

PRODUCT-CATEGORY RULES (PCR)

for preparing an environmental product
declaration (EPD) for

(Asymmetrical Digital Subscriber Line Customer
Premises Equipment)

PCR 2007:7

Environment and Development Foundation

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1. General information

This is a PCR for ADSL CPE (Asymmetrical Digital Subscriber Line Customer Premises Equipment). This PCR is valid for production and use of ADSL CPE modules globally. The requirements of this PCR are intended for EPDs that will be certified according to the requirements of the ISO 14025 EPD system. The document is valid through 2010-07-XX.

This document has been prepared by ZyXEL Co, Ltd. It has been reviewed by interested parties representing major Taiwanese¹ companies of similar products at the Open Consultation Meeting held on 2007-7-24 in Taiwan.

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2. Company and product description

The EPD shall include information about the producing company/organisation. The information can include for example information related to the manufacturing processes and of environmental work such as the existence of an environmental management system. The information might include specific issues that the company/organisation wants to point out; e.g. if the product meets certain environmental criteria, or related information concerning environmental health and safety.

This PCR covers the ADSL CPE (Asymmetrical Digital Subscriber Line Customer Premises Equipment) product. The product includes the packaging.

2.1 Product function

The ADSL is an asymmetrical data transmission technology. The term “asymmetrical” denotes the difference in the upload and download speed. The applications of ADSL CPE may include the provision of digital data service through ADSL modem/router, or added value voice service though ADSL IAD (Integrated Access Device) products. In general, an ADSL IAD includes a quick online ADSL access port, one or more LAN access port, one WLAN port, 2 or more PSTN/ISDN ports, as well as firewall function, in order to crate a fast and secure broadband access environment.

2.2 Product components

The main components of the ADSL CPE are the following:

- main body (including external casing, printed circuit board and relevant electronic components)
- power supply
- network cable; phone cable
- packaging
- user manual
- CD ROM.

¹ Taiwan manufactures over 70% of the global ADSL supplies (Source: [Far-sight magazine, vol. 250](#))

The data quality needs for the main components are given in section 9 on Calculation rules and data quality requirements. The other product components are part of the product and shall be included in the EPD, but the data quality needs for these are different than those of the main components.

2.3 Product technical description

The following information shall be included in the technical description of the product:

- 1 Types, transmission speed and number of ADSL (WAN) access ports
- 2 Types, transmission speed and number of LAN access ports
- 3 Built-in LAN and supporting transmission protocol
- 4 Firewall/bandwidth management
- 5 Internet phone VoIP terminal
- 6 Electricity consumption
- 7 Other information

3. List of materials and chemical substances

The product content of the following materials and substances shall be declared:

- List all materials ≥ 0.5 weight-% in the product;
- List all materials/substances in the product that are submitted to legal requirements and customer demands;
- The following materials shall be declared for the main components: flame retardants, lead in solder; lead and flame-retardants in solder mask; substances that are specified in the RoHS directive (2002/95/EC).

Statements about halogen-free flame retardants, lead-free soldering and RoHS²-free substances may only be used if proper documentation can be provided (such as documented tests by accredited or certified test/inspection facilities). Relevant such accreditation bodies that give accreditation to test facilities are TAF (Taiwan Accreditation Foundation), APLAC (Asia Laboratory Accreditation Cooperation), ILAC (International Laboratory Accreditation Cooperation) or ILAC MRA (ILAC Mutual Recognition Arrangement).

Regarding confirmation of existence of hazardous substances in accordance with definitions in testing standards adopted by various accredited test facilities, please refer to (Draft) IEC 62321.

4. Functional unit

The functional unit is one ADSL CPE unit. This functional unit is chosen since the product is sold by one ADSL CPE unit.

5. System boundaries

² Restriction of the Use of Certain Hazardous Substances

The main system boundaries of the product system are presented in Figure 1 below.

