



This document supports you in working with the ERCO Environmental Product Declarations (EPDs) and the information derived from them.

ERCO EPD

Environmental Product Declaration

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What is an EPD?

EPD stands for Environmental Product Declaration and is a standardised and internationally recognised form of environmental labelling for products. EPDs provide detailed information about the environmental impact of a product.

They are focussing on:

- resource consumption
- energy consumption
- air, soil and water pollution

The Life Cycle Assessment (LCA) is considered for all stages of the product life cycle. It includes:

- raw material extraction and transport
- product manufacturing and delivery
- installation
- operation
- disposal / recycling

What is the purpose of an EPD?

EPDs provide buyers, builders, architects, planners and other decision-makers with detailed and transparent information about the environmental impact of a product.

Some of their main applications are:

- **Product comparisons**

Direct comparisons are only possible if the EPDs of the products to be compared were created by the same "programme owner". In this case, the underlying set of rules is the same, which allows for a comparison. In cases where the programme owners use different parameters to determine the functional unit (cf. page 5), a direct comparison is no longer possible.

- **Sustainability assessments**

EPDs are frequently used in comprehensive sustainability assessments of building projects, allowing for the analysis of the entire ecological footprint.

- **Compliance with sustainability standards and certifications**

Some Green Building certification schemes, such as LEED (Leadership in Energy and Environmental Design) or BREEAM (Building Research Establishment Environmental Assessment Method), require the provision of EPDs to assess the sustainability of products and buildings.

- **Regulatory compliance**

In some regions, EPDs are required for specific product categories to comply with directives or standards.

- **Supply chain management**

As EPDs also assess transport, manufacturers can also use them to assess their supply chains, thus enabling sustainable planning of transport routes and suppliers.

- **Research and development**

The ecological footprint documented in an EPD is intended to encourage the footprint improvement for newly developed products.

How are EPDs monitored?

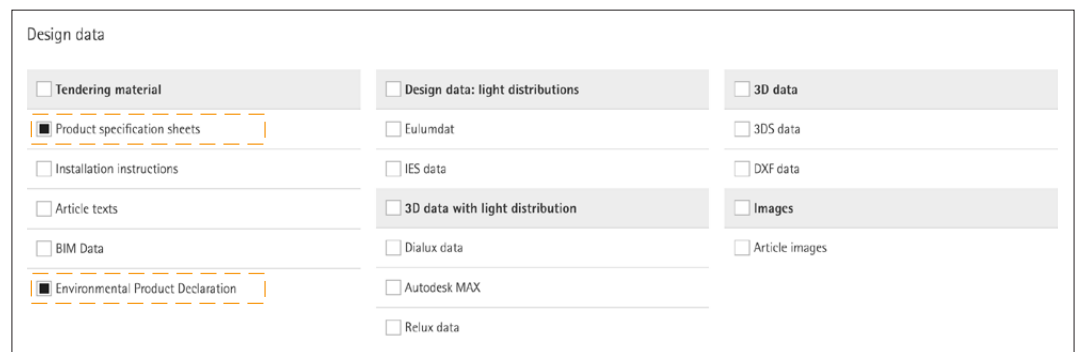
The effectiveness of EPDs is heavily dependent on their accuracy, completeness and comparability. The documents are therefore created in accordance with internationally recognised standards. These are currently the ISO 14025, EN 15804 and EN 50693 standards as well as the ISO 14040/44 standard for the life cycle assessment. EPDs may only be generated by recognised programme owners. The programme owner for ERCO EPDs is PEP ecopassport, which is the source of the sets of rules for creating EPDs. Documents generated in this way are verified by an independent body and are valid for five years. Sets of rules, EPD producer and accreditation number of the independent verifier can be found at the beginning of each EPD.



Where can I find EPD information for ERCO luminaires?

At ERCO, EPD information is communicated via the EPD and the product data sheet, which are both linked to the article number. Open a specific product, for example via article number: [www.erco.com/\[article number\]](http://www.erco.com/[article number])

The download links are found in the Planning data section.



What is the difference between the information on the data sheet and the EPD?

