TÜRK STANDARDLARI ENSTİTÜSÜ

Türk Standardı

TS EN 50600-4-3

Mart 2017

ICS 35.020; 35.110; 35.160

RENKLİ İÇERİK

Bilgi teknolojisi - Veri merkezi tesisleri ve altyapıları - Bölüm 4-3: Yenilenebilir Enerji Faktörü
EN 50600-4-3:2016

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

TSE Standard Hazırlama Merkezi Başkanlığı
Necatibey Caddesi No: 112
06100 Bakanlıklar * ANKARA

Tel: + 90 312 416 68 30
Faks: + 90 312 416 64 39

ICS 35.020; 35.110; 35.160

TÜRK STANDARDI

TS EN 50600-4-3 : 2017-03
EN 50600-4-3:2016

Milli Önsöz

Bu standard, CLC/TC 215 "Electrotechnical aspects of telecommunication equipment - Telekomünikasyon ekipmanlarının elektroteknik yönleri" Teknik Komitesi tarafından hazırlanmış, CENELEC tarafından 10.10.2016 tarihinde onaylanmış ve Türk Standardları Enstitüsü Teknik Kurulu'nun 20.03.2017 tarihli toplantısında Türk Standardı olarak kabul edilerek yayımına karar verilmiştir.

Bu standardda kullanılan bazı kelimeler ve/veya ifadeler patent haklarına konu olabilir. Böyle bir patent hakkının belirlenmesi durumunda TSE sorumlu tutulamaz.

CENELEC üyeleri sırasıyla,Almanya, Avusturya, Belçika, Birleşik Krallık, Bulgaristan, Çek Cumhuriyeti, Danimarka, Estonya, Finlandiya, Fransa, Hırvatistan, Hollanda, İrlanda, İspanya, İsveç, İsviçre, İtalya, İzlanda, Kıbrıs, Letonya, Litvanya, Lüksemburg, Macaristan, Makedonya, Malta, Norveç, Polonya, Portekiz, Romanya, Slovakya, Slovenya, Türkiye ve Yunanistan'ın millî standard kuruluşlarıdır.

TS EN 50600-4-3 : 2017 standardı, EN 50600-4-3:2016 standardı ile birebir aynı olup, Avrupa Standardizasyon Komitesi'nin (Avenue Marnix 17, B-1000 Brussels) izniyle basılmıştır.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50600-4-3

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

This European Standard was approved by CENELEC on 2016-10-10. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 50600-4-3:2016 E

Contents

Page

Figures

Tables

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) [2017-07-10]
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) [2019-10-10]

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

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.

Regarding the various parts in 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 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.

