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## PROPOSAL

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From:	Secretary-General of the European Commission, signed by Ms Martine DEPREZ, Director
date of receipt:	15 December 2021
To:	Mr Jeppe TRANHOLM-MIKKELSEN, Secretary-General of the Council of the European Union
No. Cion doc.:	COM(2021) 802 final - ANNEXES 1 to 9
Subject:	ANNEXES to the Proposal for a Directive of the European Parliament and of the Council on the energy performance of buildings (recast)

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Delegations will find attached document COM(2021) 802 final - ANNEXES 1 to 9.

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Encl.: COM(2021) 802 final - ANNEXES 1 to 9



Brussels, 15.12.2021  
COM(2021) 802 final

ANNEXES 1 to 9

## **ANNEXES**

**to the Proposal for a**

**Directive of the European Parliament and of the Council**

**on the energy performance of buildings (recast)**

{SEC(2021) 430 final} - {SWD(2021) 453 final} - {SWD(2021) 454 final}

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↓ 2010/31/EU

## ANNEX I

### *COMMON GENERAL FRAMEWORK FOR THE CALCULATION OF ENERGY PERFORMANCE OF BUILDINGS*

(referred to in Article ~~43~~)

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↓ 2018/844 Art. 1.14 and Annex .1(a) (adapted)  
⇒ new

1. The energy performance of a building shall be determined on the basis of calculated or ~~actual~~  metered  energy use and shall reflect typical energy use for space heating, space cooling, domestic hot water, ventilation, built-in lighting and other technical building systems. ⇒ Member States shall ensure that the typical energy use is representative of actual operating conditions for each relevant typology and reflects the typical user behaviour. Where possible, typical energy use and typical user behaviour shall be based on available national statistics, building codes and metered data. ⇐

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↓ new

Where metered energy is the basis for calculating the energy performance of buildings, the calculation methodology shall be capable of identifying the influence of the behaviour of occupants and the local climate, which shall not be reflected in the result of the calculation. Metered energy to be used for the purposes of calculating the energy performance of buildings shall require readings of at least hourly intervals and must differentiate between energy carriers.

Member States may use metered energy consumption under typical operating conditions to verify the correctness of the calculated energy use and enable comparison between calculated and actual performance. Metered energy consumption for the purposes of verification and comparison may be based on monthly readings.

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↓ 2018/844 Art. 1.14 and Annex .1(a) (adapted)  
⇒ new

The energy performance of a building shall be expressed by a numeric indicator of primary energy use ⇒ per unit of reference floor area per year, ⇐ in kWh/(m<sup>2</sup>.y) for the purpose of both energy performance certification and compliance with minimum energy performance requirements. The methodology applied for the determination of the energy performance of a building shall be transparent and open to innovation.

Member States shall describe their national calculation methodology ⇒ based on Annex A ⇐ ~~following the national annexes~~ of the  key European  overarching standards  on energy performance of buildings , namely  EN  ISO 52000-1,  EN ISO  52003-1,  EN ISO  52010-1,  EN ISO  52016-1, ~~and~~  EN ISO  52018-1, ⇒ EN 16798-1 and EN 17423 or superseding documents ⇐ ~~developed under mandate M/480~~

~~given to the European Committee for Standardisation (CEN).~~ This provision shall not constitute a legal codification of those standards.

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↓ new

Member States shall take the necessary measures to ensure that, where buildings are supplied by district heating or cooling systems, the benefits of such supply are recognised and accounted for in the calculation methodology through individually certified or recognised primary energy factors.

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↓ 2018/844 Art. 1.14 and Annex .1(b) (adapted)  
⇒ new

2. The energy needs ⇒ and energy use ⇐ for space heating, space cooling, domestic hot water, ventilation, lighting and other technical building systems shall be calculated ⇒ using hourly or sub-hourly time calculation intervals in order to account for varying conditions that significantly affect the operation and performance of the system and the indoor conditions, and ⇐ ~~in order~~ to optimise health, indoor air quality and comfort levels defined by Member States at national or regional level.

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↓ new

Where product-specific regulations for energy-related products adopted under Regulation 2009/125/EC include specific product information requirements for the purpose of the calculation of energy performance under this Directive, national calculation methods shall not require additional information.

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↓ 2018/844 Art. 1.14 and Annex .1(b) (adapted)  
⇒ new

The calculation of primary energy shall be based on primary energy factors, ⇒ (distinguishing non-renewable, renewable and total) ⇐ ~~or weighting factors~~ per energy carrier, which ⇒ have to be recognised by the national authorities. Those primary energy factors ⇐ may be based on national, regional or local ⇒ information. Primary energy factors may be set on an ⇐ annual, ~~and possibly also~~ seasonal, ~~or~~ monthly, ⇒ daily or hourly basis ⇐ ~~weighted averages~~ or on more specific information made available for individual district ⇔ systems ⇔ ~~system~~.

