



Environment and Spatial Planning  
*Ministry of Housing, Spatial Planning and  
the Environment*

Criteria for the Sustainable Public Procurement of  
**Networks/Infrastructure, Telephone  
Services & Telephone Equipment**

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# 1 Introduction

The Dutch government wants to take concrete steps towards a sustainable society, and to set a good example. Each year, government organisations spend more than EUR 50 billion on the purchase of Supplies, Services and Public works. By purchasing sustainably, the government can significantly boost the market for Sustainable Public Products. Governmental authorities have set clear objectives to achieve this: the central government is aiming for 100% Sustainable Public Procurement in 2010, while the municipalities aspire towards 75% in 2010 and 100% in 2015. Provincial governments and water boards have set themselves the target of at least 50% in 2010. 100% Sustainable Public Procurement is understood to mean that all purchases meet the minimum requirements that have been set for the relevant product groups at the time of purchase. More information on this topic is available from the website Sustainable Procurement ([www.agentschapnl.nl/sustainableprocurement](http://www.agentschapnl.nl/sustainableprocurement)).

NL Agency supports government authorities in various ways to help reach these objectives. These include developing criteria for Supplies, Services and Public works procured by these authorities. This document focuses on the criteria for Networks/Infrastructure. Telephone Services & Telephone Equipment, the elaboration of the criteria in specification texts and a more detailed assessment of the criteria, as well as a number of points for attention in the pre- and post-procurement stages. Additional background information and considerations regarding the content of the criteria can be found in the criteria document on the website Sustainable Procurement [www.agentschapnl.nl/duurzaaminkopen/criteria](http://www.agentschapnl.nl/duurzaaminkopen/criteria), available in Dutch only.

## 1.1 Definition of the product group

This document deals with three ICT-related product groups at the same time. These product groups are interrelated in a way that is subject to continuous change. First of all, it is currently possible to digitise all electronic functions (equipment and software). Second, due to the increasing availability of electronic connections and the broadband transmission capacity of networks and infrastructure, it is possible to remove, relocate and share functions from existing equipment. For these reasons it was decided to create a consolidated criteria document. This document deals with three product groups:

- Networks/Infrastructure;
- Telephone Equipment;
- Telephone Services.

For the benefit of the contracting authority, a number of CPV codes that might be of relevance to these product groups has been included in the explanatory notes for these product groups below. This selection is by no means exhaustive or complete. The contracting authority retains responsibility for compiling the correct set of CPV codes that matches the relevant tender.

### **Explanatory Notes for Networks/Infrastructure**

A network provides the connection(s) between the various devices within an organisation and/or external to the organisation. The possible connections, types of connections and the underlying technologies are highly diverse and have undergone tremendous transformation in recent years. It is not within the scope of developing criteria to include a complete description of all these developments. The essence is that the Networks/Infrastructure product group is concerned with the management of various network-related services.

The traditional distinction between the internal network (Local Area Network (LAN)) and the external world (Wide Area Network (WAN)) is blurring. The Virtual Local Area Network (VLAN)<sup>1</sup> that from the perspective of the user behaves like a LAN, but that does not have to be physically located in the same area illustrates this point. It is becoming a more frequent occurrence for complete business applications to be no longer located within the office building, but instead be accommodated within the data centres of suppliers specifically equipped for this purpose ('Providers'). The link between the workplace and the data centre is then provided via high-speed internet connections. A well-known form of this type of setup is 'server-based computing': the application is executed on a central computer and the user accesses this application via the internet. Theoretically, this makes it possible to log into the system from any location anywhere in the world. Other examples include web hosting, storage, e-mail processing and back-up facilities.

The criteria are therefore focused on the infrastructure, including the required equipment, to the extent that procurement is able to influence this. The criteria therefore cover:

- Network services that make use of data centres<sup>2</sup>. A distinction is made between housing and hosting. Housing concerns the building (site, building shell) with equipment such as climate control systems and power supply systems, including UPS. Hosting concerns the housing including the ICT equipment (servers, data storage). Criteria have been developed for housing as well as hosting. These are further explained in Chapter 2 of the Dutch language document. Examples of relevant CPV codes include:

72250000 System and support services

72310000 Data-processing services

72510000 Computer-related management services

72590000 Computer-related professional services

72700000 Computer network services

- Network Equipment includes: servers, hubs, switches and routers, and broadband equipment. This equipment is located within as well as outside data centres. These products are available in various forms. Their size is often determined on the basis of the number of connections. The physical implementation of smaller pieces of equipment generally consists of a casing containing one or more printed circuit boards, electronics, power supply and connections. Equipment with many connections is often implemented in the form of a 'rack system'. This makes the equipment easy to mount (slide in) into a metal frame referred to as a 'rack'. Broadband equipment is network equipment that makes high-speed transmission services (144 kb/s or more) possible<sup>3</sup>. Criteria have been developed for a portion of this equipment. This is further explained in Chapter 2 of the Dutch language document. Relevant CPV codes are:

32400000 Networks

This document does not deal with cabling, repeaters and all other equipment that is not specifically mentioned.

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<sup>1</sup> A VLAN consists of a group of user/network stations and switches that physically can be incorporated into one or more networks, but that logically nevertheless form a single common LAN. VLANs are generally used to limit access to portions of the network, separately from the physical topology of the network.

<sup>2</sup> One definition of a data centre is (NEN 2008): a building whose primary function is to house one or more computer rooms and provide the associated facilities. A computer room is a room within a building whose primary function is to house equipment for storing data and/or processing data and/or exchanging data with equipment outside this room. A similar definition is contained in European Commission (JRC 2008): the term "data centres" includes all buildings, facilities, offices and rooms which contain enterprise servers, server communication equipment, cooling equipment and power equipment, and provide some form of data service e.g. large scale mission critical facilities all the way down to small server rooms located in office buildings.

<sup>3</sup> This concerns equipment located within the DSLAM (Digital Subscriber Line Access Multiplexer): DSL ports (e.g., ADSL, VDSL) and combined ports (e.g., MSAN, POTS+ADSL).

## Explanatory Notes for Telephone Equipment

The supply of Telephone Equipment is part of the CPV code 32500000 Telecommunications equipment and supplies group. This includes mobile phones and landline phones, wireless as well as corded and analogue as well as IP-based. Criteria have been developed for wireless landline phones (32552110). No criteria have been developed for mobile phones and other landline phones. This is further explained in Chapter 2 of the Dutch language document.

## Explanatory Notes for Telephone Services (landline and mobile)

Access to telephony and mobile data facilities is procured as a service. CPV code 64200000 Telecommunications Services. No criteria have been developed for this purpose. The relevant considerations are further explained in Chapter 2 of the Dutch language document.

## Relationship with other product groups

The product groups are related to the following product groups. Criteria already have been or will be developed for these product groups as part of separate initiatives.

- hardware (PCs, monitors);
- office equipment (imaging equipment, copiers, printers, fax machines, scanners);
- software;
- buildings;
- cables and pipelines.

## Summary Table

The table below summarises the product groups for which criteria have been developed using selected key words. These criteria are reflected in the next chapter and are explained in Chapter 2 of the Dutch language document.

Product Group and CPV Codes	Suitability Requirements	Selection Criteria	Minimum Requirements	Award Criteria	Contract Provisions
Networks/Infrastructure: Equipment (3240)			Energy Star for UPS <sup>4</sup> Code of Conduct for broadband equipment.	Used or refurbished equipment.	
Networks/Infrastructure: <b>Housing</b> services (7225, 7231, 7251, 7259, 7270)	DCiE	DCiE <sup>5</sup>			Bonus when improvements to the DCiE are realised.
Networks/Infrastructure: <b>Hosting</b> services (7225, 7231, 7251, 7259, 7270)					Reporting of power consumption.
Telephone Equipment (3250)			Energy Star for wireless phones (32552110)	Used or refurbished equipment.	
Telephone Services (6420)	No criteria.				

<sup>4</sup> UPS: Uninterruptible Power Supply, a piece of equipment that during a power outage is able to take over the supply of power to computers and other equipment for a short period of time.

<sup>5</sup> The Data Centre infrastructure Efficiency (DCiE) reflects the relationship between the power consumed by IT equipment in the data centre and the total power consumed, including the associated facilities.

## 2 Sustainability in the procurement process

The criteria in this document have been classified in the various steps of the public procurement process. More information about these steps and how to combine them with sustainability can be found in the Sustainable Public Procurement Manual. This manual can be downloaded from the website Sustainable Procurement [www.agentschapnl.nl/sustainableprocurement](http://www.agentschapnl.nl/sustainableprocurement).

