of the criteria laid down in paragraphs 2 to 7 and 10 and 11 of this Article and thereby incentivise the transition from fossil fuels to sustainable biomass fuels.

The different criteria referred to in this paragraph shall be subject to a specific notification by the relevant Member State to the Commission.

14. For the purposes referred to in points (a), (b) and (c) of the first subparagraph of paragraph 1, Member States may establish additional sustainability criteria for biomass fuels.

By 31 December 2026, the Commission shall assess the impact of such additional criteria on the internal market, accompanied, if necessary, by a proposal to ensure harmonisation thereof.

⁽¹⁾ Commission Implementing Decision (EU) 2017/1442 of 31 July 2017 establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for large combustion plants (OJ L 212, 17.8.2017, p. 1).

Article 30

Verification of compliance with the sustainability and greenhouse gas emissions saving criteria

1. Where biofuels, bioliquids and biomass fuels, or other fuels that are eligible for counting towards the numerator referred to in point (b) of Article 27(1), are to be taken into account for the purposes referred to in Articles 23 and 25 and in points (a), (b) and (c) of the first subparagraph of Article 29(1), Member States shall require economic operators to show that the sustainability and greenhouse gas emissions saving criteria laid down in Article 29(2) to (7) and (10) have been fulfilled. For those purposes, they shall require economic operators to use a mass balance system which:

- (a) allows consignments of raw material or fuels with differing sustainability and greenhouse gas emissions saving characteristics to be mixed for instance in a container, processing or logistical facility, transmission and distribution infrastructure or site;
- (b) allows consignments of raw material with differing energy content to be mixed for the purposes of further processing, provided that the size of consignments is adjusted according to their energy content;
- (c) requires information about the sustainability and greenhouse gas emissions saving characteristics and sizes of the consignments referred to in point (a) to remain assigned to the mixture; and
- (d) provides for the sum of all consignments withdrawn from the mixture to be described as having the same sustainability characteristics, in the same quantities, as the sum of all consignments added to the mixture and requires that this balance be achieved over an appropriate period of time.

The mass balance system shall ensure that each consignment is counted only once in point (a), (b) or (c) of the first subparagraph of Article 7(1) for the purposes of calculating the gross final consumption of energy from renewable sources and shall include information on whether support has been provided for the production of that consignment, and if so, on the type of support scheme.

2. Where a consignment is processed, information on the sustainability and greenhouse gas emissions saving characteristics of the consignment shall be adjusted and assigned to the output in accordance with the following rules:

- (a) when the processing of a consignment of raw material yields only one output that is intended for the production of biofuels, bioliquids or biomass fuels, renewable liquid and gaseous transport fuels of non-biological origin, or recycled carbon fuels, the size of the consignment and the related quantities of sustainability and greenhouse gas emissions saving characteristics shall be adjusted applying a conversion factor representing the ratio between the mass of the output that is intended for such production and the mass of the raw material entering the process;
- (b) when the processing of a consignment of raw material yields more than one output that is intended for the production of biofuels, bioliquids or biomass fuels, renewable liquid and gaseous transport fuels of non-biological origin, or recycled carbon fuels, for each output a separate conversion factor shall be applied and a separate mass balance shall be used.

3. Member States shall take measures to ensure that economic operators submit reliable information regarding the compliance with the greenhouse gas emissions savings thresholds set in, and adopted pursuant to, Article 25(2), and with the sustainability and greenhouse gas emissions saving criteria laid down in Article 29(2) to (7) and (10), and that economic operators make available to the relevant Member State, upon request, the data that were used to develop the information. Member States shall require economic operators to arrange for an adequate standard of independent auditing of the information submitted, and to provide evidence that this has been done. In order to comply with point (a) of Article 29(6) and point (a) of Article 29(7), the first or second party auditing may be used up to the first gathering point of the forest biomass. The auditing shall verify that the systems used by economic operators are accurate, reliable and protected against fraud, including verification ensuring that materials are not intentionally modified or discarded so that the consignment or part thereof could become a waste or residue. It shall evaluate the frequency and methodology of sampling and the robustness of the data.

The obligations laid down in this paragraph shall apply regardless of whether the biofuels, bioliquids, biomass fuels, renewable liquid and gaseous transport fuels of non-biological origin, or recycled carbon fuels are produced within the Union or are imported. Information about the geographic origin and feedstock type of biofuels, bioliquids and biomass fuels per fuel supplier shall be made available to consumers on the websites of operators, suppliers or the relevant competent authorities and shall be updated on an annual basis.

Member States shall submit to the Commission, in aggregated form, the information referred to in the first subparagraph of this paragraph. The Commission shall publish that information on the e-reporting platform referred to in Article 28 of Regulation (EU) 2018/1999 in summary form preserving the confidentiality of commercially sensitive information.

4. The Commission may decide that voluntary national or international schemes setting standards for the production of biofuels, bioliquids or biomass fuels, or other fuels that are eligible for counting towards the numerator referred to in point (b) of Article 27(1), provide accurate data on greenhouse gas emission savings for the purposes of Article 25(2) and Article 29(10), demonstrate compliance with Article 27(3) and Article 28(2) and (4), or demonstrate that consignments of biofuels, bioliquids or biomass fuels comply with the sustainability criteria laid down in Article 29(2) to (7). When demonstrating that the criteria laid down in Article 29(6) and (7) are met, the operators may provide the required evidence directly at sourcing area level. The Commission may recognise areas for the protection of rare, threatened or endangered ecosystems or species recognised by international agreements or included in lists drawn up by intergovernmental organisations or the International Union for the Conservation of Nature for the purposes of point (c)(ii) of the first subparagraph of Article 29(3).

The Commission may decide that those schemes contain accurate information on measures taken for soil, water and air protection, for the restoration of degraded land, for the avoidance of excessive water consumption in areas where water is scarce, and for certification of biofuels, bioliquids and biomass fuels with low indirect land-use change-risk.

5. The Commission shall adopt decisions under paragraph 4 of this Article by means of implementing acts. Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 34(3). Such decisions shall be valid for a period of no more than five years.

The Commission shall require that each voluntary scheme on which a decision has been adopted under paragraph 4 submit annually by 30 April a report to the Commission covering each of the points set out in Annex IX to Regulation (EU) 2018/1999. The report shall cover the preceding calendar year. The requirement to submit a report shall apply only to voluntary schemes that have operated for at least 12 months.

The Commission shall make the reports drawn up by the voluntary schemes available, in an aggregated form or in full if appropriate, on the e-reporting platform referred to in Article 28 of Regulation (EU) 2018/1999.

6. Member States may set up national schemes where compliance with the sustainability and greenhouse gas emissions saving criteria laid down in Article 29(2) to (7) and (10) and with the greenhouse gas emissions savings thresholds for renewable liquid and gaseous transport fuels of non-biological origin and recycled carbon fuels set in, and adopted pursuant to, Article 25(2) and in accordance with Article 28(5) is verified throughout the entire chain of custody involving competent national authorities.

A Member State may notify such a national scheme to the Commission. The Commission shall give priority to the assessment of such a scheme in order to facilitate mutual bilateral and multilateral recognition of schemes for verification of compliance with the sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids and biomass fuels and with the greenhouse gas emissions savings thresholds for other fuels that are eligible for counting towards the numerator referred to in point (b) of Article 27(1). The Commission may decide, by means of implementing acts, whether such a notified national scheme complies with the conditions laid down in this Directive. Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 34(3).

Where the decision is positive, schemes established in accordance with this Article shall not refuse mutual recognition with that Member State's scheme, as regards verification of compliance with the sustainability and greenhouse gas emissions saving criteria laid down in Article 29(2) to (7) and (10) and the greenhouse gas emissions savings thresholds set in, and adopted pursuant to, Article 25(2).

7. The Commission shall adopt decisions under paragraph 4 of this Article only if the scheme in question meets adequate standards of reliability, transparency and independent auditing and provides adequate assurances that no

materials have been intentionally modified or discarded so that the consignment or part thereof would fall under Annex IX. In the case of schemes to measure greenhouse gas emissions savings, such schemes shall also comply with the methodological requirements set out in Annex V or VI. Lists of areas of high biodiversity value as referred to in point (c)(ii) of the first subparagraph of Article 29(3) shall meet adequate standards of objectivity and coherence with internationally recognised standards and provide for appropriate appeal procedures.

The voluntary schemes referred to in paragraph 4 shall, at least annually, publish a list of their certification bodies used for independent auditing, indicating for each certification body by which entity or national public authority it was recognised and which entity or national public authority is monitoring it.

8. In order to ensure that compliance with the sustainability and greenhouse gas emissions saving criteria as well as with the provisions on low or high direct and indirect land-use change-risk biofuels, bioliquids and biomass fuels is verified in an efficient and harmonised manner and in particular to prevent fraud, the Commission shall adopt implementing acts specifying detailed implementing rules, including adequate standards of reliability, transparency and independent auditing and require all voluntary schemes to apply those standards. Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 34(3).

In those implementing acts, the Commission shall pay particular attention to the need to minimise administrative burden. The implementing acts shall set a time frame by which voluntary schemes are required to implement the standards. The Commission may repeal decisions recognising voluntary schemes pursuant to paragraph 4 in the event that those schemes fail to implement such standards in the time frame provided for. Where a Member State raises concerns that a voluntary scheme does not operate in accordance with the standards of reliability, transparency and independent auditing that constitute the basis for decisions under paragraph 4, the Commission shall investigate the matter and take appropriate action.

9. Where an economic operator provides evidence or data obtained in accordance with a scheme that has been the subject of a decision pursuant to paragraph 4 or 6 of this Article, to the extent covered by that decision, a Member State shall not require the supplier to provide further evidence of compliance with the sustainability and greenhouse gas emissions saving criteria laid down in Article 29(2) to (7) and (10).

Competent authorities of the Member States shall supervise the operation of certification bodies that are conducting independent auditing under a voluntary scheme. Certification bodies shall submit, upon the request of competent authorities, all relevant information necessary to supervise the operation, including the exact date, time and location of audits. Where Member States find issues of non-conformity, they shall inform the voluntary scheme without delay.

10. At the request of a Member State, which may be based on the request of an economic operator, the Commission shall, on the basis of all available evidence, examine whether the sustainability and greenhouse gas emissions saving criteria laid down in Article 29(2) to (7) and (10) in relation to a source of biofuels, bioliquids and biomass fuels, and the greenhouse gas emissions savings thresholds set in, and adopted pursuant to, Article 25(2), have been met.

Within six months of receipt of such a request and in accordance with the examination procedure referred to in Article 34(3), the Commission shall, by means of implementing acts, decide whether the Member State concerned may either:

- (a) take into account biofuels, bioliquids, biomass fuels and other fuels that are eligible for counting towards the numerator referred to in point (b) of Article 27(1) from that source for the purposes referred to in points (a), (b) and (c) of the first subparagraph of Article 29(1); or
- (b) by way of derogation from paragraph 9 of this Article, require suppliers of the source of biofuels, bioliquids, biomass fuels and other fuels that are eligible for counting towards the numerator referred to in point (b) of Article 27(1) to provide further evidence of compliance with those sustainability and greenhouse gas emissions saving criteria and those greenhouse gas emissions savings thresholds.

Article 31

Calculation of the greenhouse gas impact of biofuels, bioliquids and biomass fuels

1. For the purposes of Article 29(10), the greenhouse gas emissions saving from the use of biofuel, bioliquids and biomass fuels shall be calculated in one of the following ways:

- (a) where a default value for greenhouse gas emissions saving for the production pathway is laid down in Part A or B of Annex V for biofuels and bioliquids and in Part A of Annex VI for biomass fuels where the e_i value for those biofuels or bioliquids calculated in accordance with point 7 of Part C of Annex V and for those biomass fuels calculated in accordance with point 7 of Part B of Annex VI is equal to or less than zero, by using that default value;
- (b) by using an actual value calculated in accordance with the methodology laid down in Part C of Annex V for biofuels and bioliquids and in Part B of Annex VI for biomass fuels;
- (c) by using a value calculated as the sum of the factors of the formulas referred to in point 1 of Part C of Annex V, where disaggregated default values in Part D or E of Annex V may be used for some factors, and actual values, calculated in accordance with the methodology laid down in Part C of Annex V, are used for all other factors;
- (d) by using a value calculated as the sum of the factors of the formulas referred to in point 1 of Part B of Annex VI, where disaggregated default values in Part C of Annex VI may be used for some factors, and actual values, calculated in accordance with the methodology laid down in Part B of Annex VI, are used for all other factors.

2. Member States may submit to the Commission reports including information on the typical greenhouse gas emissions from the cultivation of agricultural raw materials of the areas on their territory classified as level 2 in the nomenclature of territorial units for statistics (NUTS) or as a more disaggregated NUTS level in accordance with Regulation (EC) No 1059/2003 of the European Parliament and of the Council ⁽¹⁾. Those reports shall be accompanied by a description of the method and data sources used to calculate the level of emissions. That method shall take into account soil characteristics, climate and expected raw material yields.

3. In the case of territories outside the Union, reports equivalent to those referred to in paragraph 2 and drawn up by competent bodies may be submitted to the Commission.

4. The Commission may, by means of implementing acts, decide that the reports referred to in paragraphs 2 and 3 of this Article contain accurate data for the purposes of measuring the greenhouse gas emissions associated with the cultivation of agriculture biomass feedstock produced in the areas included in such reports for the purposes of Article 29(10). Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 34(3).

Those data may, pursuant to such decisions, be used instead of the disaggregated default values for cultivation laid down in Part D or E of Annex V for biofuels and bioliquids and in Part C of Annex VI for biomass fuels.

5. The Commission shall review Annexes V and VI with a view, where justified, to adding or revising values for biofuel, bioliquid and biomass fuel production pathways. Those reviews shall also consider modifying the methodology laid down in Part C of Annex V and in Part B of Annex VI.

The Commission is empowered to adopt delegated acts pursuant to Article 35 to amend, where appropriate, Annexes V and VI by adding or revising the default values or modifying the methodology.

In the case of an adaptation of, or addition to, the list of default values in Annexes V and VI:

- (a) where the contribution of a factor to overall emissions is small, where there is limited variation, or where the cost or difficulty of establishing actual values is high, the default values shall be typical of normal production processes;
- (b) in all other cases, the default values shall be conservative compared to normal production processes.

⁽¹⁾ Regulation (EC) No 1059/2003 of the European Parliament and of the Council of 26 May 2003 on the establishment of a common classification of territorial units for statistics (NUTS) (OJ L 154, 21.6.2003, p. 1).

6. Where necessary in order to ensure the uniform application of Part C of Annex V and Part B of Annex VI, the Commission may adopt implementing acts setting out detailed technical specifications including definitions, conversion factors, the calculation of annual cultivation emissions or emission savings caused by changes above and below-ground carbon stocks on already cultivated land, the calculation of emission savings from CO₂ capture, CO₂ replacement and CO₂ geological storage. Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 34(3).

Article 32

Implementing acts

The implementing acts referred to in the second subparagraph of Article 29(3), Article 29(8), the first subparagraph of Article 30(5), the second subparagraph of Article 30(6), the first subparagraph of Article 30(8), the first subparagraph of Article 31(4) and Article 31(6) of this Directive, shall take full account of the provisions relating to greenhouse gas emissions reductions in accordance with Article 7a of Directive 98/70/EC of the European Parliament and of the Council ⁽¹⁾.

Article 33

Monitoring by the Commission

1. The Commission shall monitor the origin of biofuels, bioliquids and biomass fuels consumed in the Union and the impact of their production, including the impact as a result of displacement, on land use in the Union and in the main third countries of supply. Such monitoring shall be based on Member States' integrated national energy and climate plans and corresponding progress reports pursuant to Articles 3, 17 and 20 of Regulation (EU) 2018/1999, and those of relevant third countries, intergovernmental organisations, scientific studies and any other relevant pieces of information. The Commission shall also monitor the commodity price changes associated with the use of biomass for energy and any associated positive and negative effects on food security.

2. The Commission shall maintain a dialogue and exchange information with third countries and biofuel, bioliquid and biomass fuel producers, consumer organisations and civil society concerning the general implementation of the measures in this Directive relating to biofuels, bioliquids and biomass fuels. It shall, within that framework, pay particular attention to the impact that biofuel, bioliquid and biomass fuel production may have on food prices.

3. In 2026, the Commission shall submit, if appropriate, a legislative proposal on the regulatory framework for the promotion of energy from renewable sources for the period after 2030.

That proposal shall take into account the experience of the implementation of this Directive, including its sustainability and greenhouse gas emissions saving criteria, and technological developments in energy from renewable sources.

4. In 2032, the Commission shall publish a report reviewing the application of this Directive.

Article 34

Committee procedure

1. The Commission shall be assisted by the Energy Union Committee established by Article 44 of Regulation (EU) 2018/1999.

2. Notwithstanding paragraph 1, for matters relating to the sustainability of biofuels, bioliquids and biomass fuels, the Commission shall be assisted by the Committee on the Sustainability of Biofuels, Bioliquids and Biomass fuels. That committee shall be a committee within the meaning of Regulation (EU) No 182/2011.

3. Where reference is made to this paragraph, Article 5 of Regulation (EU) No 182/2011 shall apply.

⁽¹⁾ Directive 98/70/EC of the European Parliament and of the Council of 13 October 1998 relating to the quality of petrol and diesel fuels and amending Council Directive 93/12/EEC (OJ L 350, 28.12.1998, p. 58).

Where the Committee delivers no opinion, the Commission shall not adopt the draft implementing act and the third subparagraph of Article 5(4) of Regulation (EU) No 182/2011 shall apply.

Article 35

Exercise of the delegation

1. The power to adopt delegated acts is conferred on the Commission subject to the conditions laid down in this Article.
2. The power to adopt delegated acts referred to in the second subparagraph of Article 8(3), the second subparagraph of Article 25(2), the fourth subparagraph of Article 26(2), the fifth subparagraph of Article 26(2), point (c) of Article 27(1), the seventh subparagraph of Article 27(3), Article 28(5), the second subparagraph of Article 28(6), and the second subparagraph of Article 31(5) shall be conferred on the Commission for a period of five years from 24 December 2018. The Commission shall draw up a report in respect of the delegation of power not later than nine months before the end of the five-year period. The delegation of power shall be tacitly extended for periods of an identical duration, unless the European Parliament or the Council opposes such extension not later than three months before the end of each period.
3. The power to adopt delegated acts referred to in the fifth subparagraph of Article 7(3) shall be conferred on the Commission for a period of two years from 24 December 2018.
4. The delegation of power referred to in the fifth subparagraph of Article 7(3), the second subparagraph of Article 8(3), the second subparagraph of Article 25(2), the fourth subparagraph of Article 26(2), the fifth subparagraph of Article 26(2), point (c) of Article 27(1), the seventh subparagraph of Article 27(3), Article 28(5), the second subparagraph of Article 28(6), and the second subparagraph of Article 31(5) may be revoked at any time by the European Parliament or by the Council. A decision to revoke shall put an end to the delegation of the power specified in that decision. It shall take effect the day following the publication of the decision in the *Official Journal of the European Union* or at a later date specified therein. It shall not affect the validity of any delegated acts already in force.
5. Before adopting a delegated act, the Commission shall consult experts designated by each Member State in accordance with the principles laid down in the Interinstitutional Agreement of 13 April 2016 on Better Law-Making.
6. As soon as it adopts a delegated act, the Commission shall notify it simultaneously to the European Parliament and to the Council.
7. A delegated act adopted pursuant to the fifth subparagraph of Article 7(3), the second subparagraph of Article 8(3), the second subparagraph of Article 25(2), the fourth subparagraph of Article 26(2), the fifth subparagraph of Article 26(2), point (c) of Article 27(1), the seventh subparagraph of Article 27(3), Article 28(5), the second subparagraph of Article 28(6), and the second subparagraph of Article 31(5) shall enter into force only if no objection has been expressed either by the European Parliament or the Council within a period of two months of notification of that act to the European Parliament and to the Council or if, before the expiry of that period, the European Parliament and the Council have both informed the Commission that they will not object. That period shall be extended by two months at the initiative of the European Parliament or of the Council.

Article 36

Transposition

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with Articles 2 to 13, 15 to 31 and 37 and Annexes II, III and V to IX, by 30 June 2021. They shall immediately communicate the text of those measures to the Commission.

When Member States adopt those measures, they shall contain a reference to this Directive or be accompanied by such a reference on the occasion of their official publication. They shall also include a statement that references in existing laws, regulations and administrative provisions to the Directive repealed by this Directive shall be construed as references to this Directive. Member States shall determine how such reference is to be made and how that statement is to be formulated.

2. Member States shall communicate to the Commission the text of the main provisions of national law which they adopt in the field covered by this Directive.

3. This Directive shall not affect the application of the derogations pursuant to Union law on the internal market for electricity.

Article 37

Repeal

Directive 2009/28/EC, as amended by the Directives listed in Part A of Annex X, is repealed with effect from 1 July 2021, without prejudice to the obligations of the Member States relating to the time-limits for the transposition into national law of the Directives set out in Part B of Annex X and without prejudice to the obligations of Member States in 2020 as laid down in Article 3(1) and set out in Part A of Annex I to Directive 2009/28/EC.

References to the repealed Directive shall be construed as references to this Directive and shall be read in accordance with the correlation table set out in Annex XI.

Article 38

Entry into force

This Directive shall enter into force on the third day following that of its publication in the *Official Journal of the European Union*.

Article 39

Addressees

This Directive is addressed to the Member States.

Done at Strasbourg, 11 December 2018.

For the European Parliament

The President

A. TAJANI

For the Council

The President

J. BOGNER-STRAUSS

ANNEX I

NATIONAL OVERALL TARGETS FOR THE SHARE OF ENERGY FROM RENEWABLE SOURCES IN GROSS FINAL CONSUMPTION OF ENERGY IN 2020 ⁽¹⁾

A. National overall targets

	Share of energy from renewable sources in gross final consumption of energy, 2005 (S ₂₀₀₅)	Target for share of energy from renewable sources in gross final consumption of energy, 2020 (S ₂₀₂₀)
Belgium	2,2 %	13 %
Bulgaria	9,4 %	16 %
Czech Republic	6,1 %	13 %
Denmark	17,0 %	30 %
Germany	5,8 %	18 %
Estonia	18,0 %	25 %
Ireland	3,1 %	16 %
Greece	6,9 %	18 %
Spain	8,7 %	20 %
France	10,3 %	23 %
Croatia	12,6 %	20 %
Italy	5,2 %	17 %
Cyprus	2,9 %	13 %
Latvia	32,6 %	40 %
Lithuania	15,0 %	23 %
Luxembourg	0,9 %	11 %
Hungary	4,3 %	13 %
Malta	0,0 %	10 %
Netherlands	2,4 %	14 %
Austria	23,3 %	34 %
Poland	7,2 %	15 %
Portugal	20,5 %	31 %
Romania	17,8 %	24 %
Slovenia	16,0 %	25 %
Slovak Republic	6,7 %	14 %
Finland	28,5 %	38 %
Sweden	39,8 %	49 %
United Kingdom	1,3 %	15 %

⁽¹⁾ In order to be able to achieve the national objectives set out in this Annex, it is underlined that the State aid guidelines for environmental protection recognise the continued need for national mechanisms of support for the promotion of energy from renewable sources.

ANNEX II

NORMALISATION RULE FOR ACCOUNTING FOR ELECTRICITY GENERATED FROM HYDROPOWER AND WIND POWER

The following rule shall be applied for the purposes of accounting for electricity generated from hydropower in a given Member State:

$(Q_{N(\text{norm})}) / (C_N \cdot [(Q_i / (N-14)) / (Q_i C_i)]^{15})$ where:

N	=	reference year;
$Q_{N(\text{norm})}$	=	normalised electricity generated by all hydropower plants of the Member State in year N, for accounting purposes;
Q_i	=	the quantity of electricity actually generated in year i by all hydropower plants of the Member State measured in GWh, excluding production from pumped storage units using water that has previously been pumped uphill;
C_i	=	the total installed capacity, net of pumped storage, of all hydropower plants of the Member State at the end of year i, measured in MW.

The following rule shall be applied for the purposes of accounting for electricity generated from onshore wind power in a given Member State:

$(Q_{N(\text{norm})}) / ((C_N - C_{N-1}) / ((Q_i / (N-n)) / ((Q_j / (N-n)) / (C_j - C_{j-1})))$ where:

N	=	reference year;
$Q_{N(\text{norm})}$	=	normalised electricity generated by all onshore wind power plants of the Member State in year N, for accounting purposes;
Q_i	=	the quantity of electricity actually generated in year i by all onshore wind power plants of the Member State measured in GWh;
C_j	=	the total installed capacity of all the onshore wind power plants of the Member State at the end of year j, measured in MW;
n	=	4 or the number of years preceding year N for which capacity and production data are available for the Member State in question, whichever is lower.

The following rule shall be applied for the purposes of accounting for electricity generated from offshore wind power in a given Member State:

$(Q_{N(\text{norm})}) / ((C_N - C_{N-1}) / ((Q_i / (N-n)) / ((Q_j / (N-n)) / (C_j - C_{j-1})))$ where:

N	=	reference year;
$Q_{N(\text{norm})}$	=	normalised electricity generated by all offshore wind power plants of the Member State in year N, for accounting purposes;
Q_i	=	the quantity of electricity actually generated in year i by all offshore wind power plants of the Member State measured in GWh;
C_j	=	the total installed capacity of all the offshore wind power plants of the Member State at the end of year j, measured in MW;
n	=	4 or the number of years preceding year N for which capacity and production data are available for the Member State in question, whichever is lower.