EPD

The EPD contains all the details that make up the ecological footprint of a product. The data relates to the entire life cycle of the product, from raw material extraction to disposal (cradle-to-grave). This data flows into the tables for the functional unit and the declared unit (cf. page 5).

EPDs may be created for a specific article number or alternatively for an entire family of structurally homogeneous products. ERCO EPDs apply to an entire family and describe a reference product whose data can be converted for other article numbers in the same family. The extrapolation coefficients needed for the conversion are found on the data sheet of the relevant product.

Data sheet

To facilitate the work of planners, ERCO publishes on the data sheet not only the extrapolation coefficients, but also the already converted, frequently requested article-specific data of a luminaire for its Global Warming Potential (GWP and GWP biogenic).

What do declared unit and functional unit mean?

Declared unit and functional unit are central constructs in an EPD that are used in parallel. The declared unit is used to assess a specific article number, while the functional unit is used for product comparisons.

Declared unit

The declared unit shows the specific data for the life cycle assessment of an article number as specified by the manufacturer. The luminous flux and service life of a product are luminaire-specific. Thus, the calculated data should only be compared with that of other luminaires to a limited extent, as different lighting fixtures typically exhibit varying levels of luminous flux and may also have differing service lives.

Functional unit

The functional unit defines an artificial product with the data required to generate the LCA. The functional unit created by standardising the data of a specific product. For luminaires, this is the reference luminous flux of 1,000lm and the reference service life of 35,000 hours. The functional unit serves as an auxiliary construct, acting as a common denominator for comparing the life cycle assessments of various luminaires. For ERCO luminaires, the conversion of the product data for the functional unit is based on the specifications of the PCR (Product Category Rules) for luminaires from PEP ecopassport. The generation of the conversion factor is documented in the ERCO EPDs on page 2 under Reference flow.

The functional units can only be used to compare the life cycle assessments of luminaires whose functional units were created with the same set of rules.

How is the EPD structured?

An EPD for a luminaire follows a standardised structure to ensure that relevant information is covered over the entire life cycle of the luminaire. All EPDs are structured in the same way. Below is the structure of an ERCO EPD and details on the information to be found:

1. General Information

This section of the EPD presents the basis for determining the data for the reference product and the product family. These data are:

- technical specifications of the reference luminaire, such as power, luminous flux, colour temperature etc.
- presentation of the manufacturer and the reference luminaire.
- reference lifetime in hours and years for different building types based on the specified lifetime of a luminaire. This means, for example, that a luminaire in an office building is in operation for around 2,500 hours a year. With a total service life of 75,000 hours, this corresponds to 30 years.
- computation of the reference flow factor used to transfer the data of the declared unit to the functional unit.
- presentation of the range of variations of the family represented by the reference product. This concerns electrical power, luminaire luminous flux, product weight, packaging weight.
- this section also shows the constituent materials of the product with the specific and percentage weight proportions.

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2. Information on life cycle stages

This section provides a short introduction to the life cycle phases of a luminaire with a brief explanation of the basic assumptions on which the data from section 3 of the EPD is based.

Phase	Manufacturing				Installation	Application	End-of-life				Benefits
-	A1	A2	A3	A4	A5	B6	C1	C2	C3	C4	D
	Raw materials	Transport	Manufacturing	Transport	Installation	Energy consumption	Disassembly	Transport	Waste processing	Disposal	Advantages through recycling

Manufacturing A1-A4

A1 considers the supply of raw materials, including the processing of secondary materials.
 A2 describes the environmental impact of transporting raw materials and secondary materials to the manufacturer.
 A3 considers the manufacturing of the product and all upstream processes.
 A4 describes all effects in connection with the transport to the construction site.

The table shows all phases and their subdivisions (modules) used in the ERCO EPD.

Installation A5

A5 describes the environmental impacts of construction site activities associated with the installation, including the waste generated and the disposal of that waste. Included accessories are also considered.

Use phase

Phase B6 considers energy use during operation of the product over its entire life cycle. This is based on the European power mix at the time the EPD was prepared.

End-of-life C1-C4

The end-of-life phase considers the environmental impacts arising at the end of a product's life.
 C1 considers dismantling of the product.
 C2 analyses the transport to waste processing plants.
 C3 describes incineration and recycling.
 Finally, C4 considers the disposal of non-recyclable materials.

