

Official Journal of the European Union

L 420



English edition

Legislation

Volume 64

25 November 2021

Contents

I *Legislative acts*

REGULATIONS

- ★ **Council Regulation (EU) 2021/2048 of 23 November 2021 temporarily suspending autonomous Common Customs Tariff duties on imports of certain industrial products into the Canary Islands** 1

II *Non-legislative acts*

REGULATIONS

- ★ **Commission Implementing Regulation (EU) 2021/2049 of 24 November 2021 renewing the approval of the active substance cypermethrin as a candidate for substitution in accordance with Regulation (EC) No 1107/2009 of the European Parliament and of the Council concerning the placing of plant protection products on the market, and amending the Annex to Commission Implementing Regulation (EU) No 540/2011 ⁽¹⁾** 6
- ★ **Commission Implementing Regulation (EU) 2021/2050 of 24 November 2021 concerning the authorisation of the preparation of *Bacillus velezensis* CECT 5940 as a feed additive for turkeys for fattening, turkeys reared for breeding, minor poultry species for fattening and reared for breeding and ornamental birds (except for reproduction) (holder of authorisation: Evonik Operations GmbH) ⁽¹⁾** 16
- ★ **Commission Implementing Regulation (EU) 2021/2051 of 24 November 2021 concerning the authorisation of a preparation of *Bacillus velezensis* PTA-6507, *Bacillus velezensis* NRRL B-50013 and *Bacillus velezensis* NRRL B-50104 as a feed additive for turkeys for fattening (holder of authorisation: Danisco Animal Nutrition represented by Genencor International B.V.) ⁽¹⁾** 19

⁽¹⁾ Text with EEA relevance.

EN

Acts whose titles are printed in light type are those relating to day-to-day management of agricultural matters, and are generally valid for a limited period.

The titles of all other acts are printed in bold type and preceded by an asterisk.

- ★ **Commission Implementing Regulation (EU) 2021/2052 of 24 November 2021 specifying technical items of data sets of the sample survey in the income and living conditions domain on Labour market and housing, Intergenerational transmission of advantages and disadvantages, Housing difficulties, and the 2023 ad hoc subject on Households energy efficiency pursuant to Regulation (EU) 2019/1700 of the European Parliament and of the Council ⁽¹⁾ 23**

DECISIONS

- ★ **Commission Decision (EU) 2021/2053 of 8 November 2021 on the sectoral reference document on best environmental management practices, environmental performance indicators and benchmarks of excellence for the fabricated metal products manufacturing sector for the purposes of Regulation (EC) No 1221/2009 of the European Parliament and of the Council ⁽¹⁾ 55**
- ★ **Commission Decision (EU) 2021/2054 of 8 November 2021 on the sectoral reference document on best environmental management practices, environmental performance indicators and benchmarks of excellence for the telecommunications and information and communication technologies (ICT) services sector for the purposes of Regulation (EC) No 1221/2009 of the European Parliament and of the Council ⁽¹⁾ 87**
- ★ **Commission Implementing Decision (EU) 2021/2055 of 23 November 2021 amending Implementing Decision (EU) 2021/182 to set out the breakdown by Member State of REACT-EU resources for the year 2022 (notified under document C(2021) 8271) 123**
- ★ **Commission Implementing Decision (EU) 2021/2056 of 24 November 2021 establishing the equivalence, for the purpose of facilitating the right of free movement within the Union, of COVID-19 certificates issued by the Republic of Togo to the certificates issued in accordance with Regulation (EU) 2021/953 of the European Parliament and of the Council ⁽¹⁾ 126**
- ★ **Commission Implementing Decision (EU) 2021/2057 of 24 November 2021 establishing the equivalence, for the purpose of facilitating the right of free movement within the Union, of COVID-19 certificates issued by the Republic of Singapore to the certificates issued in accordance with Regulation (EU) 2021/953 of the European Parliament and of the Council ⁽¹⁾ 129**

Corrigenda

- ★ **Corrigendum to Council Decision (CFSP) 2021/2032 of 19 November 2021 on an assistance measure under the European Peace Facility to support military units trained by the EU Training Mission in Mozambique (OJ L 415, 22.11.2021) 132**

⁽¹⁾ Text with EEA relevance.

I

(Legislative acts)

REGULATIONS

COUNCIL REGULATION (EU) 2021/2048

of 23 November 2021

temporarily suspending autonomous Common Customs Tariff duties on imports of certain industrial products into the Canary Islands

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 349 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 Parliament ⁽¹⁾,

Having regard to the opinion of the European Economic and Social Committee ⁽²⁾,

Acting in accordance with a special legislative procedure,

Whereas:

- (1) In accordance with Council Regulation (EU) No 1386/2011 ⁽³⁾, the duty suspension for certain capital goods for commercial or industrial use, imported into the Canary Islands, is to expire on 31 December 2021.
- (2) In April 2021, the Government of Spain requested the prolongation of the suspension of the autonomous Common Customs Tariff duties for a number of products in accordance with Article 349 of the Treaty. Measures established by Regulation (EU) No 1386/2011 positively contributed to the development of the Canary Islands' economy, in particular in industry and construction, thus reducing the severe impact of economic and commercial disadvantages caused by the remoteness, insularity and small size of those islands.
- (3) The Canary Islands' economy continues to be negatively affected by the small size of the islands' market, its fragmentation and remoteness from continental Europe, a particularly high level of unemployment and higher production and distribution costs than those of economic operators in continental Europe. While the Canary Islands' unemployment rate showed some improvement up to 2019, unemployment increased from 20,5 % in 2019 to 22,6 % in 2020, well above an average unemployment rate in 2020 of 15,5 % in Spain and of 7,1 % in the Member States collectively (Eurostat, 2021).
- (4) Moreover, the COVID-19 pandemic halted tourism activity in the Canary Islands which, in 2020, led to an estimated drop of around 20 % in the GDP. In addition, there was a contraction in the construction and industrial activity with an estimated decline of 13 %, in comparison to 2019.

⁽¹⁾ Opinion of 5 October 2021 (not yet published in the Official Journal).

⁽²⁾ Opinion of 20 October 2021 (not yet published in the Official Journal).

⁽³⁾ Council Regulation (EU) No 1386/2011 of 19 December 2011 temporarily suspending autonomous Common Customs Tariff duties on imports of certain industrial products into the Canary Islands (OJ L 345, 29.12.2011, p. 1).

- (5) It is therefore appropriate to prolong the suspension of the Common Customs Tariff duties for certain goods as listed in Annexes I and II to Regulation (EU) No 1386/2011 in order to ensure sustainability of the positive effects of Regulation (EU) No 1386/2011, contribute to the diversification of the economy, ensure constant growth and the creation of jobs in industry and construction, enhance innovation, reduce the dependence of the local economy on the service sector and complement other measures dedicated to the stabilisation of the economic and social environment in the Canary Islands.
- (6) In addition to the product categories covered by Regulation (EU) No 1386/2011, the Government of Spain has requested the suspension of the Common Customs Tariff duties for seven new product categories falling under CN codes 3903 19, 5603 94, 5604 10, 7326 90, 7607 20, 8441 40 and 8479 90. That request should be accepted as those suspensions, which include suspensions for machines for industrial purposes and raw materials, would strengthen the economy of the Canary Islands.
- (7) In order to ensure that only economic operators located on the territory of the Canary Islands benefit from those tariff measures, the suspensions should be made conditional on the end-use of the products, in accordance with Regulation (EU) No 952/2013 of the European Parliament and of the Council ⁽⁴⁾ and Commission Implementing Regulation (EU) 2015/2447 ⁽⁵⁾.
- (8) In case of a deflection of trade and in order to ensure uniform conditions for the implementation of this Regulation, implementing powers should be conferred on the Commission allowing the Commission to temporarily withdraw the suspension. Those powers should be exercised in accordance with Regulation (EU) No 182/2011 of the European Parliament and of the Council ⁽⁶⁾.
- (9) In order to ensure continuity after the expiration of the provisions of Regulation (EU) No 1386/2011, it is appropriate to apply the measures provided in this Regulation from 1 January 2022 until 31 December 2031,

HAS ADOPTED THIS REGULATION:

Article 1

From 1 January 2022 to 31 December 2031, the Common Customs Tariff duties referred to in Article 56(2), point (c), of Regulation (EU) No 952/2013, applicable to imports into the Canary Islands of capital goods for commercial or industrial use, currently falling under the CN codes listed in Annex I to this Regulation, shall be suspended in full.

Those capital goods shall be used in accordance with the relevant provisions of Regulation (EU) No 952/2013 and of Regulation (EU) 2015/2447 for a period of at least 24 months after their release into free circulation by economic operators located in the Canary Islands.

Article 2

From 1 January 2022 to 31 December 2031, the Common Customs Tariff duties referred to in Article 56(2), point (c), of Regulation (EU) No 952/2013, applicable to imports into the Canary Islands of raw materials, parts and components, currently falling under the CN codes listed in Annex II to this Regulation, and used for industrial transformation or maintenance in the Canary Islands, shall be suspended in full.

⁽⁴⁾ Regulation (EU) No 952/2013 of the European Parliament and of the Council of 9 October 2013 laying down the Union Customs Code (OJ L 269, 10.10.2013, p. 1).

⁽⁵⁾ Commission Implementing Regulation (EU) 2015/2447 of 24 November 2015 laying down detailed rules for implementing certain provisions of Regulation (EU) No 952/2013 of the European Parliament and of the Council laying down the Union Customs Code (OJ L 343, 29.12.2015, p. 558).

⁽⁶⁾ 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).

Article 3

The suspension of duties referred to in Articles 1 and 2 shall be subject to end-use customs supervision in accordance with Article 254 of Regulation (EU) No 952/2013.

Article 4

1. Where the Commission has reason to believe that any suspension laid down in this Regulation has led to a deflection of trade for a specific product, it shall be empowered to adopt implementing acts in order to temporarily withdraw the suspension with regard to that product for a period not longer than 12 months. Such implementing acts shall be adopted in accordance with the examination procedure referred to in Article 5(2).

Import duties for products for which the suspension has been temporarily withdrawn shall be secured by a guarantee, and the release of the products concerned for free circulation in the Canary Islands shall be conditional upon the provision of such guarantee.

2. Where the Council decides, in accordance with the procedure laid down in the Treaty, within the 12-month period referred to in paragraph 1, that the suspension is to be definitively withdrawn, the amounts of duties secured by guarantees shall be collected definitively.

3. Where the Council has not adopted a decision that the suspension should definitively be withdrawn within the 12-month period referred to in paragraph 2, the guarantees shall be released.

Article 5

1. The Commission shall be assisted by the Customs Code Committee, established by Article 285(1) of Regulation (EU) No 952/2013.

2. Where reference is made to this paragraph, Article 5 of Regulation (EU) No 182/2011 shall apply.

Article 6

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

It shall apply from 1 January 2022.

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

Done at Brussels, 23 November 2021.

For the Council
The President
G. DOVŽAN

ANNEX I

Capital goods for commercial or industrial use currently falling under CN codes ⁽¹⁾:

4011 20	8418 61 00	8519 20	9006 30 00
4011 30 00	8418 69 00	8701	9006 53
4011 70 00	8418 91 00	8702	9006 59
4011 80 00	8418 99	8704 21	9007 10 00
4011 90 00	8427	8704 22	9007 20 00
5608	8431 20 00	8704 23	9008 50 00
6403 40 00	8441 40 00	8704 31	9010 10 00
6403 51 05	8450 11 90	8704 32	9011 20 90
6403 59 05	8450 12 00	8704 41	9030 33 20
6403 91 05	8450 19 00	8704 42	9106
6403 99 05	8450 20 00	8704 43	9107 00 00
8415	8450 90 00	8704 51	9207
8418 30 80	8472 30 00	8704 52	9506 91 90
8418 40 80	8479 90	8704 60	9507 10 00
8418 50	8501	8704 90 00	9507 20 90
		8705	9507 30 00

⁽¹⁾ As defined in Commission Implementing Regulation (EU) 2021/1832 of 12 October 2021 amending Annex I to Council Regulation (EEC) No 2658/87 on the tariff and statistical nomenclature and on the Common Customs Tariff (OJ L 385, 29.10.2021, p. 1).

ANNEX II

Raw materials, parts and components used for agricultural purposes, industrial transformation or maintenance currently falling under CN codes ⁽¹⁾:

3901	5208	5507 00 00	7601
3902 10 00	5209	5508 10 10	7607 20
3903 11 00	5210	5508 20 10	8529 90
3903 19 00	5212	5509	8706 00
3904 10 00	5401 10 12	5510	8707
3906 10 00	5401 10 14	5512	8708
4407 21	5401 20 10	5513	8714
4407 22	5402	5514	9002 90 00
4407 23	5403	5515	9006 91 00
4407 25	5404 11 00	5516	9007 91 00
4407 26	5404 90	5603 94	9007 92 00
4407 29	5407	5604 10 00	9008 90 00
4407 99 40	5408	6001	9010 90 80
4410	5501	6002	9104 00 00
4412	5502	6217 90	9108
5108	5503	6305	9109
5110 00 00	5504	6309 00 00	9110
5111	5505	6406	9111
5112	5506	7326 90	9112
5205			9114

⁽¹⁾ As defined in Commission Implementing Regulation (EU) 2021/1832 of 12 October 2021 amending Annex I to Council Regulation (EEC) No 2658/87 on the tariff and statistical nomenclature and on the Common Customs Tariff (OJ L 385, 29.10.2021, p. 1).

II

(Non-legislative acts)

REGULATIONS

COMMISSION IMPLEMENTING REGULATION (EU) 2021/2049

of 24 November 2021

renewing the approval of the active substance cypermethrin as a candidate for substitution in accordance with Regulation (EC) No 1107/2009 of the European Parliament and of the Council concerning the placing of plant protection products on the market, and amending the Annex to Commission Implementing Regulation (EU) No 540/2011

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC ⁽¹⁾, and in particular Article 20(1) in conjunction with Article 24(1) thereof,

Whereas:

- (1) Commission Directive 2005/53/EC ⁽²⁾ included cypermethrin as an active substance in Annex I to Council Directive 91/414/EEC ⁽³⁾.
- (2) Active substances included in Annex I to Directive 91/414/EEC are deemed to have been approved under Regulation (EC) No 1107/2009 and are listed in Part A of the Annex to Commission Implementing Regulation (EU) No 540/2011 ⁽⁴⁾.
- (3) The approval of the active substance cypermethrin, as set out in Part A of the Annex to Implementing Regulation (EU) No 540/2011, expires on 31 October 2022.
- (4) An application for the renewal of the approval of cypermethrin was submitted in accordance with Article 1 of Commission Implementing Regulation (EU) No 844/2012 ⁽⁵⁾ within the time period provided for in that Article.
- (5) The applicants submitted the supplementary dossiers required in accordance with Article 6 of Implementing Regulation (EU) No 844/2012. The application was found to be complete by the rapporteur Member State.

⁽¹⁾ OJ L 309, 24.11.2009, p. 1.

⁽²⁾ Commission Directive 2005/53/EC of 16 September 2005 amending Council Directive 91/414/EEC to include chlorothalonil, chlorotoluron, cypermethrin, daminozide and thiophanate-methyl as active substances (OJ L 241, 17.9.2005, p. 51).

⁽³⁾ Council Directive 91/414/EEC of 15 July 1991 concerning the placing of plant protection products on the market (OJ L 230, 19.8.1991, p. 1).

⁽⁴⁾ Commission Implementing Regulation (EU) No 540/2011 of 25 May 2011 implementing Regulation (EC) No 1107/2009 of the European Parliament and of the Council as regards the list of approved active substances (OJ L 153, 11.6.2011, p. 1).

⁽⁵⁾ Commission Implementing Regulation (EU) No 844/2012 of 18 September 2012 setting out the provisions necessary for the implementation of the renewal procedure for active substances, as provided for in Regulation (EC) No 1107/2009 of the European Parliament and of the Council concerning the placing of plant protection products on the market (OJ L 252, 19.9.2012, p. 26).

- (6) The rapporteur Member State prepared a draft renewal assessment report in consultation with the co-rapporteur Member State and submitted it to the European Food Safety Authority ('the Authority') and the Commission on 8 May 2017.
- (7) The Authority made the supplementary summary dossier available to the public. The Authority also circulated the draft renewal assessment report to the applicants and to the Member States for comments and launched a public consultation on it. The Authority forwarded the comments received to the Commission.
- (8) On 8 August 2018, the Authority communicated to the Commission its conclusion ⁽⁶⁾ on whether cypermethrin can be expected to meet the approval criteria provided for in Article 4 of Regulation (EC) No 1107/2009. Following discussions with the Member States, the Authority was mandated by the Commission to examine additional risk mitigation measures that were not included in the Authority's conclusion. In its statement on risk mitigation measures on cypermethrin published on 4 October 2019 ⁽⁷⁾, the Authority presented the levels of the necessary drift reduction and the measures that would be needed to demonstrate low risk to the non-target organisms, in particular aquatic organisms and non-target arthropods, including bees. The Commission presented a draft renewal report for cypermethrin to the Standing Committee on Plants, Animals, Food and Feed on 24-25 January 2019.
- (9) As regards the criteria to identify endocrine disrupting properties introduced by Commission Regulation (EU) 2018/605 ⁽⁸⁾, on the basis of the available scientific information summarised in the conclusion of the Authority, the Commission considers that cypermethrin is not to be considered as having endocrine disrupting properties.
- (10) The Commission invited the applicants to submit comments on the conclusion of the Authority and, in accordance with the third paragraph of Article 14(1) of Implementing Regulation (EU) No 844/2012, on the renewal report. The applicants submitted comments, which have been carefully examined.
- (11) The representative uses are spray applications outdoors, for which the approval criteria provided for in Article 4 of Regulation (EC) No 1107/2009 are satisfied provided that appropriate mitigation measures are taken to ensure the required protection level for aquatic organisms and non-targeted arthropods including bees. Therefore, it has been established with respect to one or more representative uses of at least one plant protection product containing cypermethrin that the approval criteria provided for in Article 4 of Regulation (EC) No 1107/2009 are satisfied where appropriate conditions and restrictions according to Article 6 of Regulation (EC) No 1107/2009 are set.
- (12) The risk assessment for the renewal of the approval of cypermethrin is based on a limited number of representative uses, which however do not restrict the uses for which plant protection products containing cypermethrin may be authorised. It is therefore appropriate not to maintain the restriction to use as an insecticide.
- (13) The Commission, however, considers that cypermethrin is a candidate for substitution pursuant to Article 24 of Regulation (EC) No 1107/2009. Given that cypermethrin is a mixture of eight isomers, and it contains a significant proportion of non-active isomers, it fulfils the condition set out in the fourth indent of point 4 of Annex II to Regulation (EC) No 1107/2009.
- (14) It is therefore appropriate to renew the approval of cypermethrin as a candidate for substitution.

⁽⁶⁾ EFSA Journal 2018;16(8):5402. Conclusion on the peer review of the pesticide risk assessment of the active substance cypermethrin. Available online: www.efsa.europa.eu.

⁽⁷⁾ <https://www.efsa.europa.eu/en/efsajournal/pub/5822>.

⁽⁸⁾ Commission Regulation (EU) 2018/605 of 19 April 2018 amending Annex II to Regulation (EC) No 1107/2009 by setting out scientific criteria for the determination of endocrine disrupting properties (OJ L 101, 20.4.2018, p. 33).

- (15) In accordance with Article 14(1) of Regulation (EC) No 1107/2009 in conjunction with Article 6 thereof and in the light of current scientific and technical knowledge, it is, however, necessary to provide for certain conditions and restrictions. It is, in particular, appropriate to require further confirmatory information.
- (16) In order to increase the confidence in the conclusion that cypermethrin does not have endocrine disrupting properties, the applicants should provide an updated assessment, in accordance with point 2.2(b) of Annex II to Regulation (EC) No 1107/2009, of the criteria laid down in points 3.6.5 and 3.8.2 of Annex II to Regulation (EC) No 1107/2009, as amended by Regulation (EU) 2018/605 and in accordance with the guidance for the identification of endocrine disruptors ⁽⁹⁾.
- (17) Implementing Regulation (EU) No 540/2011 should therefore be amended accordingly.
- (18) Commission Implementing Regulation (EU) 2021/1449 ⁽¹⁰⁾ extended the approval period of cypermethrin to 31 October 2022 in order to allow the renewal process to be completed before the expiry of the approval period of that active substance. However, given that a decision on renewal has been taken ahead of that extended expiry date, this Regulation shall apply as soon as possible.
- (19) The measures provided for in this Regulation are in accordance with the opinion of the Standing Committee on Plants, Animals, Food and Feed,

HAS ADOPTED THIS REGULATION:

Article 1

Renewal of the approval of the active substance

The approval of the active substance cypermethrin is renewed as set out in Annex I.

Article 2

Amendments to Implementing Regulation (EU) No 540/2011

The Annex to Implementing Regulation (EU) No 540/2011 is amended in accordance with Annex II to this Regulation.

Article 3

Entry into force and date of application

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

It shall apply from 1 February 2022.

⁽⁹⁾ Guidance for the identification of endocrine disruptors in the context of Regulations (EU) No 528/2012 and (EC) No 1107/2009. <https://www.efsa.europa.eu/en/efsajournal/pub/5311>.

⁽¹⁰⁾ Commission Implementing Regulation (EU) 2021/1449 of 3 September 2021 amending Implementing Regulation (EU) No 540/2011 as regards the extension of the approval periods of the active substances 2-phenylphenol (including its salts such as the sodium salt), 8-hydroxyquinoline, amidosulfuron, bifenox, chlormequat, chlorotoluron, clofentezine, clomazone, cypermethrin, daminozide, deltamethrin, dicamba, difenoconazole, diflufenican, dimethachlor, etofenprox, fenoxaprop-P, fenpropidin, fludioxonil, flufenacet, fosthiazate, indoxacarb, lenacil, MCPA, MCPB, nicosulfuron, paraffin oils, paraffin oil, penconazole, picloram, propaquizafop, prosulfocarb, quizalofop-P-ethyl, quizalofop-P-tefuryl, sulphur, tetraconazole, tri-allate, triflusaluron and tritosulfuron (OJ L 313, 6.9.2021, p. 20).

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

Done at Brussels, 24 November 2021.

For the Commission
The President
Ursula VON DER LEYEN

ANNEX I

Common Name, Identification Numbers	IUPAC Name	Purity (%)	Date of approval	Expiration of approval	Specific provisions
Cypermethrin CAS No 52315-07-8 CIPAC No 332	(RS)- α -cyano-3-phenoxybenzyl (1RS,3RS;1RS,3SR)-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate or (RS)- α -cyano-3-phenoxybenzyl-(1RS)-cis-trans-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate	920 g/kg cis:trans: 40/60 to 60/40 The following impurities are of toxicological concern and must not exceed the following levels in the technical material: hexane: 5g/kg	1 February 2022	31 January 2029	<p>Authorisations shall be limited to professional users.</p> <p>When authorising plant protection products containing cypermethrin for spray applications outdoors, in order to ensure the protection of non-target organisms, in particular aquatic organisms and non-target arthropods, including bees:</p> <ul style="list-style-type: none"> — risk mitigation measures achieving reduction of drift shall be required that lead to exposure $\leq 5,8$ mg a.s./ha in off-crop areas and, in addition, for spring applications to concentrations in water bodies $\leq 0,0038$ μg a.s./L, — only uses outside flowering of the crop and when no flowering weeds are present may be authorised. <p>For the implementation of the uniform principles, as referred to in Article 29(6) of Regulation (EC) No 1107/2009, the conclusions of the renewal report on cypermethrin, and in particular Appendices I and II thereto, shall be taken into account. Member States shall pay particular attention to:</p> <ul style="list-style-type: none"> — the protection of aquatic organisms, non-target arthropods, including bees; — the consumer risk assessment; — the technical specification of the active substance used in plant protection products.

				<p>Where considered appropriate, Member States shall set monitoring requirements when granting authorisations in accordance with Article 6(i) of the Regulation (EC) No 1107/2009, in order to complement the monitoring under Directives of the European Parliament and of the Council 2000/60/EC ⁽²⁾ and 2009/128/EC ⁽³⁾.</p> <p>The applicant shall submit to the Commission, the Member States and the Authority confirmatory information as regards:</p> <ol style="list-style-type: none"> 1. the toxicological profile of the metabolites bearing the 3-phenoxybenzoyl moiety; 2. the relative toxicity of individual cypermethrin isomers, in particular the enantiomer (1S cis αR); 3. the effect of water treatment processes on the nature of residues present in surface and groundwater, when surface water or groundwater is abstracted for drinking water. 4. Points 3.6.5 and 3.8.2 of Annex II to Regulation (EC) No 1107/2009, as amended by Regulation (EU) 2018/605. <p>The applicant shall submit:</p> <ul style="list-style-type: none"> — the information referred to in point 1 by 15 December 2022; — the information referred to in point 2 by 15 December 2023; and — the information referred to in point 3 within two years from the date of publication, by the Commission, of a guidance document on evaluation of the effect of water treatment processes on the nature of residues present in surface and groundwater.
--	--	--	--	--

					As regards Points 3.6.5 and 3.8.2 of Annex II to Regulation (EC) No 1107/2009, as amended by Regulation (EU) 2018/605 an updated assessment of the information already submitted and, where relevant, further information to confirm the absence of endocrine activity shall be submitted by 15 December 2023.
--	--	--	--	--	--

⁽¹⁾ Further details on the identity and the specification of the active substance are provided in the renewal report.

⁽²⁾ Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (OJ L 327, 22.12.2000, p. 1).

⁽³⁾ Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides (OJ L 309, 24.11.2009, p. 71).

