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**AMENDMENT 1**  
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**Information technology — Data  
centres — Key performance  
indicators —**

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

**AMENDMENT 1**

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

*Partie 2: Efficacité dans l'utilisation de la puissance (PUE)*

*AMENDEMENT 1*



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# Information technology — Data centres — Key performance indicators —

## Part 2: Power usage effectiveness (PUE)

### AMENDMENT 1

Page 3

In Clause 5, insert a new subclause “**5.1 General**”, which contains the whole of existing Clause 5.

Page 4

Insert two new subclauses 5.2 and 5.3 as follows:

#### **5.2 Total data centre energy consumption**

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

The following forms of energy shall 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 to 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 PUE 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 and no local regulation applies, the following values shall be applied:

— diesel:	9,9 kWh/l;
— gas:	10,5 kWh/m <sup>3</sup> ;
— 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  $X$  of the system used to provide the fluid used.

For the conversion of thermal energy to its electrical equivalent, the conversion factor  $X$  shall be obtained from the supplier; in case there is no equivalent available, a conversion factor  $X = 0,4$  shall be used.

Technical subsystems, e.g. on-site co-generation of heat and electricity, shall have meters at their output and are considered external 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 PUE should be counteracted by implementing the necessary meters for separation.

Page 5, 6.2.3

Amend text in 6.2.3 to read:

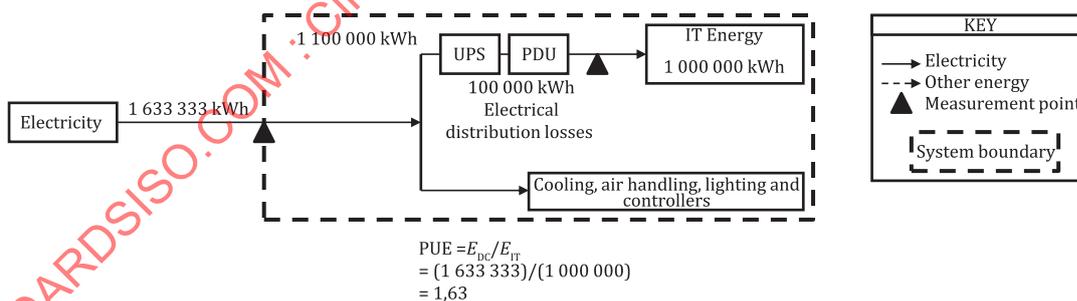
The IT load is measured at the output of the PDUs within the data centre and is typically read from a meter on the PDU output (with or without transformer, the measurement point is then after the transformer).

Page 11

Make Annex B informative, delete subclause B.1 and replace subclauses B.2 to B.4 with the following:

**B.1 Examples of PUE calculation with various energy supplies**

Figures B.1 to B.4 show examples of PUE calculation with various energy supplies.



