PHILIPS

ClearWay gen2

Product declaration

LIFE CYCLE ASSESSMENT REPORT

ClearWay gen2

as per ISO 14021, based on ISO 14040/14044

ClearWay gen2 is a functional outdoor luminaire with one housing size which can accommodate up to 40 LEDs. With its rotatable spigot it can be used in post top and side entry applications. It makes use of the Ledgine O light engine with a wide array of CCT's (Correlated Color Temperature) and optics. The canopy can be executed in a wide range of colours and optionally equipped with Marine Salt Protection (MSP) for coastal areas.
The ClearWay gen2 is a configurable painted aluminium outdoor luminaire with a glass cover which is fixated with screws. It makes use of the Philips Xitanium driver ranges and Ledgine O light engine.

Product

Product family range

The ClearWay gen2 is a family of configurator products - individual parts can be chosen from provided options and combined for a product to meet the individual needs. The assembly of the products is implemented on the manufacturing site of Ketrzyn (Poland). The manufacturing site of the product has achieved carbon neutrality as of 2019.
The EPD does not present the assessment of the impacts of the whole range, and focused on representation through the most probable worst case scenario rather than through average impacts with assessment of deviations. This approach is based on the Signify developed EPD framework.

Representative product

The ClearWay gen2 product BGP307 LED130-4S/740 II DM50 48/60S is chosen as a representative product for the family as the luminaire with the highest power consumption over the lifetime, with inclusion of an emergency power supply module. Based on multiple LCA studied of the LED based luminaires, it is defined that the use stage (and electricity consumption in particular) tends to contribute the majority of the life-cycle impacts. Thus, a product with the largest power consumption over the lifetime in the family is most likely to have largest impacts, and thus present a worst case. That choice of a product aligns with pessimistic assumptions and precautionary principle in view of the task to represent other products in the family. This approach is based on the Signify developed EPD framework.

Product application

The luminaires of the ClearWay gen2 family are designed for a broad range of outdoor road and street applications. Application areas contained are parking areas, bicycle and pedestrian paths, roads and urban and residential roads.

Technical Data

The system comprises a set of modules that are the key building blocks for a luminaire. A typical application has the following technical features:
- 1 x Xitanium driver: Full Prog, System ready (later Low Prog or Basic Prog)
- 2 LED boards with 20 LEDs with Ledgine O
- Housing made of die casted aluminium
- connectors
- strain relief
- cables
- mechanical parts from metal or plastic

Delivery status

Product weight: 5.95 kg (including 0.6 kg packaging), dimensions of the packaged product: 560mm*330mm*125mm.

Driver:

i.	Type	Xi FP 110W 0.2-0.7A SNLDAE 230V C133 sXt
ii.	Failure rate (max % @lifetime)	10%
iii.	Dimensions, mm	133 x 77 x 40

LED board

i.	Type	Ledgine O mini 6-10-20 LED
ii.	Dimension board, mm	70 x 75
iii.	Amount of PCBA per luminaire	2
iv.	Number of LEDs per PCBA	20

Constructional data

Name	Value	Unit
Dimensions	480x325x90	Mm*mm*mm
Luminous flux	13000	lm
Luminous efficacy	140	Lm/W
Radiation angle	at C0-C180: 154° at C90: 31° at C270: 54°	Deg
Colour temperature	4000	K

Base materials/Ancillary materials

Materials	Mass, kg
Metals / Aluminium	3.33
Glass / Hard glass	1.07
Packaging / Paper	0.59
Electric Comp's / EM ballasts (general)	0.54
Gaskets / Silicone	0.09
Plastics / PMMA	0.08
Electric Comp's / PCBA without cables	0.08
Metals / Stainless Steel	0.08
Metals / Steel	0.03
Electric Comp's / Cable unspecified	0.02
Plastics / PA polyamide	0.02
Electric Comp's / Connectors	0.01
Packaging / PE	0.01
Electric Comp's / Connectors	0.01
Electric Comp's / Connectors PA	0.01
Product weight (including packaging): 5.95 kg	

Manufacturing
Manufacturing of the product is partially done by Chinese suppliers for the LED boards and partly by Philips Poland (Pila) for the driver. Mechanical parts are made in China (aluminium cast housing) and in Europe. Final assembly of the luminaire is performed at the Ketrzyn site in Poland.

