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**Access, Terminals, Transmission and Multiplexing (ATTM);  
Energy management; Operational infrastructures;  
Implementation of Global KPIs;  
Part 3: ICT Sites;  
Sub-part 1: DCEM**

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## Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Access, Terminals, Transmission and Multiplexing (ATTM).

The present document is part 3, sub-part 1 of a multi-part deliverable covering the Energy management; Operational infrastructures; Implementation of Global KPIs as identified below:

ETSI EN 305 200-1: "General requirements";

ETSI TS 105 200-2: "Specific requirements";

**ETSI TS 105 200-3: "ICT Sites:**

**Sub-part 1: DCEM";**

ETSI EN 305 200-4: "Design assessments".

NOTE: Part 2 of this series has also been produced as EN and ES.

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## Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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## Introduction

Energy costs continue to rise, a trend that will continue in the future, while broadband penetration is introducing new active equipment to the network architecture.

In this context, and to reflect other environmental aspects of sustainability, it is vital that the main telecommunication operators implement effective general engineering of fixed and mobile broadband networks and sites provisioning, managing or using those networks (i.e. ICT sites) in order to respond to critical issues of energy consumption while proposing essential solutions to broadband deployment.

To guide this process, it is essential that metrics are defined, termed Global Key Performance Indicators (KPIs), that enable energy usage to be managed more effectively.

The Global Key Performance Indicators (KPIs) of the ETSI EN 305 200 series [1] address operational infrastructures and do not consider design or operation of individual components comprising those infrastructures.

The present document specifies the deployment of the Global KPI for energy management (*KPI<sub>DCEM</sub>*) for the ICT sites of broadband deployment as specified in ETSI EN 305 200-3-1 [2].

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# 1 Scope

The reporting of Global KPIs in accordance with ETSI EN 305 200-3-1 [2] requires the collection of data to enable the calculation of the following aspects:

- objective KPI relating to the total energy consumption ( $KPI_{EC}$ );
- objective KPI relating to the use of energy performance ( $KPI_{EP}$ ) which combines  $KPI_{EC}$  with other measurements of energy consumption to provide Objective KPIs related to task efficiency ( $KPI_{TE}$ ), the reuse of energy ( $KPI_{REUSE}$ ) and the use of renewable energy ( $KPI_{REN}$ ).

The present document supports the requirements of ETSI EN 305 200-3-1 [2] providing a framework for, and detailing, the implementation procedures including any necessary techniques for estimation of energy consumption together with constants to be employed for weighting and banding purposes.

## 2 References

### 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

- [1] ETSI EN 305 200 series: "Access, Terminals, Transmission and Multiplexing (ATTM); Energy management; Operational infrastructures; Global KPIs".
- [2] ETSI EN 305 200-3-1: "Access, Terminals, Transmission and Multiplexing (ATTM); Energy management; Operational infrastructures; Global KPIs; Part 3: ICT sites; Sub-part 1: DCEM".

### 2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] CENELEC EN 50600-4-2: "Information technology - Data centre facilities and infrastructures; Part 4-2: Power Usage Effectiveness".
- [i.2] CENELEC EN 50600-4-3: "Information technology - Data centre facilities and infrastructures; Part 4-3: Renewable Energy Factor".
- [i.3] CENELEC EN 50600-4-6: "Information technology - Data centre facilities and infrastructures; Part 4-6: Energy Reuse Factor".
- [i.4] ETSI EN 305 174-2: "Access, Terminals, Transmission and Multiplexing (ATTM); Broadband Deployment and Lifecycle Resource Management; Part 2: ICT sites".



- [i.5] ETSI TS 105 174-2: "Access, Terminals, Transmission and Multiplexing (ATTM); Broadband Deployment and Energy Management; Part 2: ICT sites".
- [i.6] ETSI EN 305 200-2-1: "Access, Terminals, Transmission and Multiplexing (ATTM); Energy management; Operational infrastructures; Global KPIs; Part 2: Specific requirements; Sub-part 1: ICT Sites".

## 3 Definition of terms, symbols and abbreviations

### 3.1 Terms

For the purposes of the present document, the terms given in ETSI EN 305 200-3-1 [2] apply.

### 3.2 Symbols

For the purposes of the present document, the symbols given in ETSI EN 305 200-3-1 [2] apply.