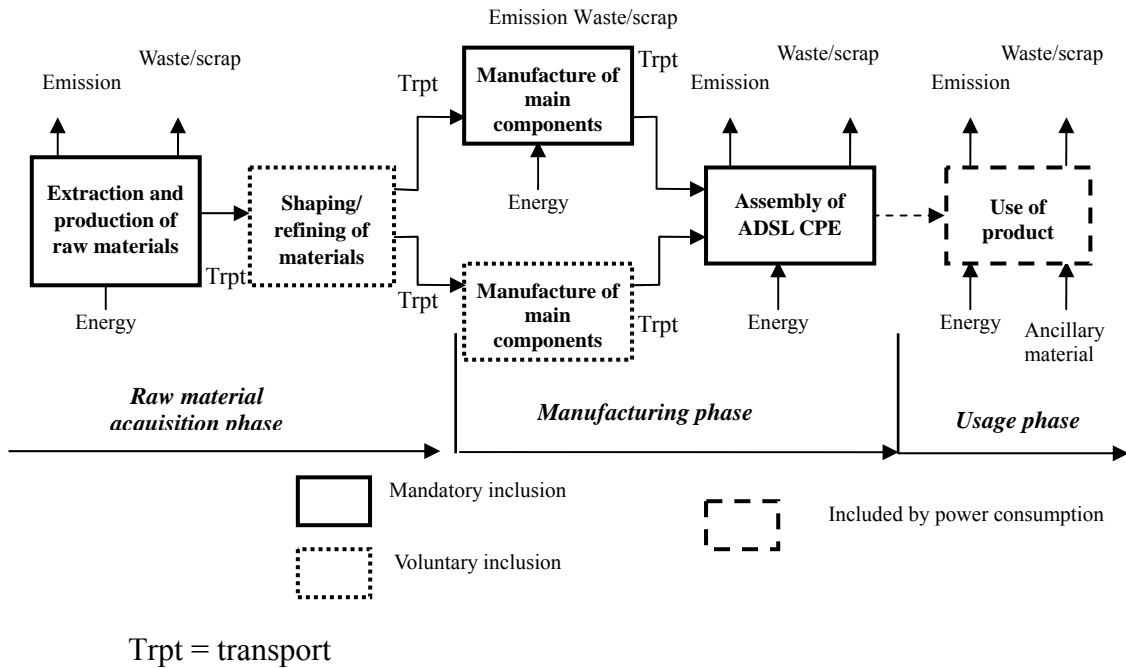


Figure 1. The main product system boundaries.

The life cycle of the ADSL CPE comprises the manufacturing phase and the use phase according to Fig 1. Information about recycling is voluntary (see section 11).

Manufacturing Phase

Information about the following unit processes shall be included in the LCA:

- Extraction and production of the raw materials used for both main components and other small parts
- Manufacturing of main components
- Assembly of product
- Transport of main components to the manufacturer of the product
- Transport of components to the manufacturer of the product

The shaping and refining of the used raw materials and the manufacture of the other small parts are activities that are voluntary to include in the LCA. If voluntary information is included this should be mentioned in the EPD.

Use Phase

If the product is being used at the customer premise, the power consumption at On Mode/Active Power Mode shall be given and shall be confirmed in accordance with the test method applicable in the region where the product is being used, for example, ETSI EN 30019-1-3. If the product is equipped with a main switch, the power consumption by the power supply at the power off mode should be considered. If feasible, the product's energy consumption scenario shall be described.

Recycling/end of life

Recycling information is mandatory to be included in the EPD (for example, the recycling/disassembly report or the recycling channel information).

5.1 Specification of different boundary settings

Boundary in time

Define the time period for which the LCA results are valid in the LCA.

Boundary towards nature

If the manufacturing process is being conducted inside Taiwan, the classification of waste shall be based on Taiwan's Waste Disposal Act. In case of other countries, equivalent laws or regulations should be considered.

The boundaries towards nature shall describe the flow of material and energy resources from nature into the system and emissions from the system to air and water and waste out of the system.

Landfill processes should not be included; only the amount of disposed waste. However, in case of wastewater treatment or incineration, these processes should be included.

Boundaries in the life cycle

The boundaries in the life cycle are illustrated in the flow chart in Figure 1. Building of site, infrastructure, production of manufacturing equipment and personnel activities shall not be included.

Boundaries towards other technical systems

The boundaries towards other technical systems describe the inflow of material and components from other systems and the outflow of material to other systems. For inputs of recycled materials or energy to a product system for the manufacturing phase: the recycling process and the transportation from recycling to the use of the material shall be included in the data set. For outputs of products subject to recycling for the manufacturing phase: the transportation to the recycling process should be included.

(Note: For further clarification – see Chapter 7: Open loop recycling.)

Boundaries regarding geographical coverage

The manufacturing phase can include manufacturing processes anywhere in the globe. The data shall be representative for the region where the process is taking place. For the main components, the data shall be site-specific wherever the process is taking place (see section 9). In order to facilitate comparison, however, the data for life cycle impact assessment shall be the same disregarding where the emissions take place (see section 10).