### 2.1 Preparatory stage (points for consideration)

Every purchase or call for tender starts with drawing up the inventory of the needs of the internal or external customer. Sustainability can be incorporated into this stage by considering whether the purchase is truly necessary and whether a more sustainable alternative might be available. Specific points for consideration regarding procurement for the Networks/Infrastructure, Telephone Services and Telephone Equipment product group are<sup>6</sup>:

- Consider measures designed to ensure that the need for data storage and data traffic is reduced.
- Assess the required reliability and availability of data communications. For non-critical applications, a reduced level of reliability may be sufficient. This can be combined with reduced power consumption.
- Consider the best practices in 'Energy savings in datahotels' (ECN 2008) or the Code of Conduct (European Commission JRC 2008). These cover the following subject areas: cooling, electrical power supply (including UPS), the building, other installations, management and use of the data centre, ICT equipment and the monitoring of power consumption.
- In terms of the analysis and monitoring of the total power consumption, it is recommended that the total power consumption be subdivided into components. Some modern equipment includes features for reporting power consumption. This can also be accomplished through means of intelligent Power Distribution Units (PDUs), which are able to read this information. Furthermore, there are all kinds of 'smart plugs' that can easily be placed between the electrical outlet and the equipment's electrical plug. Certain systems exist that can collect consumption data via wireless communications after which it can be analysed using separate software.
- Acquire server equipment that complies with the relevant Energy Star criteria (these are expected in 2010).
- Consider an integral approach to the entire ICT-chain, including the end-users.
- Take steps to ensure the efficient utilisation of hardware (server, storage, network) and shut off components where possible. Utilisation of resources of more than 80% is considered optimal. To date an official utilisation benchmark does not yet exist, however. The key technologies that make efficient hardware utilisation possible are:
  - Virtualisation: the separation of information and software from physical resources. Virtualisation, for example, makes it possible to consolidate multiple processes on the same server, as a result of which it is possible to shut down part(s) of the equipment.

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<sup>6</sup> At the time of developing criteria for this productgroup, criteria for software were also being developed. The result is a list of points for consideration regarding procurement of Software. Many of the points for consideration for software can also be applied for the product groups under consideration here. It is recommended that these points be included for consideration. This document is available in Dutch only. Sustainability criteria for Sustainable Public Procurement of Networks/Infrastructure, Telephone Services & Telephone Equipment version 1.3

- Provisioning/Move technology: the automated and dynamic allocation of physical resources to data and applications / the ability to transfer a data or application workload to another physical resource without any interruptions (cloud computing).
- Power management: the ability to use automated means for managing the power consumption of hardware and to completely or almost completely shut off the hardware.
- Also analyse the use of peripheral equipment. For example, for each piece of equipment, assess whether it is necessary to link it to a UPS.

## 2.2 Specification stage (criteria)

During the specification stage, the needs of the internal or external customer are translated into a tender document. This stage entails the formulation of:

- Criteria for supplier qualification. These could include grounds for exclusion, suitability requirements, i.e. requirements with regard to suppliers, and, in the case of restricted procedures, any selection criteria, i.e. wishes with regard to suppliers.
- A description of the minimum requirements pertaining to supply, service or task (the Schedule of Requirements).
- Award criteria, i.e. wishes regarding Supplies, Services and Public works. These are only applicable when the tendering process is based on the principle of the Most Economically Advantageous Offer ('Economisch Meest Voordelige Inschrijving' or EMVI).
- The contract stipulating the contract provisions.

More information on the various types of criteria and the various tender options can be found in the Sustainable Public Procurement Manual. Innovation is also included in the award criteria, where relevant. Innovation is oriented towards the development and introduction of new ideas and products.

The criteria in this document have been formulated to support the purchaser in the Sustainable Public Procurement of Networks/Infrastructuur, Telephone Services & Telephone Equipment. The criteria have been subjected to legal review. However, every procurement and tender process is unique. For that reason, the drafting of a tender document remains the responsibility of the purchaser.

