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Framework for the calculation of life-cycle greenhouse gas emissions – international standards and national

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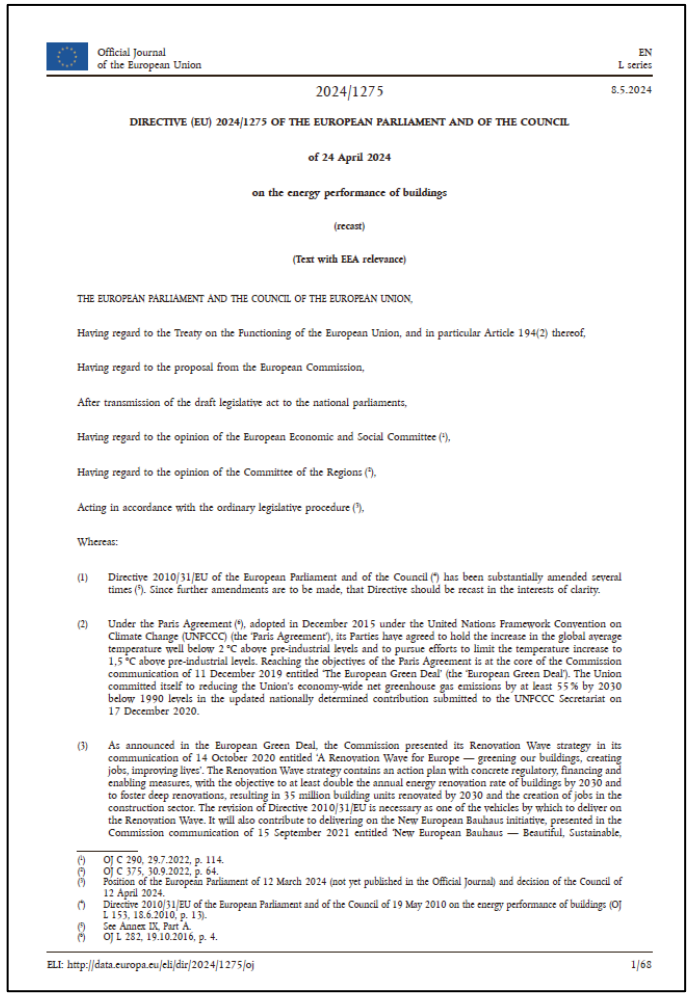
IHA Interim Meeting, Rio de Janairo, Brazil, August 14, 2024

April 2024:
New EU Directive on the Energy Performance of Buildings (2024/1275/EU)

Overall targets:

2030: reducing net greenhouse gas emissions by at least 55 % compared to 1990 levels

2050: climate-neutrality



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DIRECTIVE (EU) 2024/1275 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 24 April 2024

on the energy performance of buildings

(recast)

(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

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

Having regard to the proposal from the European Commission,

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

Having regard to the opinion of the European Economic and Social Committee [1],

Having regard to the opinion of the Committee of the Regions [2],

Acting in accordance with the ordinary legislative procedure [3],

Whereas:

(1) Directive 2010/31/EU of the European Parliament and of the Council [4] has been substantially amended several times [5]. Since further amendments are to be made, that Directive should be recast in the interests of clarity.

(2) Under the Paris Agreement [6], adopted in December 2015 under the United Nations Framework Convention on Climate Change (UNFCCC) (the 'Paris Agreement'), its Parties have agreed to hold the increase in the global average temperature well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1,5 °C above pre-industrial levels. Reaching the objectives of the Paris Agreement is at the core of the Commission communication of 11 December 2019 entitled 'The European Green Deal' (the 'European Green Deal'). The Union committed itself to reducing the Union's economy-wide net greenhouse gas emissions by at least 55 % by 2030 below 1990 levels in the updated nationally determined contribution submitted to the UNFCCC Secretariat on 17 December 2020.