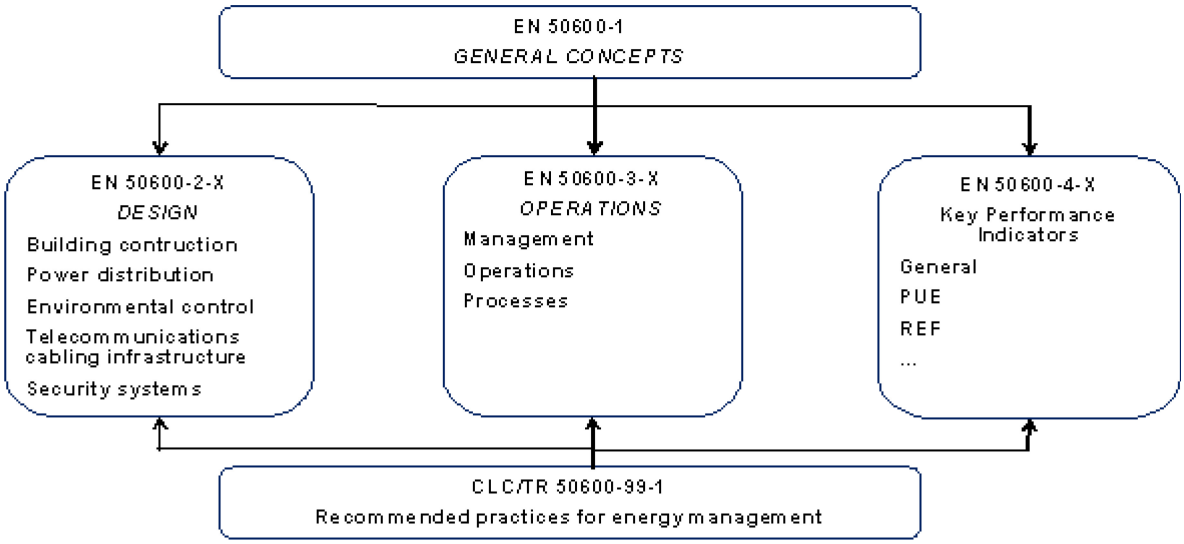

Figure 1 — Schematic relationship between the EN 50600 series of documents

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 CO_2 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.

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.]

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

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 CO_2 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,

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 off-set 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).

All forms of electrical energy at interfaces shall be metered to kWh. If any of the required forms of energy are not accounted for at the interfaces then E_{DC} is not determined and REF cannot be calculated.

Gaseous or liquid fuels shall be metered in kWh or converted into kWh using the heat of combustion values for the fuel used. Where information on combustion values is not available the following values shall be applied:

— diesel: 9,9 kWh/l;

— gas: 10,5 kWh/m^3;

— hydrogen: 38,9 kWh/kg;

— bioethanol: 6 kWh/l.

The energy contribution of fluids for cooling shall be measured using heat meters (providing information on flow rate and differential temperature) and multiplied by the relevant conversion factor of the system used to provide the fluid used.

If technical subsystems, e.g. on-site co-generation of heat and electricity, have meters at their output, they are considered external to the system. If technical subsystems have meters at their input or only have partial metering at their outputs, they are considered internal to the system.

5.3 Total data centre energy consumption in mixed-use buildings

The total data centre energy consumption for data centres in mixed-used buildings shall be calculated on the energy use of the data centre as system only if metering of all shared technical subsystems allows separation of energy usage.

If energy use of shared technical subsystems cannot be separated, total data centre energy usage shall comprise the building in total. The impact on REF should be counteracted by implementing the necessary meters for separation.

6 Measurement of Renewable Energy Factor

Measurements of E_{ren} and E_{DC} shall be undertaken using either:

a) “watt meters” with the capability to report energy use, or

b) kilowatt-hour (kWh) meters that report the “true” energy (true rms), via the simultaneous measurement of the voltage, current, and power factor over time.

NOTE Kilovolt-ampere (kVA), the product of voltage and current, is not an acceptable measurement. Although the product of volts and amperes mathematically results in watts, “true” energy is determined by integrating a power factor corrected value of volts and amperes. The frequency, phase variance and load reaction cause energy calculation difference between apparent energy and “true” energy. The error is inherently significant when power delivery includes alternating current (AC). Kilovolt-ampere (kVA) measurements can be used for other functions in the data centre; however, kVA is insufficient for efficiency measurements.

Energy input from local renewable sources also shall be measured with the same procedure as total data centre energy consumption.

REF shall be determined as an annualized value. The calculation of REF requires the recording and documenting of E_{DC} and E_{ren} over a coincident period of twelve months. This standard does not specify the frequency of measurements of E_{DC} and E_{ren}, since REF is calculated on an annual timeframe. However, the frequency of measurement employed will define the timing of subsequent PUE calculations on a rolling annual basis.

7 Directions for use of Renewable Energy Factor

The use of this KPI allows data centre managers to improve a data centre's energy procurement process and increase the diversity of energy dependence of a data centre. In addition, customers of data centres can use this KPI as a guide to select a data centre.

Furthermore, it is possible to establish a target value for the REF, measure its improvement during one year, publish the result and eventually disclose the data centre's energy diversity and its contribution to environmental sustainability.

8 Reporting of Renewable Energy Factor

In order for a reported REF to be meaningful, the reporting organization shall provide the following information:

a) the data centre (including the boundaries of the structure) under inspection;

b) the REF value;

c) the termination date of the period of measurement using the format of ISO 8601 (e.g. yyyy-mm-dd).