### 2.2.1 Supplier qualifications

#### Suitability requirements

Networks/Infrastructure: Services – Housing

Suitability requirement no. 1	<p>A data centre that is used for data housing, at least the portion that is used for implementing the contract, must have a yearly average Data Centre infrastructure Efficiency (DCiE) value of at least 50%.</p> <p>The DCiE is the ratio consisting of the annual electricity consumed by the IT equipment divided by the annual electricity consumed by the entire data centre. This number reflects the share of the power consumed by the IT equipment. A higher value means a higher data centre efficiency.</p>
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	<p><u>Means of proof:</u></p> <ol style="list-style-type: none"> <li>1. Self declaration to be included in this tender by the tenderer to confirm compliance with this suitability requirement.</li> <li>2. A report prepared by an independent expert.</li> </ol>
Notes for purchaser	<p><u>Verification of means of proof:</u></p> <ol style="list-style-type: none"> <li>1. Data centre power consumption measurement reports.</li> <li>2. No further verification.</li> </ol>

### Selection criteria

Networks/Infrastructure: Services – Housing

Selection criterion no. 1	<p>To the extent that a data centre that is used for housing data has a yearly weighted Data Centre infrastructure Efficiency (DCiE) value of more than 50%, additional points are awarded in accordance with the following formula:</p> <p>Number of points = (DCiE – 50%) * [x] points</p> <p>The DCiE is the ratio consisting of the annual electricity consumed by the IT equipment divided by the annual electricity consumed by the entire data centre. This number reflects the share of the power consumed by the IT equipment. A higher value means a higher data centre efficiency.</p> <p><u>Means of proof:</u></p> <ol style="list-style-type: none"> <li>1. Self declaration to be included in this tender by the tenderer to confirm compliance with this criterion.</li> <li>2. A report prepared by an independent expert.</li> </ol>
Notes for purchaser	<p><u>Verification of means of proof:</u></p> <ol style="list-style-type: none"> <li>1. Data centre power consumption measurement reports.</li> <li>2. No further verification.</li> </ol> <p>Notes for purchaser: projections based on the ECN 2008 are that the proposed DCiE values will vary between 50% and 90%. This means that tenderers could qualify for 0 to 40 * [x] points.</p> <p>It is recommended that the purchaser assesses whether the higher DCiE affects the pricing.</p>

In addition to the supplier qualification criteria for this specific product group, there are still other opportunities for incorporating sustainability into this component. Additional information on this topic can be found in the Sustainable Procurement Manual.

## 2.2.2 Schedule of requirements

### Minimum requirements

Networks/Infrastructure: Equipment

<p>Minimum requirement no. 1</p>	<p>UPS equipment meets the requirements described in the Code of Conduct on Energy Efficiency and Quality of AC Uninterruptible Power Systems (European Commission, Ispra 2006); hereafter referred to as Code of Conduct on UPS. The relevant requirements are identified in Appendix 2.</p> <p><u>Means of proof:</u></p> <ol style="list-style-type: none"> <li>1. Self declaration to be included in this tender by the tenderer to confirm compliance with this minimum requirement, with references to the manufacturer's technical documentation.</li> <li>2. Manufacturer's technical documentation.</li> </ol>
<p>Notes for purchaser</p>	<p>The Code of Conduct on UPS can be found at:  <a href="http://re.jrc.ec.europa.eu/energyefficiency/html/standby_initiative_UPS.htm">http://re.jrc.ec.europa.eu/energyefficiency/html/standby_initiative_UPS.htm</a>.</p> <p><u>Verification of means of proof:</u></p> <ol style="list-style-type: none"> <li>1. Manufacturer's technical documentation.</li> <li>2. No further verification.</li> </ol>

Networks/Infrastructure: Equipment

<p>Minimum Requirement no. 2</p>	<p>Broadband equipment must meet the requirements as described in Appendix C.2 of the Code of Conduct on Energy Consumption of Broadband Equipment Version 3 (European Commission, 2008). The relevant requirements are identified in Appendix 3.</p> <p><u>Means of proof:</u></p> <ol style="list-style-type: none"> <li>1. Self declaration to be included in this tender by the tenderer to confirm compliance with this minimum requirement, with references to the manufacturer's technical documentation.</li> <li>2. Manufacturer's technical documentation.</li> </ol>
<p>Notes for purchaser</p>	<p>The Code of Conduct on Broadband can be found at:  <a href="http://re.jrc.ec.europa.eu/energyefficiency/html/standby_initiative_broadband%20communication.htm">http://re.jrc.ec.europa.eu/energyefficiency/html/standby_initiative_broadband%20communication.htm</a></p> <p><u>Verification of means of proof:</u></p> <ol style="list-style-type: none"> <li>1. Manufacturer's technical documentation.</li> <li>2. No further verification.</li> </ol>