Benefits D

D includes the environmental benefits resulting from incineration or recycling.

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3. Environmental impacts

Section 3 of the EPD provides information for each phase of life and each of the modules covered in section 2 of the EPD contains the specific values for the reference article. These values are separated according to the type of environmental impact. Both the values for the declared unit and those for the functional unit are output. The acronyms used in the EPD tables can be found on pages 12 et seq.

Parameter	Unit											Total, excl. D
		A1-A3	A4	A5	B6	Dismantling C1	Transport C2	Incineration/Recycling C3	Disposal C4	D		
GWP	kg CO ₂ -eq.	4.38E+00	9.57E-02	2.03E-01	9.31E+01	0.00E+00	2.68E-03	1.96E-01	2.66E-03	-1.01E-01	9.80E+01	
GWP-fossil	kg CO ₂ -eq.	4.58E+00	9.57E-02	9.20E-03	9.31E+01	0.00E+00	2.66E-03	1.96E-01	2.66E-03	-1.01E-01	9.80E+01	
GWP-biogenic	kg CO ₂ -eq.	-1.94E-01	0.00E+00	1.94E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
GWP-luluc	kg CO ₂ -eq.	2.20E-03	8.72E-04	1.32E-05	1.05E-02	0.00E+00	2.42E-05	2.04E-06	2.53E-06	-2.98E-06	1.36E-02	
ODP	kg CFC-11-eq.	5.79E-08	1.22E-14	1.09E-14	1.93E-09	0.00E+00	3.39E-16	8.83E-14	3.69E-15	-6.80E-13	5.98E-08	
AP	mol H ⁺ -eq.	7.80E-02	3.46E-04	1.61E-05	2.96E-01	0.00E+00	1.07E-05	2.05E-04	8.59E-06	-2.98E-04	3.74E-01	
EP-freshwater	kg P-eq.	2.31E-03	3.43E-07	1.20E-07	3.97E-04	0.00E+00	9.52E-09	2.57E-08	4.19E-07	-4.23E-08	2.71E-03	
EP-marine	kg N-eq.	5.68E-03	1.60E-04	7.23E-06	5.12E-02	0.00E+00	5.01E-06	9.54E-05	3.69E-06	-5.10E-05	5.71E-02	
EP-terrestrial	mol N-eq.	6.05E-02	1.79E-03	7.15E-05	5.36E-01	0.00E+00	5.61E-05	1.07E-03	2.55E-05	-5.42E-04	5.99E-01	
POCP	kg NMVOC eq.	1.87E-02	3.13E-04	1.96E-05	1.40E-01	0.00E+00	9.74E-06	2.46E-04	9.91E-06	-1.60E-04	1.60E-01	
ADPE	kg Sb-eq.	7.17E-04	6.20E-09	1.91E-10	1.91E-05	0.00E+00	1.71E-10	2.48E-08	6.07E-11	-2.72E-06	7.36E-04	
ADPF	MJ	6.67E+01	1.28E+00	4.62E-02	1.97E+03	0.00E+00	3.54E-02	2.08E-01	2.94E-02	-1.76E+00	2.04E+03	
WDP	m ³ world eq. Deprived	1.11E+02	1.14E-03	2.76E-03	1.81E+01	0.00E+00	3.15E-05	2.35E-02	5.57E-05	-1.25E-02	1.29E+02	

Typical table for the results of the indicators for the environmental impact of a product. Additional tables show data on the use of resources, waste categories and output categories broken down in the same way by phase/module. Finally, there is also information on the proportion of organic carbon in the product and the packaging.

What EPD information is shown in the ERCO product data sheets?

