




PRODUCT ENVIRONMENTAL PROFILE

EPD according to ISO 14025

Streetlight SL11

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EPD prepared by	Sphera Solutions GmbH		
Independent verification of the declaration and data in compliance with ISO 14025: 2006			
Internal		External	X
The PCR review was conducted by a panel of experts chaired by Julie Orgelet (DDemain)			
PEP are compliant with XP C08-100-1:2016 or EN 50693:2019			
The elements of the present PEP cannot be compared with elements from another program.			
Document in compliance with ISO 14025 : 2006 « Environmental labels and declarations. Type III environmental declarations»			

1 General information

1.1 Product information

The Streetlight SL 11 iQ mini (5XC2A51F08GE) is a mast luminaire with primary light control with 3 zone faceted reflector made of plastic with silver coating. The primary optical cover is made of transparent PMMA, whereas the housing is made of a powder coated diecast aluminium.

The light distribution types is ST1.2a with direct asymmetric light distribution. The light source of the luminaire is a high power LED with a rated luminous flux of 3.570 lm and a luminous efficiency of 157 lm/W. The luminaire can be controlled remotely via Street or Desk-Remote (wireless, voltage-free reading and setting of iQ features in the workshop via application-optimized NFC function/RFID function) and is powered by cable with a nominal operating voltage between 220 and 240 V.

The product is CE, ENEC, VDE certified and can be used for outdoor applications at ambient temperature between -25 and +50°C.

Table 1 summarizes the key technological data of the analyzed product.

Table 1: Key technological data

Information	Unit	
Product code	-	5XC2A51F08GE
Light source	-	LED
Power supply	-	50/60 Hz AC
Colour temperature	K	3,000
Protection index for water and dust (IP)	-	66
Impact resistance index (IK)	-	09
Nominal operating voltage	V	220 - 240
Declared lifetime of the luminaire (L80B10)	Hours	100,000
Declaration lifetime of the light source	Hours	100,000
Useful output flux	Lumen	3,570
Electrical input power	W	23
Luminous efficiency	Lumen/W	155
Length	mm	157
Width/Diameter	mm	736
Height	mm	174
Reference use scenario	-	116

Based on the declared lifetime of the luminaire and the average annual operating hours by the selected building type according to EN 13201-5:2016, the luminaire has the following annual service time:

Table 2: Use scenario

Type of building	Annual operating hours by default	Operational lifetime (years)
Outdoor application (urban / tunnel / zone, open space)	4,000	25

Following the requirements of the PSR, the operational lifetime is 25 years.

1.2 Overview

The general information used for the EPD are listed below:

Table 3: Basic EPD information

Information	
Functional unit	Provide lighting that delivers an outgoing artificial luminous flux of 1,000 lumens during a reference lifetime of 35,000 hours
Reference flow / declared unit*	0.098 pieces per functional unit
Life cycle stages covered (according to EN15804+A2)	Cradle-to-grave and Module D
Product category according to PSR	Luminaires
Product family name	Streetlight SL 11
All products of the product family	5XC2A51F08GE, 5XC1&#x\$*%%CE+++++, 5XC1&#x\$*%%DE+++++, 5XC2&#x\$*%%GE+++++, 5XC2&#x\$*%%FE+++++, 5XC2&#x\$*%%HE+++++, 5XC3&#x\$*%%LE+++++, 5XC3&#x\$*%%ME+++++
Extrapolation rules	The tables in the last section provide information about the used extrapolation rules and the resulting extrapolation factors according to the applied PSR.

* The reference flow is calculated as: $(1,000/\text{outgoing luminous flux of the analyzed product in lumens}) \times (35,000/\text{declared product lifetime of the analyzed product in hours})$

Consequently, the reference flow of the following product correspond to:

$$(1,000/3,570) \times (35,000/100,000) = 0.098$$

2 Constituent materials

2.1 Overview

Table 4: Packed product composition

Information	Weight [in kg]	Share [in %]
Total weight	6.9	100.0
Product	6.5	94.0
Packaging	0.4	6.0
Additional equipment	0.0	0.0

