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ANNEXES 1 to 4

ANNEXES

to the

Delegated Act

**on the first phase of the establishment of a common Union rating scheme for data
centres**

ANNEX I

Information to be communicated to the European database on data centres

The following information shall be communicated to the European database on data centres:

1. Information on the reporting data centre
 - (a) *Data centre name* is the name used to identify and describe the reporting data centre.
 - (b) *Owner and operator of the data centre* including the name and contact details of the owner and of the operator of the reporting data centre.
 - (c) *Location of the data centre* is the Local Administrative Unit Code (LAU code) of the location of the reporting data centre (building or site) expressed in accordance with the most recent LAU tables published by Eurostat.
 - (d) *Type of data centre* is the type of the reporting data centre that matches the main operation of the reporting data centre, in accordance with the definition of data centre and the definitions of every type of data centres set out by this Regulation.

The type of reporting data centre can take one of the values 'enterprise data centre', 'colocation data centre' or 'co-hosting data centre', combined with one of the values 'structure' or 'group of structures'.

If a colocation data centre also offers co-hosting services or if a co-hosting data centre also offers colocation services, this shall be indicated.

- (e) *Year and month of entry into operation* is the calendar year and month during which the reporting data centre started providing information technology services.

2. Information on the operation of the reporting data centre

The data centre operator of each reporting data centre shall provide the following information:

- (a) electrical infrastructure redundancy level at high voltage level / at low voltage level (line-up) / at rack level;
 - (b) cooling infrastructure redundancy level at room level / at rack level.

For the redundancy levels, if "N" represents the baseline number of components or functions to satisfy the normal conditions, redundancy shall be expressed compared to that baseline "N", for example as "N+1," "N+2," "2N", etc. Facility redundancy can apply to an entire site (backup site), systems or components. Information technology redundancy can apply to hardware and software.

ANNEX II

Key performance indicators to be monitored, gathered and communicated to the European database on data centres and the measurement methodologies

For all monitoring, data centre operators shall keep a record of the measurement points and measurement devices used, for a period of at least ten years.

The following key performance indicators shall be monitored, gathered and communicated to the European database on data centres:

1. energy and sustainability indicators
 - (a) *Installed information technology power demand* (“PD_{IT}”, in kW), as defined in Article 2. Where the installed information technology power demand has changed during the reporting period, a weighted average shall be used.

Where the installed information technology power demand cannot be determined, the data centre rated information technology power demand (in kW), as defined in Article 2, can be used. Where the data centre rated information technology power demand has changed during the reporting period, a weighted average shall be used.

The reporting data centre shall indicate which metric it uses for its reporting;

- (b) *Data centre total floor area* (“S_{DC}”, in square meters).

If the structure that houses the data centre has a different primary function (for example, office building), the value of S_{DC} must be limited to the sum of the floor area occupied by the data centre’s computer room or rooms and the floor area occupied by the equipment necessary for the proper operation of the data centre.

If this equipment also serves the other functions of the structure (for example, common cooling system for the whole structure), a percentage of the floor area occupied by such equipment that reflects the rated power demand of the data centre computer room or rooms shall be used for the calculation of the previous subparagraph.

If the data centre occupies one structure, the value of S_{DC} shall be the floor area of this structure.

If the data centre occupies a group of structures, the value of S_{DC} shall be the sum of the floor areas of all structures;

- (c) *Data centre computer room floor area* (“S_{CR}”, in square meters).

If the data centre occupies a group of structures, the value of S_{CR} shall be the sum of the computer room floor area of all structures;

- (d) *Total energy consumption* (“E_{DC}”, in kWh) of the reporting data centre shall be measured as defined by, and by using the methodology in the CEN/CENELEC EN 50600-4-2 standard or equivalent.

Total energy consumption includes the use of electricity, fuels and other energy sources used for cooling.

The amount of E_{DC} coming from backup generators (E_{DC-BG}, in kWh) shall be measured separately.

