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Access, Terminals, Transmission and Multiplexing (ATTM) - Energy management - Operational infrastructures - Global KPIs - Part 1: General requirements

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Foreword

This European Standard (EN) has been produced by ETSI Technical Committee Access, Terminals, Transmission and Multiplexing (ATTM).

The present document is part 1 of a multi-part deliverable covering Global Key Performance Indicators for energy management of operational broadband deployment infrastructures, as identified below:

Part 1: **"General requirements";**

Part 2: "Specific requirements";

Part 3: "ICT Sites";

Part 4: "Design assessments".

National transposition dates	
Date of adoption of this EN:	4 July 2018
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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 specified in the standards in the ETSI EN 305 200 series [i.2] address operational infrastructures and do not consider design or operation of individual components comprising those infrastructures.

The ETSI EN 305 200 [i.2] multi-part deliverable comprises:

- The present document: a generic requirements document addressing Global KPIs for operational infrastructures.
- A sub-series ETSI EN 305 200-2 that defines the Global KPIs, and drives energy management targets, for specific operational networks and sites and which describes how the Global KPIs are to be applied (which may be used to support future regulatory objectives):
  - ETSI EN 305 200-2-1 [i.3]: "ICT sites";
  - ETSI EN 305 200-2-2 [i.4]: "Fixed broadband access networks";

  NOTE: Excluding cable access networks.

  - ETSI EN 305 200-2-3 [i.5]: "Mobile broadband access networks".

  The standards do not define weightings of Objective KPIs or targets or limits for Global KPIs but may contain information on values that have been used by certain organizations.
- A sub-series ETSI EN 305 200-3 including ETSI EN 305 200-3-1 [i.6] that defines particular implementations of Global KPIs within ICT sites based on the requirements of ETSI EN 305 200-2-1 [i.3], and which may define levels of performance to simplify and provide clearer understanding of Global KPIs allowing the evaluation of performance of energy use management in ICT sites.

  The standards do not define weightings of Objective KPIs or targets or limits for Global KPIs but may contain information on values that have been used by certain organizations.
- A sub-series ETSI EN 305 200-4 including ETSI EN 305 200-4-4 [i.7] that defines design assessments of Global KPIs, and drives energy management targets, for specific operational networks and sites and which describes how the Global KPIs are to be applied (which may be used to support future regulatory objectives).

These standards may be considered to be a contribution to the application of ISO 50001 [i.8] in relation to the development of policy for the continuous improvement of energy management and will accelerate:

- the availability of operational infrastructure architectures and network implementations that use energy more efficiently;
- the definition and attainment objectives for other environmental aspects of sustainability for operational broadband networks.

1 Scope

The present document describes the energy management landscape of the operational infrastructures of broadband deployment addressed by this multi-part deliverable, their inter-relationship and boundaries.

It specifies the following aspects for Global Key Performance Indicators in relation to energy management for the operational infrastructures of broadband deployment:

- common objectives in relation to energy consumption:
  - energy consumption;
  - task effectiveness;
  - energy re-use;
  - renewable energy;
- general requirements for all KPIs specified in the other standards in the ETSI EN 305 200 series [i.2] in relation to:
  - infrastructure scalability;
  - infrastructure evolution;
  - formulae and definition of terms;
  - measurement points and procedures;
- the use of KPIs.

The environmental impact and management of different energy sources are outside the scope of the present document.

Within the present document:

- clause 4 explains the context underlying the need for the development of Global KPIs for energy efficiency and introduces the Objective KPIs upon which the Global KPIs are founded;
- clause 5 specifies the general requirements that are applied to all KPIs defined within the standards in the ETSI EN 305 200-2 series and ETSI EN 305 200-3 series;
- clause 6 summarizes the applicability of the Global and Objective KPIs defined within the standards in the ETSI EN 305 200-2 series and ETSI EN 305 200-3 series.

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.

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

Not applicable.

2.2 Informative references

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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] Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings.

[i.2] ETSI EN 305 200 series: "Access, Terminals, Transmission and Multiplexing (ATTM); Energy management; Operational infrastructures; Global KPIs".