2.2 Product

Table 5: Material composition - product

Information	Weight [in kg]	Share [in %]
Total weight	6.5	100.0
Metals	3.7	57.2
- Aluminium	3.6	56.0
- Stainless Steel	0.1	1.0
- Other	<0.1	0.1
Electronics	1.9	29.9
Plastics	0.8	12.9
- PC/ABS	0.2	3.3
- PC	0.2	3.1
- PMMA	0.2	2.5
- Silicone	0.1	2.5
- Other	0.1	1.8

2.3 Packaging

Table 6: Material composition - packaging

Information	Weight [in kg]	Share [in %]
Total weight	0.4	100.0
Plastics	0.1	20.0
Paper/cardboard	0.3	80.0

3 Information on life cycle stages

3.1 Manufacturing (A1-A3)

Electronic components are largely sourced from Asia, mechanical components from Europe. The Electronic control gear is then manufactured in Germany. For higher wattages the production takes place in Eastern Europe. Other production steps at the Siteco factory in Traunreut (Germany) are the manufacturing of LED modules, plastic injection moulding and coating of reflectors, painting of housing and final assembly, as well as parameterization of the product. The Siteco factory in Traunreut in Germany is ISO 9001 / 14001 / 45001 / 50001 certified.

3.2 Distribution (A4)

The main market of the product is Europe with a special focus on the DACH region (Germany, Austria, Switzerland). For this reason, the transport distance has been calculated as weighted average based on sales statistics. As a result, an intracontinental transport with 730 km by truck is considered.

The background assumptions for the transportation are listed below.

Table 7: Background information distribution

Information	Unit	Truck
Fuel type	-	Diesel
Fuel consumption	l/(kg*km)	1.99E-05
Total distance	km	730
Capacity utilisation (including empty runs)	%	85
Bulk density of transported products	kg/m ³	n.a.
Volume capacity utilisation factor	-	n.a.

3.3 Installation (A5)

The product is designed for simplified installation (i.e. only fixation with screws). No energy or material input is required. During installation, the product is unpacked and the packaging becomes waste. Siteco uses partnerships to get approximately 80% of these materials into recycling processes. The rest is sent to incineration processes with energy recovery.

3.4 Use stage (B1-B6)

The product has no direct emissions (B1) and is designed so that no maintenance is required (B2) or parts need to be replaced (B4). Furthermore, no standard repairs (B3) or refurbishments (B5) are foreseen. The use of the product does consume electricity (B6), but no water (B7).

The main market of the product is Europe.

3.5 End of life (C1-C4)

The product falls under the Waste from Electrical and Electronic Equipment (WEEE) directive 2012/19/EU subcategory 4. Primary data on the treatment of the product has been used. The EoL scenario displays an European average and is the following:

- Incineration without energy recovery: 5%
- Incineration with energy recovery: 5%
- Landfilling: 5%
- Recycling¹: 85%

3.6 Benefits and loads beyond the system boundaries stage (D)

The incineration with energy recovery and recycling of the product and packaging generates environmental benefits by avoiding the production of primary materials or energy. The amount and types of waste streams from the product and packaging are listed in Table 8.

Table 8: Material flows for benefits and loads beyond the system boundaries

Information	Unit	Value
Total weight going into re-use	kg/functional unit	0.00
Total weight going into recycling	kg/functional unit	0.38
- Share from product	%	91
- Share from packaging	%	9
Total weight going into incineration with energy recovery	kg/functional unit	0.23
- Share from product	%	97
- Share from packaging	%	3

¹ The recycling scenario for the product excl. packaging considers recycling processes for all metals and incineration with energy recovery for all other material groups.

4 Environmental impacts

4.1 Introduction

The following table summarizes the key information for the calculation of the environmental impacts:

Table 9: Basic information LCA model

Information	Value
Used LCA software	GaBi 10
Used LCI database	GaBi Professional 2023.1 + Extension 2023.1
PCR version	PEP-PCR-ED4-EN-2021 09 06
Functional unit	Provide lighting that delivers an outgoing artificial luminous flux of 1,000 lumens during a reference lifetime of 35,000 hours

4.2 Results per functional unit

The following results of the environmental declaration have been developed by considering an outgoing artificial luminous flux of 1,000 lumens over a reference lifetime of 35,000 hours. The results refer to the core environmental impact indicators and indicators describing resource use, waste categories, and output flows according to EN 15804:2012+A2:2019.