Total energy consumption shall be measured at the input of the data centre system before the supply transfer switchgear. The measurement points shall be set at the

primary and secondary supply of energy and at every additional supply, for example, back-up generation.

In the case of a cogeneration or an absorption chiller, if internal to the system, the measurement point shall be at the input of the cogeneration or absorption chiller, measuring the fuel consumed. If external, in the case of cogeneration, the measurement points shall be at the electricity and heat outputs, and in the case of the absorption chiller, the measurement point shall be at the cooling output;

- (e) *Total energy consumption of information technology equipment* (“ E_{IT} ”, in kWh) shall be measured in accordance with the category 1 methodology for the calculation of the PUE set out in the CEN/CENELEC EN 50600-4-2 standard or equivalent. Data centres shall measure the combined annual energy consumption at every uninterruptible power system (UPS) connected to data centre information technology equipment.

For data centres that do not have a UPS, for example, direct current data centres, E_{IT} can be measured at the power distribution unit (PDU) connected to data centre information technology equipment, or in accordance with the category 2 methodology for the calculation of the PUE set out in the CEN/CENELEC EN 50600-4-2 standard, or at a measurement point that data centres will specify.

Figure 1 illustrates a general schema of monitoring and measurement points in a data centre, where measurement locations for the total energy consumption and the total consumption of information technology equipment are indicated;

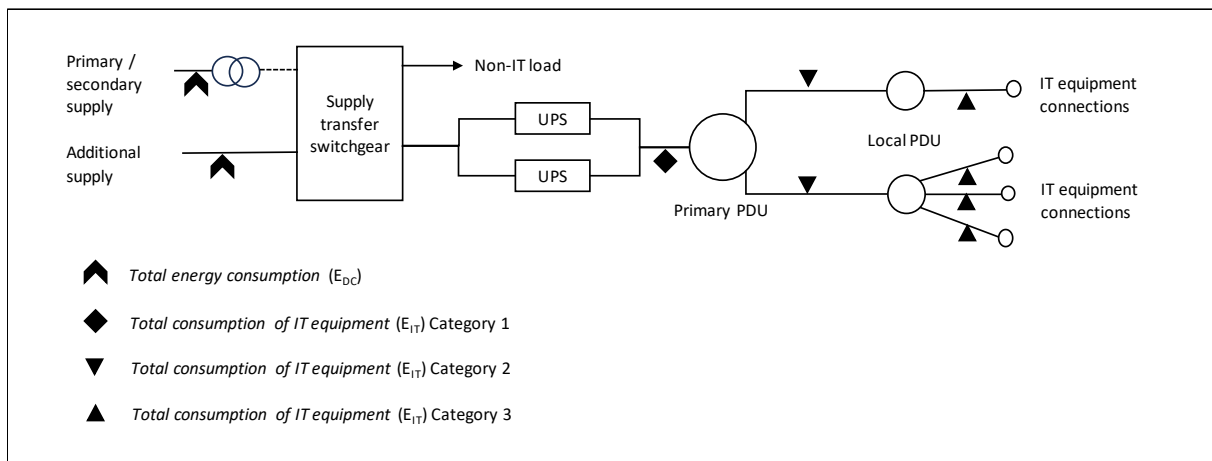


Figure 1: Measurement of energy consumption

- (f) *Electrical grid functions* is the information on whether any functions that support the stability, reliability, and resilience of the electrical grid are provided by the data centre, such as peak demand shifting or firm frequency response (FFR);
- (g) *Average battery capacity* (“ C_{BtG} ”, in kW) is the average capacity of the data centre batteries that were offered to the grid via a relevant market or contracts for electrical grid functions;
- (h) *Total water input* (“ W_{IN} ”, in cubic meters) shall be measured as defined by, and by using the methodology set out in the CEN/CENELEC EN 50600-4-9 standard WUE Category 2, or if not possible, the methodology set out in Category 1, or equivalent standard. Data centres shall measure all water volumes that enter the data centre boundary and are used in relation to the data centre functions including environmental, power, security, and information technology.