Telephone Equipment: wireless landline telephones

<p>Minimum Requirement no. 3</p>	<p>Wireless landline telephones must meet the Energy Star criteria as described in Appendix 1.</p> <p><u>means of proof:</u></p> <ol style="list-style-type: none"> <li>1. Self declaration to be included in this tender by the tenderer to confirm compliance with this minimum requirement, with references to the manufacturer’s technical documentation.</li> <li>2. Manufacturer’s technical documentation</li> </ol>
<p>Notes for purchaser</p>	<p><u>Verification of means of proof:</u></p> <ol style="list-style-type: none"> <li>1. Manufacturer’s technical documentation.</li> <li>2. No further verification</li> </ol>

### 2.2.3 Award criteria

#### Award criteria

Networks/Infrastructure: Equipment and Telephone Equipment

<p>Award criterion no.1</p>	<p>For that portion of the equipment to be supplied, measured in terms of sales value, that consists of used or refurbished equipment with a power consumption equal to or lower than new equipment, a maximum of [x] points will be assigned to this component of the tender on the basis of the following approach:</p> <p>Number of points = proposed portion * [x] points</p> <p>The sales value consists of the price established in the contract multiplied by the number of units purchased by the contracting authority.</p> <p>Refurbished equipment consists of equipment subjected to a major aesthetic or functional maintenance or minor repairs as a result of which it meets the original specifications.</p> <p><u>Means of proof:</u></p> <ol style="list-style-type: none"> <li>1. Description to be included in this tender by the tenderer to confirm the extent of compliance with this criterion.</li> <li>2. Manufacturer’s technical documentation.</li> </ol>
<p>Notes for purchaser</p>	<p><u>Verification of means of proof:</u></p> <ol style="list-style-type: none"> <li>1. Manufacturer’s technical documentation.</li> <li>2. No further verification.</li> </ol>

## 2.2.4 Contract

### Contract provisions

Networks/Infrastructure: Services – Hosting

Contract Provision no. 1	The data hosting provider quarterly (or in accordance with a higher frequency mutually agreed upon) reports the electricity consumed by the equipment involved in the execution of the contract, to the contracting authority. Consumption is specified in terms of hourly
Notes for purchaser	<p>This provision is designed to provide the contracting authority with insight into the possibilities of influencing the power consumed by the ICT activities.</p> <p>It is recommended that the purchaser specify the reporting format in mutual consultation, depending on what the contracting authority can and wants to do with the data. Some providers have access to a software platform for this purpose</p>

Networks/Infrastructure: Services – Housing

Contract Provision no. 2	<p>If during any one contracting year, an improvement in the DCiE is realised in relation to the DCiE at the outset of the contract, then the provider is entitled to a bonus for the next contracting period in accordance with the following formula:</p> <p>Bonus (in €) = {DCiE(improved) – DCiE(outset of contract)} * [x]</p> <p>Improvements in the DCiE must be supported by a report prepared by an independent expert.</p> <p>The DCiE is the ratio consisting of the annual electricity consumed by the IT equipment divided by the annual electricity consumed by the entire data centre. This number reflects the share of the power consumed by the IT equipment. A higher value means a higher data centre efficiency.</p>
Notes for purchaser	<p>This provision encourages the tenderer to improve the annual weighted Data Centre Infrastructure Efficiency (DCiE). To qualify for this bonus, the DCiE at the outset of the contract must be established. Depending on the nature of the service, the representative contract period for the bonus must be established.</p> <p>Information such as the monitoring data collected in the context of participation in the Long-term Agreement on Energy Efficiency (MJA) or the Code of Conduct can serve as the expert's report.</p> <p>Based on ECN (2008) and the minimum DCiE requirement, it is expected that the proposed DCiE will vary between 50% and 90%, so that the theoretical maximum improvement that can be achieved is 40%. If, for example, 1,000 is chosen as the value 'x'. then an improvement of 40% in the DCiE as described above yields a bonus of € 400.</p>

## **2.3 Utilisation stage (points for consideration)**

Once the procurement stage has been concluded and a product or service has been purchased, there are opportunities for using the product in a sustainable manner. Specific points for consideration for this product group are the same as the points for consideration identified for the Preparatory Stage.