Primary energy factors or weighting factors shall be defined by Member States. ⇒ The choices made and data sources shall be reported according to EN 17423 or any superseding document. Member States may opt for an average EU primary energy factor for electricity established pursuant to Directive (EU) .../... [recast EED] instead of a primary energy factor reflecting the electricity mix in the country. ⇐

~~In the application of those factors to the calculation of energy performance, Member States shall ensure that the optimal energy performance of the building envelope is pursued.~~

~~In the calculation of the primary energy factors for the purpose of calculating the energy performance of buildings, Member States may take into account renewable energy sources~~

~~supplied through the energy carrier and renewable energy sources that are generated and used on-site, provided that it applies on a non-discriminatory basis.~~

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↓ 2018/844 Art. 1.14 and Annex .1(c) (adapted)  
⇒ new

32a. For the purpose of expressing the energy performance of a building, Member States may define additional numeric indicators of total, non-renewable and renewable primary energy use, and of ⇒ operational ⇐ greenhouse gas ~~emission~~ ⊗ emissions ⊗ produced in kgCO<sub>2</sub>eq/(m<sup>2</sup>.y).

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↓ 2010/31/EU (adapted)

43. The methodology shall be laid down taking into consideration at least the following aspects:

- (a) the following actual thermal characteristics of the building including its internal partitions:
    - (i) thermal capacity;
    - (ii) insulation;
    - (iii) passive heating;
    - (iv) cooling elements; ~~and~~
    - (v) thermal bridges;
  - (b) heating installation and hot water supply, including their insulation characteristics;
  - (c) air-conditioning installations;
  - (d) natural and mechanical ventilation which may include air-tightness;
  - (e) built-in lighting installation (mainly in the non-residential sector);
  - (f) the design, positioning and orientation of the building, including outdoor climate;
  - (g) passive solar systems and solar protection;
  - (h) indoor climatic conditions, including the designed indoor climate;
  - (i) internal loads.
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↓ 2018/844 Art. 1.14 and Annex .1(d)

54. The positive influence of the following aspects shall be taken into account:

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↓ 2010/31/EU

- (a) local solar exposure conditions, active solar systems and other heating and electricity systems based on energy from renewable sources;

- (b) electricity produced by cogeneration;
- (c) district or block heating and cooling systems;
- (d) natural lighting.

65. For the purpose of the calculation buildings should be adequately classified into the following categories:

- (a) single-family houses of different types;
- (b) apartment blocks;
- (c) offices;
- (d) educational buildings;
- (e) hospitals;
- (f) hotels and restaurants;
- (g) sports facilities;
- (h) wholesale and retail trade services buildings;
- (i) other types of energy-consuming buildings.

↓ new

## **ANNEX II**

### ***TEMPLATE FOR THE NATIONAL BUILDING RENOVATION PLANS***

(referred to in Article 3)

EPBD Article 3	Mandatory Indicators	Optional Indicators / comments
(a) Overview of the national building stock	Number of buildings and total floor area (m <sup>2</sup> ): <ul style="list-style-type: none"><li>— per building type (including public buildings and social housing)</li><li>— per energy performance class</li><li>— NZEB</li><li>— worst-performing (including a definition)</li></ul>	Number of buildings and total floor area (m <sup>2</sup> ): <ul style="list-style-type: none"><li>— per building age</li><li>— per building size</li><li>— per climatic zone</li><li>— demolition (number and total floor area)</li></ul>
	Number of energy performance certificates: <ul style="list-style-type: none"><li>— per building type (including public buildings)</li><li>— per energy performance class</li></ul>	Number of energy performance certificates: <ul style="list-style-type: none"><li>- per construction period</li></ul>

	<p>Annual renovation rates: number and total floor area (m<sup>2</sup>)</p> <ul style="list-style-type: none"> <li>— per building type</li> <li>— to nearly zero-energy building levels</li> <li>— per renovation depth (weighted average renovation)</li> <li>— deep renovations</li> <li>— public buildings</li> </ul>	
	<p>Primary and final annual energy consumption (ktoe):</p> <ul style="list-style-type: none"> <li>— per building type</li> <li>— per end use</li> </ul> <p>Energy savings (Ktoe):</p> <ul style="list-style-type: none"> <li>— per building type</li> <li>— public buildings</li> </ul> <p>Share of renewable energy in the building sector (MW generated):</p> <ul style="list-style-type: none"> <li>— for different uses</li> <li>— on-site</li> <li>— off-site</li> </ul>	<p>Reduction in energy costs (EUR) per household (average)</p> <p>Primary energy demand of a building corresponding to the top 15% (substantial contribution threshold) and the top 30% (do no significant harm threshold) of the national building stock, as per the EU Climate Taxonomy Delegated Act</p> <p>Share of heating system in the building sector per boiler/heating system type</p>
	<p>Annual greenhouse gas emissions (kgCO<sub>2</sub>eq/(m<sup>2</sup>.y):</p> <ul style="list-style-type: none"> <li>— per building type (including public buildings)</li> </ul> <p>Annual greenhouse gas emission reduction (kgCO<sub>2</sub>eq/(m<sup>2</sup>.y):</p> <ul style="list-style-type: none"> <li>— per building type (including public buildings)</li> </ul>	