Due to regional differences in the RE, all public reporting of REF should include the following:

1) the basis of RE used in the context of the given reporting;

2) the entity/entities that has/have issued the RE certificates which are referred to in the context of the given reporting;

3) the annual amount of RE from on-site generation;

4) the annual RE certificates or written evidence obtained from the utility supplier(s) that the energy supplied during the reporting period complies with the definition of RE defined in 3.1.1.

Annex A
(informative)

Renewable Energy Factor and authorities issuing a renewable energy certificate

Specific definitions of Renewable Energy or a RE certificate authorized by a country or a regional authority can be used instead of 3.1.1 and/or 3.1.2. In such a case, additional information should be provided within parentheses following REF to identify the definition used. Table A.1 contains a number of authorities defining or issuing the equivalent of a RE certificate as described herein. This list is not comprehensive and is subject to change, as other regional bodies emerge that issue and track renewable certificates, that energy should also be counted as renewable for the purposes of this metric.

Table A.1 — Description of REF and authorities issuing a RE certificate

Region	Description	Regional authority /Issuer(s)	Link
UK	REF(EU, yyyy-mm-dd)	Department of Energy and Climate Change	https://www.gov.uk/government/publications/2010-to-2015-government-policy-low-carbon-technologies/2010-to-2015-government-policy-low-carbon-technologies#appendix-5-the-renewables-obligation-ro
Spain		The Green Certificate Company (GCC)	http://www.aib-net.org/portal/page/portal/AIB_HOME/ECS/Fact_Sheets (See Fact Sheet 4)
Denmark		Energinet.dk	
France		Powernext	
Germany		Umweltbundesamt (UBA)	
Sweden		Grexel	
Italy		Gestore Servizi Elettrici (GSE)	
Switzerland		Swissgrid	
Belgium		Brugel, VREG, CWaPE	
Austria		Eenrgie-Control	
Czech Republic		OTE	
Estonia		Elering	
Finland		Grexel	
Croatia		HROTE	
Iceland		Landsnet	
Luxembourg		ILR	
Netherlands		TenneT	
Norway		Statnett	
Portugal		REN	
Slovenia		Energy Agency	

Annex B
(informative)

Examples of Renewable Energy Factor calculation

This annex provides examples for the calculation of REF, taking into account different constellations of on-site renewable energy (RE) and RE certificate usage. These examples assume that the RE portion of the utility electricity is 0.

— **Example 1:**

With the configuration of Figure B.1, REF results in REF = 0,00.