## Appendix 1 Criteria for ENERGY STAR Qualified Telephony

Product Category*	Version 1.0 Standby Mode Requirements Effective January 1, 2002 – October 31, 2006	Version 2.0 Requirements Effective November 1, 2006
• Additional Handset	≤ 1.5 watts	≤ 1 watt
• Answering Machine • Cordless Telephone • Multi-Handset Cordless Telephone	≤ 3.3watts	≤ 2 watts
• Answering Machine with SST • Cordless Telephone with SST • Multi-Handset Cordless Telephone with SST	≤ 3.6 watts	≤ 2 watts
• Combination Cordless Telephone/Answering Machine • Multi-Handset Combination Cordless Telephone/Answering Machine	≤ 4.0 watts	≤ 2.5 watts
• Combination Cordless Telephone/ Answering Machine with SST • Multi-Handset Combination Cordless Telephone/Answering Machine with SST	≤ 5.1 watts	≤ 2.5 watts

## Appendix 2 Criteria for Energy Star-UPS-equipment

For UPS double conversion in the basic configuration with the classification "VFI – S..." (See EN 62040-3 Ed. 1.0 b: 1999 for the definition of the classification). from 1-1-2008 to 31-12-2009 Normal mode Minimum efficiency measured according to EN 62040-3 Annex AA

Mode	UPS range: $\geq 10 - < 20$ kVA	UPS range: $\geq 20 - < 40$ kVA	UPS range: $\geq 40 - < 200$ kVA	UPS range: $\geq 200$ kVA
25 % of nominal power	83 %	84 %	86.5 %	89 %
50 % of nominal power	89 %	89.5 %	90.5 %	92 %
75 % of nominal power	90.5 %	91 %	92 %	93 %
100 % of nominal power	91 %	91.5 %	92 %	93 %

2. For all VI and VFI UPS, except "VFI – S..." (See EN 62040-3 Ed. 1.0 b: 1999 for the definition of the classification) from 1-1-2008 to 31-12-2009

Mode	UPS range: $\geq 10 - < 20$ kVA	UPS range: $\geq 20 - < 40$ kVA	UPS range: $\geq 40 - < 200$ kVA	UPS range: $\geq 200$ kVA
25 % of nominal power	88 %	88.5 %	89 %	91.5 %
50 % of nominal power	92 %	92.5 %	93 %	94.5 %
75 % of nominal power	92.5 %	93 %	93.5 %	94.5 %
100 % of nominal power	92.5 %	93 %	93.5 %	94.5 %

For all VFD UPS (see EN 62040-3 Ed. 1.0 b: 1999 for the definition of the classification) from 1-1-2008 to 31-12-2009 Normal mode Minimum efficiency measured according to EN 62040-3 Annex AA

Mode	UPS range: $\geq 10 - < 20$ kVA	UPS range: $\geq 20 - < 40$ kVA	UPS range: $\geq 40 - < 200$ kVA	UPS range: $\geq 200$ kVA
25 % of nominal power	93 %	93.5 %	94 %	95 %
50 % of nominal power	95 %	95.5 %	96 %	97 %
75 % of nominal power	95.7 %	96.3 %	96.7 %	97.7 %
100 % of nominal power	96 %	96.5 %	97 %	98 %

Additional devices: For additional components that may be added on to the equipment in the basic configuration, the following additional maximum losses per device are allowed. Additional isolation transformer connected at the inlet or outlet in the normal power path (no stand-by connection on the bypass line) Maximum losses per transformer, Normal mode Load according to EN 62040-3 Annex AA

Mode	$\geq 10 - < 40$ kVA	$\geq 40 - < 200$ kVA	$\geq 200 - 500$ kVA	$> 500$ kVA
25 % of nominal transformer power	1.5 %	1.0 %	0.7 %	0.5%

50 % of nominal transformer power	1.9 %	1.5 %	1.1 %	0.7%
75 % of nominal transformer power	2.6 %	2.0 %	1.7 %	1.3%
100 % of nominal transformer power	3.6 %	3.2 %	2.7 %	2.0 %