	<p>Market barriers and failures (description):</p> <ul style="list-style-type: none"><li>– Split incentives</li><li>– Capacity of construction and energy sector</li></ul> <p>Overview of the capacities in the construction, energy efficiency and renewable energy sectors</p>	<p>Market barriers and failures (description):</p> <ul style="list-style-type: none"><li>– Administrative</li><li>– Financial</li><li>– Technical</li><li>– Awareness</li><li>– Other</li></ul> <p>Number of:</p> <ul style="list-style-type: none"><li>– Energy service companies</li><li>– construction companies</li><li>– architects and engineers</li><li>– skilled workers</li><li>– one-stop-shops</li><li>– SMES in the construction/renovation sector</li></ul> <p>Projections of the construction workforce:</p> <ul style="list-style-type: none"><li>- Architects/engineers/skilled workers retired</li><li>- Architects/engineers/skilled workers entering the market</li><li>- Young people in the sector</li><li>- Women in the sector</li></ul> <p>Overview and forecast of the evolution of prices of construction materials and national market developments</p>
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	<p>Energy poverty (definition):</p> <ul style="list-style-type: none"> <li>– % of people affected by energy poverty</li> <li>– proportion of disposable household income spent on energy</li> <li>– population living in inadequate dwelling conditions (e.g. leaking roof) or with inadequate thermal comfort conditions</li> </ul>	
	<p>Primary energy factors:</p> <ul style="list-style-type: none"> <li>– per energy carrier</li> <li>– non-renewable primary energy factor</li> <li>– renewable primary energy factor</li> <li>– total primary energy factor</li> </ul>	
	Definition of nearly-zero energy building for new and existing buildings	an overview of the legal and administrative framework
	Cost-optimal minimum requirements for new and existing buildings	
(b) Roadmap for 2030, 2040, 2050	<p>Targets for annual renovation rates: number and total floor area (m<sup>2</sup>):</p> <ul style="list-style-type: none"> <li>– per building type</li> <li>– worst-performing</li> </ul>	<p>Targets for expected share (%) of renovated buildings:</p> <ul style="list-style-type: none"> <li>– per building type</li> <li>– per renovation depth</li> </ul>

	<p>Target for expected primary and final annual energy consumption (ktoe):</p> <ul style="list-style-type: none"> <li>— per building type</li> <li>— per end use</li> </ul> <p>Expected energy savings:</p> <ul style="list-style-type: none"> <li>— per building type</li> </ul>	<p>Share of energy from renewable sources in the building sector (MW generated)</p>
	<p>Targets for expected greenhouse gas emissions (kgCO<sub>2</sub>eq/(m<sup>2</sup>.y):</p> <ul style="list-style-type: none"> <li>— per building type</li> </ul> <p>Targets for expected greenhouse gas emission reduction (%):</p> <ul style="list-style-type: none"> <li>— per building type</li> </ul>	<p>Split between emissions covered by Chapter III [stationary installations], Chapter IVa [new emissions trading for buildings and road transport] of Directive 2003/87/EC, and other stock;</p>
	<p>Expected wider benefits</p> <ul style="list-style-type: none"> <li>— Creation of new jobs</li> <li>— % reduction of people affected by energy poverty</li> </ul>	<p>— Increase of GDP (share and billion Euros)</p>
	<p>Contribution to Member State's binding national target for greenhouse gas emissions pursuant to [revised Effort Sharing Regulation]</p>	
	<p>Contribution to the Union's energy efficiency targets in accordance with Directive (EU) .../... [recast EED] (share and figure in ktoe, primary and final consumption):</p> <ul style="list-style-type: none"> <li>— against the overall energy efficiency target</li> </ul>	<p>Contribution to the Union's energy efficiency targets in accordance with Directive (EU) .../... [recast EED] target (share and figure in ktoe, primary and final [consumption):</p> <ul style="list-style-type: none"> <li>— against Article 8 EED target (energy savings obligation)</li> </ul>

	<p>Contribution to the Union's renewable energy targets in accordance with Directive (EU) 2018/2001 [amended RED] (share, MW generated):</p> <ul style="list-style-type: none"> <li>— against the overall target for energy from renewable sources</li> <li>— against the indicative target for the share of energy from renewable sources in the building sector</li> </ul>	
	<p>Contribution to Union's 2030 climate target and 2050 climate neutrality goal in accordance with Regulation (EU) 2021/1119 (share and figure in (kgCO<sub>2</sub>eq/(m<sup>2</sup>.y))):</p> <ul style="list-style-type: none"> <li>— against the overall decarbonisation target</li> </ul>	
<p>(c) Overview of implemented and planned policies and measures</p>	<p>Policies and measures with regard to the following elements:</p> <p>(a) the identification of cost-effective approaches to renovation for different building types and climatic zones, considering potential relevant trigger points in the lifecycle of the building;</p> <p>(b) national minimum energy performance standards pursuant to Article 9 and other policies and actions to target the worst-performing segments of the national building stock;</p> <p>(c) the promotion of deep renovation of buildings, including staged deep renovation;</p> <p>(d) empowering and protecting vulnerable customers and the alleviation of energy poverty, including policies and measures pursuant to Article 22 of Directive (EU) .../... [recast EED], and housing affordability;</p> <p>(e) the creation of one-stop-shops or similar mechanisms for the provision of technical, administrative and financial advice and assistance;</p> <p>(f) the decarbonisation of heating and cooling, including through district heating and cooling networks, and the phase out of fossil</p>	<p>Policies and measures with regard to the following elements:</p> <p>(a) the increase of climate resilience of buildings;</p> <p>(b) the promotion of the energy services market;</p> <p>(c) the increase of fire safety;</p> <p>(d) the increase of resilience against disaster risks, including risks related to intense seismic activity;</p> <p>(e) the removal of hazardous substances including asbestos; and</p> <p>(f) accessibility for persons with disabilities.</p> <p>For all policies and measures:</p> <ul style="list-style-type: none"> <li>- administrative resources and capacities</li> <li>- area(s) covered: <ul style="list-style-type: none"> <li>— worst-performing</li> <li>— minimum energy performance standards</li> </ul> </li> </ul>