### 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI EN 305 200-3-1 [2] and the following apply:

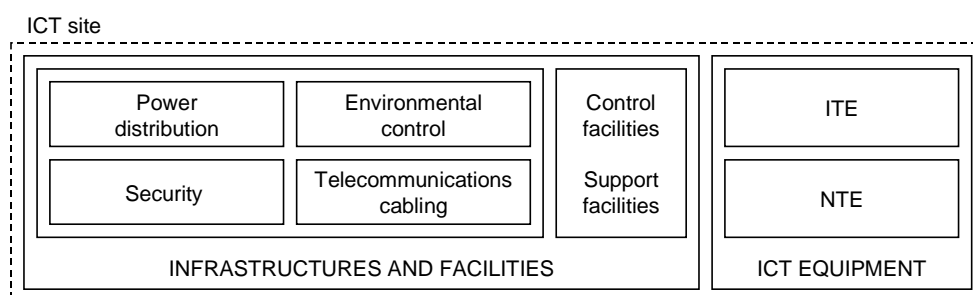
NGO                      Non-Governmental Organization

## 4 Global KPIs of ETSI EN 305 200-3-1

### 4.1 ICT sites

The ICT sites addressed by ETSI EN 305 200-3-1 [2] and the present document are Operator Sites (OSs) and Network Data Centres (NDCs). It should be noted that an OS that is only connected to the core network is considered to be an NDC.

The schematic of an ICT site used in the present document is shown in Figure 1 (taken from of ETSI EN 305 200-3-1 [2]).



**Figure 1: Schematic of the functional elements of an ICT site**

With reference to the schematic in Figure 1:

- an NDC accommodates a mixture of information technology equipment (ITE) and network telecommunication equipment (NTE);
- an OS will also accommodate a mixture of ITE and NTE - where the NTE may provide connections to core, fixed access, terrestrial mobile access and satellite mobile access network infrastructures;

- the present document does not differentiate between ITE and NTE and the generic term ICT equipment is used.

## 4.2 KPIs for energy management

### 4.2.1 Global KPI ( $KPI_{DCEM}$ ) for ICT sites

From ETSI EN 305 200-3-1 [2],  $KPI_{DCEM}$  is a combination of two separate KPIs, for a common assessment period  $k$ , as follows:

- 1) the Objective KPI for energy consumption expressed as  $KPI_{EC}$  (see clause 4.2.2.1);
- 2) a combination of three Objective KPIs for energy performance expressed as  $KPI_{EP}$ :

$$KPI_{EP} = KPI_{TE} \times ((1 - W_{REUSE} \times KPI_{REUSE}) \times (1 - W_{REN} \times KPI_{REN})) \text{ subject to a minimum value of 0.}$$

where:

$KPI_{TE}$  = Objective KPI for task effectiveness (see clause 4.2.2.2);

$KPI_{REUSE}$  = Objective KPI for energy re-use (see clause 4.2.2.3);

$KPI_{REN}$  = Objective KPI for renewable energy (see clause 4.2.2.4);

and:

$W_{REUSE}$  = weighting factor for energy re-use (see clause 6);

$W_{REN}$  = weighting factor for renewable energy (see clause 6).

$KPI_{EC}$  is presented as a banded value  $DC_G$  (see clause 6).

$KPI_{EP}$  is presented as a banded value  $DC_{CLASS}$  (see clause 6).

### 4.2.2 Objective KPIs

#### 4.2.2.1 Energy consumption ( $KPI_{EC}$ )

From ETSI EN 305 200-3-1 [2],  $KPI_{EC}$  for the assessment period  $k$ ,  $KPI_{EC}^{(k)}$  is defined mathematically as:

$$KPI_{EC}^{(k)} = C^{(k)} = \sum_{s=1}^S C_s^{(k)} \text{ or } KPI_{EC}^{(k)} = \sum_{n=1}^N C_n^{(k)} \text{ (when applied to groups of ICT sites)}$$

where, for the assessment period  $k$ :

$C^{(k)}$  = total energy consumption by the ICT site

$C_n^{(k)}$  = total energy consumption by ICT site  $n$

$C_s^{(k)}$  = total energy consumption by ICT site from energy source  $s$

$n$  = ICT site number

$N$  = total number of ICT sites

$s$  = energy source number

$S$  = total number of separate energy sources of the ICT site including those provided only during fault conditions