[i.3] 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".

[i.4] ETSI EN 305 200-2-2: "Access, Terminals, Transmission and Multiplexing (ATTM); Energy management; Operational infrastructures; Global KPIs; Part 2: Specific requirements; Sub-part 2: Fixed broadband access networks".

[i.5] ETSI EN 305 200-2-3: "Access, Terminals, Transmission and Multiplexing (ATTM); Energy management; Operational infrastructures; Global KPIs; Part 2: Specific requirements; Sub-part 3: Mobile broadband access networks".

[i.6] 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".

[i.7] ETSI EN 305 200-4-4: "Integrated broadband cable telecommunication networks (CABLE); Energy management; Operational infrastructures; Global KPIs; Part 4: Design assessments; Sub-part 4: Cable access networks".

[i.8] ISO 50001: "Energy management systems - Requirements with guidance for use".

[i.9] ISO Guide 82: "Guide for addressing sustainability in standards".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

access network: functional elements (that is equipment and infrastructure) that enable communication between an operator site (OS) and a customer network

cable access network: access network provided by cable operators comprising optical fibre and metallic cabling providing direct connection to customer premises

energy consumption: total consumption of energy by an operational infrastructure

energy management: combination of reduced energy consumption and increased task effectiveness, re-use of energy and use of renewable energy

energy re-use: transfer or conversion of energy (typically in the form of heat) produced by the operational infrastructure to do other work

fixed (broadband) access network: access network provided by telecommunications operators comprising optical fibre and metallic cabling providing direct connection to customer premises

global KPI: KPI, combining two or more Objective KPIs, which reflects the overall energy management performance of an operational infrastructure

ICT equipment: equipment providing data storage, processing and transport services

NOTE: A combination of Information Technology Equipment and Network Telecommunications Equipment.

ICT equipment load: total requirement for power by a set of information technology equipment (ITE) and/or network telecommunications equipment (NTE)

ICT site: site containing structures or group of structures dedicated to the accommodation, interconnection and operation of ICT equipment together with all the facilities and infrastructures for power distribution and environmental control together with the necessary levels of resilience and security required to provide the desired service availability

Information Technology Equipment (ITE): equipment providing data storage, processing and transport services for subsequent distribution by network telecommunications equipment (NTE)

mobile access network: telecommunications network in which the access to the network (connection between user equipment and network) is implemented over the air interface

Network Telecommunications Equipment (NTE): equipment between the boundaries of, and dedicated to providing connection to, core and/or access networks

objective KPI: KPI assessing one of the objectives of operational energy performance which is subsequently used to define a Global KPI for energy management

operational infrastructure: combination of ICT equipment together with the power supply and environmental control systems necessary to ensure provision of service

renewable energy: energy produced from dedicated generation systems using resources that are naturally replenished and for which the energy required for production does not exceed 10 % of the energy produced

NOTE: Directive 2010/31/EU [i.1] defines "energy from renewable sources" as energy from renewable non-fossil sources, namely wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases.

task effectiveness: measure of the work done (as a result of design and/or operational procedures) for a given amount of energy consumed

3.2 Symbols

For the purposes of the present document, the following symbols apply:

Δt	the maximum time variation between measurement points of the different Objective KPIs within a given Global KPI
k	assessment period index
KPI_{EC}	Objective KPI of energy consumption
$KPI_{Global\_Energy\_Management}$	Global KPI of energy management
KPI_{REN}	Objective KPI of renewable energy usage
KPI_{REUSE}	Objective KPI of energy re-use
KPI_{TE}	Objective KPI of task effectiveness
T_{KPI}	period of time over which Objective KPIs are assessed
T_{REPEAT}	the time between which the Objective and Global KPIs are assessed to determine relevant trend information
W_{EC}	weighting factor applied to KPI_{EC}
W_L	weighting factor within KPI_{REUSE}
W_{REN}	weighting factor applied to KPI_{REN}
W_{REUSE}	weighting factor applied to KPI_{REUSE}
W_{TE}	weighting factor applied to KPI_{TE}