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Information technology - Data centre facilities and infrastructures - Part 99-2: Recommended practices for environmental sustainability

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Information technology - Data centre facilities and infrastructures - Part 99-2: Recommended practices for environmental sustainability

Technologies de l'information - Installations et infrastructures des centres de traitement de données - Partie 99-2 : Pratiques recommandées en faveur de la durabilité environnementale

Informationstechnik - Einrichtungen und Infrastrukturen von Rechenzentren - Teil 99-2: Empfohlene Praktiken für umweltbezogene Nachhaltigkeit

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Contents

Page

European foreword

This document (CLC/TR 50600-99-2:2018) was prepared by the Technical Committee CENELEC TC 215, *Electrotechnical aspects of telecommunication equipment*.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

Regarding the structure of the EN 50600 series, see the Introduction.

Introduction

The unrestricted access to internet-based information demanded by the information society has led to an exponential growth of both internet traffic and the volume of stored/retrieved data. Data centres are housing and supporting the information technology and network telecommunications equipment for data processing, data storage and data transport. They are required both by network operators (delivering those services to customer premises) and by enterprises within those customer premises.

Data centres need to provide modular, scalable and flexible facilities and infrastructures to easily accommodate the rapidly changing requirements of the market. In addition, energy consumption of data centres has become critical both from an environmental point of view (reduction of carbon footprint) and with respect to economic considerations (cost of energy) for the data centre operator.

The implementation of data centres varies in terms of:

a) purpose (enterprise, co-location, co-hosting, or network operator facilities);

b) security level;

c) physical size;

d) accommodation (mobile, temporary and permanent constructions).

The needs of data centres also vary in terms of availability of service, the provision of security and the objectives for energy efficiency. These needs and objectives influence the design of data centres in terms of building construction, power distribution, environmental control and physical security. Effective management and operational information is required to monitor achievement of the defined needs and objectives.

This series specifies requirements and recommendations to support the various parties involved in the design, planning, procurement, integration, installation, operation and maintenance of facilities and infrastructures within data centres. These parties include:

1) owners, facility managers, ICT managers, project managers, main contractors;

2) architects, consultants, building designers and builders, system and installation designers;

3) facility and infrastructure integrators, suppliers of equipment;

4) installers, maintainers.

At the time of publication of this Technical Report, EN 50600 series will comprise the following standards and documents:

EN 50600-1, *Information technology — Data centre facilities and infrastructures — Part 1: General concepts;*

EN 50600-2-1, *Information technology — Data centre facilities and infrastructures — Part 2-1: Building construction;*

EN 50600-2-2, *Information technology — Data centre facilities and infrastructures — Part 2-2: Power distribution;*

EN 50600-2-3, *Information technology — Data centre facilities and infrastructures — Part 2-3: Environmental control;*

EN 50600-2-4, *Information technology — Data centre facilities and infrastructures — Part 2-4: Telecommunications cabling infrastructure;*

EN 50600-2-5, *Information technology — Data centre facilities and infrastructures — Part 2-5: Security systems;*

EN 50600-3-1, *Information technology — Data centre facilities and infrastructures — Part 3-1: Management and operational information.*

EN 50600-4-1, *Information technology — Data centre facilities and infrastructures — Part 4-1: Overview of and general requirements for key performance indicators*

EN 50600-4-2, *Information technology — Data centre facilities and infrastructures — Part 4-2: Power Usage Effectiveness*

EN 50600-4-3, *Information technology — Data centre facilities and infrastructures — Part 4-3: Renewable Energy Factor*

CLC/TR 50600-99-1, *Information technology — Data centre facilities and infrastructures — Part 99-1: Recommended practices for energy management*

CLC/TR 50600-99-2, Information technology — Data centre facilities and infrastructures — Part 99-2: Recommended practices for environmental sustainability

CLC/TR 50600-99-3, Information technology — Data centre facilities and infrastructures — Part 99-3: Guidance to the application of EN 50600 series

The inter-relationship of the documents within the EN 50600 series is shown in Figure 1.

