SLOVENSKI STANDARD
SIST EN 50600-4-8:2023

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Informacijska tehnologija - Naprave in infrastruktura podatkovnega centra - 4-8. del: Učinkovitost porabe ogljika

Information technology - Data centre facilities and infrastructures - Part 4-8: Carbon usage effectiveness

Informationstechnik - Einrichtungen und Infrastrukturen von Rechenzentren - Teil 4-8: Effektivität der Vermeidung von CO2-Emissionen

Technologie de l'information - Installation et infrastructures de centres de traitement de données - Partie 4-8: Efficacité de l'utilisation du carbone

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ICS:

13.020.99	Drugi standardi v zvezi z varstvom okolja	Other standards related to environmental protection
35.110	Omreževanje	Networking
35.160	Mikroprocesorski sistemi	Microprocessor systems

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Technologie de l'information - Installation et infrastructures de centres de traitement de données - Partie 4-8: Efficacité de l'utilisation du carbone

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European Committee for Electrotechnical Standardization
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European foreword

This document (EN 50600-4-8:2022) has been prepared by CLC/TC 215 “Electrotechnical aspects of telecommunication equipment”. It is based on the text of ISO/IEC 30134-8:2022 “Information technology - Data centres key performance indicators - Part 8: Carbon usage effectiveness (CUE)”.

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2023-12-12
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2025-12-12

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Any feedback and questions on this document should be directed to the users’ national committee. A complete listing of these bodies can be found on the CENELEC website.

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 usually 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 environmental footprint) and with respect to economical 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, telecommunications cabling and physical security as well as the operation of the data centre. Effective management and operational information is important in order to monitor achievement of the defined needs and objectives.

Recognizing the substantial resource consumption, particularly of energy, of larger data centres, it is also important to provide tools for the assessment of that consumption both in terms of overall value and of source mix and to provide Key Performance Indicators (KPIs) to evaluate trends and drive performance improvements.

At the time of publication of this document, the EN 50600 series is designed as a framework of standards, technical specifications and technical reports covering the design, the operation and management, the key performance indicators for energy efficient operation of the data centre as well as a data centre maturity model.

The EN 50600-2 series defines the requirements for the data centre design.

The EN 50600-3 series defines the requirements for the operation and the management of the data centre.

The EN 50600-4 series defines the key performance indicators for the data centre.

The CLC/TS 50600-5 series defines the data centre maturity model requirements and recommendations.

The CLC/TR 50600-99-X Technical Reports cover recommended practices and guidance for specific topics around data centre operation and design.

This series of documents 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, operators, facility managers, ICT managers, project managers, main contractors;

2) consulting engineers, architects, building designers and builders, system and installation designers, auditors, test and commissioning agents;

3) facility and infrastructure integrators, suppliers of equipment;

4) installers, maintainers.

At the time of publication of this document, the EN 50600-4 series comprises the following documents:

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*;

EN 50600-4-6, *Information technology — Data centre facilities and infrastructures — Part 4-6*: *Energy Reuse Factor*;

EN 50600-4-7, *Information technology — Data centre facilities and infrastructures — Part 4-7*: *Cooling Efficiency Ratio*;

EN 50600-4-8, *Information technology — Data centre facilities and infrastructures — Part 4-8: Carbon Usage Effectiveness;*

EN 50600-4-9, *Information technology — Data centre facilities and infrastructures — Part 4-9: Water Usage Effectiveness*

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

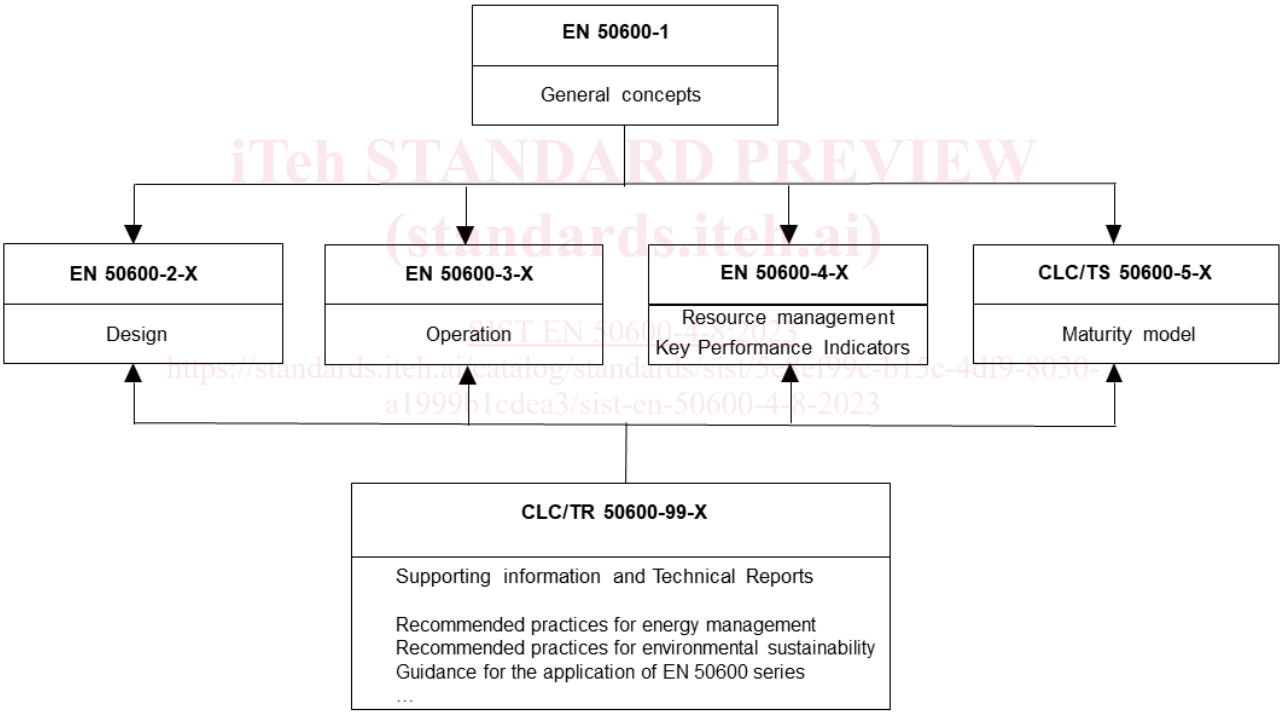

Figure 1 — Schematic relationship between the EN 50600 series of documents

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.