Table 10: Results core environmental impact indicators per functional unit (0.68 kg product incl. packaging)

	Raw materials & parts		Manufacturing	Distribution	Installation	Use	End of life			Benefits and loads beyond the system boundaries
	A1	A2	A3	A4	A5	B6	C2	C3	C4	D
GWP - total [kg CO ₂ eq.]	3.02E+00	3.11E-02	1.08E-01	5.04E-02	1.31E-02	4.83E+01	4.07E-02	4.52E-01	2.72E-02	-1.15E+00
GWP - fossil [kg CO ₂ eq.]	3.10E+00	2.94E-02	6.22E-02	4.56E-02	4.13E-03	4.75E+01	3.85E-02	4.52E-01	2.72E-02	-1.17E+00
GWP - biogenic [kg CO ₂ eq.]	-7.93E-02	1.39E-03	4.54E-02	4.52E-03	8.94E-03	7.54E-01	1.82E-03	3.91E-04	1.78E-06	2.94E-02
GWP - luluc [kg CO ₂ eq.]	2.65E-03	2.69E-04	2.86E-05	3.17E-04	1.16E-07	6.94E-03	3.52E-04	1.42E-04	2.03E-06	-1.27E-03
ODP [kg CFC-11 eq.]	1.65E-11	3.77E-15	7.03E-12	4.97E-14	1.89E-15	1.19E-09	4.94E-15	5.57E-13	2.41E-14	-3.79E-12
AP [Mole of H+ eq.]	2.55E-02	3.38E-05	1.77E-04	6.08E-05	3.01E-06	7.91E-02	4.43E-05	6.15E-04	1.59E-05	-1.31E-02
EP - freshwater [kg P eq.]	1.13E-05	1.06E-07	1.45E-06	5.26E-07	5.56E-10	2.57E-04	1.39E-07	2.52E-07	1.06E-08	-1.70E-06
EP - marine [kg N eq.]	2.36E-03	1.13E-05	6.21E-05	2.32E-05	1.05E-06	2.38E-02	1.48E-05	2.49E-04	5.46E-06	-1.04E-03
EP - terrestrial [Mole of N eq.]	2.55E-02	1.34E-04	6.34E-04	2.43E-04	1.37E-05	2.46E-01	1.75E-04	2.82E-03	6.92E-05	-1.12E-02
POCP [kg NMVOC eq.]	8.21E-03	2.95E-05	1.34E-04	5.36E-05	2.81E-06	5.85E-02	3.86E-05	6.80E-04	1.46E-05	-3.70E-03
ADPE [kg Sb eq.]	4.05E-04	1.91E-09	4.39E-08	8.28E-09	1.70E-11	8.30E-06	2.50E-09	1.74E-08	1.98E-10	-3.34E-04
ADPF [MJ]	4.65E+01	3.95E-01	8.34E-01	6.20E-01	4.63E-03	7.45E+02	5.17E-01	2.78E+00	4.24E-02	-1.58E+01
WDP [m ³ world equiv.]	7.38E-01	3.50E-04	8.55E-03	1.02E-03	1.51E-03	3.56E+00	4.59E-04	5.30E-02	5.14E-03	-3.26E-01

Table 11: Results indicators describing resource use, waste categories, and output flows per functional unit (0.68 kg product incl. packaging)

Indicator	Acronym [Unit]	Total (excl. D)
Renewable primary energy (without raw material)	PERE [MJ]	6.38E+02
Renewable primary energy (raw material)	PERM [MJ]	5.82E-01
Total use of renewable primary energy	PERT [MJ]	6.39E+02
Non-renewable primary energy (without raw material)	PENRE [MJ]	7.92E+02
Non-renewable primary energy (raw material)	PENRM [MJ]	4.84E+00
Total use of non-renewable primary energy	PENRT [MJ]	7.97E+02
Use of secondary materials	SM [kg]	3.36E-01
Use of renewable secondary fuels	RSF [MJ]	7.06E-02
Use of non-renewable secondary fuels	NRSF [MJ]	1.11E+00
Net use of fresh water	FW [m3]	3.10E-01
Hazardous waste disposed	HWD [kg]	1.50E-07
Non-hazardous waste disposed	NHWD [kg]	1.17E+00
Radioactive waste disposed	RWD [kg]	8.90E-02
Components for reuse	CRU [kg]	0.00E+00
Materials for recycling	MFR [kg]	3.78E-01
Materials for energy recovery	MER [kg]	2.62E-01
Exported electricity	EEE [MJ]	4.99E-01
Exported thermal energy	EET [MJ]	1.15E+00
Biogenic carbon content of the product	Biog. C in product [kg]	0.00E+00
Biogenic carbon content of the associated packaging	Biog. C in packaging [kg]	1.39E-02

