

PRODUCT-CATEGORY
RULES
(PCR)

for preparing an environmental product
declaration (EPD) for Product Group

“Mechanical Equipment for buildings”

NPCR 011

This PCR-document is managed by the epd-Norge, see www.epd-norge.no

List of Contents

1. GENERAL INFORMATION	3
2. DEFINITION OF PRODUCT CATEGORY TYPE.....	4
3. LCA-BASED INFORMATION	4
3.1 Definition of functional unit / declared Unit	5
3.2 System boundaries.....	5
3.3 Description of data	5
3.4 Criteria for inclusions inputs and outputs, and data quality requirements	6
3.5 Units	6
4. INVENTORY ANALYSIS	6
4.1 Data collection and calculation procedures.....	6
4.2 Cut off criteria	8
4.3 Allocation rules	8
5. ENVIRONMENTAL IMPACT CATEGORIES AND CALCULATION PROCEDURES	8
6. PARAMETERS AND SOURCE OF DATA OF THE UNDERLYING LCA REPORT	9
7. OTHER INFORMATION.....	10
8. CONTENT OF THE ENVIRONMENTAL DECLARATION (EPD)	10
8.1 General information to be declared	10
8.2 Parameters to be declared	11
9. REFERENCES	12
APPENDIX 1: GLOSSARY	14
APPENDIX 2: FLOW CHART	15
APPENDIX 3: DATABASES AND CALCULATION PROCEDURES	17
APPENDIX 4: MATERIALS AND SUBSTANCES USED IN MECHANICAL EQUIPMENT FOR BUILDINGS	18
APPENDIX 5: WASTE SCENARIOS	18

1. GENERAL INFORMATION

The Product Category Rules (PCR) defines the criteria for identification of a specific product category and sets out the parameters to prepare the Environmental Product Declaration (EPD).

This PCR aims to identify and define rules for the product mechanical equipment for buildings in order to:

- identify the functional and performance characteristics of the product;
- define the criteria to be used in the Life Cycle Assessment (LCA) study of products belonging to the category;
- specify the information that must be reported in the EPD.

This PCR is valid until January 2010 (3 years). When new requirements concerning use of chemicals will be implemented (REACH directive) this PCR may need to be revised.

The PCR complies with the requirements of ISO 14025, Environmental labelling and declarations – Type III environmental declarations – Principles and procedures, and the ISO 14040-standards on Environmental Management - Life Cycle Assessment (LCA) as listed in the list of references.

In addition, specific technical standards for the relevant product must be fulfilled and information about this shall be listed in the declaration.

Program operator:
Næringslivets Stiftelse for Miljødeklarasjoner
NHO, Postboks 5250 Majorstuen,
0303 Oslo

The PCR has been prepared by the members of the PCR WG and NTNU.

Members of the PCR WG (mechanical equipment for buildings):

Jonny A Strømme	Glamox ASA
Jarle Kristiansen	TrioVing AS
Anne Løkkeberg	VingCard AS
Terje Christophersen	Luxo ASA
Wilfred Nygård / Anette R.Nilsen	Oso AS

Consultant:
Annik Magerholm Fet NTNU

DEFINITION OF PRODUCT CATEGORY TYPE

The product category that this PCR covers is defined by the group of mechanical equipment that can fulfil functions related to indoor environment when installed in a building (e.g. lighting, indoor air quality, security, heating).

The functional performances of the products are all described by the technical standards, see Table 1, for the actual product. Each of the standards describing the technical performances in the use phase of the products shall be listed as reference documents in the product's EPD.

A list of product types that this PCR is valid for is given in Table 1. This list can be expanded if there are any other products where underlying LCA-data show that the product belongs to the same product category.

Table 1: Product types that this PCR is valid for

Product type	Functional unit
Lighting system	<p>Luminaire that delivers a luminous power (or luminous flux) per power¹ unit of Lumen/Watt over a period of 15 years with inflows² every 2 year.</p> <p>Lumen output will take into account all internal loss. Watts will include all loss in transformers/ballasts.</p> <p>¹ Inclusive transformers/ballasts (or electronic control gear) ² See chapt. 3.4 The <u>SI</u> unit of luminous flux is the <u>lumen</u> (lm). One lumen is defined as the luminous flux of light produced by a light source that emits one <u>candela</u> of <u>luminous intensity</u> over a solid angle of one <u>steradian</u>. Lumen (lm) = cd*sr In other systems of units, luminous flux may have units of <u>power</u>.</p>
Security lock systems (e.g. Electronic lock systems, mechanical lock systems, door hardware)	<p>System that enables entrance to building units over a period of 20 years.</p> <p>However, depending of product type, frequency of use and climate, the products can last for either months or several decades. The functional unit and maintenance requirements and inflows¹ will be further specified in each product declaration</p> <p>¹ See chapt. 3.4</p>
Water heating system (e.g. Water heater)	<p>A water heater that delivers water on a temperature by 40 C by flush-tapping on an amount of the double of its closed water volume</p> <p>By example: A 200 l closed water heater to deliver 400 l by flush-tapping by 40 C.</p>

NOTE: This PCR can be expanded to cover ventilation systems (Air Heating/Cooling (Exchange) systems) for use in buildings and constructions.