The reporting data centre shall indicate which WUE Category it uses for its reporting.

Figure 2 illustrates a general schema of monitoring and measurement points in a data centre, including measurement locations for E_{RES-OS} , W_{IN} , and E_{REUSE} ;

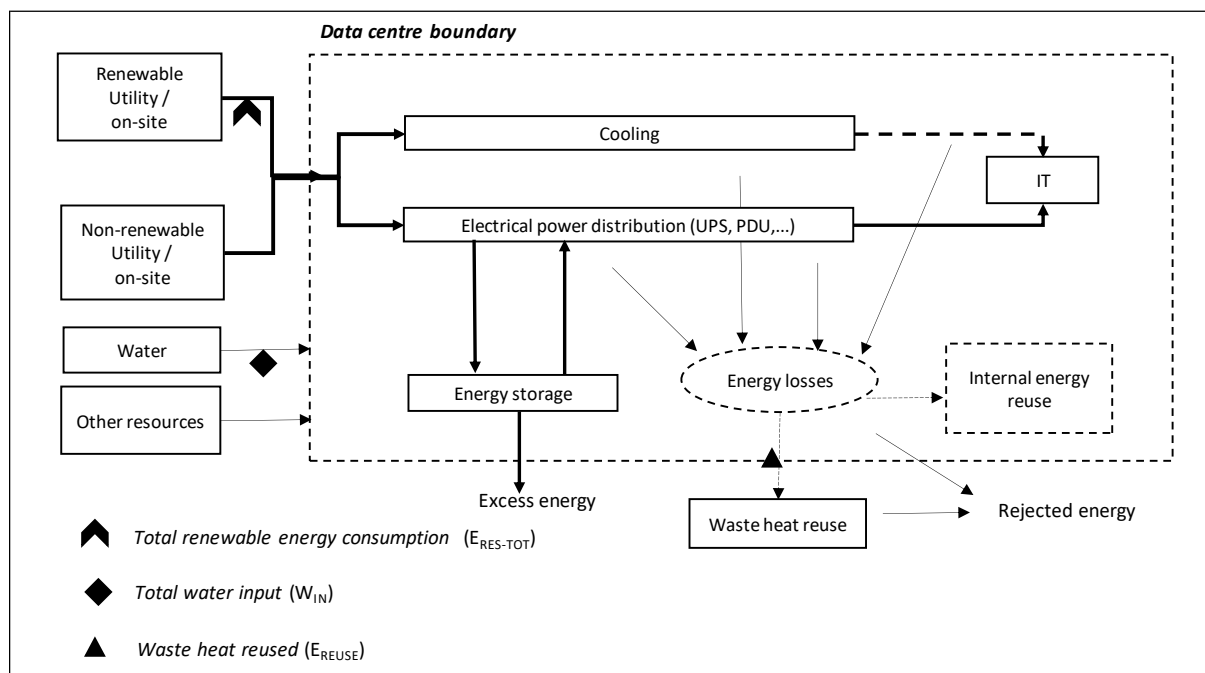


Figure 2: Measurement of water input and waste heat reused.

- (i) *Total potable water input* (“ W_{IN-POT} ”, in cubic meters) shall be measured as defined by, and by using the methodology set out in, the CEN/CENELEC EN 50600-4-9 standard WUE Category 1 or equivalent. Data centres shall measure all potable water sources that enter the data centre boundary and are used for data centre functions including environmental, power, security, and information technology;

If the structure that houses the data centre has a different primary function, the values of W_{IN} and W_{IN-POT} must be limited to the water used (or estimated as used) by the equipment in the data centre’s computer room or rooms and the equipment necessary for the operation of the data centre.