4.3 Results per unit of product

The following results of the environmental declaration have been developed by considering the entire life cycle of one product with the technical properties described in 1.. The results refer to the core environmental impact indicators and indicators describing resource use, waste categories, and output flows according to EN 15804:2012+A2:2019.

Table 12: Results core environmental impact indicators per unit of product

	Raw materials & parts		Manufacturing	Distribution	Installation	Use	End of life			Benefits and loads beyond the system boundaries
	A1	A2	A3	A4	A5	B6	C2	C3	C4	D
GWP - total [kg CO ₂ eq.]	3.08E+01	3.17E-01	1.10E+00	5.14E-01	1.33E-01	492.7	4.15E-01	4.61E+00	2.77E-01	-1.17E+01
GWP - fossil [kg CO ₂ eq.]	3.16E+01	3.00E-01	6.35E-01	4.65E-01	4.22E-02	4.85E+02	3.93E-01	4.61E+00	2.77E-01	-1.20E+01
GWP - biogenic [kg CO ₂ eq.]	-8.09E-01	1.42E-02	4.63E-01	4.61E-02	9.12E-02	7.70E+00	1.86E-02	3.99E-03	1.82E-05	3.00E-01
GWP - luluc [kg CO ₂ eq.]	2.71E-02	2.74E-03	2.92E-04	3.23E-03	1.18E-06	7.08E-02	3.59E-03	1.45E-03	2.08E-05	-1.29E-02

ODP [kg CFC-11 eq.]	1.68E-10	3.85E-14	7.17E-11	5.07E-13	1.93E-14	1.22E-08	5.04E-14	5.69E-12	2.46E-13	-3.87E-11
AP [Mole of H+ eq.]	2.60E-01	3.45E-04	1.80E-03	6.20E-04	3.07E-05	8.07E-01	4.52E-04	6.28E-03	1.62E-04	-1.33E-01
EP - freshwater [kg P eq.]	1.15E-04	1.08E-06	1.48E-05	5.36E-06	5.67E-09	2.62E-03	1.42E-06	2.57E-06	1.08E-07	-1.73E-05
EP - marine [kg N eq.]	2.41E-02	1.16E-04	6.34E-04	2.36E-04	1.07E-05	2.43E-01	1.51E-04	2.54E-03	5.57E-05	-1.06E-02
EP - terrestrial [Mole of N eq.]	2.60E-01	1.36E-03	6.47E-03	2.48E-03	1.40E-04	2.51E+00	1.78E-03	2.88E-02	7.06E-04	-1.15E-01
POCP [kg NMVOC eq.]	8.38E-02	3.01E-04	1.36E-03	5.46E-04	2.87E-05	5.97E-01	3.93E-04	6.94E-03	1.49E-04	-3.77E-02
ADPE [kg Sb eq.]	4.14E-03	1.95E-08	4.48E-07	8.44E-08	1.74E-10	8.47E-05	2.55E-08	1.78E-07	2.02E-09	-3.41E-03
ADPF [MJ]	4.74E+02	4.03E+00	8.51E+00	6.32E+00	4.73E-02	7.60E+03	5.28E+00	2.84E+01	4.33E-01	-1.62E+02
WDP [m³ world equiv.]	7.53E+00	3.58E-03	8.73E-02	1.04E-02	1.54E-02	3.64E+01	4.68E-03	5.41E-01	5.24E-02	-3.33E+00

Table 13: Results indicators describing resource use, waste categories, and output flows per unit of product