Extract from environmental product declaration
 The complete environmental product declaration can be found at: www.ercos.com/A2000293

Extrapolation factors of the article		Manufacturing	Distribution	Installation	Use	EoL					Benefits and loads
Lighting output		1.152	0.670	0.596	0.632	0.707					1.152
Parameter	Unit	A1-A3	A4	A5	B6	C1	C2	C3	C4	D	Total, excl. D
Results per functional unit											
GWP	kg CO2-eq.	5.05E00	6.41E-02	1.21E-01	5.88E01	0.00E00	1.89E-03	1.39E-01	1.88E-03	-1.16E-01	6.42E01
GWP-biogenic	kg CO2-eq.	-2.23E-01	0.00E00	1.16E-01	0.00E00	0.00E00	0.00E00	0.00E00	0.00E00	0.00E00	-1.07E-01
Results per declared unit											
GWP	kg CO2-eq.	2.34E01	2.97E-01	5.60E-01	2.72E02	0.00E00	8.77E-03	6.41E-01	8.70E-03	-5.40E-01	2.97E02
GWP-biogenic	kg CO2-eq.	-1.03E00	0.00E00	5.35E-01	0.00E00	0.00E00	0.00E00	0.00E00	0.00E00	0.00E00	-4.95E-01
A1-A3	Manufacturing										
A4	Distribution										
A5	Installation										
B6	Use										
C1-C4	End of Life										
D	Benefits and loads										

Extrapolation coefficients / factors

The data sheet of an ERCO luminaire contains the extrapolation coefficients for each life cycle phase of a product. You can use the extrapolation coefficients to convert the data of the reference product from the EPD for the respective article number.

The extrapolation coefficients listed on the data sheet can only be applied to the declared unit data of the EPD. To convert the functional unit of the EPD, the extrapolation coefficients themselves need to be converted. Cf. section 3.3. of the EPD.

Results per functional unit / declared unit

In addition to the extrapolation coefficients, the data sheet contains the data for the frequently requested global warming potential (GWP) general and GWP biogenic. GWP is the sum of the values of the following parameters: GWP fossil, GWP luluc and GWP biogenic; GWP biogenic only considers the CO2 values whose emissions are attributable to an organic source.

As a service, this data has already been converted for the corresponding article number so that you can use this data directly.

The data in the tables Results per functional unit / Results per declared unit do therefore not need to be converted further.

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How is the EPD reference data converted?

Sample conversion

Suppose you want to determine the GWP-biogenic for the phase "Manufacturing A1-A3".

Proceed as follows for the computation:

On the product data sheet, you will find the extrapolation factor "1.152" for Manufacturing.

Extract from environmental product declaration
The complete environmental product declaration can be found at: www.ercos.com/A2000293

Extrapolation factors of the article
Lighting output 1183

Parameter	Unit	A1-A3	A4	A5	B6	C1	C2	C3	C4	D	Total, excl. D
Results per functional unit											
GWP	kg CO ₂ -eq.	5.05E00	6.41E-02	1.21E-01	5.88E01	0.00E00	1.89E-03	1.39E-01	1.88E-03	-1.16E-01	6.42E01
GWP-biogenic	kg CO ₂ -eq.	-2.23E-01	0.00E00	1.16E-01	0.00E00	0.00E00	0.00E00	0.00E00	0.00E00	0.00E00	-1.07E-01
Results per declared unit											
GWP	kg CO ₂ -eq.	2.34E01	2.97E-01	5.60E-01	2.72E02	0.00E00	8.77E-03	6.41E-01	8.70E-03	-5.40E-01	2.97E02

In the EPD, you will find the value "-8.98E-01" for the declared unit for GWP-biogenic.

Parameter	Unit	A1-A3	A4	A5	B6	C1	C2	C3	C4	D	Total, excl. D
GWP	kg CO ₂ -eq.	2.03E+01	4.43E-01	9.40E-01	4.31E+02	0.00E+00	1.24E-02	9.07E-01	1.23E-02	-4.69E-01	4.54E+02
GWP-fossil	kg CO ₂ -eq.	2.12E+01	4.43E-01	4.26E-02	4.31E+02	0.00E+00	1.23E-02	9.07E-01	1.23E-02	-4.69E-01	4.54E+02
GWP-biogenic	kg CO ₂ -eq.	-8.98E-01	0.00E+00	8.98E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GWP-luluc	kg CO ₂ -eq.	1.02E-02	4.04E-03	6.09E-05	4.85E-02	0.00E+00	1.12E-04	9.45E-06	1.17E-05	-1.38E-05	6.29E-02
ODP	kg CFC-11-eq.	2.68E-07	5.67E-14	5.05E-14	8.95E-09	0.00E+00	1.57E-15	4.09E-13	1.71E-14	-3.15E-12	2.77E-07
AP	mol H ⁺ -eq.	3.61E-01	1.60E-03	7.46E-05	1.37E+00	0.00E+00	4.97E-05	9.47E-04	3.98E-05	-1.38E-03	1.73E+00
EP-freshwater	kg P-eq.	1.07E-02	1.59E-06	5.56E-07	1.84E-03	0.00E+00	4.41E-08	1.19E-07	1.94E-06	-1.96E-07	1.25E-02

