Opinion of the European Economic and Social Committee on ‘Wooden construction for CO₂ reduction in the building sector’
(exploratory opinion requested by the Swedish Presidency)
(2023/C 184/04)

Rapporteur: Rudolf KOLBE
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Referral
Swedish Presidency, 14.11.2022

Legal basis
Article 304 of the Treaty on the Functioning of the European Union

Plenary Assembly decision
14.12.2022

Section responsible
Section for Transport, Energy, Infrastructure and the Information Society

Adopted in section
7.3.2023

Adopted at plenary
22.3.2023

Plenary session No
577

Outcome of vote
(for/against/abstentions)
153/2/4

1. Conclusions and recommendations

1.1. The European Economic and Social Committee (EESC) sees bio-based building materials as an important lever to drive the green transition. An increase in the share of wood in construction to reduce carbon emissions must be promoted through active and sustainable forest management in the EU and should be not hampered by policy constraints.

1.2. Given the public sector’s capacity to lead by example, the EESC calls on the Member States to increase the use of wood in public buildings, which is below the overall average.

1.3. The EESC also considers that easily accessible support measures to help SMEs research, develop and innovate on alternative building materials are an important means of exploiting the potential of timber construction.

1.4. The EESC suggests that barriers to timber construction arising from formal, legal and technical requirements should be scrutinised as to their necessity with respect to planning quality, and notes that innovations must be able to comply with the state of the art not only by meeting standards, but also through the use of ‘equivalent alternative solutions’.

1.5. As different building regulations also create barriers to the use of renewable building materials, the EESC calls for harmonisation measures and sees the New European Bauhaus (NEB) as an important driver in this connection.

1.6. The EESC recommends the consistent use of life cycle assessments for expert sustainability assessments over the whole life cycle of buildings and when comparing environmental impacts.

1.7. The EESC stresses the importance of minimum standards for life-cycle carbon emissions from buildings and for the corresponding carbon reporting requirement across the construction sector.

1.8. The EESC sees the Energy Performance of Buildings Directive (EPBD) as the main policy tool for setting requirements to reduce carbon emissions over the full life-cycle of buildings. The EESC calls on the European Commission to develop a carbon certification scheme that takes full account of the role that wood products play in offsetting emissions.
1.9. The EESC considers it essential to transfer know-how, as envisaged in the NEBAcademy, and to provide appropriate training and development at national level. Training and development on the use of new sustainable construction methods and materials is needed for all those involved in the construction process: planners, architects, engineers, technicians, IT specialists and construction workers.

1.10. In the EESC’s view, quality-based procurement procedures, including sustainability and life-cycle criteria, as well as the choice of appropriate procurement procedures that allow innovative solutions, are a prerequisite for achieving climate objectives and promoting timber construction. The EESC therefore calls for both a stronger legal obligation with respect to quality-based competition and climate-friendly public procurement as well as for measures to train contracting authorities accordingly.

1.11. The EESC calls on the Member States to participate in the Austrian and Finnish Governments’ Wood POP initiative, which aims to mobilise public and private players in the timber sector at national and regional level and to support the reorientation of investments towards sustainable bio-based solutions and timber-based value chains.

2. General comments

2.1. The tradition of timber construction is rooted in a centuries-old history of innovation. Among other things, the use of sustainable materials has been included in the thinking behind the New European Bauhaus (1).

2.2. The EESC agrees with the Commission that innovative, bio-based and sustainable (construction) materials, made using low-carbon procedures, are key to the green transition. According to the International Energy Agency (IEA) building report (2), buildings currently account for 33% of global CO₂ emissions (2021). Most are due, directly and indirectly, to the operation of buildings, but 6.4% (2021) are caused by construction and the production of building materials. Transport, demolition and infrastructure are not included here. Emissions resulting from transport are attributed to the transport sector. It is fair to assume that actual emissions from construction are higher. According to the Commission, buildings account for around 40% of energy consumption and one third of greenhouse gas emissions across the EU. Cuts to greenhouse gas emissions are mainly due to energy renovation measures, the growing share of renewable energy sources and the renewal of heating systems. That said, the number of main residences is on the rise, and floor area per dwelling is increasing.