**Figure B.1 — Example for a data centre purchasing all electricity**

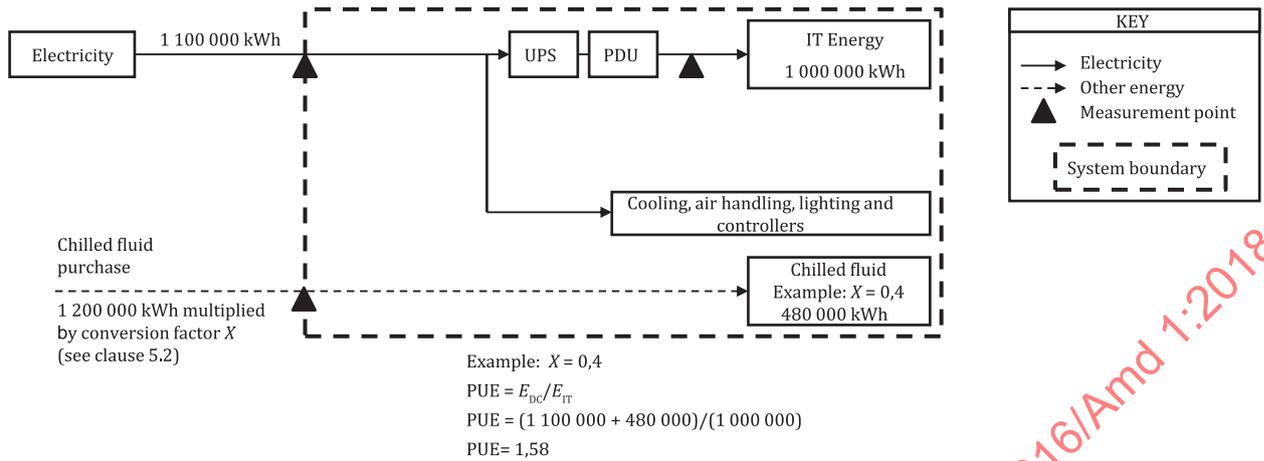


Figure B.2 — Example for a data centre purchasing electricity and chilled water

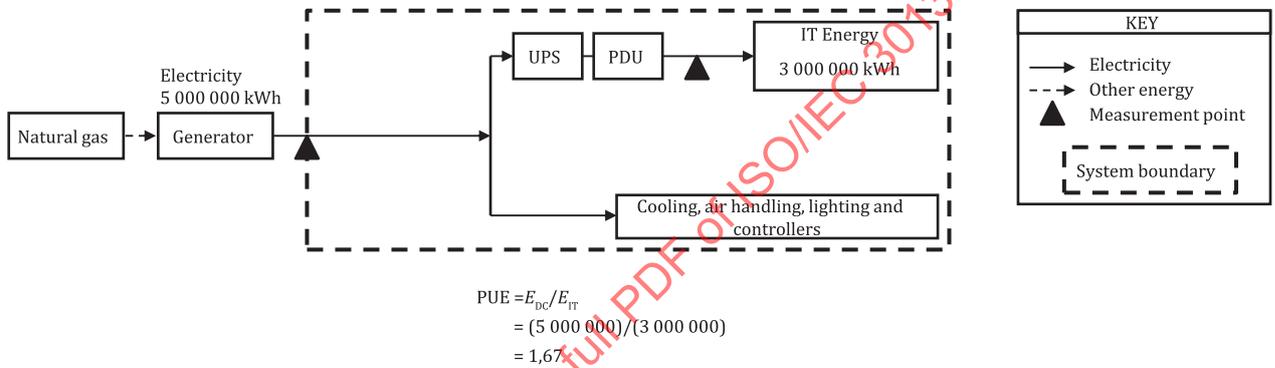


Figure B.3 — Example for a data centre purchasing natural gas

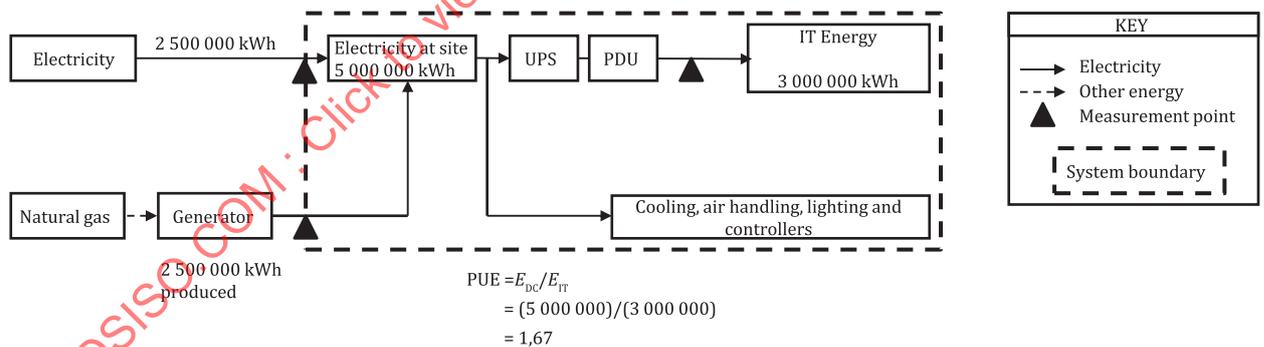


Figure B.4 — Example for a data centre purchasing electricity and natural gas

**B.2 Example of PUE calculation with cogeneration using electricity and natural gas**

Figure B.5 shows an example of PUE calculation with cogeneration using electricity and natural gas.