Multiply the values:
1.152 x (-8.98E-01) = -1.03E00

As GWP-biogenic is a frequently used value, you will also find it directly on the product data sheet. You can check the value that you just computed as an example with that of the product data sheet:

Extract from environmental product declaration
The complete environmental product declaration can be found at: www.ercos.com/A2000293

Extrapolation factors of the article
Lighting output 1183

Parameter	Unit	A1-A3	A4	A5	B6	C1	C2	C3	C4	D	Total, excl. D
Results per functional unit											
GWP	kg CO ₂ -eq.	5.05E00	6.41E-02	1.21E-01	5.88E01	0.00E00	1.89E-03	1.39E-01	1.88E-03	-1.16E-01	6.42E01
GWP-biogenic	kg CO ₂ -eq.	-2.23E-01	0.00E00	1.16E-01	0.00E00	0.00E00	0.00E00	0.00E00	0.00E00	0.00E00	-1.07E-01
Results per declared unit											
GWP	kg CO ₂ -eq.	2.34E01	2.97E-01	5.60E-01	2.72E02	0.00E00	8.77E-03	6.41E-01	8.70E-03	-5.40E-01	2.97E02
GWP-biogenic	kg CO ₂ -eq.	-1.03E00	0.00E00	5.35E-01	0.00E00	0.00E00	0.00E00	0.00E00	0.00E00	0.00E00	-4.95E-01

Note on the exponential representation of decimal numbers in the EPD

This scientific notation is used to represent very small or very large numbers with a certain number of digits. It is frequently used in spreadsheets or calculators, as only a limited number of digits are available in a data field or on the display.

Here is an example:

Very large numbers

8,000,000 is shown as 8E+06.

E+06 stands for 10^6 , where E stands for the base 10, the subsequent digit for the exponent, 8,000,000 is therefore equal to 8×10^6 and equal to 8E+06

Tip:

The + sign in front of the exponent means that the decimal point must be moved to the right.

Very small numbers

0.000008 is shown as 8E-06.

E-06 stands for 10^{-6} (= $1/10^6$) where E stands for the base 10, the subsequent digit for the exponent.

0.000008 is therefore equal to 8×10^{-6} and equal to 8E-06

Tip:

The - sign in front of the exponent therefore means that the decimal point must be moved to the left.

Note:

+ or - signs after the E do not mean that the number is a positive or negative number.

This arises exclusively from the usual preceding - sign.

If the value after E = 0, the decimal point remains where it is ($10^0=1$).

Examples from an EPD table

2.42E-05 means 0.0000242

-3.39E-16 means -0.0000000000000000339.

4.58E+00 means 4.58

Appendix: EPD Glossary

LED module code	This is the product ID of the EPREL database
Assigned lifetime	Underlying service life of the product
Declaration lifetime of the LED module	The operating time determined according to LM80 TM21 for the luminous flux maintenance of the luminaire
Useful output flux	Luminaire luminous flux
Electrical power	System power or connected load of the luminaire
Luminous efficiency	Luminous efficacy
Reference lifetime	Service life of the luminaire, based on the building or application type (eg, hotel, office...)
Functional unit	The functional unit defines an artificial product with the data on which the results of the LCA are based. The functional unit is created by standardising (normalising) the data of a specific product. For luminaires, this is the reference luminous flux of 1,000lm and the reference service life of 35,000 hours. The life cycle assessments of all luminaires whose functional unit was produced in this way are directly comparable.
Declared unit	Life cycle assessment data based on actual product data according to manufacturer specifications
Reference flow factor	Factor for converting the declared unit data into the functional unit
Extrapolation coefficient	Factor for converting the declared unit data for a specific article number.
Extrapolation factor	
Homogeneous environmental family	Product family with homogeneous ecological properties
Reference product	Selected product that represents a homogeneous product family
Constituent materials	Material composition of a product
Life cycle stages	Life cycle stages of a product
Cradle-to-grave	Life cycle of a product up to disposal
Modules	Subcategory of the life cycle stages of a product