2.3. The EESC stresses the huge importance of forests for the lives of people around the world. For example, Europe’s 400 billion trees absorb almost 9% of its greenhouse gas emissions. The EESC is aware that deforestation is a huge global problem; however, forest resources within the EU are on the increase. Between 1990 and 2020, forest area increased by 9% and the volume of wood in European forests rose by 50% (3). The EESC fully supports all of the European Commission’s efforts to tackle this global problem and stresses the need to continue promoting healthy and growing forests in the EU. An increase in the share of wood in construction to reduce carbon emissions should be promoted through active and sustainable forest management across the EU and should not be hampered by policy constraints.

2.4. The EESC therefore notes that tapping the potential of both solid and non-solid timber construction in the context of climate action must be inextricably linked to sustainable forest management. The Austrian CareforParis project (4), involving cooperation between the Austrian Research Centre for Forests (BFW), the University of Natural Resources and Life Sciences (BOKU), Wood K Plus and the Environment Agency Austria, has mapped out and analysed different scenarios for forest management. The scenarios take different climate-related changes and adaptation strategies for Austrian forests as a basis, and show possible developments up to the year 2150. The carbon footprint of forests and wood products and the prevention of CO₂ emissions through the use of wood products were analysed in detail. The combination of forest growth, timber use and prevention of greenhouse gas emissions through use of wood products will lead to a positive carbon

(1) OJ C 275, 18.7.2022, p. 73; OJ C 155, 30.4.2021, p. 73.
(2) IEA (2022) building report at: https://www.iea.org/reports/buildings
footprint. Europe's forests are an important carbon sink. Between 2010 and 2020, the average annual amount of carbon sequestered in forest biomass reached 155 million tonnes in the European region. In the EU-28, the amount sequestered equates to 10% of gross greenhouse gas emissions \(^\text{(*)}\). A bigger lever in climate action is the replacement of fossil raw materials and energy sources with wood (in terms of material and energy) and the prevention of emissions associated with it. Providing wood as a substitute for materials with higher life cycle emissions is therefore an important measure in tackling climate change.

2.5. Embodied energy is the energy that must be used for the production, storage, transport, installation and ultimately disposal of materials or components and buildings. Unlike other conventional building materials, wood sequesters carbon before it is used as a building material (a tree consists of approximately 50% pure carbon). When looking at the carbon footprint of wood, the factors of origin, transport distance and type of processing, as well as reusability, are essential. Comparisons of equivalent buildings over their entire life cycle reveal that, unlike other building materials, wood performs better in terms of embodied energy, greenhouse gas emissions, air and water pollution and other impact indicators. The wood products currently produced each year (= wood used as a material) prevent around 10% of total annual greenhouse gas emissions through the substitution effect alone.

2.6. More specifically, timber construction can save up to 40% of CO\(_2\) emissions compared to concrete. When applying the volume-to-weight conversion recommended by Hagauer et al. (2009) \(^\text{(*)}\), the dry weight of 1 cubic metre (m\(^3\)) of wood (mixed softwood and hardwood) is 417 kg. Assuming that the carbon component is 50%, the CO\(_2\) equivalent is 0.765 tonnes per m\(^3\). This means that, if 1 cubic metre of additional ready-to-use wood is harvested, 0.765 million tonnes of CO\(_2\) can be sequestered into permanent products.

2.7. The number of wooden buildings has grown in recent years. In Austria, for example, the proportion of timber constructions \(^\text{(*)}\) has increased by more than 70% in 20 years, accounting for 24% in 2018 in terms of useful floor area. Of this, 53% was in the residential sector, 11% in commercial and industrial construction and 29% in special-purpose buildings in the agricultural sector. By comparison, the proportion amongst public buildings was only 7%. In Sweden and Finland, 90% of all new single-family houses are made of wood, and about 20% of newly built multi-family houses have a timber construction.

2.8. Increasing urban density can play a key role in combating climate change and inevitably goes hand in hand with taller buildings. Current projects show that timber constructions can reach great heights. Examples of this are the Sara Cultural Centre in Sweden, which has 20 storeys and a height of 75 m \(^\text{(*)}\), and the Ascent Tower in Milwaukee, which has 18 storeys of timber construction \(^\text{(*)}\).

2.9. Today’s wood building systems can easily be adapted to provide comprehensive solutions for building renovation, creating high-quality homes and achieving significant energy savings. Renovation projects take advantage not only of the easily available urban infrastructure, but also of the embodied energy already included in the current building stock.

2.10. Using existing reserves instead of adding new buildings means making more efficient use of the resources that a city has to offer, and must therefore be prioritised in principle. The advantages are the speed with which components can be assembled, a better load/weight ratio compared to other materials, and therefore a relatively low self-load on the existing structure.