Product processing/Installation
Product can be mounted on a stand-alone pole or bracket.

Packaging
0.598 kg, including cardboard box, PE bag and labels.

Condition of use
Designed for use outdoor in average European conditions. No extreme exposure to chemicals or pollution is implied. For higher saline environments like near the sea, Marine Salt Protection coating is required and can be ordered from factory. Applications may apply dimming or lighting controls to allow further energy saving. Product is used in the European market context and assumed to use average European electricity mix.

Environment and health during use
The product is compliant with the European RoHS Directive 2011/65/EU of 8 June 2011 on Restriction of the use of certain Hazardous Substances in Electrical and Electronic equipment and with the European REACH regulation (EC) No 1907/2006 of 18 December 2006 on the Registration, Evaluation, Authorization and Restriction of Chemicals. CE, WEEE, SLR, ENEC, ENEC+, IEC 60598 and the attached norms applicable.

Reference service life
The RSL is established as 100 000 hours operation, the equivalent of 25 years operation in outdoor public areas (4000 hours per year).

End of life
In the European Union, luminaires fall within the scope of the WEEE directive. Efforts are made to improve collection, reuse and recycling of the product mainly via collective Collection & Recycling Service Organizations (CRSOs). In the end of life, the luminaire is 85% collected and disassembled. The collected parts are disassembled and steel, aluminium, glass, electronic parts, and cables are sent to recycling. Batteries are collected and sent to treatment. The quantitative assessments are based on a material split and respective recycling rates. Non-collected and non-recycled after disassembly content is disposed to the municipal waste stream where it undergoes separation, preparation and treatment according to the average European statistics. Waste generated in installation and parts replacement are 100% collected and sent to respective treatment.

Extraordinary effects
• Fire: effects of fire can lead to emissions of PBDD/F (brominated compounds).
• Water: no known impacts on the environment following unforeseeable influence of water, e.g. flooding.
• Mechanical destruction: no known impacts on the environment following unforeseeable mechanical destruction.

Further information
Details of the product are published on:
https://www.lighting.philips.nl/

Calculation rules

Declared unit

Declared product	Value	Declared unit
BGP307 LED130-4S/740 II DM50 48/60S	Unit	1 piece

The declared unit is a luminaire with a diecast aluminium housing, 1 driver, 2 LED boards, cables, and other plastic, and metal constructive components totalling a weight of 5.348 kg excluding packaging, providing a luminous flux of 13 000 lum, including luminaire losses. The luminaire, provides sufficient light for a typical outdoor application, operated in a European context for 100 000 hours.

System boundary

Cradle to gate with options
Modules A1-A3 include: raw material extraction, processing, energy and materials and manufacture of modules and packaging.
The following scenarios are also included:
- Transport to installation (A4);
- Disposal of packaging materials (A5);
- Replacement of driver (10% rate) and LED board (1% rate) (B3);
- Operational energy use (B6);
- Transport to end of life (C2);
- Waste processing (C3);
- Final disposal for WEEE fraction not recycled (C4).
- Benefits and loads beyond system boundary: Recycling of cardboard packaging, electronics, cables, steel elements of luminaire. (D)

Estimates and assumptions

Background data are used for suppliers' specific processes. Foreground data are used for the assembly of the lighting unit in regards to the components of the luminaire (system). When necessary, generic data was generated based on averaging the data of multiple products of the same category. Data on collection and recycling are based on data of the generic European statistics. The end of life scenario assumes recycling of the separated materials, but does not include energy recovery from incineration of the waste. Representation of the family is assumed on the worst case scenario with largest power consumption over the lifetime, and is not compliant with EN15804+A1.

Cut-off criteria

Where no data was available, items that represent less than 1% of the total product weight were neglected. No excluded flows were of any known particular environmental concern.

Background data

Necessary background data are sourced from the Signify database and the Ecoinvent database v3.7.1.

Data quality

Specific data used is less than 5 years old. Background data is geographically representative of the production location, and is less than 10 years old.