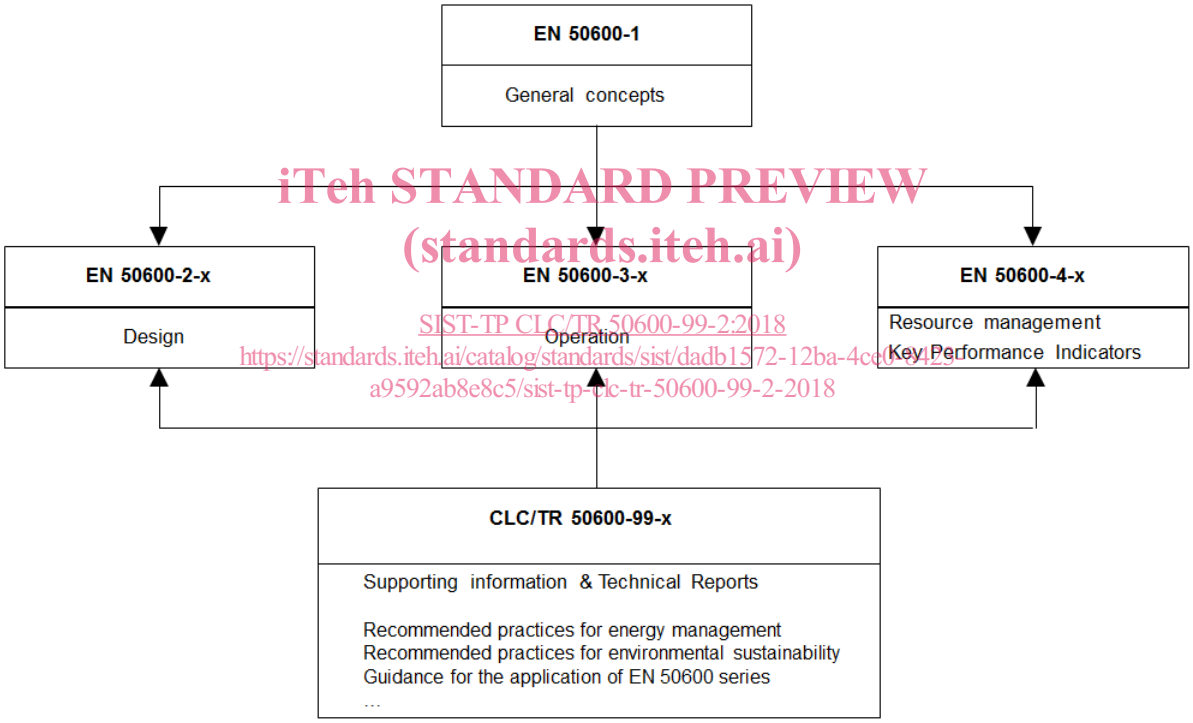

Figure 1 — Schematic relationship between the EN 50600 series of documents

EN 50600-2-X documents specify requirements and recommendations for particular facilities and infrastructures to support the relevant classification for “availability”, “physical security” and “energy efficiency enablement” selected from EN 50600-1.

EN 50600-3-X documents specify requirements and recommendations for data centre operations, processes and management.

EN 50600-4-X documents specify requirements and recommendations for key performance indicators (KPIs) used to assess and improve the resource usage efficiency and effectiveness, respectively, of a data centre.

This Technical Report is a compilation of recommended practices for improving the environmental sustainability of data centres.

This document considers that environmental sustainability of a data centre comprises three key areas:

— energy use;

— embodied impact of information and communication technology (ICT) equipment and mechanical and electrical systems;

— source energy mix of the above (i.e. amount of renewable content).

The recommended practices for improving the environmental sustainability of data centres relating to operational energy use of a data centre (i.e. reductions of energy consumption and/or improvements of energy efficiency, re-use of energy and use of renewable energy) are detailed in CLC/TR 50600-99-1.

However, any recommendations of CLC/TR 50600-99-1 that have applicability beyond energy management and concern environmental sustainability will be included in this document. The long-term objective is to avoid unintentional duplication of recommended practices in the two documents.

This document provides recommended practices to:

- assess and implement improvements to the environmental sustainability in data centres, by means of Life Cycle Assessment (LCA);

- assist the industry in taking steps towards more sustainable behaviour.

Customers or suppliers of information and communication technology (ICT) services possibly find it useful to request or provide a list of the practices of this Technical Report that are implemented in a data centre to assist in the procurement of services that meet their environmental or sustainability standards.

This Technical Report also acts as an education and reference document to assist data centre operators in identifying and implementing measures to improve the energy management of their data centres.

1 Scope

This document is a compilation of recommended practices for improving the environmental sustainability of both new and existing data centres. Environmental impacts consider not just those associated with electricity but also water usage and other pollutants.