2.11. Wood is also well suited to cascading use. Having several stages of use increases value creation, reduces resource consumption and means that CO\(_2\) is sequestered for a longer period.

2.12. The formal, legal and technical requirements to ensure planning quality in timber construction are comparatively higher and more comprehensive than for other types of construction. This level of complexity hinders the increase in the market share of timber construction. Standardising components, connections and construction groups can support


\(^{(*)}\) See the Sara Cultural Centre, Skellefteå, Sweden, White Arkitekter, 2021.

\(^{(*)}\) See the Ascent Tower, Milwaukee, WIEHAG Austria, 2021.
implementation and ensure cost-effectiveness and quality. One current initiative is the dataholz.eu database, which makes tested building components and component connections available online in Germany and Austria. As a matter of principle, the EESC notes that innovations in timber construction must also be able to comply with the state of the art across all sectors, not only through existing standards, but also through the use of ‘equivalent alternative solutions’.

3. Specific comments

3.1. The EESC notes that, thanks to standardisation, precision and quality, timber construction systems are well suited both to new construction as well as to refurbishing current buildings and making use of existing free space in urban areas. Their many advantages include their adaptability, high level of pre-fabrication, shorter construction times and lower weight compared to other materials.

3.2. A key criterion for assessing buildings is their environmental impact over the entire life cycle. Environmental impacts arise from construction (production and transport of construction products used), use and dismantling (including recycling or disposal of construction products). Environmental impacts are recorded in life cycle assessments (EN 15804:15.02.2022).

3.3. Life cycle assessment is an appropriate tool for assessing the sustainability of construction products. The EESC recommends that the life cycle assessment tool for expert sustainability assessment over the entire life cycle be consistently used for buildings to show and compare their environmental impact.

3.4. In recent years, building regulations concerning the use of renewable building materials have been relaxed. The possibilities for timber construction have grown, particularly when it comes to fire protection. Current projects are exploring this issue.

3.5. The research project TIMpuls (10), led by the Technical University of Munich (TUM), is currently researching fires in multi-storey wooden buildings with the aim of laying solid foundations for a single set of rules for the construction of high-rise wooden buildings.

3.6. Recent research and projects carried out show that timber construction by no means lags behind other design methods when it comes to fire safety and also has benefits in terms of seismic safety (11).

3.7. Different legal rules, even within the Member States, often create unnecessary hurdles. The EESC therefore calls for building regulations to be further harmonised with a view to ensuring parity with other building materials.

3.8. The EESC urges Member States to increase the use of wood in public buildings, which is below the overall average. The public sector has a leading role to play in harnessing the potential of timber construction to achieve climate change objectives. In particular, outstanding, innovative buildings made from timber can be a source of identity and an incentive for the increased use of wood.

3.9. In procurement procedures, criteria such as bio-economy, sustainability, life-cycle costs and climate impact are often not used — or used too little — to identify the best bidder, at the expense of timber construction solutions. The EESC therefore calls for a stronger commitment to include criteria to achieve climate objectives in public procurement.

3.10. In the case of prefabricated timber construction, planning must be almost at the execution stage to avoid any risk of interpretation and to ensure clear comparability. In order to secure advantages in terms of technical and economic optimisation and implementation time (12), consideration must be given to the wide range of products and the influence of manufacturing, logistics and assembly processes at an earlier stage compared to cases of construction using low levels of pre-fabrication. This is possible through the early inclusion of bidder information, with the choice of an appropriate procurement procedure, such as an architectural competition or competitive dialogue, or with the involvement of specialised planners by the tendering party.

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(12) See the leanWOOD research project — Neue Kooperations- und Prozessmodelle für das vorgefertigte Bauen mit Holz (new cooperation and process models for pre-fabricated construction using wood), HSLU Hochschule Luzern, 2017.
3.11. The EESC stresses the importance of the New European Bauhaus in promoting high-quality climate-friendly building materials and thereby the use of timber in construction. Currently, timber accounts for only 3% of building materials in the EU, so the potential of wood construction for climate action is far from being exploited. The EESC therefore considers support for R & D &I relating to alternative building materials under the NEB to be an important element in realising this potential.