6. Cut-off rules

Processes/activities that altogether do not contribute to more than 1% of the total environmental impact for any impact category are allowed to be omitted from the inventory analysis. Parts and materials not included in the LCA shall be documented.

(Note: The “1%-rule” can be based on the inflow of materials to the system provided no exceptional environmental concerns exist. This has to be based on an assessment of the environmental relevance.)

7. Allocation rules

When choosing allocation rules the following principles are recommended:

- Multi-output**: allocation based on the way in which resource use and pollutant emissions change following quantitative modifications in products or functions delivered by the system being studied or on economic relations (this can e.g. for some main components lead to allocation by number (or, for some parts, by surface))
- Multi-input**: allocation based on physical causal relationships; i.e. relationship between how the pollutant emission from the process is affected by changes in the incoming waste flows
- Open loop recycling**: For inputs of recycled materials or energy to a product system for the manufacturing phase: the recycling process and the transportation from recycling to the use of the material shall be included in the data set. For outputs of products subject to recycling for the manufacturing phase: the transportation to the recycling process should be included.

(Note:

- The main “EPD-rule” is that the allocation should be valid for the whole product system. However, other allocation rules may be defined for selected sub-processes, which have to be justified.*
- Collection of product-specific information to avoid allocation is always to prefer.*
- Refer to the example provided in Section 6.3 of ISO/TR 14049 on “ Example of allocation avoidance by dividing the unit process to be allocated into two or more processes”; or in Section 6.4 of ISO/TR 14049 on “ Example of allocation avoidance by expanding the boundaries for comparison of systems with different outputs.”)*

8. Units

The following units shall be used:

- SI units.
- Preferred power and energy units:
 - kW or W for power;
 - kWh for energy.

9. Calculation rules and data quality requirements

- Site-specific data** shall be used for the production of the main components and for the main assembly, i.e. plant-specific data from manufacturing processes or transportation. If other types of information are used, this should be described and motivated.
- Generic data** can be used for the manufacturing processes of the small parts other than main components (if any) of the ADSL CPE unit. Generic data can be used for e.g. production of bulk materials used (see also Enclosure 1 Generic data sources). For e.g. purchase of bulk and raw materials on a spot market and of waste handling phases, generic data shall be used. Generic data may also be used if there is a lack of specific data possibly having a negligible

influence on the final result. Generic data can also be used when specific data are lacking, e.g. when a supplier refuses to provide data. As a general rule, the sum of the contribution to all parts of the life cycle to the separate impact categories from the use of generic data, instead of product-specific data, must not exceed 10% of the total contribution to the impact categories. However, there can be exceptions to this rule, depending on the specific product.

-Data should represent annual average values for a specific year.

Data quality requirements for the manufacturing phase

-Site-specific data shall be used for the main assembly of the product and for the manufacture of the main components.

-The mix of electricity used during the manufacturing phase should be site specific, but can be approximated as the official one in the country of the manufacturing site if site-specific data can not be obtained. The mix of electricity shall be documented.

-Hazardous waste is defined by Taiwan's Waste Disposal Act, or other relevant national law if in any other country.

-Transport to manufacturer with actual transportation and distance from the supplier.

10. Parameters to be declared in the EPD

The following parameters shall be declared for the manufacturing phase.

Resource use

Use of non-renewable resources:

-without energy content

-with energy content

Use of renewable resources:

-without energy content -with energy content

-Electricity consumption from the main assembly and the assembly of the main components (additional information since the energy carriers that are used to generate the electricity already is accounted for under renewable and nonrenewable resources).

Pollutant emissions expressed as potential environmental impact

-Global warming	kg CO ₂ equivalents
-Acidification	kmol H ⁺
-Ozone depletion	kg CFC-11 equivalents
-Photochemical oxidant formation	ethene-equivalents
-Eutrophication	kg P ₂ O ₅ equivalents

Use phase

For the use phase, the power at On Mode/Active Power Mode shall be given;

If the power is quipped with a main switch, the power consumption of the power supply during off-mode should be considered;

The preferred power and energy units shall be kW or W for power and kWh for energy.

Additional information

Materials for recycling (*optional*)
Waste, divided into:

- Hazardous waste is defined by Taiwan's Waste Disposal Act, or other relevant national law if in any other country.
- Other waste

(*Note: Waste to declare includes solid and semi-solid waste.*)

11. Recycling information

The recycling information shall include information such as a disassembly instruction and e.g. which parts/components such as the metal case that are suitable for recycling, and which parts that are not suitable for recycling. Information needed by e.g. the WEEE³ directive for the manufacturer of the final product may be included for the ADSL CPE.