The Annex to Implementing Regulation (EU) No 540/2011 is amended as follows:

(1) in Part A, entry 103 on cypermethrin is deleted;

(2) in Part E, the following entry is added:

'14	Cypermethrin CAS No 52315-07-8 CIPAC No 332	(RS)- α -cyano-3-phenoxybenzyl (1RS,3RS;1RS,3SR)-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate or (RS)- α -cyano-3-phenoxybenzyl-(1RS)-cis-trans-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate	920 g/kg cis:trans: 40/60 to 60/40 The following impurities are of toxicological concern and must not exceed the following levels in the technical material: hexane: 5g/kg	1 February 2022	31 January 2029	<p>Authorisations shall be limited to professional users.</p> <p>When authorising plant protection products containing cypermethrin for spray applications outdoors, in order to ensure the protection of non-target organisms, in particular aquatic organisms and non-target arthropods, including bees:</p> <ul style="list-style-type: none"> — risk mitigation measures achieving reduction of drift shall be required that lead to exposure $\leq 5,8$ mg a.s./ha in off-crop areas and, in addition, for spring applications to concentrations in water bodies $\leq 0,0038$ μg a.s./L, — only uses outside flowering of the crop and when no flowering weeds are present may be authorised. <p>For the implementation of the uniform principles, as referred to in Article 29(6) of Regulation (EC) No 1107/2009, the conclusions of the renewal report on cypermethrin, and in particular Appendices I and II thereto, shall be taken into account. Member States shall pay particular attention to:</p> <ul style="list-style-type: none"> — the protection of aquatic organisms, non-target arthropods, including bees; — consumer risk assessment; — the technical specification of the active substance used in plant protection products.
-----	---	--	---	-----------------	-----------------	---

					<p>Where considered appropriate, Member States shall set monitoring requirements when granting authorisations in accordance with Article 6(i) of the Regulation (EC) No 1107/2009, in order to complement the monitoring under Directives of the European Parliament and of the Council 2000/60/EC (*) and 2009/128/EC (**).</p> <p>The applicant shall submit to the Commission, the Member States and the Authority confirmatory information as regards:</p> <ol style="list-style-type: none"> 1. the toxicological profile of the metabolites bearing the 3-phenoxybenzoyl moiety; 2. the relative toxicity of individual cypermethrin isomers, in particular the enantiomer (1S cis αR); 3. the effect of water treatment processes on the nature of residues present in surface and groundwater, when surface water or groundwater is abstracted for drinking water. 4. Points 3.6.5 and 3.8.2 of Annex II to Regulation (EC) No 1107/2009, as amended by Regulation (EU) 2018/605 <p>The applicant shall submit:</p> <ul style="list-style-type: none"> — the information referred to in point 1 by 15 December 2022; — the information referred to in point 2 by 15 December 2023; and — the information referred to in point 3 within two years from the date of publication, by the Commission, of a guidance document on evaluation of the effect of water treatment processes on the nature of residues present in surface and groundwater.
--	--	--	--	--	--

COMMISSION IMPLEMENTING REGULATION (EU) 2021/2050

of 24 November 2021

concerning the authorisation of the preparation of *Bacillus velezensis* CECT 5940 as a feed additive for turkeys for fattening, turkeys reared for breeding, minor poultry species for fattening and reared for breeding and ornamental birds (except for reproduction) (holder of authorisation: Evonik Operations GmbH)

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EC) No 1831/2003 of the European Parliament and of the Council of 22 September 2003 on additives for use in animal nutrition ⁽¹⁾, and in particular Article 9(2) thereof,

Whereas:

- (1) Regulation (EC) No 1831/2003 provides for the authorisation of additives for use in animal nutrition and for the grounds and procedures for granting such an authorisation.
- (2) In accordance with Article 7 of Regulation (EC) No 1831/2003 an application was submitted for the authorisation of the preparation of *Bacillus velezensis* CECT 5940. That application was accompanied by the particulars and documents required under Article 7(3) of Regulation (EC) No 1831/2003.
- (3) The application concerns the authorisation of the preparation of *Bacillus velezensis* CECT 5940 (previously taxonomically identified as *Bacillus amyloliquefaciens* CECT 5940) as a feed additive for turkeys for fattening, turkeys reared for breeding, minor poultry species for fattening and reared for breeding and ornamental birds (except for reproduction), to be classified in the category 'zootechnical additives'.
- (4) The European Food Safety Authority ('the Authority') concluded in its opinion of 5 May 2021 ⁽²⁾ that, under the proposed conditions of use, the preparation of *Bacillus amyloliquefaciens* CECT 5940 does not have adverse effects on animal health, consumer safety or the environment. It also concluded that this preparation is not an irritant to skin/eye or a skin sensitiser but should be considered a respiratory sensitiser. Therefore, the Commission considers that appropriate protective measures should be taken to prevent adverse effects on human health, in particular as regards the users of the additive. The Authority also concluded that the preparation has the potential to be efficacious as a zootechnical additive in feedingstuffs. The Authority does not consider that there is a need for specific requirements of postmarket monitoring. It also verified the report on the methods of analysis of the feed additive in feed submitted by the Reference Laboratory set up by Regulation (EC) No 1831/2003.
- (5) The assessment of the preparation of *Bacillus amyloliquefaciens* CECT 5940 shows that the conditions for authorisation, as provided for in Article 5 of Regulation (EC) No 1831/2003, are satisfied. Accordingly, the use of that substance should be authorised as specified in the Annex to this Regulation.
- (6) The measures provided for in this Regulation are in accordance with the opinion of the Standing Committee on Plants, Animals, Food and Feed,

⁽¹⁾ OJ L 268, 18.10.2003, p. 29.⁽²⁾ EFSA Journal 2021;19(6):6620.

HAS ADOPTED THIS REGULATION:

Article 1

The preparation specified in the Annex, belonging to the additive category 'zootechnical additives' and to the functional group 'gut flora stabilisers', is authorised as an additive in animal nutrition, subject to the conditions laid down in that Annex.

Article 2

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

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

Done at Brussels, 24 November 2021.

For the Commission
The President
Ursula VON DER LEYEN

Identification number of the additive	Name of the holder of authorisation	Additive	Composition, chemical formula, description, analytical method	Species or category of animal	Maximum age	Minimum content	Maximum content	Other provisions	End of period of authorisation
						CFU/kg of complete feedingstuff with a moisture content of 12 %			
Category of zootechnical additives. Functional group: gut flora stabilisers.									
4b1822i	Evonik Operations GmbH	Bacillus velezensis CECT 5940	Additive composition: Preparation of <i>Bacillus velezensis</i> CECT 5940 containing a minimum of: —1 × 10 ⁹ CFU/g additive Solid form	Turkeys for fattening Turkeys reared for breeding Minor poultry species for fattening and reared for breeding Ornamental birds (except for reproduction)	-	1 × 10 ⁹	-	1. In the directions for use of the additive and premixture, the storage conditions and stability to heat treatment shall be indicated. 2. May be used in feed containing the permitted coccidiostats: diclazuril and monensin sodium. 3. For users of the additive and premixtures, feed business operators shall establish operational procedures and organisational measures to address potential risks resulting from their use. Where those risks cannot be eliminated or reduced to a minimum by such procedures and measures, the additive and premixtures shall be used with personal protective equipment, including breathing protection.	15.12.2031
			Characterisation of the active substance: Viable spores of <i>Bacillus velezensis</i> ECT 5940						
			Analytical method ⁽¹⁾: Enumeration: spread plate method using tryptone soya agar (EN 15784); Identification: pulsed-field gel electrophoresis (PFGE) method.						

⁽¹⁾ Details of the analytical methods are available at the following address of the Reference Laboratory: <https://ec.europa.eu/jrc/en/eurl/feed-additives/evaluation-reports>.

COMMISSION IMPLEMENTING REGULATION (EU) 2021/2051

of 24 November 2021

concerning the authorisation of a preparation of *Bacillus velezensis* PTA-6507, *Bacillus velezensis* NRRL B-50013 and *Bacillus velezensis* NRRL B-50104 as a feed additive for turkeys for fattening (holder of authorisation: Danisco Animal Nutrition represented by Genencor International B.V.)

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EC) No 1831/2003 of the European Parliament and of the Council of 22 September 2003 on additives for use in animal nutrition ⁽¹⁾, and in particular Article 9(2) thereof,

Whereas:

- (1) Regulation (EC) No 1831/2003 provides for the authorisation of additives for use in animal nutrition and for the grounds and procedures for granting and renewing such authorisation.
- (2) In accordance with Article 7 of Regulation (EC) No 1831/2003 an application was submitted for the authorisation of a preparation of *Bacillus velezensis* PTA-6507, *Bacillus velezensis* NRRL B-50013 and *Bacillus velezensis* NRRL B-50104. That application was accompanied by the particulars and documents required under Article 7(3) of Regulation (EC) No 1831/2003.
- (3) The application concerns the authorisation of the preparation of *Bacillus velezensis* PTA-6507, *Bacillus velezensis* NRRL B-50013 and *Bacillus velezensis* NRRL B-50104, previously identified as *Bacillus amyloliquefaciens* PTA-6507, *Bacillus amyloliquefaciens* NRRL B-50013 and *Bacillus amyloliquefaciens* NRRL B-50104 as a feed additive for turkeys for fattening, to be classified in the category 'zootechnical additives'.
- (4) The European Food Safety Authority ('the Authority') concluded in its opinion of 17 March 2021 ⁽²⁾ that under the proposed conditions of use, the preparation of *Bacillus velezensis* PTA-6507, *Bacillus velezensis* NRRL B-50013 and *Bacillus velezensis* NRRL B-50104 does not have an adverse effect on animal health, consumer safety or the environment. It also concluded that this preparation is not irritant to skin and eyes and is not a dermal sensitiser but given the proteinaceous nature of the active agents, the preparation should be considered a respiratory sensitiser. Therefore, the Commission considers that appropriate protective measures should be taken to prevent adverse effects on human health, in particular as regards the users of the additive. The Authority also concluded that the preparation has the potential to be efficacious as zootechnical additive in feedingstuffs. The Authority does not consider that there is a need for specific requirements of postmarket monitoring. It also verified the report on the methods of analysis of the feed additive in feed submitted by the Reference Laboratory set up by Regulation (EC) No 1831/2003.
- (5) The assessment of the preparation of *Bacillus velezensis* PTA-6507, *Bacillus velezensis* NRRL B-50013 and *Bacillus velezensis* NRRL B-50104 shows that the conditions for authorisation, as provided for in Article 5 of Regulation (EC) No 1831/2003, are satisfied. Accordingly, the use of the product should be authorised as specified in the Annex to this Regulation.
- (6) The measures provided for in this Regulation are in accordance with the opinion of the Standing Committee on Plants, Animals, Food and Feed,

⁽¹⁾ OJ L 268, 18.10.2003, p. 29.⁽²⁾ EFSA Journal 2021;19(4):6535.

HAS ADOPTED THIS REGULATION:

Article 1

The preparation specified in the Annex, belonging to the additive category 'zootechnical additives' and to the functional group 'gut flora stabilisers', is authorised as an additive in animal nutrition, subject to the conditions laid down in that Annex.

Article 2

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

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

Done at Brussels, 24 November 2021.

For the Commission
The President
Ursula VON DER LEYEN

ANNEX

Identification number of the additive	Name of the holder of authorisation	Additive	Composition, chemical formula, description, analytical method	Species or category of animal	Maximum age	Minimum content	Maximum content	Other provisions	End of period of authorisation
						CFU/kg of complete feedingstuff with a moisture content of 12 %			

Category: zootechnical additives**Functional group: gut flora stabilisers**

4b1827i	Danisco Animal Nutrition represented by Genencor International B.V.	<i>Bacillus velezensis</i> PTA-6507, <i>Bacillus. velezensis</i> NRRL B-50013 and <i>Bacillus. velezensis</i> NRRL B-50104	<i>Additive composition</i> Preparation of <i>Bacillus velezensis</i> PTA-6507, <i>Bacillus. velezensis</i> NRRL B-50013 and <i>Bacillus. velezensis</i> NRRL B-50104 containing a minimum $2,5 \times 10^9$ CFU/g additive (total) with a minimum of bacterial concentration of $8,3 \times 10^8$ of each strain/g additive. Solid form	Turkeys for fattening	-	$7,5 \times 10^7$	-	1. In the directions for use of the additive and premixtures, the storage conditions and stability to heat treatment shall be indicated. 2. May be used in feed containing the following permitted coccidiostats: lasalocid A sodium, monensin sodium and diclazuril. 3. For users of the additive and premixtures, feed business operators shall establish operational procedures and organisational measures to address potential risks resulting from its use. Where those risks cannot	15 December 2031
			<i>Characterisation of the active substance</i> Viable spores of <i>Bacillus velezensis</i> PTA-6507, <i>Bacillus. velezensis</i> NRRL B-50013 and <i>Bacillus. velezensis</i> NRRL B-50104						
			<i>Analytical method ⁽¹⁾</i> Identification and enumeration of <i>Bacillus velezensis</i> PTA-6507, <i>Bacillus. velezensis</i> NRRL B-50013 and <i>Bacillus. velezensis</i> NRRL B-50104 in the feed additive, premixtures and feedingstuffs						

			<ul style="list-style-type: none"> — Identification: Pulsed Field Gel Electrophoresis (PFGE) — Enumeration: Spread plate method following heat treatment – EN 15784 					be eliminated or reduced to a minimum by such procedures and measures, the additive and premixtures shall be used with personal protective equipment, including breathing protection.	
--	--	--	---	--	--	--	--	---	--

(¹) Details of the analytical methods are available at the following address of the Reference Laboratory: <https://ec.europa.eu/jrc/en/eurl/feed-additives/evaluation-reports>

COMMISSION IMPLEMENTING REGULATION (EU) 2021/2052**of 24 November 2021****specifying technical items of data sets of the sample survey in the income and living conditions domain on Labour market and housing, Intergenerational transmission of advantages and disadvantages, Housing difficulties, and the 2023 ad hoc subject on Households energy efficiency pursuant to Regulation (EU) 2019/1700 of the European Parliament and of the Council****(Text with EEA relevance)**

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EU) 2019/1700 of the European Parliament and the Council of 10 October 2019 establishing a common framework for European statistics relating to persons and households, based on data at individual level collected from samples, amending Regulations (EC) No 808/2004, (EC) No 452/2008 and (EC) No 1338/2008 of the European Parliament and of the Council, and repealing Regulation (EC) No 1177/2003 of the European Parliament and of the Council and Council Regulation (EC) No 577/98 ⁽¹⁾, and in particular Article 7(1) thereof,

Whereas:

- (1) To ensure that implementation of the income and living conditions domain is conducted accurately, the Commission should specify the technical items of the data sets on Labour market and Housing, Intergenerational transmission of advantages and disadvantages, Housing difficulties, and the 2023 ad hoc subject on Households energy efficiency.
- (2) Income and living conditions domain provides information required by the European Semester and the European Pillar of Social Rights, in particular on income distribution, poverty and social exclusion. It also provides information for various other EU policies related to living conditions and poverty. There is a strong policy need for detailed information on Labour market and Housing, Intergenerational transmission of advantages and disadvantages, Housing difficulties. The ad hoc subject of Households energy efficiency is of key importance especially in view of the Recommendation for Member States on tackling energy poverty.
- (3) The measures provided for in this Regulation are in accordance with the opinion of the European Statistical System Committee established by Article 7 of Regulation (EC) No 223/2009 of the European Parliament and of the Council ⁽²⁾.

HAS ADOPTED THIS REGULATION:

Article 1

The technical characteristics of the data sets in the income and living conditions domain as regards the detailed topics Labour market and housing, Intergenerational transmission of advantages and disadvantages, Housing difficulties, and the 2023 ad hoc subject on Households energy efficiency are set out in the Annex and refer to:

- (a) the variable's identifier;
- (b) the variable's name;

⁽¹⁾ OJ L 261I, 14.10.2019, p. 1.

⁽²⁾ 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).

- (c) the modality label and code;
- (d) the collection unit;
- (e) the mode of collection;
- (f) the reference period.

Article 2

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

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

Done at Brussels, 24 November 2021.

For the Commission
The President
Ursula VON DER LEYEN

ANNEX

Technical characteristics of variables

Variable's identifier	Variable name	Modality code	Modality label	Collection unit	Mode of collection	Reference period
Detailed topic: Characteristics of the workplace						
PL230	Public/private employment sector	1	Public	All current household members aged 16 and over or selected respondent (where applies)	Personal interview (proxy as an exception for persons temporarily away or in incapacity) or registers	Current
		2	Private			
		3	Mixed			
		99	Don't know			
PL230_F	Public/private employment sector (flag)	1	Collected via survey/ interview			
		2	Collected from administrative data			
		3	Imputed			
		4	Not possible to establish a source			
		-1	Missing			
		-2	Not applicable (PL032≠1)			
		-3	Not selected respondent			
PW100	Job satisfaction	0-10	Not at all satisfied to Completely satisfied	All current household members aged 16 and over or selected respondent (where applies)	Personal interview (proxy as an exception for persons temporarily away or in incapacity)	Current
		99	Do not know			
PW100_F	Job Satisfaction (flag)	1	Filled			
		-1	Missing			

		-2	Not applicable (PL032*1)			
		-3	Not selected respondent			
		-7	Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
PL260	Usual hours worked per week	1 - 99	Number of hours	All current household members aged 16 and over or selected respondent (where applies)	Personal interview (proxy as an exception for persons temporarily away or in incapacity) or registers	Income reference period
PL260_F	Usual hours worked per week (flag)	1	Collected via survey/ interview			
		2	Collected from administrative data			
		3	Imputed			
		4	Not possible to establish a source			
		-1	Missing			
		-2	Not applicable (PL211*1-4)			
		-3	Not selected respondent			
		-7	Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
PL130	Size of the local unit for main job	1-9	Exact number of persons, if between 1 and 9	All current household members aged 16 and over or selected	Personal interview (proxy as an exception for persons	Current
		10	10 to 19 persons			

		11	20 to 49 persons	respondent (where applies)	temporarily away or in incapacity) or registers	
		12	50 to 249 persons			
		13	250 persons or more			
		14	Do not know but less than 10 persons			
		15	Do not know but 10 persons or more			
PL130_F	Size of the local unit for main job (flag)	1	Collected via survey/ interview			
		2	Collected from administrative data			
		3	Imputed			
		4	Not possible to establish a source			
		-1	Missing			
		-2	Not applicable (PL032#1)			
		-3	Not selected respondent			
		-7	Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			

Detailed topic: Employment status

PL035	Worked at least one hour during the previous week	1	Yes	All current household members aged 16 and over or selected respondent (where applies)	Personal interview (proxy as an exception for persons temporarily away or in incapacity) or registers	Previous week
		2	No			
PL035_F	Worked at least one hour during the previous week (flag)	1	Collected via survey/ interview			
		2	Collected from administrative data			

		3	Imputed			
		4	Not possible to establish a source			
		-1	Missing			
		-2	Not applicable (RB081#16-74)			
		-3	Not selected respondent			
		-7	Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			
PL025	Available for work	1	Yes	All current household members aged 16 and over or selected respondent (where applies)	Personal interview (proxy as an exception for persons temporarily away or in incapacity)	Current
		2	No			
PL025_F	Available for work (flag)	1	Filled			
		-1	Missing			
		-2	Not applicable (PL035=1)			
		-3	Not selected respondent			
		-7	Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			
PL020	Actively looking for job	1	Yes	All current household members aged 16 and over or selected respondent (where applies)	Personal interview (proxy as an exception for persons temporarily away or in incapacity)	Past four weeks
		2	No			

PL020_F	Actively looking for job (flag)	1 -1 -2 -3 -7	Filled Missing Not applicable (PL035=1) Not selected respondent Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
PL120	Reason for working less than 30 hours	1 2 3 4 5 6 7	Undergoing education or training Personal illness or disability Wants to work more hours but cannot find a job(s) or work(s) of more hours Do not want to work more hours Number of hours in all job(s) are considered as a full-time job Housework, looking after children or other persons Other reasons	All current household members aged 16 and over or selected respondent (where applies)	Personal interview (proxy as an exception for persons temporarily away or in incapacity)	Current
PL120_F	Reason for working less than 30 hours (flag)	1 -1 -2 -3 -7	Filled Missing Not applicable (PL032≠1 or (PL032=1 and PL060 + PL100 >30)) Not selected respondent Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			

PL280	Length of registration of unemployment	1	The whole period	All current household members aged 16 and over or selected respondent (where applies)	Personal interview (proxy as an exception for persons temporarily away or in incapacity) or registers	Period of unemployment during the income reference period
		2	Part of the period			
		3	Not registered at all			
PL280_F	Length of registration of unemployment (flag)	1	Collected via survey/ interview			
		2	Collected from administrative data			
		3	Imputed			
		4	Not possible to establish a source			
		-1	Missing			
		-2	Not applicable (PL211#5 or RB081#16-74)			
		-3	Not selected respondent			
		-7	Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			

Detailed topic: Educational attainment-details, including education interrupted or abandoned

PE030	Year when highest level of education was attained		year (Four digits)	All current household members aged 16 and over or selected respondent (where applies)	Personal interview (proxy as an exception for persons temporarily away or in incapacity) or registers	Current
PE030_F	Year when highest level of education was attained (flag)	1	Collected via survey/ interview			
		2	Collected from administrative data			

		3	Imputed			
		4	Not possible to establish a source			
		-1	Missing			
		-2	Not applicable (PE041 = 000)			
		-3	Not selected respondent			
		-7	Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
PE050	Education interrupted or abandoned	1	Yes, one	All current household members aged 16-34 or selected respondent (where applies)	Personal interview (proxy as an exception for persons temporarily away or in incapacity) or registers	Lifetime
		2	Yes, several			
		3	No			
PE050_F	Education interrupted or abandoned (flag)	1	Collected via survey/ interview			
		2	Collected from administrative data			
		3	Imputed			
		4	Not possible to establish a source			
		-1	Missing			
		-2	Not applicable (RB081 ≠ 16-34 or never attended school)			
		-3	Not selected respondent			
		-7	Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			

Detailed topic: Housing conditions details, including deprivation and imputed rent						
HS160	Problems with the dwelling: too dark, not enough light	1 2	Yes No	Household	Household respondent	Current
HS160_F	Problems with the dwelling: too dark, not enough light (flag)	1 -1 -7	Filled Missing Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
HS170	Noise from neighbours or from the street	1 2	Yes No	Household	Household respondent	Current
HS170_F	Noise from neighbours or from the street (flag)	1 -1 -7	Filled Missing Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
HC020	Size of the dwelling in square meters	0-999	Square meters	Household	Household respondent or registers	Current
HC020_F	Size of the dwelling in square meters (flag)	1 2 3 4 -1 -7	Collected via survey/ interview Collected from administrative data Imputed Not possible to establish a source Missing Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
HC080	Overall satisfaction with the dwelling	1 2	Very dissatisfied Dissatisfied	Household	Household respondent	Current

		3	Satisfied			
		4	Very satisfied			
HC080_F	Overall satisfaction with the dwelling (flag)	1 -1 -7	Filled Missing Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
HY030	Imputed rent	0-99 999 999,99	Amount (national currency)	Household	Estimated	Income reference period
HY030_F	Imputed rent (flag)	1 -1 -7	Filled Missing Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
HH040	Leaking roof, damp walls/ floors/ foundation, or rot in window frames or floor	1 2	Yes No	Household	Household respondent	Current
HH040_F	Leaking roof, damp walls/ floors/ foundation, or rot in window frames or floor (flag)	1 -1 -7	Filled Missing Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
HS140	Financial burden of the total housing cost	1 2 3	A heavy burden A slight burden Not a burden at all	Household	Household respondent	Current
HS140_F	Financial burden of the total housing cost (flag)	1 -1 -2	Filled Missing Not applicable (no housing cost)			

		-7	Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
HS180	Pollution, grime or other environmental problems	1 2	Yes No	Household	Household respondent	Current
HS180_F	Pollution, grime or other environmental problems (flag)	1 -1 -7	Filled Missing Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
HS190	Crime, violence or vandalism in the area	1 2	Yes No	Household	Household respondent	Current
HS190_F	Crime, violence or vandalism in the area (flag)	1 -1 -7	Filled Missing Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
HH081	Bath or shower in dwelling (OPTIONAL)	1 2 3	Yes, for sole use of the household Yes, shared No	Household	Household respondent	Current
HH081_F	Bath or shower in dwelling (OPTIONAL) (flag)	1 -1 -7 -8	Filled Missing Not applicable (Not collected according to the implementation of the “multiannual rolling planning”) Not applicable (variable not collected)			

HH091	Indoor flushing toilet for sole use of the household (OPTIONAL)	1	Yes, for sole use of the household	Household	Household respondent	Current
		2	Yes, shared			
		3	No			
HH091_F	Indoor flushing toilet for sole use of the household (OPTIONAL) (flag)	1	Filled			
		-1	Missing			
		-7	Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
		-8	Not applicable (variable not collected)			

Detailed topic: Intergenerational transmission of advantages and disadvantages

PT220	Type of household when respondent was around 14 years old	1	Private household	All current household members or selected respondent (if applicable) aged 25-59	Personal interview (proxy as an exception for persons temporarily away or in incapacity)	When respondent was around 14 years old
		2	Lived in a collective household or institution			
PT220_F	Type of household when respondent was around 14 years old (flag)	1	Filled			
		-1	Missing			
		-3	Not selected respondent			
		-6	Not in age range (25-59)			
		-7	Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
PT230	Presence of mother when respondent was around 14 years old	1	Yes	All current household members or selected respondent (if applicable) aged 25-59	Personal interview (proxy as an exception for persons temporarily away or in incapacity)	When respondent was around 14 years old
		2	No, she did not live in the same household but I had contact			
		3	No, she did not live in the same household and I had no contact			

		4	No, deceased			
PT230_F	Presence of mother when respondent was around 14 years old (flag)	1	Filled			
		-1	Missing			
		-2	Not applicable (lived in a collective household or institution)			
		-3	Not "selected respondent"			
		-6	Not in age range (25-59)			
		-7	Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			
PT240	Presence of father when respondent was around 14 years old	1	Yes	All current household members or selected respondent (if applicable) aged 25-59	Personal interview (proxy as an exception for persons temporarily away or in incapacity)	When respondent was around 14 years old
		2	No, he did not live in the same household but I had contact			
		3	No, he did not live in the same household and I had no contact			
		4	No, deceased			
PT240_F	Presence of father when respondent was around 14 years old (flag)	1	Filled			
		-1	Missing			
		-2	Not applicable (lived in a collective household or institution)			
		-3	Not "selected respondent"			
		-6	Not in age range (25-59)			
		-7	Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			

PT070	Citizenship of the father (OPTIONAL)	99	Country of main citizenship (SCL GEO alpha-2 code) Don't know	All current household members or selected respondent (if applicable) aged 25-59	Personal interview (proxy as an exception for persons temporarily away or in incapacity) or registers	When respondent was around 14 years old
PT070_F	Citizenship of the father (OPTIONAL) (flag)	1 2 3 4 -1 -2 -3 -5 -6 -7 -8	Collected via survey/ interview Collected from administrative data Imputed Not possible to establish a source Missing Not applicable (lived in a collective household or institution) Not selected respondent Not applicable (father not present and no contact or deceased) Not in age range (25-59) Not applicable (Not collected according to the implementation of the "multiannual rolling planning") Not applicable (variable not collected)			
PT100	Citizenship of the mother (OPTIONAL)	99	Country of main citizenship (SCL GEO alpha-2 code) Don't know	All current household members or selected	Personal interview (proxy as an exception for persons	When respondent was around 14 years old

				respondent (if applicable) aged 25-59	temporarily away or in incapacity) or registers	
PT100_F	Citizenship of the mother (OPTIONAL) (flag)	1	Collected via survey/ interview			
		2	Collected from administrative data			
		3	Imputed			
		4	Not possible to establish a source			
		-1	Missing			
		-2	Not applicable (lived in a collective household or institution)			
		-3	Not selected respondent			
		-5	Not applicable (mother not present and no contact or deceased)			
		-6	Not in age range (25-59)			
		-7	Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			
		-8	Not applicable (variable not collected)			
PT110	Highest level of education attained by the father	1	Low level (less than primary, primary education or lower secondary education)	All current household members or selected respondent (if applicable) aged 25-59	Personal interview (proxy as an exception for persons temporarily away or in incapacity) or registers	When respondent was around 14 years old
		2	Medium level (upper secondary education and past-secondary education non-tertiary education)			

		3	High level (short-cycle tertiary education, bachelor's or equivalent level, master's or equivalent level, doctoral or equivalent level)			
		99	Don't know			
PT110_F	Highest level of education attained by the father (flag)	1	Collected via survey/ interview			
		2	Collected from administrative data			
		3	Imputed			
		4	Not possible to establish a source			
		-1	Missing			
		-2	Not applicable (lived in a collective household or institution)			
		-3	Not selected respondent			
		-5	Not applicable (father not present and no contact or deceased)			
		-6	Not in age range (25-59)			
		-7	Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			
PT120	Highest level of education attained by the mother	1	Low level (less than primary, primary education or lower secondary education)	All current household members or selected respondent (if applicable) aged 25-59	Personal interview (proxy as an exception for persons temporarily away or in incapacity) or registers	When respondent was around 14 years old
		2	Medium level (upper secondary education and past-secondary education non-tertiary education)			

		3	High level (short-cycle tertiary education, bachelor's or equivalent level, master's or equivalent level, doctoral or equivalent level)			
		99	Don't know			
PT120_F	Highest level of education attained by the mother (flag)	1	Collected via survey/ interview			
		2	Collected from administrative data			
		3	Imputed			
		4	Not possible to establish a source			
		-1	Missing			
		-2	Not applicable (lived in a collective household or institution)			
		-3	Not selected respondent			
		-5	Not applicable (mother not present and no contact or deceased)			
		-6	Not in age range (25-59)			
		-7	Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			
PT130	Activity status of the father when respondent was around 14 years old	1	Employed	All current household members or selected respondent (if applicable) aged 25-59	Personal interview (proxy as an exception for persons temporarily away or in incapacity) or registers	When respondent was around 14 years old
		2	Self-employed (including family worker)			
		3	Unemployed			
		4	In retirement or in early retirement			
		5	Fulfilling domestic tasks			