It is recognised that the practices included are not universally applicable to all scales and business models of data centres or be undertaken by all parties involved in data centre operation, ownership or use.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 50600 (all parts), *Information technology — Data centres facilities and infrastructures*

EN 50600-2-3, *Information technology — Data centre facilities and infrastructures — Part 2-3: Environmental control*

EN 50600-3-1, *Information technology — Data centre facilities and infrastructures — Part 3-1: Management and operational information*

EN 50600-4-3, *Information technology — Data centre facilities and infrastructures — Part 4-3: Renewable Energy Factor*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at **http://www.electropedia.org/**
- ISO Online browsing platform: available at **http://www.iso.org/obp**

3.1.1
embodied impact
environmental impact caused pre- and post-use, including during manufacture and disposal

3.1.2
energy efficiency
measure of the work done (as a result of design and/or operational procedures) for a given amount of energy consumed

[SOURCE: CLC/TR 50600-99-1:2018, 3.1.12]

3.1.3
energy management
combination of reduced energy consumption and increased energy efficiency, re-use of energy and use of renewable energy

Note 1 to entry: See also EN 50600-3-1 for another definition of energy management.

3.1.4
information and communication technology (ICT) equipment
information technology (IT) and network telecommunications (NT) equipment providing data storage, processing and transport services

Note 1 to entry Representing the “critical load” of the data centre

[SOURCE: CLC/TR 50600-99-1:2018, 3.1.17]

3.1.5
system boundary
defines which processes are included in the LCA, chosen during goal and scope definition and govern what is included in the flow model constructed in the subsequent inventory analysis

3.1.6
virtualisation
creation of a virtual version of physical ICT equipment or resource to offer a more efficient use of ICT hardware

[SOURCE: CLC/TR 50600-99-1:2018, 3.1.24]

3.2 Abbreviations

For the purposes of this document the abbreviations of the EN 50600 series and the following ones apply.

ADP	Abiotic Depletion Potential
ASHRAE	Formerly "American Society of Heating, Refrigeration and Air conditioning Engineers"
BREEAM	Building Research Establishment Environmental Assessment Methodology
DC-CED	Data Centre - Cumulative Energy Demand
DC-CF	Data Centre Carbon Footprint
DC-DMI	Data Centre - Direct Material Input
DG JRC	Directorate-General Joint Research Council of the European Commission
EC	European Commission
ERE	Energy Reuse Effectiveness
ERF	Energy Reuse Factor
ICT	Information and communications technology
IT	Information technology
KPI	Key Performance Indicator
LCA	Life cycle assessment
LCI	Life cycle inventory
LEED	Leadership in Energy and Environmental Design
M&E	Mechanical and electrical
NT	Network Telecommunications
OCP	Open Compute Project

PUE	Power usage effectiveness
SLA	Service level agreement
UV	Ultra violet
WD	Water Discharged
WEEE	Waste electrical and electronic equipment
WUE	Water Usage Effectiveness

4 Environmental sustainability

4.1 General

Sustainable development can be defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs.

The three pillars of sustainable development are recognised as:

a) economic development;

b) social development;

c) environmental protection.

This document recommends practices to reduce environmental impact using a scientific approach, life cycle assessment (LCA), which considers the impact on:

1) human health (including climate change);

2) ecosystem quality (impacts on the natural environment from an environmental mechanism, measured by the percentage of vascular species that could potentially be lost as a result);

3) resources (measured by the surplus energy required to extract the same mass of a resource due to a reduction in quality of the remaining mineral and fossil resources).

Environmental sustainability should be considered at the earliest possible stage of the design process in order to achieve the greatest influence. Some recommendations for new facilities can also be applicable for existing facilities, although the practices applied can be associated with increased costs and disruption.

4.2 Life cycle assessment

Users of this document are not required to undertake an LCA. This sub-clause provides a background to the method, and guidance based on the findings of previous LCA studies. However, users who wish to undertake an LCA to gain a more detailed understanding of the areas of impact of a specific facility are referred to in EN 15643-1, EN ISO 14040, ITU-T L.1410 and the ILCD Handbook.

LCA takes a holistic approach to identify key environmental impacts throughout a product, process or service life cycle, from the point of material extraction to end-of-life, and allows the full environmental impact of decisions to be understood.

An LCA has four stages:

a) goal and scope (including system boundaries);

b) life cycle inventory (LCI), flows entering and leaving system (across the system boundary), e.g. emissions to air, discharges to water/ soil, use of mineral resources etc.;