Appendix: Acronyms in the EPDs

General

PEP	Product Environmental Profile	Synonym for EPD (Environmental Product Declaration)
PCR	Product Category Rules	Defines the general rules according to which an EPD is generated
PSR	Product Specific Rules	Defines the rules for certain products, eg, PSR 0014 for luminaires
LCA	Life Cycle Analysis	Assessment of the life cycle of a product including PCR and PSR
WEEE	Waste of Electrical and Electronical Equipment	EU Directive on the disposal of electronic equipment
EPREL	European Product Registry for Energy Labelling	European lighting database according to the SLR (Single Lighting Regulation)

EPD tables 6 and 8: Environmental impact

GWP	Global Warming Potential	Sum of greenhouse gas emissions (CO ₂ and similar) of GWP fossil, biogenic and luluc
GWP-fossil	Global Warming Potential fossil	Based on greenhouse gas emissions (CO ₂ and similar) from fossil sources
GWP-biogenic	Global Warming Potential biogenic	Based on greenhouse gas emissions (CO ₂ and similar) from organic sources
GWP-luluc	Global warming potential - land use and land use change	Based on greenhouse gas emissions (CO ₂ and similar) influenced by it
ODP	Ozone depletion potential	Potential for depletion of the stratospheric ozone layer; based on mass of trichlorofluoromethane (CFC-11) or similarly acting substances
AP	Acidification Potential	Acidification potential of soil and water, based on the concentration of H ⁺ ions or similarly acting substances
EP-freshwater	Eutrophication Potential - freshwater	This is the potential for the undesired direct introduction of nutrients into rivers, lakes etc; this potential is measured by the mass of phosphates or other substances with a similar effect that are introduced
EP-marine	Eutrophication Potential - marine	This is the undesirable direct introduction of nutrients into seawater; this potential is measured by the mass of nitrates or other substances with a similar effect that are introduced
EP-terrestrial	Eutrophication Potential	This is the undesired indirect introduction (ie, also into the air and soil) of phosphates, nitrates or similar substances whose concentration can lead to exceeding the limit values in water bodies;
POCP	Photochemical ozone creation potential	The measurement is based on the mass of NMVOC (non-methane volatile organic compounds - volatile organic compounds) emissions
ADPE	Abiotic Depletion Potential for Non-Fossil Resources	The measurement is based on the mass of antimony and other substances with similar effects
ADPF	Abiotic Depletion Potential for fossil resources	Measured in mega joules (MJ)
WDP	Water Deprivation Potential	This takes into account the local situation in terms of availability and consumption and sets this in relation to the global average; figures in cubic meters

Appendix: Acronyms in the EPD

EPD tables 7 and 9: Use of resources

PERE	Primary Renewable Energy	As an energy source
PERM	Primary Renewable Energy Material	As raw material
PERT	Primary Renewable Energy Total	Total renewable energy
PENRE	Primary Not-Renewable Energy	As energy source
PENRM	Primary Not-Renewable Energy Material	As a raw material
PENRT	Primary Not-Renewable Energy Total	Non-renewable primary energy, total
SM	Secondary Material	Use of secondary materials
RSF	Renewable Secondary Fuels	Renewable secondary fuels
NRSF	Non-Renewable Secondary Fuels	Non-renewable secondary fuels
FW	Fresh water	Net use of freshwater resources

Waste categories

HWD	Hazardous Waste Disposed	Hazardous waste for disposal
NHWD	Non-Hazardous Waste Disposed	Non-hazardous waste for disposal
RWD	Radioactive Waste Disposed	Radioactive waste for disposal

Output categories

CRU	Components for Re-Use	Components for re-use
MFR	Materials For Recycling	Materials for recycling
MER	Materials for Energy Recovery	Materials for energy recovery
EE	Exported Energy	Exported energy