ANNEX III

ENERGY CONTENT OF FUELS

Fuel	Energy content by weight (lower calorific value, MJ/kg)	Energy content by volume (lower calorific value, MJ/l)
FUELS FROM BIOMASS AND/OR BIOMASS PROCESSING OPERATIONS		
Bio-Propane	46	24
Pure vegetable oil (oil produced from oil plants through pressing, extraction or comparable procedures, crude or refined but chemically unmodified)	37	34
Biodiesel - fatty acid methyl ester (methyl-ester produced from oil of biomass origin)	37	33
Biodiesel - fatty acid ethyl ester (ethyl-ester produced from oil of biomass origin)	38	34
Biogas that can be purified to natural gas quality	50	—
Hydrotreated (thermochemically treated with hydrogen) oil of biomass origin, to be used for replacement of diesel	44	34
Hydrotreated (thermochemically treated with hydrogen) oil of biomass origin, to be used for replacement of petrol	45	30
Hydrotreated (thermochemically treated with hydrogen) oil of biomass origin, to be used for replacement of jet fuel	44	34
Hydrotreated oil (thermochemically treated with hydrogen) of biomass origin, to be used for replacement of liquefied petroleum gas	46	24
Co-processed oil (processed in a refinery simultaneously with fossil fuel) of biomass or pyrolysed biomass origin to be used for replacement of diesel	43	36
Co-processed oil (processed in a refinery simultaneously with fossil fuel) of biomass or pyrolysed biomass origin, to be used to replace petrol	44	32
Co-processed oil (processed in a refinery simultaneously with fossil fuel) of biomass or pyrolysed biomass origin, to be used to replace jet fuel	43	33
Co-processed oil (processed in a refinery simultaneously with fossil fuel) of biomass or pyrolysed biomass origin, to be used to replace liquefied petroleum gas	46	23
RENEWABLE FUELS THAT CAN BE PRODUCED FROM VARIOUS RENEWABLE SOURCES, INCLUDING BIOMASS		
Methanol from renewable sources	20	16
Ethanol from renewable sources	27	21
Propanol from renewable sources	31	25
Butanol from renewable sources	33	27

Fuel	Energy content by weight (lower calorific value, MJ/kg)	Energy content by volume (lower calorific value, MJ/l)
Fischer-Tropsch diesel (a synthetic hydrocarbon or mixture of synthetic hydrocarbons to be used for replacement of diesel)	44	34
Fischer-Tropsch petrol (a synthetic hydrocarbon or mixture of synthetic hydrocarbons produced from biomass, to be used for replacement of petrol)	44	33
Fischer-Tropsch jet fuel (a synthetic hydrocarbon or mixture of synthetic hydrocarbons produced from biomass, to be used for replacement of jet fuel)	44	33
Fischer-Tropsch liquefied petroleum gas (a synthetic hydrocarbon or mixture of synthetic hydrocarbons, to be used for replacement of liquefied petroleum gas)	46	24
DME (dimethylether)	28	19
Hydrogen from renewable sources	120	—
ETBE (ethyl-tertio-butyl-ether produced on the basis of ethanol)	36 (of which 37 % from renewable sources)	27 (of which 37 % from renewable sources)
MTBE (methyl-tertio-butyl-ether produced on the basis of methanol)	35 (of which 22 % from renewable sources)	26 (of which 22 % from renewable sources)
TAAE (tertiary-amyl-ethyl-ether produced on the basis of ethanol)	38 (of which 29 % from renewable sources)	29 (of which 29 % from renewable sources)
TAME (tertiary-amyl-methyl-ether produced on the basis of methanol)	36 (of which 18 % from renewable sources)	28 (of which 18 % from renewable sources)
THxEE (tertiary-hexyl-ethyl-ether produced on the basis of ethanol)	38 (of which 25 % from renewable sources)	30 (of which 25 % from renewable sources)
THxME (tertiary-hexyl-methyl-ether produced on the basis of methanol)	38 of which 14 % from renewable sources)	30 (of which 14 % from renewable sources)
FOSSIL FUELS		
Petrol	43	32
Diesel	43	36

ANNEX IV

CERTIFICATION OF INSTALLERS

The certification schemes or equivalent qualification schemes referred to in Article 18(3) shall be based on the following criteria:

1. The certification or qualification process shall be transparent and clearly defined by the Member States or by the administrative body that they appoint.
2. Installers of biomass, heat pump, shallow geothermal and solar photovoltaic and solar thermal energy shall be certified by an accredited training programme or training provider.
3. The accreditation of the training programme or provider shall be effected by Member States or by the administrative body that they appoint. The accrediting body shall ensure that the training programme offered by the training provider has continuity and regional or national coverage. The training provider shall have adequate technical facilities to provide practical training, including some laboratory equipment or corresponding facilities to provide practical training. The training provider shall also offer in addition to the basic training, shorter refresher courses on topical issues, including on new technologies, to enable life-long learning in installations. The training provider may be the manufacturer of the equipment or system, institutes or associations.
4. The training leading to certification or qualification of an installer shall include theoretical and practical parts. At the end of the training, the installer must have the skills required to install the relevant equipment and systems to meet the performance and reliability needs of the customer, incorporate quality craftsmanship, and comply with all applicable codes and standards, including energy and eco-labelling.
5. The training course shall end with an examination leading to a certificate or qualification. The examination shall include a practical assessment of successfully installing biomass boilers or stoves, heat pumps, shallow geothermal installations, solar photovoltaic or solar thermal installations.
6. The certification schemes or equivalent qualification schemes referred to in Article 18(3) shall take due account of the following guidelines:
 - (a) Accredited training programmes should be offered to installers with work experience, who have undergone, or are undergoing, the following types of training:
 - (i) in the case of biomass boiler and stove installers: training as a plumber, pipe fitter, heating engineer or technician of sanitary and heating or cooling equipment as a prerequisite;
 - (ii) in the case of heat pump installers: training as a plumber or refrigeration engineer and have basic electrical and plumbing skills (cutting pipe, soldering pipe joints, gluing pipe joints, lagging, sealing fittings, testing for leaks and installation of heating or cooling systems) as a prerequisite;
 - (iii) in the case of a solar photovoltaic or solar thermal installer: training as a plumber or electrician and have plumbing, electrical and roofing skills, including knowledge of soldering pipe joints, gluing pipe joints, sealing fittings, testing for plumbing leaks, ability to connect wiring, familiar with basic roof materials, flashing and sealing methods as a prerequisite; or
 - (iv) a vocational training scheme to provide an installer with adequate skills corresponding to a three years education in the skills referred to in point (a), (b) or (c), including both classroom and workplace learning.
 - (b) The theoretical part of the biomass stove and boiler installer training should give an overview of the market situation of biomass and cover ecological aspects, biomass fuels, logistics, fire protection, related subsidies, combustion techniques, firing systems, optimal hydraulic solutions, cost and profitability comparison as well as the design, installation and maintenance of biomass boilers and stoves. The training should also provide good knowledge of any European standards for technology and biomass fuels, such as pellets, and biomass related national and Union law.

- (c) The theoretical part of the heat pump installer training should give an overview of the market situation for heat pumps and cover geothermal resources and ground source temperatures of different regions, soil and rock identification for thermal conductivity, regulations on using geothermal resources, feasibility of using heat pumps in buildings and determining the most suitable heat pump system, and knowledge about their technical requirements, safety, air filtering, connection with the heat source and system layout. The training should also provide good knowledge of any European standards for heat pumps, and of relevant national and Union law. The installer should demonstrate the following key competences:
- (i) a basic understanding of the physical and operation principles of a heat pump, including characteristics of the heat pump cycle: context between low temperatures of the heat sink, high temperatures of the heat source, and the efficiency of the system, determination of the coefficient of performance and seasonal performance factor (SPF);
 - (ii) an understanding of the components and their function within a heat pump cycle, including the compressor, expansion valve, evaporator, condenser, fixtures and fittings, lubricating oil, refrigerant, superheating and sub-cooling and cooling possibilities with heat pumps; and
 - (iii) the ability to choose and size the components in typical installation situations, including determining the typical values of the heat load of different buildings and for hot water production based on energy consumption, determining the capacity of the heat pump on the heat load for hot water production, on the storage mass of the building and on interruptible current supply; determine the buffer tank component and its volume and integration of a second heating system.
- (d) The theoretical part of the solar photovoltaic and solar thermal installer training should give an overview of the market situation of solar products and cost and profitability comparisons, and cover ecological aspects, components, characteristics and dimensioning of solar systems, selection of accurate systems and dimensioning of components, determination of the heat demand, fire protection, related subsidies, as well as the design, installation and maintenance of solar photovoltaic and solar thermal installations. The training should also provide good knowledge of any European standards for technology, and certification such as Solar Keymark, and related national and Union law. The installer should demonstrate the following key competences:
- (i) the ability to work safely using the required tools and equipment and implementing safety codes and standards and to identify plumbing, electrical and other hazards associated with solar installations;
 - (ii) the ability to identify systems and their components specific to active and passive systems, including the mechanical design, and to determine the components' location and system layout and configuration;
 - (iii) the ability to determine the required installation area, orientation and tilt for the solar photovoltaic and solar water heater, taking account of shading, solar access, structural integrity, the appropriateness of the installation for the building or the climate and to identify different installation methods suitable for roof types and the balance of system equipment required for the installation; and
 - (iv) for solar photovoltaic systems in particular, the ability to adapt the electrical design, including determining design currents, selecting appropriate conductor types and ratings for each electrical circuit, determining appropriate size, ratings and locations for all associated equipment and subsystems and selecting an appropriate interconnection point.
- (e) The installer certification should be time restricted, so that a refresher seminar or event would be necessary for continued certification.
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ANNEX V

RULES FOR CALCULATING THE GREENHOUSE GAS IMPACT OF BIOFUELS, BIOLIQUIDS AND THEIR FOSSIL FUEL COMPARATORS

A. TYPICAL AND DEFAULT VALUES FOR BIOFUELS IF PRODUCED WITH NO NET CARBON EMISSIONS FROM LAND-USE CHANGE

Biofuel production pathway	Greenhouse gas emissions saving – typical value	Greenhouse gas emissions saving – default value
sugar beet ethanol (no biogas from slop, natural gas as process fuel in conventional boiler)	67 %	59 %
sugar beet ethanol (with biogas from slop, natural gas as process fuel in conventional boiler)	77 %	73 %
sugar beet ethanol (no biogas from slop, natural gas as process fuel in CHP plant (*))	73 %	68 %
sugar beet ethanol (with biogas from slop, natural gas as process fuel in CHP plant (*))	79 %	76 %
sugar beet ethanol (no biogas from slop, lignite as process fuel in CHP plant (*))	58 %	47 %
sugar beet ethanol (with biogas from slop, lignite as process fuel in CHP plant (*))	71 %	64 %
corn (maize) ethanol (natural gas as process fuel in conventional boiler)	48 %	40 %
corn (maize) ethanol, (natural gas as process fuel in CHP plant (*))	55 %	48 %
corn (maize) ethanol (lignite as process fuel in CHP plant (*))	40 %	28 %
corn (maize) ethanol (forest residues as process fuel in CHP plant (*))	69 %	68 %
other cereals excluding maize ethanol (natural gas as process fuel in conventional boiler)	47 %	38 %
other cereals excluding maize ethanol (natural gas as process fuel in CHP plant (*))	53 %	46 %
other cereals excluding maize ethanol (lignite as process fuel in CHP plant (*))	37 %	24 %
other cereals excluding maize ethanol (forest residues as process fuel in CHP plant (*))	67 %	67 %

Biofuel production pathway	Greenhouse gas emissions saving – typical value	Greenhouse gas emissions saving – default value
sugar cane ethanol	70 %	70 %
the part from renewable sources of ethyl-tertio-butyl-ether (ETBE)	Equal to that of the ethanol production pathway used	
the part from renewable sources of tertiary-amyl-ethyl-ether (TAEE)	Equal to that of the ethanol production pathway used	
rape seed biodiesel	52 %	47 %
sunflower biodiesel	57 %	52 %
soybean biodiesel	55 %	50 %
palm oil biodiesel (open effluent pond)	32 %	19 %
palm oil biodiesel (process with methane capture at oil mill)	51 %	45 %
waste cooking oil biodiesel	88 %	84 %
animal fats from rendering biodiesel (**)	84 %	78 %
hydrotreated vegetable oil from rape seed	51 %	47 %
hydrotreated vegetable oil from sunflower	58 %	54 %
hydrotreated vegetable oil from soybean	55 %	51 %
hydrotreated vegetable oil from palm oil (open effluent pond)	34 %	22 %
hydrotreated vegetable oil from palm oil (process with methane capture at oil mill)	53 %	49 %
hydrotreated oil from waste cooking oil	87 %	83 %
hydrotreated oil from animal fats from rendering (**)	83 %	77 %
pure vegetable oil from rape seed	59 %	57 %
pure vegetable oil from sunflower	65 %	64 %
pure vegetable oil from soybean	63 %	61 %
pure vegetable oil from palm oil (open effluent pond)	40 %	30 %
pure vegetable oil from palm oil (process with methane capture at oil mill)	59 %	57 %

Biofuel production pathway	Greenhouse gas emissions saving – typical value	Greenhouse gas emissions saving – default value
pure oil from waste cooking oil	98 %	98 %

(*) Default values for processes using CHP are valid only if all the process heat is supplied by CHP.

(**) Applies only to biofuels produced from animal by-products classified as category 1 and 2 material in accordance with Regulation (EC) No 1069/2009 of the European Parliament and of the Council⁽¹⁾, for which emissions related to hygienisation as part of the rendering are not considered.

B. ESTIMATED TYPICAL AND DEFAULT VALUES FOR FUTURE BIOFUELS THAT WERE NOT ON THE MARKET OR WERE ON THE MARKET ONLY IN NEGLIGIBLE QUANTITIES IN 2016, IF PRODUCED WITH NO NET CARBON EMISSIONS FROM LAND-USE CHANGE

Biofuel production pathway	Greenhouse gas emissions saving - typical value	Greenhouse gas emissions saving - default value
wheat straw ethanol	85 %	83 %
waste wood Fischer-Tropsch diesel in free-standing plant	85 %	85 %
farmed wood Fischer-Tropsch diesel in free-standing plant	82 %	82 %
waste wood Fischer-Tropsch petrol in free-standing plant	85 %	85 %
farmed wood Fischer-Tropsch petrol in free-standing plant	82 %	82 %
waste wood dimethylether (DME) in free-standing plant	86 %	86 %
farmed wood dimethylether (DME) in free-standing plant	83 %	83 %
waste wood methanol in free-standing plant	86 %	86 %
farmed wood methanol in free-standing plant	83 %	83 %
Fischer-Tropsch diesel from black-liquor gasification integrated with pulp mill	89 %	89 %
Fischer-Tropsch petrol from black-liquor gasification integrated with pulp mill	89 %	89 %
dimethylether (DME) from black-liquor gasification integrated with pulp mill	89 %	89 %
Methanol from black-liquor gasification integrated with pulp mill	89 %	89 %
the part from renewable sources of methyl-tertio-butyl-ether (MTBE)	Equal to that of the methanol production pathway used	

⁽¹⁾ Regulation (EC) No 1069/2009 of the European Parliament and of the Council of 21 October 2009 laying down health rules as regards animal by-products and derived products not intended for human consumption and repealing Regulation (EC) No 1774/2002 (Animal by-products Regulation) (OJ L 300, 14.11.2009, p. 1).

C. METHODOLOGY

1. Greenhouse gas emissions from the production and use of transport fuels, biofuels and bioliquids shall be calculated as follows:

- (a) greenhouse gas emissions from the production and use of biofuels shall be calculated as:

$$E = e_{ec} + e_l + e_p + e_{td} + e_u - e_{sca} - e_{ccs} - e_{ccr}$$

where

E	=	total emissions from the use of the fuel;
e_{ec}	=	emissions from the extraction or cultivation of raw materials;
e_l	=	annualised emissions from carbon stock changes caused by land-use change;
e_p	=	emissions from processing;
e_{td}	=	emissions from transport and distribution;
e_u	=	emissions from the fuel in use;
e_{sca}	=	emission savings from soil carbon accumulation via improved agricultural management;
e_{ccs}	=	emission savings from CO ₂ capture and geological storage; and
e_{ccr}	=	emission savings from CO ₂ capture and replacement.

Emissions from the manufacture of machinery and equipment shall not be taken into account.

- (b) Greenhouse gas emissions from the production and use of bioliquids shall be calculated as for biofuels (E), but with the extension necessary for including the energy conversion to electricity and/or heat and cooling produced, as follows:

- (i) For energy installations delivering only heat:

$$EC_h = \frac{E}{\eta_h}$$

- (ii) For energy installations delivering only electricity:

$$EC_{el} = \frac{E}{\eta_{el}}$$

where

$EC_{h,el}$ = Total greenhouse gas emissions from the final energy commodity.

E = Total greenhouse gas emissions of the bioliquid before end-conversion.

η_{el} = The electrical efficiency, defined as the annual electricity produced divided by the annual bioliquid input based on its energy content.

η_h = The heat efficiency, defined as the annual useful heat output divided by the annual bioliquid input based on its energy content.

- (iii) For the electricity or mechanical energy coming from energy installations delivering useful heat together with electricity and/or mechanical energy:

$$EC_{el} = \frac{E}{\eta_{el}} \left(\frac{C_{el} \cdot \eta_{el}}{C_{el} \cdot \eta_{el} + C_h \cdot \eta_h} \right)$$

- (iv) For the useful heat coming from energy installations delivering heat together with electricity and/or mechanical energy:

$$EC_h = \frac{E}{\eta_h} \left(\frac{C_h \cdot \eta_h}{C_{el} \cdot \eta_{el} + C_h \cdot \eta_h} \right)$$

where:

$EC_{h,el}$ = Total greenhouse gas emissions from the final energy commodity.

E = Total greenhouse gas emissions of the bioliquid before end-conversion.

η_{el} = The electrical efficiency, defined as the annual electricity produced divided by the annual fuel input based on its energy content.

η_h = The heat efficiency, defined as the annual useful heat output divided by the annual fuel input based on its energy content.

C_{el} = Fraction of exergy in the electricity, and/or mechanical energy, set to 100 % ($C_{el} = 1$).

C_h = Carnot efficiency (fraction of exergy in the useful heat).

The Carnot efficiency, C_h , for useful heat at different temperatures is defined as:

$$C_h = \frac{T_h - T_0}{T_h}$$

where

T_h = Temperature, measured in absolute temperature (kelvin) of the useful heat at point of delivery.

T_0 = Temperature of surroundings, set at 273,15 kelvin (equal to 0 °C)

If the excess heat is exported for heating of buildings, at a temperature below 150 °C (423,15 kelvin), C_h can alternatively be defined as follows:

C_h = Carnot efficiency in heat at 150 °C (423,15 kelvin), which is: 0,3546

For the purposes of that calculation, the following definitions apply:

- (a) 'cogeneration' means the simultaneous generation in one process of thermal energy and electricity and/or mechanical energy;
- (b) 'useful heat' means heat generated to satisfy an economical justifiable demand for heat, for heating and cooling purposes;
- (c) 'economically justifiable demand' means the demand that does not exceed the needs for heat or cooling and which would otherwise be satisfied at market conditions.

2. Greenhouse gas emissions from biofuels and bioliquids shall be expressed as follows:

- (a) greenhouse gas emissions from biofuels, E , shall be expressed in terms of grams of CO₂ equivalent per MJ of fuel, g CO₂eq/MJ.
- (b) greenhouse gas emissions from bioliquids, EC , in terms of grams of CO₂ equivalent per MJ of final energy commodity (heat or electricity), g CO₂eq/MJ.

When heating and cooling are co-generated with electricity, emissions shall be allocated between heat and electricity (as under 1(b)), irrespective if the heat is used for actual heating purposes or for cooling ⁽¹⁾.

⁽¹⁾ Heat or waste heat is used to generate cooling (chilled air or water) through absorption **chillers**. Therefore, it is appropriate to calculate only the emissions associated to the heat produced per MJ of heat, irrespective if the end-use of the heat is actual heating or cooling via absorption chillers.

Where the greenhouse gas emissions from the extraction or cultivation of raw materials e_{ec} are expressed in unit g CO₂eq/dry-ton of feedstock, the conversion to grams of CO₂ equivalent per MJ of fuel, g CO₂eq/MJ, shall be calculated as follows ⁽¹⁾:

$$e_{ec}^{fuel_a} \left[\frac{gCO_2eq}{MJ fuel} \right]_{ec} = \frac{e_{ec}^{feedstock_a} \left[\frac{gCO_2eq}{t_{dry}} \right]}{LHV_a \left[\frac{MJ feedstock}{t_{dry} feedstock} \right]} \times Fuel\ feedstock\ factor_a \times Allocation\ factor\ fuel_a$$

where

$$Allocation\ factor\ fuel_a = \left[\frac{Energy\ in\ fuel}{Energy\ fuel + Energy\ in\ co-products} \right]$$

$$Fuel\ feedstock\ factor_a = [Ratio\ of\ MJ\ feedstock\ required\ to\ make\ 1\ MJ\ fuel]$$

Emissions per dry-ton feedstock shall be calculated as follows:

$$e_{ec}^{feedstock_a} \left[\frac{gCO_2eq}{t_{dry}} \right] = \frac{e_{ec}^{feedstock_a} \left[\frac{gCO_2eq}{t_{moist}} \right]}{(1 - moisture\ content)}$$

3. Greenhouse gas emissions savings from biofuels and bioliquids shall be calculated as follows:

(a) greenhouse gas emissions savings from biofuels:

$$SAVING = (E_{F(t)} - E_B)/E_{F(t)},$$

where

E_B	=	total emissions from the biofuel; and
$E_{F(t)}$	=	total emissions from the fossil fuel comparator for transport

(b) greenhouse gas emissions savings from heat and cooling, and electricity being generated from bioliquids:

$$SAVING = (EC_{F(h\&c,el)} - EC_{B(h\&c,el)})/EC_{F(h\&c,el)},$$

where

$EC_{B(h\&c,el)}$ = total emissions from the heat or electricity; and

$EC_{F(h\&c,el)}$ = total emissions from the fossil fuel comparator for useful heat or electricity.

4. The greenhouse gases taken into account for the purposes of point 1 shall be CO₂, N₂O and CH₄. For the purposes of calculating CO₂ equivalence, those gases shall be valued as follows:

CO ₂	:	1
N ₂ O	:	298
CH ₄	:	25

5. Emissions from the extraction or cultivation of raw materials, e_{ec} , shall include emissions from the extraction or cultivation process itself; from the collection, drying and storage of raw materials; from waste and leakages; and from the production of chemicals or products used in extraction or cultivation. Capture of CO₂ in the cultivation of raw materials shall be excluded. Estimates of emissions from agriculture biomass cultivation may be derived from

⁽¹⁾ The formula for calculating greenhouse gas emissions from the extraction or cultivation of raw materials e_{ec} describes cases where feedstock is converted into biofuels in one step. For more complex supply chains, adjustments are needed for calculating greenhouse gas emissions from the extraction or cultivation of raw materials e_{ec} for intermediate products.

the use of regional averages for cultivation emissions included in the reports referred to in Article 31(4) or the information on the disaggregated default values for cultivation emissions included in this Annex, as an alternative to using actual values. In the absence of relevant information in those reports it is allowed to calculate averages based on local farming practises based for instance on data of a group of farms, as an alternative to using actual values.

6. For the purposes of the calculation referred to in point 1(a), greenhouse gas emissions savings from improved agriculture management, e_{scat} , such as shifting to reduced or zero-tillage, improved crop/rotation, the use of cover crops, including crop residue management, and the use of organic soil improver (e.g. compost, manure fermentation digestate), shall be taken into account only if solid and verifiable evidence is provided that the soil carbon has increased or that it is reasonable to expect to have increased over the period in which the raw materials concerned were cultivated while taking into account the emissions where such practices lead to increased fertiliser and herbicide use ⁽¹⁾.
7. Annualised emissions from carbon stock changes caused by land-use change, e_i , shall be calculated by dividing total emissions equally over 20 years. For the calculation of those emissions, the following rule shall be applied:

$$e_i = (CS_R - CS_A) \times 3,664 \times 1/20 \times 1/P - e_B, \text{ (}^2\text{)}$$

where

e_i	=	annualised greenhouse gas emissions from carbon stock change due to land-use change (measured as mass (grams) of CO ₂ -equivalent per unit of biofuel or bioliquid energy (megajoules)). 'Cropland' ⁽³⁾ and 'perennial cropland' ⁽⁴⁾ shall be regarded as one land use;
CS_R	=	the carbon stock per unit area associated with the reference land-use (measured as mass (tonnes) of carbon per unit area, including both soil and vegetation). The reference land-use shall be the land-use in January 2008 or 20 years before the raw material was obtained, whichever was the later;
CS_A	=	the carbon stock per unit area associated with the actual land-use (measured as mass (tonnes) of carbon per unit area, including both soil and vegetation). In cases where the carbon stock accumulates over more than one year, the value attributed to CS_A shall be the estimated stock per unit area after 20 years or when the crop reaches maturity, whichever the earlier;
P	=	the productivity of the crop (measured as biofuel or bioliquid energy per unit area per year) and
e_B	=	bonus of 29 g CO ₂ eq/MJ biofuel or bioliquid if biomass is obtained from restored degraded land under the conditions laid down in point 8.

8. The bonus of 29 g CO₂eq/MJ shall be attributed if evidence is provided that the land:

(a) was not in use for agriculture or any other activity in January 2008; and

(b) is severely degraded land, including such land that was formerly in agricultural use.

The bonus of 29 g CO₂eq/MJ shall apply for a period of up to 20 years from the date of conversion of the land to agricultural use, provided that a steady increase in carbon stocks as well as a sizable reduction in erosion phenomena for land falling under (b) are ensured.

⁽¹⁾ Measurements of soil carbon can constitute such evidence, e.g. by a first measurement in advance of the cultivation and subsequent ones at regular intervals several years apart. In such a case, before the second measurement is available, increase in soil carbon would be estimated on the basis of representative experiments or soil models. From the second measurement onwards, the measurements would constitute the basis for determining the existence of an increase in soil carbon and its magnitude.

⁽²⁾ The quotient obtained by dividing the molecular weight of CO₂ (44,010 g/mol) by the molecular weight of carbon (12,011 g/mol) is equal to 3,664.

⁽³⁾ Cropland as defined by IPCC.

⁽⁴⁾ Perennial crops are defined as multi-annual crops, the stem of which is usually not annually harvested such as short rotation coppice and oil palm.

9. 'Severely degraded land' means land that, for a significant period of time, has either been significantly salinated or presented significantly low organic matter content and has been severely eroded.
10. The Commission shall review, by 31 December 2020, guidelines for the calculation of land carbon stocks ⁽¹⁾ drawing on the 2006 IPCC Guidelines for National Greenhouse Gas Inventories – volume 4 and in accordance with Regulation (EU) No 525/2013 and Regulation (EU) 2018/841 of the European Parliament and of the Council ⁽²⁾. The Commission guidelines shall serve as the basis for the calculation of land carbon stocks for the purposes of this Directive.
11. Emissions from processing, e_p , shall include emissions from the processing itself; from waste and leakages; and from the production of chemicals or products used in processing including the CO₂ emissions corresponding to the carbon contents of fossil inputs, whether or not actually combusted in the process.

In accounting for the consumption of electricity not produced within the fuel production plant, the greenhouse gas emissions intensity of the production and distribution of that electricity shall be assumed to be equal to the average emission intensity of the production and distribution of electricity in a defined region. By way of derogation from this rule, producers may use an average value for an individual electricity production plant for electricity produced by that plant, if that plant is not connected to the electricity grid.

Emissions from processing shall include emissions from drying of interim products and materials where relevant.

12. Emissions from transport and distribution, e_{td} , shall include emissions from the transport of raw and semi-finished materials and from the storage and distribution of finished materials. Emissions from transport and distribution to be taken into account under point 5 shall not be covered by this point.
13. Emissions of the fuel in use, e_u , shall be taken to be zero for biofuels and bioliquids.

Emissions of non-CO₂ greenhouse gases (N₂O and CH₄) of the fuel in use shall be included in the e_u factor for bioliquids.

14. Emission savings from CO₂ capture and geological storage, e_{ccs} , that have not already been accounted for in e_p , shall be limited to emissions avoided through the capture and storage of emitted CO₂ directly related to the extraction, transport, processing and distribution of fuel if stored in compliance with Directive 2009/31/EC of the European Parliament and of the Council ⁽³⁾.
15. Emission savings from CO₂ capture and replacement, e_{ccr} , shall be related directly to the production of biofuel or bioliquid they are attributed to, and shall be limited to emissions avoided through the capture of CO₂ of which the carbon originates from biomass and which is used to replace fossil-derived CO₂ in production of commercial products and services.
16. Where a cogeneration unit – providing heat and/or electricity to a fuel production process for which emissions are being calculated – produces excess electricity and/or excess useful heat, the greenhouse gas emissions shall be divided between the electricity and the useful heat according to the temperature of the heat (which reflects the usefulness (utility) of the heat). The useful part of the heat is found by multiplying its energy content with the Carnot efficiency, C_h , calculated as follows:

$$C_h = \frac{T_h - T_0}{T_h}$$

where

T_h = Temperature, measured in absolute temperature (kelvin) of the useful heat at point of delivery.

T_0 = Temperature of surroundings, set at 273,15 kelvin (equal to 0 °C)

⁽¹⁾ Commission Decision 2010/335/EU of 10 June 2010 on guidelines for the calculation of land carbon stocks for the purpose of Annex V to Directive 2009/28/EC (OJ L 151, 17.6.2010, p. 19).