2. LCA-BASED INFORMATION

The declaration for mechanical equipment for buildings and constructions shall include information from each of the life cycle stages: "Production", "Installation", "Use in building", "Disassembling" and "End of life treatment". If information on any of these life cycle stages is missing, this shall be clearly stated in the EPD.

2.1 Definition of functional unit / declared Unit

As mechanical equipment for buildings and constructions can fulfil various functions, the functional unit shall be considered as a "declared unit" in accordance with the technical standard for the actual product category, see Table 1.

2.2 System boundaries

The entire life cycle is to be covered. This includes all industrial processes from raw material extraction and production, installation in buildings, use and maintenance, dismantling, transportation, and disposal. Rules on how recycling processes should be handled are described in chapter 4.2, Allocation rules.

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.

The boundaries towards other technical systems describe the inflow of material and components from other systems and the outflow of material to other systems.

The flow chart of the processes for one case example (lighting system) is illustrated in Appendix 2 to this PCR. The system boundaries appear partly different for the different product types, and must be described or illustrated in the EPD. Appendix 2 can be used as a model to illustrate the flow chart for the actual product type.

Building of site, infrastructure and production of manufacturing equipment and personnel activities shall not be included, nor is biological CO₂ consumptions and emissions included within the system boundaries.

2.3 Description of data

Table 2 shows for which product types where on-site information and LCA-documentation are available.

Table 2: Product types and environmental background information

Product type	Environmental background information
Lighting system	LCA-documentation: "Environmental Sound Product Development of light fittings", STØ-report OR 36.95, 1995 Glamox Annual Environment Report "Life Cycle Assessment av Vision", Terje Christophersen, 1998
Security lock systems (e.g. Electronic lock systems, mechanical lock systems, door hardware)	On-site process documentation: Resultatdokument 2005, Miljøkartlegging TrioVing Resultatdokument 2005, Miljøkartlegging VingCard Elsafe
Water heating system (e.g. Water heater)	On-site process documentation: Miljøredegjørelse fra 2003, OSO AS

For the supplement of data, specific data should be prioritized. In the absence of specific data, data from databases can be used as specific data if the following rules are demonstrated:

1. representativeness of the geographical area
2. technological equivalence
3. boundaries towards nature equivalence
4. boundaries towards technical systems equivalence.

The demonstration of the compliance to these 4 rules shall be clearly described in the technical report from the LCA-study, or in the report on environmental background information. The data sources have to be documented, including the database and the year of publication. This requirement also encompasses sources of data for transport models (including transport form, distances and quantities to be transported) and thermal energy production shall be documented.

Some components that are part of the mechanical equipment, are imported (e.g from China) as “one unit / one box”. Separate LCA should be obtained if possible, if not the “box” must be estimated as a combination of specified materials and generic LCA-data are to be used.

The EPD should give information about the databases that are used, and if possible, information about national databases in the country where the components are produced.

Appendix 3 gives an overview of relevant databases to be used for generic data.

2.4 Criteria for inclusions inputs and outputs, and data quality requirements

Input- and output data must be gathered based on instruction in Chapter 4. Some types of mechanical equipment need inflow or outflow of materials and other products during the use and the maintenance of the product.

Examples of relevant in- and outflows are:

Lighting system:	Light tubes, Igniters, Electronic ballast, electronic control gear and batteries
Security lock systems:	Key-cards, keys, batteries, soft ware
Water heating systems:	Nothing specific
Air heating /cooling system:	Filters, cooling media

The life cycle of such must be addressed (this means that separate LCA-results for such must be available). The same requirements as described under 4.1 should be applied here.

2.5 Units

The following units shall be used:

- SI units for both the LCA and the EPD
- Preferred power and energy units:
 - kW for power
 - kWh (J) for energy
 - Voltage (V)
- Lumen lm = cd*sr
- Lux = lm/m²
- Force = Newton (N)
- Pressure Pa = N/m²
- Temperature (C or F)

3. INVENTORY ANALYSIS

3.1 Data collection and calculation procedures

Information and data to be presented in an EPD shall be based upon an LCA-study or equivalent. Data collection and calculation procedures shall therefore follow instructions given in ISO 14040-43

Data must be collected for inputs and calculated for outputs.

Typical input data are material resources and energy resources. Resources can be classified as natural resources or secondary (alternative) resources, and sorted as non-renewable and renewable. Resources are further grouped as resources without energy content (e.g. main raw materials and water) and resources with energy content (e.g. fossil fuels)

The main input data for mechanical equipments for buildings are (raw)materials, energy, water/air and transport. If data for input materials (e.g. metals) are taken from an LCA-database, they include normally information about raw-material extraction, energy and the use of different secondary resources.

(Raw) Materials

Appendix 4 lists the most relevant for materials used in mechanical equipments for buildings.

The quantities (kg) of (raw)materials must be specified.

They are grouped as

- Metals
- Plastics
- Glass
- Coating
- Packaging materials
- Other materials
- Additives (Not included in the product)

Energy consumption:

- Energy consumption (specified as renewable and non-renewable) in the different life cycle stages (kWh or kJ)

Water/Air:

- Water (m³) if used in the production

Transport:

- Transport is counted in terms of the capacity (%) of the vehicles (trucks, trains, ships) and the length of the routes travelled (km).

