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ANNEXES 1 to 9

ANNEXES

to the

COMMISSION DELEGATED REGULATION (EU) .../...

supplementing Directive (EU) 2010/31/EU of the European Parliament and of the Council by establishing an optional common European Union scheme for rating the smart readiness of buildings

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ANNEX I

Calculation of smart readiness scores

1. The smart readiness of a building or building unit reflects the capabilities of the building or building unit to adapt its operation to the needs of the occupants and the grid, and to improve its energy efficiency and overall in-use performance.
2. The smart readiness of a building or building unit is determined on the basis of the assessment of smart-ready services present or planned in, or relevant for, the building or building unit, and their functionality level.
3. The smart readiness of a building or building unit is expressed by a rating that derives from a total smart readiness score expressed as a percentage and that represents the ratio between the smart readiness of the building or building unit compared to the maximum smart readiness that it could reach.
4. The calculation of the smart readiness scores is based on pre-defined weighting factors in line with Annexes III, V and VII, the value of which may depend on climatic conditions and other relevant aspects, such as the type of building.
5. For expressing the smart readiness of a building or building unit, the methodology also allows the use of disaggregated smart readiness scores expressed as a percentage. The disaggregated scores may express smart readiness for one or more of the following:
 - (a) three key smart readiness functionalities as highlighted in point 2 of Annex Ia, to Directive 2010/31/EU:
 - (1) energy performance and operation;
 - (2) response to the needs of the occupants; and
 - (3) energy flexibility, including the ability of the building or building unit to enable participation in demand response.
 - (b) the smart readiness impact criteria as defined in Annex II to this Regulation;
 - (c) the smart readiness technical domains as defined in Annex IV to this Regulation.
6. The calculation of the smart readiness scores of a building or building unit relies on the assessment of the smart-ready services that are present, or planned at design stage, and on their functionality level. The assessment aims to determine with sufficient reliability what services are present or planned, and if so, the functionality level for each of those services. For this purpose, where they are available, digital models of buildings, including building information models or digital twins, may be used. The smart-ready services that can be present in a building are listed in a pre-defined smart-ready service catalogue as set out in Annex VI and are organised in pre-defined technical domains as set out in Annex IV.
7. The calculation of smart readiness scores is made in accordance with the following protocol:
 - (a) in accordance with the catalogue of smart-ready services as set out in Annex VI to this Regulation, for each technical domain as set out in Annex IV to this Regulation, smart-ready services that are present are assessed and, for each one, the functionality level is determined according to the catalogue of smart-ready services.

- (b) in accordance with the catalogue of smart-ready services, and for each smart readiness impact criterion as set out in Annex II, the score $I(d,ic)$ of each technical domain is determined, as follows:

$$I(d, ic) = \sum_{i=1}^{N_d} I_{ic}(FL(S_{i,d})).$$

where:

- (1) d is the number of the technical domain in question,
- (2) ic is the number of the impact criterion in question,
- (3) N_d is the total number of services in technical domain d ,
- (4) $S_{i,d}$ is service i of technical domain d ,
- (5) $FL(S_{i,d})$ is the functionality level of service $S_{i,d}$ as available in the building or building unit,
- (6) $I_{ic}(FL(S_{i,d}))$ is the score of service $S_{i,d}$ for impact criterion number ic , according to the service's functionality level,

- (c) in accordance with the catalogue of smart-ready services, the maximum score of each technical domain for each impact criterion $I_{max}(d,ic)$ is determined, as follows:

$$I_{max}(d, ic) = \sum_{i=1}^{N_d} I_{ic}(FL_{max}(S_{i,d}))$$

where:

- (1) $FL_{max}(S_{i,d})$ is the highest functionality level that service $S_{i,d}$ could have according to the smart-ready service catalogue,
- (2) $I_{ic}(FL_{max}(S_{i,d}))$ is the score of service $S_{i,d}$ for its highest functionality level, which means the maximum score of service $S_{i,d}$ for impact criterion number ic ,