		6	Inability to work due to long-standing health problems'			
		7	Other inactive person			
		99	Don't know			
PT130_F	Activity status of the father when respondent was around 14 years old (flag)	1	Collected via survey/ interview			
		2	Collected from administrative data			
		3	Imputed			
		4	Not possible to establish a source			
		-1	Missing			
		-2	Not applicable (lived in a collective household or institution)			
		-3	Not selected respondent			
		-5	Not applicable (father not present and no contact or deceased)			
		-6	Not in age range (25-59)			
		-7	Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			
PT160	Activity status of the mother when respondent was around 14 years old	1	Employed	All current household members or selected respondent (if applicable) aged 25-59	Personal interview (proxy as an exception for persons temporarily away or in incapacity) or registers	When respondent was around 14 years old
		2	Self-employed (including family worker)			
		3	Unemployed			
		4	In retirement or in early retirement			
		5	Fulfilling domestic tasks			
		6	Inability to work due to long-standing health problems'			

		7	Other inactive person			
		99	Don't know			
PT160_F	Activity status of the mother when respondent was around 14 years old (flag)	1	Collected via survey/ interview			
		2	Collected from administrative data			
		3	Imputed			
		4	Not possible to establish a source			
		-1	Missing			
		-2	Not applicable (lived in a collective household or institution)			
		-3	Not selected respondent			
		-5	Not applicable (mother not present and no contact or deceased)			
		-6	Not in age range (25-59)			
		-7	Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			
PT150	Main occupation of the father when respondent was around 14 years old (OPTIONAL)	99	ISCO-08 (COM) code (1 digit) Don't know	All current household members or selected respondent (if applicable) aged 25-59	Personal interview (proxy as an exception for persons temporarily away or in incapacity) or registers	When respondent was around 14 years old
PT150_F	Main occupation of the father when respondent was around 14 years old (OPTIONAL) (flag)	1	Collected via survey/ interview			
		2	Collected from administrative data			
		3	Imputed			

		4	Not possible to establish a source			
		-1	Missing			
		-2	Not applicable (lived in a collective household or institution)			
		-3	Not selected respondent			
		-4	Not applicable father not employed			
		-5	Not applicable (father not present and no contact or deceased)			
		-6	Not in age range (25-59)			
		-7	Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			
		-8	Not applicable (variable not collected)			
PT180	Main occupation of the mother when respondent was around 14 years old (OPTIONAL)	99	ISCO-08 (COM) code (1 digit) Don't know	All current household members or selected respondent (if applicable) aged 25-59	Personal interview (proxy as an exception for persons temporarily away or in incapacity) or registers	When respondent was around 14 years old
PT180_F	Main occupation of the mother when respondent was around 14 years old (OPTIONAL) (flag)	1	Collected via survey/ interview			
		2	Collected from administrative data			
		3	Imputed			
		4	Not possible to establish a source			
		-1	Missing			

		-2	Not applicable (lived in a collective household or institution)			
		-3	Not selected respondent			
		-4	Not applicable mother not employed			
		-5	Not applicable (mother not present and no contact or deceased)			
		-6	Not in age range (25-59)			
		-7	Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			
		-8	Not applicable (variable not collected)			
PT210	Tenancy status when respondent was around 14 years old	1	Owned	All current household members or selected respondent (if applicable) aged 25-59	Personal interview (proxy as an exception for persons temporarily away or in incapacity) or registers	When respondent was around 14 years old
		2	Rented			
		3	Accommodation provided for free			
		99	Don't know			
PT210_F	Tenancy status when respondent was around 14 years old (flag)	1	Collected via survey/ interview			
		2	Collected from administrative data			
		3	Imputed			
		4	Not possible to establish a source			
		-1	Missing			
		-2	Not applicable (lived in a collective household or institution)			

		-3	Not selected respondent			
		-6	Not in age range (25-59)			
		-7	Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			
PT190	Financial situation of the household when respondent was around 14 years old	1	Very bad	All current household members or selected respondent (if applicable) aged 25-59	Personal interview (proxy as an exception for persons temporarily away or in incapacity)	When respondent was around 14 years old
		2	Bad			
		3	Moderately bad			
		4	Moderately good			
		5	Good			
		6	Very good			
		99	Don't know			
PT190_F	Financial situation of the household when respondent was around 14 years old (flag)	1	Filled			
		-1	Missing			
		-2	Not applicable (lived in a collective household or institution)			
		-3	Not selected respondent			
		-6	Not in age range (25-59)			
		-7	Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			
PT260	Basic school needs (books and equipment for school) met when respondent was around 14 years old	1	Yes	All current household members or selected respondent (if applicable) aged 25-59	Personal interview (proxy as an exception for persons temporarily away or in incapacity)	When respondent was around 14 years old
		2	No, due to financial reasons			
		3	No, other reason			

PT260_F	Basic school needs (books and equipment for school) met when respondent was around 14 years old (flag)	1	Filled			
		-1	Missing			
		-2	Not applicable (lived in a collective household or institution)			
		-3	Not selected respondent			
		-6	Not in age range (25-59)			
		-7	Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			
PT270	Having daily meal with meat, chicken, fish (or vegetarian equivalent) when respondent was around 14 years old	1	Yes	All current household members or selected respondent (if applicable) aged 25-59	Personal interview (proxy as an exception for persons temporarily away or in incapacity)	When respondent was around 14 years old
		2	No, due to financial reasons			
		3	No, other reason			
PT270_F	Having daily meal with meat, chicken, fish (or vegetarian equivalent) when respondent was around 14 years old (flag)	1	Filled			
		-1	Missing			
		-2	Not applicable (lived in a collective household or institution)			
		-3	Not selected respondent			
		-6	Not in age range (25-59)			
		-7	Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			
PT280	One week of annual holiday away from home when	1	Yes	All current household members or	Personal interview (proxy as an	When respondent
		2	No, due to financial reasons			

	respondent was around 14 years old	3	No, other reason	selected respondent (if applicable) aged 25-59	exception for persons temporarily away or in incapacity)	was around 14 years old
PT280_F	One week of annual holiday away from home when respondent was around 14 years old (flag)	1 -1 -2 -3 -6 -7	Filled Missing Not applicable (lived in a collective household or institution) Not selected respondent Not in age range (25-59) Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			

Detailed topic: Housing difficulties (including renting difficulties) and reasons

PHD01	Past experience of housing difficulties	1 2 3 4 5	Yes, staying with friends or relatives temporarily Yes, staying in emergency or other temporary accommodation Yes, staying in a place not intended as a permanent home Yes, sleeping rough or sleeping in public space No	All current household members aged 16 and over or selected respondent (where applies)	Personal interview (proxy as an exception for persons aged 16-24)	Lifetime
PHD01_F	Past experience of housing difficulties (flag)	1 -1 -3 -7	Filled Missing Not selected respondent Not applicable (Not collected according to the			

			implementation of the “multiannual rolling planning”)			
PHD07	When housing difficulties took place (OPTIONAL)	1 2	Within last 5 years More than 5 years ago	All current household members aged 16 and over or selected respondent (where applies)	Personal interview (proxy as an exception for persons aged 16-24)	Lifetime
PHD07_F	When housing difficulties took place (OPTIONAL) (flag)	1 -1 -2 -3 -7 -8	Filled Missing Not applicable (PHD01=5) Not selected respondent Not applicable (Not collected according to the implementation of the “multiannual rolling planning”) Not applicable (variable not collected)			
PHD02	Duration of the most recent experience of housing difficulties (OPTIONAL)		Duration (number of months)	All current household members aged 16 and over or selected respondent (where applies)	Personal interview	Lifetime
PHD02_F	Duration of the most recent experience of housing difficulties (OPTIONAL) (flag)	1 -1 -2 -3 -7	Filled Missing Not applicable (PHD01=5) Not selected respondent Not applicable (Not collected according to the			

		-8	implementation of the “multiannual rolling planning”) Not applicable (variable not collected)			
PHD03	Main reason for past housing difficulties	1 2 3 4 5 6 7 8	Relationship or family problems Health problems Unemployment End of rental contract Uninhabitable accommodation Leaving an institution after a long stay and no home to go to Financial problems/ Insufficient income Other	All current household members aged 16 and over or selected respondent (where applies)	Personal interview (proxy as an exception for persons aged 16-24)	Lifetime
PHD03_F	Main reason for past housing difficulties (flag)	1 -1 -2 -3 -7	Filled Missing Not applicable (PHD01=5) Not selected respondent Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
PHD05	Exit from housing difficulties	1 2	Existing, new or renewed relationship with family or partner Addressed health problems	All current household members aged 16 and over or selected	Personal interview (proxy as an exception for persons aged 16-24)	Lifetime

		3 4 5 6	Gained employment Moved into social or subsidised private housing Other Still experiencing housing difficulties	respondent (where applies)		
PHD05_F	Exit from housing difficulties (flag)	1 -1 -2 -3 -7	Filled Missing Not applicable (PHD01=5) Not selected respondent Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
PHD06	Renting difficulties	1 2	Yes No	All current household members aged 16 and over or selected respondent (where applies)	Personal interview (proxy as an exception for persons temporarily away or in incapacity)	Last 12 months
PHD06_F	Renting difficulties (flag)	1 -1 -2 -3 -7	Filled Missing Not applicable (HH021=1,2,5) Not selected respondent Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			

2023 ad hoc subject- Households energy efficiency						
HC001	Heating system used	1	District heating network/teleheating	Household	Household respondent or registers	Current
		2	Central heating system			
		3	Individual heating system			
		4	Non-fixed heating			
		5	No heating at all			
		99	Don't know			
HC001_F	Heating system used (flag)	1	Collected via survey/interview			
		2	Collected from administrative data			
		3	Imputed			
		4	Not possible to establish a source			
		-1	Missing			
		-7	Not applicable (Not collected according to the implementation of the "multiannual rolling planning")			
HC002	Main energy source	1	Electricity	Household	Household respondent or registers	Current
		2	Gas (natural or propane)			
		3	Oil			
		4	Biomass			
		5	Wood logs			
		6	Coal			
		7	Renewable energy			
		8	Other			
		99	Don't know			
HC002_F	Main energy source (flag)	1	Collected via survey/interview			
		2	Collected from administrative data			

		3 4 -1 -7	Imputed Not possible to establish a source Missing Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
HC003	Renovation (thermal insulation, windows or heating system)	1 2 3 4 99	Yes- three or more measures Yes-two measures Yes-one measure No Don't know	Household	Household respondent	Last 5 years
HC003_F	Renovation (thermal insulation, windows or heating system) (flag)	1 -1 -7	Filled Missing Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
HC060	Inability to keep the dwelling comfortably warm during winter	1 2	Yes No	Household	Household respondent	Usual
HC060_F	Inability to keep the dwelling comfortably warm during winter (flag)	1 -1 -7	Filled Missing Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
HC070	Inability to keep the dwelling comfortably cool during summer (OPTIONAL)	1 2	Yes No	Household	Household respondent	Usual

HC070_F	Inability to keep the dwelling comfortably cool during summer (OPTIONAL) (flag)	1 -1 -7 -8	Filled Missing Not applicable (Not collected according to the implementation of the “multiannual rolling planning”) Not applicable (variable not collected)			
HC004	Type of windows (OPTIONAL)	1 2 3 4 5 99	Only single glazing Only double glazing Only triple glazing Mixed single and double/triple glazing Mixed double and triple glazing Don't know	Household	Household respondent	Current
HC004_F	Type of windows (OPTIONAL) (flag)	1 -1 -7 -8	Filled Missing Not applicable (Not collected according to the implementation of the “multiannual rolling planning”) Not applicable (variable not collected)			
HC005	Year of construction (OPTIONAL)	1 2 3 4 5 6 99	Before 1945 1946-1960 1961-1980 1981-2000 2001-2020 2021 or after Don't know	Household	Household respondent or registers	Current

HC005_F	Year of construction (OPTIONAL) (flag)	1	Collected via survey/ interview			
		2	Collected from administrative data			
		3	Imputed			
		4	Not possible to establish a source			
		-1	Missing			
		-7	Not applicable (Not collected according to the implementation of the “multiannual rolling planning”)			
		-8	Not applicable (variable not collected)			

DECISIONS

COMMISSION DECISION (EU) 2021/2053

of 8 November 2021

on the sectoral reference document on best environmental management practices, environmental performance indicators and benchmarks of excellence for the fabricated metal products manufacturing sector for the purposes of Regulation (EC) No 1221/2009 of the European Parliament and of the Council

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EC) No 1221/2009 of the European Parliament and of the Council of 25 November 2009 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS), repealing Regulation (EC) No 761/2001 and Commission Decisions 2001/681/EC and 2006/193/EC ⁽¹⁾, and in particular Article 46(1) thereof,

Whereas:

- (1) Regulation (EC) No 1221/2009 obliges the Commission to develop sectoral reference documents for specific economic sectors. The documents must include best environmental management practices, environmental performance indicators and, where appropriate, benchmarks of excellence and rating systems identifying environmental performance levels. Organisations registered or preparing to become registered under the eco-management and audit scheme established by Regulation (EC) No 1221/2009 are required to take the sectoral reference documents into account when developing their environmental management system and when assessing their environmental performance in their environmental statement, or updated environmental statement, prepared in accordance with Annex IV to that Regulation.
- (2) Regulation (EC) No 1221/2009 required the Commission to establish a working plan setting out an indicative list of sectors to be considered priority sectors for the adoption of sectoral and cross-sectoral reference documents. The Commission has, in that working plan ⁽²⁾, identified the fabricated metal products manufacturing sector as a priority sector.
- (3) The sectoral reference document should identify, by way of best environmental management practices for that sector ⁽³⁾, concrete actions to improve the overall environmental management of companies in the sector in three main areas, which cover, from the perspective of the manufacturers, the main environmental aspects of the fabricated metal products manufacturing companies. Those main areas are cross cutting issues, optimisation of utilities and manufacturing processes. Specific environmental performance indicators and benchmarks of excellence for a particular best environmental management practice should also be given whenever possible and meaningful.

⁽¹⁾ OJ L 342, 22.12.2009, p. 1.

⁽²⁾ Communication from the Commission – Establishment of the working plan setting out an indicative list of sectors for the adoption of sectoral and cross-sectoral reference documents, under Regulation (EC) No 1221/2009 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS) (OJ C 358, 8.12.2011, p. 2).

⁽³⁾ Antonopoulos I., Canfora P., Gaudillat P., Dri M., Eder P., Best Environmental Management Practice in the Fabricated Metal Products manufacturing sector, EUR 30025 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-14299-7, doi:10.2760/894966, JRC119281; https://susproc.jrc.ec.europa.eu/product-bureau/sites/default/files/inline-files/JRC_BEMP_fabricated_metal_product_manufacturing_report.pdf

- (4) In order to allow organisations in the fabricated metal products manufacturing sector, environmental verifiers, national authorities, accreditation and licensing bodies and other operators sufficient time to prepare for introduction of the sectoral reference document for the fabricated metal products manufacturing sector, the date of application of this Decision should be deferred.
- (5) In developing the sectoral reference document, the Commission has consulted with Member States and other stakeholders in accordance with Regulation (EC) No 1221/2009.
- (6) The measures provided for in this Decision are in accordance with the opinion of the Committee established by Article 49 of Regulation (EC) No 1221/2009,

HAS ADOPTED THIS DECISION:

Article 1

The sectoral reference document on best environmental management practices, sector environmental performance indicators and benchmarks of excellence for the fabricated metal products manufacturing sector is set out in the Annex.

Article 2

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

It shall apply from 25 March 2022.

Done at Brussels, 8 November 2021.

For the Commission
The President
Ursula VON DER LEYEN

ANNEX

Contents

1. INTRODUCTION	58
2. SCOPE	60
3. BEST ENVIRONMENTAL MANAGEMENT PRACTICES, SECTOR ENVIRONMENTAL PERFORMANCE INDICATORS AND BENCHMARKS OF EXCELLENCE FOR THE FABRICATED METAL PRODUCTS MANUFACTURING SECTOR	64
3.1. BEMPs for cross cutting issues	64
3.1.1. Applying effective methods for environmental management	64
3.1.2. Collaboration and communication along and across the value chain	65
3.1.3. Energy management	66
3.1.4. Environmentally sound and resource efficient management of chemicals	66
3.1.5. Biodiversity management	67
3.1.6. Remanufacturing and high quality refurbishment of high value and/or large series products and components	68
3.1.7. Link to the Reference Documents on Best Available Techniques relevant for fabricated metal product manufacturing companies	69
3.2. BEMPs for optimisation of utilities	69
3.2.1. Efficient ventilation	69
3.2.2. Optimal lighting	70
3.2.3. Environmental optimisation of cooling systems	71
3.2.4. Rational and efficient use of compressed air	71
3.2.5. Use of renewable energy	72
3.2.6. Rainwater collection	73
3.3. BEMPs for manufacturing processes	73
3.3.1. Selection of resource efficient metal working fluids	73
3.3.2. Minimisation of lubricoolant consumption in metal processing	74
3.3.3. Incremental sheet metal forming as alternative for mould making	74
3.3.4. Reduction of standby energy use of metal working machines	75
3.3.5. Maintaining material value for metal residues	75
3.3.6. Multi directional forging	76
3.3.7. Hybrid machining as a method to reduce energy use	76
3.3.8. Use of predictive control for paint booth HVAC management	77
4. RECOMMENDED SECTOR-SPECIFIC KEY ENVIRONMENTAL PERFORMANCE INDICATORS	78

1. INTRODUCTION

This Sectoral Reference Document (SRD) is based on a detailed scientific and policy report ⁽¹⁾ ('Best Practice Report') developed by the European Commission's Joint Research Centre (JRC).

Relevant legal background

The Community eco-management and audit scheme (EMAS) was introduced in 1993, for voluntary participation by organisations, by Council Regulation (EEC) No 1836/93 ⁽²⁾. Subsequently, EMAS has undergone two major revisions:

Regulation (EC) No 761/2001 of the European Parliament and of the Council ⁽³⁾;

Regulation (EC) No 1221/2009 of the European Parliament and of the Council.

An important new element of the latest revision, which came into force on 11 January 2010, is Article 46 on the development of SRDs. The SRDs have to include best environmental management practices (BEMPs), environmental performance indicators for the specific sectors and, where appropriate, benchmarks of excellence and rating systems identifying performance levels.

How to understand and use this document

The eco-management and audit scheme (EMAS) is a scheme for voluntary participation by organisations committed to continuous environmental improvement. Within this framework, this SRD provides sector-specific guidance to the fabricated metal products manufacturing sector and points out a number of options for improvement as well as best practices.

The document was written by the European Commission using input from stakeholders. A Technical Working Group, comprising experts and stakeholders of the sector, led by the JRC, discussed and ultimately agreed on the best environmental management practices, sector-specific environmental performance indicators and benchmarks of excellence described in this document; these benchmarks in particular were deemed to be representative of the levels of environmental performance that are achieved by the best performing organisations in the sector.

The SRD aims to help and support all organisations that intend to improve their environmental performance by providing ideas and inspiration as well as practical and technical guidance.

The SRD is primarily addressed to organisations that are already registered with EMAS; secondly to organisations that are considering registering with EMAS in the future; and thirdly to all organisations that wish to learn more about best environmental management practices in order to improve their environmental performance. Consequently, the objective of this document is to support all organisations in the fabricated metal products manufacturing sector to focus on relevant environmental aspects, both direct and indirect, and to find information on best environmental management practices, as well as appropriate sector-specific environmental performance indicators to measure their environmental performance, and benchmarks of excellence.

How SRDs should be taken into account by EMAS-registered organisations:

Pursuant to Regulation (EC) No 1221/2009, EMAS-registered organisations are to take SRDs into account at two different levels:

1. When developing and implementing their environmental management system in light of the environmental reviews (Article 4(1)(b)):

Organisations should use relevant elements of the SRD when defining and reviewing their environmental targets and objectives in accordance with the relevant environmental aspects identified in the environmental review and policy, as well as when deciding on the actions to implement to improve their environmental performance.

⁽¹⁾ The scientific and policy report is publicly available on the JRC website at the following address: https://susproc.jrc.ec.europa.eu/activities/emas/fab_metal_prod.html. The conclusions on best environmental management practices and their applicability as well as the identified specific environmental performance indicators and the benchmarks of excellence contained in this Sectoral Reference Document are based on the findings documented in the scientific and policy report. All the background information and technical details can be found there.

⁽²⁾ Council Regulation (EEC) No 1836/93 of 29 June 1993 allowing voluntary participation by companies in the industrial sector in a Community eco-management and audit scheme (OJ L 168, 10.7.1993, p. 1).

⁽³⁾ Regulation (EC) No 761/2001 of the European Parliament and of the Council of 19 March 2001 allowing voluntary participation by organisations in a Community eco-management and audit scheme (EMAS) (OJ L 114, 24.4.2001, p. 1).

2. When preparing the environmental statement (*Article 4(1)(d) and Article 4(4)*):

- (a) Organisations should consider the relevant sector-specific environmental performance indicators in the SRD when choosing the indicators ⁽⁴⁾ to use for their reporting of environmental performance.

When choosing the set of indicators for reporting, they should take into account the indicators proposed in the corresponding SRD and their relevance with regards to the significant environmental aspects identified by the organisation in its environmental review. Indicators need only be taken into account where relevant to those environmental aspects that are judged as being most significant in the environmental review.

- (b) When reporting on environmental performance and on other factors regarding environmental performance, organisations should mention in the environmental statement how the relevant best environmental management practices and, if available, benchmarks of excellence have been taken into account.

They should describe how relevant best environmental management practices and benchmarks of excellence (which provide an indication of the environmental performance level that is achieved by best performers) were used to identify measures and actions, and possibly to set priorities, to (further) improve their environmental performance. However, implementing best environmental management practices or meeting the identified benchmarks of excellence is not mandatory, because the voluntary character of EMAS leaves the assessment of the feasibility of the benchmarks and of the implementation of the best practices, in terms of costs and benefits, to the organisations themselves.

Similarly to environmental performance indicators, the relevance and applicability of the best environmental management practices and benchmarks of excellence should be assessed by the organisation according to the significant environmental aspects identified by the organisation in its environmental review, as well as technical and financial aspects.

Elements of SRDs (indicators, BEMPs or benchmarks of excellence) not considered relevant with regards to the significant environmental aspects identified by the organisation in its environmental review should not be reported or described in the environmental statement.

EMAS participation is an ongoing process. Every time an organisation plans to improve its environmental performance (and reviews its environmental performance) it shall consult the SRD on specific topics to find inspiration about which issues to tackle next in a step-wise approach.

EMAS environmental verifiers shall check if and how the SRD was taken into account by the organisation when preparing its environmental statement (Article 18(5)(d) of Regulation (EC) No 1221/2009).

When undertaking an audit, accredited environmental verifiers will need evidence from the organisation of how the relevant elements of the SRD have been selected in light of the environmental review and taken into account. They shall not check compliance with the described benchmarks of excellence, but they shall verify evidence on how the SRD was used as a guide to identify indicators and proper voluntary measures that the organisation can implement to improve its environmental performance.

Given the voluntary nature of EMAS and SRD, no disproportionate burdens should be put on the organisations to provide such evidence. In particular, verifiers shall not require an individual justification for each of the best practices, sector-specific environmental performance indicators and benchmarks of excellence which are mentioned in the SRD and not considered relevant by the organisation in light of its environmental review. Nevertheless, they could suggest relevant additional elements for the organisation to take into account in the future as further evidence of its commitment to continuous performance improvement.

⁽⁴⁾ According to Annex IV (B.(f)) of the EMAS Regulation, the environmental statement shall contain 'a summary of the data available on the environmental performance of the organisation with respect to its significant environmental aspects. Reporting shall be on both the core environmental performance indicators and the specific environmental performance indicators as set out in Section C. Where environmental objectives and targets exist, the respective data shall be reported.' Annex IV – Section C.3. states that 'each organisation shall also report annually on its performance relating to the significant direct and indirect environmental aspects and impacts that are related to its core business activities, that are measurable and verifiable, and that are not covered already by the core indicators. Where available, the organisation shall take account of sectoral reference documents as referred to in Article 46 to facilitate the identification of relevant sector specific indicators.'

Structure of the Sectoral Reference Document

This document consists of four chapters. Chapter 1 introduces EMAS' legal background and describes how to use this document, while Chapter 2 defines the scope of this SRD. Chapter 3 briefly describes the different best environmental management practices (BEMPs) ⁽ⁱ⁾ together with information on their applicability. When specific environmental performance indicators and benchmarks of excellence could be formulated for a particular BEMP, these are also given. However, defining benchmarks of excellence was not possible for all BEMPs, either because of the limited availability of data or because of the specific conditions of each company and/or plant (type of products manufactured ranging from small prototypes and products with complex geometries, manufactured in small series or large series, to large or small components, diversity of manufacturing processes carried out in each manufacturing facility, etc.) vary to such an extent that a benchmark of excellence would not be meaningful. Even when benchmarks of excellence are given, these are not meant as targets for all companies to reach or metrics to compare the environmental performance across companies of the sector, but rather as a measure of what is possible to help individual companies assess the progress they made and motivate them to improve further. Finally, Chapter 4 presents a comprehensive table with a selection of the most relevant environmental performance indicators, associated explanations and related benchmarks of excellence.

2. SCOPE

This reference document addresses the environmental performance of the fabricated metal products manufacturing sector. The target group of this document are companies belonging to the fabricated metal products manufacturing sector, and specifically companies to the following NACE codes (according to the statistical classification of economic activities in the European Community established by Regulation (EC) No 1893/2006 ⁽ⁱⁱ⁾):

NACE Division 24 * 'Manufacture of basic metals'

24.2 Manufacture of tubes, pipes, hollow profiles and related fittings, of steel (24.20)

24.3 Manufacture of other products of first processing of steel (24.31–24.34)

24.5 Casting of metals (24.51–24.54)

NACE Division 25 'Manufacture of fabricated metal products, except machinery and equipment' (included all activities)

NACE Division 28 ** 'Manufacture of machinery and equipment n.e.c.'

28.1 Manufacture of general-purpose machinery (including only 28.14 and 28.15)

NACE Division 29 ** 'Manufacture of motor vehicles, trailers and semi-trailers'

29.3 Manufacture of other parts and accessories for motor vehicles (29.32)

NACE Division 32 ** 'Other manufacturing'

32.1 Manufacture of jewellery, bijouterie and related articles (32.11–32.13)

32.2 Manufacture of musical instruments (32.20)

32.3 Manufacture of sports goods (32.30)

32.4 Manufacture of games and toys (32.40)

32.5 Manufacture of medical and dental instruments and supplies (32.50)

⁽ⁱ⁾ A detailed description of each of the best practices, with practical guidance on how to implement them, is available in the 'Best Practice Report' published by the JRC and available online at: http://susproc.jrc.ec.europa.eu/activities/emas/documents/BEMP_FabMetProd_BackgroundReport.pdf. Organisations are invited to consult it if interested in learning more about some of the best practices described in this SRD.

⁽ⁱⁱ⁾ Regulation (EC) No 1893/2006 of the European Parliament and of the Council of 20 December 2006 establishing the statistical classification of economic activities NACE Revision 2 and amending Council Regulation (EEC) No 3037/90 as well as certain EC Regulations on specific statistical domains (OJ L 393, 30.12.2006, p. 1). NB: NACE stands for *Nomenclature statistique des Activités économiques dans la Communauté Européenne*.

^(*) Only small scale operations (considerably smaller than IED thresholds with substantially different manufacturing processes, e.g. much more manual than automated processes).

^(**) These activities are considered in scope insofar as the products concerned are composed mainly of metal.

NACE Division 33 'Repair and installation of machinery and equipment'

33.1 Repair of fabricated metal products, machinery and equipment (33.11–33.12 **)

This reference document is divided into three main sections (Table 2-1) which cover, from the perspective of the manufacturers, the main environmental aspects of the fabricated metal products manufacturing companies.