	<p>fuels in heating and cooling with a view to a complete phase-out by 2040 at the latest;</p> <p>(g) the promotion of renewable energy sources in buildings in line with the indicative target for the share of energy from renewable sources in the building sector set in Article 15a(1) of Directive (EU) 2018/2001 [amended RED];</p> <p>(h) the reduction of whole life-cycle greenhouse gas emissions for the construction, renovation, operation and end of life of buildings, and the uptake of carbon removals;</p> <p>(i) prevention and high-quality treatment of construction and demolition waste in line with Directive 2008/98/EC, notably as regards the waste hierarchy, and the objectives of the circular economy;</p> <p>(j) district and neighbourhood approaches, including the role of renewable energy communities and citizen energy communities;</p> <p>(k) the improvement of buildings owned by public bodies, including policies and measures pursuant to Articles 5, 6 and 7 of the [recast EED];</p> <p>(l) the promotion of smart technologies and infrastructure for sustainable mobility in buildings;</p> <p>(m) addressing market barriers and market failures;</p> <p>(n) addressing skills gaps and mismatches in human capacities, and promoting education, training, upskilling and reskilling in the construction, sector and energy efficiency and renewable energy sectors; and</p> <p>(o) awareness raising campaigns and other advisory tools.</p> <p>For all policies and measures:</p>	<ul style="list-style-type: none"> <li>— energy poverty, social housing</li> <li>— public buildings</li> <li>— residential (single-family, multi family)</li> <li>— non-residential</li> <li>— industry</li> <li>— renewable energy sources</li> <li>— phase-out of fossil fuels in heating and cooling</li> <li>— whole life-cycle greenhouse gas emissions</li> <li>— circular economy and waste</li> <li>— one-stop-shops</li> <li>— renovation passports</li> <li>— smart technologies</li> <li>— sustainable mobility in buildings</li> <li>— district and neighbourhood approaches</li> <li>— skills, training</li> <li>— awareness campaigns and advisory tools</li> </ul>
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	<ul style="list-style-type: none"> <li>– Name of policy or measure</li> <li>– Short description (precise scope, objective and modalities of operation)</li> <li>– Quantified objective</li> <li>– Type of policy or measure (such as legislative; economic; fiscal; training, awareness)</li> <li>– Planned budget and funding sources</li> <li>– Entities responsible for implementing the policy</li> <li>– Expected impact</li> <li>– Status of implementation</li> <li>– Date of entry into force</li> <li>– Implementation period</li> </ul>	
(d) Outline of the investment needs, the budgetary sources and the administrative resources	<ul style="list-style-type: none"> <li>– Total investment needs for 2030, 2040, 2050 (million EUR)</li> <li>– Public investments (million EUR)</li> <li>– Private investments (million EUR)</li> <li>– Budgetary resources</li> <li>– Secured budget</li> </ul>	Secured budget

### **ANNEX III**

#### **REQUIREMENTS FOR NEW AND RENOVATED ZERO-EMISSION BUILDINGS AND CALCULATION OF LIFE-CYCLE GLOBAL WARMING POTENTIAL (GWP)**

(referred to in Article 2(2) and Article 7)

#### **I. Requirements for zero-emission buildings**

The total annual primary energy use of a new zero-emission building shall comply with the maximum thresholds indicated in the table below.

<b>EU climatic zone<sup>1</sup></b>	<b>Residential building</b>	<b>Office building</b>	<b>Other non-residential building*</b>
Mediterranean	<60 kWh/(m <sup>2</sup> .y)	<70 kWh/(m <sup>2</sup> .y)	< NZEB total primary energy use defined at national level
Oceanic	<60 kWh/(m <sup>2</sup> .y)	<85 kWh/(m <sup>2</sup> .y)	< NZEB total primary energy use defined at national level
Continental	<65 kWh/(m <sup>2</sup> .y)	<85 kWh/(m <sup>2</sup> .y)	< NZEB total primary energy use defined at national level
Nordic	<75 kWh/(m <sup>2</sup> .y)	<90 kWh/(m <sup>2</sup> .y)	< NZEB total primary energy use defined at national level

*\*Note: the threshold should be smaller than the threshold for total primary energy use established at the Member State level for nearly zero-energy non-residential buildings type other than offices*

The total annual primary energy use of a new or renovated zero-emission building shall be fully covered, on a net annual basis, by

- energy from renewable sources generated on-site and fulfilling the criteria of Article 7 of Directive (EU) 2018/2001 [amended RED],
- renewable energy provided from a renewable energy community within the meaning of Article 22 of Directive (EU) 2018/2001 [amended RED], or
- renewable energy and waste heat from an efficient district heating and cooling system in accordance with Article (24(1) of Directive (EU) .../... [recast EED].

<sup>1</sup> Mediterranean: CY, HR, IT, EL, MT, ES, PT, Oceanic: BE, DK, IE, DE, FR, LU, NL, Continental: AT, BG, CZ, HU, PL, RO, SL, SK, Nordic: EE, FI, LV, LT, SE.

A zero-emission building shall not cause any on-site carbon emissions from fossil fuels.

