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Information technology — Data centres — Key performance indicators —

Part 3: Renewable energy factor (REF)

Technologies de l'information — Centres de données — Indicateurs de performance clés —

Partie 3: Facteur d'énergie renouvelable (REF)

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/JTC 1, *Information technology*, Subcommittee SC 39, *Sustainability for and by Information Technology*.

ISO/IEC 30134 consists of the following parts, under general title *Information technology — Data centres — Key performance indicators*:

— *Part 1: Overview and general requirements*

— *Part 2: Power usage effectiveness (PUE)*

— *Part 3: Renewable energy factor (REF)*

The following parts are under preparation:

— *Part 4: IT equipment energy efficiency for servers (ITEEsv)*

— *Part 5: IT equipment utilization for servers (ITEUsv)*

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Introduction

The global economy is now reliant on information and communication technologies and the associated generation, transmission, dissemination, computation and storage of digital data. All markets have experienced exponential growth in that data, for social, educational and business sectors and, while the internet backbone carries the traffic, there are a wide variety of data centres at nodes and hubs within both private enterprise and shared/collocation facilities.

The historical data generation growth rate exceeds the capacity growth rate of the information and communications technology hardware and, with less than half (in 2014) of the world's population having access to an internet connection, that growth in data can only accelerate. In addition, with many governments having "digital agendas" to provide both citizens and businesses with ever-faster broadband access, the very increase in network speed and capacity will, by itself, generate ever more usage (Jevons Paradox). Data generation and the consequential increase in data manipulation and storage are directly linked to increasing power consumption.

With this background, it is clear that 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 (KPIs) that cover the effective use of resources (including but not limited to energy) and the reduction of CO_2 emissions essential.

Within the ISO/IEC 30134 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 determine the overall resource effectiveness or efficiency of a data centre, a holistic suite of metrics is required. This part of ISO/IEC 30134 specifies the renewable energy factor (REF) which provides a quantitative metric for the actual use of renewable energy (RE) in the form of electricity in a data centre.

NOTE This part of ISO/IEC 30134 adopts the ISO/IEC definition of RE but defers to the definition that apply within local jurisdiction(s).

The use of and the demand for RE became increasingly popular as it reduces or replaces the use of non-RE sources. In many countries, legislation promotes the use of RE and gives incentives in order to increase the diversity of energy dependence and improve social sustainability. In several countries, governments have targets for the use of RE and/or companies have a target for the use of RE among all electricity consumed. The use of RE 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.

The use of REF as a key performance indicator (KPI) 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 RE to their national or corporate targets.

This part of ISO/IEC 30134 is part of a series of International Standards for such KPIs and has been produced in accordance with ISO/IEC 30134-1, which defines common requirements for a holistic suite of KPIs for data centre resource usage effectiveness or efficiency.

The ISO/IEC 30134 series do not specify limits or targets for any KPI and do 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.

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Information technology — Data centres — Key performance indicators —

Part 3: Renewable energy factor (REF)

1 Scope

This part of ISO/IEC 30134

a) defines the renewable energy factor (REF) of a data centre,

b) specifies a methodology to calculate and to present the REF, and

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.

ISO/IEC 30134-1, *Information technology — Data centres — Key performance indicators — Part 1: Overview and general requirements*

3 Terms, definitions, abbreviated terms and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 30134-1 and the following apply.

3.1.1
renewable energy
RE
energy obtained from a *renewable energy source* (3.1.4)

[SOURCE: ISO/IEC 13273-2:2015, 3.1.6, modified]

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

3.1.2
renewable energy certificate
RE 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* (3.1.4)

3.1.3
renewable energy factor
REF
ratio of the *renewable energy* (3.1.1) owned and controlled by a data centre to the total data centre energy consumption

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3.1.4
renewable energy source
RE source
energy source not depleted by extraction as it is naturally replenished at a rate faster than it is extracted

[SOURCE: ISO/IEC 13273-2:2015, 3.1.5, modified]

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 source as renewable can differ among jurisdictions, based on local environmental or other reasons.

3.1.5
total data centre energy consumption
total 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.

3.2 Abbreviated terms

For the purposes of this document, the abbreviated terms given in ISO/IEC 30134-1 and the following apply.

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 (annual) in kWh owned and controlled by a data centre

4 Relevance of renewable energy factor (REF)

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 carbon emission that 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 the use of RE.

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