Table 2-1

Structure of the reference document for the fabricated metal products manufacturing sector and main environmental aspects addressed

Section	Description	Main environmental aspects addressed
3.1. BEMPs for the cross-cutting issues	This section encloses practices that provide guidance on how manufacturers can integrate environmental sustainability frameworks into their existing business models and management systems in order to reduce their environmental impacts.	Site management
3.2. BEMPs for the optimisation of utilities	This set of BEMPs provides guidance on how to improve the overall environmental performance of the supporting processes of the manufacturing plants, such as lighting or ventilation etc.	Utilities and maintenance
3.3. BEMPs for the manufacturing processes	This section encloses practices that improve the environmental performance of the core manufacturing operations.	Industrial processes

The direct and indirect environmental aspects presented in Table 2-2 and Table 2-3 respectively, were selected as the most commonly relevant in the sector. However, the environmental aspects to be managed by specific companies need to be assessed on a case-by-case basis.

Table 2-2

Most relevant direct environmental aspects and related main environmental pressures addressed in this document

Processes	Most relevant direct environmental aspects	Related main environmental pressures
Supporting processes	Management, procurement, supply chain management, quality control	Raw materials Energy Water Consumables Waste: non-hazardous
	Logistics, handling, storage, packaging	Raw materials Energy GHG emissions Water Consumables Emissions to air Noise, odour, vibration etc. Land use Biodiversity Waste: non hazardous

(**) These activities are considered in scope insofar as the products concerned are composed mainly of metal.

Processes	Most relevant direct environmental aspects	Related main environmental pressures
	Emission treatment	Energy Consumables Emissions to water Emissions to air Noise, Odour, vibration etc. Waste: non-hazardous, hazardous
	Utilities and maintenance	Energy Water Consumables Emissions to water Noise, odour, vibration etc. Waste: non hazardous, hazardous Land use Biodiversity
Manufacturing processes	Casting	Raw materials Energy Waste: hazardous
	Shaping	Raw materials Energy Noise, odour, vibration etc. Waste: hazardous
	Metal powder	Raw materials Energy Noise, odour, vibration etc. Waste: hazardous
	Heat treatment	Raw materials Energy Noise, odour, vibration etc. Waste: hazardous GHG gases (including F-gases, e.g. from cooling)
	Removing	Raw materials Energy Water Consumables Emissions to water Emissions to air Noise, odour, vibration etc. Waste: non-hazardous
	Additive processes	Raw materials Energy Noise, odour, vibration etc. Waste: hazardous, non hazardous
	Deformation	Raw materials Energy Noise, odour, vibration etc. Waste: hazardous

Processes	Most relevant direct environmental aspects	Related main environmental pressures
	Joining	Raw materials Energy Consumables Emissions to air Noise, odour, vibration etc. Waste: non-hazardous
	Surface treatment	Raw materials Energy Water Consumables Emissions to water Emissions to air Noise, odour, vibration etc. Waste: non-hazardous, hazardous
	Assembly	Energy Consumables Noise, odour, vibration etc. Waste: hazardous
Product and infrastructure design	Product design	Raw materials Energy Water Consumables Emissions to air
	Infrastructure design (plant level)	Raw materials Energy Water Consumables Emissions to air Emissions to water Waste: non-hazardous Land use Biodiversity
	Process design (plant level)	Raw materials Energy Water Consumables Emissions to air Emissions to water Waste: hazardous, non-hazardous

Table 2-3

Most relevant indirect environmental aspects and related main environmental pressures addressed in this document

Activities	Most relevant indirect environmental aspects	Related main environmental pressures
Upstream activities	Raw material extraction and metal production	Raw materials Energy & related GHG emissions Water Consumables Emissions to water Emissions to air
	Tools and equipment production	
Downstream activities	Use and service phase	Raw materials Energy & related GHG emissions Consumables Emissions to air Waste: hazardous, non-hazardous
	End of Life	
	Waste management	

The environmental aspects of the NACE codes under the scope of this document that are covered by the Reference Documents on Best Available Techniques (BREFs) ⁽⁷⁾, directly or indirectly linked to the manufacture of fabricated metal products manufacturing as well as by EU legislation, policy instruments and best practice guidance are excluded from the scope of this document.

3. BEST ENVIRONMENTAL MANAGEMENT PRACTICES, SECTOR ENVIRONMENTAL PERFORMANCE INDICATORS AND BENCHMARKS OF EXCELLENCE FOR THE FABRICATED METAL PRODUCTS MANUFACTURING SECTOR

3.1. BEMPs for cross cutting issues

This section is relevant for the fabricated metal products manufacturers.

3.1.1. Applying effective methods for environmental management

BEMP is to use effective methods for environmental management, in order to optimise process and product design at the production stage and reduce environmental impacts along the whole value chain. This framework encompasses two levels:

The strategic, which implies the application of circular economy and life cycle thinking approaches,

The operational, with the use of tools that ensure continuous improvement of the environmental performance such as lean management and stock reduction.

Applicability

The BEMP is broadly applicable for all companies, including SMEs. Lack of sufficient in-house technical knowledge and the need for staff training can limit the applicability of this BEMP.

⁽⁷⁾ Information on the Reference Documents on Best Available Techniques is available at: <https://eippcb.jrc.ec.europa.eu/index.html>

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i1) Resource efficiency (kg finished products/kg of material input (alternatively: kg waste produced/kg input materials in case the kg finished products are not known)).	(b1) Systematic consideration of life cycle thinking, lean management and circular economy in all strategic decisions making.
(i2) Mapping of material flows and their environmental relevance (Y/N).	(b2) New products development are assessed for environmental improvements.
(i3) On-site energy use (kWh/kg finished product or manufactured part ⁽¹⁾).	
(i4) Scope 1, 2 and 3 greenhouse gas-emissions (kg CO ₂ equivalent/kg finished product or manufactured part).	
(i5) Water use (l water/kg finished product or manufactured part).	

⁽¹⁾ The output (expressed in the indicators as kg finished product or manufactured part) can be expressed in different ways: number of parts, kg of products etc. depending on the type of products and their homogeneity/heterogeneity. Companies can choose suitable metrics to express the output.

3.1.2. Collaboration and communication along and across the value chain

BEMP is to collaborate with other companies within the sector, companies in other sectors and throughout the value chain. This collaboration can be organised as:

- sustainable sourcing and procuring of materials and other auxiliary inputs required and use of renewable energy for manufacturing operations;
- optimising resources by sharing energy and/or resources in an industrial symbiosis network;
- engaging systematically with stakeholders on the development of new environmentally friendly products and on the improvement of the environmental performance of the existing ones.

Applicability

This BEMP is broadly applicable to all size of companies in the sector, including SMEs.

Lack of sufficient in-house technical knowledge and the need for staff training implies extra costs that may constitute a significant barrier for some companies, especially for SMEs.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i6) Percentage of goods and services (% of the total value) which are environmentally certified or with a demonstrably reduced environmental impact.	(b3) All purchased goods and services meet environmental criteria established by the company.
(i7) Use of by-products ⁽¹⁾ , residual energy or other resources from other companies (kg materials from other companies/kg total input; MJ energy recovered from other companies/MJ total energy use).	(b4) Collaboration with other organisations to use energy and resources more efficiently at systemic level.
(i8) Systematic stakeholder involvement with a focus on improved environmental performance (e.g. in product design, sustainable sourcing, cooperation for improved waste management) (Y/N).	(b5) Structural engagement of stakeholders in the development of more environmentally friendly products.

(i9) Purchase of second-hand machines or use of machinery from other companies (Y/N).	
(i10) Amount of packaging waste (kg of packaging waste/kg finished product or manufactured part).	
⁽¹⁾ Companies that utilise waste materials for energy i.e. heat production by other companies, must have in place appropriate and effective emission treatments systems to avoid air pollution.	

3.1.3. Energy management

BEMP is to optimise energy use by implementing an energy management plan including systematic and detailed energy monitoring across manufacturing sites at the process level, comprising the following elements:

- establishing an energy strategy and detailed action plan;
- gaining commitment from senior management;
- defining ambitious and achievable targets and achieve continuous improvement;
- performance measurement and assessment at the process level;
- communication of energy issues across the organisation;
- staff training and encouragement for active engagement;
- investment in energy efficient equipment and consideration of energy efficiency in procurement processes.

The plan can be based on a standardised or customised format, such as ISO 50001 or as part of a global environmental management system like EMAS.

Applicability

The BEMP is applicable to all types of companies in this sector, including SMEs.

The lack of in-house technical knowledge, especially in smaller companies can be a limitation for the applicability of this BEMP. Additionally, improper integration of the elements of the energy management system and weak communication across the organisation can downgrade the performance and effectiveness of the energy management system in place.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i11) Energy use per manufactured product (kWh/kg finished product or manufactured part).	(b6) Continuous energy monitoring at process level is implemented and driving energy efficiency improvements.
(i12) Energy monitoring system at process level (Y/N).	

3.1.4. Environmentally sound and resource efficient management of chemicals

BEMP is to optimise the amounts of chemicals used for manufacturing processes, minimise the chemicals that are disposed of and substitute hazardous chemicals wherever possible with more environmentally friendly alternatives.

To achieve these aims, fabricated metal products manufacturers can implement the following measures:

- reviewing the current chemical use and management on-site;
- monitoring the chemical use at the level of individual chemicals (and not several chemicals together) and focusing on the most important chemicals used;

- reducing the chemical use wherever possible, e.g. by changing manufacturing processes, using the chemicals more efficiently, adopt business models that align incentives between chemical suppliers and users to incentivise the reduction of chemical volumes;
- replacing hazardous chemicals and substituting with alternatives with lower environmental impact;
- reducing chemical waste and outflows, e.g. by reusing or recycling chemicals; where relevant, using external expertise, such as through partial or total outsourcing of chemical management.

Applicability

The BEMP is broadly applicable by all type of companies of the sector, including SMEs.

The operation of the described chemical management system requires some technical knowledge, which may be an important barrier, especially for the SMEs.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i13) For individual chemicals used, amount of chemical applied (kg/kg finished product or manufactured part) and its classification according to Regulation (EC) 1272/2008 (CLP Regulation).	(b7) Regular (at least once a year) review the use of chemicals to minimise their use and explore opportunities for substitution.
(i14) Amount of (hazardous) chemical waste generated (kg/kg finished product or manufactured part).	

3.1.5. Biodiversity management

BEMP is to take into account direct and indirect impacts throughout the value chain and on-site manufacturing processes, by taking the following actions:

- assessing direct impacts by conducting a site review and identifying hotspots;
- conducting an ecosystem management review to identify the impacts of ecosystem services throughout the value chain;
- working with relevant (local) stakeholders to minimise any issues;
- measuring impacts by defining and monitoring relevant metrics;
- regular reporting to share information about the company's efforts.

Applicability

The BEMP is broadly applicable to all types of companies in this sector, including SMEs.

The implementation of the elements of the BEMP requires commitment from the hierarchy. It is not possible to quantify the direct benefits from the implementation of the elements of this BEMP. Similarly, the calculation of a direct return of investment when applying the elements of the BEMP is not possible as well. These two points can constitute a significant barrier especially for the SMEs.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i15) Number of projects collaborations with stakeholders to address biodiversity issues (no).	(b8) A biodiversity action plan is developed and implemented for all relevant sites (including manufacturing sites) to protect and enhance the local biodiversity.
(i16) Located in or adjacent to protected areas: size of areas under biodiversity friendly management in comparison to total area of company sites (%).	

(i17) Inventory of land or other areas, owned, leased or managed by the company in or adjacent to protected areas or areas of high biodiversity value (area, m ²). (i18) Procedure/instruments in place to analyse biodiversity related feedback from customers, stakeholders, suppliers (Y/N). (i19) Implementation of a site biodiversity action plan in all manufacturing facilities (Y/N). (i20) Total size of restored habitats and/or areas (on-site or both on-site and off-site) to compensate for damages to biodiversity caused by the company (m ²) in comparison to land used by the company (m ²).	
--	--

3.1.6. *Remanufacturing and high quality refurbishment of high value and/or large series products and components*

Remanufacturing involves dismantling a product, restoring and replacing components and testing individual parts and whole product to ensure that the product meets the same quality standards as new products manufactured nowadays accompanied with an appropriate warranty. Refurbishment refers to used products that met their original quality standards when it was first introduced in the market i.e. the refurbished product achieves the quality standard level that was in place when it was firstly manufactured and actually not the one of the same product produced nowadays.

BEMP is to take into account and enable opportunities for remanufacturing or refurbishment of used fabricated metal products and bringing them into the market for reuse, when environmental benefits are proven under a full life cycle perspective. The remanufactured or refurbished products shall achieve at least the same quality levels they had when they were first introduced in the market and are sold with the appropriate warranty.

Applicability

The BEMP is applicable to all types of companies in this sector, including SMEs.

Remanufacturing or refurbishment may increase companies' operational costs, which are certainly outbalanced for manufacturing of high value products/components/parts and for large volume series.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i21) Percentage of raw material saved by remanufacturing/refurbishment compared to producing a new product (kg of material reused in remanufacturing/refurbishment/kg of material for new product). (i22) Avoided greenhouse gas emissions associated with remanufacturing/refurbishing a product compared to producing a new one (CO ₂ equivalent emissions remanufacturing/refurbishing/CO ₂ equivalent emissions new product), specifying if scope 1, 2 and/or 3 are included.	(b9) The company is offering remanufactured/refurbished products with LCA verified proven environmental benefits.

3.1.7. *Link to the Reference Documents on Best Available Techniques relevant for fabricated metal product manufacturing companies*

It is BEMP for fabricated metal products manufacturing companies to consult the relevant Best Available Techniques ⁽⁸⁾ (BAT) described in the relevant Reference Documents on BAT (BREFs) to identify relevant environmental issues to address and, where appropriate, implement the techniques.

Applicability

Best Available Techniques (BAT) described in the relevant Reference Documents on BAT (BREFs) applies to large companies under the scope of Industrial Emissions Directive (IED) ⁽⁹⁾.

This BEMP is very relevant for the SMEs (below the IED threshold). However, the lack of technical knowledge or capacity (of SMEs) may constitute a limiting factor.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i23) Consideration of relevant BATs.	N/A

3.2. **BEMPs for optimisation of utilities**

This section deals with practices for the supporting processes and is relevant for the fabricated metal products manufacturers.

3.2.1. *Efficient ventilation*

BEMP is to improve the efficiency of the ventilation system and reduce its energy use by:

- performing a study of the manufacturing site, including buildings and processes;
- mapping the sources of heat, humidity, and pollutants to indoor air;
- reducing these sources by e.g. implementing effective maintenance that limits emissions of pollutants or isolating a source thanks to an air pressure differential;
- defining the actual (current and future) needs for ventilation;
- carrying out an audit of the existing ventilation system, to compare the defined needs with the current installation;
- re-designing the ventilation system to reduce its energy use and enhance energy recovery ⁽¹⁰⁾, use the recovered heat to drive cooling (air-conditioning system) or for heating or pre-heating, install local renewables (solar thermal or solar PV to drive the cooling systems) and reduce the volume of air supplied (which reduces the energy use for heating or cooling it). Demand based ventilation can be designed to avoid peak draws and allow more energy efficient operation with down-sized equipment.

A similar approach can be also implemented for new installations, whereby the needs are defined on the designed building and processes and there is further opportunity to minimise them by influencing their design.

Applicability

The BEMP is applicable to all types of companies in this sector, including SMEs. Insufficient in-house technical knowledge can also sometimes constitute a barrier to implement all the elements of this BEMP.

The safety of the staff of the manufacturing facility must be set against the energy efficiency of the ventilation system in place.

⁽⁸⁾ The full list of the existing developed BREFs is available here: <http://eippcb.jrc.ec.europa.eu/reference/>

⁽⁹⁾ Directive 2010/75/EU of the European Parliament and of the Council: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:334:0017:0119:en:PDF>

⁽¹⁰⁾ E.g. recovering heating energy for building heating with a heat exchanger.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i24) Effective air volume extracted from the building (m ³ /hour, m ³ /shift or m ³ /production batch). (i25) Demand driven ventilation system (Y/N). (i26) Energy use for ventilation per m ³ building (kWh/m ³ building). (i27) Energy use to heat or to cool the air used for ventilation per m ³ building (kWh/m ³ building).	(b11) Demand driven ventilation is implemented to reduce HVAC energy use.

3.2.2. Optimal lighting

In order to achieve optimal lighting in new built and existing manufacturing sites, a lighting study, to define the actual (current and future) light needs and a lighting plan, to define the optimal lighting solution (light systems, fittings, lamps, use of daylight, etc.) need to be carried out.

It is BEMP for manufacturers of fabricated metal products to optimise existing and new lighting systems by:

- maximising the use of daylight;
- installing presence detectors controlled lighting in key locations;
- monitoring separately the energy use for lighting;
- selecting the most appropriate energy efficient lamps in terms of their planned hours of use and area of installation;
- implementing a regular plan for cleaning and maintenance for the lighting system.

Applicability

This BEMP is broadly applicable to all types of companies in the sector, including SMEs. However, it is more suitable for new built manufacturing sites or renovated production lines.

The natural lighting is an important element on efficient lighting systems, but its implementation may be limited to all locations due to local natural conditions. Similarly, its applicability may be limited in existing manufacturing sites due to architectural constraints.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i28) Use of daylight wherever possible (Y/N). (i29) Share of the lighting controlled by sensors (motion sensors, daylight sensors) (%). (i30) Energy use of lighting equipment (kWh/year/m ² of lighted floor). (i31) Installed lighting power (kW/m ² of lighted floor). (i32) Share of LED/low-energy light bulbs (%). (i33) Average efficacy of luminaires throughout plant (lm/W).	N/A

3.2.3. *Environmental optimisation of cooling systems*

BEMP is to systemically improve the energy efficiency and overall environmental performance of cooling systems for the machine shops of the manufacturing site by:

- striving to reduce the cooling demand;
- performing an audit of the cooling system in place in order to compare the defined needs with the current cooling installation;
- redesigning the cooling system with a focus on maximising energy and water efficiency and minimising GHG emissions.

Applicability

The BEMP is applicable to all types of companies in this sector, including SMEs and it is more suitable for new built or renovated manufacturing sites.

However, the implementation of this BEMP may require support from external partners, which may constitute a possible barrier, especially for the SMEs.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i34) Total equivalent warming impact (TEWI) of the cooling system (CO ₂ e).	N/A
(i35) Global warming potential (GWP) of refrigerants used (CO ₂ e).	
(i36) Energy use for cooling (kWh/year; kWh/kg finished product or manufactured part).	
(i37) Water use (tap water/rain water/surface water) for cooling (m ³ /year; m ³ /kg finished product or manufactured part).	

3.2.4. *Rational and efficient use of compressed air*

BEMP is for fabricated metal product manufacturers to reduce their energy consumption associated with the use of compressed air in the manufacturing processes by the following measures:

Mapping and assessing the use of compressed air. When part of the compressed air is used in inefficient applications or in an inappropriate manner, other technological solutions may be more fit for purpose or more efficient. In case a switch from pneumatic tools to electricity-driven tools for a certain application is considered, a proper assessment, considering not just energy consumption but all environmental aspects as well as the specific needs of the application, needs to be carried out.

Optimising the compressed air system by:

- identifying and eliminating leaks, using suitable control technology, such as ultrasound measuring instruments for air leaks that are hidden or difficult to access;
- better matching of the supply and demand of compressed air within the manufacturing facility, i.e. matching the air pressure, volume and quality to the needs of the various end-use devices and, when appropriate, producing the compressed air closer to the consumption centres by choosing decentralised units rather than a large centralised compressor catering for all uses;
- producing the compressed air at a lower pressure by decreasing the pressure losses in the distribution network and, when needed, adding pressure boosters only for devices that require higher pressure than most applications;
- designing the compressed air system based on the annual load duration curve, in order to ensure supply with the minimum energy use over base, peak and minimal loads;

- selecting highly efficient components for the compressed air system, such as highly efficient compressors, variable frequency drives and air dryers with integrated cold storage;
- once all of the above is optimised, recovering the heat from the compressor(s) through the installation of a plate heat exchanger within the oil circuit of the compressors; the recovered heat can be employed in a variety of applications, such as the drying of products, regeneration of the desiccant dryer, space heating, cooling thanks to the operation of an absorption chiller or converting the recovered heat into mechanical energy using Organic Rankine Cycle (ORC) machines.

Applicability

This BEMP is applicable to all types of companies in this sector, including SMEs. It is more suitable for new or renovated production lines.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i38) Electricity use per standard cubic meter of compressed air delivered at the point of end-use (kWh/m ³) at a stated pressure level. (i39) Air leakage index (%).	(b12) The electricity use of the compressed air system is lower than 0.11 kWh/m ³ of delivered compressed air, for large installations working at 6.5 bars effective, with volume flow normalised on 1 013 mbar and 20 °C, and pressure deviations not exceeding 0,2 bars effective. (b13) After all air consumers are switched off, the network pressure remains stable and the compressors (on standby) do not switch to load condition.
$\text{Air Leakage Index} = \frac{\sum_i t_{i(cr)} * C_{i(cr)}}{t_{(sb)} * C_{(tot)}}$ <p>(%) which is calculated when all air consumers are switched off as the sum for each of the compressors of the time it runs multiplied by the capacity of that compressor, divided by the total standby time and the total rated capacity of the compressors in the system.</p>	

3.2.5. Use of renewable energy

BEMP is for fabricated metal product manufacturing companies to use renewable energy for their processes by:

- purchasing of verified renewable electricity or own generation of electricity from renewable energy sources;
- generating heat from renewable energy sources (e.g. solar thermal, including concentrated solar thermal, geothermal or heat pumps that can also run on renewable electricity e.g. with solar PV, sustainable (waste based) biomass and biogas);
- installing energy storage systems, including thermal storage complementing solar thermal, geothermal, ambient heat applications, including coupled with heat pumps for heating and cooling, where relevant, to enable higher rates of own use of self-generated renewable energy.

Applicability

The BEMP is broadly applicable to all types of companies in this sector, including SMEs.

The own heat generation from renewables and integration in the fabrication processes, highly depends on the technological specificities of the carried out manufacturing processes and the actual demand e.g. high-temperature process.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i40) Share of electricity from renewable sources (self-generated or purchased) out of the total electricity use (%).	(b14) All electricity use is met by self-generated renewable energy or purchased verified renewable electricity via a long-term power purchasing agreement.
(i41) Share of heat from renewable sources out of the total heat use (%).	(b15) The use of renewable heat generated on-site is integrated in suitable manufacturing processes.

3.2.6. Rainwater collection

BEMP is to reduce freshwater use at manufacturing sites by collecting and using rainwater in the various manufacturing or ancillary processes. Such a system collects rainwater from a catchment area (often the roof of the manufacturing plant or the parking space), has a conveyance system to collect it in a storage tank and a distribution system (pipes and pump) to bring it to the final use points.

Applicability

The BEMP is broadly applicable to all types of companies in this sector, including SMEs. It is more suitable for new built or retrofitted plants and particularly to those plants where the collected rainwater can be used as process water. In case of retrofitting, the building characteristics may constitute a barrier to the implementation of the BEMP.

The geographical location highly influences the relevance of this BEMP (e.g. amount of precipitation, local water scarcity). In certain regions, the BEMP is compulsory by legislation for flood prevention and to reduce the use of ground water.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i42) Share of rainwater use on total water consumption (%).	(b16) Rainwater is collected and used as process water in manufacturing and ancillary processes.

3.3. BEMPs for manufacturing processes

This section deals with practices for the core manufacturing processes and is relevant for the fabricated metal products manufacturers.

3.3.1. Selection of resource efficient metal working fluids

BEMP is to select resource efficient metal working fluids by:

carrying out systematic science-based in-depth assessments of available metal working fluids, according to a broad set of criteria, including both environmental and economic aspects, with consideration of the entire life cycle of the fluids and of the manufactured products;

looking for available metal working fluids that can provide different functions (e.g. lubrication, chip removal, cleaning) at the same time, or can be used more than once after appropriate recovery and/or reformulation.

BEMP is also to evaluate and control the performance of the selected metal working fluids during or after their application by means of a monitoring system.

Applicability

This BEMP is applicable to all types of companies in this sector, including SMEs. However, the lack of in-house technical knowledge can constitute a barrier, especially in SMEs.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i43) Total amount of metal working fluids purchased per year (kg (or l)/year).	(b17) The company achieves continuous (i.e. year-on-year) improvement in environmental performance as reflected by an improvement in, at least, the following indicators: — energy use per manufactured product; — resource efficiency; — consumption of metal working fluids per manufactured product.
(i44) Total amount of recovered metal working fluids per year (kg (or l)/year).	
(i45) Number of different metal working fluids used in the company (total number of metal working fluids).	
(i46) Consumption of metal working fluids per manufactured product (kg (or l)/kg finished product or manufactured part).	

3.3.2. Minimisation of lubricoolant consumption in metal processing

BEMP is to minimise the use of lubricoolants in metal processing and shaping operations. This can be achieved by applying techniques such as cryogenic cooling or high pressure lubricoolant supply. These techniques result in reduced waste generation, higher overall process efficiencies and consequently lower energy use as well as extended tool service life.

Applicability

This BEMP is broadly applicable to all types of companies in this sector, including SMEs. Due to its energy intensity, it is more suitable for small series or prototypes and for new or renewed installations rather than retrofitting on an ongoing process.

However, the energy intensity is a parameter that needs to be carefully examined on a case-by-case basis. This, in combination with the lack of in-house technical knowledge and expertise may constitute a significant barrier for the application of this BEMP.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i47) Consumption of lubricoolants per processed part (l/part).	(b17) The company achieves continuous (i.e. year-on-year) improvement in environmental performance as reflected by an improvement in, at least, the following indicators: — energy use per manufactured product; — resource efficiency; — consumption of metal working fluids per manufactured product.

3.3.3. Incremental sheet metal forming as alternative for mould making

For the production of small series, it is BEMP to apply incremental sheet metal forming (ISF) as an alternative for mould making. This allows the manufacturing of complex products with a higher material efficiency.

Applicability

This BEMP is broadly applicable to all types of companies in the sector, including SMEs. ISF can be used for a wide variety of materials and it is more suitable for complex product geometries and for small series of production and prototypes. However, companies prior to switching to ISF technique, may carry out a life cycle assessment to understand environmental benefits.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i11) Energy use per manufactured product (kWh/kg finished product or manufactured part). (i1) Resource efficiency (kg finished product/kg of material input). (i48) Environmental benefits of switching to ISF proven by a full LCA or a simplified LCA based on semi-quantitative analysis (Y/N).	(b17) The company achieves continuous (i.e. year-on-year) improvement in environmental performance as reflected by an improvement in, at least, the following indicators: — energy use per manufactured product; — resource efficiency; — consumption of metal working fluids per manufactured product.

3.3.4. Reduction of standby energy use of metal working machines

BEMP is to reduce the standby energy use of metal working machines by switching off (and on again) the machines in the most efficient way, either manually or automatically (re-programming the control system) or by purchasing more energy-efficient machines in which a 'green' standby mode (with very low energy use) is integrated. This operational way is often based on several subunits that can be switched off individually instead of putting the entire machine simply on standby. An additional approach is reducing the duration of standby phases, especially for machines with high energy use during downtime, through an optimisation of production planning.

Applicability

The BEMP is broadly applicable in all types of companies from the sector, including SMEs.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i11) Energy use per manufactured product (kWh/kg finished product or manufactured part). (i49) For individual relevant machines: total energy use per machine and year (kWh/year). (i50) For individual relevant machines: total energy use per machine during downtime (kWh/hour). (i51) Percentage of machines having a switch-off/do-not-switch off label (%).	(b18) All metal working machines have either a green standby mode or a label indicating when they should be manually switched off.

3.3.5. Maintaining material value for metal residues

BEMP is to maintain material value by post-processing metal scrap (chips and swarf), in particular through two aspects of metal residue processing:

- segregating flows of metal residues to ensure a high level of purity allowing further recovery and recycling at higher quality grades;
- recovering and segregating cutting oil and metal, for instance by pressing chips and swarf into briquettes.

Applicability

This BEMP is applicable to all types of companies in this sector, including SMEs and more relevant for the production of large series.

