
**Informacijska tehnologija - Naprave in infrastruktura podatkovnih centrov - 4-3.
del: Delež obnovljive energije**

Information technology - Data centre facilities and infrastructures - Part 4-3: Renewable Energy Factor

Informationstechnik - Einrichtungen und Infrastrukturen von Rechenzentren - Teil 4-3: Anteil erneuerbarer Energien

Technologie de l'information - Installation et infrastructures de centres de traitement de données - Partie 4-3 : Coefficient d'énergie renouvelable

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Ta slovenski standard je istoveten z: EN 50600-4-3:2016

ICS:

35.110 Omreževanje Networking

SIST EN 50600-4-3:2017 **en**

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EUROPEAN STANDARD

EN 50600-4-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2016

ICS 35.020; 35.110; 35.160

English Version

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

Technologie de l'information - Installation et infrastructures
de centres de traitement de données - Partie 4-3 :
Coefficient d'énergie renouvelable

Informationstechnik - Einrichtungen und Infrastrukturen von
Rechenzentren - Teil 4-3: Anteil erneuerbarer Energien

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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European foreword

This document (EN 50600-4-3:2016) has been prepared by CLC/TC 215 “Electrotechnical aspects of telecommunication equipment”.

The following dates are proposed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) [2017-09-10]
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) [2019-10-10]

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Regarding the various parts in the EN 50600 series, see the Introduction.

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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 of European Standards 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 European Standard, the 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*.

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

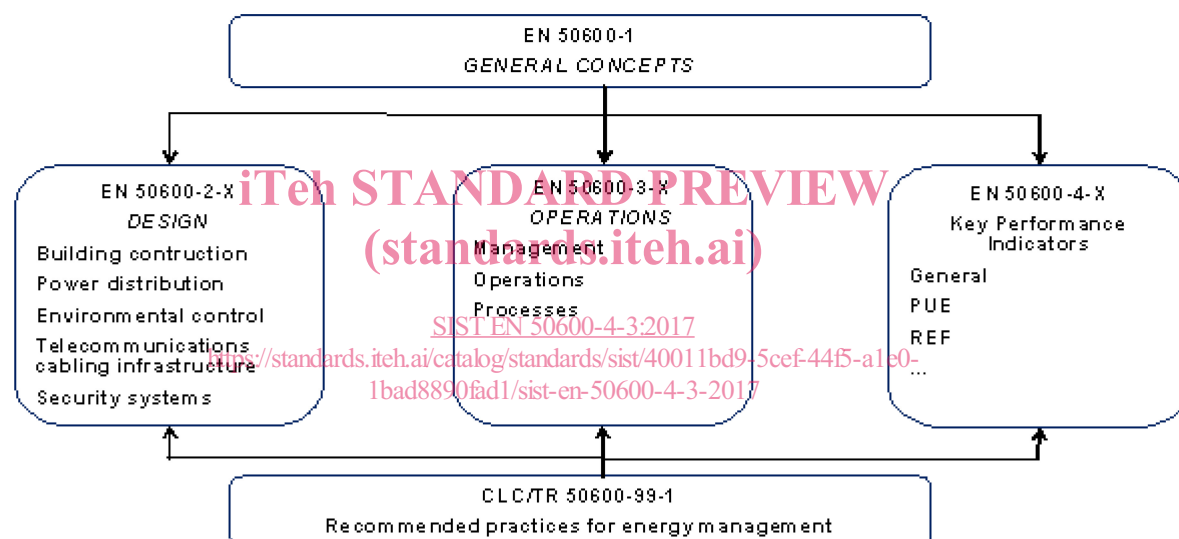


Figure 1 — Schematic relationship between the EN 50600 series of documents

EN 50600-2-X standards 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.

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 CO₂ emissions essential.

NOTE 1 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.

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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 European Standard specifies the Renewable Energy Factor (REF), which provides a quantitative metric for the actual use of renewable energy, in the form of electricity, in a data centre.

NOTE 2 This standard adopts the ISO/IEC definition of renewable energy, but defers to the definition that apply within local jurisdiction(s).

The use of and the demand for renewable energy becomes increasingly popular since it reduces or replaces the use of non-renewable energy sources. In many countries, legislation promotes the use of renewable energy and gives incentives in order to increase the diversity of energy dependence and improve the social sustainability. In several countries, governments have targets for the use of renewable energy and/or companies have a target for the use of renewable energy among all electricity consumed. The use of renewable energy as one of the sources to power data centre becomes increasingly important as their electricity consumption has risen to a significant share of the total global electricity consumption.

This European Standard is intended for use by data centre managers. The use of the Renewable Energy Factor as a key performance indicator allows data centre managers to improve a data centre's energy procurement portfolio and increase the diversity of energy dependence. Data centre managers can confirm their achievement of the use of renewable energy to their national or corporate targets.