- (j) *Waste heat reused* (“ E_{REUSE} ”, in kWh) shall be measured as defined by, and by using the methodology set out in, the CEN/CENELEC EN 50600-4-6 standard or equivalent. Data centres shall measure the heat that is used or reused outside of the data centre boundary, and which substitutes partly or totally energy needed outside the data centre boundary.

Defining the boundaries of the data centre is a key aspect to successfully measure this indicator, since only energy being reused outside the boundaries of the data centre is counted. Figure 2 provides a scheme to set the data centre boundaries, which are described by the perimeter, spaces and equipment contained therein.

Reused energy shall be measured at the boundary of the data centre at the point where the energy provided is handed off to be used by the other party.

If part of the waste heat is reused for cooling the data centre, that part must be subtracted from the reused waste heat, that is to say, subtracting the share of flow rate of cooling fluid used in the data centre;

- (k) *Average waste heat temperature* (“ T_{WH} ”, in degree Celsius) shall be measured as the temperature of the fluid used to cool the information and communication technology equipment in the data centre computer room, averaged over the year, and across every measurement point.

The waste heat temperature is measured at the point where the heated fluid enters the heat exchanger(s) at the data centre computer room boundary (Figure 3). For data centres with heat recovery, that is at the heat recovery exchanger. If there is no heat recovery, the measurement is taken at every heat exchanger at the data centre computer room boundary carrying heat from the information technology equipment;