⁽²⁾ Regulation (EU) 2018/841 of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU (OJ L 156, 19.6.2018, p. 1).

⁽³⁾ Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 (OJ L 140, 5.6.2009, p. 114).

If the excess heat is exported for heating of buildings, at a temperature below 150 °C (423,15 kelvin), C_h can alternatively be defined as follows:

$$C_h = \text{Carnot efficiency in heat at } 150 \text{ °C (423,15 kelvin), which is: } 0,3546$$

For the purposes of that calculation, the actual efficiencies shall be used, defined as the annual mechanical energy, electricity and heat produced respectively divided by the annual energy input.

For the purposes of that calculation, the following definitions apply:

- (a) 'cogeneration' shall mean the simultaneous generation in one process of thermal energy and electrical and/or mechanical energy;
 - (b) 'useful heat' shall mean heat generated to satisfy an economical justifiable demand for heat, for heating or cooling purposes;
 - (c) 'economically justifiable demand' shall mean the demand that does not exceed the needs for heat or cooling and which would otherwise be satisfied at market conditions.
17. Where a fuel production process produces, in combination, the fuel for which emissions are being calculated and one or more other products (co-products), greenhouse gas emissions shall be divided between the fuel or its intermediate product and the co-products in proportion to their energy content (determined by lower heating value in the case of co-products other than electricity and heat). The greenhouse gas intensity of excess useful heat or excess electricity is the same as the greenhouse gas intensity of heat or electricity delivered to the fuel production process and is determined from calculating the greenhouse intensity of all inputs and emissions, including the feedstock and CH₄ and N₂O emissions, to and from the cogeneration unit, boiler or other apparatus delivering heat or electricity to the fuel production process. In the case of cogeneration of electricity and heat, the calculation is performed following point 16.
18. For the purposes of the calculation referred to in point 17, the emissions to be divided shall be $e_{ec} + e_1 + e_{sca}$ + those fractions of e_p , e_{id} , e_{ccs} , and e_{ccr} that take place up to and including the process step at which a co-product is produced. If any allocation to co-products has taken place at an earlier process step in the life-cycle, the fraction of those emissions assigned in the last such process step to the intermediate fuel product shall be used for those purposes instead of the total of those emissions.

In the case of biofuels and bioliquids, all co-products shall be taken into account for the purposes of that calculation. No emissions shall be allocated to wastes and residues. Co-products that have a negative energy content shall be considered to have an energy content of zero for the purposes of the calculation.

Wastes and residues, including tree tops and branches, straw, husks, cobs and nut shells, and residues from processing, including crude glycerine (glycerine that is not refined) and bagasse, shall be considered to have zero life-cycle greenhouse gas emissions up to the process of collection of those materials irrespectively of whether they are processed to interim products before being transformed into the final product.

In the case of fuels produced in refineries, other than the combination of processing plants with boilers or cogeneration units providing heat and/or electricity to the processing plant, the unit of analysis for the purposes of the calculation referred to in point 17 shall be the refinery.

19. For biofuels, for the purposes of the calculation referred to in point 3, the fossil fuel comparator $E_{F(t)}$ shall be 94 g CO₂eq/MJ.

For bioliquids used for the production of electricity, for the purposes of the calculation referred to in point 3, the fossil fuel comparator $EC_{F(e)}$ shall be 183 g CO₂eq/MJ.

For bioliquids used for the production of useful heat, as well as for the production of heating and/or cooling, for the purposes of the calculation referred to in point 3, the fossil fuel comparator $EC_{F(h\&c)}$ shall be 80 g CO₂eq/MJ.

D. DISAGGREGATED DEFAULT VALUES FOR BIOFUELS AND BIOLIQUIDS

Disaggregated default values for cultivation: 'e_{cc}' as defined in Part C of this Annex, including soil N₂O emissions

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
sugar beet ethanol	9,6	9,6
corn (maize) ethanol	25,5	25,5
other cereals excluding corn (maize) ethanol	27,0	27,0
sugar cane ethanol	17,1	17,1
the part from renewable sources of ETBE	Equal to that of the ethanol production pathway used	
the part from renewable sources of TAAE	Equal to that of the ethanol production pathway used	
rape seed biodiesel	32,0	32,0
sunflower biodiesel	26,1	26,1
soybean biodiesel	21,2	21,2
palm oil biodiesel	26,2	26,2
waste cooking oil biodiesel	0	0
animal fats from rendering biodiesel (**)	0	0
hydrotreated vegetable oil from rape seed	33,4	33,4
hydrotreated vegetable oil from sunflower	26,9	26,9
hydrotreated vegetable oil from soybean	22,1	22,1
hydrotreated vegetable oil from palm oil	27,4	27,4
hydrotreated oil from waste cooking oil	0	0
hydrotreated oil from animal fats from rendering (**)	0	0
pure vegetable oil from rape seed	33,4	33,4
pure vegetable oil from sunflower	27,2	27,2
pure vegetable oil from soybean	22,2	22,2
pure vegetable oil from palm oil	27,1	27,1
pure oil from waste cooking oil	0	0

(**) Applies only to biofuels produced from animal by-products classified as category 1 and 2 material in accordance with Regulation (EC) No 1069/2009, for which emissions related to hygienisation as part of the rendering are not considered.

Disaggregated default values for cultivation: 'e_{cc}' – for soil N₂O emissions only (these are already included in the disaggregated values for cultivation emissions in the 'e_{cc}' table)

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
sugar beet ethanol	4,9	4,9
corn (maize) ethanol	13,7	13,7
other cereals excluding corn (maize) ethanol	14,1	14,1
sugar cane ethanol	2,1	2,1
the part from renewable sources of ETBE	Equal to that of the ethanol production pathway used	
the part from renewable sources of TAAE	Equal to that of the ethanol production pathway used	
rape seed biodiesel	17,6	17,6
sunflower biodiesel	12,2	12,2
soybean biodiesel	13,4	13,4
palm oil biodiesel	16,5	16,5
waste cooking oil biodiesel	0	0
animal fats from rendering biodiesel (**)	0	0
hydrotreated vegetable oil from rape seed	18,0	18,0
hydrotreated vegetable oil from sunflower	12,5	12,5
hydrotreated vegetable oil from soybean	13,7	13,7
hydrotreated vegetable oil from palm oil	16,9	16,9
hydrotreated oil from waste cooking oil	0	0
hydrotreated oil from animal fats from rendering (**)	0	0
pure vegetable oil from rape seed	17,6	17,6
pure vegetable oil from sunflower	12,2	12,2
pure vegetable oil from soybean	13,4	13,4
pure vegetable oil from palm oil	16,5	16,5
pure oil from waste cooking oil	0	0

(**) Note: applies only to biofuels produced from animal by-products classified as category 1 and 2 material in accordance with Regulation (EC) No 1069/2009, for which emissions related to hygienisation as part of the rendering are not considered.

Disaggregated default values for processing: 'e_p' as defined in Part C of this Annex

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
sugar beet ethanol (no biogas from slop, natural gas as process fuel in conventional boiler)	18,8	26,3
sugar beet ethanol (with biogas from slop, natural gas as process fuel in conventional boiler)	9,7	13,6
sugar beet ethanol (no biogas from slop, natural gas as process fuel in CHP plant (*))	13,2	18,5
sugar beet ethanol (with biogas from slop, natural gas as process fuel in CHP plant (*))	7,6	10,6
sugar beet ethanol (no biogas from slop, lignite as process fuel in CHP plant (*))	27,4	38,3
sugar beet ethanol (with biogas from slop, lignite as process fuel in CHP plant (*))	15,7	22,0
corn (maize) ethanol (natural gas as process fuel in conventional boiler)	20,8	29,1
corn (maize) ethanol, (natural gas as process fuel in CHP plant (*))	14,8	20,8
corn (maize) ethanol (lignite as process fuel in CHP plant (*))	28,6	40,1
corn (maize) ethanol (forest residues as process fuel in CHP plant (*))	1,8	2,6
other cereals excluding maize ethanol (natural gas as process fuel in conventional boiler)	21,0	29,3
other cereals excluding maize ethanol (natural gas as process fuel in CHP plant (*))	15,1	21,1
other cereals excluding maize ethanol (lignite as process fuel in CHP plant (*))	30,3	42,5
other cereals excluding maize ethanol (forest residues as process fuel in CHP plant (*))	1,5	2,2
sugar cane ethanol	1,3	1,8
the part from renewable sources of ETBE	Equal to that of the ethanol production pathway used	

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
the part from renewable sources of TAEE	Equal to that of the ethanol production pathway used	
rape seed biodiesel	11,7	16,3
sunflower biodiesel	11,8	16,5
soybean biodiesel	12,1	16,9
palm oil biodiesel (open effluent pond)	30,4	42,6
palm oil biodiesel (process with methane capture at oil mill)	13,2	18,5
waste cooking oil biodiesel	9,3	13,0
animal fats from rendering biodiesel (**)	13,6	19,1
hydrotreated vegetable oil from rape seed	10,7	15,0
hydrotreated vegetable oil from sunflower	10,5	14,7
hydrotreated vegetable oil from soybean	10,9	15,2
hydrotreated vegetable oil from palm oil (open effluent pond)	27,8	38,9
hydrotreated vegetable oil from palm oil (process with methane capture at oil mill)	9,7	13,6
hydrotreated oil from waste cooking oil	10,2	14,3
hydrotreated oil from animal fats from rendering (**)	14,5	20,3
pure vegetable oil from rape seed	3,7	5,2
pure vegetable oil from sunflower	3,8	5,4
pure vegetable oil from soybean	4,2	5,9
pure vegetable oil from palm oil (open effluent pond)	22,6	31,7
pure vegetable oil from palm oil (process with methane capture at oil mill)	4,7	6,5
pure oil from waste cooking oil	0,6	0,8

(*) Default values for processes using CHP are valid only if all the process heat is supplied by CHP.

(**) Note: applies only to biofuels produced from animal by-products classified as category 1 and 2 material in accordance with Regulation (EC) No 1069/2009, for which emissions related to hygienisation as part of the rendering are not considered.

Disaggregated default values for oil extraction only (these are already included in the disaggregated values for processing emissions in the 'e_p' table)

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
rape seed biodiesel	3,0	4,2
sunflower biodiesel	2,9	4,0
soybean biodiesel	3,2	4,4
palm oil biodiesel (open effluent pond)	20,9	29,2
palm oil biodiesel (process with methane capture at oil mill)	3,7	5,1
waste cooking oil biodiesel	0	0
animal fats from rendering biodiesel (**)	4,3	6,1
hydrotreated vegetable oil from rape seed	3,1	4,4
hydrotreated vegetable oil from sunflower	3,0	4,1
hydrotreated vegetable oil from soybean	3,3	4,6
hydrotreated vegetable oil from palm oil (open effluent pond)	21,9	30,7
hydrotreated vegetable oil from palm oil (process with methane capture at oil mill)	3,8	5,4
hydrotreated oil from waste cooking oil	0	0
hydrotreated oil from animal fats from rendering (**)	4,3	6,0
pure vegetable oil from rape seed	3,1	4,4
pure vegetable oil from sunflower	3,0	4,2
pure vegetable oil from soybean	3,4	4,7
pure vegetable oil from palm oil (open effluent pond)	21,8	30,5
pure vegetable oil from palm oil (process with methane capture at oil mill)	3,8	5,3
pure oil from waste cooking oil	0	0

(**) Note: applies only to biofuels produced from animal by-products classified as category 1 and 2 material in accordance with Regulation (EC) No 1069/2009, for which emissions related to hygenisation as part of the rendering are not considered.

Disaggregated default values for transport and distribution: 'e_{td}' as defined in Part C of this Annex

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
sugar beet ethanol (no biogas from slop, natural gas as process fuel in conventional boiler)	2,3	2,3
sugar beet ethanol (with biogas from slop, natural gas as process fuel in conventional boiler)	2,3	2,3
sugar beet ethanol (no biogas from slop, natural gas as process fuel in CHP plant (*))	2,3	2,3
sugar beet ethanol (with biogas from slop, natural gas as process fuel in CHP plant (*))	2,3	2,3
sugar beet ethanol (no biogas from slop, lignite as process fuel in CHP plant (*))	2,3	2,3
sugar beet ethanol (with biogas from slop, lignite as process fuel in CHP plant (*))	2,3	2,3
corn (maize) ethanol (natural gas as process fuel in CHP plant (*))	2,2	2,2
corn (maize) ethanol (natural gas as process fuel in conventional boiler)	2,2	2,2
corn (maize) ethanol (lignite as process fuel in CHP plant (*))	2,2	2,2
corn (maize) ethanol (forest residues as process fuel in CHP plant (*))	2,2	2,2
other cereals excluding maize ethanol (natural gas as process fuel in conventional boiler)	2,2	2,2
other cereals excluding maize ethanol (natural gas as process fuel in CHP plant (*))	2,2	2,2
other cereals excluding maize ethanol (lignite as process fuel in CHP plant (*))	2,2	2,2
other cereals excluding maize ethanol (forest residues as process fuel in CHP plant (*))	2,2	2,2
sugar cane ethanol	9,7	9,7
the part from renewable sources of ETBE	Equal to that of the ethanol production pathway used	

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
the part from renewable sources of TAAE	Equal to that of the ethanol production pathway used	
rape seed biodiesel	1,8	1,8
sunflower biodiesel	2,1	2,1
soybean biodiesel	8,9	8,9
palm oil biodiesel (open effluent pond)	6,9	6,9
palm oil biodiesel (process with methane capture at oil mill)	6,9	6,9
waste cooking oil biodiesel	1,9	1,9
animal fats from rendering biodiesel (**)	1,7	1,7
hydrotreated vegetable oil from rape seed	1,7	1,7
hydrotreated vegetable oil from sunflower	2,0	2,0
hydrotreated vegetable oil from soybean	9,2	9,2
hydrotreated vegetable oil from palm oil (open effluent pond)	7,0	7,0
hydrotreated vegetable oil from palm oil (process with methane capture at oil mill)	7,0	7,0
hydrotreated oil from waste cooking oil	1,7	1,7
hydrotreated oil from animal fats from rendering (**)	1,5	1,5
pure vegetable oil from rape seed	1,4	1,4
pure vegetable oil from sunflower	1,7	1,7
pure vegetable oil from soybean	8,8	8,8
pure vegetable oil from palm oil (open effluent pond)	6,7	6,7
pure vegetable oil from palm oil (process with methane capture at oil mill)	6,7	6,7
pure oil from waste cooking oil	1,4	1,4

(*) Default values for processes using CHP are valid only if all the process heat is supplied by CHP.

(**) Note: applies only to biofuels produced from animal by-products classified as category 1 and 2 material in accordance with Regulation (EC) No 1069/2009, for which emissions related to hygienisation as part of the rendering are not considered.

Disaggregated default values for transport and distribution of final fuel only. These are already included in the table of 'transport and distribution emissions e_{td} ' as defined in Part C of this Annex, but the following values are useful if an economic operator wishes to declare actual transport emissions for crops or oil transport only).

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
sugar beet ethanol (no biogas from slop, natural gas as process fuel in conventional boiler)	1,6	1,6
sugar beet ethanol (with biogas from slop, natural gas as process fuel in conventional boiler)	1,6	1,6
sugar beet ethanol (no biogas from slop, natural gas as process fuel in CHP plant (*))	1,6	1,6
sugar beet ethanol (with biogas from slop, natural gas as process fuel in CHP plant (*))	1,6	1,6
sugar beet ethanol (no biogas from slop, lignite as process fuel in CHP plant (*))	1,6	1,6
sugar beet ethanol (with biogas from slop, lignite as process fuel in CHP plant (*))	1,6	1,6
corn (maize) ethanol (natural gas as process fuel in conventional boiler)	1,6	1,6
corn (maize) ethanol (natural gas as process fuel in CHP plant (*))	1,6	1,6
corn (maize) ethanol (lignite as process fuel in CHP plant (*))	1,6	1,6
corn (maize) ethanol (forest residues as process fuel in CHP plant (*))	1,6	1,6
other cereals excluding maize ethanol (natural gas as process fuel in conventional boiler)	1,6	1,6
other cereals excluding maize ethanol (natural gas as process fuel in CHP plant (*))	1,6	1,6
other cereals excluding maize ethanol (lignite as process fuel in CHP plant (*))	1,6	1,6
other cereals excluding maize ethanol (forest residues as process fuel in CHP plant (*))	1,6	1,6
sugar cane ethanol	6,0	6,0
the part of ethyl-tertio-butyl-ether (ETBE) from renewable ethanol	Will be considered to be equal to that of the ethanol production pathway used	

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
the part of tertiary-amyl-ethyl-ether (TAEE) from renewable ethanol	Will be considered to be equal to that of the ethanol production pathway used	
rape seed biodiesel	1,3	1,3
sunflower biodiesel	1,3	1,3
soybean biodiesel	1,3	1,3
palm oil biodiesel (open effluent pond)	1,3	1,3
palm oil biodiesel (process with methane capture at oil mill)	1,3	1,3
waste cooking oil biodiesel	1,3	1,3
animal fats from rendering biodiesel (**)	1,3	1,3
hydrotreated vegetable oil from rape seed	1,2	1,2
hydrotreated vegetable oil from sunflower	1,2	1,2
hydrotreated vegetable oil from soybean	1,2	1,2
hydrotreated vegetable oil from palm oil (open effluent pond)	1,2	1,2
hydrotreated vegetable oil from palm oil (process with methane capture at oil mill)	1,2	1,2
hydrotreated oil from waste cooking oil	1,2	1,2
hydrotreated oil from animal fats from rendering (**)	1,2	1,2
pure vegetable oil from rape seed	0,8	0,8
pure vegetable oil from sunflower	0,8	0,8
pure vegetable oil from soybean	0,8	0,8
pure vegetable oil from palm oil (open effluent pond)	0,8	0,8
pure vegetable oil from palm oil (process with methane capture at oil mill)	0,8	0,8
pure oil from waste cooking oil	0,8	0,8

(*) Default values for processes using CHP are valid only if all the process heat is supplied by CHP.

(**) Note: applies only to biofuels produced from animal by-products classified as category 1 and 2 material in accordance with Regulation (EC) No 1069/2009, for which emissions related to hygienisation as part of the rendering are not considered.

Total for cultivation, processing, transport and distribution

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
sugar beet ethanol (no biogas from slop, natural gas as process fuel in conventional boiler)	30,7	38,2
sugar beet ethanol (with biogas from slop, natural gas as process fuel in conventional boiler)	21,6	25,5
sugar beet ethanol (no biogas from slop, natural gas as process fuel in CHP plant (*))	25,1	30,4
sugar beet ethanol (with biogas from slop, natural gas as process fuel in CHP plant (*))	19,5	22,5
sugar beet ethanol (no biogas from slop, lignite as process fuel in CHP plant (*))	39,3	50,2
sugar beet ethanol (with biogas from slop, lignite as process fuel in CHP plant (*))	27,6	33,9
corn (maize) ethanol (natural gas as process fuel in conventional boiler)	48,5	56,8
corn (maize) ethanol, (natural gas as process fuel in CHP plant (*))	42,5	48,5
corn (maize) ethanol (lignite as process fuel in CHP plant (*))	56,3	67,8
corn (maize) ethanol (forest residues as process fuel in CHP plant (*))	29,5	30,3
other cereals excluding maize ethanol (natural gas as process fuel in conventional boiler)	50,2	58,5
other cereals excluding maize ethanol (natural gas as process fuel in CHP plant (*))	44,3	50,3
other cereals excluding maize ethanol (lignite as process fuel in CHP plant (*))	59,5	71,7
other cereals excluding maize ethanol (forest residues as process fuel in CHP plant (*))	30,7	31,4
sugar cane ethanol	28,1	28,6
the part from renewable sources of ETBE	Equal to that of the ethanol production pathway used	
the part from renewable sources of TAAE	Equal to that of the ethanol production pathway used	

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
rape seed biodiesel	45,5	50,1
sunflower biodiesel	40,0	44,7
soybean biodiesel	42,2	47,0
palm oil biodiesel (open effluent pond)	63,5	75,7
palm oil biodiesel (process with methane capture at oil mill)	46,3	51,6
waste cooking oil biodiesel	11,2	14,9
animals fats from rendering biodiesel (**)	15,3	20,8
hydrotreated vegetable oil from rape seed	45,8	50,1
hydrotreated vegetable oil from sunflower	39,4	43,6
hydrotreated vegetable oil from soybean	42,2	46,5
hydrotreated vegetable oil from palm oil (open effluent pond)	62,2	73,3
hydrotreated vegetable oil from palm oil (process with methane capture at oil mill)	44,1	48,0
hydrotreated oil from waste cooking oil	11,9	16,0
hydrotreated oil from animal fats from rendering (**)	16,0	21,8
pure vegetable oil from rape seed	38,5	40,0
pure vegetable oil from sunflower	32,7	34,3
pure vegetable oil from soybean	35,2	36,9
pure vegetable oil from palm oil (open effluent pond)	56,3	65,4
pure vegetable oil from palm oil (process with methane capture at oil mill)	38,4	57,2
pure oil from waste cooking oil	2,0	2,2

(*) Default values for processes using CHP are valid only if all the process heat is supplied by CHP.

(**) Note: applies only to biofuels produced from animal by-products classified as category 1 and 2 material in accordance with Regulation (EC) No 1069/2009, for which emissions related to hygienisation as part of the rendering are not considered.

E. ESTIMATED DISAGGREGATED DEFAULT VALUES FOR FUTURE BIOFUELS AND BIOLIQUIDS THAT WERE NOT ON THE MARKET OR WERE ONLY ON THE MARKET IN NEGLIGIBLE QUANTITIES IN 2016

Disaggregated default values for cultivation: 'e_{cc}' as defined in Part C of this Annex, including N₂O emissions (including chipping of waste or farmed wood)

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
wheat straw ethanol	1,8	1,8
waste wood Fischer-Tropsch diesel in free-standing plant	3,3	3,3
farmed wood Fischer-Tropsch diesel in free-standing plant	8,2	8,2
waste wood Fischer-Tropsch petrol in free-standing plant	8,2	8,2
farmed wood Fischer-Tropsch petrol in free-standing plant	12,4	12,4
waste wood dimethylether (DME) in free-standing plant	3,1	3,1
farmed wood dimethylether (DME) in free-standing plant	7,6	7,6
waste wood methanol in free-standing plant	3,1	3,1
farmed wood methanol in free-standing plant	7,6	7,6
Fischer-Tropsch diesel from black-liquor gasification integrated with pulp mill	2,5	2,5
Fischer-Tropsch petrol from black-liquor gasification integrated with pulp mill	2,5	2,5
dimethylether (DME) from black-liquor gasification integrated with pulp mill	2,5	2,5
Methanol from black-liquor gasification integrated with pulp mill	2,5	2,5
the part from renewable sources of MTBE	Equal to that of the methanol production pathway used	

Disaggregated default values for soil N₂O emissions (included in disaggregated default values for cultivation emissions in the 'e_{cc}' table)

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
wheat straw ethanol	0	0
waste wood Fischer-Tropsch diesel in free-standing plant	0	0

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
farmed wood Fischer-Tropsch diesel in free-standing plant	4,4	4,4
waste wood Fischer-Tropsch petrol in free-standing plant	0	0
farmed wood Fischer-Tropsch petrol in free-standing plant	4,4	4,4
waste wood dimethylether (DME) in free-standing plant	0	0
farmed wood dimethylether (DME) in free-standing plant	4,1	4,1
waste wood methanol in free-standing plant	0	0
farmed wood methanol in free-standing plant	4,1	4,1
Fischer-Tropsch diesel from black-liquor gasification integrated with pulp mill	0	0
Fischer-Tropsch petrol from black-liquor gasification integrated with pulp mill	0	0
dimethylether (DME) from black-liquor gasification integrated with pulp mill	0	0
Methanol from black-liquor gasification integrated with pulp mill	0	0
the part from renewable sources of MTBE	Equal to that of the methanol production pathway used	

Disaggregated default values for processing: 'e_p' as defined in Part C of this Annex

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
wheat straw ethanol	4,8	6,8
waste wood Fischer-Tropsch diesel in free-standing plant	0,1	0,1
farmed wood Fischer-Tropsch diesel in free-standing plant	0,1	0,1
waste wood Fischer-Tropsch petrol in free-standing plant	0,1	0,1
farmed wood Fischer-Tropsch petrol in free-standing plant	0,1	0,1
waste wood dimethylether (DME) in free-standing plant	0	0

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
farmed wood dimethylether (DME) in free-standing plant	0	0
waste wood methanol in free-standing plant	0	0
farmed wood methanol in free-standing plant	0	0
Fischer-Tropsch diesel from black-liquor gasification integrated with pulp mill	0	0
Fischer-Tropsch petrol from black-liquor gasification integrated with pulp mill	0	0
dimethylether (DME) from black-liquor gasification integrated with pulp mill	0	0
methanol from black-liquor gasification integrated with pulp mill	0	0
the part from renewable sources of MTBE	Equal to that of the methanol production pathway used	

Disaggregated default values for transport and distribution: 'e_{td}' as defined in Part C of this Annex

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
wheat straw ethanol	7,1	7,1
waste wood Fischer-Tropsch diesel in free-standing plant	10,3	10,3
farmed wood Fischer-Tropsch diesel in free-standing plant	8,4	8,4
waste wood Fischer-Tropsch petrol in free-standing plant	10,3	10,3
farmed wood Fischer-Tropsch petrol in free-standing plant	8,4	8,4
waste wood dimethylether (DME) in free-standing plant	10,4	10,4
farmed wood dimethylether (DME) in free-standing plant	8,6	8,6
waste wood methanol in free-standing plant	10,4	10,4
farmed wood methanol in free-standing plant	8,6	8,6
Fischer-Tropsch diesel from black-liquor gasification integrated with pulp mill	7,7	7,7
Fischer-Tropsch petrol from black-liquor gasification integrated with pulp mill	7,9	7,9
dimethylether (DME) from black-liquor gasification integrated with pulp mill	7,7	7,7

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
methanol from black-liquor gasification integrated with pulp mill	7,9	7,9
the part from renewable sources of MTBE	Equal to that of the methanol production pathway used	

Disaggregated default values for transport and distribution of final fuel only. These are already included in the table of 'transport and distribution emissions e_{td}' as defined in Part C of this Annex, but the following values are useful if an economic operator wishes to declare actual transport emissions for feedstock transport only).