Indicator	Acronym [Unit]	Total (excl. D)
Renewable primary energy (without raw material)	PERE [MJ]	6.51E+03
Renewable primary energy (raw material)	PERM [MJ]	5.94E+00
Total use of renewable primary energy	PERT [MJ]	6.52E+03
Non-renewable primary energy (without raw material)	PENRE [MJ]	8.08E+03
Non-renewable primary energy (raw material)	PENRM [MJ]	4.94E+01
Total use of non-renewable primary energy	PENRT [MJ]	8.13E+03
Use of secondary materials	SM [kg]	3.43E+00
Use of renewable secondary fuels	RSF [MJ]	7.20E-01
Use of non-renewable secondary fuels	NRSF [MJ]	1.13E+01
Net use of fresh water	FW [m3]	3.16E+00
Hazardous waste disposed	HWD [kg]	1.53E-06
Non-hazardous waste disposed	NHWD [kg]	1.19E+01
Radioactive waste disposed	RWD [kg]	9.08E-01
Components for reuse	CRU [kg]	0.00E+00
Materials for recycling	MFR [kg]	3.85E+00
Materials for energy recovery	MER [kg]	2.67E+00
Exported electricity	EEE [MJ]	5.09E+00
Exported thermal energy	EET [MJ]	1.17E+01
Biogenic carbon content of the product	Biog. C in product [kg]	0.00E+00
Biogenic carbon content of the associated packaging	Biog. C in packaging [kg]	1.42E-01

5 Extrapolation rules

The extrapolation coefficients included in the PEP Eco-passport have been developed according to the valid PCR & PSR. Table 14 shows the key properties of the reference product, function as extrapolation basis.

Table 14: Reference values for the extrapolation

Parameter	Unit	Reference value (5XC2A51F08GE)
Weight of structural/ mechanical parts	kg	4.56
Weight of power equipment	kg	1.84
Weight of light source	kg	0.09
Weight of light management system	kg	0
Weight of product (excl. packaging)	kg	6.48
Weight of packaging	kg	0.42
Typical power consumption	W	12
Lumen output	lm	3,570
Weight of product (incl. packaging)	kg	6.90

The extrapolation at the level of the functional unit needs to be done according to the following formula:

$$\text{Extrapolation coefficient at the product level} \times \left(\frac{\text{Lighting output of reference product (lumens)}}{\text{Lighting output of product concerned (lumens)}} \right)$$

The required extrapolation coefficients at the product level are listed in the following table.

Table 15: Extrapolation coefficients at the product level

Product code	Fabrication stage	Distribution stage	Installation stage	Use stage	End of life stage
5XC2A51F08GE	1	1	1	1	1
5XC1&#x\$*%%CE+++++	0.81	0.81	0.88	0.63	0.80
5XC1&#x\$*%%DE+++++	0.81	0.81	0.88	1.08	0.80
5XC2&#x\$*%%GE+++++	1.02	0.99	1.00	1.04	0.99
5XC2&#x\$*%%FE+++++	1.02	0.99	1.00	1.92	0.99
5XC2&#x\$*%%HE+++++	1.02	0.99	1.00	2.33	0.99
5XC3&#x\$*%%LE+++++	1.76	1.76	1.57	2.54	1.77
5XC3&#x\$*%%ME+++++	1.76	1.76	1.57	4.83	1.77

Lumen output of each product variant and other important properties are listed in the table below.

Table 16: Information about the product family

Product Code	Typical power consumption	Lumen output	Weight of structural/mechanical parts	Weight of power equipment	Weight of light source	Weight of light management system	Weight of product (excl. packaging)	Weight of packaging	Weight of product (incl. packaging)
	W	lm	kg	kg	kg	kg	kg	kg	kg
5XC2A51F08GE	12	3,570	4.56	1.84	0.09	0	6.48	0.42	6.90
5XC1&\$*%%CE+++++	7.5	1,801	3.68	1.45	0.07	0	5.20	0.37	5.57
5XC1&\$*%%DE+++++	13	3,565	3.68	1.45	0.07	0	5.20	0.37	5.57
5XC2&\$*%%GE+++++	12.5	3,454	4.67	1.84	0.09	0	6.40	0.42	6.82
5XC2&\$*%%FE+++++	23	6,377	4.67	1.84	0.09	0	6.40	0.42	6.82
5XC2&\$*%%HE+++++	28	7,829	4.67	1.84	0.09	0	6.40	0.42	6.82
5XC3&\$*%%LE+++++	30.5	9,393	8.14	3.2	0.16	0	11.5	0.66	12.16
5XC3&\$*%%ME+++++	58	16,858	8.14	3.2	0.16	0	11.5	0.66	12.16