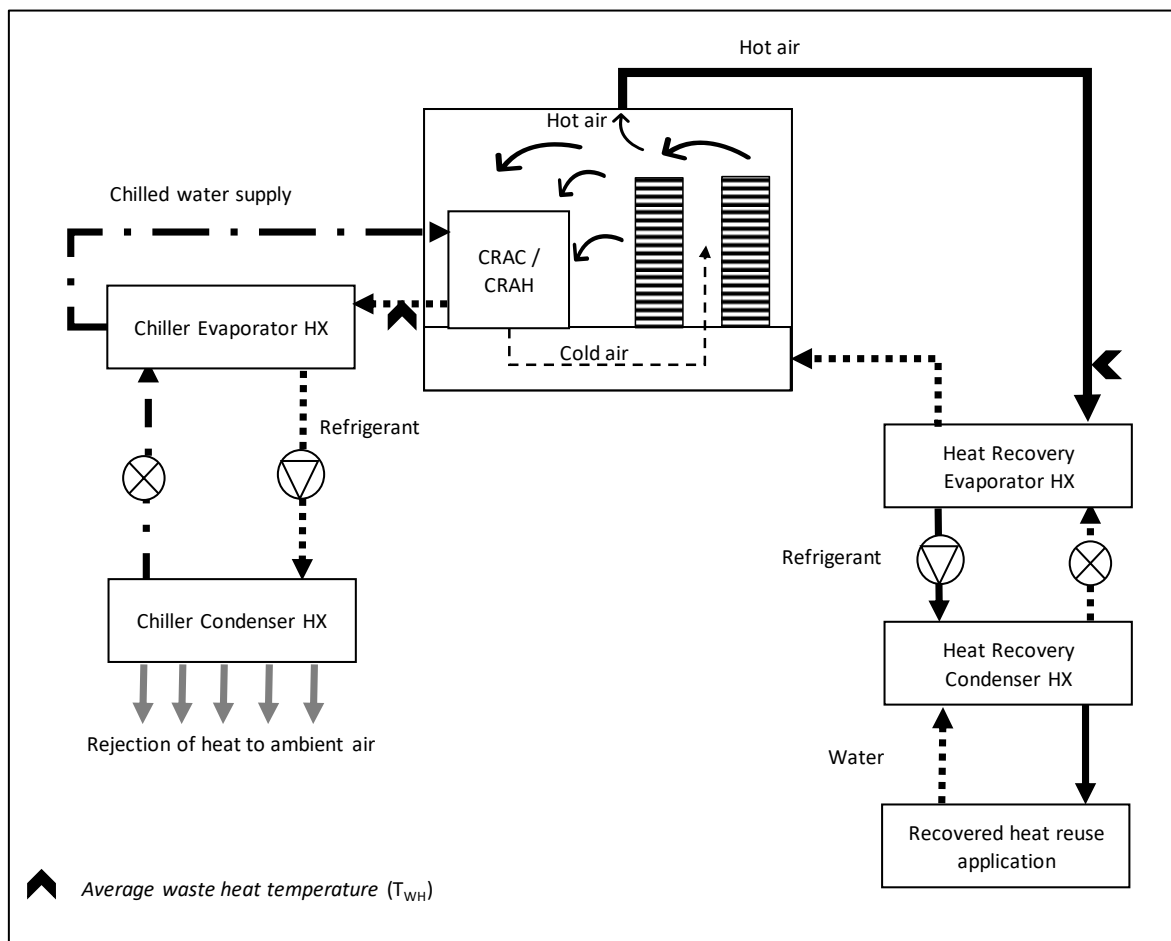


Figure 3: Measurement of waste heat temperature

- (l) *Average setpoint information technology equipment intake air temperature* (“ T_{IN} ”, in degree Celsius) shall be measured as the average setpoint temperature in all data centre computer rooms, set as a setpoint command to the cooling system used for the information and communication technology equipment in the data centre computer rooms averaged over the year.
- (m) *Types of refrigerants* used in the cooling and air conditioning equipment of the data centre computer room floor area, where each type of refrigerant is the common name

or industrial designation of the refrigerant in accordance with the Annexes to the Regulation (EU) 517/2014¹;

- (n) *Cooling degree days* (“CDD”, in degree-days) shall be determined as the number of cooling degree days for the location of the reporting data centre during the last calendar year, by using the methodology used by Eurostat and the Joint Research Centre² or equivalent³, and with a base temperature of 21 degree Celsius. Open access sources shall be used to determine the cooling degree days;
- (o) *Total renewable energy consumption* (“E_{RES-TOT}”, in kWh) shall be determined as defined by, and by using the methodology set out in the CEN/CENELEC EN 50600-4-3 standard or equivalent. E_{RES-TOT} is the sum of E_{RES-GOO}, E_{RES-PPA} and E_{RES-OS}, as defined below;
- (p) *Total renewable energy consumption from Guarantees of Origin* (“E_{RES-GOO}”, in kWh) shall be determined as the sum of the Guarantees of Origin purchased and retired by the reporting data centre. The data centre shall measure the E_{RES-PPA} that enters the data centre boundary, and which cannot be counted for more than one data centre or be created from power purchasing agreements or on-site renewables;
- (q) *Total renewable energy consumption from Power Purchasing Agreements* (“E_{RES-PPA}”, in kWh) shall be determined as the amount of energy from Power Purchasing Agreements made by the reporting data centre. The data centre shall measure the E_{RES-PPA} that enters the data centre boundary, and which cannot be counted for more than one data centre.

Any Guarantees of Origin created as a result of such Power Purchasing Agreements must be owned and retired by the reporting data centre so that they are included in E_{RES-PPA}. Otherwise, the concerned amount of energy shall be subtracted from the measured E_{RES-PPA};

- (r) *Total renewable energy consumption from on-site renewables* (“E_{RES-OS}”, in kWh) shall be measured as the energy generated from on-site renewable energy sources within the data centre boundary. See Figure 2.

Any Guarantees of Origin created as a result of these on-site renewable energy sources must be owned and retired by the reporting data centre so that they are included in E_{RES-OS}. Otherwise, the amount of energy in question shall be subtracted from the measured E_{RES-OS}.