3.12. In many cases, users in the construction sector are not always sufficiently aware of the possibilities for using it. A lack of knowledge often leads to only limited use of timber. The EESC therefore considers the transfer of know-how within Europe — as envisaged in the NEB Academy — to be very important, while also recognising the need to ensure that sufficient education and training is provided, including at national level. Training and development on the use of new sustainable construction methods and materials will be needed for all categories of workers involved in the construction process: planners, architects, engineers, technicians, IT specialists and construction workers. It is only with properly trained people that the green transition can be achieved.

3.13. The EESC welcomes the joint European social project RESILIENTWOOD, led by the European Confederation of Woodworking Industries (CEI-Bois) and the European Federation of Building and Woodworkers (EFBWW), which aims to develop recommendations and guidelines for businesses, vocational trainers and public authorities, in order to attract young people to the EU wood industry, adapt to technological changes, and develop workers.

3.14. The EESC believes it is important to publish technical information in order to provide the state of the art in timber construction to all stakeholders and to set construction and structural standards to facilitate timber construction.

3.15. The Energy Performance of Buildings Directive (EPBD) is the main piece of EU legislation in the buildings sector. It requires EU Member States to set performance levels for their buildings, to strategically plan the decarbonisation of their building stock through long-term renovation strategies, and to implement additional measures. The EPBD is therefore the obvious policy tool for setting requirements and clear catalysts for the reduction of carbon emissions over a building's life cycle.

3.16. The provisions of the EPBD must be aligned with the objectives of climate neutrality and identify the most important and urgent measures to be taken by 2050. While it is important to improve the energy performance of buildings, without a clear understanding of their integrated carbon footprint, there is a risk that the measures will be below par.

3.17. The EESC welcomes the Ecodesign Regulation for Sustainable Products proposed in spring 2022 as an important step towards greener, circular products. The establishment of minimum criteria, such as reducing products' environmental and climate footprints, can also be fully applied to timber construction and create economic opportunities for innovation, although timber construction is not currently included in the Regulation.

3.18. Mandatory life-cycle carbon reporting for the construction sector will facilitate data collection and benchmarking and enable the construction sector to develop the necessary skills and capacities. Binding minimum standards for life-cycle carbon emissions need to be introduced and strengthened over time. The EESC calls on the European Commission to develop a carbon certification scheme that takes full account of the role that wood products play in offsetting emissions.

3.19. The EESC calls on the Member States to fully participate in the Austrian and Finnish Governments' new Wood POP initiative, which is a platform to promote dialogue on wood-related policy aimed at mobilising key public and private players in the timber sector at national and regional level, while supporting the reorientation of investments towards sustainable bio-based solutions and wood-based value chains.
3.20. In its complementary opinion CCMI/205 *Industry 5.0 in the wooden construction sector*, the EESC stresses that wood as a building material provides a great opportunity as it is a sustainable and cost-effective alternative to traditional materials such as concrete and steel. Another advantage is the high labour productivity, which allows for faster and more efficient building work. Moreover, timber construction provides employment opportunities in rural areas. It also offers environmental benefits as wood is a renewable resource and generates fewer carbon emissions than other materials both during production and throughout its life cycle. Timber construction also promotes the conservation and maintenance of forests and thus helps to reduce greenhouse gases.


The President
of the European Economic and Social Committee
Christa SCHWENG
ANNEX

The supplementary opinion of the Consultative Commission on Industrial Change — ‘Industry 5.0 in the wooden construction sector’ can be found on the following pages:

Opinion of the Consultative Commission on Industrial Change on ‘Industry 5.0 in the wooden construction sector’

(supplementary opinion to TEN/794)

Rapporteur: Martin BÖHME
Co-rapporteur: Rolf GEHRING

Plenary assembly decision 15.11.2022
Legal basis Rule 56(1) of the Rules of Procedure
Supplementary opinion
Section responsible Consultative Commission on Industrial Change (CCMI)
Adopted in CCMI 27.2.2023
Outcome of vote (for/against/abstentions) 29/0/3

1. Conclusions and recommendations

1.1. The European Economic and Social Committee (EESC) stresses that the use of wood as a building material presents a great opportunity, as it is a sustainable and cost-effective alternative and complement to traditional building materials such as concrete and steel. Another advantage is the high labour productivity of timber construction, which allows for faster and more efficient construction of buildings. The possibility of prefabricating components in factories also reduces costs and increases safety during construction.

1.2. Education, training and lifelong learning of the workforce in the field of timber construction is more important than ever. Education and training must be the result of social dialogue with the involvement of all social partners.