Additional device to reach harmonic currents at the input better than defined in IEC 61000-2-2, 61000-3-2 and 61000-3-12 The measured losses of this device, which can be deducted from the system losses, shall not exceed the following values per device Normal mode, Load according to EN 62040-3 Annex AA

25%	0.6%
50%	1.0%
75%	1.6%
100%	2.5%

## Appendix 3 Code of Conduct-criteria Broadband Equipment

*This annex describes the criteria of European Commission (2008), Code of Conduct on Energy Consumption of Broadband Equipment Version 3, annex C.2 Network equipment*

The following targets are power consumption targets per port.

a) All power values measured at the "A" interface as described in the standard ETSI 102 533 [8] or at the AC input, in case of directly mains powered systems. For directly mains powered systems, the power limits stated in Table 14 through Table 20, will be increased by 10%.

b) The stated target figures apply for equipment operating in their native modes only. In other words, the targets for ADSL2+ equipment apply for equipment that are designed to operate natively in ADSL2+ mode and not VDSL2 equipment operating in ADSL2+ Fallback mode.

### C.2.1 Broadband DSL Network equipment

Table 14: Broadband ports – DSL-full-power-state

Equipment	Tier 2009-2010 (1.1.2009- 31.12.2010) (W)	Tier 2011 1.1.2011- 31.12.2011) (W)
ADSL 2+ (including ADSL and ADSL2 and with transmission power of 19,8 dBm)	1,3	1,2
VDSL2 (profile 8b)	2,0	1,8
VDSL2 (profile 12a and 17a)	1,8	1,6
VDSL2 (profile 30a)	2,5	2,0

The above values are for fully equipped with maximum configuration DSLAMs with more than 100 ports. For equipment up to 100 ports (and with maximum configuration) 0,3 W per line may be added to the above values, with a minimum value of 10 W for the whole DSLAM. The additional allowance for the uplink interface (which is applicable for all Power States (Full, Low & Standby) is:

- 4,5W per equipment for each Point to Point 1000Mbit/s interface
- 18W per equipment for each Point to Point 10Gbit/s interface
- 6W per equipment for each Point to Multipoint (GPON) interface

Table 15: Broadband ports – DSL-low power state

Equipment	Tier 2009-2010 (1.1.2009- 31.12.2010) (W)	Tier 2011 (1.1.2011- 31.12.2011) (W)
ADSL 2+ (including ADSL2)	1,1	0,8
VDSL2	--	1,2

Start-up/Wake-up times from DSL-low-power-state to DSL-full-power-state should be less than 1 second to guarantee a good quality of service (e.g. voice calls).

Table 16: Broadband ports – DSL-standby-state

Equipment	Tier 2009-2010 (1.1.2009- 31.12.2010) (W)	Tier 2011 (1.1.2011- 31.12.2011) (W))
ADSL 2+ (including ADSL and ADSL2)	0,4	0,4
VDSL2	0,8	0,6

The above values for DSL-low-power- and -standby-states are for fully equipped with maximum configuration for DSLAMs with more than 100 ports. For equipment up to 100 ports (and with maximum configuration) 0,3W per line may be added to the above values for the whole DSLAM, with a minimum value of 10W

Start-up/Wake-up times from DSL-standby-state to DSL Full Power-state should be less than 1 second to guarantee a good quality of service (e.g. voice calls).

To minimize cost/dimensions/power consumption, the network equipments contain chips that control multiple DSL lines (4-8-16) each. If special care is not taken, a single line in DSLfull-power-state could result in a chip fully operational on the other lines also (in Low power or Standby), resulting in an unnecessary waste of energy. The network systems (and their basic components) shall therefore be designed in order to tackle this issue, maximizing the energy savings also in mixed environments with lines in different power states, being this the typical situation found in the network.

### C.2.2 Combined DSL/Narrowband Network equipment

Power consumption limits for POTS interface implementation into an MSAN are defined in Table 17. The values defined apply to a testing condition where the line length is assumed to be 3km of 0,5mm gauge copper which equates to a loop resistance of approximately 510  $\Omega$ , and CPE termination resistance is assumed to be zero. It is further assumed that power consumed by MSAN functionality which is common to both Broadband and POTS is split appropriately across the two functions.