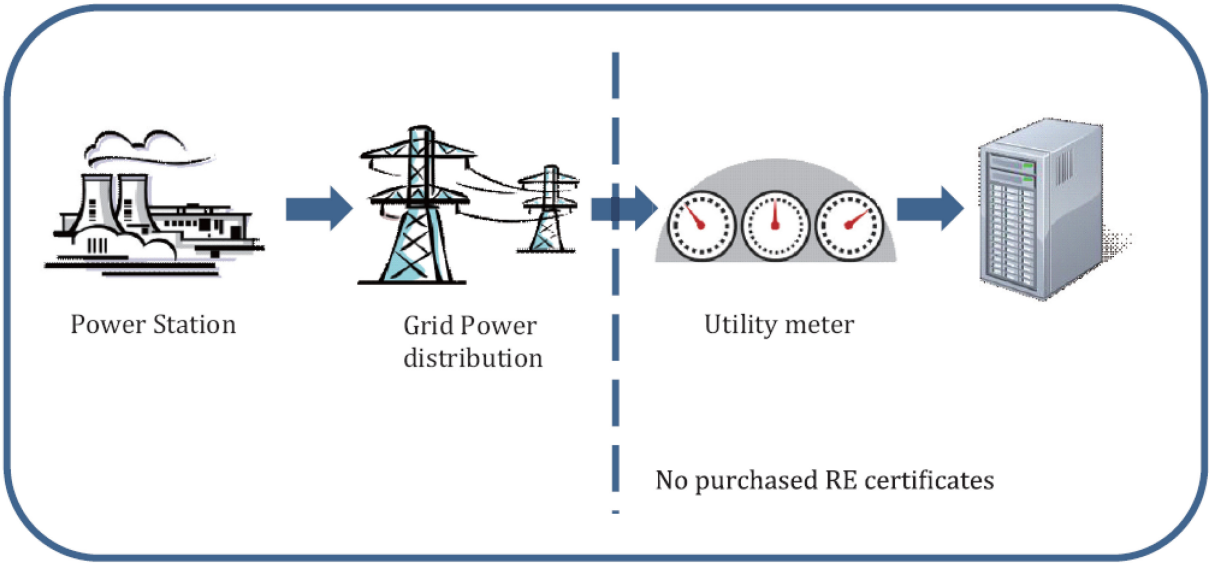

Figure B.1 — Grid energy purchased without RE certificates

— **Example 2:**

With the configuration of Figure B.2, REF results in REF = 0,20.

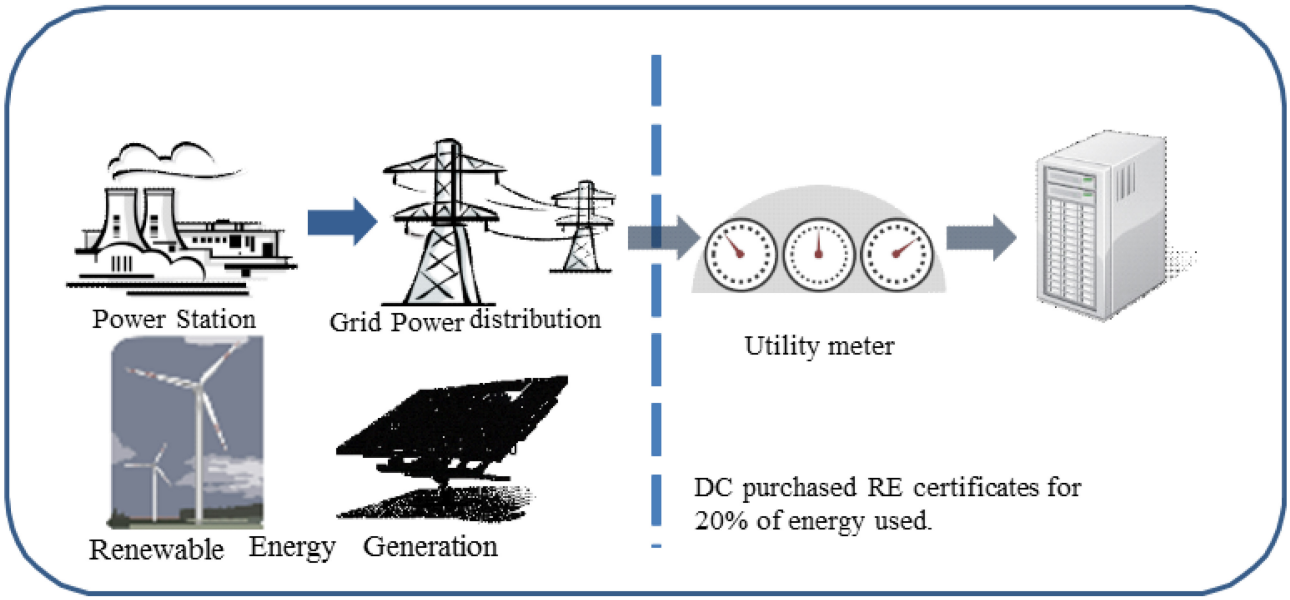

Figure B.2 — RE certificates purchased and retired for 20 % of the energy owned and controlled by the data centre

— **Example 3:**

With the configuration of Figure B.3, REF results in REF = 0,10.