(3) As announced in the European Green Deal, the Commission presented its Renovation Wave strategy in its communication of 14 October 2020 entitled 'A Renovation Wave for Europe — greening our buildings, creating jobs, improving lives'. The Renovation Wave strategy contains an action plan with concrete regulatory, financing and enabling measures, with the objective to at least double the annual energy renovation rate of buildings by 2030 and to foster deep renovations, resulting in 35 million building units renovated by 2030 and the creation of jobs in the construction sector. The revision of Directive 2010/31/EU is necessary as one of the vehicles by which to deliver on the Renovation Wave. It will also contribute to delivering on the New European Bauhaus initiative, presented in the Commission communication of 15 September 2021 entitled 'New European Bauhaus — Beautiful, Sustainable,

[1] OJ C 290, 29.7.2022, p. 114.
[2] OJ C 375, 10.9.2022, p. 64.
[3] Position of the European Parliament of 12 March 2024 (not yet published in the Official Journal) and decision of the Council of 12 April 2024.
[4] Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (OJ L 153, 18.6.2010, p. 13).
[5] See Annex IX, Part A.
[6] OJ L 282, 19.10.2016, p. 4.

ELI: http://data.europa.eu/eli/dir/2024/1275/oj — 1/68

(2024/1275/EU)

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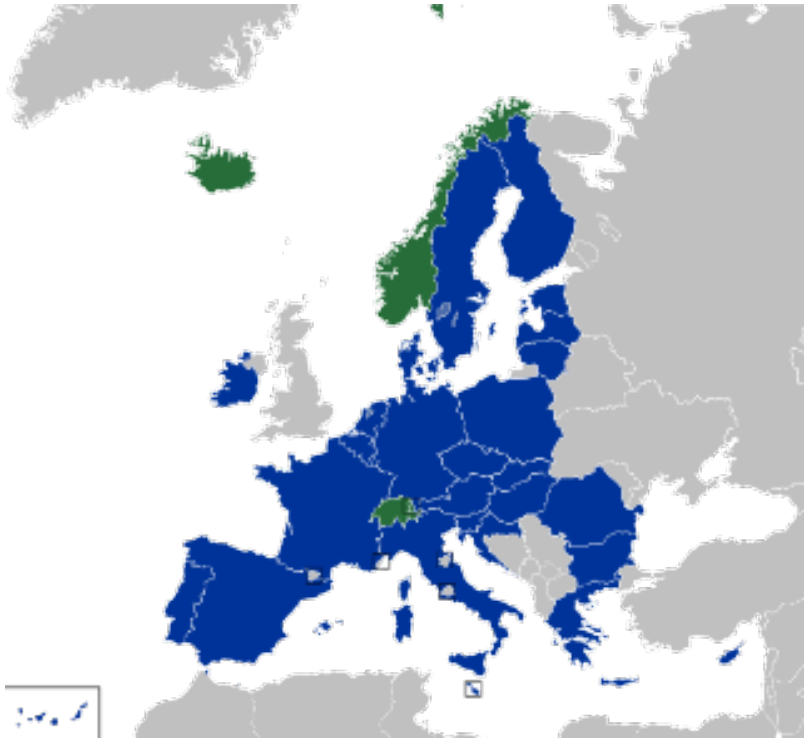
Requirements related to Greenhouse Gas (GHG) emissions and Global Warming Potential (GWP)

1) From 2030: **Zero Emission Building** as requirement for all new buildings - article 7(1)

2) **Life-cycle calculation of GWP** - article 7(2):
- from 2027 for all new buildings larger than 2 000 m2
- from 2030 for all new buildings

3) From 2030: Member states to introduce **national targets for life-cycle GWP from new construction** (limit values) – article 7(5)

4) From 2026: **Information on GWP** in Energy Performance Certificates - article 19(2) and Annex V:
- operational GHG emissions in all EPCs
- life-cycle GWP (where available)