2. ICT capacity indicators

ICT capacity is measured for servers and data storage products as servers and data storage products are defined in the Commission Regulation (EU) 2019/424⁴. ICT

¹ Regulation (EU) No 517/2014 of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006 (OJ L 150, 20.5.2014, p. 195–230, ELI: <http://data.europa.eu/eli/reg/2014/517/oj>)

² https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Heating_and_cooling_degree_days_-_statistics

³ For example, the Copernicus Climate Data Store:
<https://cds.climate.copernicus.eu/cdsapp#!/software/app-heating-cooling-degree-days?tab=app>

⁴ Commission Regulation (EU) 2019/424 of 15 March 2019 laying down ecodesign requirements for servers and data storage products pursuant to Directive 2009/125/EC of the European Parliament and of the Council and amending Commission Regulation (EU) No 617/2013 (OJ L 74, 18.3.2019, p. 46, ELI: <http://data.europa.eu/eli/reg/2019/424/oj>)

capacity indicators shall be reported for the respective equipment in-place as of December 31st of the reporting year.

- (a) *ICT capacity for servers* (“C_{SERV}”) shall be the sum of the SERT active state performance or equivalent for all servers. Server ICT capacity is the active state performance rating as declared in the manufacturer information in accordance with Commission Regulation (EU) 2019/424. The active state performance value for the configured server or group of servers in a data centre computer room shall be either interpolated from the declared active state performance value for a configuration declared under the Regulation (EU) 2019/424, or provided by a server manufacturer, or provided by a table of values for CPU part numbers created from a large SERT dataset, or estimated from a large dataset of measured values where a recognised calculation method exists. . Where there is no recognised calculation methodology, the performance of the declared configuration most closely matching the configured server shall be used. When a server is upgraded, its new capacity shall be recalculated if a recognised methodology for estimating the SERT active state performance exists.

ICT capacity for servers shall be reported, as a minimum, for all new servers installed in the reporting data centre after the date of the entry into force of this Delegated Regulation. Data centre operators shall estimate and indicate the percentage of the data centre computer room floor area that the reported indicator covers.

Colocation data centre operators may calculate C_{SERV} by extrapolating the value that corresponds to at least 90% of the installed information technology power demand of all new servers installed in the reporting data centre, as referred to in the previous sub-paragraph.

- (b) *ICT capacity for storage equipment* (“C_{STOR}”, in petabytes) shall be the *storage capacity*, namely the sum of the raw (addressable) capacity of all SSD and HDD storage devices installed in all the storage equipment as declared by the storage device manufacturer.

ICT capacity for storage equipment shall be reported, as a minimum, for all new devices installed in the reporting data centre after the date of the entry into force of this Delegated Regulation. Data centre operators shall estimate and indicate the percentage of the data centre computer room floor area that the reported indicator covers.

Colocation data centre operators may calculate C_{STOR} by extrapolating the value that corresponds to at least 90% of the installed information technology power demand of all new storage equipment installed in the reporting data centre, as referred to in the previous sub-paragraph.

3. Data traffic indicators

Data centre operators may base the monitoring and measurement of these indicators on any adequately reliable sources or combination of sources of data available, including data measured directly by the operator, data reported by data centre customers, or data provided by telecommunication operators and service providers.

- (a) *Incoming traffic bandwidth* (“B_{IN}”, in gigabytes per second) shall be measured as the total provisioned bandwidth for incoming traffic to the data centre computer room, aggregated for all the connectivity capacity, and averaged over the year;

- (b) *Outgoing traffic bandwidth* (“B_{OUT}”, in gigabytes per second) shall be measured as the total provisioned bandwidth for outgoing traffic from the data centre computer room, aggregated for all the connectivity capacity, and averaged over the year;
- (c) *Incoming data traffic* (“T_{IN}”, in exabytes) shall be measured as the total incoming data to the data centre computer room, aggregated over the course of the reporting year, irrespective of the number of the data centre’s connections;
- (d) *Outgoing data traffic* (“T_{OUT}”, in exabytes) shall be measured as the total outgoing data from the data centre computer room, aggregated over the course of the reporting year, irrespective of the number of the data centre’s connections.