Other incoming materials, see 3.4, must be specified separately.

Typical output data are finished products, by-products, wastes (e.g. hazardous and non-hazardous waste) and emissions generated during production processes, during transportation, use and maintenance and from end-of life treatment of the products. For contribution to environmental impact categories, see Chapter 5.

For simplicity, LCA data tools¹ are recommended to be used in the calculation.

Specific or generic data:

The use of specific or generic data shall be documented. As a rule the following distribution will be applied:

- Extraction of and production of (raw)materials (specific and/or generic data)
- Manufacturing of the product (specific)

¹ Use for exempel GaBi or SimpaPro

- The mix of electricity used in the production process or during the use of the product in buildings. If site-specific data cannot be obtained, the official mix in the country where the main energy consuming processes take place, should be used. The mix of electricity (calculation procedure) shall be documented.
- Hazardous waste shall be specified according to the list in Appendix 5.

3.2 Cut off criteria

Processes and activities that do not contribute to more than 1% of the total environmental impact for each impact category can be omitted from the inventory. Omissions from the inventory must be documented and justified based upon available information.

3.3 Allocation rules

The following methods of allocation are preferred:

- Multi-input processes: Allocation based on physical relationships (i.e. mass balances).
- Multi-output processes: Allocation based on the economic relationships between the output products.
- Open loop recycling: No allocation should be made for materials subject to recycling. The recycling processes are included when recycled materials are used as inputs. Outputs subject to recycling are regarded as outputs to the next life cycle.

Deviation from these allocation rules must be documented and reasoned for.

4. ENVIRONMENTAL IMPACT CATEGORIES AND CALCULATION PROCEDURES

The EPD shall report on the contribution to the following environmental impact categories listed in Table 3 (see also Chapter 8.2):

Table 3 Environmental Impact categories

Impact category	Unit
Depletion of non-renewables (energy and minerals)	
Climate change (<i>Global warming potential (GWP)</i>)	[kg CO ₂ equiv]
Depletion of the stratospheric ozone layer (<i>Ozone Depletion Potential (ODP)</i>)	[kg CFC 11 equiv]
Acidification of land and water sources (<i>Acidification Potential (AP)</i>)	[kg SO ₂ equiv]
Eutrophication (<i>Nutrition Potential (NP)</i>)	[kg PO ₄ equiv]
Formation of photochemical oxidants (<i>Photochemical oxidant creation potential (POCP)</i>)	[kg C ₂ H ₄ equiv]

The first category is the result from inputs (use of raw materials and fossil fuels or energy, see 8.2 for presentation in the EPD) The environmental impact (Abiotic depletion) is often calculated with reference to how much is left in nature of the actual energy carrier or materials, that means it's calculated as a fraction. The calculation procedures for the contribution to the other impact categories shall follow the instructions in the ISO 14043-standard, and the results shall be clearly documented in the LCA-technical report, or report on environmental background information.

Appendix 3 to this PCR gives an overview of relevant methods and the procedures for the calculation of the contribution to the different environmental impact categories. The contribution to each impact categories shall be given by listed units.

Waste generation is another impact category and the waste should be classified into non hazardous and hazardous waste. The categories of hazardous waste and non-hazardous waste are based upon LCI including inflows and outflows as described in 3.4 for each of the product types.

For mechanical equipment the calculation procedures as described in Appendix 4 shall be used depending on which waste treatment system or *product–end-of–life* scenarios that are to be used. for calculation of waste flows

5. PARAMETERS AND SOURCE OF DATA OF THE UNDERLYING LCA REPORT

The underlying LCA-studies of lighting systems show the contribution to the different environmental impact categories are:

Impact category	Approximate contribution
Climate change	30 % from light tubes, 60 % from transportation:
Depletion of the stratospheric ozone layer	Not specified in previous LCA
Acidification of land and water sources	8% from product components, 90 % from usage of the product, 2 % from transport
Eutrophication	Not specified in previous LCA
Formation of photochemical oxidants	30 % from energy use in processes, 5 % from transport, 10 % from light fitting products, 55 % from electricity production

End-of life treatment analyses show that approximately 90 - 95 % of the lighting product goes to recycling and material recovery, the rest is treated as hazardous waste.

For security lock systems:

The annual environmental accounts and assessments from the production processes show the approximate rating of the significant environmental aspects:

Transport	23 %
Packaging	17 %
Area	14 %
Emissions	14 %
Energy	12 %
Waste	8 %
Water	4 %
Raw materials	4 %
Stock material	2,5 %
Other Consumption materials	1,5 %

A complete LCA may result in a different rating based upon the weighting of the different impact categories.

For heating systems:

There is no underlying LCA-data for the heating systems as described in this PCR. It is assumed that 98 % of materials are recyclable metals and other materials.

A complete list of components analyzed in an LCA, will be listed in the EPD.

6. OTHER INFORMATION

The specified rules in the previous sections secures that all relevant environmental impact information will be documented in the EPD. Other information that can be represented in the EPD is specification of materials and substances that can adversely affect human health and the indoor environment in all stages of the life cycle.