Information on proper handling of parts of the product that can not be recycled and need to be treated as waste at the end of its life cycle can be added.

12. Other environmental information (*Optional*)

Information to include in the EPD may cover the technology used, the places for manufacture and assembly, other factors such as work environment, health or risk aspects, etc. Information may also be included on aspects that the producer has and know are specifically desired by the customer (e.g. risk related issues) and how the product should be handled during service and maintenance, and how to reduce the environmental impact during the use of the product. It is also possible to include information about the product's compliance with environmental information systems such as eco-labelling.

Information about release of most frequent emissions at use should be included. Information about smell may be included since it is an aspect asked for at purchasing by customers.

13. Information about the certification

Information about the PCR review, the EPD verification and the certification body shall be included. The following template shall be used:

The PCR review for ADSL CPE (PCR 2007: 7) was administered by the Environment and Development Foundation and carried by an LCA expert panel chaired by Dr. Ning Yu (ningyu@edf.org.tw)

Independent verification of the declaration, according to ISO 14025:2006

Internal External

³ Waste Electrical and Electronic Equipment Directive

Third party verifier : accredited by

Environmental declarations from different programmes may not be comparable.

14. References

The EPD shall refer to:

-Requirements for Environmental Product Declarations, EPD, (MSR 1999:2) published by the Swedish Environmental Management Council at www.environdec.com;

-The relevant PCR document

-The underlying LCA report

The EPD shall also have references to the following documents, if available:

-Other documents that verify and complement the EPD

-Instructions for recycling

Enclosure 1 – Generic data sources to use

For processes in Taiwan, the latest published versions of Taiwan generic data, or data published by Taiwan government's competent authorities on commerce, industry, and energy issues shall be used. Other sources of generic data should be used if they are being more valid for other regions of the world, e.g. for Europe.

The latest published versions of the following generic databases shall be used.

Material	Database	Published
Steel	IISI (International Iron and Steel Institute)	1998
Copper	ICA (International Copper Association)	1998
Copper semi products	ICA (International Copper Association) + IME (Institut für Metallhüttenwesen und Elektrometallurgi, Aachen)	1998 1995
Electricity	ETH (Eidgenössische Technische Hochschule) Data combined with IEA (International Energy Agency) statistics 1998	1996
Aluminum	EAA (European Aluminum Association)	2000
Plastics (and some chemicals)	APME (Association of Plastics Manufacturers in Europe)	1993-1998
Electronic components	EIME (Environmental Information and Management Explorer) EcoBilan	1998-2000

Enclosure 2 Reporting format for the EPD

This enclosure includes information about the reporting format of the EPD in terms of compulsory headings accompanied with guidance on what type of data and information to present.

The following headings and subheadings are recommended to use in a template to be used as a general reporting format. (*Numbers in brackets refer to relevant Chapter in the PCR manual. Information in Italics refers to data/information suggested to be included.*)

Introductory part

The EPD should preferably have an upper introductory part including:

- *the logotype of the EPD[®] system*
- *the name of the company/organisation accompanied by its logotype*
- *the name of the product*
- *the EPD registration number*

Description of the company/organisation and the product/service

The company/organisation

- *Description of the company/organisation*
- *Description of the overall environmental work, existence of quality system and Environmental management system*

The product/service (according to Chapter 2)

- *Main application of the product*
- *Description of the product with technical specifications, manufacturing processes and presentation of places of manufacture (in case of several sites)*
- *Specific characteristics improving the usefulness of the product with regard to good environmental performance*
- *Other types of relevant information such as specific manufacturing processes beneficial from the environmental point of view*

List of materials and chemical substances

- *Declaration of contents (according to Chapter 3)*

Presentation of the environmental performance

- *Overview of the LCA method used, e.g. the period when the LCA was carried out, Functional unit, system boundaries (e.g. with an illustration), cut-off and allocation rules and data sources*

The manufacturing phase (according to Chapter 10)

The use phase (according to Chapter 10)

- *Geographic area where the product is delivered*
- *Data from transports*
- *End-of-life information*

Information from the company and the certification body

Recycling information (according to Chapter 11)

Other environmental information (according to Chapter 12)

Information about the certification

- *The name of the certification body and verifier*
- *The validity of the certificate*
- *Fulfillment of laws and prescriptions*

References (according to Chapter 13)

- *The relevant PCR document*
- *Requirements for EPD, MSR 1999:2*
- *Underlying LCA studies*
- *Other supportive documents for the LCA information*
- *Other relevant documents about the company's/organisation's environmental work*