The volume of material working residues must be significant to ensure economic feasibility.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i52) Oil recovered (l oil/year). (i53) Oil resource efficiency (% of oil in briquettes or separator output).	(b19) Turning chips and grinding swarf have oil/moisture content respectively lower than 2 % and 8 %.

3.3.6. Multi directional forging

When forging complex products with a high variation in cross-section, it is BEMP to apply multi-directional forging. This practice reduces significantly the formation of flash by applying pressure in different directions in the piece under fabrication, resulting in less material needing to be removed by machining afterwards.

Applicability

This BEMP is broadly applicable to all types of companies in this sector, including SMEs. It is especially suitable for complexly formed components and niche products, and for companies with large production series. Multi-directional forging can be applied to a wide variety of materials (aluminium, copper, magnesium, titanium).

However, the applicability of this BEMP may be limited due to the need of purchasing special forging tools and technical knowledge which result in high investment cost.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i54) Percentage of generated flash per manufactured part (%). (i55) Total energy required for the forging process (energy input for forging kWh/kg finished product or manufactured part). (i1) Resource efficiency (kg finished product or manufactured part/kg of material input).	(b17) The company achieves continuous (i.e. year-on-year) improvement in environmental performance as reflected by an improvement in, at least, the following indicators: — energy use per manufactured product; — resource efficiency; — consumption of metal working fluids per manufactured product.

3.3.7. Hybrid machining as a method to reduce energy use

BEMP is for fabricated metal product manufacturers to use hybrid machining if this allows a significant decrease in the total energy needs for machining per single part/product/component by combining two or more different manufacturing processes into a new setup exploiting synergistically the advantages of each individual process.

The combination of the various manufacturing processes e.g. milling, drilling can enable more freedom in the design and fabrication of parts, products, components when compared to the use of conventional machining technologies.

Applicability

Hybrid machining is broadly applicable to all types of companies in this sector, including SMEs. It is especially suitable for manufacturing sites that have new machines. Hybrid machining is very relevant for the manufacturing of parts/products/components with complex geometries.

The combination of relatively high investment costs and lack of in-house specific technical knowledge/capacity required to implement this BEMP may limit its applicability, especially in SMEs.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i1) Resource efficiency (kg finished product or manufactured part/kg of material input). (i11) Energy use (kWh/kg finished product or manufacture part).	(b17) The company achieves continuous (i.e. year-on-year) improvement in environmental performance as reflected by an improvement in, at least, the following indicators: — energy use per manufactured product; — resource efficiency; — consumption of metal working fluids per manufactured product.

3.3.8. Use of predictive control for paint booth HVAC management

BEMP is to minimise the energy use of the HVAC for paint booths by implementing a predictive control system, based on feedback and feedforward control, operating on a window of values. Such system allows keeping constant the speed at which the paint dries without necessarily maintaining constant the temperature and humidity levels in the paint booth, as is the case in conventional control systems. The working principle is keeping constant only the difference between the limit to how much vapour can be absorbed by the air (which varies with temperature) and the amount of water vapour already in the air.

Applicability

This BEMP is suitable for companies with large series of production, large paint booths and with multiple paint booths.

The full and effective implementation of the BEMP requires:

- qualified employees with profound knowledge of the paint drying process and of paint quality control;
- maintenance of the effectiveness of the installation;
- reliable and continuous data monitoring (sensors, measuring, etc.) and automation systems in place (on-site).

The fulfilment of the increased above mentioned requirements in combination with the lack of in-house technical knowledge and high investment costs constitute a barrier to its implementation, especially for SMEs.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
(i56) Energy use for painting (kWh/m ² of surface coated/painted).	(b17) The company achieves continuous (i.e. year-on-year) improvement in environmental performance as reflected by an improvement in, at least, the following indicators: — energy use per manufactured product; — resource efficiency; — consumption of metal working fluids per manufactured product.

4. RECOMMENDED SECTOR-SPECIFIC KEY ENVIRONMENTAL PERFORMANCE INDICATORS

Table 4.1 lists a selection of key environmental performance indicators for the fabricated metal products manufacturing sector, together with the related benchmarks and reference to the relevant BEMPs. These are a subset of all the indicators mentioned in Section 3.

Table 4.1

Key environmental performance indicators and benchmarks of excellence for the fabricated metal products manufacturing sector

Indicator	Common units	Main target group	Short description	Recommended minimum level of monitoring	Related EMAS core indicator ⁽¹⁾	Benchmark of excellence	Related BEMP ⁽²⁾
BEMPs for cross cutting issues							
Resource efficiency	kg finished products/kg input materials	Fabricated metal products manufacturers	Amount of finished manufactured products divided by the amount of input materials required for the manufacturing of finished products. The results of this indicator can help the application of approaches such as life cycle thinking, lean management and circular economy to assess the potential for environmental improvements in the manufacturing of existing or new metal products.	Site	Material efficiency	Systematic consideration of life cycle thinking, lean management and circular economy in all strategic decisions making.	3.1.1, 3.3.3, 3.3.6, 3.3.7
Mapping of material flows and their environmental relevance	Y/N	Fabricated metal products manufacturers	This indicator refers to the mapping of all the flows of the materials used for the manufacturing of metal products in order to realise their environmental relevance.	Facility	Material efficiency	New products development are assessed for environmental improvements.	3.1.1
Percentage of goods and services which are environmentally certified or with a verified reduced environmental impact.	%	Fabricated metal products manufacturers	Number of manufactured products or provided services with a verified reduced environmental impact divided by the total number of manufactured products or provided services.	Facility	Material efficiency	All purchased goods and services meet environmental criteria established by the company.	3.1.2

Indicator	Common units	Main target group	Short description	Recommended minimum level of monitoring	Related EMAS core indicator ⁽¹⁾	Benchmark of excellence	Related BEMP ⁽²⁾
Use of by-products, residual energy or other resources from other companies.	kg materials from other companies/kg total input; MJ energy recovered from other companies/MJ total energy use	Fabricated metal products manufacturers	This indicator refers to the amount of used by-products or residual energy from other companies for the manufacturing of products or parts, divided by the total amount or energy inputs.	Company	Material efficiency	Collaboration with other organisations to use energy and resources more efficiently at systemic level.	3.1.2
Systematic stakeholder involvement with a focus on improved environmental performance	Y/N	Fabricated metal products manufacturers	This indicator refers to whether the involvement of stakeholders across the value chain in the development process of new products or parts with improved environmental performance is taking place systematically.	Company	Material efficiency	Structural engagement of stakeholders in the development of more environmentally friendly products.	3.1.2
Energy monitoring system at process level	Y/N	Fabricated metal products manufacturers	This indicator refers to the implementation of a systematic and detailed energy monitoring across manufacturing sites at process level.	Site	Energy efficiency	Continuous energy monitoring at process level is implemented and driving energy efficiency improvements	3.1.3
For individual chemicals used, amount of chemical applied and its classification according to Regulation (EC) 1272/2008 (CLP Regulation)	kg/kg finished product or manufactured part	Fabricated metal products manufacturers	Total amount of individual chemicals used in the manufacturing processes divided by the amount of finished product or manufactured part. The use of chemicals is reviewed periodically to explore substitution opportunities and chemicals are classified according to 1272/2008 EC CLP Regulation.	Site	Material efficiency	Regular (at least once a year) review the use of chemicals to minimise their use and explore opportunities for substitution	3.1.4

Indicator	Common units	Main target group	Short description	Recommended minimum level of monitoring	Related EMAS core indicator ⁽¹⁾	Benchmark of excellence	Related BEMP ⁽²⁾
Implementation of a site biodiversity action plan in all manufacturing facilities	Y/N	Fabricated metal products manufacturers	This indicator refers to whether all manufacturing facilities have in place a biodiversity action plan for the site.	Site	Biodiversity	A biodiversity action plan is developed and implemented for all relevant sites (including manufacturing sites) to protect and enhance the local biodiversity	3.1.5
Avoided greenhouse gas emissions associated with remanufacturing/ refurbishing a product compared to producing a new one, specifying if scope 1, 2 and/or 3 are included	GHG emissions remanufacturing/ refurbishing/CO ₂ equivalent emissions new product	Fabricated metal products manufacturers	Greenhouse gas emissions associated with remanufacturing or refurbishment of a product divided by the carbon dioxide equivalent emissions generated from the development of a new product. This indicator includes scope 1, 2 and 3 greenhouse gas-emissions.	Site	Emissions	The company is offering remanufactured/ refurbished products with LCA verified proven environmental benefits	3.1.6

BEMPs for optimisation of utilities

Demand driven ventilation system	Y/N	Fabricated metal products manufacturers	This indicator refers to the installation and operation of demand driven ventilation systems in the manufacturing facilities.	Facility	Energy efficiency	Demand driven ventilation is implemented to reduce HVAC energy use	3.2.1
Effective air volume extracted from the building	m ³ /hour m ³ /shift m ³ /production batch	Fabricated metal products manufacturers	Air volume extracted from the building per hour OR per shift OR per production batch	Site	Energy efficiency	N/A	3.2.1
Energy use of lighting equipment	kWh/year/m ² of lighted floor	Fabricated metal products manufacturers	Energy use of the installed lighting equipment in the manufacturing facility divided by the surface of the lighted floor of the manufacturing facility per year.	Facility	Energy efficiency	N/A	3.2.2

Indicator	Common units	Main target group	Short description	Recommended minimum level of monitoring	Related EMAS core indicator ⁽¹⁾	Benchmark of excellence	Related BEMP ⁽²⁾
Energy use for cooling	kWh/year kWh/kg finished product or manufactured part	Fabricated metal products manufacturers	Energy use of the cooling system in the manufacturing facility per year OR divided by the amount of finished product or manufactured part	Facility	Energy efficiency	N/A	3.2.3
Water use for cooling (tap water/rain water/surface water)	m ³ /year	Fabricated metal products manufacturers	Volume of water used by the cooling system in the manufacturing facility per year. The type of water should also be reported, e.g. tap/rain water.	Facility	Water	N/A	3.2.3
Electricity use per standard cubic meter of compressed air delivered at the point of end-use at a stated pressure level	kWh/m ³	Fabricated metal products manufacturers	Electricity use of the compressed air system (including the energy use of the compressors, dryers and secondary drives) per standard cubic metre of compressed air delivered, at a stated pressure level.	Facility	Energy efficiency	The electricity use of the compressed air system is lower than 0,11 kWh/m ³ of delivered compressed air, for large installations working at 6,5 bars effective, with volume flow normalized on 1 013 mbar and 20 °C, and pressure deviations not exceeding 0,2 bars effective.	3.2.4
Air leakage index	Number	Fabricated metal products manufacturers	<p>The Air Leakage Index is calculated when all air consumers are switched off as the sum for each of the compressors of the time it runs multiplied by the capacity of that compressor, divided by the total standby time and the total rated capacity of the compressors in the system, and it is expressed as:</p> $\text{Air Leakage Index} = \frac{\sum_i t_{i(cr)} * C_{i(cr)}}{t_{(sb)} * C_{(tot)}}$	Facility	Energy efficiency	After all air consumers are switched off, the network pressure remains stable and the compressors (on standby) do not switch to load condition.	3.2.4

Indicator	Common units	Main target group	Short description	Recommended minimum level of monitoring	Related EMAS core indicator ⁽¹⁾	Benchmark of excellence	Related BEMP ⁽²⁾
			where: $t_{i(cr)}$ is the time (min) during which a compressor runs when all air consumers are switched off (standby of the compressed air system); $C_{i(cr)}$ is the capacity (Nl/min) of the compressor that switches on for the time $t_{i(cr)}$ while all air consumers are switched off; $t_{(sb)}$ is the total time (min) during which the installed compressed air equipment is in standby mode; $C_{(tot)}$ is sum of the rated capacity (Nl/min) of all the compressors in the compressed air system.				
Share of electricity from renewable sources (self-generated or purchased) out of the total electricity use	%	Fabricated metal products manufacturers	Electricity from renewable sources either self-generated or purchased divided by the total electricity use within the site. Purchased renewable electricity, it is only accounted for in this indicator if verified as additional (i.e. not already accounted for by another organisation or in the electricity mix of the grid).	Site	Energy efficiency	All electricity use is met by self-generated renewable energy or purchased verified renewable electricity via a long-term power purchasing agreement.	3.2.5
Share of heat from renewable sources out of the total heat use	%	Fabricated metal products manufacturers	Heat from renewable sources (e.g. solar thermal, geothermal, heat pumps, waste based biomass and biogas, renewable electricity, preferably generated locally as part of self-generation or a renewable community based approach) divided by the total use of heat by the site.	Site	Energy efficiency	The use of renewable heat generated on-site is integrated in suitable manufacturing processes.	3.2.5

Indicator	Common units	Main target group	Short description	Recommended minimum level of monitoring	Related EMAS core indicator ⁽¹⁾	Benchmark of excellence	Related BEMP ⁽²⁾
Share of rainwater consumption on total water consumption	%	Fabricated metal products manufacturers	Total volume of rainwater consumed for on-site or ancillary processes divided by the total volume of water consumed for on-site or ancillary process in the manufacturing sites.	Site	Water	Rainwater is collected and used as process water in manufacturing and ancillary processes	3.2.6
BEMPs for manufacturing processes							
Total amount of metal working fluids purchased per year	Kg/year L/year	Fabricated metal products manufacturers	Amount of metal working fluids used in the manufacturing processes of the manufacturing site per year.	Site	Material efficiency	The company achieves continuous (i.e. year-on-year) improvement in environmental performance as reflected by an improvement in, at least, the following indicators: – energy use per manufactured product; – resource efficiency; – consumption of metal working fluids per manufactured product.	3.3.1
Consumption of metal working fluids per manufactured product	kg (or l)/kg finished product or manufactured part	Fabricated metal products manufacturers	Amount of metal working fluids consumed in the manufacturing processes divided by the amount of finished products or manufactured parts.	Site	Material efficiency	The company achieves continuous (i.e. year-on-year) improvement in environmental performance as reflected by an improvement in, at least, the following indicators: — energy use per manufactured product;	3.3.1

Indicator	Common units	Main target group	Short description	Recommended minimum level of monitoring	Related EMAS core indicator ⁽¹⁾	Benchmark of excellence	Related BEMP ⁽²⁾
						<ul style="list-style-type: none"> — resource efficiency; — consumption of metal working fluids per manufactured product. 	
Consumption of lubricoolants per processed part	L/manufactured part	Fabricated metal products manufacturers	Volume of lubricoolants consumed in the manufacturing processes/ operations per manufactured part.	Site	Material efficiency	<p>The company achieves continuous (i.e. year-on-year) improvement in environmental performance as reflected by an improvement in, at least, the following indicators:</p> <ul style="list-style-type: none"> — energy use per manufactured product; — resource efficiency; — consumption of metal working fluids per manufactured product. 	3.3.2
Energy use	kWh/kg finished product or manufactured part	Fabricated metal products manufacturers	Energy use in the manufacturing facility for the manufacturing of products or parts divided by the amount of finished product or manufactured part.	Facility	Energy efficiency	<p>The company achieves continuous (i.e. year-on-year) improvement in environmental performance as reflected by an improvement in, at least, the following indicators:</p> <ul style="list-style-type: none"> — energy use per manufactured product; 	3.1.3, 3.3.3, 3.3.4, 3.3.7

Indicator	Common units	Main target group	Short description	Recommended minimum level of monitoring	Related EMAS core indicator ⁽¹⁾	Benchmark of excellence	Related BEMP ⁽²⁾
						<ul style="list-style-type: none"> — resource efficiency; — consumption of metal working fluids per manufactured product. 	
For individual relevant machines: total energy use per machine during downtime	kWh/hour	Fabricated metal products manufacturers	Amount of energy used by the machines during downtime per hour.	Facility	Energy efficiency	All metal working machines have either a green standby mode or a label indicating when they should be manually switched off	3.3.4
Oil recovered	L oil/year	Fabricated metal products manufacturers	Volume of cutting oils recovered from the manufacturing processes per year.	Facility	Material efficiency	Turning chips and grinding swarf have oil/moisture content respectively lower than 2 % then 8 %	3.3.5
Total energy required for the forging process	kWh/kg finished product or manufactured part	Fabricated metal products manufacturers	Total energy required for the forging process divided by the amount of finished product or manufactured part.	Facility	Material efficiency	<p>The company achieves continuous (i.e. year-on-year) improvement in environmental performance as reflected by an improvement in, at least, the following indicators:</p> <ul style="list-style-type: none"> — energy use per manufactured product; — resource efficiency; — consumption of metal working fluids per manufactured product. 	3.3.6

Indicator	Common units	Main target group	Short description	Recommended minimum level of monitoring	Related EMAS core indicator ⁽¹⁾	Benchmark of excellence	Related BEMP ⁽²⁾
Energy use for painting	kWh/m ² of surface coated/painted	Fabricated metal products manufacturers	Energy use for painting of the products/parts divided by the surface of the coated or painted manufactured products or parts.	Site	Energy efficiency	The company achieves continuous (i.e. year-on-year) improvement in environmental performance as reflected by an improvement in, at least, the following indicators: — energy use per manufactured product; — resource efficiency; — consumption of metal working fluids per manufactured product.	3.3.8

⁽¹⁾ EMAS core indicators are listed in Annex IV to Regulation (EC) No 1221/2009 (Section C.2).

⁽²⁾ The numbers refer to the sections in this document.

COMMISSION DECISION (EU) 2021/2054**of 8 November 2021**

on the sectoral reference document on best environmental management practices, environmental performance indicators and benchmarks of excellence for the telecommunications and information and communication technologies (ICT) services sector for the purposes of Regulation (EC) No 1221/2009 of the European Parliament and of the Council

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EC) No 1221/2009 of the European Parliament and of the Council of 25 November 2009 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS), repealing Regulation (EC) No 761/2001 and Commission Decisions 2001/681/EC and 2006/193/EC ⁽¹⁾, and in particular Article 46(1) thereof,

Whereas:

- (1) Regulation (EC) No 1221/2009 obliges the Commission to develop sectoral reference documents for specific economic sectors. The documents must include best environmental management practices, environmental performance indicators and, where appropriate, benchmarks of excellence and rating systems identifying environmental performance levels. Organisations registered, or preparing to become registered, under the eco-management and audit scheme established by Regulation (EC) No 1221/2009 are required to take the sectoral reference documents into account when developing their environmental management system and when assessing their environmental performance in their environmental statement, or updated environmental statement, prepared in accordance with Annex IV to that Regulation.
- (2) Regulation (EC) No 1221/2009 required the Commission to establish a working plan setting out an indicative list of sectors to be considered priority sectors for the adoption of sectoral and cross-sectoral reference documents. The Commission has, in that working plan ⁽²⁾, identified the telecommunications and information and communication technologies (ICT) services sector as a priority sector.
- (3) The sectoral reference document for the telecommunications and ICT services sector should set out best environmental management practices for all telecommunications and ICT services providers, including telecommunication operators, ICT consultancy firms, data processing and hosting companies, software developers and publishers, broadcasters and installers of ICT equipment and sites. Specific environmental performance indicators and benchmarks of excellence for a particular best environmental management practice should also be given whenever possible and meaningful.
- (4) By way of these best environmental management practices for that sector ⁽³⁾, concrete actions to improve the overall environmental management of companies should be identified in four main areas. Those main areas, which are considered to best support the efforts of all telecommunications and ICT services providers, are cross cutting issues, data centres, electronic communication networks, and improving the energy and environmental performance in other sectors

⁽¹⁾ OJ L 342, 22.12.2009, p. 1.

⁽²⁾ Communication from the Commission – Establishment of the working plan setting out an indicative list of sectors for the adoption of sectoral and cross-sectoral reference documents, under Regulation (EC) No 1221/2009 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS) (OJ C 358, 8.12.2011, p. 2).

⁽³⁾ Canfora P., Gaudillat P., Antonopoulos I., Dri M., Best Environmental Management Practice in the Telecommunications and ICT Services sector, EUR 30365 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-21574-5, doi:10.2760/354984, JRC121781; <https://publications.jrc.ec.europa.eu/repository/handle/JRC121781>

- (5) In order to allow organisations in the telecommunications and ICT services sector, environmental verifiers, national authorities, accreditation and licensing bodies and other operators sufficient time to prepare for the introduction of the sectoral reference document for the telecommunications and ICT services sector, the date of application of this Decision should be deferred.
- (6) In developing the sectoral reference document, the Commission has consulted with Member States and other stakeholders in accordance with Regulation (EC) No 1221/2009.
- (7) The measures provided for in this Decision are in accordance with the opinion of the Committee established by Article 49 of Regulation (EC) No 1221/2009,

HAS ADOPTED THIS DECISION:

Article 1

The sectoral reference document on best environmental management practices, sector environmental performance indicators and benchmarks of excellence for the telecommunications and information and communication technologies (ICT) services sector is set out in the Annex.

Article 2

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

It shall apply from 25 March 2022.

Done at Brussels, 8 November 2021.

For the Commission
The President
Ursula VON DER LEYEN

ANNEX

Contents

1. INTRODUCTION	90
2. SCOPE	92
3. BEST ENVIRONMENTAL MANAGEMENT PRACTICES, SECTOR ENVIRONMENTAL PERFORMANCE INDICATORS AND BENCHMARKS OF EXCELLENCE FOR THE TELECOMMUNICATIONS AND ICT SERVICES SECTOR	96
3.1. BEMPs for cross-cutting issues	96
3.1.1. Making the best use of an environmental management system	96
3.1.2. Procurement of sustainable ICT products and services	97
3.1.3. Optimising the energy consumption of end-user devices	98
3.1.4. Use of renewable and low carbon energy	99
3.1.5. Resource efficiency of ICT equipment through waste prevention, reuse and recycling	99
3.1.6. Minimising data traffic demand through green software	100
3.2. BEMPs for data centres	101
3.2.1. Implement an energy management system for data centres (including measuring, monitoring and management of ICT and other equipment)	101
3.2.2. Define and implement a data management and storage policy	102
3.2.3. Improve airflow management and design	103
3.2.4. Improve cooling management	103
3.2.5. Review and adjust temperature and humidity settings	104
3.2.6. BEMPs related to selecting and deploying new equipment for data centres	105
3.2.6.1. Selection and deployment of environmentally friendly equipment for data centres	105
3.2.7. BEMPs related to new build or refurbishment of data centres	106
3.2.7.1. Planning of new data centres	106
3.2.7.2. Reuse of data centre waste heat	106
3.2.7.3. Design of the data centre building and physical layout	107
3.2.7.4. Selecting the geographical location of the new data centre	107
3.2.7.5. Use of alternative sources of water	108
3.3. BEMPs related to electronic communication networks	109
3.3.1. Improving the energy management of existing networks	109
3.3.2. Improving risk management for electromagnetic fields through assessment and transparency of data	110
3.3.3. Selecting and deploying more energy-efficient electronic communication network equipment	111
3.3.4. Installing and upgrading telecommunication networks	112
3.3.5. Reducing the environmental impacts when building or renovating telecommunication networks	113
3.4. Improving the energy and environmental performance in other sectors ('Greening by ICT')	114
3.4.1. Greening by ICT	114
4. RECOMMENDED SECTOR-SPECIFIC KEY ENVIRONMENTAL PERFORMANCE INDICATORS	115

1. INTRODUCTION

This Sectoral Reference Document (SRD) is based on a detailed scientific and policy report ⁽¹⁾ ('Best Practice Report') developed by the European Commission's Joint Research Centre (JRC).

Relevant legal background

The Community eco-management and audit scheme (EMAS) was introduced in 1993, for voluntary participation by organisations, by Council Regulation (EEC) No 1836/93 ⁽²⁾. Subsequently, EMAS has undergone two major revisions:

Regulation (EC) No 761/2001 of the European Parliament and of the Council ⁽³⁾;

Regulation (EC) No 1221/2009 of the European Parliament and of the Council.

An important new element of the latest revision, which came into force on 11 January 2010, is Article 46 on the development of SRDs. The SRDs have to include best environmental management practices (BEMPs), environmental performance indicators for the specific sectors and, where appropriate, benchmarks of excellence and rating systems identifying performance levels.

How to understand and use this document

The eco-management and audit scheme (EMAS) is a scheme for voluntary participation by organisations committed to continuous environmental improvement. Within this framework, this SRD provides sector-specific guidance to the telecommunications and ICT services sector and points out a number of options for improvement as well as best practices.

The document was written by the European Commission using input from stakeholders. A Technical Working Group, comprising experts and stakeholders of the sector, led by the JRC, discussed and ultimately agreed on the best environmental management practices, sector-specific environmental performance indicators and benchmarks of excellence described in this document; these benchmarks in particular were deemed to be representative of the levels of environmental performance that are achieved by the best performing organisations in the sector.

The SRD aims to help and support all organisations that intend to improve their environmental performance by providing ideas and inspiration as well as practical and technical guidance.

The SRD is primarily addressed to organisations that are already registered with EMAS; secondly to organisations that are considering registering with EMAS in the future; and thirdly to all organisations that wish to learn more about best environmental management practices in order to improve their environmental performance. Consequently, the objective of this document is to support all organisations in the telecommunications and ICT services sector to focus on relevant environmental aspects, both direct and indirect, and to find information on best environmental management practices, as well as appropriate sector-specific environmental performance indicators to measure their environmental performance, and benchmarks of excellence.

How SRDs should be taken into account by EMAS-registered organisations:

Pursuant to Regulation (EC) No 1221/2009, EMAS-registered organisations are to take SRDs into account at two different levels:

1. When developing and implementing their environmental management system in light of the environmental reviews (Article 4(1)(b)):

⁽¹⁾ The scientific and policy report is publicly available on the JRC website at the following address: <https://susproc.jrc.ec.europa.eu/activities/emas/telecom.html>. The conclusions on best environmental management practices and their applicability as well as the identified specific environmental performance indicators and the benchmarks of excellence contained in this Sectoral Reference Document are based on the findings documented in the scientific and policy report. All the background information and technical details can be found there.

⁽²⁾ Council Regulation (EEC) No 1836/93 of 29 June 1993 allowing voluntary participation by companies in the industrial sector in a Community eco-management and audit scheme (OJ L 168, 10.7.1993, p. 1).

⁽³⁾ Regulation (EC) No 761/2001 of the European Parliament and of the Council of 19 March 2001 allowing voluntary participation by organisations in a Community eco-management and audit scheme (EMAS) (OJ L 114, 24.4.2001, p. 1).

Organisations should use relevant elements of the SRD when defining and reviewing their environmental targets and objectives in accordance with the relevant environmental aspects identified in the environmental review and policy, as well as when deciding on the actions to implement to improve their environmental performance.

2. When preparing the environmental statement (*Article 4(1)(d) and Article 4(4)*):

- (a) Organisations should consider the relevant sector-specific environmental performance indicators in the SRD when choosing the indicators ⁽⁴⁾ to use for their reporting of environmental performance.

When choosing the set of indicators for reporting, they should take into account the indicators proposed in the corresponding SRD and their relevance with regards to the significant environmental aspects identified by the organisation in its environmental review. Indicators need only be taken into account where relevant to those environmental aspects that are judged as being most significant in the environmental review.

- (b) When reporting on environmental performance and on other factors regarding environmental performance, organisations should mention in the environmental statement how the relevant best environmental management practices and, if available, benchmarks of excellence have been taken into account.

They should describe how relevant best environmental management practices and benchmarks of excellence (which provide an indication of the environmental performance level that is achieved by best performers) were used to identify measures and actions, and possibly to set priorities, to (further) improve their environmental performance. However, implementing best environmental management practices or meeting the identified benchmarks of excellence is not mandatory, because the voluntary character of EMAS leaves the assessment of the feasibility of the benchmarks and of the implementation of the best practices, in terms of costs and benefits, to the organisations themselves.

Similarly to environmental performance indicators, the relevance and applicability of the best environmental management practices and benchmarks of excellence should be assessed by the organisation according to the significant environmental aspects identified by the organisation in its environmental review, as well as technical and financial aspects.

Elements of SRDs (indicators, BEMPs or benchmarks of excellence) not considered relevant with regards to the significant environmental aspects identified by the organisation in its environmental review should not be reported or described in the environmental statement.