- (d) The smart readiness score expressed as a percentage for each of the impact criterion SR_{ic} is determined using the weighting specified in Annex V, as follows:

$$SR_{ic} = \frac{\sum_{d=1}^N W_{d,ic} \times I(d,ic)}{\sum_{d=1}^N W_{d,ic} \times I_{max}(d,ic)} \times 100$$

where:

- (1) d is the number of the technical domain in question,
 - (2) N is the total number of technical domains (according to Annex IV),
 - (3) $W_{d,ic}$ is the weighting factor expressed as a percentage of technical domain number d for impact criterion number ic ,
- (e) smart readiness scores along the three key functionalities highlighted in Annex Ia, point 2 of Directive 2010/31/EU, SR_f , are determined, using the weighting factors specified according to Annex III, as follows:

$$SR_f = \sum_{ic=1}^M W_f(ic) \times SR_{ic}$$

where:

- (1) M is the total number of impact criteria according to Annex II,
- (2) $W_f(ic)$ is the weighting factor expressed in percentage of impact criterion number ic for key functionality f according to Annex III,
- (3) SR_{ic} is the smart readiness score for impact criterion number ic .

(f) the total smart readiness score SR may be calculated, as a weighted sum of the key functionalities' smart readiness scores, as follows:

$$SR = \sum W_f \times SR_f$$

where:

- (1) SR_f is the smart readiness score for key functionality f ,
- (2) W_f is the weight of key functionality f in the calculation of the total smart readiness scores, with $\sum W_f = 1$.

(g) smart readiness scores of technical domains for each impact criterion $SR_{d,ic}$ may be calculated, as follows:

$$SR_{d,ic} = \frac{I(d,ic)}{I_{max}(d,ic)} \times 100$$

where:

- (1) $I(d,ic)$ is the score of domain number d for impact criterion ic ,
- (2) $I_{max}(d,ic)$ is the maximum score of domain number d for impact criterion number ic .

ANNEX II

Smart readiness impact criteria

The smart readiness impact criteria considered in the calculation protocol set out in Annex I are the following:

- (a) energy efficiency,
- (b) maintenance and fault prediction,
- (c) comfort,
- (d) convenience,
- (e) health, well-being and accessibility,
- (f) information to occupants,
- (g) energy flexibility and storage.

ANNEX III
Weighting of impact criteria in key functionalities

1. Each impact criterion set out in Annex II of this Regulation is considered for only one of the three key functionalities, as set out in points 2 to 4. For each key functionality, Member States shall define the respective weighting factors of relevant impact criteria.
2. For the ‘energy performance and operation’ key functionality, the relevant impact criteria are ‘energy efficiency’ and ‘maintenance and fault prediction’.
3. For the ‘response to user needs’ key functionality, the relevant impact criteria are ‘comfort’, ‘convenience’, ‘information to occupants’ and ‘health, well-being & accessibility’.
4. For the ‘energy flexibility’ key functionality, the relevant impact criterion is ‘energy flexibility & storage’.

ANNEX IV **Technical domains**

The smart readiness technical domains considered in the calculation protocol set out in Annex I to this Regulation are the following:

- (a) heating,
- (b) cooling,
- (c) domestic hot water,
- (d) ventilation,
- (e) lighting,
- (f) dynamic building envelope,
- (g) electricity,
- (h) electric vehicle charging,
- (i) monitoring and control.