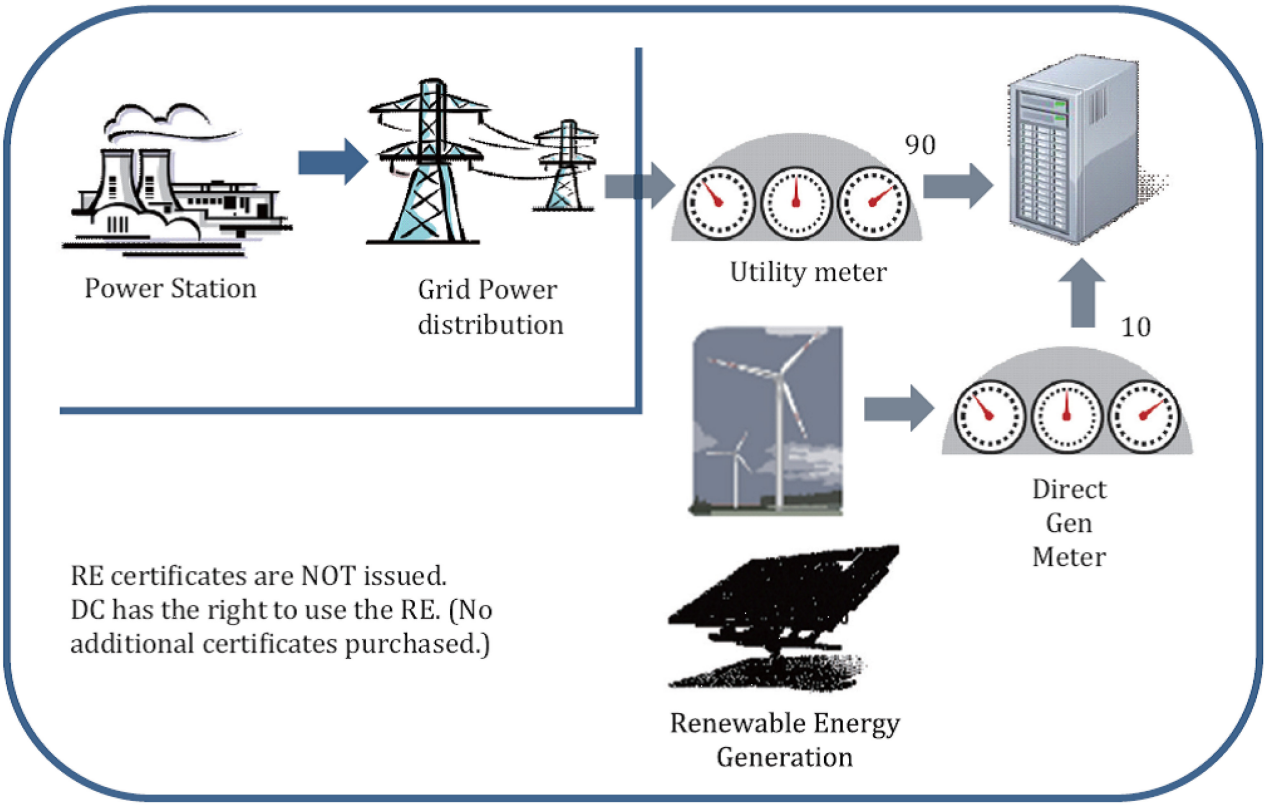

Figure B.3 — RE certificates for locally generated RE are retired by the data centre

— **Example 4:**

With the configuration of Figure B.4, REF results in REF = 0,20.