EMAS participation is an ongoing process. Every time an organisation plans to improve its environmental performance (and reviews its environmental performance) it shall consult the SRD on specific topics to find inspiration about which issues to tackle next in a step-wise approach.

EMAS environmental verifiers shall check if and how the SRD was taken into account by the organisation when preparing its environmental statement (Article 18(5)(d) of Regulation (EC) No 1221/2009).

When undertaking an audit, accredited environmental verifiers will need evidence from the organisation of how the relevant elements of the SRD have been selected in light of the environmental review and taken into account. They shall not check compliance with the described benchmarks of excellence, but they shall verify evidence on how the SRD was used as a guide to identify indicators and proper voluntary measures that the organisation can implement to improve its environmental performance.

⁽⁴⁾ According to Annex IV (B.(f)) of the EMAS Regulation, then environmental statement shall contain 'a summary of the data available on the environmental performance of the organisation with respect to its significant environmental aspects. Reporting shall be on both the core environmental performance indicators and the specific environmental performance indicators as set out in Section C. Where environmental objectives and targets exist, the respective data shall be reported.' Annex IV – Section C.3 states that 'each organisation shall also report annually on its performance relating to the significant direct and indirect environmental aspects and impacts that are related to its core business activities, that are measurable and verifiable, and that are not covered already by the core indicators. Where available, the organisation shall take account of sectoral reference documents as referred to in Article 46 to facilitate the identification of relevant sector specific indicators.'

Given the voluntary nature of EMAS and SRD, no disproportionate burdens should be put on the organisations to provide such evidence. In particular, verifiers shall not require an individual justification for each of the best practices, sector-specific environmental performance indicators and benchmarks of excellence which are mentioned in the SRD and not considered relevant by the organisation in light of its environmental review. Nevertheless, they could suggest relevant additional elements for the organisation to take into account in the future as further evidence of its commitment to continuous performance improvement.

Structure of the Sectoral Reference Document

This document consists of four chapters. Chapter 1 introduces EMAS' legal background and describes how to use this document, while Chapter 2 defines the scope of this SRD. Chapter 3 briefly describes the different best environmental management practices (BEMPs) ⁽⁵⁾ together with information on their applicability. When specific environmental performance indicators and benchmarks of excellence could be formulated for a particular BEMP, these are also given. However, defining benchmarks of excellence was not possible for all BEMPs, either because of the limited availability of data or because of the specific conditions of each company and/or site (e.g. environmental and climate conditions for data centres, accessibility of remote base stations, etc.) vary to such an extent that a benchmark of excellence would not be meaningful. Even when benchmarks of excellence are given, these are **not** meant as targets for all companies to reach or metrics to compare the environmental performance *across companies* of the sector, but rather as a measure of what is possible to help *individual companies assess the progress* they made and motivate them to improve further. Finally, Chapter 4 presents a comprehensive table with a selection of the most relevant environmental performance indicators, associated explanations and related benchmarks of excellence.

2. SCOPE

This reference document addresses the environmental performance of the telecommunications and ICT services sector ⁽⁶⁾. The best environmental management practices (BEMPs) described in this document were identified as best practices that can support the efforts of all Telecommunications and ICT services providers, i.e. telecommunication operators, ICT consultancy firms, data processing and hosting companies, software developers and publishers, broadcasters, installers of ICT equipment and sites, etc. Large organisations that store and process large quantities of data on their clients, supply chain and/or products (e.g. public administrations, hospitals, universities, banks) can also find several BEMPs of relevance to their activities.

The companies and organisation of the telecommunications and ICT services sector that fall under the scope of this report are listed below:

Only certain sub-categories of publishing activities (NACE Code 58):

58.21 Publishing of computer games

58.29 Other software publishing

All the sub-categories of telecommunications activities (NACE Code 61):

61.1 Wired telecommunications activities

61.2 Wireless telecommunications activities

61.3 Satellite telecommunications activities

61.9 Other telecommunications activities

⁽⁵⁾ A detailed description of each of the best practices, with practical guidance on how to implement them, is available in the 'Best Practice Report' published by the JRC and available online at: http://susproc.jrc.ec.europa.eu/activities/emas/documents/BEMP_Telecom_FinalReport.pdf

Organisations are invited to consult it if interested in learning more about some of the best practices described in this SRD.

⁽⁶⁾ Note that the European Electronic Communications Code (cf. Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code), acknowledging the convergence of the telecommunications, media and information technology sectors, now establishes common rules applicable to the broader sector including e.g. broadcasting. Where relevant and applicable, BEMPs are mentioned in reference to the new nomenclature.

All the sub-categories of computer programming, consultancy and related activities (NACE Code 62):

62.01 Computer programming activities

62.02 Computer consultancy activities

62.03 Computer facilities management activities

62.09 Other information technology and computer service activities

Only certain sub-categories of information service activities (NACE Code 63):

63.11 Data processing, hosting and related activities

63.12 Web portals

In addition to this core target group, other types of organisations classified under the NACE codes but not belonging to the NACE code sections listed above can also find several BEMPs of relevance, because of their increasing digitalisation:

- Publishing of books, newspapers, journals, etc. (NACE Code 58.1) via internet
- Motion picture, video and television programme production, sound recording and music publishing activities (NACE Code 59)
- Broadcasting via internet (NACE Code 60)
- News agency activities (NACE Code 63.91)
- Other information service activities n.e.c. (NACE Code 63.99)

Other organisations that are classified under other NACE sections and have to manage or operate large data storage, data processing and/or telecommunication infrastructures as a vital part of their activities may also find several BEMPs of relevance. Some examples are organisations belonging to:

- Reproduction of software (NACE Code 18.20)
- Activities of call centres (NACE Code 82.20)
- Architectural and engineering activities and related technical consultancy (NACE Code 71.1)
- Technical testing and analysis (NACE Code 71.20)
- Research and experimental development on natural sciences and engineering (NACE Code 72.1)
- Libraries, archives, museums and other cultural activities (NACE Code 91.0) as well as large organisations that store and process large quantities of data on their clients, supply chain and/or products such as public administrations, hospitals, universities, banks, manufacturers, retailers and other service companies.

The Telecommunications and ICT Services sector as defined in this report covers only a specific part of the value chain of such services and related equipment. This choice was aimed at avoiding overlap with other best practice reports:

- The ICT manufacturing industries (NACE Code 26.1, 26.2, 26.3 and 26.8), ICT trade industries (NACE Code 46.5), Installation of mainframe and similar computers (NACE Code 33.20) and recycling, reuse and repair of ICT equipment (NACE Code 95.1) are covered by the best practice report for the electrical and electronic equipment manufacturing sector ⁽⁷⁾;
- The ICT retail trade (NACE Code 47.1 and 47.4) can be considered covered by the best practice report for the retail trade sector ⁽⁸⁾.

⁽⁷⁾ The best practice report for the electrical and electronic equipment manufacturing sector is under development and will be available online at: <http://susproc.jrc.ec.europa.eu/activities/emas/eeem.html>

⁽⁸⁾ The best practice report for the retail trade sector is available online at: <http://susproc.jrc.ec.europa.eu/activities/emas/retail.html>

This document covers the core business activities of organisations in the Telecommunications and ICT Services sector. Beyond the direct management of ICT assets, core business activities are considered to include also the relationship with key stakeholders, although limited to practices that telecommunications and ICT services providers can implement themselves (e.g. establishing environmental criteria during procurement of ICT equipment, providing information to customers on the energy consumption of devices provided to them).

The management of offices and general company transport are also not included as these are common for all types of organisations and not specific to organisations in the Telecommunications and ICT Services sector. Besides, the best environmental management practices (BEMPs) related to mobility (business travel and employee commuting) and sustainability practices in offices are already developed in the document on BEMP in the Public Administration Sector ^(*). No BEMP that is specific to the Telecommunications and ICT Services buildings and transportation was identified in these areas.

The manufacturing, retail and recycling of ICT equipment are not included in this study as they are covered in the documents on BEMP for other sectors.

This report distinguishes between:

- BEMPs that minimise the environmental impacts of organisations in the Telecommunications and ICT Services sector, referred as 'greening of ICT' practices;
- BEMPs that organisations in the Telecommunications and ICT Services sector can implement in order to minimise environmental impacts of other sectors beyond the Telecommunications and ICT Services sector, referred as 'greening by ICT' practices.

An overview of the scope of the BEMPs for the Telecommunications and ICT Services sector is given in Figure 1.

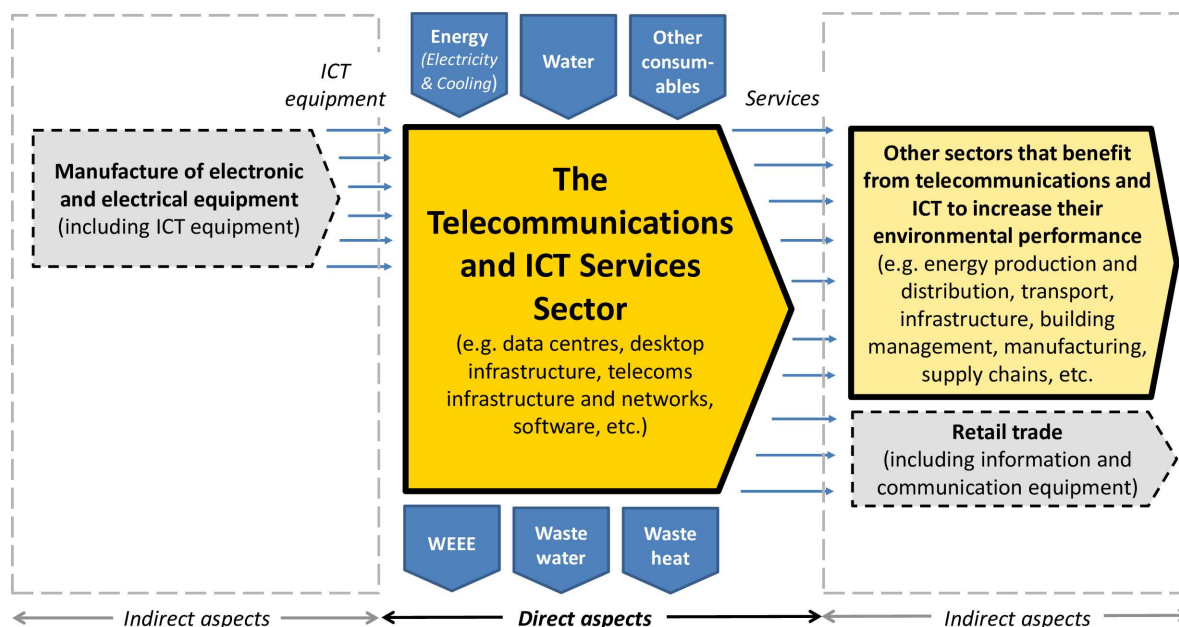


Figure 1: Overview of the scope of the document

The main environmental aspects and associated environmental pressures for the telecommunications and ICT services sector are presented in Table 1. These environmental aspects were selected as the most relevant in the sector and are those that are covered in this document. However, the environmental aspects to be managed by specific organisations should be assessed on a case by case basis.

^(*) The best practice report for the public administration sector is available online at: http://susproc.jrc.ec.europa.eu/activities/emas/public_admin.html

Table 1

Main environmental aspects and environmental pressures related to the Telecommunications and ICT Services sector

Service/Activity	Main environmental aspects	Main environmental pressures
Data Centre	<ul style="list-style-type: none"> — ICT equipment (servers, storage devices, etc.) — Software (processors) — HVAC — Power supply — Buildings 	<ul style="list-style-type: none"> — Energy and water consumption — Generation of WEEE and waste water — GHG emissions from electricity production and refrigerant leakages
End-user devices	<ul style="list-style-type: none"> — ICT equipment (computers, peripheral devices, etc.) — Software 	<ul style="list-style-type: none"> — Energy consumption to power hardware — Generation of WEEE — GHG emissions from electricity production
Telecommunication infrastructure and networks	<ul style="list-style-type: none"> — Buildings (central offices, base stations, etc.) — Nodes (antennas, satellites, routers, etc.) — Links (cables, fibres, landlines, etc.) — Terminals (phones, computers, modems, etc.) — Software (processors, etc.) 	<ul style="list-style-type: none"> — Electricity consumption from network equipment and cooling systems — Fuel consumption related to transportation — Generation of WEEE — Electromagnetic waves generation — GHG emissions from electricity production — Changes to the landscape and habitats due to infrastructure deployment
Broadcasting services	<ul style="list-style-type: none"> — Buildings (base stations) — Transmitters (antennas, satellites, etc.) — Links (cables, fibres, etc.) — Terminals (radios, TVs, etc.) — Software (processor) 	<ul style="list-style-type: none"> — Energy consumption — Generation of WEEE — Electromagnetic waves generation — GHG emissions from electricity production — Changes to the landscape and habitats

The BEMPs of this reference document are classified as illustrated in Table 2.

Table 2

Structure of the document

Section	Description
3.1. BEMPs for the cross-cutting issues	This section describes practices that can be implemented by any actor of the telecommunications and ICT services sector (implementation of an environmental management system, deployment of a green procurement policy, prevention and management of Waste Electrical and Electronic Equipment, use of renewable energy...)
3.2. BEMPs for Data centres	This set of BEMPs focuses on practices specific to data centres (cooling and airflow management, server virtualisation, etc.) and referenced within the Cenelec Technical Report CLC/TR 50600-99-1

3.3. BEMPs for electronic communication networks	This section encloses practices aiming at better managing existing wired and wireless networks (in terms of energy consumption and electromagnetic field issues), at installing more energy-efficient network equipment and reducing the impact of building or renovating network infrastructures.
3.4. BEMPs for Improving the environmental performance in other sectors ('Greening by ICT')	This section encloses practices that demonstrate how ICT can reduce environmental impacts in other sectors based on real examples from companies in the telecommunications and ICT service sector

3. BEST ENVIRONMENTAL MANAGEMENT PRACTICES, SECTOR ENVIRONMENTAL PERFORMANCE INDICATORS AND BENCHMARKS OF EXCELLENCE FOR THE TELECOMMUNICATIONS AND ICT SERVICES SECTOR

3.1. BEMPs for cross-cutting issues

This section focuses on cross-cutting measures which could apply to all types of organisations in the telecommunications and ICT services sector at different levels (data centres, telecommunication networks, end-user devices, etc.).

3.1.1. *Making the best use of an environmental management system*

ICT facilities have important environmental impacts through energy consumption, water consumption and waste generation. It is particularly important for telecommunications and ICT services companies to monitor their environmental impacts and implement an environmental management system to systematically minimise these impacts. It is considered best practice to:

Define the organisation's ICT needs and audit the existing ICT equipment, services and software.

Measure, monitor and manage the environmental performance of ICT equipment infrastructure and facilities.

Set objectives and action plans based on benchmarking and best practices.

Ensure that set objectives and action plans are part of effective company-wide environmental policies, such as an energy efficiency strategy

Applicability

This BEMP is broadly applicable to all companies and organisation of the sector. However, the resources and means allocated to the process must be adapted to the size and the environmental impact of the site or the company. For small and mid-size companies, efforts needed must be assessed and validated.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Implementation of an asset management system, e.g. certified ISO 55001 (Y/N) — Share of operations with an advanced environmental management system implemented (% of facilities/operations), e.g. EMAS verified, ISO 14001 certified 	<ul style="list-style-type: none"> — The company has a global and integrated asset management system e.g. certified ISO 55001 — 100 % of operations implement an advanced environmental management system, e.g. EMAS verified or ISO 14001 certified

<ul style="list-style-type: none"> — Share of operations measuring and monitoring energy use and water consumption as well as waste management — Share of staff provided at least once with information on environmental objectives and training on relevant environmental management actions — Use of energy efficiency indicators (Y/N); — WEEE generation (in kg or tonnes) per unit of turnover (EUR) — Use of water efficiency indicators (Y/N) — Total carbon emissions (in tCO₂eq.) for scope 1 and 2 ⁽¹⁾ — Total carbon emissions compensated (in tCO₂eq.) — Carbon emissions (in tCO₂eq.) for scope 1 and 2 per unit of turnover (EUR) 	<ul style="list-style-type: none"> — 100 % of operations measure and monitor their energy use and water consumption as well as waste management — The company has achieved carbon neutrality (scope 1 and 2), including through the use of renewable energy and carbon compensation, after having pursued all efforts to improve energy efficiency
---	--

⁽¹⁾ Total carbon emissions for scope 1 and 2 can be calculated based on the Greenhouse Gas Protocol, available online at: <https://ghgprotocol.org/>

3.1.2. Procurement of sustainable ICT products and services

The selection and deployment of ICT products and services needs to be based on an integrated strategy to tackle their inherent environmental impacts, such as their energy consumption and the use of specific materials such as rare metals and chemicals. It is considered best practice to:

- Assess the existing assets of ICT equipment and the needs in the procurement process preparation.
- Include in the call for tender required specific environmental criteria to be met.
- Provide training and guidance to end-users when deploying ICT solutions so they can make the best use of the products and services.

Establish energy and environmental performance criteria for ICT equipment provided to customers to help them reduce their environmental impact.

Applicability

The implementation of a policy for the procurement of sustainable ICT services and products is applicable in any company but will require specific skills on sustainability. Large organisations have greater potential to leverage influence over their suppliers, but SMEs may exert considerable influence over local suppliers.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Share of products or services purchased by the company complying with specific environmental criteria (e.g. EU Ecolabel, top class energy label, Energy Star, TCO-certified etc.) — Use of total cost of ownership as criterion in call for tenders (Y/N) — Share of equipment purchased by the company complying with internationally recognised best practices or requirements (e.g. EU Codes of Conduct) 	<ul style="list-style-type: none"> — All ICT equipment purchased by the company is ISO Type I eco-labelled (e.g. EU Ecolabel, Blue Angel) (if available), Energy Star, or EU Green Public Procurement criteria (if available) are applied in its procurement. — All broadband equipment purchased by the company meets the criteria in the EU Code of Conduct on broadband equipment — 100 % of packaging purchased by the company is made from recycled material or was awarded the Forest Stewardship Council label

<ul style="list-style-type: none"> — Share of packaging purchased by the company made from recycled materials or awarded the Forest Stewardship Council label — Share of the weight given to environmental criteria in calls for tenders — Share of suppliers that have an environmental management system or energy management system in place (e.g. EMAS verified, ISO 14001 or ISO 50001 certified) — Share of ICT products and services provided by the company to customers for which environmental information is available to end users 	<ul style="list-style-type: none"> — 10 % of the bid weighting is dedicated to environmental performance when purchasing ICT equipment — 100 % of products and services provided by the company has related environmental information available to end users — Use of total cost of ownership as criterion in call for tenders
--	---

3.1.3. *Optimising the energy consumption of end-user devices*

There is a large potential to reduce the energy consumption of end-user equipment used within the offices and facilities of telecommunications and ICT services companies thanks to specific power management measures. It is best practice to:

Adopt technical solutions:

- Installing appropriate devices in terms of energy performance and functionalities depending on the needs of users;
- Properly configuring equipment to minimise unnecessary functionalities and power consumption;
- Performing regular energy audits to check devices configuration and powered-off devices;
- Developing power management solutions using different types of power management modes (manual, default, through software) or using dedicated devices (smart power strip, etc.).

Adopt organisational solutions:

- Assessing individual user acceptance;
- Raising users' awareness.

Applicability

This BEMP is applicable to both large and small companies, although SMEs might benefit more from techniques based on individual user awareness rather than deployment of automated controls, more suited to large companies. Implementing power management depends on the leadership's commitment to support overall energy savings objectives and environmental performance. It is also dependant on the implication of the staff to contribute to the power management measures as well as support from the IT and procurement departments.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Energy use of offices (kWh) per unit of turnover or number of workstations or employees working on-site (excluding HVAC and lightning if possible) — Share of end-user ICT devices having been configured on installation at optimal power management — Share of end-user ICT devices audited on power management at an appropriate frequency (e.g. yearly, only once during the lifetime of the product etc.) — Share of staff trained at least once on energy savings 	<ul style="list-style-type: none"> — All end-user ICT devices are configured on installation at optimal power management — All end-user ICT devices have been audited on power management at least once during their lifetime — All staff has been trained at least once on energy savings

3.1.4. *Use of renewable and low carbon energy*

ICT facilities have a high carbon footprint due to intensive energy use. Electricity generation from renewable sources such as biomass, solar, wind and geothermal cooling systems, significantly reduces their carbon footprint. It is considered BEMP to:

- Purchase third-party green electricity.
- Produce one's own electricity, either on or off-site.
- Store electricity on-site in an efficient way.

Applicability

The BEMP is broadly applicable by all type of companies of the sector, including SMEs. The geographical location of the facility and its size may affect its applicability though.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Share of renewable electricity purchased (with Guarantees of Origin) out of the total electricity use (%) — Share of renewable electricity produced on site out of the total electricity use (%) — Renewable Energy factor (REF) according to EN 50600-4-3 — Carbon Usage Effectiveness (CUE) = CO₂-eq. emissions from the energy consumption of the facility (kgCO₂ eq)/total ICT energy consumption (kWh) — Carbon content of the energy used = CO₂-eq. emissions from the energy consumption of the facility (kgCO₂ eq)/total energy consumption (kWh) 	<ul style="list-style-type: none"> — 100 % of electricity used is from renewable energy sources (either purchased or produced on-site)

3.1.5. *Resource efficiency of ICT equipment through waste prevention, reuse and recycling*

Resource efficiency and appropriate waste management in the ICT sector is important because of the use of specific materials that need to be properly treated at end-of-life to avoid damage to human health and the environment. It also offers a large potential for limiting resource depletion through recycling. Specific waste management techniques can be implemented in order to improve waste management at each stage of the waste hierarchy in ICT companies. It is BEMP to:

- Develop a waste prevention plan.
- Promote LCA-based eco-design through procurement.
- Increase the service life and limit the obsolescence of ICT equipment.
- Implement systems to enable re-use of ICT equipment.
- Ensure traceable collection and proper sorting of end-of-life ICT equipment.

Applicability

The BEMP is in principle broadly applicable to all types of companies in this sector; in practice small companies may contract out some waste management operations. The ownership model of the equipment will also dictate the available options for resource efficiency.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Share of facilities or sites with a certified zero waste management system or with a certified asset management system (% of facilities/sites) — Average service life of ICT equipment to be calculated for different product groups (e.g. servers, routers, end-user devices) — Share of ICT waste generated from own operations recovered for reuse or refurbishment or sent for recycling — Share of WEEE or ICT waste generated from clients recovered for reuse or refurbishment, or sent for recycling — Amount of ICT waste sent to landfill (t) 	<ul style="list-style-type: none"> — 100 % of facilities have a certified zero waste management system or a certified asset management system — 90 % of own ICT equipment recovered for reuse or refurbishment or sent for recycling — 30 % of ICT equipment from clients taken back and recovered for reuse or refurbishment or sent for recycling (for ICT companies providing equipment to customers) — Zero ICT waste sent to landfill

3.1.6. Minimising data traffic demand through green software

While software does not directly consume energy, it greatly influences the energy efficiency of the ICT hardware on which it runs. However, a large share of software code does not take into account energy consumption, and opportunities exist to optimise software, reduce the volume of data processed and transmitted, and ultimately reduce the energy consumption of hardware.

This BEMP is dedicated to practices that can be implemented either when developing new software or when optimising existing software, for servers and networks considering both mobile applications (for smartphones and tablets) and computer software (for laptop and desktop), as well as web portals and web-based applications. It is BEMP to:

- Select or develop more energy efficient software that minimises power consumption of ICT equipment while running.
- Design demand-adaptive software based on the assessment of end-users needs, in order to avoid energy over-consumption at usage phase and to limit the obsolescence of existing ICT devices.
- Monitor the energy consumption of software to assess the real performance of the acquired software, or to assess the opportunity of improving the energy efficiency of existing software.
- Assess software environmental impacts through LCA at development phase and performance measurement (CPU, RAM and energy utilisation) at usage phase.
- Refactor existing software to improve its energy efficiency.

Applicability

The BEMP is applicable to all types of companies in this sector, whether companies procure or develop their own software solutions.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Share of sites that have implemented the best practices of the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding the development and deployment of new IT services; — Amount of data transferred in relation with software utilisation (bit/web page view or bit/min of mobile application use) 	<ul style="list-style-type: none"> — All data centres have implemented the best practices in the EU Code of Conduct on Data Centre Energy Efficiency or the expected practices of CLC/TR 50600-99-1 regarding the development and deployment of new IT services. — All staff (software developers) trained on energy efficient software.

<ul style="list-style-type: none"> — Share of newly acquired software for which the energy performance has been used as a selection criterion within procurement (%); — Share of newly developed software for which the energy performance has been used as a development criterion (%); — Share of demand-adaptive designed software; — Share of existing software which has been refactored or which has undergone code reviews towards higher energy efficiency (%); — Share of software for which the energy performance has been assessed or monitored (%). — Share of software for which a LCA has been carried out; — Share of software developers (staff) trained on energy efficient software (%). 	<ul style="list-style-type: none"> — At least one project for minimising data traffic demand through green software was implemented during the year
--	--

3.2. BEMPs for data centres

This section deals with practices that improve the environmental performance of the operations of data centres. Many of the techniques identified within this chapter can also be implemented in telecommunication central offices.

There is a large variety of data centres and many different ways to categorise them; the following characteristics can be used to differentiate between data centres: the size of the data centre (determined by the physical area, number of servers and/or workload capacity); its geographical location; the purpose or type of the operator (e.g. enterprise data centres, co-location⁽¹⁰⁾, co-hosting, or network operator facilities); and its security level (Tier I to IV). These characteristics all have an impact on the applicability of the following BEMPs to different data centres.

3.2.1. *Implement an energy management system for data centres (including measuring, monitoring and management of ICT and other equipment)*

The energy consumption of data centres is responsible for a major share of their environmental impacts. It is therefore important for data centre operators to have a clear and detailed view on energy consumption at the appropriate granularity levels, and to systematically exploit all opportunities to minimise it. It is considered best practice to:

- Implement an energy management system (e.g. ISO 50001 or through EMAS).
- Audit existing equipment and services to ensure that all areas with potential for optimisation and consolidation are identified to maximise any unused capability prior to new material investment.
- Install metering equipment capable of measuring energy consumption and environmental parameters at different levels (row, cabinet, rack or ICT device level).
- Monitor and report key performance indicators on equipment utilisation, energy consumption and environmental conditions.

Applicability

General remarks on the applicability of data centre BEMPs apply. Most energy management best practices will be better suited to localised, mid-tier and enterprise-class data centres.

⁽¹⁰⁾ Co-location of data centres can also refer to exchange points of ICT services.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — KPI_{DCEM} Global KPI for Data Centre according to ETSI standard — Share of facilities having an energy management system certified according to ISO 50001 or integrated in EMAS, or complying with the EU Code of Conduct on Data Centre Energy Efficiency or the 'expected practices' of CLC/TR 50600-99-1 — Share of ICT, cooling or power equipment with specific metering equipment (for their utilisation, energy consumption, temperature or humidity conditions) — Share of staff provided with information on energy objectives or training on relevant energy management actions during the year 	<ul style="list-style-type: none"> — The KPI_{DCP} for existing data centres is equal to or lower than 1,5 — All data centres have an energy management system certified according to ISO 50001 or integrated in EMAS, or complying with the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the 'expected practices' of CLC/TR 50600-99-1

3.2.2. Define and implement a data management and storage policy

Minimising the quantity of data stored onto drives and the computing capacity required to run applications, databases and services is a key measure to reduce the energy consumption of data centres by reducing the number of powered hardware (servers and storage devices). It is considered best practice to:

- Implement an effective data management and storage policy to minimise the share of stored data either unnecessary, duplicated or does not require rapid access.
- Deploy grid and virtualisation technologies to maximise the use of shared platforms.
- Consolidate existing services and decommission unnecessary hardware (and virtual machines) to reduce the number of highly resilient and reliable hardware powered (servers, networking and storage equipment).