ANNEX III

Data centre sustainability indicators and calculation methodologies

The following data centre sustainability indicators shall be calculated based on the information and key performance indicators communicated to the European database on data centres in accordance with Annexes I and II:

(a) Power Usage Effectiveness (PUE)

E_{DC} and E_{IT} , as both defined in Annex II, shall be used to calculate the PUE of a data centre:

$$PUE = E_{DC}/E_{IT};$$

(b) Water Usage Effectiveness (WUE)

W_{IN} , as defined in Annex III and E_{IT} , as defined in Annex II but expressed in MWh, shall be used to calculate the WUE of a data centre:

$$WUE = W_{IN}/E_{IT};$$

(c) Energy Reuse Factor (ERF)

E_{REUSE} and E_{DC} , as both defined in Annex II, shall be used to calculate the ERF of a data centre:

$$ERF = E_{REUSE}/E_{DC};$$

(d) Renewable Energy Factor (REF)

$E_{RES-TOT}$ and E_{DC} , as both defined in Annex II, shall be used to calculate the REF of a data centre:

$$REF = E_{RES-TOT}/E_{DC}.$$

ANNEX IV

Publicly available information in the European database on data centres

Pursuant to Article 12 of Directive (EU) 2023/1791, the European database shall be publicly available on an aggregated level.

Data shall be available at two levels of aggregation, namely, at Member State level and Union level.

Size categories of data centres shall be based on the data centre's information technology installed power as follows:

- (a) very small data centre: 100 – 500 kW;
- (b) small data centre: 500 –1000 kW;
- (c) medium size data centre: 1 – 2 MW;
- (d) large data centre: 2 –10 MW;
- (e) very large data centre: >10 MW.

The following information shall be publicly available:

- (a) at Member State level
 - (i) number of reporting data centres;
 - (ii) distribution of reporting data centres by size categories;
 - (iii) total installed information technology power demand (PD_{IT}) of all reporting data centres;
 - (iv) total energy consumption (E_{DC}) of all reporting data centres;
 - (v) total water consumption (W_{IN}) of all reporting data centres;
 - (vi) average PUE for all reporting data centres in the MS territory, average PUE per type of data centre, and average PUE per size category;
 - (vii) average WUE for all reporting data centres in the MS territory, average WUE per type of data centre, and average WUE per size category;
 - (viii) average ERF for all reporting data centres in the MS territory, average ERF per type of data centre, and average ERF per size category;
 - (ix) average REF for all reporting data centres in the MS territory, average REF per type of data centre, and average REF per size category.

For points (vi) – (ix), the aggregation of the sustainability indicators shall be performed with a weighted metric aggregation, using the total energy consumption as the weighting factor.

For points (vi) – (ix), presentation of aggregated data per type of data centre and per size category will be possible only if the respective category contains data from at least three data centres.

- (b) at Union level
 - (i) number of reporting data centres;
 - (ii) distribution of reporting data centres by size categories;

- (iii) total installed information technology power demand (PD_{IT}) of all reporting data centres;
- (iv) total energy consumption (E_{DC}) of all reporting data centres;
- (v) total water consumption (W_{IN}) of all reporting data centres;
- (vi) average PUE for all reporting data centres in the Union territory, average PUE per type of data centre, average PUE per size category;
- (vii) average WUE for all reporting data centres in the Union territory, average WUE per type of data centre, average WUE per size category;
- (viii) average ERF for all reporting data centres in the Union territory, average ERF per type of data centre, average ERF per size category;
- (ix) average REF for all reporting data centres in the Union territory, average REF per type of data centre, average REF per size category.

For points (vi) – (ix), the aggregation of the sustainability indicators shall be performed with a weighted metric aggregation, using the total energy consumption as the weighting factor.