Only where, due to the nature of the building or lack of access to renewable energy communities or eligible district heating and cooling systems, it is technically not feasible to fulfil the requirements under the first paragraph, the total annual primary energy use may also be covered by energy from the grid complying with criteria established at national level.

## II. Calculation of life-cycle global warming potential (GWP) of new buildings pursuant to Article 7(2)

For the calculation of the life-cycle global warming potential (GWP) of new buildings pursuant to Article 7(2), the GWP is communicated as a numeric indicator for each life-cycle stage expressed as kgCO<sub>2</sub>e/m<sup>2</sup> (of useful floor area) averaged for one year of a reference study period of 50 years. The data selection, scenario definition and calculations shall be carried out in accordance with EN 15978 (EN 15978:2011. Sustainability of construction works. Assessment of environmental performance of buildings. Calculation method). The scope of building elements and technical equipment is as defined in the Level(s) common EU framework for indicator 1.2. Where a national calculation tool exists, or is required for making disclosures or for obtaining building permits, that tool may be used to provide the required disclosure. Other calculation tools may be used if they fulfil the minimum criteria laid down by the Level(s) common EU framework. Data regarding specific construction products calculated in accordance with [revised Construction Products Regulation] shall be used when available.



**ANNEX IVIA**

***COMMON GENERAL FRAMEWORK FOR RATING THE SMART READINESS OF BUILDINGS***

1. The Commission shall establish the definition of the smart readiness indicator and a methodology by which it is to be calculated, in order to assess the capabilities of a building or building unit to adapt its operation to the needs of the occupant and of the grid and to improve its energy efficiency and overall performance.

The smart readiness indicator shall cover features for enhanced energy savings, benchmarking and flexibility, enhanced functionalities and capabilities resulting from more interconnected and intelligent devices.

The methodology shall take into account features such as smart meters, building automation and control systems, self-regulating devices for the regulation of indoor air temperature, built-in home appliances, recharging points for electric vehicles, energy storage and detailed functionalities and the interoperability of those features, as well as benefits for the indoor climate condition, energy efficiency, performance levels and enabled flexibility.

2. The methodology shall rely on three key functionalities relating to the building and its technical building systems:

- (a) the ability to maintain energy performance and operation of the building through the adaptation of energy consumption for example through use of energy from renewable sources;
- (b) the ability to adapt its operation mode in response to the needs of the occupant while paying due attention to the availability of user-friendliness, maintaining healthy indoor climate conditions and the ability to report on energy use; and
- (c) the flexibility of a building's overall electricity demand, including its ability to enable participation in active and passive as well as implicit and explicit demand response, in relation to the grid, for example through flexibility and load shifting capacities.

3. The methodology may further take into account:

- (a) the interoperability between systems (smart meters, building automation and control systems, built-in home appliances, self-regulating devices for the regulation of indoor air temperature within the building and indoor air quality sensors and ventilations); and
- (b) the positive influence of existing communication networks, in particular the existence of high-speed-ready in-building physical infrastructure, such as the voluntary 'broadband ready' label, and the existence of an access point for

multi-dwelling buildings, in accordance with Article 8 of Directive 2014/61/EU of the European Parliament and of the Council<sup>2</sup>.

4. The methodology shall not negatively affect existing national energy performance certification schemes and shall build on related initiatives at national level, while taking into account the principle of occupant ownership, data protection, privacy and security, in compliance with relevant Union data protection and privacy law as well as best available techniques for cyber security.

5. The methodology shall set out the most appropriate format of the smart readiness indicator parameter and shall be simple, transparent, and easily understandable for consumers, owners, investors and demand-response market participants.

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<sup>2</sup> Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L 155, 23.5.2014, p. 1).

## **ANNEX V**

### ***TEMPLATE FOR ENERGY PERFORMANCE CERTIFICATES***

(referred to in Article 16)

1. On its front page, the energy performance certificate shall display at least the following elements:

- (a) the energy performance class;
- (b) the calculated annual primary energy use in kWh/(m<sup>2</sup> year);
- (c) the calculated annual primary energy consumption in kWh or MWh;
- (d) the calculated annual final energy use in kWh/(m<sup>2</sup> year);
- (e) the calculated annual final energy consumption in kWh or MWh;
- (f) renewable energy production in kWh or MWh;
- (g) renewable energy in % of energy use;
- (h) operational greenhouse gas emissions (kg CO<sub>2</sub>/(m<sup>2</sup> year));
- (i) the greenhouse gas emission class (if applicable).

2. In addition, the energy performance certificate may include the following indicators:

- (a) energy use, peak load, size of generator or system, main energy carrier and main type of element for each of the uses: heating, cooling, domestic hot water, ventilation and in-built lighting;
- (b) renewable energy produced on site, main energy carrier and type of renewable energy source;
- (c) a yes/no indication whether a calculation of the Global Warming Potential has been carried out for the building;
- (d) the value of the life-cycle Global Warming Potential (if available);
- (e) information on carbon removals associated to the temporary storage of carbon in or on buildings;
- (e) a yes/no indication whether a renovation passport is available for the building;
- (f) the average U-value for the opaque elements of the building envelope;
- (g) the average U-value for the transparent elements of the building envelope;
- (h) type of most common transparent element (e.g. double glazed window);
- (i) results of the analysis on overheating risk (if available);
- (j) the presence of fixed sensors that monitor the levels of indoor air quality;
- (k) the presence of fixed controls that respond to the levels of indoor air quality;
- (l) number and type of charging points for electric vehicles;
- (m) presence, type and size of energy storage systems;

(n) feasibility of adapting the heating system to operate at more efficient temperature settings;

(o) feasibility of adapting the air-conditioning system to operate at more efficient temperature settings;

p) metered energy consumption;

q) operational fine particulate matter (PM2.5) emissions.