When properly implemented, these techniques lead to a reduction of the hardware purchased which also results in significant material resources savings.

Applicability

This BEMP is broadly applicable by all companies and organisations of the sector, irrespective of their size, security level or purpose although application may be different for enterprises or colocation data centres. Even if virtualisation is more frequently used in bigger data centres, this technique can also be implemented in smaller server rooms.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Energy use (kWh) per rack — Average storage disks space utilisation (%) — Average server utilisation (%) — Average cabinet utilisation (%) — Share of servers virtualised (%) — Share of data centres that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding data management and storage, and management of existing ICT equipment and services 	<ul style="list-style-type: none"> — All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the expected practices of CLC/TR 50600-99-1 regarding data management and storage, and management of existing ICT equipment and services

3.2.3. *Improve airflow management and design*

The reliability of IT systems depends on environmental conditions (temperature, humidity, dust, etc.) that must be ensured by appropriate control of the indoor air quality. Airflow management for data centres aims at avoiding air recirculation and mixing of cooling air supplied and hot air rejected from equipment. It is BEMP to:

- Implement a hot aisle/cold aisle configuration for ICT equipment to ensure that hardware shares an air flow direction without mixing cold and hot air.
- Ensure aisles separation and containment to avoid the recirculation of air around the servers.
- Segregate ICT equipment according to their environmental requirement (mainly humidity and temperature) and provide appropriate airflows to separate environmental areas.
- Improve the floor and ceiling design to reduce bypass air flow, to prevent re-circulated air, and to reduce obstructions created by cabling or other structures.
- Adjust volumes and quality of supplied cooled air to the IT equipment needs (function of heat produced and environmental requirements), and provide a slight oversupply of air to minimise heated air recirculation.

Improved airflow management increases both the efficiency and the capacity of the cooling equipment, reduces the utilisation of fans and humidifiers (and their energy consumption) and minimise the production of waste heat.

Applicability

Most of these actions can only be implemented by the data centre operator since they require changes in operational conditions, evolutions of the design of the facility or installation of new equipment. Although the best practices identified can be implemented in data centres of any size, scale effects can be observed in larger data centres with shorter return on investments.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Air flow efficiency (fan power in kWh/fan airflow in m³/hour) — Return Temperature Index (identification of air recirculation) — Flow performance of the air handler (unit less) — Thermal performance of the air handler (unit less). — Rack cooling index (difference between allowable intake temperature and the one recommended by ASHRAE) — Share of racks installed with hot aisle/cold aisle configuration (with containment) — Share of data centres that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding airflow management and design 	<ul style="list-style-type: none"> — 100 % of new racks are installed with hot aisle/cold aisle configuration (with containment) — All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the expected practices of CLC/TR 50600-99-1 regarding airflow management and design, and installation of ICT equipment to optimise airflow management.

3.2.4. *Improve cooling management*

Cooling is needed to remove the heat produced by ICT equipment in a data centre or a network room and to ensure the right operating conditions for ICT equipment to perform reliably. Sizing the necessary cooling system of a data centre depends on the environment where the data centre is located, on the efficiency of the IT equipment used in the data centre and on the airflow management performance. It is BEMP to:

- Maintain the cooling system in optimum condition depending on IT load requirements to preserve its efficiency.
- Review and adapt the cooling system capacity by shutting down unused equipment and better taking into account specific equipment operating requirements.
- Optimise and automate the cooling system output by connecting CRAC units or using smart and multifactor units.

Applicability

The BEMP is broadly applicable in all companies of the sector. Maintaining the cooling system and carrying out regular reviews of its capacities can be done in most data centres, irrespectively of their size, security level or purpose.

However, automating the cooling system output can imply costs to purchase smart equipment, making it more appropriate for large size data centres.

It must be noted that specific regulation and environmental guidance can conflict with the decrease of cooling needs. For instance, BREEAM and LEED give points for increasing insulation of data centres. An increased insulation of data centres will require additional cooling needs since the heat produced by servers cannot dissipate.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — COP (coefficient of performance): average cooling load (kW)/average cooling system power (kW) — Share of data centre total energy use dedicated to the cooling system (%) — Carbon Usage Effectiveness (CUE) — Water Usage Effectiveness (WUE) — Share of data centres that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency (parts 5.2, 5.4 and 5.5) or the Expected Practices of CLC/TR 50600-99-1 regarding cooling management 	<ul style="list-style-type: none"> — Select equipment with a COP of 7 or higher for water chillers, and 4 or higher for Direct Expansion (DX) cooling systems — All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency (parts 5.2, 5.4 and 5.5) or the expected practices of CLC/TR 50600-99-1 regarding cooling management

3.2.5. Review and adjust temperature and humidity settings

ICT facilities are often overcooled, and the server intake temperature set point can be raised within the recommended or allowable temperature ranges (given in the manufacturer specifications) in order to reduce the cooling capacity and the energy consumption of the cooling system.

A similar situation is generally observed regarding humidity, and the energy and water consumption of humidifiers can be reduced by allowing a broader range of humidity levels. It is therefore BEMP to:

- Review and raise temperature set points of cooling systems if practical, to reduce cooling needs and maximise the use of economisers.
- Review and change humidity settings of cooling systems if practical, to reduce the needs for humidifiers.

Applicability

The BEMP is broadly applicable to all types of companies in this sector. Raising temperature set points, adjusting volumes and quality of supplied cool air, and reviewing humidity settings can be done in most data centres, irrespectively of their size, security level or purpose, within the operational specification given by the server manufacturer and within acceptable working conditions.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Airflow Efficiency (fan power in kWh/airflow in m³/hour) — Return Temperature Index (RTI) — Share of data centres that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding temperature and humidity settings 	<ul style="list-style-type: none"> — All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the expected practices of CLC/TR 50600-99-1 regarding temperature and humidity settings

3.2.6. BEMPs related to selecting and deploying new equipment for data centres

The section deals with practices for the improvement of the energy efficiency of individual equipment and ICT services used in data centres:

3.2.6.1. Selection and deployment of environmentally friendly equipment for data centres

The selection and deployment of ICT devices as well as cooling and power supply equipment needs to be based on an integrated strategy to minimise their overall environmental performance (energy use, water use, embodied energy, resource efficiency). It is BEMP to:

- Implement a green procurement policy specific to data centres equipment, from process preparation to bid evaluation.
- Select and install environmentally-performant servers and storage equipment; i.e. equipment with the option to enable power management features, equipment suitable for the data centre power density and cooling delivery capabilities, equipment meeting the expected environmental conditions (temperature and humidity), etc.
- Select environmentally-performant cooling equipment; i.e. equipment with high CoP or variable speed controls, appropriately sized cooling units, centralised cooling systems, economisers, etc..
- Select environmentally-performant power equipment; i.e. highly efficient UPS, modular UPS, etc.

Applicability

Techniques on green procurement and environmentally-performant servers are broadly applicable to any new and existing data centre.

For cooling systems, the location of the data centre is a fundamental factor concerning the feasibility and the performance of a free cooling system. Alternative cooling systems such as liquid cooling or free-air cooling are most easily implemented in new data centres rather than existing ones. For power systems, the elements to take into consideration for the adoption of new, more efficient UPS systems vary depending on when a new infrastructure is being built or when upgrading an existing infrastructure.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Design PUE (dPUE) — Share of ICT products or services purchased by the company complying with specific environmental criteria (e.g. EU Ecolabel, EnergyStar) 	<ul style="list-style-type: none"> — All new Data Centre ICT equipment is ISO Type I eco-labelled (e.g. EU Ecolabel, Blue Angel, etc.) (if available) or Energy Star labelled

<ul style="list-style-type: none"> — Share of suppliers with an environmental management system or energy management system in place (e.g. EMAS verified, ISO 14001 or ISO 50001 certified) — Share of facilities that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding the selection and deployment of new IT equipment/power equipment/cooling equipment — Average energy efficiency of UPS (given by manufacturers) — Average COP of cooling equipment (given by manufacturers) 	<ul style="list-style-type: none"> — All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding the selection and deployment of new ICT equipment/of cooling system/of new power equipment/of other data centre equipment. — UPS meet the requirements of the Code of Conduct for UPS — Select equipment with a COP of 7 or higher for water chillers, and 4 or higher for Direct Expansion (DX) cooling systems
---	---

3.2.7. BEMPs related to new build or refurbishment of data centres

The section deals with practices for the improvement of the energy efficiency of new built or refurbished data centres.

3.2.7.1. Planning of new data centres

When building or upgrading a data centre, the planning phase offers the most significant opportunities to ensure its environmental performance. Data centres are often oversized to allow future extensions, which generates energy inefficiencies. In many cases, the building can prevent the data centre from upgrading to new and more energy efficient equipment. It is BEMP to:

- Limit the level of physical infrastructure resilience and service availability according to business requirements.
- Build a modular data centre to avoid oversizing and maximise infrastructure efficiency under partial and variable load conditions.

Applicability

This BEMP is broadly applicable to all companies of the sector, being most relevant for localised, mid-tier and enterprise-class data centres. Building a data centre according to a modular architecture is particularly relevant for big data centres.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Energy use of the data centre per floor area (kWh/m²) — Design PUE (dPUE) — Share of sites that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding Utilisation, management and planning of new build or refurbishment of data centres 	<p>All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the expected practices of CLC/TR 50600-99-1 regarding utilisation, management and planning of new build and refurbishment of data centres</p>

3.2.7.2. Reuse of data centre waste heat

As any electrical equipment, IT equipment requires power supply and produces waste heat while running. Data centres produce large quantities of waste heat, which is an opportunity for heat reuse. It is BEMP to:

- Re-use the waste heat produced in some rooms of the data centre to provide low grade heating to industrial or office space (including other areas of the data centre).

Applicability

This BEMPs can be broadly implemented by any data centre regardless of its size, tier or purpose.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Energy Reuse Factor (ERF) — Energy Reuse Effectiveness (ERE) — Share of sites that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding reuse of data centre waste heat 	<ul style="list-style-type: none"> — All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding reuse of data centre waste heat

3.2.7.3. Design of the data centre building and physical layout

The physical layout of the data centre influences significantly its cooling system performance, since cooled areas (where racks are located) may be unnecessarily located close to internal heat sources (such as mechanical or electrical equipment) or in areas heated by external sources (e.g. solar radiation). It is BEMP to:

- Minimise direct solar heating of the cooled areas of the data centre, in order to minimise cooling requirements.
- Locate cooling equipment in appropriate areas of the data centre, such as areas with free air movement, areas with sufficient space to optimise cooling performance, areas free of obstructions and free of equipment generating heat.

Applicability

This BEMP is most relevant for building new, enterprise-class data centres, as it aims to shape the aspect and structure of the new built data centre and can be costly to implement.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Share of sites that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding data centre building physical layout 	<ul style="list-style-type: none"> — All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the expected practices of CLC/TR 50600-99-1 regarding data centre building physical layout

3.2.7.4. Selecting the geographical location of the new data centre

The geographical location of the data centre has great influence on its future carbon and environmental impacts. It is considered best practice to:

- Favour brownfield locations over greenfield.
- Select a geographical location with environmental conditions improving the performance of side-economisers, offering opportunities for installing equipment for the production of renewable energy or limiting threats and natural disasters.
- Locate the data centre close to energy, cooling and heating sources, to minimise energy losses due to energy transport and to offer opportunities for the reduction of carbon emissions (consumption of renewable energy, waste heat or free cooling).
- Minimise impacts of the building on the environment (noise, aesthetic impacts, needs for telecommunication networks and other infrastructures, etc.).

Applicability

The BEMP is broadly applicable in all types of companies from the sector, including SMEs, but most relevant for mid-tier and enterprise-class data centres.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Share of new facilities with free cooling solutions (air-side economisers, geothermal cooling, etc.) — Share of new facilities with renewable energy production on site (photovoltaic panels, wind turbine, etc.) — Share of new facilities with heat reuse system — Share of sites that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding data centre geographical location 	<ul style="list-style-type: none"> — All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the expected and optional practices of CLC/TR 50600-99-1 regarding data centre geographical location

3.2.7.5. Use of alternative sources of water

Water is used in data centres for two purposes: cooling and humidification, which are intimately linked. In particular, evaporative chillers require significant amount of water. It is BEMP to:

- Monitor water consumption from all sources in all data centre spaces.
- Limit impact on potable water resources by using non-potable water sources (rainwater, wastewater, etc.).

Applicability

This BEMP is relevant for large, enterprise-class data centres. The choice of the cooling system solution depends on the size of the data centre, which is intimately linked to the activity and the size of the company.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Share of water consumed in data centres by source, such as mains water, rainwater or non-utility water sources — Water consumption of the data centre per floor area (m³ consumed/m² of data centre) — Water Usage Effectiveness (WUE) — Share of sites that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding water sources 	<ul style="list-style-type: none"> — All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the expected practices of CLC/TR 50600-99-1 regarding water sources

3.3. BEMPs related to electronic communication networks

The section describes practices focusing on the network configuration of the different elements that form electronic communication infrastructure and networks ⁽¹⁾.

3.3.1. Improving the energy management of existing networks

Due to end-user demand variability, traffic loads on electronic communication networks vary significantly over time and space. The energy consumption of modern telecommunications equipment is the highest when the equipment is operating at maximum traffic load, but it does not decrease much when the equipment is underutilised. A large part of the daily network energy consumption is thus spent for providing full system capacity, even when the actual traffic demand is much lower. It is BEMP to:

- Measure the energy consumption of network elements by using smart energy meters and automated analysis.
- Use smart stand-by functions to implement network energy management, and switch as many devices as possible to low consumption mode when the traffic load is low to adapt the overall capacity of the network to the demand.
- Use dynamic power scaling opportunities to adapt the operation mode of network equipment to low or moderate traffic period times.
- Take advantage of dynamic scheduling transmission to better manage data traffic, and to control the amount and the timing of data packet transmission.
- Provide energy-aware services to reduce the traffic demand at peak load, as well as the overall capacity of the network.

Applicability

The applicability of the various measures of this BEMP is presented in Table 3.

Table 3

Applicability of best practices aiming at improving the energy management of existing electronic communication networks (ECNs)

Technique	Network segment	Network technology	End-users' requirements	Actor
Measure the energy consumption	From core to access network	All type of technology	All type of end-users	Electronic communications networks (ECN) operators
Using smart stand-by functions	From core to access network	All type of technology	Inappropriate for users requiring connexion stability or a very short resuming time	ECN operators
Using dynamic power scaling opportunities	From core to access network	All type of technology	All type of end-users	ECN operators
Taking advantage of dynamic scheduling transmission	From core to access network	All type of technology	Inappropriate for users requiring fast transmission rates	ECN operators

⁽¹⁾ Please note that 'electronic communication networks' is used in the broad sense of the European Electronic Communications Code (including wireless, optical ...) and not referring strictly to communications based only on a physical layer exchanging *electronic* signals.

Providing energy-aware services	From core to access network	All type of technology	Inappropriate for users requiring high Quality of Services	ECN operators and ICT service providers
--	-----------------------------	------------------------	--	---

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Average energy consumption per customer or subscriber in kWh/customer or subscriber ⁽¹⁾ — Mobile/Fixed Network data Energy Efficiency (the data volume delivered/the energy consumption) in bit/J — Share of network energy usage for which energy consumption is measured (in %) — Share of network nodes for which dynamic power management solutions (such as dynamic power scaling or dynamic scheduling transmission) are implemented (in %) 	<ul style="list-style-type: none"> — 50 % of the network energy usage is real-time monitored at telecommunication sites level (base stations and/or fixed-network nodes), or above — An energy management system is in place for telecommunication networks

⁽¹⁾ This indicator is not suited to benchmark between different types of operators.

3.3.2. Improving risk management for electromagnetic fields through assessment and transparency of data

Electromagnetic fields (EMF) are a public concern in relation to the growing wireless networks. Strict regulations have been defined and intense research works have been carried out to tackle this issue. It is best practice for telecom operators to:

- Improve risk management for electromagnetic fields through assessment and transparency of data on EMF exposure.

Applicability

The implementation of this BEMP depends on the content of national regulations regarding EMF and on the local context (existence of associations against EMF exposure, media coverage of EMF issues, visibility of antennas, etc.). It is most relevant for network operators.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — The percentage of sites assessed by measurement for compliance with EMF limits; — The percentage of sites regularly or continuously monitored (also with a software) for compliance with EMF limits; — The percentage of the results from the two indicators above that are made publicly available and transparent to the public (%). 	N/A

3.3.3. *Selecting and deploying more energy-efficient electronic communication network equipment*

Both mobile and wireline networks use ICT equipment that require electricity and specific environmental conditions to properly function. Electronic communication ⁽¹²⁾ operators have the opportunity when selecting and deploying such materials within their networks to improve energy efficiency by selecting and configuring appropriate equipment. It is best practice to:

- Opt for selecting and deploying the most energy-efficient ICT equipment (radio, telecommunication, broadband and IT devices) in telecommunication networks (more energy efficient technology, power management features, etc.).
- Opt for deploying integrated and multi-standard solutions, instead of multiple single-standard systems running in parallel and not properly configured.
- Opt for selecting and deploying the most energy-efficient cooling systems in base stations (e.g. passive cooling, simple fans, heat exchangers, etc.) and central offices (e.g. hot aisle/cold aisle blanking plates, hot air containments, air ducting, etc.).
- Opt for selecting and deploying the most energy-efficient UPS (e.g. high efficient UPS, modular UPS, etc.) in base stations and central offices.
- Opt for designing telecommunication sites which maximise energy-efficiency by migrating distributed functions to central servers in wireline networks, moving radio equipment closer to the antenna, and using an appropriate design of UPS.
- Use software enabling energy savings all along the network, to implement virtualisation (for increasing equipment sharing and reducing the number of needed hardware equipment) or networking functions (for allowing a greater flexibility and efficiency of the network).

Applicability

The applicability of the measures of this BEMP is presented in Table 4.

Table 4

Applicability of the measures of this BEMP

Technique	Network segment	Network technology	End-users' requirements	Actor
Select more energy-efficient ICT equipment (radio, telecommunication, broadband and IT devices)	From core to access network	All type of technology	All type of end-users	ECN operators and technology providers
Deploy integrated and multi-standard solutions	Access networks	Mobile networks	All type of end-users	ECN operators and installers
Select and deploy more energy efficient cooling systems	From core to access network	All type of technology	All type of end-users	ECN operators, technology providers, and installers
Select and deploy more energy efficient UPS	From core to access network	All type of technology	All type of end-users	ECN operators, technology providers, and installers

⁽¹²⁾ In the sense of the European Electronic Communications Code.

Design more energy-efficient telecommunication sites	Access networks	All type of technology	All type of end-users	ECN operators and installers
Use software enabling energy savings	From core to access network	All type of technology	All type of end-users	ECN operators

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Percentage of broadband equipment meeting the Broadband Code of Conduct ⁽¹⁾ requirements in terms of energy consumption — Percentage of equipment able to deliver dynamic energy management — Share of base stations with multi-standard solutions — Share of base stations with a Remote Radio Head or Active Antenna System — Share of sites equipped with hardware compliant with the ETSI standard ⁽²⁾ — Share of sites with non-mechanical cooling — The temperature is set at the maximum allowable according to the equipment on site (Y/N) — Average UPS System Efficiency — Average COP of cooling systems 	<ul style="list-style-type: none"> — 100 % of new installed broadband equipment meets the requirements of the EU Code of Conduct for broadband equipment in terms of energy consumption — Energy efficiency of power/energy stations is 96 % or higher — Select equipment with a COP of 7 or higher for water chillers, and 4 or higher for Direct Expansion (DX) cooling systems

⁽¹⁾ EU Code of Conduct on Energy Consumption of Broadband Equipment:

<https://e3p.jrc.ec.europa.eu/communities/ict-code-conduct-energy-consumption-broadband-communication-equipment>

⁽²⁾ ETSI ES 202 336.

3.3.4. Installing and upgrading telecommunication networks

Beyond the installation of new energy efficient equipment on network sites, organisational solutions can deliver significant energy savings, for instance, by ensuring that unused equipment is plugged off and power and cooling supply are not oversized and are optimised to the actual current needs. It is best practice to:

- Take advantage of technology transition (e.g. deploying 5G technology in existing base station sites or for fixed stations switching from copper to fibre networks) to optimise network sites, undertaking decommissioning/switch off of the unused equipment, replacement of the obsolete equipment, proper configuration of the cooling systems, etc.
- Put in place a decommissioning plan through the integration of such practices in a management process focused on upgrading base station sites.

Applicability

This BEMP is more relevant for large mobile companies which own thousands of sites, and for operators of networks in rural areas (where the sites are more spaced out). Telecommunication operators and their suppliers in charge of the installation of ICT equipment are the main actors concerned by this BEMP.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Mobile Network data Energy Efficiency (EEMN,DV) — Mobile Network coverage Energy Efficiency (EEMN,CoA) — Wireline network efficiency (ICT energy use/total energy use of the network) — Quantity of unused or inefficient equipment decommissioned and removed from base station sites each year (kg) — Switch off from copper to fibre networks i.e. copper exchanges (%) 	<ul style="list-style-type: none"> — A plan and a management process for optimising all existing network sites have been defined (to remove unused and inefficient equipment, to properly configure cooling systems, etc.)

3.3.5. Reducing the environmental impacts when building or renovating telecommunication networks

Telecommunication and broadcasting infrastructures generate neighbourhood nuisances (aesthetic impact, noise from generators and cooling system, etc.) and are responsible for land-use (potentially associated with biodiversity disturbance). To limit such impacts when building new infrastructures or when renovating existing ones, it is BEMP to:

- Plan capacity and forecast demand ahead of building or renovation
- Co-locate ICT infrastructures, in order to limit the number of different infrastructures.
- Locate network infrastructures (fixe-lined, antennas, buildings, etc.) close to existing access roads and out of conservation areas
- Install noise reducing solutions, such as barriers, absorptive material or mufflers.

Applicability

The applicability of the measures of this BEMP is presented in Table 5.

Table 5

Applicability of the measures of this BEMP

Technique	Network segment	Operation	Actor
Co-location and sharing of ICT infrastructures	Radio Access Networks (RAN)	New build and renovation	Network operators; owners of other infrastructures
Location close to existing access roads and out of conservation areas	Any network infrastructure	New build	Network operators; local authorities
Installation of noise reducing solutions	Base stations and central office (generators and cooling systems)	New build and renovation	Network operators; local authorities

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — Percentage of sites passive sharing (%); — Percentage of sites active sharing (%); — Measures to reduce visual and environmental impacts applied e.g. noise-reduction solutions when building new wireline networks (Y/N). 	<ul style="list-style-type: none"> — At least 30 % of sites are shared with other operators (wherever feasible, e.g. legally)

3.4. Improving the energy and environmental performance in other sectors ('Greening by ICT')

This section deals with practices focussing on the most relevant opportunities for the telecommunications and ICT service sector to contribute to improving the environmental performance of other sectors.

3.4.1. Greening by ICT

Across all sectors, four main change levers for reducing GHG emissions and improving environmental performance in general through ICT are available:

- Digitalisation and dematerialisation
- Data collection and communication
- System integration
- Process, activity, and functional optimisation

These solutions are closely related to one another and complementary. They apply at different lifecycle stages: while developing the services or products, between the development phase and the utilisation phase, and at the user's site.

From an ICT company perspective and for each of these four main levers, it is best practice to:

- keep on developing new solutions that offer opportunities to reduce environmental impacts (through R & D investments, partnerships with companies from other sectors, etc.);
- help companies deploy such solutions into their operations and business (by specifically designing the solution according to its client needs, by providing training and communication, etc.);
- internally deploy these solutions, if relevant.

Applicability

The BEMP is broadly applicable to all types of companies in this sector.

Associated environmental performance indicators and benchmarks of excellence

Environmental performance indicators	Benchmarks of excellence
<ul style="list-style-type: none"> — GHG emissions based on the Greenhouse Gas Protocol, scope 3 emissions — number of innovative dematerialisation solutions proposed to clients — Share of products and services (in terms of turnover) delivered digitally to the client 	<ul style="list-style-type: none"> — N/A

4. RECOMMENDED SECTOR-SPECIFIC KEY ENVIRONMENTAL PERFORMANCE INDICATORS

Table 4.1 lists a selection of key environmental performance indicators for the telecommunications and ICT services sector, together with the related benchmarks and reference to the relevant BEMPs. These are a subset of all the indicators mentioned in Section 3.