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

1 Scope

This European Standard:

- a) defines the Renewable Energy Factor (REF) of a data centre;
- b) specifies a methodology to calculate and to present the REF;
- c) provides information on the correct interpretation of the REF.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 8601, *Data elements and interchange formats — Information interchange — Representation of dates and times*

3 Terms, definitions, abbreviations and symbols

3.1 Terms and definitions

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

3.1.1

renewable energy

energy obtained from a renewable energy source

Note 1 to entry: Criteria to categorize an energy as renewable can differ amongst jurisdictions, based on local environmental or other reasons.

[SOURCE: EN ISO/IEC 13273-2:2016, 3.1.6, modified – The information regarding the changes that were brought to the original definition in IEC 60050-617:2009, 617-04-11 were removed.]

3.1.2

renewable energy certificate

tradable, contractual instrument that represents a proof that a certain amount of electricity (or other type of energy) was generated from a renewable energy source

3.1.3

Renewable Energy Factor

ratio of the renewable energy owned and controlled by a data centre to the total data centre energy

3.1.4

renewable energy source

energy source not depleted by extraction as it is naturally replenished at a rate faster than it is extracted

Note 1 to entry: Renewable energy source excludes recovered or wasted energy.

Note 2 to entry: Organic fraction of municipal waste may be considered as a renewable energy source.

Note 3 to entry: Whether the energy stored in a technical system is renewable or not depends upon the nature of the original energy source.

Note 4 to entry: Criteria to categorize an energy as renewable can differ amongst jurisdictions, based on local environmental or other reasons.

[SOURCE: EN ISO/IEC 13273-2:2016, 3.1.5, modified – The information regarding the changes that were brought to the original definition in CEN/CLC/TR 16103:2010, 4.1.3 were removed.]

EN 50600-4-3:2016**3.1.5****total data centre energy consumption**

total annual energy consumption for all energy types serving the data centre, measured in kWh at its boundary

Note 1 to entry: Energy measured with energy metering devices at the boundary of the data centre or point of generation within the boundary.

Note 2 to entry: This includes electricity, natural gas and district utilities such as supplied chilled water or condensed water.

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

3.2 Abbreviations

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

KPI Key Performance Indicator

RE Renewable Energy

REF Renewable Energy Factor

3.3 Symbols

For the purposes of this document the following symbols apply.

E_{DC} total data centre energy consumption (annual) in kWh
 E_{ren} renewable energy in kWh (owned and controlled by a data centre)

4 Relevance of Renewable Energy Factor

<https://standards.iteh.ai/catalog/standards/sist/40011bd9-5cef-44f5-a1e0-45711c0004-3:2017>

The Renewable Energy Factor (REF) metric describes the percentage of renewable energy (RE) over total data centre energy. REF provides an assessment of the mitigation of CO₂ emission originated from energy consumption in a data centre. REF is an effective KPI to monitor the use of RE and to increase the diversity of energy dependence and improve the sustainability of a data centre by enhancing use of RE.

5 Determination of Renewable Energy Factor**5.1 General**

REF is defined as the ratio of renewable energy (RE) used in comparison with the total data centre energy consumption as shown in Formula (1):

$$\text{REF} = \frac{E_{\text{ren}}}{E_{\text{DC}}} \quad (1)$$

where:

E_{ren} is the RE in kWh owned and controlled by a data centre (i.e. any energy for which the data centre owns the legal right to the environmental attributes of renewable generation) including that:

- a) generated on-site of the data centre and whose legal rights to the environmental attributes of RE are retired in the data centre (so, that is no longer a contractual instrument to be traded, or that is no longer a possession of the last owner or the renewable certificate system administrator);

NOTE 1 "Retired" is an official term that means "consumed".

- b) obtained by procurement of RE certificates and retired in the data centre;
- c) portion of utility electricity, defined as RE, provided the data centre has obtained documented written evidence from the source utility provider(s) that the energy supplied, for the reporting period in question;

NOTE 2 This excludes RE generated in a data centre site but whose legal rights to the environmental attributes of RE were sold to other parties or the market.

E_{DC} is the total data centre energy consumption (annual) in kWh.

REF shall have a maximum value of 1,00, indicating 100 % of the total data centre energy is RE.

On-site generation of RE beyond the need of the data centre shall not be accounted for REF. Therefore, a value greater than 1,00 is not possible.

Because the RE content of the KPI is based on legal ownership of the rights to the environmental benefits, it is important to clarify that the location of energy source does not change the calculation of the REF.

For example,

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- a) where a data centre has a solar panel on its roof to generate electricity and the data centre sells the RE certificates associated with this electricity, the contribution of the solar panel is excluded as RE within the calculation of the REF;
- b) a data centre that receives electricity entirely from a coal-fired plant can purchase RE certificates to offset the entire electric use, and these certificates are included as RE within the calculation of the REF.

Examples of REF calculation are included in Annex B.

5.2 Total data centre energy consumption

The data centre under consideration shall be viewed at as a system defined by interfaces through which energy flows.

The following forms of energy shall to be metered at the interfaces:

- a) electricity;
- b) gaseous fuel;
- c) fluid fuel;
- d) fluids for cooling (comprising water usage when returned fluid and not evaporated).

The following forms of energy are not required be metered at these interfaces:

- 1) air for cooling;
- 2) water from natural sources (i.e. requiring no energy consumption in its provision).