The energy performance certificate may include the following links with other initiatives if these apply in the relevant Member State:

(a) a yes/no indication whether a smart readiness assessment has been carried out for the building;

(b) the value of the smart readiness assessment (if available);

(c) a yes/no indication whether a Digital Building Logbook is available for the building.

Persons with disabilities shall have equal access to the information in energy performance certificates.

↓ 2010/31/EU (adapted)

## ANNEX VIII

### *INDEPENDENT CONTROL SYSTEMS FOR ENERGY PERFORMANCE CERTIFICATES ~~AND INSPECTION~~ REPORTS*

↓ new

#### 1. Definition of quality of energy performance certificate

Member States shall provide a clear definition of what is considered a valid energy performance certificate.

The definition of a valid energy performance certificate shall ensure:

↓ 2010/31/EU (adapted)  
→<sub>1</sub> 2018/844 Art. 1.14 and Annex .3(a)  
⇒ new

1. →<sub>1</sub> ~~The competent authorities or bodies to which the competent authorities have delegated the responsibility for implementing the independent control system shall make a random selection of all the energy performance certificates issued annually and subject them to verification. The sample shall be of a sufficient size to ensure statistically significant compliance results.~~ ←

~~The verification shall be based on the options indicated below or on equivalent measures:~~

(a)  a  validity check of the input data ⇒ (including on-site checks) ⇐ of the building used to issue the energy performance certificate and the results stated in the certificate;

↓ new

(b) the validity of the calculations;

(c) a maximum deviation for the energy performance of a building, preferably expressed by the numeric indicator of primary energy use (kWh/(m<sup>2</sup> year));

(d) a minimum number of elements differing from default or standard values.

↓ 2010/31/EU

~~(b) check of the input data and verification of the results of the energy performance certificate, including the recommendations made;~~

~~(c) full check of the input data of the building used to issue the energy performance certificate, full verification of the results stated in the certificate, including the recommendations made, and on-site visit of the building, if possible, to check correspondence between specifications given in the energy performance certificate and the building certified.~~

~~2. The competent authorities or bodies to which the competent authorities have delegated the responsibility for implementing the independent control system shall make a random selection of at least a statistically significant percentage of all the inspection reports issued annually and subject those reports to verification.~~

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↓ new

Member States may include additional elements in the definition of a valid energy performance certificate, such as maximum deviation for specific input data values.

## 2. Quality of the control system for energy performance certificates

Member States shall provide a clear definition of the quality objectives and the level of statistical confidence that the energy performance certificate framework should achieve. The independent control system shall ensure at least 90% of valid issued energy performance certificates with a statistical confidence of 95% for the evaluated period, which shall not exceed one year.

The level of quality and the level of confidence shall be measured using random sampling and shall account for all elements provided in the definition of a valid energy performance certificate. Member States shall require third-party verification for the evaluation of at least 25% of the random sample when the independent control systems have been delegated to non-governmental bodies.

The validity of the input data shall be verified with information provided by the independent expert. Such information may include product certificates, specifications or building plans that include details on the performance of the different elements included in the energy performance certificate.

The validity of the input data shall be verified by on-site visits in at least 10% of the energy performance certificates that are part of the random sampling used to assess the overall quality of the scheme.

In addition to the minimum random sampling to determine the overall level of quality, Member States may use different strategies to specifically detect and target poor quality in energy performance certificates with the objective to improve the overall quality of the scheme. Such targeted analysis cannot be used as the basis to measure the overall quality of the scheme.

Member States shall deploy pre-emptive and reactive measures to ensure the quality of the overall energy performance certificate framework. Those measures may include additional training for independent experts, targeted sampling, obligation to re-submit energy performance certificates, proportional fines and temporary or permanent bans for experts.

Where information is added to a database it shall be possible for national authorities to identify the originator of the addition, for monitoring and verification purposes.

## 3. Availability of energy performance certificates

The independent control system shall verify the availability of energy performance certificates to prospective buyers and tenants in order to ensure that it is possible to consider the energy performance of the building in their decision to buy or rent.

The independent control system shall verify the visibility of the energy performance indicator and class in advertising media.

## 4. Treatment of building typologies

The independent control system shall account for different building typologies, particularly for those building typologies that are most prevalent in the real estate market, such as single residential, multi-residential, offices or retail.

#### 5. Public disclosure

Member States shall regularly publish, on the national database on energy performance certificates, at least the following information on the quality system:

- (a) the definition of quality in energy performance certificates;
  - (b) quality objectives for the energy performance certificate scheme;
  - (c) results of the quality assessment, including number of certificates evaluated and relative size to the total number of issued certificates in the given period (per typology);
  - (d) contingency measures to improve the overall quality of energy performance certificates.
- 

↓ 2018/844 Art. 1.14 and Annex  
.3(b)

~~3. Where information is added to a database it shall be possible for national authorities to identify the originator of the addition, for monitoring and verification purposes.~~

## ANNEX VIII

### *COMPARATIVE METHODOLOGY FRAMEWORK TO IDENTIFY COST-OPTIMAL LEVELS OF ENERGY PERFORMANCE REQUIREMENTS FOR BUILDINGS AND BUILDING ELEMENTS*

The comparative methodology framework shall enable Member States to determine the energy ⇒ and emission ⇐ performance of buildings and building elements and the economic aspects of measures relating to the energy ⇒ and emission ⇐ performance, and to link them with a view to identifying the cost-optimal level.