1.3. The EESC sees significant opportunities for workers, especially in rural areas, in the development of the timber construction sector. Good jobs in the wood industry and timber construction can help to improve the economic situation in rural areas where the wood industry plays an important role.

1.4. The EESC underlines the many environmental benefits of timber construction. One of the biggest advantages is that wood is a renewable raw material that produces lower carbon emissions than other building materials in the production of components and buildings, and over their life cycle. Furthermore, the use of wood in the construction sector promotes the conservation and maintenance of forests, by providing incentives for sustainable forest management. Wood absorbs and stores CO$_2$ from the atmosphere as it grows. Thus, when it is used for building, it becomes a green building material and contributes to the overall reduction in greenhouse gases.

1.5. The EESC refers to its recent publications on construction and construction products, in particular opinions Harmonised conditions for the marketing of construction products (1) and Wooden construction for CO$_2$ reduction in the building sector (2).

(1) OJ C 75, 28.2.2023, p. 159.
(2) Wooden construction for CO$_2$ reduction in the building sector (see OJ, p. 18).
1.6. The use of wood in the construction sector reinforces the view of the anti-seismic behaviour of wood as it was manifested in certain cases such as the earthquake in Alaska in 1964. The EESC believes that people living in earthquake-prone areas should be encouraged to use wood as a building material.

2. General comments

2.1. This opinion complements the general comments made in opinion TEN/794 on Wooden construction for CO₂ reduction in the building sector.

2.2. The construction sector is a major contributor to greenhouse gas emissions, and thus an important factor in terms of damage to the climate. The emissions come mainly from the use of fossil fuels for the production of heat and electricity in buildings, and from the production of building materials. There is a real need for measures to reduce greenhouse gas emissions in the construction sector, e.g. by using renewable energies, improving the energy performance of buildings, and using sustainable building materials (1).

2.3. The EESC highlights that, in order to increase the importance of sustainably produced wood as a building material in the construction industry, the need for sustainable forest management for the production of wood as a raw material should be emphasised. Sustainable forest management involves managing and using forests in such a way that they are not only environmentally, but also economically and socially, sustainable. This means that forests are preserved for both current and future generations, and that natural resources are used responsibly. One important element of sustainable forest management is preserving forests’ biodiversity and ecosystem services. It is also important to reduce forests’ vulnerability to natural disruptions such as forest fires and insect infestations.

2.4. From a technical point of view, timber construction requires the input of much less ‘grey energy’ than other building materials such as concrete. Grey energy is the energy used to produce, transport, store and recycle products; reducing it means using less energy for these processes, leading to lower carbon emissions and more sustainable energy consumption, and can also help to improve the competitiveness of businesses.

2.5. The EESC notes that legislation sometimes hinders the development of timber construction by restricting the use of wood as a building material or by imposing certain rules and standards that are difficult or expensive to implement in timber construction. One example of this is the height limit that some countries impose for wooden buildings; this may limit the possibilities for timber construction and hinder the development of innovative wooden structures. When it comes to fire protection of buildings, it is unacceptable that wood is subject to different performance rules from other materials. The EESC advocates homogenising the rules at European level, regardless of the material.

2.6. Timber construction can make an important contribution to developing a more circular economy and in particular to the objective of a more bio-based economy, as set out in the relevant EU policies. The applications and material properties of wood and wood-based products need to be further developed in this regard. In particular, the recyclability of wood products plays an essential role in this connection, but combinations of wood with other materials will also become increasingly important. Action, coordinated and supported at European level, to promote research cooperation in the fields of material properties and composite materials can play an important role here and stimulate innovation.

2.7. The transformation of our industries towards the concept of Industry 5.0 has a social foundation, but also a strong technical side. Digitalisation (building information modelling), robotisation and machine learning (artificial intelligence) will transform the entire value chain, from forestry to construction, maintenance and recycling. This requires a legal framework with regard to general product requirements, requirements for construction products and standardisation. They need to be coordinated in the field of timber construction. In line with the social objectives outlined for Industry 5.0, technological developments and work organisation concepts should follow a human-centred approach to technology design. It will also be important to systematically consider the potential positive or negative effects for a healthy working and living environment, from the very first step of technological development.