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
wheat straw ethanol	1,6	1,6
waste wood Fischer-Tropsch diesel in free-standing plant	1,2	1,2
farmed wood Fischer-Tropsch diesel in free-standing plant	1,2	1,2
waste wood Fischer-Tropsch petrol in free-standing plant	1,2	1,2
farmed wood Fischer-Tropsch petrol in free-standing plant	1,2	1,2
waste wood dimethylether (DME) in free-standing plant	2,0	2,0
farmed wood dimethylether (DME) in free-standing plant	2,0	2,0
waste wood methanol in free-standing plant	2,0	2,0
farmed wood methanol in free-standing plant	2,0	2,0
Fischer-Tropsch diesel from black-liquor gasification integrated with pulp mill	2,0	2,0
Fischer-Tropsch petrol from black-liquor gasification integrated with pulp mill	2,0	2,0
dimethylether (DME) from black-liquor gasification integrated with pulp mill	2,0	2,0

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
methanol from black-liquor gasification integrated with pulp mill	2,0	2,0
the part from renewable sources of MTBE	Equal to that of the methanol production pathway used	

Total for cultivation, processing, transport and distribution

Biofuel and bioliquid production pathway	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
wheat straw ethanol	13,7	15,7
waste wood Fischer-Tropsch diesel in free-standing plant	13,7	13,7
farmed wood Fischer-Tropsch diesel in free-standing plant	16,7	16,7
waste wood Fischer-Tropsch petrol in free-standing plant	13,7	13,7
farmed wood Fischer-Tropsch petrol in free-standing plant	16,7	16,7
waste wood dimethylether (DME) in free-standing plant	13,5	13,5
farmed wood dimethylether (DME) in free-standing plant	16,2	16,2
waste wood methanol in free-standing plant	13,5	13,5
farmed wood methanol in free-standing plant	16,2	16,2
Fischer-Tropsch diesel from black-liquor gasification integrated with pulp mill	10,2	10,2
Fischer-Tropsch petrol from black-liquor gasification integrated with pulp mill	10,4	10,4
dimethylether (DME) from black-liquor gasification integrated with pulp mill	10,2	10,2
methanol from black-liquor gasification integrated with pulp mill	10,4	10,4
the part from renewable sources of MTBE	Equal to that of the methanol production pathway used	

ANNEX VI

RULES FOR CALCULATING THE GREENHOUSE GAS IMPACT OF BIOMASS FUELS AND THEIR FOSSIL FUEL COMPARATORS

A. Typical and default values of greenhouse gas emissions savings for biomass fuels if produced with no net-carbon emissions from land-use change

WOODCHIPS					
Biomass fuel production system	Transport distance	Greenhouse gas emissions savings –typical value		Greenhouse gas emissions savings – default value	
		Heat	Electricity	Heat	Electricity
Woodchips from forest residues	1 to 500 km	93 %	89 %	91 %	87 %
	500 to 2 500 km	89 %	84 %	87 %	81 %
	2 500 to 10 000 km	82 %	73 %	78 %	67 %
	Above 10 000 km	67 %	51 %	60 %	41 %
Woodchips from short rotation coppice (Eucalyptus)	2 500 to 10 000 km	77 %	65 %	73 %	60 %
Woodchips from short rotation coppice (Poplar – Fertilised)	1 to 500 km	89 %	83 %	87 %	81 %
	500 to 2 500 km	85 %	78 %	84 %	76 %
	2 500 to 10 000 km	78 %	67 %	74 %	62 %
	Above 10 000 km	63 %	45 %	57 %	35 %
Woodchips from short rotation coppice (Poplar – No fertilisation)	1 to 500 km	91 %	87 %	90 %	85 %
	500 to 2 500 km	88 %	82 %	86 %	79 %
	2 500 to 10 000 km	80 %	70 %	77 %	65 %
	Above 10 000 km	65 %	48 %	59 %	39 %
Woodchips from stemwood	1 to 500 km	93 %	89 %	92 %	88 %
	500 to 2 500 km	90 %	85 %	88 %	82 %
	2 500 to 10 000 km	82 %	73 %	79 %	68 %
	Above 10 000 km	67 %	51 %	61 %	42 %
Woodchips from industry residues	1 to 500 km	94 %	92 %	93 %	90 %
	500 to 2 500 km	91 %	87 %	90 %	85 %
	2 500 to 10 000 km	83 %	75 %	80 %	71 %
	Above 10 000 km	69 %	54 %	63 %	44 %

WOOD PELLETS (*)						
Biomass fuel production system		Transport distance	Greenhouse gas emissions savings – typical value		Greenhouse gas emissions savings – default value	
			Heat	Electricity	Heat	Electricity
Wood briquettes or pellets from forest residues	Case 1	1 to 500 km	58 %	37 %	49 %	24 %
		500 to 2 500 km	58 %	37 %	49 %	25 %
		2 500 to 10 000 km	55 %	34 %	47 %	21 %
		Above 10 000 km	50 %	26 %	40 %	11 %
	Case 2a	1 to 500 km	77 %	66 %	72 %	59 %
		500 to 2 500 km	77 %	66 %	72 %	59 %
		2 500 to 10 000 km	75 %	62 %	70 %	55 %
		Above 10 000 km	69 %	54 %	63 %	45 %
	Case 3a	1 to 500 km	92 %	88 %	90 %	85 %
		500 to 2 500 km	92 %	88 %	90 %	86 %
		2 500 to 10 000 km	90 %	85 %	88 %	81 %
		Above 10 000 km	84 %	76 %	81 %	72 %
Wood briquettes or pellets from short rotation coppice (Eucalyptus)	Case 1	2 500 to 10 000 km	52 %	28 %	43 %	15 %
	Case 2a	2 500 to 10 000 km	70 %	56 %	66 %	49 %
	Case 3a	2 500 to 10 000 km	85 %	78 %	83 %	75 %
Wood briquettes or pellets from short rotation coppice (Poplar – Fertilised)	Case 1	1 to 500 km	54 %	32 %	46 %	20 %
		500 to 10 000 km	52 %	29 %	44 %	16 %
		Above 10 000 km	47 %	21 %	37 %	7 %
	Case 2a	1 to 500 km	73 %	60 %	69 %	54 %
		500 to 10 000 km	71 %	57 %	67 %	50 %
		Above 10 000 km	66 %	49 %	60 %	41 %
	Case 3a	1 to 500 km	88 %	82 %	87 %	81 %
		500 to 10 000 km	86 %	79 %	84 %	77 %
		Above 10 000 km	80 %	71 %	78 %	67 %

WOOD PELLETS (*)							
Biomass fuel production system		Transport distance	Greenhouse gas emissions savings – typical value		Greenhouse gas emissions savings – default value		
			Heat	Electricity	Heat	Electricity	
Wood briquettes or pellets from short rotation coppice (Poplar – No fertilisation)	Case 1	1 to 500 km	56 %	35 %	48 %	23 %	
		500 to 10 000 km	54 %	32 %	46 %	20 %	
		Above 10 000 km	49 %	24 %	40 %	10 %	
	Case 2a	1 to 500 km	76 %	64 %	72 %	58 %	
		500 to 10 000 km	74 %	61 %	69 %	54 %	
		Above 10 000 km	68 %	53 %	63 %	45 %	
	Case 3a	1 to 500 km	91 %	86 %	90 %	85 %	
		500 to 10 000 km	89 %	83 %	87 %	81 %	
		Above 10 000 km	83 %	75 %	81 %	71 %	
	Stemwood	Case 1	1 to 500 km	57 %	37 %	49 %	24 %
			500 to 2 500 km	58 %	37 %	49 %	25 %
			2 500 to 10 000 km	55 %	34 %	47 %	21 %
Above 10 000 km			50 %	26 %	40 %	11 %	
Case 2a		1 to 500 km	77 %	66 %	73 %	60 %	
		500 to 2 500 km	77 %	66 %	73 %	60 %	
		2 500 to 10 000 km	75 %	63 %	70 %	56 %	
		Above 10 000 km	70 %	55 %	64 %	46 %	
Case 3a		1 to 500 km	92 %	88 %	91 %	86 %	
		500 to 2 500 km	92 %	88 %	91 %	87 %	
		2 500 to 10 000 km	90 %	85 %	88 %	83 %	
		Above 10 000 km	84 %	77 %	82 %	73 %	
Wood briquettes or pellets from wood industry residues	Case 1	1 to 500 km	75 %	62 %	69 %	55 %	
		500 to 2 500 km	75 %	62 %	70 %	55 %	
		2 500 to 10 000 km	72 %	59 %	67 %	51 %	
		Above 10 000 km	67 %	51 %	61 %	42 %	
	Case 2a	1 to 500 km	87 %	80 %	84 %	76 %	
		500 to 2 500 km	87 %	80 %	84 %	77 %	
		2 500 to 10 000 km	85 %	77 %	82 %	73 %	
		Above 10 000 km	79 %	69 %	75 %	63 %	

WOOD PELLETS (*)						
Biomass fuel production system		Transport distance	Greenhouse gas emissions savings – typical value		Greenhouse gas emissions savings – default value	
			Heat	Electricity	Heat	Electricity
	Case 3a	1 to 500 km	95 %	93 %	94 %	91 %
		500 to 2 500 km	95 %	93 %	94 %	92 %
		2 500 to 10 000 km	93 %	90 %	92 %	88 %
		Above 10 000 km	88 %	82 %	85 %	78 %

(*) Case 1 refers to processes in which a natural gas boiler is used to provide the process heat to the pellet mill. Electricity for the pellet mill is supplied from the grid;
 Case 2a refers to processes in which a woodchips boiler, fed with pre-dried chips, is used to provide process heat. Electricity for the pellet mill is supplied from the grid;
 Case 3a refers to processes in which a CHP, fed with pre-dried woodchips, is used to provide electricity and heat to the pellet mill.

AGRICULTURE PATHWAYS						
Biomass fuel production system		Transport distance	Greenhouse gas emissions savings – typical value		Greenhouse gas emissions savings – default value	
			Heat	Electricity	Heat	Electricity
Agricultural Residues with density < 0,2 t/m ³ (*)	1 to 500 km	95 %	92 %	93 %	90 %	
	500 to 2 500 km	89 %	83 %	86 %	80 %	
	2 500 to 10 000 km	77 %	66 %	73 %	60 %	
	Above 10 000 km	57 %	36 %	48 %	23 %	
Agricultural Residues with density > 0,2 t/m ³ (**)	1 to 500 km	95 %	92 %	93 %	90 %	
	500 to 2 500 km	93 %	89 %	92 %	87 %	
	2 500 to 10 000 km	88 %	82 %	85 %	78 %	
	Above 10 000 km	78 %	68 %	74 %	61 %	
Straw pellets	1 to 500 km	88 %	82 %	85 %	78 %	
	500 to 10 000 km	86 %	79 %	83 %	74 %	
	Above 10 000 km	80 %	70 %	76 %	64 %	
Bagasse briquettes	500 to 10 000 km	93 %	89 %	91 %	87 %	
	Above 10 000 km	87 %	81 %	85 %	77 %	
Palm Kernel Meal	Above 10 000 km	20 %	-18 %	11 %	-33 %	

AGRICULTURE PATHWAYS

Biomass fuel production system	Transport distance	Greenhouse gas emissions savings – typical value		Greenhouse gas emissions savings – default value	
		Heat	Electricity	Heat	Electricity
Palm Kernel Meal (no CH ₄ emissions from oil mill)	Above 10 000 km	46 %	20 %	42 %	14 %

(*) This group of materials includes agricultural residues with a low bulk density and it comprises materials such as straw bales, oat hulls, rice husks and sugar cane bagasse bales (not exhaustive list).

(**) The group of agricultural residues with higher bulk density includes materials such as corn cobs, nut shells, soybean hulls, palm kernel shells (not exhaustive list).

BIOGAS FOR ELECTRICITY (*)

Biogas production system		Technological option	Greenhouse gas emissions savings – typical value	Greenhouse gas emissions savings – default value
Wet manure ⁽¹⁾	Case 1	Open digestate ⁽²⁾	146 %	94 %
		Close digestate ⁽³⁾	246 %	240 %
	Case 2	Open digestate	136 %	85 %
		Close digestate	227 %	219 %
	Case 3	Open digestate	142 %	86 %
		Close digestate	243 %	235 %
Maize whole plant ⁽⁴⁾	Case 1	Open digestate	36 %	21 %
		Close digestate	59 %	53 %
	Case 2	Open digestate	34 %	18 %
		Close digestate	55 %	47 %
	Case 3	Open digestate	28 %	10 %
		Close digestate	52 %	43 %

⁽¹⁾ The values for biogas production from manure include negative emissions for emissions saved from raw manure management. The value of e_{scat} considered is equal to $-45 \text{ g CO}_2\text{eq/MJ}$ manure used in anaerobic digestion.

⁽²⁾ Open storage of digestate accounts for additional emissions of CH₄ and N₂O. The magnitude of those emissions changes with ambient conditions, substrate types and the digestion efficiency.

⁽³⁾ Close storage means that the digestate resulting from the digestion process is stored in a gas-tight tank and that the additional biogas released during storage is considered to be recovered for production of additional electricity or biomethane. No greenhouse gas emissions are included in that process.

⁽⁴⁾ Maize whole plant means maize harvested as fodder and ensiled for preservation.

BIOGAS FOR ELECTRICITY (*)				
Biogas production system		Technological option	Greenhouse gas emissions savings – typical value	Greenhouse gas emissions savings – default value
Biowaste	Case 1	Open digestate	47 %	26 %
		Close digestate	84 %	78 %
	Case 2	Open digestate	43 %	21 %
		Close digestate	77 %	68 %
	Case 3	Open digestate	38 %	14 %
		Close digestate	76 %	66 %

(*) Case 1 refers to pathways in which electricity and heat required in the process are supplied by the CHP engine itself.
Case 2 refers to pathways in which the electricity required in the process is taken from the grid and the process heat is supplied by the CHP engine itself. In some Member States, operators are not allowed to claim the gross production for subsidies and case 1 is the more likely configuration.
Case 3 refers to pathways in which the electricity required in the process is taken from the grid and the process heat is supplied by a biogas boiler. This case applies to some installations in which the CHP engine is not on-site and biogas is sold (but not upgraded to biomethane).

BIOGAS FOR ELECTRICITY – MIXTURES OF MANURE AND MAIZE				
Biogas production system		Technological option	Greenhouse gas emissions savings – typical value	Greenhouse gas emissions savings – default value
Manure – Maize 80 % - 20 %	Case 1	Open digestate	72 %	45 %
		Close digestate	120 %	114 %
	Case 2	Open digestate	67 %	40 %
		Close digestate	111 %	103 %
	Case 3	Open digestate	65 %	35 %
		Close digestate	114 %	106 %
Manure – Maize 70 % - 30 %	Case 1	Open digestate	60 %	37 %
		Close digestate	100 %	94 %
	Case 2	Open digestate	57 %	32 %
		Close digestate	93 %	85 %
	Case 3	Open digestate	53 %	27 %
		Close digestate	94 %	85 %

BIOGAS FOR ELECTRICITY – MIXTURES OF MANURE AND MAIZE				
Biogas production system		Technological option	Greenhouse gas emissions savings – typical value	Greenhouse gas emissions savings – default value
Manure – Maize 60 % - 40 %	Case 1	Open digestate	53 %	32 %
		Close digestate	88 %	82 %
	Case 2	Open digestate	50 %	28 %
		Close digestate	82 %	73 %
	Case 3	Open digestate	46 %	22 %
		Close digestate	81 %	72 %

BIOMETHANE FOR TRANSPORT (*)			
Biomethane production system	Technological options	Greenhouse gas emissions savings – typical value	Greenhouse gas emissions savings – default value
Wet manure	Open digestate, no off-gas combustion	117 %	72 %
	Open digestate, off-gas combustion	133 %	94 %
	Close digestate, no off-gas combustion	190 %	179 %
	Close digestate, off-gas combustion	206 %	202 %
Maize whole plant	Open digestate, no off-gas combustion	35 %	17 %
	Open digestate, off-gas combustion	51 %	39 %
	Close digestate, no off-gas combustion	52 %	41 %
	Close digestate, off-gas combustion	68 %	63 %
Biowaste	Open digestate, no off-gas combustion	43 %	20 %
	Open digestate, off-gas combustion	59 %	42 %
	Close digestate, no off-gas combustion	70 %	58 %
	Close digestate, off-gas combustion	86 %	80 %

(*) The greenhouse gas emissions savings for biomethane only refer to compressed biomethane relative to the fossil fuel comparator for transport of 94 g CO₂eq/MJ.

BIOMETHANE – MIXTURES OF MANURE AND MAIZE (*)			
Biomethane production system	Technological options	Greenhouse gas emissions savings – typical value	Greenhouse gas emissions savings – default value
Manure – Maize 80 % - 20 %	Open digestate, no off-gas combustion ⁽¹⁾	62 %	35 %
	Open digestate, off-gas combustion ⁽²⁾	78 %	57 %
	Close digestate, no off-gas combustion	97 %	86 %
	Close digestate, off-gas combustion	113 %	108 %
Manure – Maize 70 % - 30 %	Open digestate, no off-gas combustion	53 %	29 %
	Open digestate, off-gas combustion	69 %	51 %
	Close digestate, no off-gas combustion	83 %	71 %
	Close digestate, off-gas combustion	99 %	94 %
Manure – Maize 60 % - 40 %	Open digestate, no off-gas combustion	48 %	25 %
	Open digestate, off-gas combustion	64 %	48 %
	Close digestate, no off-gas combustion	74 %	62 %
	Close digestate, off-gas combustion	90 %	84 %

(*) The greenhouse gas emissions savings for biomethane only refer to compressed biomethane relative to the fossil fuel comparator for transport of 94 g CO₂eq/MJ.

B. METHODOLOGY

1. Greenhouse gas emissions from the production and use of biomass fuels, shall be calculated as follows:

- (a) Greenhouse gas emissions from the production and use of biomass fuels before conversion into electricity, heating and cooling, shall be calculated as:

$$E = e_{cc} + e_l + e_p + e_{id} + e_u - e_{sca} - e_{ccs} - e_{ccr}$$

Where

E = total emissions from the production of the fuel before energy conversion;

e_{cc} = emissions from the extraction or cultivation of raw materials;

e_l = annualised emissions from carbon stock changes caused by land-use change;

e_p = emissions from processing;

⁽¹⁾ This category includes the following categories of technologies for biogas upgrade to biomethane: Pressure Swing Adsorption (PSA), Pressure Water Scrubbing (PWS), Membranes, Cryogenic, and Organic Physical Scrubbing (OPS). It includes an emission of 0,03 MJ CH₄/MJ biomethane for the emission of methane in the off-gases.

⁽²⁾ This category includes the following categories of technologies for biogas upgrade to biomethane: Pressure Water Scrubbing (PWS) when water is recycled, Pressure Swing Adsorption (PSA), Chemical Scrubbing, Organic Physical Scrubbing (OPS), Membranes and Cryogenic upgrading. No methane emissions are considered for this category (the methane in the off-gas is combusted, if any).

- e_{td} = emissions from transport and distribution;
- e_u = emissions from the fuel in use;
- e_{sca} = emission savings from soil carbon accumulation via improved agricultural management;
- e_{ccs} = emission savings from CO₂ capture and geological storage; and
- e_{ccr} = emission savings from CO₂ capture and replacement.

Emissions from the manufacture of machinery and equipment shall not be taken into account.

- (b) In the case of co-digestion of different substrates in a biogas plant for the production of biogas or biomethane, the typical and default values of greenhouse gas emissions shall be calculated as:

$$E = \sum_1^n \cdot E_n$$

where

E = greenhouse gas emissions per MJ biogas or biomethane produced from co-digestion of the defined mixture of substrates

S_n = Share of feedstock n in energy content

E_n = Emission in g CO₂/MJ for pathway n as provided in Part D of this Annex (*)

$$S_n = \frac{P_n \cdot W_n}{\sum_1^n \cdot W_n}$$

where

P_n = energy yield [MJ] per kilogram of wet input of feedstock n (**)

W_n = weighting factor of substrate n defined as:

$$W_n = \frac{I_n}{\sum_1^n I_n} \cdot \left(\frac{1 - AM_n}{1 - SM_n} \right)$$

where:

I_n = Annual input to digester of substrate n [tonne of fresh matter]

AM_n = Average annual moisture of substrate n [kg water/kg fresh matter]

SM_n = Standard moisture for substrate n (***)

- (*) For animal manure used as substrate, a bonus of 45 g CO₂eq/MJ manure (– 54 kg CO₂eq/t fresh matter) is added for improved agricultural and manure management.

- (**) The following values of P_n shall be used for calculating typical and default values:

P(Maize): 4,16 [MJ]_{biogas}/kg_{wet maize @ 65 % moisture}]

P(Manure): 0,50 [MJ]_{biogas}/kg_{wet manure @ 90 % moisture}]

P(Biowaste) 3,41 [MJ]_{biogas}/kg_{wet biowaste @ 76 % moisture}]

- (***) The following values of the standard moisture for substrate SM_n shall be used:

SM(Maize): 0,65 [kg water/kg fresh matter]

SM(Manure): 0,90 [kg water/kg fresh matter]

SM(Biowaste): 0,76 [kg water/kg fresh matter]

- (c) In the case of co-digestion of n substrates in a biogas plant for the production of electricity or biomethane, actual greenhouse gas emissions of biogas and biomethane are calculated as follows:

$$E = \sum_1^n S_n \cdot (e_{ec,n} + e_{td,feedstock,n} + e_{l,n} - e_{sca,n}) + e_p + e_{td,product} + e_u - e_{ccs} - e_{ccr}$$

where

E	= total emissions from the production of the biogas or biomethane before energy conversion;
S_n	= Share of feedstock n , in fraction of input to the digester;
$e_{ec,n}$	= emissions from the extraction or cultivation of feedstock n ;
$e_{td,feedstock,n}$	= emissions from transport of feedstock n to the digester;
$e_{l,n}$	= annualised emissions from carbon stock changes caused by land-use change, for feedstock n ;
e_{sca}	= emission savings from improved agricultural management of feedstock n (*);
e_p	= emissions from processing;
$e_{td,product}$	= emissions from transport and distribution of biogas and/or biomethane;
e_u	= emissions from the fuel in use, that is greenhouse gases emitted during combustion;
e_{ccs}	= emission savings from CO ₂ capture and geological storage; and
e_{ccr}	= emission savings from CO ₂ capture and replacement.

(*) For e_{sca} a bonus of 45 g CO₂eq/MJ manure shall be attributed for improved agricultural and manure management in the case animal manure is used as a substrate for the production of biogas and biomethane.

- (d) Greenhouse gas emissions from the use of biomass fuels in producing electricity, heating and cooling, including the energy conversion to electricity and/or heat or cooling produced, shall be calculated as follows:

- (i) For energy installations delivering only heat:

$$EC_h = \frac{E}{\eta_h}$$

- (ii) For energy installations delivering only electricity:

$$EC_{el} = \frac{E}{\eta_{el}}$$

where

$EC_{h,el}$	= Total greenhouse gas emissions from the final energy commodity.
E	= Total greenhouse gas emissions of the fuel before end-conversion.
η_{el}	= The electrical efficiency, defined as the annual electricity produced divided by the annual fuel input, based on its energy content.
η_h	= The heat efficiency, defined as the annual useful heat output divided by the annual fuel input, based on its energy content.

- (iii) For the electricity or mechanical energy coming from energy installations delivering useful heat together with electricity and/or mechanical energy:

$$EC_{el} = \frac{E}{\eta_{el}} \left(\frac{C_{el} \cdot \eta_{el}}{C_{el} \cdot \eta_{el} + C_h \cdot \eta_h} \right)$$

- (iv) For the useful heat coming from energy installations delivering heat together with electricity and/or mechanical energy:

$$EC_h = \frac{E}{\eta_h} \left(\frac{C_h \cdot \eta_h}{C_{el} \cdot \eta_{el} + C_h \cdot \eta_h} \right)$$

where:

- $EC_{h,el}$ = Total greenhouse gas emissions from the final energy commodity.
- E = Total greenhouse gas emissions of the fuel before end-conversion.
- η_{el} = The electrical efficiency, defined as the annual electricity produced divided by the annual energy input, based on its energy content.
- η_h = The heat efficiency, defined as the annual useful heat output divided by the annual energy input, based on its energy content.
- C_{el} = Fraction of exergy in the electricity, and/or mechanical energy, set to 100 % ($C_{el} = 1$).
- C_h = Carnot efficiency (fraction of exergy in the useful heat).

The Carnot efficiency, C_h , for useful heat at different temperatures is defined as:

$$C_h = \frac{T_h - T_0}{T_h}$$

where:

- T_h = Temperature, measured in absolute temperature (kelvin) of the useful heat at point of delivery.
- T_0 = Temperature of surroundings, set at 273,15 kelvin (equal to 0 °C).

If the excess heat is exported for heating of buildings, at a temperature below 150 °C (423,15 kelvin), C_h can alternatively be defined as follows:

- C_h = Carnot efficiency in heat at 150 °C (423,15 kelvin), which is: 0,3546

For the purposes of that calculation, the following definitions apply:

- (i) 'cogeneration' shall mean the simultaneous generation in one process of thermal energy and electricity and/or mechanical energy;
- (ii) 'useful heat' shall mean heat generated to satisfy an economical justifiable demand for heat, for heating or cooling purposes;
- (iii) 'economically justifiable demand' shall mean the demand that does not exceed the needs for heat or cooling and which would otherwise be satisfied at market conditions.

2. Greenhouse gas emissions from biomass fuels shall be expressed as follows:

- (a) greenhouse gas emissions from biomass fuels, E , shall be expressed in terms of grams of CO₂ equivalent per MJ of biomass fuel, g CO₂eq/MJ;
- (b) greenhouse gas emissions from heating or electricity, produced from biomass fuels, EC , shall be expressed in terms of grams of CO₂ equivalent per MJ of final energy commodity (heat or electricity), g CO₂eq/MJ.

When heating and cooling are co-generated with electricity, emissions shall be allocated between heat and electricity (as under point 1(d)), irrespective if the heat is used for actual heating purposes or for cooling. ⁽¹⁾

⁽¹⁾ Heat or waste heat is used to generate cooling (chilled air or water) through absorption chillers. Therefore, it is appropriate to calculate only the emissions associated to the heat produced, per MJ of heat, irrespective if the end-use of the heat is actual heating or cooling via absorption chillers.

Where the greenhouse gas emissions from the extraction or cultivation of raw materials e_{ec} are expressed in unit g CO₂eq/dry-ton of feedstock, the conversion to grams of CO₂ equivalent per MJ of fuel, g CO₂eq /MJ, shall be calculated as follows ⁽¹⁾:

$$e_{ec}fuel_a \left[\frac{gCO_2eq}{MJ fuel} \right]_{ec} = \frac{e_{ec}feedstock_a \left[\frac{gCO_2eq}{t_{dry}} \right]}{LHV_a \left[\frac{MJ feedstock}{t_{dry} feedstock} \right]} \cdot Fuel\ feedstock\ factor_a \cdot Allocation\ factor\ fuel_a$$

Where

$$Allocation\ factor\ fuel_a = \left[\frac{Energy\ in\ fuel}{Energy\ fuel + Energy\ in\ co-products} \right]$$

$$Fuel\ feedstock\ factor_a = [Ratio\ of\ MJ\ feedstock\ required\ to\ make\ 1\ MJ\ fuel]$$

Emissions per dry-ton feedstock shall be calculated as follows:

$$e_{ec}feedstock_a \left[\frac{gCO_2eq}{t_{dry}} \right] = \frac{e_{ec}feedstock_a \left[\frac{gCO_2eq}{t_{moist}} \right]}{(1 - moisture\ content)}$$

3. Greenhouse gas emissions savings from biomass fuels shall be calculated as follows:

(a) greenhouse gas emissions savings from biomass fuels used as transport fuels:

$$SAVING = (E_{F(t)} - E_B) / E_{F(t)}$$

where

E_B = total emissions from biomass fuels used as transport fuels; and

$E_{F(t)}$ = total emissions from the fossil fuel comparator for transport

(b) greenhouse gas emissions savings from heat and cooling, and electricity being generated from biomass fuels:

$$SAVING = (EC_{F(h\&c,el)} - EC_{B(h\&c,el)}) / EC_{F(h\&c,el)}$$

where

$EC_{B(h\&c,el)}$ = total emissions from the heat or electricity,

$EC_{F(h\&c,el)}$ = total emissions from the fossil fuel comparator for useful heat or electricity.