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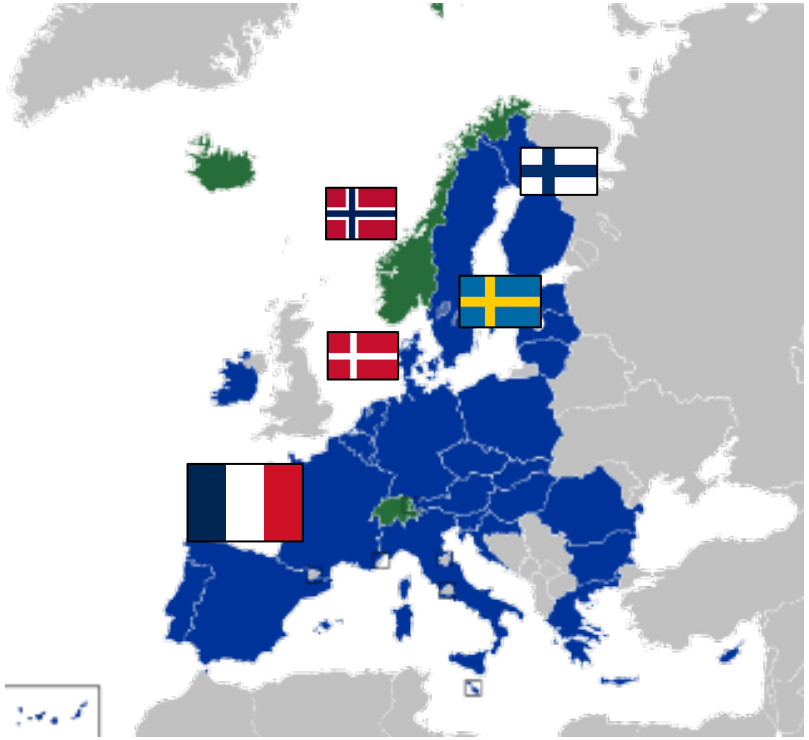
GHG calculations already being introduced in national regulations

Several European countries have introduced requirements related to life-cycle greenhouse gas emissions in national regulation:

- France, Denmark and Finland:
  calculation of greenhouse gas emissions and
  maximum emission levels (CO_2e per m2)

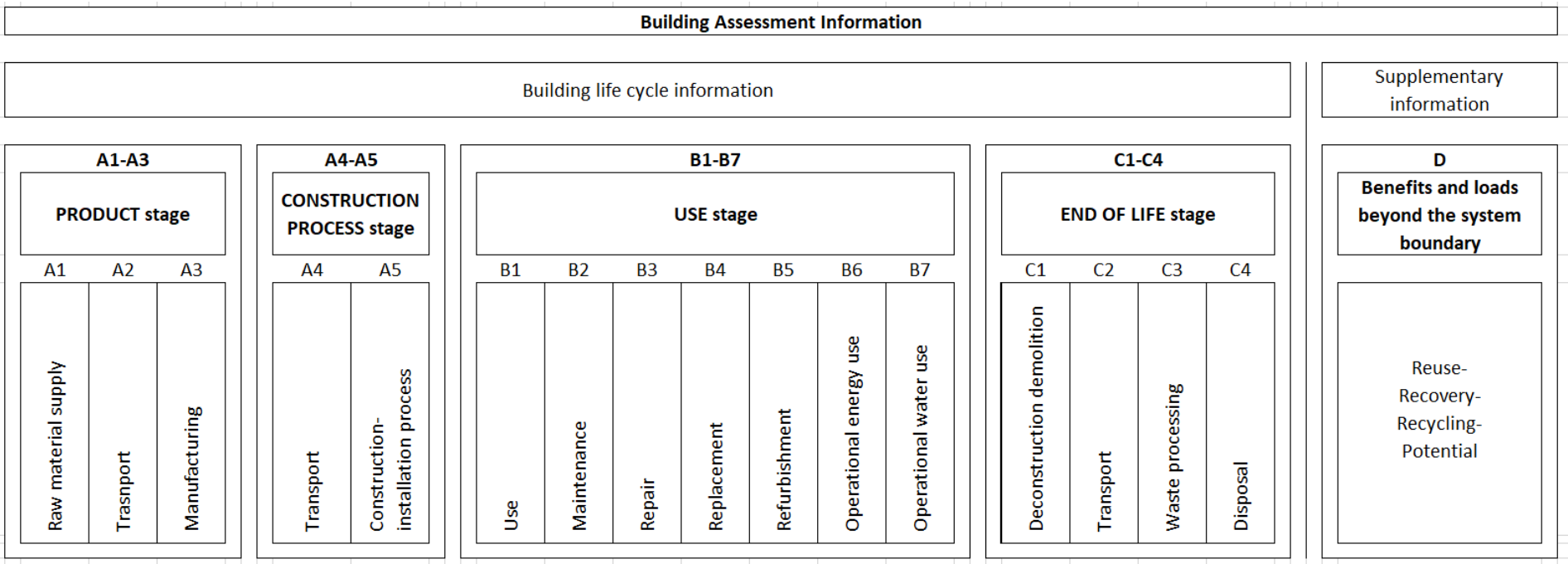
- Norway and Sweden:
  calculation of greenhouse gas emissions