The comparative methodology framework shall be accompanied by guidelines outlining how to apply ~~this~~ ⊗ that ⊗ framework in the calculation of cost-optimal performance levels.

The comparative methodology framework shall allow for taking into account use patterns, outdoor climate conditions ⇒ and their future changes according to best available climate science ⇐, investment costs, building category, maintenance and operating costs (including energy costs and savings), earnings from energy produced, where applicable, ⇒ environmental and health externalities of energy use, ⇐ and ~~disposal~~ ⇒ waste management ⇐ costs, where applicable. It should be based on relevant European standards relating to this Directive.

The Commission shall also provide:

- guidelines to accompany the comparative methodology framework; ~~these~~ ⊗ those ⊗ guidelines will serve to enable the Member States to undertake the steps listed below; ~~and~~
- information on estimated long-term energy price developments.

For the application of the comparative methodology framework by Member States, general conditions, expressed by parameters, shall be laid down at Member State level.

The comparative methodology framework shall require Member States to:

- define reference buildings that are characterised by and representative of their functionality and geographic location, including indoor and outdoor climate conditions. The reference buildings shall cover residential and non-residential buildings, both new and existing ones; ~~and~~
- define energy efficiency measures to be assessed for the reference buildings. ~~These~~ ⊗ Those ⊗ may be measures for individual buildings as a whole, for individual building elements, or for a combination of building elements; ~~and~~
- assess the final and primary energy need ⇒ and resulting emissions ⇐ of the reference buildings ~~and the reference buildings~~ with the defined energy efficiency measures applied; ~~and~~
- calculate the costs (i.e. the net present value) of the energy efficiency measures (as referred to in the second indent) during the expected economic lifecycle applied to the reference buildings (as referred to in the first indent) by applying the comparative methodology framework principles.

By calculating the costs of the energy efficiency measures during the expected economic lifecycle, the cost-effectiveness of different levels of minimum energy performance



requirements is assessed by the Member States. ~~This~~ That will allow the determination of cost-optimal levels of energy performance requirements.

**ANNEX VIII**

**PART A**

<i><del>Repealed Directive with its successive amendment</del></i>	
<i><del>(referred to in Article 29)</del></i>	
<del>Directive 2002/91/EC of the European Parliament and of the Council (OJ L 1, 4.1.2003, p. 65)</del>	
<del>Regulation (EC) No 1137/2008 of the European Parliament and of the Council (OJ L 311, 21.11.2008, p. 1)</del>	<del>only point 9.9 of the Annex</del>

**PART B**

<i><del>Time limits for transposition into national law and application</del></i>		
<i><del>(referred to in Article 29)</del></i>		
<del>Directive</del>	<del>Time limit for transposition</del>	<del>Date of application</del>
<del>2002/91/EC</del>	<del>4 January 2006</del>	<del>4 January 2009 as regards Articles 7, 8 and 9 only</del>

**PART A**

Repealed Directive  
with list of the successive amendments thereto  
(referred to in Article 33)

Directive 2010/31/EU of the European Parliament and of the Council (OJ L 153, 18.6.2010, p. 13)	
Directive (EU) 2018/844 of the European Parliament and of the Council (OJ L 156, 19.6.2018, p. 75)	only Article 1
Regulation (EU) 2018/1999 of the European Parliament and of the Council (OJ L 328, 21.12.2018, p. 1)	only Article 53

***PART B***

Time-limits for transposition into national law and dates of application  
(referred to in Article 33)

Directive	Time-limit for transposition	Dates of application
2010/31/EU	9 July 2012	as far as Articles 2, 3, 9, 11, 12, 13, 17, 18, 20 and 27 are concerned, 9 January 2013; as far as Articles 4, 5, 6, 7, 8, 14, 15 and 16 are concerned, 9 January 2013 with regard to buildings occupied by the public authorities and 9 July 2013 with regard to other buildings
(EU) 2018/844	10 March 2020	

**ANNEX IX**

Correlation table	
Directive <del>2002/91/EC</del> ⊗ 2010/31/EU ⊗	This Directive
Article 1	Article 1
Article 2, point (1)	Article 2, point 1
—	Article 2, point (2)
Article 2, point (2)	Article 2, point (3)
—	Article 2, points (4) and (5)
Article 2, points (3), (3a), (4) and (5)	Article 2, point (6), (7), (8) and (9)
—	Article 2, points (10), (11) and (12)
Article 2, points (6), (7), (8) and (9)	Article 2, points (13), (14), (15) and (16)
—	Article 2, points (17), (18), (19) and (20)
Article 2, point (10)	Article 2, point (21)
—	Article 2, points (22), (23), (24), (25), (26) and (27)
Article 2, points (11), (12), (13) and (14)	Article 2, points (28), (29), (30) and (31)
—	Article 2, points (32), (33), (34), (35), (36) and (37)
Article 2, point (15)	Article 2, point (37)
Article 2, points (15), (15a), (15b), (15c), (16) and (17)	Article 2, points (38), (39), (40), (41), (42) and (43)
Article 2, point (18)	—
Article 2, point (19)	Article 2, point (44)
—	Article 2, points (45), (46), (47), (48), (49), (50), (51), (52), (53), (54), (55), (56) and (57)