ANNEX V

Weighting of technical domains

1. Each technical domain is weighted for each of the impact criterion and the weighting factors characterise the influence of the technical domain on the impact criterion.
2. Technical domains' weighting factors are expressed as a percentage, and for each impact criterion, the sum of the weighting factors of the technical domains equals to 100 %.
3. The standard approach to allocate weighting factors to the technical domains is based on:
 - (a) The climatic zone's energy balance for the weighting factors of 'heating', 'cooling', 'domestic hot water', 'ventilation', 'lighting', and 'electricity' technical domains along the 'energy efficiency', 'maintenance and prediction' and 'energy flexibility and storage' impact criteria;
 - (b) for all other cases: weighting factors that are either fixed or equally distributed.
4. Member States define the climatic zones that are used, where relevant, in the determination of weighting factors. For this purpose, Member States may use, where available, relevant Union guidance.
5. The weighting factors of technical domains may differ between residential and non-residential buildings for some impact criteria.
6. Member States define the weighting factors and, for this purpose, are encouraged to use, where available, relevant Union guidance. They may also take into account possible impacts from climate change.

ANNEX VI
Smart ready service catalogue

1. For the purpose of calculating smart readiness scores in accordance with the methodology set out in Annex I, Member States make available at least one smart-ready catalogue to be used by experts as the basis for identifying and assessing smart-ready services.
2. A smart-ready service catalogue includes the list of smart-ready services to be considered for calculating the smart readiness score, related functionality levels, and corresponding individual scores for the impact criteria.
3. The definition and any subsequent update of smart-ready catalogues reflect the current state of the art of smart-ready technologies.
4. Member States are encouraged to provide guidelines to experts on the most effective way to identify and assess smart-ready services using, where available, relevant Union guidance.
5. Member States may decide to make available several smart-ready catalogues, for instance for different building types.

ANNEX VII
Possible adaptation of the standard calculation process

1. To avoid unfairly penalising a building or building unit, some smart-ready services may be omitted in the calculation of the smart readiness scores, in case those services are not relevant for that building or building unit.
2. Member States define the conditions under which such adaptations are relevant and allowed.
3. Weighting factors of those technical domains for which the (climatic) energy balance approach would be used under the standard calculation may be calculated on the basis of the consumptions as evaluated in the energy performance certificate of the building or building unit in question.

ANNEX VIII
Smart readiness rating

1. The smart readiness rating is expressed on the basis of seven smart readiness classes, from highest smart readiness to lowest smart readiness.
2. Each smart readiness class corresponds to a range of total smart readiness scores as follows: 90 – 100 %; 80 – 90 %; 65 – 80 %; 50 - 65 %; 35 – 50 %; 20 – 35 %; < 20 %.

ANNEX IX

Content of the smart readiness indicator certificate

The information contained in the smart readiness indicator and conveyed to the end user includes the following:

- (a) unique ID of the certificate,
- (b) date of issue and date of expiry of the certificate,
- (c) an informational text clarifying the scope of the smart readiness indicator, in particular with regard to energy performance certificates,
- (d) general information on the building or building unit (type of building or building unit, surface area, year of construction and where relevant, of renovation, location),
- (e) where available, the energy performance class of the building or building unit as specified by a valid energy performance certificate,
- (f) smart readiness class of the building or building unit,
- (g) optionally, total smart readiness score of the building or building unit,
- (h) smart readiness scores along the three key functionalities highlighted in Annex I of this Regulation,
- (i) smart readiness score per impact criterion,
- (j) optionally, scores of each technical domain for each impact criterion,
- (k) where possible, available information on connectivity, in particular on the existence of high-speed-ready in-building physical infrastructure, such as the voluntary ‘broadband ready’ label,
- (l) where possible, available information on interoperability, cybersecurity of systems and data protection, including where relevant on conformity to commonly agreed standards, and information on related risks,
- (m) an informational text clarifying that the certificate reflects the smart readiness at the date of issuance and that any significant modifications to the building and its systems would affect smart readiness and would therefore require an update of the information given on the certificate,
- (n) optionally, recommendations on how to improve the smart readiness of the building or building unit taking into account, where relevant, the heritage value.
- (o) optionally, additional information on the assumptions made in the calculation of scores such as weighting factors of impact criteria used for calculating smart readiness scores for key functionalities.