International standards for whole life-cycle calculations

- EN 15978 defines a framework for calculating the environmental performance of buildings
- EN 15804 and ISO 21930 define the information in Environmental Product Declarations (EPD)

EN 15978



EN 15804

ISO 21930

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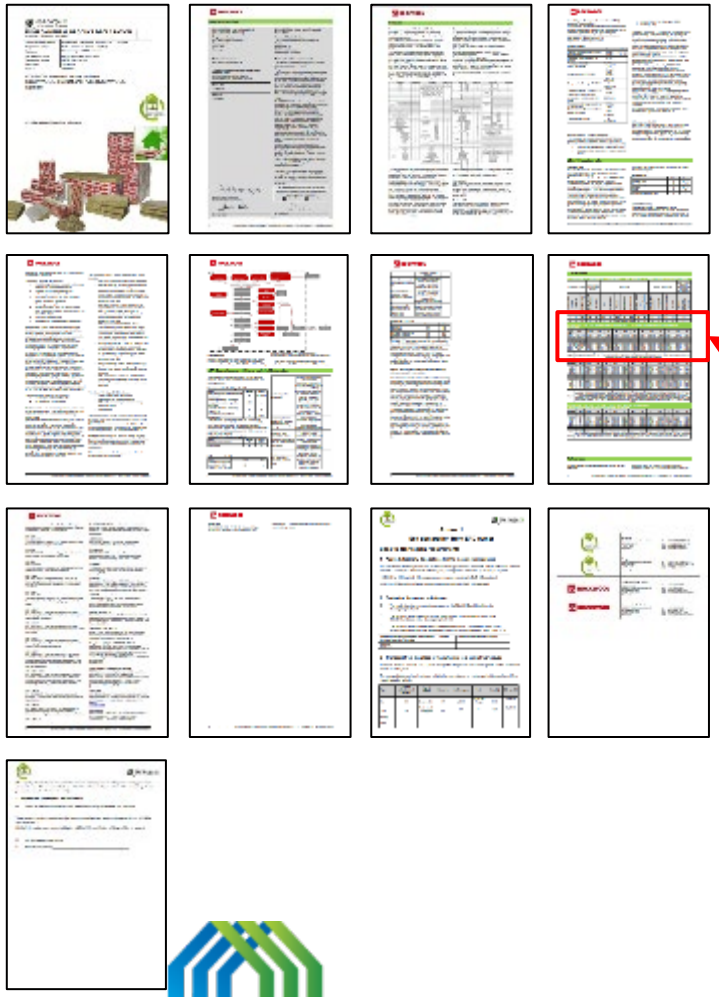
Product specific EPDs
Example: EPD from Rockwool (stone wool producer)



RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m2 of thermal insulation product with an R=1m2K/W