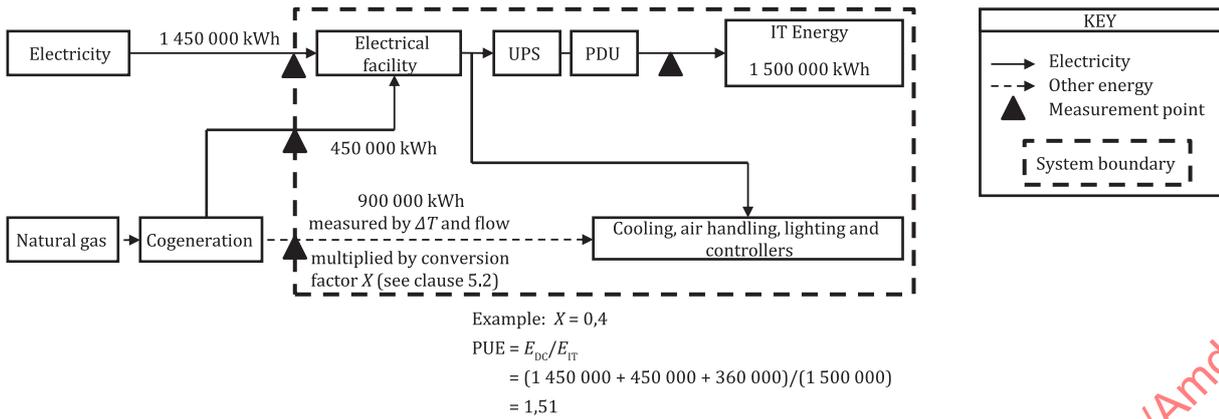


Figure B.5 — PUE calculation with cogeneration using electricity and natural gas

B.3 Examples of PUE calculation with absorption type chiller

Figures B.6 and B.7 show examples of PUE calculation with absorption type refrigerator.

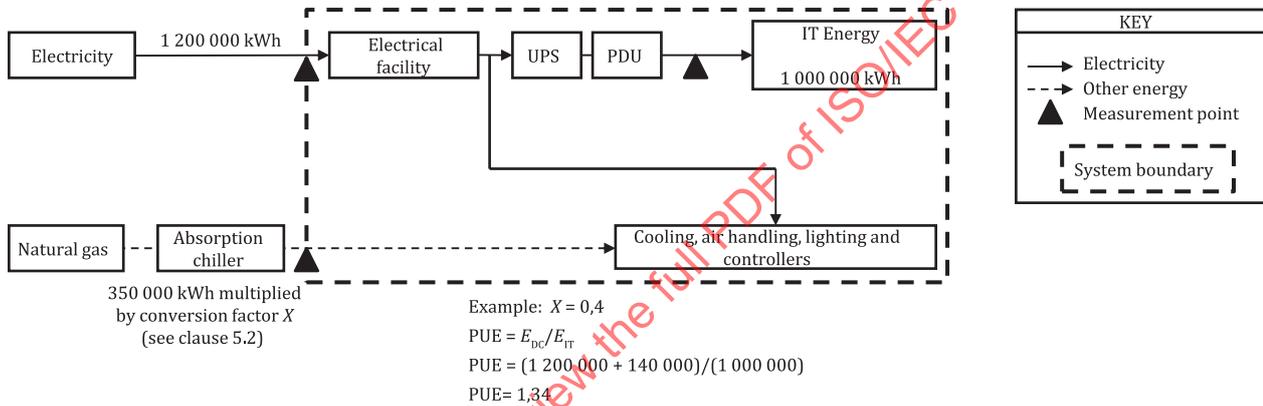


Figure B.6 — Method 1: Measured by chilled water flow

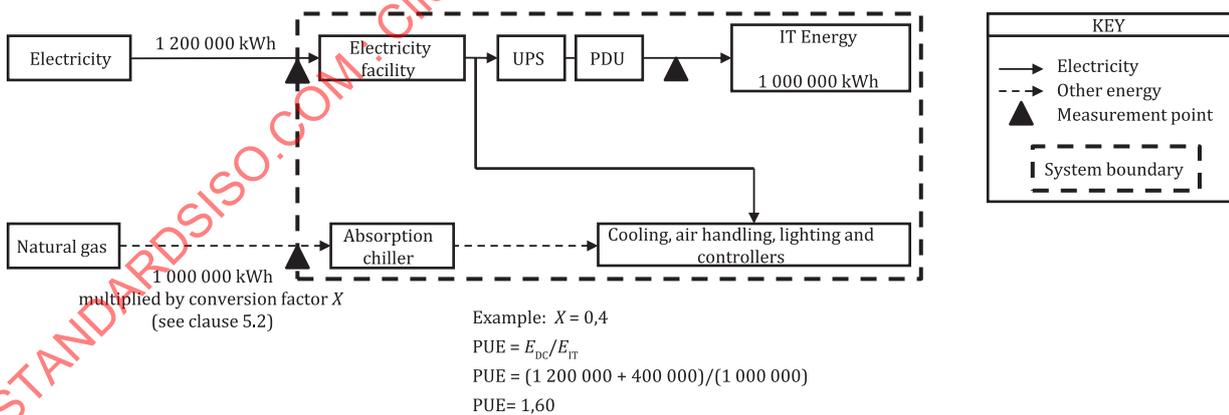


Figure B.7 — Method 2: Measured by input gas