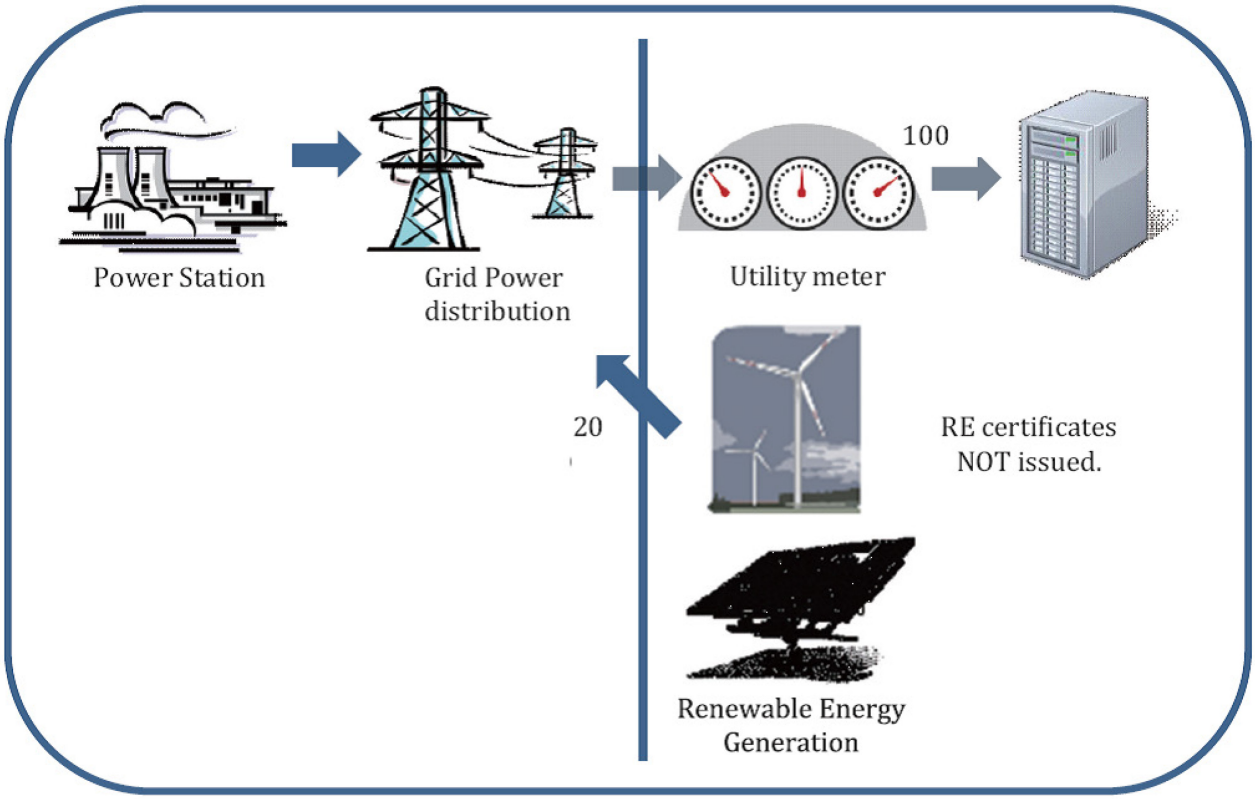

Figure B.4 — Locally generated energy sold to the utility with RE certificates retired by the data centre

— **Example 5:**

With the configuration of Figure B.5, REF results in REF = 1,00.

NOTE 1 Of the 130 units generated by on-site renewable sources, the data centre could sell 30 units worth of RE certificates without impacting its REF of 1,00.

NOTE 2 REF can be calculated as 1,30 [(120+10)/(90+10)], but REF cannot exceed 1,00.