NOTE Within the EN 50600-4-X series, the term “resource usage effectiveness” is more generally used for KPIs in preference to “resource usage efficiency”, which is restricted to situations where the input and output parameters used to define the KPI have the same units.

In today’s digital society data centre growth, and power consumption in particular, is an inevitable consequence and that growth will demand increasing power consumption despite the most stringent energy efficiency strategies. This makes the need for key performance indicators that cover the effective use of resources (including but not limited to energy) and the reduction of CO_2 emissions essential.

In order to enable the optimum resource effectiveness of data centres a suite of effective KPIs is needed to measure and report on resources consumed in order to develop an improvement roadmap.

These standards are intended to accelerate the provision of operational infrastructures with improved resource usage effectiveness.

This document specifies the Carbon Usage Effectiveness (CUE), which provides a quantitative metric for the CO_2 emissions attributed to a data centre. CUE is a simple method for reporting the CO_2 intensity of the data centre during operation. By reporting CO_2 emissions, it is possible to present the data centre’s contribution to climate change (enhanced greenhouse effect).

This document is intended for use by data centre managers. Carbon Usage Effectiveness (CUE) will provide the data centre manager quickly the sustainability of their data centres, compare the results, and determine if any energy efficiency and/or sustainability improvements need to be made. The impact of operational carbon usage is emerging as extremely important in the design, location, and operation of current and future data centres.

Additional standards in the EN 50600-4-X series will be developed, each describing a specific KPI for resource usage effectiveness or efficiency.

The EN 50600-4-X series does not specify limits or targets for any KPI and does not describe or imply, unless specifically stated, any form of aggregation of individual KPIs into a combined nor an overall KPI for data centre resource usage effectiveness or efficiency.

This document is intended for use by and collaboration between data centre managers, facility managers, ICT managers, and main contractors.

This series of European Standards does not address the selection of information technology and network telecommunications equipment, software and associated configuration issues.

1 Scope

This document specifies the Carbon Usage Effectiveness as a KPI to quantify the CO_2 emissions of a data centre during the use phase of the data centre life cycle.

This document

a) defines the Carbon Usage Effectiveness (CUE) of a data centre,

b) introduces CUE measurement categories,

c) describes the relationship of this KPI to a data centre's infrastructure, information technology equipment and information technology operations,

d) defines the measurement, the calculation and the reporting of the parameter,

e) provides information on the correct interpretation of the CUE.

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 50600-4-1:2016, *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*

ISO 8601-1, *Date and time — Representations for information interchange — Part 1: Basic rules*

3 Terms, definitions, abbreviations and symbols

3.1 Terms and definitions

For the purposes of this document the terms and definitions given in EN 50600-4-1, EN 50600-4-2 and the following apply.

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

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1.1
Carbon Usage Effectiveness
ratio of the data centre annual CO_2 emissions and IT equipment energy demand

3.1.2
total data centre energy consumption
total annual energy consumption for all energy types serving the data centre at its boundary

Note 1 to entry: The total data centre energy is measured in kWh; the energy is measured with energy metering devices at the boundary of the data centre or points of generation within the boundary.

Note 2 to entry: This includes energy derived from sources such as natural gas, hydrogen, bioethanol and district utilities (e.g. chilled water, condenser water).

Note 3 to entry: Total annual energy includes supporting infrastructure.

3.1.3
IT equipment energy consumption
energy consumed by equipment that is used to manage, process, store or route data within the computer room space

Note 1 to entry: The IT equipment energy consumption is measured in kWh; examples for IT equipment are servers, storage equipment, and telecommunications equipment.

Note 2 to entry: IT equipment energy use follows same categories as in EN 50600-4-2.

3.1.4
global warming potential
radiative impact of a given greenhouse gas relative to that of carbon dioxide

3.1.5
greenhouse gases
gaseous constituent of the atmosphere that absorbs and emits radiation at specific wavelengths within the spectrum of infrared radiation emitted by the earth's surface, the atmosphere, and clouds

Note 1 to entry: For the purposes of this document seven GHG are considered: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and Nitrogen trifluoride (NF_3).

Note 2 to entry: A list of greenhouse gases with their recognized global warming potentials is provided in EN ISO 14067.

3.1.6
carbon dioxide equivalent
global warming potential of a greenhouse gas expressed in terms of the global warming potential of one unit of carbon dioxide

3.1.7
carbon dioxide emission factor
specific carbon dioxide emission stemming from the data centre’s energy use and facility operations

Note 1 to entry: The term “facility operations” covers CO_2 emissions caused e.g. by refrigerants or diesel generators.

3.2 Abbreviations

For the purposes of this document, the abbreviations of EN 50600-4-1 and the following apply.

CUE	Carbon Usage Effectiveness
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
DC	data centre
DC CO_2	data centre related carbon dioxide emissions
EFC	Carbon Dioxide Emission Factor
GHG	Greenhouse Gases
PUE	Power Usage Effectiveness
pCUE	partial carbon usage effectiveness