Article 2, point (20)	—
Article 2a	Article 3
Article 3	Article 4
Article 4	Article 5
Article 5	Article 6
Articles 6 and 9	Article 7
Article 7	Article 8
—	Article 9
—	Article 10
Article 8(1), (9)	Article 11
Article 8(2) to (8)	Article 12
Article 8(10), (11)	Article 13
—	Article 14
Article 10	Article 15
Article 11	Article 16
Article 12	Article 17
Article 13	Article 18
—	Article 19
Articles 14 and 15	Article 20
Article 16	Article 21
Article 17	Article 22
—	Article 23
Article 18	Article 24
Article 19	Article 25
Article 19a	—
Article 20	Article 26
Article 21	Article 27

Article 22	Article 28
Article 23	Article 29
Article 26	Article 30
Article 27	Article 31
Article 28	Article 32
Article 29	Article 33
Article 30	Article 34
Article 31	Article 35
Annex I	Annex I
—	Annex II
—	Annex III
Annex IA	Annex IV
—	Annex V
Annex II	Annex VI
Annex III	Annex VII
Annex IV	Annex VIII
Annex V	Annex IX
<del>Article 1</del>	<del>Article 1</del>
<del>Article 2, point (1)</del>	<del>Article 2, point (1)</del>
—	<del>Article 2, points (2) and (3)</del>
<del>Article 2, point (2)</del>	<del>Article 2, point (4) and Annex I</del>
—	<del>Article 2, points (5), (6), (7), (8), (9), (10) and (11)</del>
<del>Article 2, point (3)</del>	<del>Article 2, point (12)</del>
<del>Article 2, point (4)</del>	<del>Article 2, point (13)</del>
—	<del>Article 2, point (14)</del>
<del>Article 2, point (5)</del>	<del>Article 2, point (15)</del>

<del>Article 2, point (6)</del>	<del>Article 2, point (16)</del>
<del>Article 2, point (7)</del>	<del>Article 2, point (17)</del>
<del>Article 2, point (8)</del>	<del>Article 2, point (18)</del>
<del>—</del>	<del>Article 2, point (19)</del>
<del>Article 3</del>	<del>Article 3 and Annex I</del>
<del>Article 4(1)</del>	<del>Article 4(1)</del>
<del>Article 4(2)</del>	<del>—</del>
<del>Article 4(3)</del>	<del>Article 4(2)</del>
<del>—</del>	<del>Article 5</del>
<del>Article 5</del>	<del>Article 6(1)</del>
<del>—</del>	<del>Article 6(2) and (3)</del>
<del>Article 6</del>	<del>Article 7</del>
<del>—</del>	<del>Articles 8, 9 and 10</del>
<del>Article 7(1) first subparagraph</del>	<del>Article 11(8) and Article 12(2)</del>
<del>Article 7(1) second subparagraph</del>	<del>Article 11(6)</del>
<del>Article 7(1) third subparagraph</del>	<del>Article 12(6)</del>
<del>Article 7(2)</del>	<del>Article 11(1) and (2)</del>
<del>—</del>	<del>Article 11(3), (4), (5), (7) and (9)</del>
<del>—</del>	<del>Article 12(1), (3), (4), (5) and (7)</del>
<del>Article 7(3)</del>	<del>Article 13(1) and (3)</del>
<del>—</del>	<del>Article 13(2)</del>
<del>Article 8, point (a)</del>	<del>Article 14(1) and (3)</del>
<del>—</del>	<del>Article 14(2)</del>
<del>Article 8, point (b)</del>	<del>Article 14(4)</del>
<del>—</del>	<del>Article 14(5)</del>
<del>Article 9</del>	<del>Article 15(1)</del>

<del>—</del>	<del>Article 15(2), (3), (4) and (5)</del>
<del>—</del>	<del>Article 16</del>
<del>Article 10</del>	<del>Article 17</del>
<del>—</del>	<del>Article 18</del>
<del>Article 11, introductory wording</del>	<del>Article 19</del>
<del>Article 11, points (a) and (b)</del>	<del>—</del>
<del>Article 12</del>	<del>Article 20(1) and Article 20(2) second subparagraph</del>
<del>—</del>	<del>Article 20(2) first subparagraph and Article 20(3) and (4)</del>
<del>—</del>	<del>Article 21</del>
<del>Article 13</del>	<del>Article 22</del>
<del>—</del>	<del>Articles 23, 24 and 25</del>
<del>Article 14(1)</del>	<del>Article 26(1)</del>
<del>Article 14(2) and (3)</del>	<del>—</del>
<del>—</del>	<del>Article 26(2)</del>
<del>—</del>	<del>Article 27</del>
<del>Article 15(1)</del>	<del>Article 28</del>
<del>Article 15(2)</del>	<del>—</del>
<del>—</del>	<del>Article 29</del>
<del>Article 16</del>	<del>Article 30</del>
<del>Article 17</del>	<del>Article 31</del>
<del>Annex</del>	<del>Annex I</del>
<del>—</del>	<del>Annexes II to V</del>