A detailed list of the product's substances (chemicals used in manufacture), including CAS number and health class (Risk phrases), can be included in the product content declaration. The content of substances shall be declared in weight %. In those cases where information of content could affect patent or company secrets, a qualitative list of chemicals and their expected functions is sufficient, including the Risk phrases.

A description of toxicity effects and potential health impacts occurring in the production of or during the use of the product can be given.

The EPD can also give information about the country of pre-productions, and references to national databases. Information about the age of the LCA-data shall also be included

7. CONTENT OF THE ENVIRONMENTAL DECLARATION (EPD)

All Type III environmental declarations in a product category shall follow the format and include the parameters as identified in this PCR.

7.1 General information to be declared

The following general information shall be declared:

- the name and address of the manufacturer(s);
- product identification by product type, name (including e.g. production code), the function (use) and the declared unit, see Table 1;
- a simple visual representation of the product, a general specification for the composition of the product and the description of the application (installation) of the mechanical equipment in the building and construction;
- name of the programme and the programme operator's address and, if relevant the logo and website, the verifier of the EPD and the PCR identification (by number);
- the date the declaration was issued and period of validity;
- environmental information according to specification in 8.2;
- a statement of whether the declaration is complete or modular with reference to LCA-reports or other environmental reports for background information. The time period for which the LCA results are valid must be defined and reported in the EPD;
- information on where explanatory material may be obtained;
- a diagram of the product's life cycle stages the EPD represents, subdivided into product stages "Production", "Installation", "Use in building", "Disassembling" and "End of life treatment".
- a description of the processes and ancillary materials that are required for installing the mechanical equipment in the building and their maintenance and replacement according to the cut-off criteria in the PCR, see chapter 4.2.
- other information as specified in Chapter 7

If the EPD does not cover the entire life cycle this shall be clearly stated on the front page of the

EPD. Alternative statements can be:

- This declaration covers environmental impacts throughout the product life cycle, from raw material extraction to product disposal.
- This declaration covers environmental impacts from raw material extraction to use and maintenance. The declaration does not cover product disposal, and is therefore not comparable to declarations that cover the entire product life cycle.
- This declaration covers environmental impacts from raw material extraction to production. The declaration does not cover use and maintenance or product disposal, and is therefore not comparable to declarations that cover the entire product life cycle.
- This declaration is a module environmental product declaration. It covers the main production process of the product. Raw material extraction and production, use and maintenance, and disposal are not included.

7.2 Parameters to be declared

The environmental performance (information) to be declared in the EPD must be specified for the functional unit (declared unit, see Table 1).

Parameters to be declared are:

Input data according to Inventory analysis, see Chapter 4.1, and the impact category *Depletion of non-renewables (energy and minerals)*, see Table 4, Chapter 5.

Depletion of non-renewable energy can be differentiated into:

- Fossil oil
- Natural gas
- Coal
- Uranium

Information about the use of renewable energy can be differentiated into:

- Hydropower
- Wind power/Solar power
- Biomass

Output information presented as contribution to the environmental impact categories presented in Table 4 in Chapter 5:

- Climate change (greenhouse gases). Emission of greenhouse gases (expressed as the sum of global warming potential, GWP in kg CO₂ - equivalents, 100 years).
- Depletion of the stratospheric ozone layer. Emission of ozone-depleting gases (expressed as the sum of ozone-depleting potential, ODP in kg CFC 11-equivalents, 20 years).
- Acidification of land and water sources. Emission of acidifying gases (expressed as the sum of acidifying potential, AP in kg SO₂ - equivalents).
- Eutrophication. Emission of substances contributing to eutrophication potential, (expressed as the sum of nutrition potential, NP in kg PO₄ -equivalents).
- Formation of tropospheric ozone (photochemical oxidants). Emission of gases that contribute to the creation of ground-level ozone (expressed as the sum of ozone-creating potential, POPC, in kg C₂H₄-equivalents).

Wastes:

Non hazardous waste (kg).

Hazardous waste (kg) according to recommendations in Appendix 5

- Waste streams based on "End of life treatment scenarios" for mechanical equipment, see Appendix 5.

7.3 Recommended format on the EPD

There are no requirements listed to the format (or lay-out) of the EPD. To avoid confusion from the interpreter of the information presented in an EPD for mechanical equipment, and to help identification of EPDs belonging to the same product category, the format presented in Appendix 6 is recommended.

REFERENCES

- ISO 14025:2006, Environmental labels and declarations, Type III Environmental Declarations
- ISO CD 21930 :2004 Building construction – Sustainability in building construction -Environmental declaration of building products
- ISO 14040:1997 Environmental Management - Life Cycle Assessment - Principles and Framework
- ISO 14041:1998 Environmental Management - Life Cycle Assessment - Goal and Scope Definition and Life Cycle Inventory Analysis
- ISO 14042:2000 Environmental Management - Life Cycle Assessment - Life Cycle Impact Assessment
- ISO 14043:2006 Environmental Management - Life Cycle Assessment
- ISO 14001:2004 Environmental management system requirements
- ISO 9001: 2000 Quality management system requirements

Waste treatment:

- FOR-2005-05-02-406. Waste Electrical and Electronic Equipment directive 2002/96/EC (WEEE direktivet)
- EU directives 91/689/EEC and 75/442/EE (see also regulation of June 1, 2004 no. 930 of recycling and treatment of waste with amendment by the Ministry of the Environment 2. May 2005 (avfallsforskriften)).
- Norsk EE forskrift 2002/96 Avfallshåndtering
- RoHS-directive 2002/95/EC - Restriction of Hazardous Substances Directive (RoHS)

Additional national standards and documents to be specified or referred to in the declaration if relevant

- NS-EN 1838:1999 Lighting applications - Emergency lighting (nwendt belysning – nødbelysning)
- NS-EN 12193:1999 Light and lighting - Sports lighting (Lys og belysning – idrettsbelysning)
- NS-EN 12464-1:2003 Light and lighting - Light of work places - Part 1: Indoor work places (Lys og belysning- belysning av arbeidsplasser)
- NS-EN 12464-2: 2003 Light and lighting - Light of work places - Part 1: Outdoor work places (Lys på arbeidsplass ute)
- NS-EN 12665 Light and lighting - Basic terms and criteria for specifying lighting requirements
- NEK 400 installasjon Forskrift om elektrisk lavspenningsutstyr.
- ISPM 15 Internasjonal plantesanitær standard for pakkemateriale
- BS 476 part 22: Clause 6. Fire test
- EN 1634-1 Fire test
- DIN 18273: 1995-09 bzw. 1997-12 Fire test / Certificate
- EN 61000-6-1, EMC test / conformity
- EN 61000-6-2, EMC test / conformity
- EN 61000-6-3, EMC test / conformity
- EN 61000-6-4, EMC test / conformity
- NEK EN 50021 Electric equipment in explosive environment (Elektrisk utstyr i eksplosjonsfarlige omgivelse – Type beskyttelse, ikke gnistgivende "n")
- NEK EN 55015:2006 Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
- NEK EN 60598-1:2004/A1:2006 Luminaires -- Part 1: General requirements and tests

- IEC 60068-2-6 Ed. 6.0 en Environmental testing - Part 2: Tests - Test Fc: Vibration (sinusoidal)
- IEC 61547 Amd.1 Ed. 1.0 Amendment 1 - Equipment for general lighting purposes - EMC immunity requirements
- IEC 60092-306 Ed. 3.0 Electrical installations in ships. Part 306: Equipment - Luminaires and accessories
- IEC 60598-2-22 Ed. 3.1 Luminaires - Part 2-22: Particular requirements - Luminaires for emergency lighting
- IEC 60598-2-24 Ed. 1.0 Luminaires - Part 2-24: Particular requirements - Luminaires with limited surface temperatures
- IEC 60598-2-1 Ed. 1.0 Luminaires. Part 2: Particular requirements. Section One: Fixed general purpose luminaires
- IEC 60598-2-1 Amd.1 Ed. 1.0 Amendment 1 - Luminaires. Part 2: Particular requirements. Section One: Fixed general purpose luminaires
- IEC 60598-2-2 Amd.1 Ed. 2.0 Amendment 1 - Luminaires - Part 2: Particular requirements - Section 2: Recessed luminaires
- IEC 60598-2-2 Ed. 2.1 Luminaires - Part 2: Particular requirements - Section2: Recessed luminaires
- IEC 61000-3-2 Ed. 3.0 Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
- ISO 68-2:1998 ISO general-purpose screw threads -- Basic profile -- Part 2: Inch screw threads

APPENDIX 1: GLOSSARY

Declared unit:

Quantity of a building product for use as a reference unit in an environmental declaration for the full life cycle of the product [ISO / CD 21930, draft 12,2004,. ISO 14025, 2006]

Functional unit:

A. general: quantified performance of a product system for use as a reference unit in an life cycle assessment study [ISO 14040:1997 and ISO 14025, 2006]

b. related to building product: quantified performance of a building product for use as a reference unit in an environmental declaration for the full life cycle of the product [ISO / CD 21930, draft 12, 2004]

Impact category:

Class representing environmental issues of concern into which LCI results may be assigned [ISO 14042:2000]

Life Cycle:

Consecutive and interlinked stages of a product system, from raw material acquisition or generation of natural resources to the final disposal [ISO 14040:1997]

Life cycle assessment (LCA):

Compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle [ISO 14040:1997]

Non-renewable resource:

Resource that exists in an fixed amount in various places in the earth's crust and that cannot be replenished on a human time scale. Non-renewable resources have the potential for renewal only by geological, physical, and chemical processes taking place over millions to billions of years. [ISO / CD 21930, draft 12, 2004]

Product Category Rules (PCR):

Set of specific rules, requirements, and guidelines for developing Type III environmental declarations for one or more products categories [ISO 14025, 2006]

Renewable resource:

Resource that is grown, naturally replenished, or replaced, as a rate that exceeds depletion for the useable supply of that resource [ISO / CD 21930, draft 12, 2004]

