Indicator DC$_{EM}$ for monitoring of ICT Sites Energy Management, Data Centres included

The European Key Performance Indicator **DC$_{EM}$** (*Dataprocessing & Communications Energy Management*) is a matrix {**DC$_G$ / Site Size; DC$_P$ / Performance Indicator**} using **4 technical indicators**:

- **KPI$_{EC}$**   **yearly energy consumption from all sources,**
- **KPI$_{TE}$**   **task effectiveness (close to former PUE),**
- **KPI$_{REUSE}$** **yearly energy reuse rate,**
- **KPI$_{REN}$**   **yearly use rate of renewable energy as defined fully in the standard.**

The **DC$_{EM}$** KPI is the application of the new **European standard** related to eco design and eco efficiency of ICT sites including all data centre, IT, communication & telecommunication sites.

This standard (ETSI ES 205 200-3) has been defined following ETSI OEU works aiming at developing a global performance indicator of energy management. A European standard (ETSI EN 305 200-3-1) will replace this standard in year 2018.

Two goals were targeted for DC$_{EM}$: define eco efficiency level of any ICT site or group of ICT sites and allow benchmarking of ICT sites group of ICT sites in various industry sectors.

The DC$_{EM}$ classifies ICT sites and group of sites according to an eco-efficiency class that combines energy-management related sustainability aspects (energy reuse and use of locally produced renewable energy) with task efficiency (KPI$_{TE}$, close to the indicator known as PUE).

The most performant current ICT sites are rated B or C.

The 9 levels of eco efficiency of ICT sites

Each ICT site reports an allocated gauge (from XXS to XXL) depending on its yearly total energy consumption (including energy from local power generators and cold loop providers).
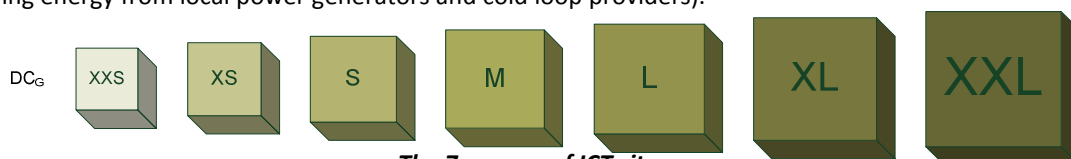
The 7 gauges of ICT sites

Each group of ICT sites report its yearly global energy consumption (including energy from local power generators and cold loop providers).

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The DC_{EM} of an ICT site will be improved when site engineering meets the recommendations of the ETSI TS 105 174-2 standard, itself part of the ETSI TS 105 174 series defining the general engineering of sustainable and energy efficient networks and sites. A European norm (ETSI EN 305 174-2) will replace this standard by 2018.

For a single ICT site

Each ICT site has its performance DC_P evaluated as follows:

$$DC_P = KPI_{TE} \times \left(1 - W_{REUSE} \times KPI_{REUSE}\right) \times \left(1 - W_{REN} \times KPI_{REN}\right)$$

The definition of gauges ranges and numbers, their associated weighting factors W_{REUSE} and W_{REN}, and classes are in the hands of user of the user of the standard. Values used by eG4U are as follows:

DC_G	KPI_{EC} range
XXS	$KPI_{EC} \leq 0.04$ GWh
XS	0.04 GWh $< KPI_{EC} \leq 0.2$ GWh
S	0.2 GWh $< KPI_{EC} \leq 1$ GWh
M	1 GWh $< KPI_{EC} \leq 5$ GWh
L	5 GWh $< KPI_{EC} \leq 25$ GWh
XL	25 GWh $< KPI_{EC} \leq 120$ GWh
XXL	$KPI_{EC} > 120$ GWh

Default gauges as proposed by eG4U

Values of W_{REUSE} and W_{REN} proposed by eG4U are 0.5 for all gauges.

	DC_P	
DC$_{CLASS}$	≥	<
A		1,00
B	1,00	1,40
C	1,40	1,70
D	1,70	1,90
E	1,90	2,10
F	2,10	2,30
G	2,30	

Default Classes as proposed by eG4U

For a group of ICT sites

Global energy consumption:

$$KPI_{ECG} = \sum_{i=1}^{n} KPI_{EC}(i)$$

Where: $KPI_{EC}(i) = KPI_{EC}$ for site *i*.

Global class: The class associated with a group of ICT sites is the weighted average of the included ICT sites, where the weighting factor is their yearly energy consumption.

$$NumClassG = \frac{\sum_{i=1}^{n} NumClass\ (i) * KPI_{EC}(i)}{\sum_{i=1}^{n} KPI_{EC}(i)}$$

Where:
- *NumClass* = class number, A=1…I=9 and *NumClassG* the number of the resulting class,
- $KPI_{EC}(i) = KPI_{EC}$ for site *i*.

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