Table 4.1

Key environmental performance indicators and benchmarks of excellence for the telecommunications and ICT services sector

Indicator	Common units	Main target group	Recommended minimum level of monitoring	Related EMAS core indicator ⁽¹⁾	Benchmark of excellence	Related BEMP ⁽²⁾
BEMPs for cross-cutting issues						
Implementation of an asset management system, e.g. certified ISO 55001	Y/N	All Telecom/ICT companies	Site	Material efficiency	The company has a global and integrated asset management system e.g. certified ISO 55001	3.1.1
Share of operations with an advanced environmental management system implemented, e.g. EMAS verified, ISO 14001 certified	% of facilities/ operations	All Telecom/ICT companies	Site	All	100 % of operations implement an advanced environmental management system, e.g. EMAS verified or ISO 14001 certified	3.1.1
Share of operations measuring and monitoring energy use and water consumption as well as waste management	% of facilities/ operations	All Telecom/ICT companies	Site	Energy efficiency, Water, waste	100 % of operations measure and monitor their energy use and water consumption as well as waste management	3.1.1
Total carbon emissions for scope 1 and 2	tCO ₂ eq.	All Telecom/ICT companies	Corporate	Emissions	The company has achieved carbon neutrality (scope 1 and 2), including through the use of renewable energy and carbon compensation, after having pursued all efforts to improve energy efficiency	3.1.1
Share of products or services purchased by the company complying with specific environmental criteria (e.g. EU Ecolabel, top class energy label, Energy Star, TCO-certified etc.)	%	All Telecom/ICT companies	Corporate	All	All ICT equipment purchased by the company is ISO Type I eco-labelled (e.g. EU Ecolabel, Blue Angel) (if available), Energy Star, or EU Green Public Procurement criteria (if available) are applied in its procurement.	3.1.2

Indicator	Common units	Main target group	Recommended minimum level of monitoring	Related EMAS core indicator ⁽¹⁾	Benchmark of excellence	Related BEMP ⁽²⁾
Share of equipment purchased by the company complying with internationally recognised best practices or requirements (e.g. EU Codes of Conduct)	%	All Telecom/ICT companies	Corporate	Energy efficiency	All broadband equipment purchased by the company meets the criteria in the EU Code of Conduct on broadband equipment	3.1.2
Share of packaging purchased by the company made from recycled materials or awarded the Forest Stewardship Council label	%	All Telecom/ICT companies	Corporate	Material efficiency, Biodiversity	100 % of packaging purchased by the company is made from recycled material or was awarded the Forest Stewardship Council label	3.1.2
Share of the weight given to environmental criteria in calls for tenders	%	All Telecom/ICT companies	Corporate	All	10 % of the bid weighting is dedicated to environmental performance when purchasing ICT equipment	3.1.2
Share of ICT products and services provided by the company to customers for which environmental information is available to end users	%	All Telecom/ICT companies	Corporate	All	100 % of products and services provided by the company has related environmental information available to end users	3.1.2
Use of total cost of ownership as criterion in call for tenders	(Y/N)	All Telecom/ICT companies	Corporate	Material efficiency, Energy efficiency	Use of total cost of ownership as criterion in call for tenders	3.1.2
Share of end-user ICT devices having been configured on installation at optimal power management	%	All Telecom/ICT companies	Site	Energy efficiency	All end-user ICT devices are configured on installation at optimal power management	3.1.3
Share of end-user ICT devices audited on power management at an appropriate frequency (e.g. yearly, only once during the lifetime of the product etc.)	%	All Telecom/ICT companies	Site	Energy efficiency	All end-user ICT devices have been audited on power management at least once during their lifetime	3.1.3
Share of staff trained at least once on energy savings	%	All Telecom/ICT companies	Site	Energy efficiency	All staff has been trained at least once on energy savings	3.1.3

Indicator	Common units	Main target group	Recommended minimum level of monitoring	Related EMAS core indicator ⁽¹⁾	Benchmark of excellence	Related BEMP ⁽²⁾
Share of renewable electricity purchased (with Guarantees of Origin) out of the total electricity use Share of renewable electricity produced on site out of the total electricity use	%	All Telecom/ICT companies	Corporate	Energy efficiency	100 % of electricity used is from renewable energy sources (either purchased or produced on-site)	3.1.4
Share of facilities or sites with a certified zero waste management system or with a certified asset management system (% of facilities/sites)	%	All Telecom/ICT companies	Site	Waste Material efficiency	100 % of facilities have a certified zero waste management system or a certified asset management system	3.1.5
Share of ICT waste generated from own operations recovered for reuse or refurbishment or sent for recycling	%	All Telecom/ICT companies	Site	Waste Material efficiency	90 % of own ICT equipment recovered for reuse or refurbishment or sent for recycling	3.1.5
Share of WEEE or ICT waste generated from clients recovered for reuse or refurbishment, or sent for recycling	%	All Telecom/ICT companies	Site	Waste Material efficiency	30 % of ICT equipment from clients taken back and recovered for reuse or refurbishment or sent for recycling (for ICT companies providing equipment to customers)	3.1.5
Amount of ICT waste sent to landfill	t/year	All Telecom/ICT companies	Site	Waste	Zero ICT waste sent to landfill	3.1.5
Share of sites that have implemented the best practices of the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding the development and deployment of new IT services	%	All Telecom/ICT companies	Site	Energy efficiency	All data centres have implemented the best practices in the EU Code of Conduct on Data Centre Energy Efficiency or the expected practices of CLC/TR 50600-99-1 regarding the development and deployment of new IT services.	3.1.6
Share of software developers (staff) trained on energy efficient software	%	All Telecom/ICT companies	Corporate	Energy efficiency	All staff (software developers) trained on energy efficient software.	3.1.6
Share of newly developed software for which the energy performance has been used as a development criterion (%);	%	All Telecom/ICT companies	Corporate	Energy efficiency	At least one project for minimising data traffic demand through green software was implemented during the year	3.1.6

Indicator	Common units	Main target group	Recommended minimum level of monitoring	Related EMAS core indicator ⁽¹⁾	Benchmark of excellence	Related BEMP ⁽²⁾
Data centres BEMPs						
KPI _{DCEM} Global KPI for Data Centre according to ETSI standard		Data centre operators	Site	Energy efficiency	The KPI _{DCP} for existing data centres is equal to or lower than 1,5	3.2.1
Share of facilities having an energy management system certified according ISO 50001 or integrated in EMAS, or complying with the EU Code of Conduct on Data Centre Energy Efficiency or the 'expected practices' of CLC/TR 50600-99-1	%	Data centre operators	Site	Energy efficiency	All data centres have an energy management system certified according to ISO 50001 or integrated in EMAS, or complying with the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the 'expected practices' of CLC/TR 50600-99-1	3.2.1
Share of data centres that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding data management and storage, and management of existing ICT equipment and services	%	Data centre operators	Site	Energy Efficiency	All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the expected practices of CLC/TR 50600-99-1 regarding data management and storage, and management of existing ICT equipment and services	3.2.2
Share of racks installed with hot aisle/cold aisle configuration (with containment)	%	Data centre operators	Site	Energy Efficiency	100 % of new racks are installed with hot aisle/cold aisle configuration (with containment)	3.2.3
Share of data centres that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding airflow management and design	%	Data centre operators	Site	Energy Efficiency	All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the expected practices of CLC/TR 50600-99-1 regarding airflow management and design , and installation of ICT equipment to optimise airflow management	3.2.3

Indicator	Common units	Main target group	Recommended minimum level of monitoring	Related EMAS core indicator ⁽¹⁾	Benchmark of excellence	Related BEMP ⁽²⁾
COP (coefficient of performance): average cooling load (kW)/average cooling system power (kW)	-	Data centre operators	Site	Energy Efficiency	Select equipment with a COP of 7 or higher for water chillers, and 4 or higher for Direct Expansion (DX) cooling systems	3.2.4, 3.3.1, 3.5.3
Share of data centres that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency (parts 5.2, 5.4 and 5.5) or the Expected Practices of CLC/TR 50600-99-1 regarding cooling management	%	Data centre operators	Site	Energy Efficiency	All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency (parts 5.2, 5.4 and 5.5) or the expected practices of CLC/TR 50600-99-1 regarding cooling management	3.2.4
Share of data centres that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding temperature and humidity settings	%	Data centre operators	Site	Energy Efficiency	All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the expected practices of CLC/TR 50600-99-1 regarding temperature and humidity settings	3.2.5
Design PUE (dPUE)	-	Data centre operators	Site	Energy Efficiency	-	3.2.6.1, 3.4.1
Share of ICT products or services purchased by the company complying with specific environmental criteria (e.g. EU Ecolabel, EnergyStar)	%	Data centre operators	Site	Energy Efficiency Material Efficiency	All new Data Centre ICT equipment is ISO Type I eco-labelled (e.g. EU Ecolabel, Blue Angel, etc.) (if available) or Energy Star labelled	3.2.7.1
Share of facilities that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding the selection and deployment of new IT equipment/power equipment/cooling equipment	%	Data centre operators	Site	Energy Efficiency	All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding the selection and deployment of new ICT equipment/of cooling system/of new power equipment/of other data centre equipment.	3.2.6.1

Indicator	Common units	Main target group	Recommended minimum level of monitoring	Related EMAS core indicator ⁽¹⁾	Benchmark of excellence	Related BEMP ⁽²⁾
Average energy efficiency of UPS (given by manufacturers)	-	Data centre operators	Site	Energy Efficiency	UPS meet the requirements of the Code of Conduct for UPS	3.2.6.1
Share of sites that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/FprTR 50600-99-1 regarding Utilisation, management and planning of new build or refurbishment of data centres	%	Data centre operators	Site	Material Efficiency, Energy Efficiency	All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the expected practices of CLC/TR 50600-99-1 regarding utilisation, management and planning of new build and refurbishment of data centres	3.2.7.1
Share of sites that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding reuse of data centre waste heat	%	Data centre operators	Site	Energy Efficiency	All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding reuse of data centre waste heat	3.2.7.2
Share of sites that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding data centre building physical layout	%	Data centre operators	Site	Energy Efficiency	All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the expected practices of CLC/TR 50600-99-1 regarding data centre building physical layout	3.2.7.3
Share of sites that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding data centre geographical location	%	Data centre operators	Site	Energy Efficiency	All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the expected and optional practices of CLC/TR 50600-99-1 regarding data centre geographical location	3.2.7.4
Water consumption of the data centre per floor area (m ³ consumed/m ² of data centre)		Data centre operators	Site	Water	-	3.2.7.5

Indicator	Common units	Main target group	Recommended minimum level of monitoring	Related EMAS core indicator ⁽¹⁾	Benchmark of excellence	Related BEMP ⁽²⁾
Share of sites that have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the Expected Practices of CLC/TR 50600-99-1 regarding water sources	%	Data centre operators	Site	Water	All data centres have implemented the expected minimum practices in the EU Code of Conduct on Data Centre Energy Efficiency or the expected practices of CLC/TR 50600-99-1 regarding water sources	3.2.7.5
Electronic communication networks BEMPs						
Share of network energy usage for which energy consumption is measured	%	Network operators	Site	Energy Efficiency	50 % of the network energy usage is real-time monitored at telecommunication sites level (base stations and/or fixed-network nodes), or above	3.3.1
Average energy consumption per customer or subscriber (NB This indicator is not suited to benchmark between different types of operators)	kWh/customer or subscriber	Network operators	Site	Energy Efficiency	An energy management system is in place for telecommunication networks	3.3.1
Percentage of sites assessed by measurement for compliance with EMF limits	%	Network operators	Site	Emissions	-	3.3.2
Percentage of broadband equipment meeting the Broadband Code of Conduct requirements in terms of energy consumption	%	Network operators	Site	Energy Efficiency	100 % of new installed broadband equipment meets the requirements of the EU Code of Conduct for broadband equipment in terms of energy consumption	3.3.3
Average UPS System Efficiency	%	Network operators	Site	Energy Efficiency	Energy efficiency of power/energy stations is 96 % or higher	3.3.3
Quantity of unused or inefficient equipment decommissioned and removed from base station sites each year	kg	Network operators	Site	Material efficiency Energy Efficiency	A plan and a management process for optimising all existing network sites have been defined (to remove unused and inefficient equipment, to properly configure cooling systems, etc.)	3.3.4

Indicator	Common units	Main target group	Recommended minimum level of monitoring	Related EMAS core indicator ⁽¹⁾	Benchmark of excellence	Related BEMP ⁽²⁾
Percentage of sites passive sharing	%	Network operators	Site	Material efficiency	At least 30 % of sites are shared with other operators (wherever feasible, e.g. legally)	3.3.5
Greening by ICT BEMPs						
GHG emissions based on the Greenhouse Gas Protocol, scope 3 emissions	tCO ₂ eq	All Telecom/ICT companies	Corporate	Emissions	N/A	3.4.1

⁽¹⁾ EMAS core indicators are listed in Annex IV to Regulation (EC) No 1221/2009 (Section C.2).

⁽²⁾ The numbers refer to the sections in this document.

COMMISSION IMPLEMENTING DECISION (EU) 2021/2055**of 23 November 2021****amending Implementing Decision (EU) 2021/182 to set out the breakdown by Member State of REACT-EU resources for the year 2022***(notified under document C(2021) 8271)*

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund and laying down general provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund and repealing Council Regulation (EC) No 1083/2006 ⁽¹⁾, and in particular Article 92b(4) thereof,

Whereas:

- (1) Implementing Decision (EU) 2021/182 ⁽²⁾ sets out the breakdown by Member State of REACT-EU resources as appropriations from the Structural Funds for the year 2021 in accordance with Article 92b(4) of Regulation (EU) No 1303/2013.
- (2) In accordance with Article 92b(4) of Regulation (EU) No 1303/2013, Implementing Decision (EU) 2021/182 needs to be revised in 2021 to set out the breakdown of the REACT-EU resources for the year 2022 based on data available by 19 October 2021.
- (3) The title of Implementing Decision (EU) 2021/182 should be amended to include references to the 2022 breakdown.
- (4) Annex VIIa to Regulation (EU) No 1303/2013 sets out the criteria and methodology for the allocation of the REACT-EU resources.
- (5) For reasons of programming by the Member States, the specific breakdown should be given in 2018 prices to set out the resources effectively available after deducting the amount for technical assistance at the initiative of the Commission and the support to administrative expenditure. For reasons of transparency, breakdowns should be expressed also in current prices.
- (6) Implementing Decision (EU) 2021/182 should therefore be amended accordingly,

HAS ADOPTED THIS DECISION:

Article 1

Implementing Decision (EU) 2021/182 is amended as follows:

1. the title is replaced by the following:
‘Commission Implementing Decision (EU) 2021/182 setting out the breakdown by Member State of REACT-EU resources for the years 2021 and 2022’;
2. the Annex is numbered as ‘Annex I’;
3. the Annex to this Decision, including the breakdown by Member State of REACT-EU resources for the year 2022, is added as Annex II.

⁽¹⁾ OJ L 347, 20.12.2013, p. 320.

⁽²⁾ Commission Implementing Decision (EU) 2021/182 of 12 February 2021 setting out the breakdown by Member State of REACT-EU resources for the year 2021 (notified under document number C(2021) 843) (OJ L 53, 16.2.2021, p. 103).

Article 2

This Decision is addressed to the Member States.

Done at Brussels, 23 November 2021.

For the Commission

Elisa FERREIRA

Member of the Commission

ANNEX

‘ANNEX II

REACT-EU – 2022 ALLOCATION

(in EUR)

	2022 2018 prices	2022 current prices
BE	65 678 817	71 092 864
BG	129 016 223	139 651 309
CZ	292 945 458	317 093 585
DK	30 237 404	32 729 938
DE	477 860 614	517 251 696
EE	27 410 709	29 670 233
IE	49 212 516	53 269 210
EL	256 696 718	277 856 782
ES	3 353 135 895	3 629 542 131
FR	783 463 169	848 045 730
HR	93 362 597	101 058 677
IT	2 849 397 546	3 084 279 540
CY	19 298 312	20 889 114
LV	18 833 529	20 386 018
LT	46 605 557	50 447 354
LU	3 602 204	3 899 141
HU	96 435 113	104 384 468
MT	10 312 226	11 162 285
NL	111 523 544	120 716 671
AT	55 005 031	59 539 214
PL	247 608 310	268 019 198
PT	503 146 935	544 622 423
RO	199 713 869	216 176 714
SI	14 474 977	15 668 180
SK	119 366 039	129 205 640
FI	33 851 812	36 642 291
SE	73 015 402	79 034 219
EU27	9 961 210 526	10782334625'

COMMISSION IMPLEMENTING DECISION (EU) 2021/2056**of 24 November 2021****establishing the equivalence, for the purpose of facilitating the right of free movement within the Union, of COVID-19 certificates issued by the Republic of Togo to the certificates issued in accordance with Regulation (EU) 2021/953 of the European Parliament and of the Council****(Text with EEA relevance)**

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EU) 2021/953 of the European Parliament and of the Council of 14 June 2021 on a framework for the issuance, verification and acceptance of interoperable COVID-19 vaccination, test and recovery certificates (EU Digital COVID Certificate) to facilitate free movement during the COVID-19 pandemic ⁽¹⁾, and in particular Article 8(2) thereof,

Whereas:

- (1) Regulation (EU) 2021/953 lays down a framework for the issuance, verification and acceptance of interoperable COVID-19 vaccination, test and recovery certificates ('EU Digital COVID Certificate') for the purpose of facilitating the holders' exercise of their right to free movement during the COVID-19 pandemic. It is also to contribute to facilitating the gradual lifting of restrictions to free movement put in place by Member States, in accordance with Union law, to limit the spread of SARS-CoV-2, in a coordinated manner.
- (2) Regulation (EU) 2021/953 allows for the acceptance of COVID-19 certificates issued by third countries to Union citizens and their family members where the Commission finds that those COVID-19 certificates are issued in accordance with standards that are to be considered as equivalent to those established pursuant to that Regulation. Furthermore, in accordance with Regulation (EU) 2021/954 of the European Parliament and of the Council ⁽²⁾, Member States are to apply the rules laid down in Regulation (EU) 2021/953 to third-country nationals who do not fall within the scope of that Regulation, but who are legally staying or residing in their territory and who are entitled to travel to other Member States in accordance with Union law. Therefore, any equivalence findings of this Decision should apply to COVID-19 vaccination and test certificates issued by the Republic of Togo to Union citizens and their family members. Similarly, on the basis of Regulation (EU) 2021/954, such equivalence findings should also apply to COVID-19 vaccination and test certificates issued by the Republic of Togo to third-country nationals legally staying or residing in the territory of the Member States under the conditions laid down in that Regulation.
- (3) On 27 August 2021, the Republic of Togo provided the Commission with detailed information on the issuance of interoperable COVID-19 vaccination and test certificates under the system entitled 'PasseCOVID togolais'. The Republic of Togo informed the Commission that it considered that its COVID-19 certificates are being issued in accordance with a standard and a technological system that are interoperable with the trust framework established by Regulation (EU) 2021/953 and that allow for the verification of the authenticity, validity and integrity of the certificates. In this regard, the Republic of Togo informed the Commission that COVID-19 certificates issued by the Republic of Togo in accordance with the 'PasseCOVID togolais' system contain the data set out in the Annex to Regulation (EU) 2021/953.

⁽¹⁾ OJ L 211, 15.6.2021, p. 1.

⁽²⁾ Regulation (EU) 2021/954 of the European Parliament and of the Council of 14 June 2021 on a framework for the issuance, verification and acceptance of interoperable COVID-19 vaccination, test and recovery certificates (EU Digital COVID Certificate) with regard to third country nationals legally staying or residing in the territories of Member States during the COVID-19 pandemic (OJ L 211, 15.6.2021, p. 24).

- (4) The Republic of Togo also informed the Commission that it accepts vaccination, test and recovery certificates issued by the Member States and EEA countries in accordance with Regulation (EU) 2021/953. The Republic of Togo also informed the Commission that a nucleic acid amplification test is mandatory at the airport upon arrival for all travellers holding an EU Digital COVID Certificate test certificate delivered following a negative rapid antigen test.
- (5) On 30 September 2021, following a request by the Republic of Togo, the Commission carried out technical tests that demonstrated that the COVID-19 vaccination and test certificates are issued by the Republic of Togo in accordance with a system, the 'PasseCOVID togolais', that is interoperable with the trust framework established by Regulation (EU) 2021/953, and allows for the verification of the authenticity, validity and integrity of the certificates. The Commission also confirmed that the COVID-19 vaccination and test certificates issued by the Republic of Togo in accordance with the 'PasseCOVID togolais' system contain the necessary data.
- (6) In addition, the Republic of Togo informed the Commission that it issues interoperable vaccination certificates for COVID-19 vaccines. Those vaccines currently include Comirnaty, CoronaVac, Covishield and COVID-19 Vaccine Janssen.
- (7) The Republic of Togo also informed the Commission that it issues interoperable test certificates for nucleic acid amplification tests, but not for rapid antigen tests.
- (8) Furthermore, the Republic of Togo informed the Commission that it does not issue interoperable certificates of recovery.
- (9) In addition, the Republic of Togo informed the Commission that when verifiers in Togo verify certificates, the personal data included in them will be processed only to verify and confirm the holder's vaccination, test result or recovery status and will not be retained afterwards.
- (10) The necessary elements for establishing that COVID-19 certificates issued by the Republic of Togo in accordance with the 'PasseCOVID togolais' system are to be considered as equivalent to those issued in accordance with Regulation (EU) 2021/953 are thus fulfilled.
- (11) Therefore, COVID-19 certificates issued by the Republic of Togo in accordance with the 'PasseCOVID togolais' system should be accepted under the conditions referred to in Article 5(5) and Article 6(5) of Regulation (EU) 2021/953.
- (12) In order for this Decision to be operational, the Republic of Togo should be connected to the EU Digital COVID Certificate trust framework established by Regulation (EU) 2021/953.
- (13) In order to protect the Union's interests, in particular in the area of public health, the Commission may use its powers to suspend or terminate this Decision if the conditions of Article 8(2) of Regulation (EU) 2021/953 are no longer met.
- (14) In order to connect the Republic of Togo to the EU Digital COVID Certificate trust framework established by Regulation (EU) 2021/953 as rapidly as possible, this Decision should enter into force on the day of its publication in the *Official Journal of the European Union*.
- (15) The measures provided for in this Decision are in accordance with the opinion of the Committee established by Article 14 of Regulation (EU) 2021/953,

HAS ADOPTED THIS DECISION:

Article 1

COVID-19 vaccination and test certificates issued by the Republic of Togo in accordance with the 'PasseCOVID togolais' system shall, for the purpose of facilitating the right of free movement within the Union, be considered as equivalent to those issued in accordance with Regulation (EU) 2021/953.

Article 2

The Republic of Togo shall be connected to the EU Digital COVID Certificate trust framework established by Regulation (EU) 2021/953.

Article 3

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

Done at Brussels, 24 November 2021.

For the Commission
The President
Ursula VON DER LEYEN

COMMISSION IMPLEMENTING DECISION (EU) 2021/2057**of 24 November 2021****establishing the equivalence, for the purpose of facilitating the right of free movement within the Union, of COVID-19 certificates issued by the Republic of Singapore to the certificates issued in accordance with Regulation (EU) 2021/953 of the European Parliament and of the Council****(Text with EEA relevance)**

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EU) 2021/953 of the European Parliament and of the Council of 14 June 2021 on a framework for the issuance, verification and acceptance of interoperable COVID-19 vaccination, test and recovery certificates (EU Digital COVID Certificate) to facilitate free movement during the COVID-19 pandemic ⁽¹⁾, and in particular Article 8(2) thereof,

Whereas:

- (1) Regulation (EU) 2021/953 lays down a framework for the issuance, verification and acceptance of interoperable COVID-19 vaccination, test and recovery certificates ('EU Digital COVID Certificate') for the purpose of facilitating the holders' exercise of their right to free movement during the COVID-19 pandemic. It is also to contribute to facilitating the gradual lifting of restrictions to free movement put in place by Member States, in accordance with Union law, to limit the spread of SARS-CoV-2, in a coordinated manner.
- (2) Regulation (EU) 2021/953 allows for the acceptance of COVID-19 certificates issued by third countries to Union citizens and their family members where the Commission finds that those COVID-19 certificates are issued in accordance with standards that are to be considered as equivalent to those established pursuant to that Regulation. Furthermore, in accordance with Regulation (EU) 2021/954 of the European Parliament and of the Council ⁽²⁾, Member States are to apply the rules laid down in Regulation (EU) 2021/953 to third-country nationals who do not fall within the scope of that Regulation, but who are legally staying or residing in their territory and who are entitled to travel to other Member States in accordance with Union law. Therefore, any equivalence findings of this Decision should apply to COVID-19 vaccination and test certificates issued by the Republic of Singapore to Union citizens and their family members. Similarly, on the basis of Regulation (EU) 2021/954, such equivalence findings should also apply to COVID-19 vaccination and test certificates issued by the Republic of Singapore to third-country nationals legally staying or residing in the territory of the Member States under the conditions laid down in that Regulation.
- (3) On 26 July 2021, the Republic of Singapore provided the Commission with detailed information on the issuance of interoperable COVID-19 vaccination and test certificates under the system entitled 'HealthCerts'. The Republic of Singapore informed the Commission that it considered that its COVID-19 certificates are being issued in accordance with a standard and a technological system that are interoperable with the trust framework established by Regulation (EU) 2021/953 and that allow for the verification of the authenticity, validity and integrity of the certificates. In this regard, the Republic of Singapore informed the Commission that COVID-19 certificates issued by the Republic of Singapore in accordance with the 'HealthCerts' system contain the data set out in the Annex to Regulation (EU) 2021/953.

⁽¹⁾ OJ L 211, 15.6.2021, p. 1.

⁽²⁾ Regulation (EU) 2021/954 of the European Parliament and of the Council of 14 June 2021 on a framework for the issuance, verification and acceptance of interoperable COVID-19 vaccination, test and recovery certificates (EU Digital COVID Certificate) with regard to third country nationals legally staying or residing in the territories of Member States during the COVID-19 pandemic (OJ L 211, 15.6.2021, p. 24).

- (4) The Republic of Singapore also informed the Commission that it accepts vaccination and test certificates issued by the Member States and EEA countries in accordance with Regulation (EU) 2021/953. In addition, the Republic of Singapore informed the Commission that it will treat holders of EU Digital COVID Certificate test and vaccination certificates equally as holders of test and vaccination certificates issued by the Republic of Singapore. In particular, the Republic of Singapore confirmed that the EU DCC test certificates will be accepted as valid proof of negative pre-departure test for travellers. The Republic of Singapore indicated that, following the adoption of this Decision, the holders of EU DCC vaccination certificates will be eligible for vaccination-differentiated safe management measures in Singapore for 30 days without additional vaccination certificates.
- (5) In particular, the Republic of Singapore informed the Commission that it recognises all vaccines having finalised the World Health Organisation's Emergency Use Listing procedure as well as those authorised under Singapore's Pandemic Special Access Route. Singapore will also accept PSAR-authorised vaccines. Regarding the tests, the Republic of Singapore informed the Commission that it accepts test certificates as proof of the traveller's infection status, or lack thereof, but this currently does not translate into the waiving of travel restrictions. Those waivers are a matter of Singapore's border health policies. Further, Singapore does not currently relax border requirements for recovered travellers.
- (6) On 30 September 2021, following a request by the Republic of Singapore, the Commission carried out technical tests that demonstrated that the COVID-19 vaccination and test certificates are issued by the Republic of Singapore in accordance with a system, the 'HealthCerts', that is interoperable with the trust framework established by Regulation (EU) 2021/953, and allows for the verification of the authenticity, validity and integrity of the certificates. The Commission also confirmed that the COVID-19 vaccination and test certificates issued by the Republic of Singapore in accordance with the 'HealthCerts' system contain the necessary data.
- (7) In addition, the Republic of Singapore informed the Commission that it will issue interoperable vaccination certificates for COVID-19 vaccines. Those vaccines currently include Comirnaty and Spikevax.
- (8) The Republic of Singapore also informed the Commission that it will issue interoperable test certificates only for nucleic acid amplification tests and for rapid antigen tests listed in the common and updated list of COVID-19 rapid antigen tests agreed by the Health Security Committee, established by Article 17 of Decision No 1082/2013/EU of the European Parliament and of the Council ⁽³⁾, on the basis of the Council Recommendation of 21 January 2021 ⁽⁴⁾.
- (9) Furthermore, the Republic of Singapore informed the Commission that it does not issue interoperable certificates of recovery.
- (10) In addition, the Republic of Singapore informed the Commission that when verifiers in Singapore verify certificates, the personal data included in them will be processed only to verify and confirm the holder's vaccination, test result or recovery status and will not be retained afterwards.
- (11) The necessary elements for establishing that COVID-19 vaccination and test certificates issued by the Republic of Singapore in accordance with the 'HealthCerts' system are to be considered as equivalent to those issued in accordance with Regulation (EU) 2021/953 are thus fulfilled.
- (12) Therefore, COVID-19 certificates issued by the Republic of Singapore in accordance with the 'HealthCerts' system should be accepted under the conditions referred to in Articles 5(5) and 6(5) of Regulation (EU) 2021/953.

⁽³⁾ Decision No 1082/2013/EU of the European Parliament and of the Council of 22 October 2013 on serious cross-border threats to health and repealing Decision No 2119/98/EC (OJ L 293, 5.11.2013, p. 1).

⁽⁴⁾ Council Recommendation of 21 January 2021 on a common framework for the use and validation of rapid antigen tests and the mutual recognition of COVID-19 test results in the EU (OJ C 24, 22.1.2021, p. 1).

- (13) In order for this Decision to be operational, the Republic of Singapore should be connected to the EU Digital COVID Certificate trust framework established by Regulation (EU) 2021/953.
- (14) In order to protect the Union's interests, in particular in the area of public health, the Commission may use its powers to suspend or terminate this Decision if the conditions of Article 8(2) of Regulation (EU) 2021/953 are no longer met.
- (15) In order to connect the Republic of Singapore to the EU Digital COVID Certificate trust framework established by Regulation (EU) 2021/953 as rapidly as possible, this Decision should enter into force on the day of its publication in the *Official Journal of the European Union*.
- (16) The measures provided for in this Decision are in accordance with the opinion of the Committee established by Article 14 of Regulation (EU) 2021/953,

HAS ADOPTED THIS DECISION:

Article 1

COVID-19 vaccination and test certificates issued by the Republic of Singapore in accordance with the 'HealthCerts' system shall, for the purpose of facilitating the right of free movement within the Union, be considered as equivalent to those issued in accordance with Regulation (EU) 2021/953.

Article 2

The Republic of Singapore shall be connected to the EU Digital COVID Certificate trust framework established by Regulation (EU) 2021/953.

Article 3

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

Done at Brussels, 24 November 2021.

For the Commission
The President
Ursula VON DER LEYEN

CORRIGENDA**Corrigendum to Council Decision (CFSP) 2021/2032 of 19 November 2021 on an assistance measure under the European Peace Facility to support military units trained by the EU Training Mission in Mozambique**

(Official Journal of the European Union L 415 of 22 November 2021)

On page 28, Article 6, first sentence:

for: '... the High Representative shall provide the PSC with six monthly reports on the implementation of the Assistance Measure ...',

read: '... the High Representative shall provide the PSC with six-monthly reports on the implementation of the Assistance Measure ...'.

ISSN 1977-0677 (electronic edition)
ISSN 1725-2555 (paper edition)



Publications Office
of the European Union
L-2985 Luxembourg
LUXEMBOURG

EN