4. The greenhouse gases taken into account for the purposes of point 1 shall be CO₂, N₂O and CH₄. For the purposes of calculating CO₂ equivalence, those gases shall be valued as follows:

CO₂: 1

N₂O: 298

CH₄: 25

5. Emissions from the extraction, harvesting or cultivation of raw materials, e_{ec} , shall include emissions from the extraction, harvesting or cultivation process itself; from the collection, drying and storage of raw materials; from waste and leakages; and from the production of chemicals or products used in extraction or cultivation. Capture of CO₂ in the cultivation of raw materials shall be excluded. Estimates of emissions from agriculture biomass cultivation may be derived from the regional averages for cultivation emissions included in the reports referred to in Article 31(4) of this Directive or the information on the disaggregated default values for cultivation emissions included in this Annex, as an alternative to using actual values. In the absence of relevant information in those reports it is allowed to calculate averages based on local farming practises based for instance on data of a group of farms, as an alternative to using actual values.

Estimates of emissions from cultivation and harvesting of forestry biomass may be derived from the use of averages for cultivation and harvesting emissions calculated for geographical areas at national level, as an alternative to using actual values.

⁽¹⁾ The formula for calculating greenhouse gas emissions from the extraction or cultivation of raw materials e_{ec} describes cases where feedstock is converted into biofuels in one step. For more complex supply chains, adjustments are needed for calculating greenhouse gas emissions from the extraction or cultivation of raw materials e_{ec} for intermediate products.

6. For the purposes of the calculation referred to in point 1(a), emission savings from improved agriculture management, e_{sca} , such as shifting to reduced or zero-tillage, improved crop/rotation, the use of cover crops, including crop residue management, and the use of organic soil improver (e.g. compost, manure fermentation digestate), shall be taken into account only if solid and verifiable evidence is provided that the soil carbon has increased or that it is reasonable to expect to have increased over the period in which the raw materials concerned were cultivated while taking into account the emissions where such practices lead to increased fertiliser and herbicide use ⁽¹⁾.
7. Annualised emissions from carbon stock changes caused by land-use change, e_i , shall be calculated by dividing total emissions equally over 20 years. For the calculation of those emissions the following rule shall be applied:

$$e_i = (CS_R - CS_A) \times 3,664 \times 1/20 \times 1/P - e_b, \text{ } ^{(2)}$$

where

- e_i = annualised greenhouse gas emissions from carbon stock change due to land-use change (measured as mass of CO₂-equivalent per unit biomass fuel energy). 'Cropland' ⁽³⁾ and 'perennial cropland' ⁽⁴⁾ shall be regarded as one land use;
- CS_R = the carbon stock per unit area associated with the reference land use (measured as mass (tonnes) of carbon per unit area, including both soil and vegetation). The reference land use shall be the land use in January 2008 or 20 years before the raw material was obtained, whichever was the later;
- CS_A = the carbon stock per unit area associated with the actual land use (measured as mass (tonnes) of carbon per unit area, including both soil and vegetation). In cases where the carbon stock accumulates over more than one year, the value attributed to CS_A shall be the estimated stock per unit area after 20 years or when the crop reaches maturity, whichever the earlier;
- P = the productivity of the crop (measured as biomass fuel energy per unit area per year); and
- e_b = bonus of 29 g CO₂eq/MJ biomass fuel if biomass is obtained from restored degraded land under the conditions laid down in point 8.
8. The bonus of 29 g CO₂eq/MJ shall be attributed if evidence is provided that the land:
- (a) was not in use for agriculture in January 2008 or any other activity; and
 - (b) is severely degraded land, including such land that was formerly in agricultural use.

The bonus of 29 g CO₂eq/MJ shall apply for a period of up to 20 years from the date of conversion of the land to agricultural use, provided that a steady increase in carbon stocks as well as a sizable reduction in erosion phenomena for land falling under (b) are ensured.

9. 'Severely degraded land' means land that, for a significant period of time, has either been significantly salinated or presented significantly low organic matter content and has been severely eroded.
10. In accordance with point 10 of Part C of Annex V to this Directive, Commission Decision 2010/335/EU ⁽⁵⁾, which provides for guidelines for the calculation of land carbon stocks in relation to this Directive, drawing on the 2006 IPCC Guidelines for National Greenhouse Gas Inventories – volume 4, and in accordance with Regulations (EU) No 525/2013 and (EU) 2018/841, shall serve as the basis for the calculation of land carbon stocks.

⁽¹⁾ Measurements of soil carbon can constitute such evidence, e.g. by a first measurement in advance of the cultivation and subsequent ones at regular intervals several years apart. In such a case, before the second measurement is available, increase in soil carbon would be estimated on the basis of representative experiments or soil models. From the second measurement onwards, the measurements would constitute the basis for determining the existence of an increase in soil carbon and its magnitude.

⁽²⁾ The quotient obtained by dividing the molecular weight of CO₂ (44,010 g/mol) by the molecular weight of carbon (12,011 g/mol) is equal to 3,664.

⁽³⁾ Cropland as defined by IPCC.

⁽⁴⁾ Perennial crops are defined as multi-annual crops, the stem of which is usually not annually harvested such as short rotation coppice and oil palm.

⁽⁵⁾ Commission Decision 2010/335/EU of 10 June 2010 on guidelines for the calculation of land carbon stocks for the purpose of Annex V to Directive 2009/28/EC (OJ L 151, 17.6.2010, p. 19).

11. Emissions from processing, e_p , shall include emissions from the processing itself; from waste and leakages; and from the production of chemicals or products used in processing, including the CO₂ emissions corresponding to the carbon contents of fossil inputs, whether or not actually combusted in the process.

In accounting for the consumption of electricity not produced within the solid or gaseous biomass fuel production plant, the greenhouse gas emissions intensity of the production and distribution of that electricity shall be assumed to be equal to the average emission intensity of the production and distribution of electricity in a defined region. By way of derogation from this rule, producers may use an average value for an individual electricity production plant for electricity produced by that plant, if that plant is not connected to the electricity grid.

Emissions from processing shall include emissions from drying of interim products and materials where relevant.

12. Emissions from transport and distribution, e_{td} , shall include emissions from the transport of raw and semi-finished materials and from the storage and distribution of finished materials. Emissions from transport and distribution to be taken into account under point 5 shall not be covered by this point.
13. Emissions of CO₂ from fuel in use, e_u , shall be taken to be zero for biomass fuels. Emissions of non-CO₂ greenhouse gases (CH₄ and N₂O) from the fuel in use shall be included in the e_u factor.
14. Emission savings from CO₂ capture and geological storage, e_{ccs} , that have not already been accounted for in e_p , shall be limited to emissions avoided through the capture and storage of emitted CO₂ directly related to the extraction, transport, processing and distribution of biomass fuel if stored in compliance with Directive 2009/31/EC.
15. Emission savings from CO₂ capture and replacement, e_{ccr} , shall be related directly to the production of biomass fuel they are attributed to, and shall be limited to emissions avoided through the capture of CO₂ of which the carbon originates from biomass and which is used to replace fossil-derived CO₂ in production of commercial products and services.
16. Where a cogeneration unit – providing heat and/or electricity to a biomass fuel production process for which emissions are being calculated – produces excess electricity and/or excess useful heat, the greenhouse gas emissions shall be divided between the electricity and the useful heat according to the temperature of the heat (which reflects the usefulness (utility) of the heat). The useful part of the heat is found by multiplying its energy content with the Carnot efficiency, C_h , calculated as follows:

$$C_h = \frac{T_h - T_0}{T_h}$$

where

T_h = Temperature, measured in absolute temperature (kelvin) of the useful heat at point of delivery.

T_0 = Temperature of surroundings, set at 273,15 kelvin (equal to 0 °C).

If the excess heat is exported for heating of buildings, at a temperature below 150 °C (423,15 kelvin), C_h can alternatively be defined as follows:

C_h = Carnot efficiency in heat at 150 °C (423,15 kelvin), which is: 0,3546

For the purposes of that calculation, the actual efficiencies shall be used, defined as the annual mechanical energy, electricity and heat produced respectively divided by the annual energy input.

For the purposes of that calculation, the following definitions apply:

- (a) 'cogeneration' shall mean the simultaneous generation in one process of thermal energy and electrical and/or mechanical energy;
- (b) 'useful heat' shall mean heat generated to satisfy an economical justifiable demand for heat, for heating or cooling purposes;
- (c) 'economically justifiable demand' shall mean the demand that does not exceed the needs for heat or cooling and which would otherwise be satisfied at market conditions.

17. Where a biomass fuel production process produces, in combination, the fuel for which emissions are being calculated and one or more other products ('co-products'), greenhouse gas emissions shall be divided between the fuel or its intermediate product and the co-products in proportion to their energy content (determined by lower heating value in the case of co-products other than electricity and heat). The greenhouse gas intensity of excess useful heat or excess electricity is the same as the greenhouse gas intensity of heat or electricity delivered to the biomass fuel production process and is determined from calculating the greenhouse gas intensity of all inputs and emissions, including the feedstock and CH₄ and N₂O emissions, to and from the cogeneration unit, boiler or other apparatus delivering heat or electricity to the biomass fuel production process. In the case of cogeneration of electricity and heat, the calculation is performed following point 16.
18. For the purposes of the calculations referred to in point 17, the emissions to be divided shall be $e_{ec} + e_1 + e_{sca} +$ those fractions of e_p , e_{id} , e_{ccs} and e_{ccr} that take place up to and including the process step at which a co-product is produced. If any allocation to co-products has taken place at an earlier process step in the life-cycle, the fraction of those emissions assigned in the last such process step to the intermediate fuel product shall be used for those purposes instead of the total of those emissions.

In the case of biogas and biomethane, all co-products that do not fall under the scope of point 7 shall be taken into account for the purposes of that calculation. No emissions shall be allocated to wastes and residues. Co-products that have a negative energy content shall be considered to have an energy content of zero for the purposes of the calculation.

Wastes and residues, including tree tops and branches, straw, husks, cobs and nut shells, and residues from processing, including crude glycerine (glycerine that is not refined) and bagasse, shall be considered to have zero life-cycle greenhouse gas emissions up to the process of collection of those materials irrespectively of whether they are processed to interim products before being transformed into the final product.

In the case of biomass fuels produced in refineries, other than the combination of processing plants with boilers or cogeneration units providing heat and/or electricity to the processing plant, the unit of analysis for the purposes of the calculation referred to in point 17 shall be the refinery.

19. For biomass fuels used for the production of electricity, for the purposes of the calculation referred to in point 3, the fossil fuel comparator $EC_{F(e)}$ shall be 183 g CO₂eq/MJ electricity or 212 g CO₂eq/MJ electricity for the outermost regions.

For biomass fuels used for the production of useful heat, as well as for the production of heating and/or cooling, for the purposes of the calculation referred to in point 3, the fossil fuel comparator $EC_{F(h)}$ shall be 80 g CO₂eq/MJ heat.

For biomass fuels used for the production of useful heat, in which a direct physical substitution of coal can be demonstrated, for the purposes of the calculation referred to in point 3, the fossil fuel comparator $EC_{F(h)}$ shall be 124 g CO₂eq/MJ heat.

For biomass fuels used as transport fuels, for the purposes of the calculation referred to in point 3, the fossil fuel comparator $E_{F(t)}$ shall be 94 g CO₂eq/MJ.

C. DISAGGREGATED DEFAULT VALUES FOR BIOMASS FUELS

Wood briquettes or pellets

Biomass fuel production system	Transport distance	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)				Greenhouse gas emissions – default value (g CO ₂ eq/MJ)			
		Cultivation	Processing	Transport	Non-CO ₂ emissions from the fuel in use	Cultivation	Processing	Transport	Non-CO ₂ emissions from the fuel in use
Wood chips from forest residues	1 to 500 km	0,0	1,6	3,0	0,4	0,0	1,9	3,6	0,5
	500 to 2 500 km	0,0	1,6	5,2	0,4	0,0	1,9	6,2	0,5
	2 500 to 10 000 km	0,0	1,6	10,5	0,4	0,0	1,9	12,6	0,5
	Above 10 000 km	0,0	1,6	20,5	0,4	0,0	1,9	24,6	0,5
Wood chips from SRC (Eucalyptus)	2 500 to 10 000 km	4,4	0,0	11,0	0,4	4,4	0,0	13,2	0,5
Wood chips from SRC (Poplar – fertilised)	1 to 500 km	3,9	0,0	3,5	0,4	3,9	0,0	4,2	0,5
	500 to 2 500 km	3,9	0,0	5,6	0,4	3,9	0,0	6,8	0,5
	2 500 to 10 000 km	3,9	0,0	11,0	0,4	3,9	0,0	13,2	0,5
	Above 10 000 km	3,9	0,0	21,0	0,4	3,9	0,0	25,2	0,5
Wood chips from SRC (Poplar – Not fertilised)	1 to 500 km	2,2	0,0	3,5	0,4	2,2	0,0	4,2	0,5
	500 to 2 500 km	2,2	0,0	5,6	0,4	2,2	0,0	6,8	0,5
	2 500 to 10 000 km	2,2	0,0	11,0	0,4	2,2	0,0	13,2	0,5
	Above 10 000 km	2,2	0,0	21,0	0,4	2,2	0,0	25,2	0,5
Wood chips from stemwood	1 to 500 km	1,1	0,3	3,0	0,4	1,1	0,4	3,6	0,5
	500 to 2 500 km	1,1	0,3	5,2	0,4	1,1	0,4	6,2	0,5
	2 500 to 10 000 km	1,1	0,3	10,5	0,4	1,1	0,4	12,6	0,5
	Above 10 000 km	1,1	0,3	20,5	0,4	1,1	0,4	24,6	0,5

Biomass fuel production system	Transport distance	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)				Greenhouse gas emissions – default value (g CO ₂ eq/MJ)			
		Cultivation	Processing	Transport	Non-CO ₂ emissions from the fuel in use	Cultivation	Processing	Transport	Non-CO ₂ emissions from the fuel in use
Wood chips from wood industry residues	1 to 500 km	0,0	0,3	3,0	0,4	0,0	0,4	3,6	0,5
	500 to 2 500 km	0,0	0,3	5,2	0,4	0,0	0,4	6,2	0,5
	2 500 to 10 000 km	0,0	0,3	10,5	0,4	0,0	0,4	12,6	0,5
	Above 10 000 km	0,0	0,3	20,5	0,4	0,0	0,4	24,6	0,5

Wood briquettes or pellets

Biomass fuel production system	Transport distance	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)				Greenhouse gas emissions – default value (g CO ₂ eq/MJ)			
		Cultivation	Processing	Transport & distribution	Non-CO ₂ emissions from the fuel in use	Cultivation	Processing	Transport & distribution	Non-CO ₂ emissions from the fuel in use
Wood briquettes or pellets from forest residues (case 1)	1 to 500 km	0,0	25,8	2,9	0,3	0,0	30,9	3,5	0,3
	500 to 2 500 km	0,0	25,8	2,8	0,3	0,0	30,9	3,3	0,3
	2 500 to 10 000 km	0,0	25,8	4,3	0,3	0,0	30,9	5,2	0,3
	Above 10 000 km	0,0	25,8	7,9	0,3	0,0	30,9	9,5	0,3
Wood briquettes or pellets from forest residues (case 2a)	1 to 500 km	0,0	12,5	3,0	0,3	0,0	15,0	3,6	0,3
	500 to 2 500 km	0,0	12,5	2,9	0,3	0,0	15,0	3,5	0,3
	2 500 to 10 000 km	0,0	12,5	4,4	0,3	0,0	15,0	5,3	0,3
	Above 10 000 km	0,0	12,5	8,1	0,3	0,0	15,0	9,8	0,3
Wood briquettes or pellets from forest residues (case 3a)	1 to 500 km	0,0	2,4	3,0	0,3	0,0	2,8	3,6	0,3
	500 to 2 500 km	0,0	2,4	2,9	0,3	0,0	2,8	3,5	0,3
	2 500 to 10 000 km	0,0	2,4	4,4	0,3	0,0	2,8	5,3	0,3
	Above 10 000 km	0,0	2,4	8,2	0,3	0,0	2,8	9,8	0,3

Biomass fuel production system	Transport distance	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)				Greenhouse gas emissions – default value (g CO ₂ eq/MJ)			
		Cultivation	Processing	Transport & distribution	Non-CO ₂ emissions from the fuel in use	Cultivation	Processing	Transport & distribution	Non-CO ₂ emissions from the fuel in use
Wood briquettes from short rotation coppice (Eucalyptus – case 1)	2 500 to 10 000 km	3,9	24,5	4,3	0,3	3,9	29,4	5,2	0,3
Wood briquettes from short rotation coppice (Eucalyptus – case 2a)	2 500 to 10 000 km	5,0	10,6	4,4	0,3	5,0	12,7	5,3	0,3
Wood briquettes from short rotation coppice (Eucalyptus – case 3a)	2 500 to 10 000 km	5,3	0,3	4,4	0,3	5,3	0,4	5,3	0,3
Wood briquettes from short rotation coppice (Poplar – Fertilised – case 1)	1 to 500 km	3,4	24,5	2,9	0,3	3,4	29,4	3,5	0,3
	500 to 10 000 km	3,4	24,5	4,3	0,3	3,4	29,4	5,2	0,3
	Above 10 000 km	3,4	24,5	7,9	0,3	3,4	29,4	9,5	0,3
Wood briquettes from short rotation coppice (Poplar – Fertilised – case 2a)	1 to 500 km	4,4	10,6	3,0	0,3	4,4	12,7	3,6	0,3
	500 to 10 000 km	4,4	10,6	4,4	0,3	4,4	12,7	5,3	0,3
	Above 10 000 km	4,4	10,6	8,1	0,3	4,4	12,7	9,8	0,3
Wood briquettes from short rotation coppice (Poplar – Fertilised – case 3a)	1 to 500 km	4,6	0,3	3,0	0,3	4,6	0,4	3,6	0,3
	500 to 10 000 km	4,6	0,3	4,4	0,3	4,6	0,4	5,3	0,3
	Above 10 000 km	4,6	0,3	8,2	0,3	4,6	0,4	9,8	0,3
Wood briquettes from short rotation coppice (Poplar – no fertilisation – case 1)	1 to 500 km	2,0	24,5	2,9	0,3	2,0	29,4	3,5	0,3
	500 to 2 500 km	2,0	24,5	4,3	0,3	2,0	29,4	5,2	0,3
	2 500 to 10 000 km	2,0	24,5	7,9	0,3	2,0	29,4	9,5	0,3

Biomass fuel production system	Transport distance	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)				Greenhouse gas emissions – default value (g CO ₂ eq/MJ)			
		Cultivation	Processing	Transport & distribution	Non-CO ₂ emissions from the fuel in use	Cultivation	Processing	Transport & distribution	Non-CO ₂ emissions from the fuel in use
Wood briquettes from short rotation coppice (Poplar – no fertilisation – case 2a)	1 to 500 km	2,5	10,6	3,0	0,3	2,5	12,7	3,6	0,3
	500 to 10 000 km	2,5	10,6	4,4	0,3	2,5	12,7	5,3	0,3
	Above 10 000 km	2,5	10,6	8,1	0,3	2,5	12,7	9,8	0,3
Wood briquettes from short rotation coppice (Poplar – no fertilisation – case 3a)	1 to 500 km	2,6	0,3	3,0	0,3	2,6	0,4	3,6	0,3
	500 to 10 000 km	2,6	0,3	4,4	0,3	2,6	0,4	5,3	0,3
	Above 10 000 km	2,6	0,3	8,2	0,3	2,6	0,4	9,8	0,3
Wood briquettes or pellets from stemwood (case 1)	1 to 500 km	1,1	24,8	2,9	0,3	1,1	29,8	3,5	0,3
	500 to 2 500 km	1,1	24,8	2,8	0,3	1,1	29,8	3,3	0,3
	2 500 to 10 000 km	1,1	24,8	4,3	0,3	1,1	29,8	5,2	0,3
	Above 10 000 km	1,1	24,8	7,9	0,3	1,1	29,8	9,5	0,3
Wood briquettes or pellets from stemwood (case 2a)	1 to 500 km	1,4	11,0	3,0	0,3	1,4	13,2	3,6	0,3
	500 to 2 500 km	1,4	11,0	2,9	0,3	1,4	13,2	3,5	0,3
	2 500 to 10 000 km	1,4	11,0	4,4	0,3	1,4	13,2	5,3	0,3
	Above 10 000 km	1,4	11,0	8,1	0,3	1,4	13,2	9,8	0,3
Wood briquettes or pellets from stemwood (case 3a)	1 to 500 km	1,4	0,8	3,0	0,3	1,4	0,9	3,6	0,3
	500 to 2 500 km	1,4	0,8	2,9	0,3	1,4	0,9	3,5	0,3
	2 500 to 10 000 km	1,4	0,8	4,4	0,3	1,4	0,9	5,3	0,3
	Above 10 000 km	1,4	0,8	8,2	0,3	1,4	0,9	9,8	0,3
Wood briquettes or pellets from wood industry residues (case 1)	1 to 500 km	0,0	14,3	2,8	0,3	0,0	17,2	3,3	0,3
	500 to 2 500 km	0,0	14,3	2,7	0,3	0,0	17,2	3,2	0,3
	2 500 to 10 000 km	0,0	14,3	4,2	0,3	0,0	17,2	5,0	0,3
	Above 10 000 km	0,0	14,3	7,7	0,3	0,0	17,2	9,2	0,3

Biomass fuel production system	Transport distance	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)				Greenhouse gas emissions – default value (g CO ₂ eq/MJ)			
		Cultivation	Processing	Transport & distribution	Non-CO ₂ emissions from the fuel in use	Cultivation	Processing	Transport & distribution	Non-CO ₂ emissions from the fuel in use
Wood briquettes or pellets from wood industry residues (case 2a)	1 to 500 km	0,0	6,0	2,8	0,3	0,0	7,2	3,4	0,3
	500 to 2 500 km	0,0	6,0	2,7	0,3	0,0	7,2	3,3	0,3
	2 500 to 10 000 km	0,0	6,0	4,2	0,3	0,0	7,2	5,1	0,3
	Above 10 000 km	0,0	6,0	7,8	0,3	0,0	7,2	9,3	0,3
Wood briquettes or pellets from wood industry residues (case 3a)	1 to 500 km	0,0	0,2	2,8	0,3	0,0	0,3	3,4	0,3
	500 to 2 500 km	0,0	0,2	2,7	0,3	0,0	0,3	3,3	0,3
	2 500 to 10 000 km	0,0	0,2	4,2	0,3	0,0	0,3	5,1	0,3
	Above 10 000 km	0,0	0,2	7,8	0,3	0,0	0,3	9,3	0,3

Agriculture pathways

Biomass fuel production system	Transport distance	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)				Greenhouse gas emissions – default value (g CO ₂ eq/MJ)			
		Cultivation	Processing	Transport & distribution	Non-CO ₂ emissions from the fuel in use	Cultivation	Processing	Transport & distribution	Non-CO ₂ emissions from the fuel in use
Agricultural Residues with density < 0,2 t/m ³	1 to 500 km	0,0	0,9	2,6	0,2	0,0	1,1	3,1	0,3
	500 to 2 500 km	0,0	0,9	6,5	0,2	0,0	1,1	7,8	0,3
	2 500 to 10 000 km	0,0	0,9	14,2	0,2	0,0	1,1	17,0	0,3
	Above 10 000 km	0,0	0,9	28,3	0,2	0,0	1,1	34,0	0,3
Agricultural Residues with density > 0,2 t/m ³	1 to 500 km	0,0	0,9	2,6	0,2	0,0	1,1	3,1	0,3
	500 to 2 500 km	0,0	0,9	3,6	0,2	0,0	1,1	4,4	0,3
	2 500 to 10 000 km	0,0	0,9	7,1	0,2	0,0	1,1	8,5	0,3
	Above 10 000 km	0,0	0,9	13,6	0,2	0,0	1,1	16,3	0,3

Biomass fuel production system	Transport distance	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)				Greenhouse gas emissions – default value (g CO ₂ eq/MJ)			
		Cultivation	Processing	Transport & distribution	Non-CO ₂ emissions from the fuel in use	Cultivation	Processing	Transport & distribution	Non-CO ₂ emissions from the fuel in use
Straw pellets	1 to 500 km	0,0	5,0	3,0	0,2	0,0	6,0	3,6	0,3
	500 to 10 000 km	0,0	5,0	4,6	0,2	0,0	6,0	5,5	0,3
	Above 10 000 km	0,0	5,0	8,3	0,2	0,0	6,0	10,0	0,3
Bagasse briquettes	500 to 10 000 km	0,0	0,3	4,3	0,4	0,0	0,4	5,2	0,5
	Above 10 000 km	0,0	0,3	8,0	0,4	0,0	0,4	9,5	0,5
Palm Kernel Meal	Above 10 000 km	21,6	21,1	11,2	0,2	21,6	25,4	13,5	0,3
Palm Kernel Meal (no CH ₄ emissions from oil mill)	Above 10 000 km	21,6	3,5	11,2	0,2	21,6	4,2	13,5	0,3

Disaggregated default values for biogas for the production of electricity

Biomass fuel production system	Technology	TYPICAL VALUE [g CO ₂ eq/MJ]					DEFAULT VALUE [g CO ₂ eq/MJ]					
		Cultivation	Processing	Non-CO ₂ emissions from the fuel in use	Transport	Manure credits	Cultivation	Processing	Non-CO ₂ emissions from the fuel in use	Transport	Manure credits	
Wet manure ⁽¹⁾	case 1	Open digestate	0,0	69,6	8,9	0,8	- 107,3	0,0	97,4	12,5	0,8	- 107,3
		Close digestate	0,0	0,0	8,9	0,8	- 97,6	0,0	0,0	12,5	0,8	- 97,6
	case 2	Open digestate	0,0	74,1	8,9	0,8	- 107,3	0,0	103,7	12,5	0,8	- 107,3
		Close digestate	0,0	4,2	8,9	0,8	- 97,6	0,0	5,9	12,5	0,8	- 97,6
	case 3	Open digestate	0,0	83,2	8,9	0,9	- 120,7	0,0	116,4	12,5	0,9	- 120,7
		Close digestate	0,0	4,6	8,9	0,8	- 108,5	0,0	6,4	12,5	0,8	- 108,5

⁽¹⁾ The values for biogas production from manure include negative emissions for emissions saved from raw manure management. The value of e_{sca} considered is equal to - 45 g CO₂eq/MJ manure used in anaerobic digestion.

Biomass fuel production system		Technology	TYPICAL VALUE [g CO ₂ eq/MJ]					DEFAULT VALUE [g CO ₂ eq/MJ]				
			Cultivation	Processing	Non-CO ₂ emissions from the fuel in use	Transport	Manure credits	Cultivation	Processing	Non-CO ₂ emissions from the fuel in use	Transport	Manure credits
Maize whole plant ⁽¹⁾	case 1	Open digestate	15,6	13,5	8,9	0,0 ⁽²⁾	—	15,6	18,9	12,5	0,0	—
		Close digestate	15,2	0,0	8,9	0,0	—	15,2	0,0	12,5	0,0	—
	case 2	Open digestate	15,6	18,8	8,9	0,0	—	15,6	26,3	12,5	0,0	—
		Close digestate	15,2	5,2	8,9	0,0	—	15,2	7,2	12,5	0,0	—
	case 3	Open digestate	17,5	21,0	8,9	0,0	—	17,5	29,3	12,5	0,0	—
		Close digestate	17,1	5,7	8,9	0,0	—	17,1	7,9	12,5	0,0	—
Biowaste	case 1	Open digestate	0,0	21,8	8,9	0,5	—	0,0	30,6	12,5	0,5	—
		Close digestate	0,0	0,0	8,9	0,5	—	0,0	0,0	12,5	0,5	—
	case 2	Open digestate	0,0	27,9	8,9	0,5	—	0,0	39,0	12,5	0,5	—
		Close digestate	0,0	5,9	8,9	0,5	—	0,0	8,3	12,5	0,5	—
	case 3	Open digestate	0,0	31,2	8,9	0,5	—	0,0	43,7	12,5	0,5	—
		Close digestate	0,0	6,5	8,9	0,5	—	0,0	9,1	12,5	0,5	—

⁽¹⁾ Maize whole plant means maize harvested as fodder and ensiled for preservation.