(1) See Kreislaufwirtschaft für die Dekarbonisierung des EU-Bausektors — Modellierung ausgewählter Stoffströme und Treibhausgasemissionen [The circular economy and decarbonisation of the EU construction sector — modelling selected material flows and greenhouse gas emissions], Meta Thurid Lott, Andrea Herbst, Matthias Rehföldt.
2.8. The EESC notes that technological and material changes in timber construction will also change the organisation of work and the skills required. This creates overlaps between the construction and timber sectors and between traditional occupations in these two sectors. Adjustments to the existing curricula for individual occupations, or even redesigning occupations, are a must in this regard and should be coordinated at European level. The objective of attractive occupations with a wide range of tasks and corresponding organisation of the work will also help to make the construction and timber sectors more attractive.

2.9. The EESC believes that, due to the rapid changes in working methods (digitalisation, robotics, artificial intelligence, new machineries), education, training and lifelong learning of the workforce in the field of timber construction is more important than ever. Education and training must be the result of social dialogue with the involvement of all social partners.

3. Specific comments

3.1. Increasing levels of timber construction can be expected to make a significant contribution to strengthening regional value chains and reducing environmental footprints. From a materials point of view, timber construction presents a very effective contribution to developing a bioeconomy, particularly if there is a greater emphasis on care and maintenance throughout the entire lifecycle of timber construction, including design. In addition, in order to avoid environmental displacement effects, wood should only be sourced from places that have certified forest land (under the FSC and PEFC forest certification schemes) and whose raw wood production potential exceeds their own needs.

3.2. The EESC considers the nature of land requirements for timber production and the type of management (intensive, extensive, monoculture, organic) and sourcing (conventional or sustainable) to be of key importance for the sustainability of timber construction as a whole. Particularly in view of the desire to increase the level of timber construction in the construction sector, it is crucial, when increasing the amount of land used and converting land to wood production, to take consistent account of sustainability and biodiversity objectives.

3.3. Tests on the ground show that, from a life cycle assessment point of view, timber construction has proved to be more advantageous overall than other construction methods, such as reinforced concrete. In particular, it performs significantly better on the impact indicator for assessing global warming potential, producing only 57% of the potential of reinforced concrete construction (*). 

3.4. The EESC highlights that analysis of studies distinguishing timber construction from solid construction has shown that, in almost all cases, timber construction may have a lower environmental impact in the life cycle indicators (a) primary energy demand (total and non-renewable) and (b) global warming potential. This is independent of the construction materials chosen for the solid construction and of the specific type of timber construction (†).

3.5. The level of prefabrication in timber construction is much higher than in solid construction, which means that work on site is less weather dependent, and a larger proportion of the construction is carried out in optimal working conditions in the workshop. However, the higher degree of vertical integration requires more planning and thus a longer planning lead time.

3.6. The EESC notes that the shorter construction times in timber construction result in lower construction site overheads and shorter periods of provision. Prefabrication allows for fewer transport journeys to the site. Particularly on sites with potential in urban areas, timber construction can quickly create new living space, for example by adding new storeys or extensions.

3.7. Timber construction allows larger living spaces with the same external dimensions, because it often incorporates the insulation into the loadbearing structure, whereas they are separate in the case of solid construction. This means that timber construction allows for a slimmer external wall with the same thickness of insulation.

3.8. The EESC expects timber construction to offer additional potential in other, non-residential types of building use (e.g. office, storage and laboratory buildings), as well as in housing.

(*) https://www.berlin.de/nachhaltige-beschaffung/studien/holz-versus-stahlbetonbauweise/
3.9. The EESC notes that, as with all types of construction, high-quality design and execution is of great importance for the life cycle of the structure. This requires, in particular, well-trained architects and engineers, and a European planning directive that provides the right regulatory framework to support the professions. In the planning sector in particular, it must be ensured, via changes to the law and appropriate training for contracting entities, that contracts for services are awarded using quality-based competition (\(^\text{6}\)).

3.10. Taking into account the latest effects of the earthquakes in Turkey but also from previous earthquakes as well as the forecasts of experts for upcoming events, the EESC believes that people living in earthquake-prone areas should be encouraged to build wooden houses and buildings.

3.11. In manufacturing companies, production can be optimised and simplified using Industry 5.0 technologies, leading to a reduction in energy use and thus in carbon emissions from the production process. In addition, the prefabrication of components in factories means that construction sites can be made more efficient and produce less waste, as the components only need to be assembled on site. This leads to a reduction in energy consumption for transport and in the amount of waste generated (\(^\text{7}\)).


President
of the Consultative Commission on Industrial Change
Pietro Francesco DE LOTTO

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