Parameter	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
GWP	[kg CO_2-Eq.]	1.11E+0	1.24E-1	1.37E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.77E-3	0.00E+0	1.56E-2	-6.89E-2
ODP	[kg CFC11-Eq.]	2.96E-9	4.12E-14	1.99E-10	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.25E-15	0.00E+0	1.58E-14	-5.30E-14
AP	[kg SO_2-Eq.]	5.97E-3	1.13E-4	1.53E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.60E-6	0.00E+0	9.26E-5	-1.95E-4
EP	[kg $(PO_4)^3$-Eq.]	9.64E-4	2.36E-5	3.26E-5	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	7.66E-7	0.00E+0	1.26E-5	-1.49E-5
POCP	[kg ethene-Eq.]	3.89E-4	5.38E-7	1.24E-5	1.04E-10	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-4.72E-8	0.00E+0	7.28E-6	-2.66E-5
ADPE	[kg Sb-Eq.]										0.00E+0	5.61E-9	-1.13E-8
ADPF	[MJ]										0.00E+0	2.02E-1	-1.85E+0
Caption	GWP = Glob Eutrophicati										n potential of land and water; EP = Abiotic depletion potential for non-		

Parameter	Unit	A1-A3
GWP	[kg CO_2-Eq.]	1.11E+0

1,11 kg CO2-eq. to produce 1 m2 of Rockwool with thickness of 40 mm

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Annex III to the new EU directive: Calculation of life-cycle GWP of new buildings

Article 7(2) states that life-cycle GWP shall be calculated in accordance with ANNEX III

Annex III states that:

- the total life-cycle GWP shall be expressed as kgCO2eq/(m2) calculated over a reference study period of 50 years.
- the calculations shall be carried out in accordance with EN 15978
- the scope of building elements and technical equipment shall be as defined in the Level(s) indicator 1.2.

Level(s) is a common EU framework for assessing the sustainability of buildings, consisting of 16 core indicators

- indicator 1.2 is 'Life-cycle global warming potential'

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EU Level(s) minimum scope of building parts and elements

Building parts	Related building elements
Shell (substructure and superstructure)	
Foundations (substructure)	Piles Basements Retaining walls
Load bearing structural frame	Frame (beams, columns and slabs) Upper floors External walls Balconies
Non-load bearing elements	Ground floor slab Internal walls, partitions and doors Stairs and ramps
Facades	External wall systems, cladding and shading devices Façade openings (including windows and external doors) External paints, coatings and renders
Roof	Structure Weatherproofing
Parking facilities	Above ground and underground

Building parts	Related building elements
Core (fittings, furnishings and services)	
Fittings and furnishings	Sanitary fittings Cupboards, wardrobes and worktops Ceilings Wall and ceiling finishes Floor coverings and finishes
In-built lighting system	Light fittings Control systems and sensors
Energy system	Heating plant and distribution Cooling plant and distribution Electricity generation and distribution
Ventilation system	Air handling units Ductwork and distribution
Sanitary systems	Cold water distribution Hot water distribution Water treatment systems Drainage system
Other systems	Lifts and escalators Firefighting installations Communication and security installations Telecoms and data installations
External works	
Utilities	Connections and diversions Substations and equipment
Landscaping	Paving and other hard surfacing Fencing, railings and walls Drainage systems

Challenge:
How to keep control of all the data needed for calculating life-cycle GWP of buildings?

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GWP calculations – use of machine readable product information (PDS)

Machine readable product information

GLAVA ISOLASJON
Product 1
Product 2
Product 3
Product 4
Product n

ROCKWOOL
Product 1
Product 2
Product 3
Product 4
Product n

GILJE
Product 1
Product 2
Product 3
Product 4
Product n

NorDan
Product 1
Product 2
Product 3
Product 4
Product n

Producer n
Product 1
Product 2
Product 3
Product 4
Product n

Information portal/hub

BYGGTJENESTE NOBB

Design
Designers calculate the GWP budget

GWP calculation tool

BIM model

Construction
Contractors calculate GWP from the materials actually used

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Challenge – consequences of strict limit values?

The intention is to introduce limit values, and then to make them stricter by time

Example: limit values in Danish building codes

1/3 of the production in 2021 would not meet the new 2025 limit

Type of building	GWP - kg CO2e/(m2year)			
	Current limit	Future limits		
	2023	2025	2027	2029
Leisure homes	-	4	3,6	3,2
Single-family, row houses etc	-	6,7	6	5,4
Apartment buildings	12,0	7,5	6,8	6,1

Challenge:
How will stricter requirements impact choice of design and materials?

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