⁽²⁾ Transport of agricultural raw materials to the transformation plant is, according to the methodology provided in the Commission's report of 25 February 2010 on sustainability requirements for the use of solid and gaseous biomass sources in electricity, heating and cooling, included in the 'cultivation' value. The value for transport of maize silage accounts for 0,4 g CO₂eq/MJ biogas.

Disaggregated default values for biomethane

Biomethane production system	Technological option		TYPICAL VALUE [g CO ₂ eq/M]						DEFAULT VALUE [g CO ₂ eq/M]					
			Cultivation	Processing	Upgrading	Transport	Compression at filling station	Manure credits	Cultivation	Processing	Upgrading	Transport	Compression at filling station	Manure credits
Wet manure	Open digestate	no off-gas combustion	0,0	84,2	19,5	1,0	3,3	— 124,4	0,0	117,9	27,3	1,0	4,6	— 124,4
		off-gas combustion	0,0	84,2	4,5	1,0	3,3	— 124,4	0,0	117,9	6,3	1,0	4,6	— 124,4
	Close digestate	no off-gas combustion	0,0	3,2	19,5	0,9	3,3	— 111,9	0,0	4,4	27,3	0,9	4,6	— 111,9
		off-gas combustion	0,0	3,2	4,5	0,9	3,3	— 111,9	0,0	4,4	6,3	0,9	4,6	— 111,9
Maize whole plant	Open digestate	no off-gas combustion	18,1	20,1	19,5	0,0	3,3	—	18,1	28,1	27,3	0,0	4,6	—
		off-gas combustion	18,1	20,1	4,5	0,0	3,3	—	18,1	28,1	6,3	0,0	4,6	—
	Close digestate	no off-gas combustion	17,6	4,3	19,5	0,0	3,3	—	17,6	6,0	27,3	0,0	4,6	—
		off-gas combustion	17,6	4,3	4,5	0,0	3,3	—	17,6	6,0	6,3	0,0	4,6	—
Biowaste	Open digestate	no off-gas combustion	0,0	30,6	19,5	0,6	3,3	—	0,0	42,8	27,3	0,6	4,6	—
		off-gas combustion	0,0	30,6	4,5	0,6	3,3	—	0,0	42,8	6,3	0,6	4,6	—
	Close digestate	no off-gas combustion	0,0	5,1	19,5	0,5	3,3	—	0,0	7,2	27,3	0,5	4,6	—
		off-gas combustion	0,0	5,1	4,5	0,5	3,3	—	0,0	7,2	6,3	0,5	4,6	—

D. TOTAL TYPICAL AND DEFAULT VALUES FOR BIOMASS FUEL PATHWAYS

Biomass fuel production system	Transport distance	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
Woodchips from forest residues	1 to 500 km	5	6
	500 to 2 500 km	7	9
	2 500 to 10 000 km	12	15
	Above 10 000 km	22	27
Woodchips from short rotation coppice (Eucalyptus)	2 500 to 10 000 km	16	18
Woodchips from short rotation coppice (Poplar – Fertilised)	1 to 500 km	8	9
	500 to 2 500 km	10	11
	2 500 to 10 000 km	15	18
	Above 10 000 km	25	30
Woodchips from short rotation coppice (Poplar – No fertilisation)	1 to 500 km	6	7
	500 to 2 500 km	8	10
	2 500 to 10 000 km	14	16
	Above 10 000 km	24	28
Woodchips from stemwood	1 to 500 km	5	6
	500 to 2 500 km	7	8
	2 500 to 10 000 km	12	15
	Above 10 000 km	22	27
Woodchips from industry residues	1 to 500 km	4	5
	500 to 2 500 km	6	7
	2 500 to 10 000 km	11	13
	Above 10 000 km	21	25
Wood briquettes or pellets from forest residues (case 1)	1 to 500 km	29	35
	500 to 2 500 km	29	35
	2 500 to 10 000 km	30	36
	Above 10 000 km	34	41
Wood briquettes or pellets from forest residues (case 2a)	1 to 500 km	16	19
	500 to 2 500 km	16	19
	2 500 to 10 000 km	17	21
	Above 10 000 km	21	25

Biomass fuel production system	Transport distance	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
Wood briquettes or pellets from forest residues (case 3a)	1 to 500 km	6	7
	500 to 2 500 km	6	7
	2 500 to 10 000 km	7	8
	Above 10 000 km	11	13
Wood briquettes or pellets from short rotation coppice (Eucalyptus – case 1)	2 500 to 10 000 km	33	39
Wood briquettes or pellets from short rotation coppice (Eucalyptus – case 2a)	2 500 to 10 000 km	20	23
Wood briquettes or pellets from short rotation coppice (Eucalyptus – case 3a)	2 500 to 10 000 km	10	11
Wood briquettes or pellets from short rotation coppice (Poplar – Fertilised – case 1)	1 to 500 km	31	37
	500 to 10 000 km	32	38
	Above 10 000 km	36	43
Wood briquettes or pellets from short rotation coppice (Poplar – Fertilised – case 2a)	1 to 500 km	18	21
	500 to 10 000 km	20	23
	Above 10 000 km	23	27
Wood briquettes or pellets from short rotation coppice (Poplar – Fertilised – case 3a)	1 to 500 km	8	9
	500 to 10 000 km	10	11
	Above 10 000 km	13	15
Wood briquettes or pellets from short rotation coppice (Poplar – no fertilisation – case 1)	1 to 500 km	30	35
	500 to 10 000 km	31	37
	Above 10 000 km	35	41
Wood briquettes or pellets from short rotation coppice (Poplar – no fertilisation – case 2a)	1 to 500 km	16	19
	500 to 10 000 km	18	21
	Above 10 000 km	21	25
Wood briquettes or pellets from short rotation coppice (Poplar – no fertilisation – case 3a)	1 to 500 km	6	7
	500 to 10 000 km	8	9
	Above 10 000 km	11	13

Biomass fuel production system	Transport distance	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
Wood briquettes or pellets from stemwood (case 1)	1 to 500 km	29	35
	500 to 2 500 km	29	34
	2 500 to 10 000 km	30	36
	Above 10 000 km	34	41
Wood briquettes or pellets from stemwood (case 2a)	1 to 500 km	16	18
	500 to 2 500 km	15	18
	2 500 to 10 000 km	17	20
	Above 10 000 km	21	25
Wood briquettes or pellets from stemwood (case 3a)	1 to 500 km	5	6
	500 to 2 500 km	5	6
	2 500 to 10 000 km	7	8
	Above 10 000 km	11	12
Wood briquettes or pellets from wood industry residues (case 1)	1 to 500 km	17	21
	500 to 2 500 km	17	21
	2 500 to 10 000 km	19	23
	Above 10 000 km	22	27
Wood briquettes or pellets from wood industry residues (case 2a)	1 to 500 km	9	11
	500 to 2 500 km	9	11
	2 500 to 10 000 km	10	13
	Above 10 000 km	14	17
Wood briquettes or pellets from wood industry residues (case 3a)	1 to 500 km	3	4
	500 to 2 500 km	3	4
	2 500 to 10 000	5	6
	Above 10 000 km	8	10

Case 1 refers to processes in which a Natural Gas boiler is used to provide the process heat to the pellet mill. Process electricity is purchased from the grid.

Case 2a refers to processes in which a boiler fuelled with wood chips is used to provide the process heat to the pellet mill. Process electricity is purchased from the grid.

Case 3a refers to processes in which a CHP, fuelled with wood chips, is used to provide heat and electricity to the pellet mill.

Biomass fuel production system	Transport distance	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
Agricultural Residues with density < 0,2 t/m ³ ⁽¹⁾	1 to 500 km	4	4
	500 to 2 500 km	8	9
	2 500 to 10 000 km	15	18
	Above 10 000 km	29	35
Agricultural Residues with density > 0,2 t/m ³ ⁽²⁾	1 to 500 km	4	4
	500 to 2 500 km	5	6
	2 500 to 10 000 km	8	10
	Above 10 000 km	15	18
Straw pellets	1 to 500 km	8	10
	500 to 10 000 km	10	12
	Above 10 000 km	14	16
Bagasse briquettes	500 to 10 000 km	5	6
	Above 10 000 km	9	10
Palm Kernel Meal	Above 10 000 km	54	61
Palm Kernel Meal (no CH ₄ emissions from oil mill)	Above 10 000 km	37	40

Typical and default values – biogas for electricity

Biogas production system	Technological option		Typical value	Default value
			Greenhouse gas emissions (g CO ₂ eq/MJ)	Greenhouse gas emissions (g CO ₂ eq/MJ)
Biogas for electricity from wet manure	Case 1	Open digestate ⁽³⁾	– 28	3
		Close digestate ⁽⁴⁾	– 88	– 84
	Case 2	Open digestate	– 23	10
		Close digestate	– 84	– 78
	Case 3	Open digestate	– 28	9
		Close digestate	– 94	– 89

⁽¹⁾ This group of materials includes agricultural residues with a low bulk density and it comprises materials such as straw bales, oat hulls, rice husks and sugar cane bagasse bales (not exhaustive list).

⁽²⁾ The group of agricultural residues with higher bulk density includes materials such as corn cobs, nut shells, soybean hulls, palm kernel shells (not exhaustive list).

⁽³⁾ Open storage of digestate accounts for additional emissions of methane which change with the weather, the substrate and the digestion efficiency. In these calculations the amounts are taken to be equal to 0,05 MJ CH₄/MJ biogas for manure, 0,035 MJ CH₄/MJ biogas for maize and 0,01 MJ CH₄/MJ biogas for biowaste.

⁽⁴⁾ Close storage means that the digestate resulting from the digestion process is stored in a gas tight tank and the additional biogas released during storage is considered to be recovered for production of additional electricity or biomethane.

Biogas production system	Technological option		Typical value	Default value
			Greenhouse gas emissions (g CO ₂ eq/MJ)	Greenhouse gas emissions (g CO ₂ eq/MJ)
Biogas for electricity from maize whole plant	Case 1	Open digestate	38	47
		Close digestate	24	28
	Case 2	Open digestate	43	54
		Close digestate	29	35
	Case 3	Open digestate	47	59
		Close digestate	32	38
Biogas for electricity from biowaste	Case 1	Open digestate	31	44
		Close digestate	9	13
	Case 2	Open digestate	37	52
		Close digestate	15	21
	Case 3	Open digestate	41	57
		Close digestate	16	22

Typical and default values for biomethane

Biomethane production system	Technological option	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
Biomethane from wet manure	Open digestate, no off-gas combustion ⁽¹⁾	– 20	22
	Open digestate, off-gas combustion ⁽²⁾	– 35	1
	Close digestate, no off-gas combustion	– 88	– 79
	Close digestate, off-gas combustion	– 103	– 100
Biomethane from maize whole plant	Open digestate, no off-gas combustion	58	73
	Open digestate, off-gas combustion	43	52
	Close digestate, no off-gas combustion	41	51
	Close digestate, off-gas combustion	26	30

⁽¹⁾ This category includes the following categories of technologies for biogas upgrade to biomethane: Pressure Swing Adsorption (PSA), Pressure Water Scrubbing (PWS), Membranes, Cryogenic, and Organic Physical Scrubbing (OPS). It includes an emission of 0,03 MJ CH₄/MJ biomethane for the emission of methane in the off-gases.

⁽²⁾ This category includes the following categories of technologies for biogas upgrade to biomethane: Pressure Water Scrubbing (PWS) when water is recycled, Pressure Swing Adsorption (PSA), Chemical Scrubbing, Organic Physical Scrubbing (OPS), Membranes and Cryogenic upgrading. No methane emissions are considered for this category (the methane in the off-gas is combusted, if any).

Biomethane production system	Technological option	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
Biomethane from biowaste	Open digestate, no off-gas combustion	51	71
	Open digestate, off-gas combustion	36	50
	Close digestate, no off-gas combustion	25	35
	Close digestate, off-gas combustion	10	14

Typical and default values – biogas for electricity – mixtures of manure and maize: greenhouse gas emissions with shares given on a fresh mass basis

Biogas production system		Technological options	Greenhouse gas emissions – typical value (g CO ₂ eq/MJ)	Greenhouse gas emissions – default value (g CO ₂ eq/MJ)
Manure – Maize 80 % - 20 %	Case 1	Open digestate	17	33
		Close digestate	- 12	- 9
	Case 2	Open digestate	22	40
		Close digestate	- 7	- 2
	Case 3	Open digestate	23	43
		Close digestate	- 9	- 4
Manure – Maize 70 % - 30 %	Case 1	Open digestate	24	37
		Close digestate	0	3
	Case 2	Open digestate	29	45
		Close digestate	4	10
	Case 3	Open digestate	31	48
		Close digestate	4	10
Manure – Maize 60 % - 40 %	Case 1	Open digestate	28	40
		Close digestate	7	11
	Case 2	Open digestate	33	47
		Close digestate	12	18
	Case 3	Open digestate	36	52
		Close digestate	12	18

Comments

Case 1 refers to pathways in which electricity and heat required in the process are supplied by the CHP engine itself.

Case 2 refers to pathways in which the electricity required in the process is taken from the grid and the process heat is supplied by the CHP engine itself. In some Member States, operators are not allowed to claim the gross production for subsidies and case 1 is the more likely configuration.

Case 3 refers to pathways in which the electricity required in the process is taken from the grid and the process heat is supplied by a biogas boiler. This case applies to some installations in which the CHP engine is not on-site and biogas is sold (but not upgraded to biomethane).

Typical and default values – biomethane - mixtures of manure and maize: greenhouse gas emissions with shares given on a fresh mass basis

Biomethane production system	Technological options	Typical value	Default value
		(g CO ₂ eq/MJ)	(g CO ₂ eq/MJ)
Manure – Maize 80 % - 20 %	Open digestate, no off-gas combustion	32	57
	Open digestate, off-gas combustion	17	36
	Close digestate, no off-gas combustion	- 1	9
	Close digestate, off-gas combustion	- 16	- 12
Manure – Maize 70 % - 30 %	Open digestate, no off-gas combustion	41	62
	Open digestate, off-gas combustion	26	41
	Close digestate, no off-gas combustion	13	22
	Close digestate, off-gas combustion	- 2	1
Manure – Maize 60 % - 40 %	Open digestate, no off-gas combustion	46	66
	Open digestate, off-gas combustion	31	45
	Close digestate, no off-gas combustion	22	31
	Close digestate, off-gas combustion	7	10

Where biomethane is used as Compressed Biomethane as a transport fuel, a value of 3,3 g CO₂eq/MJ biomethane needs to be added to the typical values and a value of 4,6 g CO₂eq/MJ biomethane to the default values.

ANNEX VII

ACCOUNTING OF ENERGY FROM HEAT PUMPS

The amount of aerothermal, geothermal or hydrothermal energy captured by heat pumps to be considered to be energy from renewable sources for the purposes of this Directive, E_{RES} , shall be calculated in accordance with the following formula:

$$E_{RES} = Q_{usable} * (1 - 1/SPF)$$

where

- Q_{usable} = the estimated total usable heat delivered by heat pumps fulfilling the criteria referred to in Article 7(4), implemented as follows: Only heat pumps for which $SPF > 1,15 * 1/\eta$ shall be taken into account,
 - SPF = the estimated average seasonal performance factor for those heat pumps,
 - η = the ratio between total gross production of electricity and the primary energy consumption for the production of electricity and shall be calculated as an EU average based on Eurostat data.
-

ANNEX VIII

PART A. PROVISIONAL ESTIMATED INDIRECT LAND-USE CHANGE EMISSIONS FROM BIOFUEL, BIOLIQUID AND BIOMASS FUEL FEEDSTOCK (g CO₂eq/MJ) ⁽¹⁾

Feedstock group	Mean ⁽²⁾	Interpercentile range derived from the sensitivity analysis ⁽³⁾
Cereals and other starch-rich crops	12	8 to 16
Sugars	13	4 to 17
Oil crops	55	33 to 66

PART B. BIOFUELS, BIOLIQUIDS AND BIOMASS FUELS FOR WHICH THE ESTIMATED INDIRECT LAND-USE CHANGE EMISSIONS ARE CONSIDERED TO BE ZERO

Biofuels, bioliquids and biomass fuels produced from the following feedstock categories will be considered to have estimated indirect land-use change emissions of zero:

- (1) feedstocks which are not listed under part A of this Annex.
- (2) feedstocks, the production of which has led to direct land-use change, namely, a change from one of the following IPCC land cover categories: forest land, grassland, wetlands, settlements, or other land, to cropland or perennial cropland ⁽⁴⁾. In such a case a direct land-use change emission value (e_i) should have been calculated in accordance with point 7 of part C of Annex V.

⁽¹⁾ The mean values reported here represent a weighted average of the individually modelled feedstock values. The magnitude of the values in the Annex is sensitive to the range of assumptions (such as treatment of co-products, yield developments, carbon stocks and displacement of other commodities) used in the economic models developed for their estimation. Although it is therefore not possible to fully characterise the uncertainty range associated with such estimates, a sensitivity analysis conducted on the results based on a random variation of key parameters, a so-called Monte Carlo analysis, was conducted.

⁽²⁾ The mean values included here represent a weighted average of the individually modelled feedstock values.

⁽³⁾ The range included here reflects 90 % of the results using the fifth and ninety-fifth percentile values resulting from the analysis. The fifth percentile suggests a value below which 5 % of the observations were found (namely, 5 % of total data used showed results below 8, 4, and 33 g CO₂eq/MJ). The ninety-fifth percentile suggests a value below which 95 % of the observations were found (namely, 5 % of total data used showed results above 16, 17, and 66 g CO₂eq/MJ).

⁽⁴⁾ Perennial crops are defined as multi-annual crops, the stem of which is usually not annually harvested such as short rotation coppice and oil palm.

ANNEX IX

Part A. Feedstocks for the production of biogas for transport and advanced biofuels, the contribution of which towards the minimum shares referred to in the first and fourth subparagraphs of Article 25(1) may be considered to be twice their energy content:

- (a) Algae if cultivated on land in ponds or photobioreactors;
- (b) Biomass fraction of mixed municipal waste, but not separated household waste subject to recycling targets under point (a) of Article 11(2) of Directive 2008/98/EC;
- (c) Biowaste as defined in point (4) of Article 3 of Directive 2008/98/EC from private households subject to separate collection as defined in point (11) of Article 3 of that Directive;
- (d) Biomass fraction of industrial waste not fit for use in the food or feed chain, including material from retail and wholesale and the agro-food and fish and aquaculture industry, and excluding feedstocks listed in part B of this Annex;
- (e) Straw;
- (f) Animal manure and sewage sludge;
- (g) Palm oil mill effluent and empty palm fruit bunches;
- (h) Tall oil pitch;
- (i) Crude glycerine;
- (j) Bagasse;
- (k) Grape marcs and wine lees;
- (l) Nut shells;
- (m) Husks;
- (n) Cobs cleaned of kernels of corn;
- (o) Biomass fraction of wastes and residues from forestry and forest-based industries, namely, bark, branches, pre-commercial thinnings, leaves, needles, tree tops, saw dust, cutter shavings, black liquor, brown liquor, fibre sludge, lignin and tall oil;
- (p) Other non-food cellulosic material;
- (q) Other ligno-cellulosic material except saw logs and veneer logs.

Part B. Feedstocks for the production of biofuels and biogas for transport, the contribution of which towards the minimum share established in the first subparagraph of Article 25(1) shall be limited and may be considered to be twice their energy content:

- (a) Used cooking oil;
 - (b) Animal fats classified as categories 1 and 2 in accordance with Regulation (EC) No 1069/2009.
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ANNEX X

PART A

Repealed Directive with a list of the successive amendments thereto (referred to in Article 37)

Directive 2009/28/EC of the European Parliament and of the Council (OJ L 140, 5.6.2009, p. 16)	
Council Directive 2013/18/EU (OJ L 158, 10.6.2013, p. 230)	
Directive (EU) 2015/1513 of the European Parliament and of the Council (OJ L 239, 15.9.2015, p. 1)	Only Article 2

PART B

**Time-limits for transposition into national law
(referred to in Article 36)**

Directive	Time-limit for transposition
2009/28/EC	25 June 2009
2013/18/EU	1 July 2013
(EU) 2015/1513	10 September 2017

ANNEX XI

Correlation table

Directive 2009/28/EC	This Directive
Article 1	Article 1
Article 2, first subparagraph	Article 2, first subparagraph
Article 2, second subparagraph, introductory wording	Article 2, second subparagraph, introductory wording
Article 2, second subparagraph, point (a)	Article 2, second subparagraph, point (1)
Article 2, second subparagraph, point (b)	—
—	Article 2, second subparagraph, point (2)
Article 2, second subparagraph, point (c)	Article 2, second subparagraph, point (3)
Article 2, second subparagraph, point (d)	—
Article 2, second subparagraph, points (e), (f), (g), (h), (i), (j), (k), (l), (m), (n), (o), (p), (q), (r), (s), (t), (u), (v) and (w)	Article 2, second subparagraph, points (24), (4), (19), (32), (33), (12), (5), (6), (45), (46), (47), (23), (39), (41), (42), (43), (36), (44) and (37)
—	Article 2, second subparagraph, points (7), (8), (9), (10), (11), (13), (14), (15), (16), (17), (18), (20), (21), (22), (25), (26), (27), (28), (29), (30), (31), (34), (35), (38) and (40)
Article 3	—
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DIRECTIVE (EU) 2018/2002 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 11 December 2018
amending Directive 2012/27/EU on energy efficiency
(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 194(2) thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee ⁽¹⁾,

Having regard to the opinion of the Committee of the Regions ⁽²⁾,

Acting in accordance with the ordinary legislative procedure ⁽³⁾,

Whereas:

- (1) Moderation of energy demand is one of the five dimensions of the Energy Union Strategy established by the Commission communication of 25 February 2015 entitled 'A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy'. Improving energy efficiency throughout the full energy chain, including energy generation, transmission, distribution and end-use, will benefit the environment, improve air quality and public health, reduce greenhouse gas emissions, improve energy security by reducing dependence on energy imports from outside the Union, cut energy costs for households and companies, help alleviate energy poverty, and lead to increased competitiveness, more jobs and increased economic activity throughout the economy, thus improving citizens' quality of life. This is in line with the Union commitments made in the framework of the Energy Union and global climate agenda established by the 2015 Paris Agreement on climate change following the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change ⁽⁴⁾ (the 'Paris Agreement'), committing to keep the increase of the global average temperature to well below 2 °C above pre-industrial levels and to pursuing efforts to limit the temperature increase to 1,5 °C above pre-industrial levels.
- (2) Directive 2012/27/EU of the European Parliament and of the Council ⁽⁵⁾ is an element to progress towards the Energy Union, under which energy efficiency is to be treated as an energy source in its own right. The energy efficiency first principle should be taken into account when setting new rules for the supply side and other policy areas. The Commission should ensure that energy efficiency and demand-side response can compete on equal terms with generation capacity. Energy efficiency needs to be considered whenever decisions relating to planning the energy system or to financing are taken. Energy efficiency improvements need to be made whenever they are more cost-effective than equivalent supply-side solutions. This ought to help exploit the multiple benefits of energy efficiency for the Union, in particular for citizens and businesses.
- (3) Energy efficiency should be recognised as a crucial element and a priority consideration in future investment decisions on the Union's energy infrastructure.
- (4) Reaching an ambitious energy efficiency target requires barriers to be removed in order to facilitate investment in energy efficiency measures. One step in that direction is the clarification provided by Eurostat on 19 September 2017 on how to record energy performance contracts in national accounts, which removes uncertainties and facilitates the use of such contracts.

⁽¹⁾ OJ C 246, 28.7.2017, p. 42.

⁽²⁾ OJ C 342, 12.10.2017, p. 119.

⁽³⁾ Position of the European Parliament of 13 November 2018 (not yet published in the Official Journal) and decision of the Council of 4 December 2018.

⁽⁴⁾ OJ L 282, 19.10.2016, p. 4.

⁽⁵⁾ Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (OJ L 315, 14.11.2012, p. 1).

- (5) The European Council of 23 and 24 October 2014 supported a 27 % energy efficiency target for 2030 at Union level, to be reviewed by 2020 having in mind a Union-level target of 30 %. In its resolution of 15 December 2015 entitled 'Towards a European Energy Union', the European Parliament called on the Commission to assess, in addition, the viability of a 40 % energy efficiency target for the same timeframe. It is therefore appropriate to amend Directive 2012/27/EU, in order to adapt it to the 2030 perspective.
- (6) The need for the Union to achieve its energy efficiency targets at Union level, expressed in primary and/or final energy consumption, should be clearly set out in the form of a target of at least 32,5 % for 2030. Projections made in 2007 showed a primary energy consumption in 2030 of 1 887 Mtoe and a final energy consumption of 1 416 Mtoe. A 32,5 % reduction results in 1 273 Mtoe and 956 Mtoe in 2030 respectively. That target, which is of the same nature as the Union's 2020 target, should be assessed by the Commission for the purpose of revising it upwards by 2023 in the case of substantial cost reductions or, where needed, to meet the Union's international commitments for decarbonisation. There are no binding targets at Member State level in the 2020 and 2030 perspectives, and the freedom of Member States to set their national contributions based either on primary or final energy consumption or primary or final energy savings, or on energy intensity, should continue not to be restricted. Member States should set their national indicative energy efficiency contributions taking into account that the Union's 2030 energy consumption has to be no more than 1 273 Mtoe of primary energy and/or no more than 956 Mtoe of final energy. This means that primary energy consumption in the Union should be reduced by 26 %, and final energy consumption should be reduced by 20 % compared to the 2005 levels. A regular evaluation of progress towards the achievement of the Union's 2030 targets is necessary and is provided for in Regulation (EU) 2018/1999 of the European Parliament and of the Council ⁽¹⁾.
- (7) The operational efficiency of energy systems at any given moment is influenced by the ability to feed power generated from different sources — with different degrees of inertia and start-up times — into the grid smoothly and flexibly. Improving that efficiency will enable better use to be made of renewable energy.
- (8) Improvement in energy efficiency can contribute to higher economic output. Member States and the Union should aim to decrease energy consumption regardless of levels of economic growth.
- (9) The obligation on Member States to establish long-term strategies for mobilising investment and facilitating the renovation of their national building stock and notify them to the Commission is removed from Directive 2012/27/EU and added to Directive 2010/31/EU of the European Parliament and of the Council ⁽²⁾ where that obligation fits in with long-term plans for nearly zero energy buildings (NZEBS) and the decarbonisation of buildings.
- (10) In view of the climate and energy framework for 2030, the energy savings obligation established by Directive 2012/27/EU should be extended beyond 2020. That extension would create greater stability for investors and thus encourage long-term investments and long-term energy efficiency measures, such as the deep renovation of buildings with the long-term objective of facilitating the cost effective transformation of existing buildings into NZEBS. The energy savings obligation has an important role in the creation of local growth and jobs, and should be maintained to ensure that the Union can achieve its energy and climate objectives by creating further opportunities and to break the link between energy consumption and growth. Cooperation with the private sector is important to assess the conditions on which private investment for energy efficiency projects can be unlocked and to develop new revenue models for innovation in the field of energy efficiency.
- (11) Energy efficiency improvement measures also have a positive impact on air quality, as more energy efficient buildings contribute to reducing the demand for heating fuels, including solid heating fuels. Energy efficiency measures therefore contribute to improving indoor and outdoor air quality and help achieve, in a cost effective manner, the objectives of the Union's air quality policy, as established in particular by Directive (EU) 2016/2284 of the European Parliament and of the Council ⁽³⁾.