Table 17: Per-port MSAN POTS power consumption limits

Port State	40mA line feed (W)	32mA line feed (W)	25mA line feed (W)
Not provisioned for POTS	0,7	0,7	0,7
Provisioned for POTS-on-hook	0,7	0,7	0,7
Provisioned for POTS-off-hook	3,2	2,8	2,5

### C.2.3 Optical Line Terminations (OLT) for PON- and PtP-networks

Table 18: Optical Line Terminations

Equipment	Tier 2009 (01.01.09) (W)	Tier 2010 (01.01.2010) (W)	Tier 2011 (01.01.2011) (W)
OLT (GPON, fully equipped with maximum configuration implementing standard Layer-2 (Ethernet) aggregation	18	15	11

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functionalities, including Multicast)			
OLT (GPON, fully equipped with maximum configuration implementing also functionalities at the IP layer such as routing, MPLS, IP QoS)	20	16,5	12
OLT (Point to Point up to 1000Mbit/s, up to 100 ports, fully equipped with maximum configuration)	5	5	TBD
OLT (Point to Point up to 1000Mbit/s, from 100 and 300 ports, fully equipped with maximum configuration)	4	4	TBD
OLT (Point to Point up to 1000Mbit/s, with more than 300 ports, fully equipped with maximum configuration)	3	3	TBD
OLT (Point to Point at 10Gbit/s, up to 12 ports, fully equipped with maximum configuration)	38	38	TBD
OLT (Point to Point at 10Gbit/s, from 12 to 42 ports, fully equipped with maximum configuration)	28	28	TBD
OLT (Point to Point at 10Gbit/s, with more than 42 ports, fully equipped with maximum configuration)	18	18	TBD

The above values are for fully equipped with maximum configuration OLTs. The additional allowance for the uplink interface is:

- 4,5W per equipment for each Point to Point 1000Mbit/s interface
- 18W per equipment for each Point to Point 10Gbit/s interface
- 6W per equipment for each Point to Multipoint (GPON) interface

The above consumption for GPON OLT is per port and with ClassB+ (ITU-T G.984.2 amd1) optical modules whatever the number of ONU connected to it is. The above consumption for point to point OLT is per user port. The optical budget for the OLT P2P interfaces shall be in line with IEEE802.3 clause 58 for the 100Base-LX10 and 100Base-BX10 interfaces and IEEE802.3 clause 59 for the 1000Base-LX10 and 1000Base-BX10 interfaces. A 5 dB channel insertion loss shall be used

The Pt-Pt 10Gbit/s limits are applicable only to Point to Point at 10Gbit/s, fully equipped with maximum configuration that directly connect to Customer Premises Equipment associated with broadband distribution for residential customers and SOHO.

#### C.2.4 Wireless Broadband network equipment

Table 19: Wireless Broadband network equipment

Equipment	Tier 2009 (01.01.09) (W)	Tier 2010 (01.01.2010) (W)	Tier 2011 (01.01.2011) (W)
Wi-Fi access points (Hotspot application) 802.11b/g/n or 802.11b/g/a – ON state and Active Standby	13	TBD	TBD
Wimax Macro Radio Base Station (3 sectors) – ON state	TBD	TBD	TBD
Wimax Micro Radio Base Station (1 sector)– ON state	TBD	TBD	TBD

### C.2.5 Cable network equipment

Energy saving with this technology has a big importance since cable networks are widely distributed all over Europe.

Table 20: Cable network equipment

Equipment	Tier 2009 (01.01.09) (W)	Tier 2010 (01.01.2010) (W)	Tier 2011 (01.01.2011) (W)
I-CMTS <12 DS (downstream) ports	65	65	65
I-CMTS >12 DS ports	50	50	50
EQAM < 100 DS ports	9	8	8
EQAM 100-300 DS ports	8	7	7
EQAM > 300 DS ports	7	6,5	

I-CMTS = Integrated Cable Modem Termination System

EQAM = Edge Quadrature Amplitude Modulator

The above values are for fully equipped with maximum configuration. The additional allowance for the uplink interface is:

- 4,5W per equipment for each Point to Point 1000Mbit/s interface
- 18W per equipment for each Point to Point 10Gbit/s interface
- 6W per equipment for each Point to Multipoint (GPON) interface

### C.2.6 Powerline network equipment

Access powerline networks have not reached a high importance in Europe yet. When powerline networks will be developed, additional power targets for power line access equipment should be included in this Code of Conduct.

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