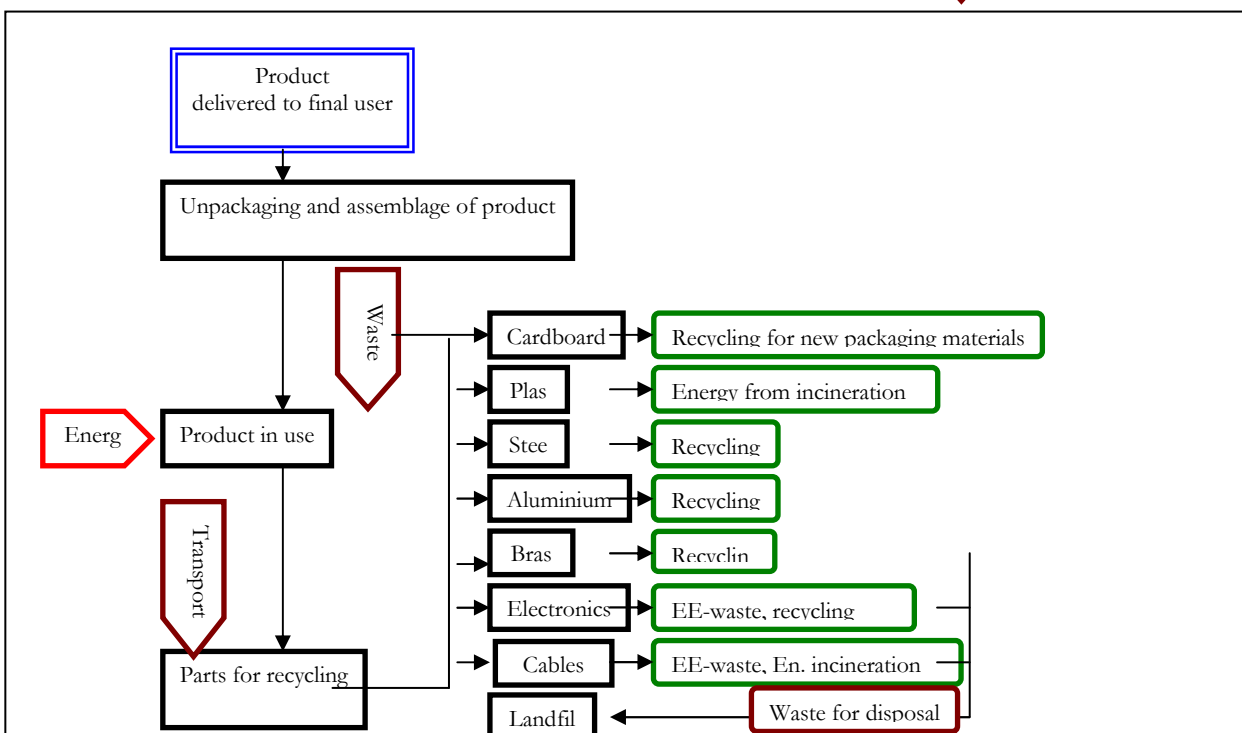
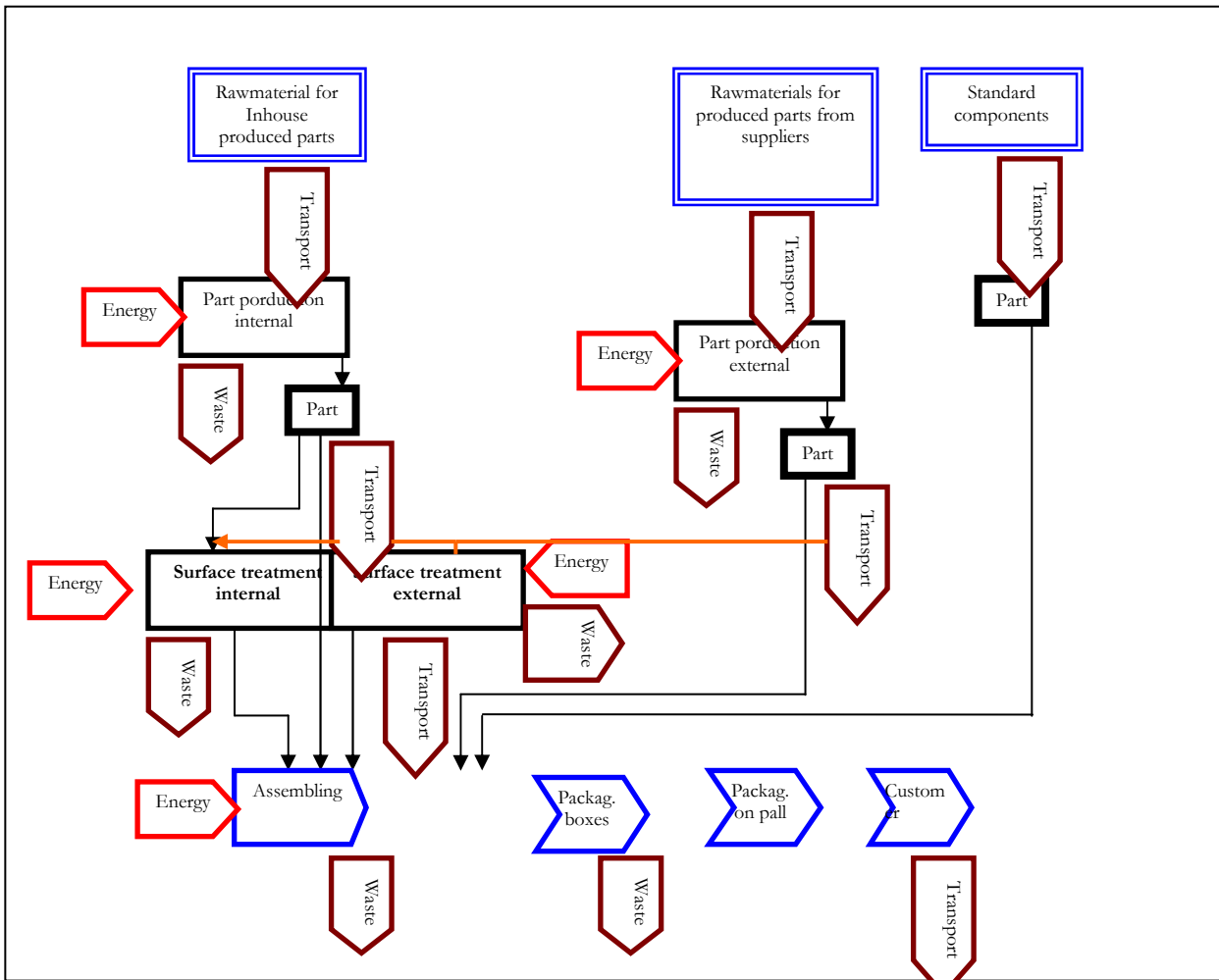
Secondary (alternative) resources:

Inputs to cement production which are either by-products or derived from industrial, municipal and agricultural wastes

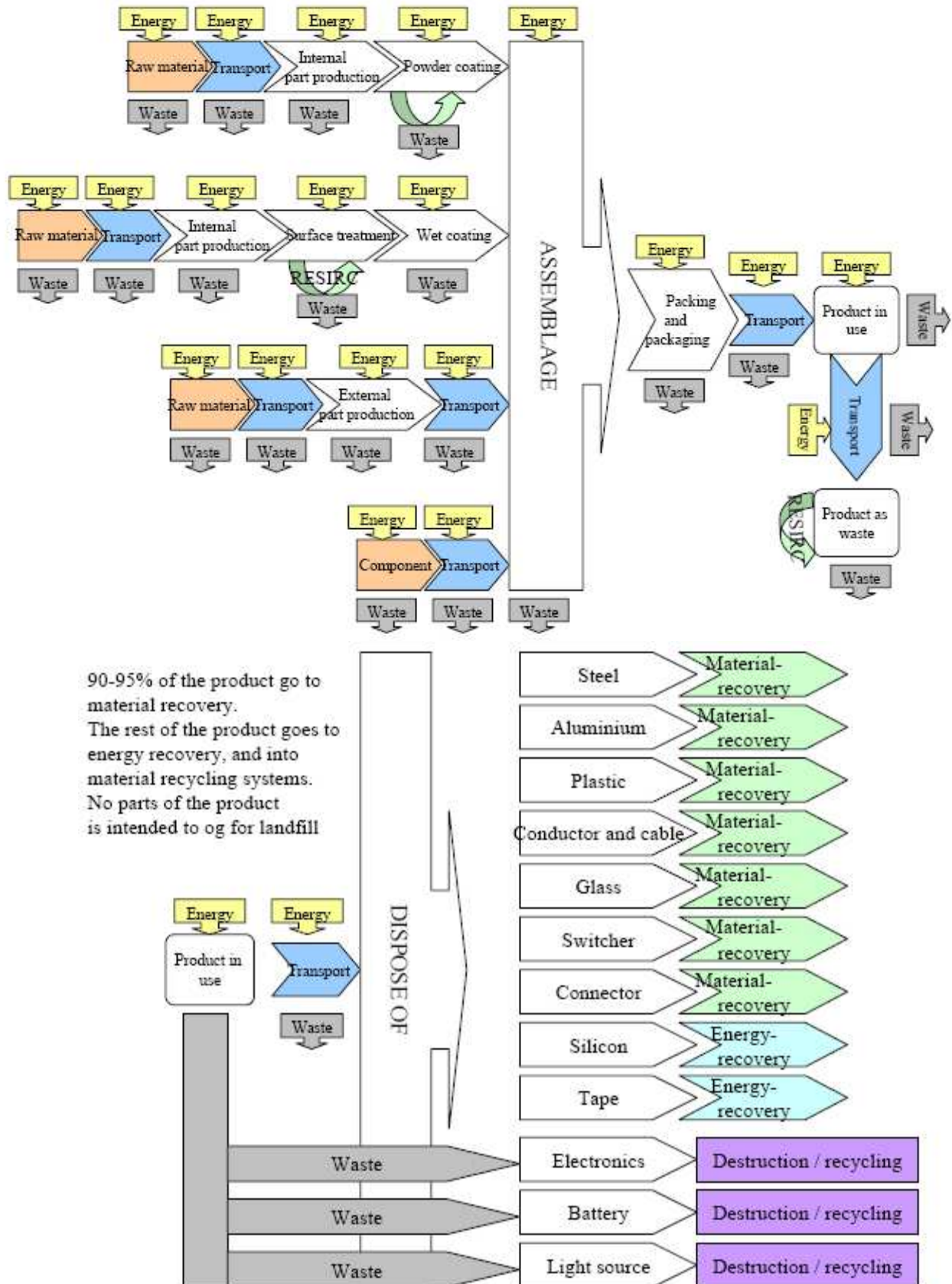
System boundary:

Interface between a product system and the environment of other product systems [ISO14040:1997]

APPENDIX 2: FLOW CHART
Security locker systems



Flow chart 1 Lighting



APPENDIX 3: DATABASES AND CALCULATION PROCEDURES

Databases for materials

Material	Database	Published
Steel	IISI (International Iron and Steel Institute) http://worldsteel.org	1998 or newer updates
Copper	ICA (International Copper Association)	1998 or newer updates
Brass	http://www.brass.org/	
Electricity	ECO-PROFILES of the European plastics industry Methodology Plastics Europe (Association of Plastics Manufacturers) http://www.plasticseurope.org/	1999 or newer updates
Aluminium	EAA (European Aluminium Association) http://www.eaa.org/	2005
Plastics	Plastics Europe (Association of Plastics Manufacturers Europe) http://www.plasticseurope.org/	1993-1998 or newer updates
Chemicals	Plastics Europe (Association of Plastics Manufacturers Europe) http://www.plasticseurope.org/	1993-1998 or newer updates

The EcolInvent LCA-database also include infra structure, and thereby a more comprehensive database.

Information about sources for calculation of contributions to impact categories:

Impact category	Unit	Source for the calculation procedures
Depletion of non-renewables (energy and minerals)	fraction	http://www.leidenuniv.nl/cml/ssp/projects/a/bioticdepl.html
Climate change (<i>Global warming potential (GWP)</i>)	[kg CO ₂ equiv]	CML 2001
Depletion of the stratospheric ozone layer (<i>Ozone Depletion Potential (ODP)</i>)	[kg CFC 11 equiv]	CML 2001
Acidification of land and water sources (<i>Acidification Potential (AP)</i>)	[kg SO ₂ equiv]	CML 2001
Eutrophication (<i>Nutrition Potential (NP)</i>)	[kg PO ₄ equiv]	CML 2001
Formation of photochemical oxidants (<i>Photochemical oxidant creation potential (POCP)</i>)	[kg C ₂ H ₄ equiv]	CML 2001

APPENDIX 4: MATERIALS AND SUBSTANCES USED IN MECHANICAL EQUIPMENT FOR BUILDINGS

Metals	Plastics	Other materials	Surface treatment
Steel plate DC01 AM	Acrylonitrile butadiene styrene	Glass	Lacquer
Steel plate DC01 ZE25/25	Polycarbonate	Lens	Powder paint
Stainless steel	Polyamide	Gasket	Zinc coat
Spring steel	Polymethyl methacrylate	Cardboard	Galvanizing
Spring stainless steel	polyacetal	Molded cardboard	Nickel plating
Steel tube	ABS Plastic	Expanded polyester	Chrome plating
Galfan	Acrylic	Paper	Powder painting MX serie 8
Galvanead	Polyester		Wet painting
Coated steel Pural	Nylon		
Caste iron	Polystiren		
Aluminium plate	TPD		
Aluminium plate			
Extruded aluminium			
Extruded anodized aluminium			
Caste aluminium			
Al 1200 MF H18			
Al 1050 MF H18			
Al 5050 MF H60			
Al -1S- H18			
Al Rundell 1S Soft			
Caste zinc			
Brass pipe			
Brass			
Nickel Silver			

APPENDIX 5: WASTE SCENARIOS

Waste scenario lighting systems:

According to regulations (see Reference list: Waste treatment) all used lighting products shall be delivered as WEEE. By following the instructions for dismantling:

- 90-95 % of the product is material recycled
- 5-10 % of the product is hazardous waste

Instruction for dismantling:

- Remove light tubes from the lamp in the building and deliver as EE waste according to requirements

- Collect lamps locally and transport to waste / material collector
- Remove light tube if still in the lamp
- Remove other parts as glass, Igniters, electronic ballast, electronic control gear and batteries.
- Crush / disintegrate the lamp and send to conveyer belt for manual sorting
- Cut electronic transformers, reactors and circuit cards from internal cables and collect separate for further treatment
- Collect aluminium for material recycling
- Collect steel with magnets for material recycling
- Collect conventional transformers and reactors (windings)
- Collect other metals like zink, brass and copper that are not connected to other parts, and send for recycling. Parts that are connected must be treated according to specified rules
- Send the rest of the armaturen (mainly plastics, cables an wires) to incineration (an mainly for energy recovery)
- After incineration, the remaining metals go for recycling.

All paper / card board packaging to recycling

Waste scenario security locker systems:

Materials like metals, electronics and plastics are separated and delivered for material reuse.

- 90 - 95 % of the product is material recycled
- 5 - 10 % of the product is hazardous waste and are to be treated according to regulations for this

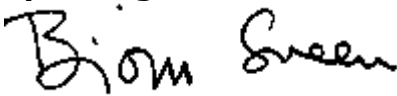
Waste scenario heating systems:

Materials like metals, electronics and plastics are separated and delivered for material reuse.

- 90 - 95 % of the product is material recycled
- 5 - 10 % of the product is hazardous waste and are to be treated according to regulations for this

This PCR has been approved 06.07.2010
by the Verification Committee of

epd-norge.no



(Bjørn Sveen, chairman)

Valid until 06.07.2013