⁽¹⁾ Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council (see page 1 of this Official Journal).

⁽²⁾ Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (OJ L 153, 18.6.2010, p. 13).

⁽³⁾ Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC (OJ L 344, 17.12.2016, p. 1).

- (12) Member States are required to achieve cumulative end-use energy savings for the entire obligation period 2021 to 2030, equivalent to new annual savings of at least 0,8 % of final energy consumption. That requirement could be met by new policy measures that are adopted during the new obligation period from 1 January 2021 to 31 December 2030 or by new individual actions as a result of policy measures adopted during or before the previous period, provided that the individual actions that trigger energy savings are introduced during the new period. To that end, Member States should be able to make use of an energy efficiency obligation scheme, alternative policy measures, or both. In addition, various options, including whether energy used in transport is included, in whole or in part, in the calculation baseline, should be provided in order to give Member States flexibility in how they calculate the amount of their energy savings, whilst ensuring that the required cumulative end-use energy savings equivalent to new annual savings of at least 0,8 % are reached.
- (13) It would, however, be disproportionate to impose such a requirement on Cyprus and on Malta. The energy market of those small island Member States exhibits specific characteristics which substantially limit the range of measures available to meet the energy savings obligation, such as the existence of a single electricity distributor, the absence of natural gas networks and of district heating and district cooling systems, as well as the small size of petroleum distribution companies. Those specific characteristics are compounded by the small size of the energy markets of those Member States. Therefore, Cyprus and Malta should be required only to achieve cumulative end-use energy savings equivalent to new savings of 0,24 % of final energy consumption for the period 2021 to 2030.
- (14) Where they use an obligation scheme, Member States should designate obligated parties among energy distributors, retail energy sales companies and transport fuel distributors or retailers on the basis of objective and non-discriminatory criteria. The designation or exemption from designation of certain categories of such distributors or retailers should not be understood to be incompatible with the principle of non-discrimination. Member States are therefore able to choose whether such distributors or retailers or only certain categories thereof are designated as obligated parties.
- (15) Member States' energy efficiency improvement measures in transport are eligible to be taken into account for achieving their end-use energy savings obligation. Such measures include policies that are, inter alia, dedicated to promoting more efficient vehicles, a modal shift to cycling, walking and collective transport, or mobility and urban planning that reduces demand for transport. In addition, schemes which accelerate the uptake of new, more efficient vehicles or policies fostering a shift to better performing fuels that reduce energy use per kilometre are also capable of being eligible, subject to compliance with the rules on materiality and additionality set out in Annex V to Directive 2012/27/EU as amended by this Directive. Such measures should, if appropriate, be consistent with Member States' national policy frameworks established pursuant to Directive 2014/94/EU of the European Parliament and of the Council ⁽¹⁾.
- (16) Measures taken by Member States pursuant to Regulation (EU) 2018/842 of the European Parliament and of the Council ⁽²⁾ and which result in verifiable, and measurable or estimable, energy efficiency improvements can be considered to be a cost-effective way for Member States to fulfil their energy-saving obligation under Directive 2012/27/EU as amended by this Directive.
- (17) As an alternative to requiring obligated parties to achieve the amount of cumulative end-use energy savings required under Article 7(1) of Directive 2012/27/EU as amended by this Directive, it should be possible for Member States, in their obligation schemes, to permit or require obligated parties to contribute to an Energy Efficiency National Fund.
- (18) Without prejudice to Article 7(4) and (5) as introduced by this Directive, Member States and obligated parties should make use of all available means and technologies to achieve the cumulative end-use energy savings required, including by promoting sustainable technologies in efficient district heating and cooling systems, efficient heating and cooling infrastructure and energy audits or equivalent management systems, provided that

⁽¹⁾ Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure (OJ L 307, 28.10.2014, p. 1).

⁽²⁾ Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013 (OJ L 156, 19.6.2018, p. 26).

the energy savings claimed comply with the requirements laid down in Article 7 of and Annex V to Directive 2012/27/EU as amended by this Directive. Member States should aim for a high degree of flexibility in the design and implementation of alternative policy measures.

- (19) Long-term energy efficiency measures will continue to deliver energy savings after 2020 but in order to contribute to the Union's 2030 energy efficiency target, those measures should deliver new savings after 2020. On the other hand, energy savings achieved after 31 December 2020 should not count towards the cumulative end-use energy savings required for the period from 1 January 2014 to 31 December 2020.
- (20) New savings should be additional to 'business as usual', so that savings that would have occurred in any event should not count towards the achievement of the energy savings requirements. In order to calculate the impact of the measures introduced, only net savings, measured as the change of energy consumption that is directly attributable to the energy efficiency measure in question, should be counted. To calculate net savings, Member States should establish a baseline scenario of how the situation would evolve in the absence of the measure in question. The policy measure in question should be evaluated against that baseline. Member States should take into account the fact that other policy measures may be carried out in the same time frame which may also have an impact on the amount of energy savings, so that not all changes observed since the introduction of a particular policy measure being evaluated can be attributed to that policy measure alone. The actions of the obligated, participating or entrusted party should in fact contribute to the achievement of the energy savings claimed in order to ensure the fulfilment of the materiality requirement.
- (21) It is important to consider, where relevant, all steps in the energy chain in the calculation of energy savings in order to increase the energy savings potential in the transmission and distribution of electricity.
- (22) The effective management of water can make a significant contribution to energy savings. The water and wastewater sectors account for 3,5 % of electricity use in the Union and that share is expected to rise. At the same time, water leaks account for 24 % of total water consumed in the Union and the energy sector is the largest consumer of water, accounting for 44 % of consumption. The potential for energy savings through the use of smart technologies and processes should be fully explored.
- (23) In accordance with Article 9 of the Treaty on the Functioning of the European Union, the Union's energy efficiency policies should be inclusive and should therefore ensure accessibility to energy efficiency measures for consumers affected by energy poverty. Improvements to the energy efficiency of buildings should, in particular, benefit vulnerable households, including those affected by energy poverty, and, where appropriate, those living in social housing. Member States can already require obligated parties to include social aims in energy-saving measures in relation to energy poverty and this possibility should be extended to alternative policy measures and Energy Efficiency National Funds and should be transformed into an obligation, while allowing Member States to retain full flexibility with regard to their size, scope and content. If an energy efficiency obligation scheme does not permit measures relating to individual energy consumers, the Member State may take measures to alleviate energy poverty by means of alternative policy measures alone.
- (24) Around 50 million households in the Union are affected by energy poverty. Energy efficiency measures must therefore be central to any cost-effective strategy to address energy poverty and consumer vulnerability and are complementary to social security policies at Member State level. To ensure that energy efficiency measures reduce energy poverty for tenants sustainably, the cost-effectiveness of such measures, as well as their affordability to property owners and tenants, should be taken into account, and adequate financial support for such measures should be guaranteed at Member State level. The Union's building stock needs, in the long term, to be converted to NZEBs in accordance with the objectives of the Paris Agreement. Current building renovation rates are insufficient and buildings occupied by citizens on low incomes who are affected by energy poverty are the hardest to reach. The measures laid down in this Directive with regard to energy savings obligations, energy efficiency obligation schemes and alternative policy measures are therefore of particular importance.
- (25) Lower consumer spending on energy should be achieved by assisting consumers in reducing their energy use by reducing the energy needs of buildings and improvements in the efficiency of appliances, which should be combined with the availability of low-energy transport modes integrated with public transport and cycling.

- (26) It is crucial to raise the awareness of all Union citizens about the benefits of increased energy efficiency and to provide them with accurate information on the ways in which it can be achieved. Increased energy efficiency is also highly important for the security of energy supply of the Union through lowering its dependence on import of fuels from third countries.
- (27) The costs and benefits of all energy efficiency measures taken, including pay-back periods, should be made fully transparent to consumers.
- (28) When implementing Directive 2012/27/EU as amended by this Directive and taking other measures in the field of energy efficiency, Member States should pay particular attention to synergies between energy efficiency measures and the efficient use of natural resources in line with the principles of the circular economy.
- (29) Taking advantage of new business models and technologies, Member States should endeavour to promote and facilitate the uptake of energy efficiency measures, including through innovative energy services for large and small customers.
- (30) As part of the measures set out in the Commission's Communication of 15 July 2015 entitled 'Delivering a New Deal for Energy Consumers', in the context of the Energy Union and the Heating and Cooling strategy, consumers' minimum rights to accurate, reliable, clear and timely information about their energy consumption need to be strengthened. Articles 9 to 11 of, and Annex VII to, Directive 2012/27/EU should be amended to provide for frequent and enhanced feedback on energy consumption where technically feasible and cost-efficient in view of the measurement devices in place. This Directive clarifies that whether sub-metering is cost-efficient or not depends on whether the related costs are proportionate to the potential energy savings. The assessment of whether sub-metering is cost-efficient may take into account the effect of other concrete, planned measures in a given building, such as any forthcoming renovation.
- (31) This Directive also clarifies that rights relating to billing, and information about billing or consumption should apply to consumers of heating, cooling or domestic hot water supplied from a central source even where they have no direct, individual contractual relationship with an energy supplier. The definition of the term 'final customer' is capable of being understood as referring only to natural or legal persons purchasing energy based on a direct, individual contract with an energy supplier. For the purposes of the relevant provisions, the term 'final user' should therefore be introduced to refer to a broader group of consumers and should, in addition to final customers purchasing heating, cooling or domestic hot water for their own end-use, also cover occupants of individual buildings or of individual units of multi-apartment or multi-purpose buildings where such units are supplied from a central source and where the occupants have no direct or individual contract with the energy supplier. The term 'sub-metering' should refer to measuring consumption in individual units of such buildings.
- (32) In order to achieve the transparency of accounting for individual consumption of thermal energy and thereby facilitate the implementation of sub-metering, Member States should ensure they have in place transparent, publicly available national rules on the allocation of the cost of heating, cooling and domestic hot water consumption in multi-apartment and multi-purpose buildings. In addition to transparency, Member States could consider taking measures to strengthen competition in the provision of sub-metering services and thereby help ensure that any costs borne by the final users are reasonable.
- (33) By 25 October 2020, newly installed heat meters and heat cost allocators should be remotely readable to ensure cost-effective, frequent provision of consumption information. The amendments to Directive 2012/27/EU introduced by this Directive relating to metering for heating, cooling and domestic hot water; sub-metering and cost allocation for heating, cooling and domestic hot water; remote reading requirement; billing and consumption information for heating and cooling and domestic hot water; cost of access to metering and billing and consumption information for heating, cooling and domestic hot water; and the minimum requirements for billing and consumption information for heating, cooling and domestic hot water are intended to apply only to heating, cooling and domestic hot water supplied from a central source. Member States are free to decide whether walk-by or drive-by technologies are to be considered remotely readable or not. Remotely readable devices do not require access to individual apartments or units to be read.
- (34) Member States should take into account the fact that the successful implementation of new technologies for measuring energy consumption requires enhanced investment in education and skills for both users and energy suppliers.

- (35) Billing information and annual statements are an important means by which customers are informed of their energy consumption. Data on consumption and costs can also convey other information that helps consumers to compare their current deal with other offers and to make use of complaint management and alternative dispute resolution mechanisms. However, considering that bill-related disputes are a common source of consumer complaints and a factor which contributes to persistently low levels of consumer satisfaction and engagement with their energy providers, it is necessary to make bills simpler, clearer and easier to understand, while ensuring that separate instruments, such as billing information, information tools and annual statements, provide all the necessary information to enable consumers to regulate their energy consumption, compare offers and switch suppliers.
- (36) Member State measures should be supported by well-designed and effective Union financial instruments, such as the European Structural and Investment Funds, the European Fund for Strategic Investments, and by financing from the European Investment Bank (EIB) and the European Bank for Reconstruction and Development (EBRD), which should support investments in energy efficiency at all stages of the energy chain and use a comprehensive cost-benefit analysis with a model of differentiated discount rates. Financial support should focus on cost-effective methods for increasing energy efficiency, which would lead to a reduction in energy consumption. The EIB and the EBRD should, together with national promotional banks, design, generate and finance programmes and projects tailored for the efficiency sector, including for energy-poor households.
- (37) In order to make it possible for the Annexes to Directive 2012/27/EU and the harmonised efficiency reference values to be updated, it is necessary to extend the delegation of powers granted to the Commission. It is of particular importance that the Commission carry out appropriate consultations during its preparatory work, including at expert level, and that those consultations be conducted in accordance with the principles laid down in the Interinstitutional Agreement of 13 April 2016 on Better Law-Making ⁽¹⁾. In particular, to ensure equal participation in the preparation of delegated acts, the European Parliament and the Council receive all documents at the same time as Member States' experts, and their experts systematically have access to meetings of Commission expert groups dealing with the preparation of delegated acts.
- (38) In order to be able to evaluate the effectiveness of Directive 2012/27/EU as amended by this Directive, a requirement to conduct a general review of that Directive and to submit a report to the European Parliament and to the Council by 28 February 2024 should be introduced. That review should take place after the global stocktake by the United Nations Framework Convention on Climate Change in 2023, in order to allow necessary alignments to that process to be introduced, also taking into account economic and innovation developments.
- (39) Local and regional authorities should be given a leading role in the development and design, execution and assessment of the measures laid down in Directive 2012/27/EU, so that they are able properly to address the specific features of their own climate, culture and society.
- (40) Reflecting technological progress and the growing share of renewable energy sources in the electricity generation sector, the default coefficient for savings in kWh electricity should be reviewed in order to reflect changes in the primary energy factor (PEF) for electricity. Calculations reflecting the energy mix of the PEF for electricity are based on annual average values. The 'physical energy content' accounting method is used for nuclear electricity and heat generation and the 'technical conversion efficiency' method is used for electricity and heat generation from fossil fuels and biomass. For non-combustible renewable energy, the method is the direct equivalent based on the 'total primary energy' approach. To calculate the primary energy share for electricity in cogeneration, the method set out in Annex II to Directive 2012/27/EU is applied. An average rather than a marginal market position is used. Conversion efficiencies are assumed to be 100 % for non-combustible renewables, 10 % for geothermal power stations and 33 % for nuclear power stations. The calculation of total efficiency for cogeneration is based on the most recent data from Eurostat. As for system boundaries, the PEF is 1 for all energy sources. The PEF value refers to 2018 and is based on data interpolated from the most recent version of the PRIMES Reference Scenario for 2015 and 2020 and adjusted with Eurostat data until 2016. The analysis covers the Member States and Norway. The dataset for Norway is based on the European Network of Transmission System Operators for Electricity data.
- (41) Energy savings which result from the implementation of Union law should not be claimed unless they result from a measure that goes beyond the minimum required by the Union legal act in question, whether by setting more ambitious energy efficiency requirements at Member State level or by increasing the take-up of the measure. Buildings present a substantial potential for further increasing energy efficiency, and the renovation of buildings is an essential and long-term element with economies of scale in increasing energy savings. It is therefore necessary to clarify that it is possible to claim all energy savings stemming from measures promoting

⁽¹⁾ OJ L 123, 12.5.2016, p. 1.

the renovation of existing buildings, provided that they exceed the savings that would have occurred in the absence of the policy measure and provided that the Member State demonstrates that the obligated, participating or entrusted party has in fact contributed to the achievement of the energy savings claimed.

- (42) In accordance with the Energy Union Strategy and the principles of better regulation, monitoring and verification rules for the implementation of energy efficiency obligation schemes and alternative policy measures, including the requirement to check a statistically representative sample of measures, should be given greater prominence. In Directive 2012/27/EU, as amended by this Directive, a statistically significant proportion and representative sample of the energy efficiency improvement measures should be understood to require the establishment of a subset of a statistical population of the energy-saving measures in question in such a way that it accurately reflects the entire population of all energy-saving measures, and thus allows for reasonably reliable conclusions regarding confidence in the totality of the measures.
- (43) Energy generated on or in buildings from renewable energy technologies reduces the amount of energy supplied from fossil fuels. The reduction of energy consumption and the use of energy from renewable sources in the buildings sector are important measures to reduce the Union's energy dependence and greenhouse gas emissions, especially in view of ambitious climate and energy objectives set for 2030 as well as the global commitment made in the context of the Paris Agreement. For the purposes of their cumulative energy savings obligation Member States may take into account, where applicable, energy savings from renewable energy generated on or in buildings for own use to meet their energy savings requirements.
- (44) In accordance with the Joint Political Declaration of 28 September 2011 of Member States and the Commission on explanatory documents ⁽¹⁾, Member States have undertaken to accompany, in justified cases, the notification of their transposition measures with one or more documents explaining the relationship between the components of a directive and the corresponding parts of national transposition instruments. With regard to this Directive, the legislator considers the transmission of such documents to be justified.
- (45) Since the objectives of this Directive, namely to achieve the Union's energy efficiency targets of 20 % by 2020 and of at least 32,5 % by 2030 and to pave the way towards further energy efficiency improvements beyond those dates, cannot be sufficiently achieved by the Member States but can rather, by reason of the scale and effects of the action, be better achieved at Union level, the Union may adopt measures, in accordance with the principle of subsidiarity as set out in Article 5 of the Treaty on European Union. In accordance with the principle of proportionality as set out in that Article, this Directive does not go beyond what is necessary in order to achieve those objectives.
- (46) Directive 2012/27/EU should therefore be amended accordingly,

HAVE ADOPTED THIS DIRECTIVE:

Article 1

Directive 2012/27/EU is amended as follows:

- (1) in Article 1, paragraph 1 is replaced by the following:

'1. This Directive establishes a common framework of measures to promote energy efficiency within the Union in order to ensure that the Union's 2020 headline targets on energy efficiency of 20 % and its 2030 headline targets on energy efficiency of at least 32,5 % are met and paves the way for further energy efficiency improvements beyond those dates.

This Directive lays down rules designed to remove barriers in the energy market and overcome market failures that impede efficiency in the supply and use of energy, and provides for the establishment of indicative national energy efficiency targets and contributions for 2020 and 2030.

This Directive contributes to the implementation of the energy efficiency first principle.;

- (2) in Article 3, the following paragraphs are added:

'4. By 31 October 2022, the Commission shall assess whether the Union has achieved its 2020 headline targets on energy efficiency.

⁽¹⁾ OJ C 369, 17.12.2011, p. 14.

5. Each Member State shall set indicative national energy efficiency contributions towards the Union's 2030 targets set in Article 1(1) of this Directive in accordance with Articles 4 and 6 of Regulation (EU) 2018/1999 (*). When setting those contributions, Member States shall take into account that the Union's 2030 energy consumption has to be no more than 1 273 Mtoe of primary energy and/or no more than 956 Mtoe of final energy. Member States shall notify those contributions to the Commission as part of their integrated national energy and climate plans as referred to in, and in accordance with, Articles 3 and 7 to 12 of Regulation (EU) 2018/1999.

6. The Commission shall assess the Union's 2030 headline targets on energy efficiency set in Article 1(1) with a view to submitting a legislative proposal by 2023 to revise those targets upwards in the event of substantial cost reductions resulting from economic or technological developments, or where needed to meet the Union's international commitments for decarbonisation.

(*) Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council (OJ L 328, 21.12.2018, p. 1).;

(3) Article 7 is replaced by the following:

'Article 7

Energy savings obligation

1. Member States shall achieve cumulative end-use energy savings at least equivalent to:

- (a) new savings each year from 1 January 2014 to 31 December 2020 of 1,5 % of annual energy sales to final customers by volume, averaged over the most recent three-year period prior to 1 January 2013. Sales of energy, by volume, used in transport may be excluded, in whole or in part, from that calculation;
- (b) new savings each year from 1 January 2021 to 31 December 2030 of 0,8 % of annual final energy consumption, averaged over the most recent three-year period prior to 1 January 2019. By way of derogation from that requirement, Cyprus and Malta shall achieve new savings each year from 1 January 2021 to 31 December 2030 equivalent to 0,24 % of annual final energy consumption, averaged over the most recent three-year period prior to 1 January 2019.

Member States may count energy savings that stem from policy measures, whether introduced by 31 December 2020 or after that date, provided that those measures result in new individual actions that are carried out after 31 December 2020.

Member States shall continue to achieve new annual savings in accordance with point (b) of the first subparagraph for ten-year periods after 2030, unless reviews by the Commission by 2027 and every 10 years thereafter conclude that this is not necessary to achieve the Union's long-term energy and climate targets for 2050.

Member States shall decide how to phase the calculated quantity of new savings over each period referred to in points (a) and (b) of the first subparagraph, provided that the required total cumulative end-use energy savings have been achieved by the end of each obligation period.

2. Provided that Member States achieve at least their cumulative end-use energy savings obligation referred to in point (b) of the first subparagraph of paragraph 1, they may calculate the required amount of energy savings by one or more of the following means:

- (a) applying an annual savings rate on energy sales to final customers or on final energy consumption, averaged over the most recent three-year period prior to 1 January 2019;
- (b) excluding, in whole or in part, energy used in transport from the calculation baseline;
- (c) making use of any of the options set out in paragraph 4.

3. Where Member States make use of the possibilities provided for in point (a), (b) or (c) of paragraph 2, they shall establish:

- (a) their own annual savings rate that will be applied in the calculation of their cumulative end-use energy savings, which shall ensure that the final amount of their net energy savings is no lower than those required under point (b) of the first subparagraph of paragraph 1; and
- (b) their own calculation baseline, which may exclude, in whole or in part, energy used in transport.

4. Subject to paragraph 5, each Member State may:
- (a) carry out the calculation required under point (a) of the first subparagraph of paragraph 1 using values of 1 % in 2014 and 2015; 1,25 % in 2016 and 2017; and 1,5 % in 2018, 2019 and 2020;
 - (b) exclude from the calculation all or part of the sales of energy used, by volume, with respect to the obligation period referred to in point (a) of the first subparagraph of paragraph 1, or final energy consumed, with respect to the obligation period referred to in point (b) of that subparagraph, by industrial activities listed in Annex I to Directive 2003/87/EC;
 - (c) count towards the amount of required energy savings, energy savings achieved in the energy transformation, distribution and transmission sectors, including efficient district heating and cooling infrastructure, as a result of implementing the requirements set out in Article 14(4), point (b) of Article 14(5), and Article 15(1) to (6) and (9). Member States shall inform the Commission about their intended policy measures under this point for the period from 1 January 2021 to 31 December 2030 as part of their integrated national energy and climate plans. The impact of those measures shall be calculated in accordance with Annex V and included in those plans;
 - (d) count towards the amount of required energy savings, energy savings resulting from individual actions newly implemented since 31 December 2008 that continue to have an impact in 2020 with respect to the obligation period referred to in point (a) of the first subparagraph of paragraph 1 and beyond 2020 with respect to the period referred to in point (b) of the first subparagraph of paragraph 1, and which can be measured and verified;
 - (e) count towards the amount of required energy savings, energy savings that stem from policy measures, provided that it can be demonstrated that those measures result in individual actions carried out from 1 January 2018 to 31 December 2020 which deliver savings after 31 December 2020;
 - (f) exclude from the calculation of the amount of required energy savings, 30 % of the verifiable amount of energy generated on or in buildings for own use as a result of policy measures promoting new installation of renewable energy technologies;
 - (g) count towards the amount of required energy savings, energy savings that exceed the energy savings required for the obligation period from 1 January 2014 to 31 December 2020, provided that those savings result from individual actions carried out under policy measures referred to in Articles 7a and 7b, notified by Member States in their National Energy Efficiency Action Plans and reported in their progress reports in accordance with Article 24.
5. Member States shall apply and calculate the effect of the options chosen under paragraph 4 for the periods referred to in points (a) and (b) of the first subparagraph of paragraph 1 separately:
- (a) for the calculation of the amount of energy savings required for the obligation period referred to in point (a) of the first subparagraph of paragraph 1, Member States may make use of points (a) to (d) of paragraph 4. All the options chosen under paragraph 4 taken together shall amount to no more than 25 % of the amount of energy savings referred to in point (a) of the first subparagraph of paragraph 1;
 - (b) for the calculation of the amount of energy savings required for the obligation period referred to in point (b) of the first subparagraph of paragraph 1, Member States may make use of points (b) to (g) of paragraph 4, provided individual actions referred to in point (d) of paragraph 4 continue to have a verifiable and measurable impact after 31 December 2020. All the options chosen under paragraph 4 taken together shall not lead to a reduction of more than 35 % of the amount of energy savings calculated in accordance with paragraphs 2 and 3.
- Regardless of whether Member States exclude, in whole or in part, energy used in transport from their calculation baseline or make use of any of the options listed in paragraph 4, they shall ensure that the calculated net amount of new savings to be achieved in final energy consumption during the obligation period from 1 January 2021 to 31 December 2030 is not lower than the amount resulting from applying the annual savings rate referred to in point (b) of the first subparagraph of paragraph 1.
6. Member States shall describe in their integrated national energy and climate plans in accordance with Annex III to Regulation (EU) 2018/1999, the calculation of the amount of energy savings to be achieved over the period from 1 January 2021 to 31 December 2030 referred to in point (b) of the first subparagraph of paragraph 1 of this Article and shall, if relevant, explain how the annual savings rate and the calculation baseline were established, and how and to what extent the options referred to in paragraph 4 of this Article were applied.
7. Energy savings achieved after 31 December 2020 shall not count towards the amount of required energy savings for the period from 1 January 2014 to 31 December 2020.

8. By way of derogation from paragraph 1 of this Article, Member States that allow obligated parties to use the option referred to in point (b) of Article 7a(6) may, for the purpose of point (a) of the first subparagraph of paragraph 1 of this Article, count energy savings obtained in any given year after 2010 and before the obligation period referred to in point (a) of the first subparagraph of paragraph 1 of this Article as if those energy savings had instead been obtained after 31 December 2013 and before 1 January 2021, provided that all of the following circumstances apply:

- (a) the energy efficiency obligation scheme was in force at any point between 31 December 2009 and 31 December 2014 and was included in the Member State's first National Energy Efficiency Action Plan submitted under Article 24(2);
- (b) the savings were generated under the obligation scheme;
- (c) the savings are calculated in accordance with Annex V;
- (d) the years for which the savings are counted as having been obtained have been reported in the National Energy Efficiency Action Plans in accordance with Article 24(2).

9. Member States shall ensure that savings resulting from policy measures referred to in Articles 7a and 7b and Article 20(6) are calculated in accordance with Annex V.

10. Member States shall achieve the amount of energy savings required under paragraph 1 of this Article either by establishing an energy efficiency obligation scheme referred to in Article 7a or by adopting alternative policy measures referred to in Article 7b. Member States may combine an energy efficiency obligation scheme with alternative policy measures.

11. In designing policy measures to fulfil their obligations to achieve energy savings, Member States shall take into account the need to alleviate energy poverty in accordance with criteria established by them, taking into consideration their available practices in the field, by requiring, to the extent appropriate, a share of energy efficiency measures under their national energy efficiency obligation schemes, alternative policy measures, or programmes or measures financed under an Energy Efficiency National Fund, to be implemented as a priority among vulnerable households, including those affected by energy poverty and, where appropriate, in social housing.

Member States shall include information about the outcome of measures to alleviate energy poverty in the context of this Directive in the integrated national energy and climate progress reports in accordance with Regulation (EU) 2018/1999.

12. Member States shall demonstrate that where there is an overlap in the impact of policy measures or individual actions, there is no double counting of energy savings.;

(4) the following Articles are inserted:

'Article 7a

Energy efficiency obligation schemes

1. Where Member States decide to fulfil their obligations to achieve the amount of savings required under Article 7(1) by way of an energy efficiency obligation scheme, they shall ensure that obligated parties as referred to in paragraph 2 of this Article operating in each Member State's territory achieve, without prejudice to Article 7(4) and (5), their cumulative end-use energy savings requirement as set out in Article 7(1).