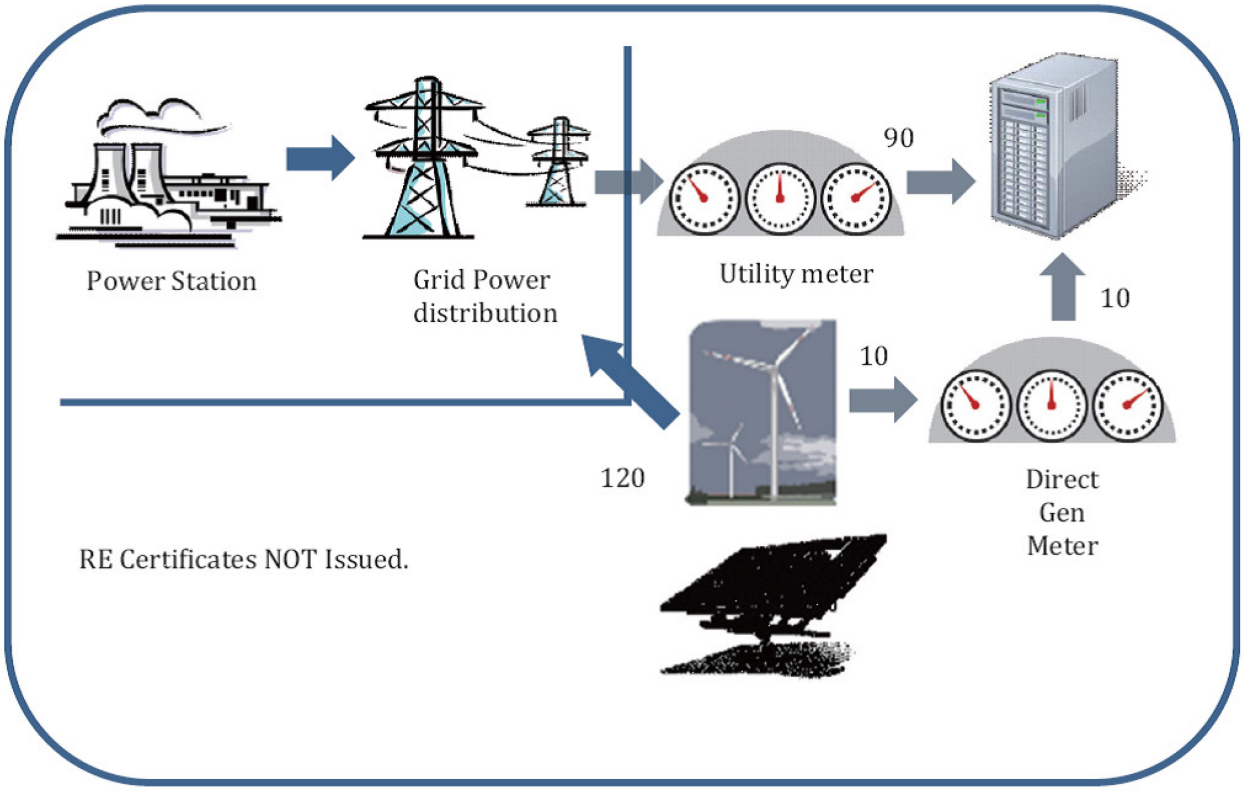

Figure B.5 — Case of on-site RE generation exceeding the data centre's consumption

Annex C
(informative)

Renewable Energy Factor calculation as a summation of the usage of renewable energy in different time intervals

While REF shall be an annualized value, energy supplier(s) could provide renewable energy (RE) portion of the grid power in different time intervals. Therefore, REF could be calculated as a summation of the usage of RE in different time intervals from energy supplier(s), as expressed in Formula (C.1). The summation of the time intervals should be one year, then the formula will yield the same result as Formula (1).

$$\mathrm{REF} = \frac{\sum_{i=1}^{n}\left(E_{\text{DC grid-used i}} \cdot \frac{E_{\text{reni}}}{E_{\text{tot i}}} + E_{\text{DC ren onsite i}} + E_{\text{DC ren cert i}}\right)}{\sum_{i=1}^{n} E_{\text{DC i}}} \qquad \text{(C.1)}$$

where:

$E_{\text{DC grid-used i}}$ is the energy provided from the grid and consumed in a data centre during the period of time *i* (kWh);

$E_{\text{ren i}}$ / $E_{\text{tot i}}$ is the RE portion of the grid power (provided by the energy supplier) in the period of time *I*;

$E_{\text{DC ren onsite i}}$ is the RE generated on-site and consumed in the data centre in the period of time *i* (kWh);

$E_{\text{DC ren cert i}}$ is the RE obtained by procurement of RE certificates and retired in the data centre in the period of time *i* (kWh);

$E_{\text{DC i}}$ is the total data centre energy consumption in the period of time *i* (kWh);

n is the number of intervals.

The time interval considered for each period will depend on the degree of granularity, with which the energy supplier can provide data on the RE portion from the grid (hourly, monthly, etc.). The level of granularity will normally depend on the agreements established by energy supplier(s) for informing their customers.

Bibliography

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*

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

EN ISO/IEC 13273-2:2016, *Energy efficiency and renewable energy sources - Common international terminology - Part 2: Renewable energy sources (ISO/IEC 13273-2:2015)*