Where applicable, Member States may decide that obligated parties fulfil those savings, in whole or in part, as a contribution to the Energy Efficiency National Fund in accordance with Article 20(6).

2. Member States shall designate, on the basis of objective and non-discriminatory criteria, obligated parties among energy distributors, retail energy sales companies and transport fuel distributors or transport fuel retailers operating in their territory. The amount of energy savings needed to fulfil the obligation shall be achieved by the obligated parties among final customers, designated by the Member State, independently of the calculation made pursuant to Article 7(1) or, if Member States so decide, through certified savings stemming from other parties as described in point (a) of paragraph 6 of this Article.

3. Where retail energy sales companies are designated as obligated parties under paragraph 2, Member States shall ensure that, in fulfilling their obligation, retail energy sales companies do not create any barriers that impede consumers from switching from one supplier to another.

4. Member States shall express the amount of energy savings required of each obligated party in terms of either final or primary energy consumption. The method chosen to express the amount of energy savings required shall also be used to calculate the savings claimed by obligated parties. The conversion factors set out in Annex IV shall apply.

5. Member States shall put in place measurement, control and verification systems under which documented verification is carried out on at least a statistically significant proportion and representative sample of the energy efficiency improvement measures put in place by the obligated parties. The measurement, control and verification shall be carried out independently of the obligated parties.

6. Within the energy efficiency obligation scheme, Member States may do one or both of the following:

- (a) permit obligated parties to count towards their obligation certified energy savings achieved by energy service providers or other third parties, including when obligated parties promote measures through other State-approved bodies or through public authorities that may involve formal partnerships and may be in combination with other sources of finance. Where Member States so permit, they shall ensure that the certification of energy savings follows an approval process that is put in place in the Member States, that is clear, transparent, and open to all market participants, and that aims to minimise the costs of certification;
- (b) allow obligated parties to count savings obtained in a given year as if they had instead been obtained in any of the four previous or three following years as long as this is not beyond the end of the obligation periods set out in Article 7(1).

Member States shall assess and, if appropriate, take measures to minimise the impact of the direct and indirect costs of energy efficiency obligation schemes on the competitiveness of energy-intensive industries exposed to international competition.

7. Member States shall, on an annual basis, publish the energy savings achieved by each obligated party, or each sub-category of obligated party, and in total under the scheme.

Article 7b

Alternative policy measures

1. Where Member States decide to fulfil their obligations to achieve the savings required under Article 7(1) by way of alternative policy measures, they shall ensure, without prejudice to Article 7(4) and (5), that the energy savings required under Article 7(1) are achieved among final customers.

2. For all measures other than those relating to taxation, Member States shall put in place measurement, control and verification systems under which documented verification is carried out on at least a statistically significant proportion and representative sample of the energy efficiency improvement measures put in place by the participating or entrusted parties. The measurement, control and verification shall be carried out independently of the participating or entrusted parties.;

(5) Article 9 is amended as follows:

(a) the title is replaced by the following:

'Metering for gas and electricity';

(b) in paragraph 1, the first subparagraph is replaced by the following:

'1. Member States shall ensure that, in so far as it is technically possible, financially reasonable and proportionate in relation to the potential energy savings, for electricity and natural gas final customers are provided with competitively priced individual meters that accurately reflect their actual energy consumption and that provide information on the actual time of use.;

(c) paragraph 3 is deleted;

(6) the following Articles are inserted:

'Article 9a

Metering for heating, cooling and domestic hot water

1. Member States shall ensure that, for district heating, district cooling and domestic hot water, final customers are provided with competitively priced meters that accurately reflect their actual energy consumption.

2. Where heating, cooling or domestic hot water is supplied to a building from a central source that services multiple buildings or from a district heating or district cooling system, a meter shall be installed at the heat exchanger or point of delivery.

Article 9b

Sub-metering and cost allocation for heating, cooling and domestic hot water

1. In multi-apartment and multi-purpose buildings with a central heating or central cooling source or supplied from a district heating or district cooling system, individual meters shall be installed to measure the consumption of heating, cooling or domestic hot water for each building unit, where technically feasible and cost effective in terms of being proportionate in relation to the potential energy savings.

Where the use of individual meters is not technically feasible or where it is not cost-efficient to measure heat consumption in each building unit, individual heat cost allocators shall be used to measure heat consumption at each radiator unless it is shown by the Member State in question that the installation of such heat cost allocators would not be cost-efficient. In those cases, alternative cost-efficient methods of heat consumption measurement may be considered. The general criteria, methodologies and/or procedures to determine technical non-feasibility and non-cost effectiveness shall be clearly set out and published by each Member State.

2. In new multi-apartment buildings and in residential parts of new multi-purpose buildings that are equipped with a central heating source for domestic hot water or are supplied from district heating systems, individual meters shall, notwithstanding the first subparagraph of paragraph 1, be provided for domestic hot water.

3. Where multi-apartment or multi-purpose buildings are supplied from district heating or district cooling, or where own common heating or cooling systems for such buildings are prevalent, Member States shall ensure they have in place transparent, publicly available national rules on the allocation of the cost of heating, cooling and domestic hot water consumption in such buildings to ensure transparency and accuracy of accounting for individual consumption. Where appropriate, such rules shall include guidelines on the manner in which to allocate cost for energy that is used as follows:

- (a) domestic hot water;
- (b) heat radiated from the building installation and for the purpose of heating the common areas, where staircases and corridors are equipped with radiators;
- (c) for the purpose of heating or cooling apartments.

Article 9c

Remote reading requirement

1. For the purposes of Articles 9a and 9b, meters and heat cost allocators installed after 25 October 2020 shall be remotely readable devices. The conditions of technical feasibility and cost effectiveness set out in Article 9b(1) shall continue to apply.

2. Meters and heat cost allocators which are not remotely readable but which have already been installed shall be rendered remotely readable or replaced with remotely readable devices by 1 January 2027, save where the Member State in question shows that this is not cost-efficient.;

(7) Article 10 is amended as follows:

- (a) the title is replaced by the following:

'Billing information for gas and electricity';

- (b) in paragraph 1, the first subparagraph is replaced by the following:

'1. Where final customers do not have smart meters as referred to in Directives 2009/72/EC and 2009/73/EC, Member States shall ensure, by 31 December 2014, that billing information is reliable, accurate and based on actual consumption, in accordance with point 1.1 of Annex VII, for electricity and gas, where that is technically possible and economically justified.;

(8) the following Article is inserted:

‘Article 10a

Billing and consumption information for heating, cooling and domestic hot water

1. Where meters or heat cost allocators are installed, Member States shall ensure that billing and consumption information is reliable, accurate and based on actual consumption or heat cost allocator readings, in accordance with points 1 and 2 of Annex VIIa for all final users, namely for natural or legal persons purchasing heating, cooling or domestic hot water for their own end-use, or natural or legal persons occupying an individual building or a unit in a multi-apartment or multi-purpose building supplied with heating, cooling or domestic hot water from a central source who has no direct or individual contract with the energy supplier.

This obligation may, where a Member State so provides, save in the case of sub-metered consumption based on heat cost allocators under Article 9b, be fulfilled by a system of regular self-reading by the final customer or final user whereby they communicate readings from their meter. Only where the final customer or final user has not provided a meter reading for a given billing interval shall billing be based on estimated consumption or a flat rate.

2. Member States shall:

- (a) require that, if information on the energy billing and historical consumption or heat cost allocator readings of final users is available, it be made available upon request by the final user, to an energy service provider designated by the final user;
- (b) ensure that final customers are offered the option of electronic billing information and bills;
- (c) ensure that clear and comprehensible information is provided with the bill to all final users in accordance with point 3 of Annex VIIa; and
- (d) promote cybersecurity and ensure the privacy and data protection of final users in accordance with applicable Union law.

Member States may provide that, at the request of the final customer, the provision of billing information shall not be considered to constitute a request for payment. In such cases, Member States shall ensure that flexible arrangements for actual payment are offered.

3. Member States shall decide who is to be responsible for providing the information referred to in paragraphs 1 and 2 to final users without a direct or individual contract with an energy supplier.’;

(9) Article 11 is replaced by the following:

‘Article 11

Cost of access to metering and billing information for electricity and gas

Member States shall ensure that final customers receive all their bills and billing information for energy consumption free of charge and that final customers have access to their consumption data in an appropriate way and free of charge.’;

(10) the following Article is inserted:

‘Article 11a

Cost of access to metering and billing and consumption information for heating, cooling and domestic hot water

1. Member States shall ensure that final users receive all their bills and billing information for energy consumption free of charge and that final users have access to their consumption data in an appropriate way and free of charge.

2. Notwithstanding paragraph 1 of this Article, the distribution of costs of billing information for the individual consumption of heating, cooling and domestic hot water in multi-apartment and multi-purpose buildings pursuant to Article 9b shall be carried out on a non-profit basis. Costs resulting from the assignment of that task to a third party, such as a service provider or the local energy supplier, covering the measuring, allocation and accounting for actual individual consumption in such buildings, may be passed onto the final users to the extent that such costs are reasonable.

3. In order to ensure reasonable costs for sub-metering services as referred to in paragraph 2, Member States may stimulate competition in that service sector by taking appropriate measures, such as recommending or otherwise promoting the use of tendering and/or the use of interoperable devices and systems facilitating switching between service providers.’;

(11) in Article 15, the following paragraph is inserted:

‘2a. By 31 December 2020, the Commission shall, after consulting relevant stakeholders, prepare a common methodology in order to encourage network operators to reduce losses, implement a cost-efficient and energy-efficient infrastructure investment programme and properly account for the energy efficiency and flexibility of the grid.’;

(12) in Article 20, the following paragraphs are inserted:

‘3a. In order to mobilise private financing for energy efficiency measures and energy renovation, in accordance with Directive 2010/31/EU, the Commission shall conduct a dialogue with both public and private financial institutions in order to map out possible actions it can take.

3b. The actions referred to in paragraph 3a shall include the following:

- (a) mobilising capital investment into energy efficiency by considering the wider impacts of energy savings for financial risk management;
- (b) ensuring better energy and finance performance data by:
 - (i) examining further how energy efficiency investments improve underlying asset values;
 - (ii) supporting studies to assess the monetisation of the non-energy benefits of energy efficiency investments.

3c. For the purpose of mobilising private financing of energy efficiency measures and energy renovation, Member States shall, when implementing this Directive:

- (a) consider ways to make better use of energy audits under Article 8 to influence decision-making;
- (b) make optimal use of the possibilities and tools proposed in the smart finance for smart buildings initiative.

3d. By 1 January 2020, the Commission shall provide guidance for Member States on how to unlock private investment.’;

(13) in Article 22, paragraph 2 is replaced by the following:

‘2. The Commission is empowered to adopt delegated acts in accordance with Article 23 to amend this Directive by adapting to technical progress the values, calculation methods, default primary energy coefficient and requirements in Annexes I to V, VII to X, and XII.’;

(14) Article 23 is amended as follows:

(a) paragraph 2 is replaced by the following:

‘2. The power to adopt delegated acts referred to in Article 22 shall be conferred on the Commission for a period of five years from 24 December 2018. The Commission shall draw up a report in respect of the delegation of power not later than nine months before the end of the five-year period. The delegation of power shall be tacitly extended for periods of an identical duration, unless the European Parliament or the Council opposes such extension not later than three months before the end of each period.’;

(b) the following paragraph is inserted:

‘3a. Before adopting a delegated act, the Commission shall consult experts designated by each Member State in accordance with the principles laid down in the Interinstitutional Agreement of 13 April 2016 on Better Law-Making (*).

(*) OJ L 123, 12.5.2016, p. 1.’;

(15) Article 24 is amended as follows:

(a) the following paragraph is inserted:

‘4a. In the context of the State of the Energy Union report, the Commission shall report on the functioning of the carbon market in accordance with Article 35(1) and point (c) of Article 35(2) of Regulation (EU) 2018/1999, taking into consideration the effects of the implementation of this Directive.’;

(b) the following paragraphs are added:

12. By 31 December 2019, the Commission shall assess the effectiveness of the implementation of the definition of small and medium-sized enterprises for the purposes of Article 8(4), and shall submit a report to the European Parliament and to the Council. As soon as possible after submission of that report, the Commission shall, if appropriate, adopt legislative proposals.

13. By 1 January 2021, the Commission shall carry out an assessment of the potential for energy efficiency in conversion, transformation, transmission, transportation and storage of energy, and shall submit a report to the European Parliament and to the Council. That report shall, if appropriate, be accompanied by legislative proposals.

14. By 31 December 2021, the Commission, shall, unless changes to the retail market provisions of Directive 2009/73/EC on common rules for the internal market in gas have meanwhile been proposed, carry out an assessment, and submit a report to the European Parliament and to the Council, on the provisions related to metering, billing and consumer information for natural gas, with the aim of aligning them, where appropriate, with the relevant provisions for electricity in Directive 2009/72/EC, in order to strengthen consumer protection and enable final customers to receive more frequent, clear and up-to-date information about their natural gas consumption and to regulate their energy use. As soon as possible after submission of that report, the Commission shall, if appropriate, adopt legislative proposals.

15. By 28 February 2024, and every five years thereafter, the Commission shall evaluate this Directive and submit a report to the European Parliament and to the Council.

That evaluation shall include:

- (a) an examination of whether to adapt, after 2030, the requirements and the alternative approach laid down in Article 5;
- (b) an assessment of the general effectiveness of this Directive and the need to adjust further the Union's energy efficiency policy in accordance with the objectives of the 2015 Paris Agreement on climate change following the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change (*) and in the light of economic and innovation developments.

That report shall be accompanied, if appropriate, by proposals for further measures.

(*) OJ L 282, 19.10.2016, p. 4.;

(16) the Annexes are amended in accordance with the Annex to this Directive.

Article 2

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 25 June 2020.

However, Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with points 5 to 10 of Article 1, and points 3 and 4 of the Annex, by 25 October 2020.

They shall immediately communicate the text of those measures to the Commission.

When Member States adopt those measures, they shall contain a reference to this Directive or be accompanied by such a reference on the occasion of their official publication. Member States shall determine how such reference is to be made.

2. Member States shall communicate to the Commission the text of the main provisions of national law which they adopt in the field covered by this Directive.

Article 3

This Directive shall enter into force on the third day following that of its publication in the *Official Journal of the European Union*.

Article 4

This Directive is addressed to the Member States.

Done at Strasbourg, 11 December 2018.

For the European Parliament

The President

A. TAJANI

For the Council

The President

J. BOGNER-STRAUSS

ANNEX

The Annexes to Directive 2012/27/EU are amended as follows:

(1) in Annex IV, footnote 3 is replaced by the following:

⁽³⁾ Applicable when energy savings are calculated in primary energy terms using a bottom-up approach based on final energy consumption. For savings in kWh electricity, Member States shall apply a coefficient established through a transparent methodology on the basis of national circumstances affecting primary energy consumption, in order to ensure a precise calculation of real savings. Those circumstances shall be substantiated, verifiable and based on objective and non-discriminatory criteria. For savings in kWh electricity, Member States may apply a default coefficient of 2,1 or use the discretion to define a different coefficient, provided that they can justify it. When doing so, Member States shall take into account the energy mix included in their integrated national energy and climate plans to be notified to the Commission in accordance with Regulation (EU) 2018/1999. By 25 December 2022 and every four years thereafter, the Commission shall revise the default coefficient on the basis of observed data. That revision shall be carried out taking into account its effects on other Union law such as Directive 2009/125/EC and Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU (OJ L 198, 28.7.2017, p. 1).;

(2) Annex V is replaced by the following:

'ANNEX V

Common methods and principles for calculating the impact of energy efficiency obligation schemes or other policy measures under Articles 7, 7a and 7b and Article 20(6)

1. Methods for calculating energy savings other than those arising from taxation measures for the purposes of Articles 7, 7a and 7b and Article 20(6).

Obligated, participating or entrusted parties, or implementing public authorities, may use the following methods for calculating energy savings:

- (a) deemed savings, by reference to the results of previous independently monitored energy improvements in similar installations. The generic approach is termed "*ex ante*";
- (b) metered savings, whereby the savings from the installation of a measure, or package of measures, are determined by recording the actual reduction in energy use, taking due account of factors such as additionality, occupancy, production levels and the weather which may affect consumption. The generic approach is termed "*ex post*";
- (c) scaled savings, whereby engineering estimates of savings are used. This approach may be used only where establishing robust measured data for a specific installation is difficult or disproportionately expensive, e.g. replacing a compressor or electric motor with a different kWh rating from that for which independent information about savings has been measured, or where those estimates are carried out on the basis of nationally established methodologies and benchmarks by qualified or accredited experts that are independent of the obligated, participating or entrusted parties involved;
- (d) surveyed savings, where consumers' response to advice, information campaigns, labelling or certification schemes or smart metering is determined. This approach may be used only for savings resulting from changes in consumer behaviour. It shall not be used for savings resulting from the installation of physical measures.

2. In determining the energy savings for an energy efficiency measure for the purposes of Articles 7, 7a and 7b and Article 20(6), the following principles apply:

- (a) The savings shall be shown to be additional to those that would have occurred in any event without the activity of the obligated, participating or entrusted parties, or implementing public authorities. To determine the savings that can be claimed as additional, Member States shall have regard to how energy use and demand would evolve in the absence of the policy

measure in question by taking into account at least the following factors: energy consumption trends, changes in consumer behaviour, technological progress and changes caused by other measures implemented at Union and national level.

- (b) Savings resulting from the implementation of mandatory Union law shall be considered to be savings that would have occurred in any event, and thus shall not be claimed as energy savings for the purpose of Article 7(1). By way of derogation from that requirement, savings related to the renovation of existing buildings may be claimed as energy savings for the purpose of Article 7(1), provided that the materiality criterion referred to in point 3(h) of this Annex is ensured. Savings resulting from the implementation of national minimum requirements established for new buildings prior to the transposition of Directive 2010/31/EU can be claimed as energy savings for the purpose of point (a) of Article 7(1), provided that the materiality criterion referred to in point 3(h) of this Annex is ensured and those savings have been notified by Member States in their National Energy Efficiency Action Plans in accordance with Article 24(2).
 - (c) Credit may be given only for savings exceeding the following levels:
 - (i) Union emission performance standards for new passenger cars and new light commercial vehicles following the implementation of Regulations (EC) No 443/2009 (*) and (EU) No 510/2011 of the European Parliament and of the Council (**);
 - (ii) Union requirements relating to the removal from the market of certain energy related products following the implementation of implementing measures under Directive 2009/125/EC.
 - (d) Policies with the purpose of encouraging higher levels of energy efficiency of products, equipment, transport systems, vehicles and fuels, buildings and building elements, processes or markets shall be permitted.
 - (e) Measures promoting the installation of small-scale renewable energy technologies on or in buildings may be eligible to be taken into account for the fulfilment of energy savings required under Article 7(1), provided that they result in verifiable, and measurable or estimable, energy savings. The calculation of energy savings shall comply with the requirements of this Annex.
 - (f) For policies that accelerate the uptake of more efficient products and vehicles, full credit may be claimed, provided that it is shown that such uptake takes place before expiry of the average expected lifetime of the product or vehicle, or before the product or vehicle would usually be replaced, and the savings are claimed only for the period until end of the average expected lifetime of the product or vehicle to be replaced.
 - (g) In promoting the uptake of energy efficiency measures, Member States shall, where relevant, ensure that quality standards for products, services and installation of measures are maintained or introduced where such standards do not exist.
 - (h) To account for climatic variations between regions, Member States may choose to adjust the savings to a standard value or to accord different energy savings in accordance with temperature variations between regions.
 - (i) The calculation of energy savings shall take into account the lifetime of the measures and the rate at which the savings decline over time. That calculation shall count the savings each individual action will achieve during the period from its date of implementation to 31 December 2020 or 31 December 2030 as appropriate. Alternatively, Member States may adopt another method that is estimated to achieve at least the same total quantity of savings. When using another method, Member States shall ensure that the total amount of energy savings calculated using that method does not exceed the amount of energy savings that would have been the result of their calculation when counting the savings each individual action will achieve during the period from its date of implementation to 31 December 2020 or 31 December 2030 as appropriate. Member States shall describe in detail in their integrated national energy and climate plans under Regulation (EU) 2018/1999 the other method and the provisions made to ensure that the binding calculation requirement is met.
3. Member States shall ensure that the following requirements for policy measures taken pursuant to Article 7b and Article 20(6) are met:
- (a) policy measures and individual actions produce verifiable end-use energy savings;

- (b) the responsibility of each participating party, entrusted party or implementing public authority, as relevant, is clearly defined;
 - (c) the energy savings that are achieved or are to be achieved are determined in a transparent manner;
 - (d) the amount of energy savings required or to be achieved by the policy measure is expressed in either final or primary energy consumption, using the conversion factors set out in Annex IV;
 - (e) an annual report on the energy savings achieved by entrusted parties, participating parties and implementing public authorities be provided and made publicly available, as well as data on the annual trend of energy savings;
 - (f) monitoring of the results and taking appropriate measures if progress is not satisfactory;
 - (g) the energy savings from an individual action are not claimed by more than one party;
 - (h) the activities of the participating party, entrusted party or implementing public authority are shown to be material to the achievement of the energy savings claimed.
4. In determining the energy saving from taxation related policy measures introduced under Article 7b, the following principles shall apply:
- (a) credit shall be given only for energy savings from taxation measures exceeding the minimum levels of taxation applicable to fuels as required in Council Directive 2003/96/EC (***) or 2006/112/EC (****);
 - (b) price elasticities for the calculation of the impact of the (energy) taxation measures shall represent the responsiveness of energy demand to price changes, and shall be estimated on the basis of recent and representative official data sources;
 - (c) the energy savings from accompanying taxation policy instruments, including fiscal incentives or payment to a fund, shall be accounted separately.
5. Notification of methodology
- Member States shall in accordance with Regulation (EU) 2018/1999 notify to the Commission their proposed detailed methodology for the operation of the energy efficiency obligation schemes and alternative measures referred to in Articles 7a and 7b, and Article 20(6). Except in the case of taxation, such notification shall include details of:
- (a) the level of the energy savings required under point (b) of the first subparagraph of Article 7(1) or savings expected to be achieved over the whole period from 1 January 2021 to 31 December 2030;
 - (b) the obligated, participating or entrusted parties, or implementing public authorities;
 - (c) target sectors;
 - (d) policy measures and individual actions, including the expected total amount of cumulative energy savings for each measure;
 - (e) the duration of the obligation period for the energy efficiency obligation scheme;
 - (f) the actions provided for by the policy measure;
 - (g) the calculation methodology, including how additionality and materiality have been determined and which methodologies and benchmarks are used for deemed and scaled savings;
 - (h) the lifetimes of measures, and how they are calculated or what they are based upon;
 - (i) the approach taken to address climatic variations within the Member State;
 - (j) the monitoring and verification systems for measures under Articles 7a and 7b and how their independence from the obligated, participating or entrusted parties is ensured;
 - (k) in the case of taxation:
 - (i) the target sectors and segment of taxpayers;
 - (ii) the implementing public authority;

- (iii) the savings expected to be achieved;
- (iv) the duration of the taxation measure; and
- (v) the calculation methodology, including the price elasticities used and how they have been established.

(*) Regulation (EC) No 443/2009 of the European Parliament and of the Council of 23 April 2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO₂ emissions from light-duty vehicles (OJ L 140, 5.6.2009, p. 1).

(**) Regulation (EU) No 510/2011 of the European Parliament and of the Council of 11 May 2011 setting emission performance standards for new light commercial vehicles as part of the Union's integrated approach to reduce CO₂ emissions from light-duty vehicles (OJ L 145, 31.5.2011, p. 1).

(***) Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity (OJ L 283, 31.10.2003, p. 51).

(****) Council Directive 2006/112/EC of 28 November 2006 on the common system of value added tax (OJ L 347, 11.12.2006, p. 1).';

- (3) in Annex VII, the title is replaced by the following:

'Minimum requirements for billing and billing information based on actual consumption of electricity and gas';

- (4) the following Annex is inserted:

'ANNEX VIIa

Minimum requirements for billing and consumption information for heating, cooling and domestic hot water

1. Billing based on actual consumption or heat cost allocator readings

In order to enable final users to regulate their own energy consumption, billing shall take place on the basis of actual consumption or heat cost allocator readings at least once per year.

2. Minimum frequency of billing or consumption information

From 25 October 2020, where remotely readable meters or heat cost allocators have been installed, billing or consumption information based on actual consumption or heat cost allocator readings shall be provided to final users at least quarterly upon request or where final customers have opted to receive electronic billing, or else twice a year.

From 1 January 2022, where remotely readable meters or heat cost allocators have been installed, billing or consumption information based on actual consumption or heat cost allocator readings shall be provided to final users at least monthly. It may also be made available via the internet and be updated as frequently as allowed by the measurement devices and systems used. Heating and cooling may be exempted from that requirement outside the heating/cooling seasons.

3. Minimum information contained in the bill

Member States shall ensure that the following information is made available to final users in clear and comprehensible terms in or with their bills where those are based on actual consumption or heat cost allocator readings:

- (a) current actual prices and actual consumption of energy or total heat cost and heat cost allocator readings;
- (b) information about the fuel mix used and the related annual greenhouse gas emissions, including for final users supplied by district heating or district cooling, and a description of the different taxes, levies and tariffs applied. Member States may limit the scope of the requirement to provide information about greenhouse gas emissions to include only supplies from district heating systems with a total rated thermal input exceeding 20 MW;

- (c) comparisons of the final users current energy consumption with consumption for the same period in the previous year, in graphic form, climate corrected for heating and cooling;
- (d) contact information for final customers' organisations, energy agencies or similar bodies, including website addresses, from which information on available energy efficiency improvement measures, comparative end-user profiles and objective technical specifications for energy-using equipment may be obtained;
- (e) information about related complaints procedures, ombudsman services or alternative dispute resolution mechanisms, as applicable in the Member States;
- (f) comparisons with an average normalised or benchmarked final user in the same user category. In the case of electronic bills, such comparisons may instead be made available online and signposted to within the bills.

Bills that are not based on actual consumption or heat cost allocator readings shall contain a clear and comprehensible explanation of how the amount set out in the bill was calculated, and at least the information referred to in points (d) and (e).';

(5) in Annex IX, point (g) of the fourth paragraph of Part 1 is replaced by the following:

'(g) Economic analysis: Inventory of effects

The economic analyses shall take into account all relevant economic effects.

Member States may assess, and take into account in their decision-making, costs and energy savings from the increased flexibility in energy supply and from a more optimal operation of the electricity networks, including avoided costs and savings from reduced infrastructure investment, in the analysed scenarios.

The costs and benefits referred to in the first paragraph shall include at least the following:

(i) Benefits

- Value of output to the consumer (heat and electricity)
- External benefits such as environmental, greenhouse gas emissions and health and safety benefits, to the extent possible
- Labour market effects, energy security and competitiveness, to the extent possible;

(ii) Costs

- Capital costs of plants and equipment
- Capital costs of the associated energy networks
- Variable and fixed operating costs
- Energy costs
- Environmental, health and safety costs, to the extent possible
- Labour market costs, energy security and competitiveness, to the extent possible.');

(6) in Annex XII, point (a) of the first paragraph is replaced by the following:

'(a) set up and make public their standard rules relating to the bearing and sharing of costs of technical adaptations, such as grid connections, grid reinforcements and the introduction of new grids, improved operation of the grid and rules on the non-discriminatory implementation of the grid codes, which are necessary in order to integrate new producers feeding electricity produced from high-efficiency cogeneration into the interconnected grid.');

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