Period under review

The period under review is the year 2021 for the product composition, RSL, and product performance and characteristics, year 2019 for the energy and material consumption at the assembly factory.

Allocation

Avoided burden approach is applied to allocation of recycled and/or secondary raw materials, as well as loads and benefits beyond the system boundary from material recycling. No loads and benefits beyond the system boundary from energy recovery in the end of life of the product or packaging is included. Energy consumption, material and waste generation at the manufacturing site not attributed to bill of materials of the products, is allocated by partitioning, on the basis of units produced.

Comparability

A comparison or an evaluation of the presented data is only possible if the data to be compared were created according to the Signify/Philips lighting framework and the building context, respectively the product specific characteristics of performance, are taken into account.

LCA: Scenarios and additional technical information

Transport to the site (A4)

Name	Value	Unit
Transport distance	1200	Km
Transport mode	truck, unspecified generic	-
Capacity utilisation incl. empty runs	45	%
Bulk density of transported product	257.38	kg/m3

Installation at the site (A5)

Name	Value	Unit
Packaging waste	0.598	kg

Reference service life

Name	Value	Unit
Reference service life	25	Years
Operating hours per year	4000	Hours
Quality of work	L90B50	-
Environment of operation	Average European conditions. No extreme exposure to chemicals or pollution is implied.	-
Usage conditions	Outdoor	-

Repair (B3)

Name	Value 1	Value 2	Unit
Repair process	Replacement of the driver	Replacement of the LED boards	-
Repair cycle	0.10	0.01	Number/RSL
Resources	0.543	0.080	kg
Transportation distance	4.8	4.8	Km
Transportation mode	Van	Van	-

Operational energy use (B6)

Name	Value	Unit
Electricity consumption	7624	kWh
Equipment output	79	W

End of life (C1-C4)

Name	Value	Unit
Collected separately	4.55	kg
Sent to recycling	3.38	kg
Sent to energy recovery	0.85	kg
Sent to landfilling	1.11	kg
Transportation distance from point of use to collection and sorting point	30	km
Transportation distance from collection point to recycling	100	km
Transportation distance from collection point to incineration and landfilling	30	km
Mode of transportation	Truck, unspecified	-

LCA Results

Description of the system boundary (X = included in lca; MND = module not declared; MNR = module not relevant)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundarys
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste Processing	Disposal	Reuse- Recovery- Recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	X	MNR	MNR	X	MND	MND	X	X	X	X

Results of the LCA - environmental impact

Parameter	Unit	A1-A3	A4	A5	B3	B6	C2	C3	C4	D
GWP	[kg CO2Eq.]	7.8E+01	9.3E-01	4.8E-02	6.6E+00	3.1E+03	7.2E-02	6.5E-01	3.7E+00	-1.9E+01
ODP	[kg CFC11Eq]	5.4E-05	1.7E-07	4.4E-09	7.7E-07	1.8E-04	1.3E-08	6.1E-08	4.6E-09	-2.1E-06
AP	[kg SO2Eq.]	4.5E-01	3.9E-03	2.1E-04	2.9E-02	1.5E+01	3.1E-04	3.5E-03	4.3E-04	-1.3E-01
EP	[kg (PO4)3Eq]	7.0E-02	7.4E-04	3.2E-05	4.7E-03	2.0E+00	5.7E-05	6.9E-04	1.5E-03	-1.5E-02
POCP	[kg Ethen Eq.]	3.2E-02	1.2E-04	1.2E-05	2.1E-03	6.0E-01	9.7E-06	2.2E-04	2.9E-05	-7.5E-03
ADPE	[kg Sb Eq.]	1.2E-02	3.0E-06	1.8E-06	5.9E-04	2.9E-02	2.3E-07	1.3E-05	3.4E-05	-2.9E-03
ADPF	[MJ]	8.5E+02	1.4E+01	6.0E-01	8.2E+01	3.6E+04	1.1E+00	6.5E+00	1.7E+00	-2.1E+02
Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non fossil resources; ADPF = Abiotic depletion potential for fossil resources									

Results of the LCA - resource use

Parameter	Unit	A1-A3	A4	A5	B3	B6	C2	C3	C4	D
PERE	[MJ]	1.2E+02	2.0E-01	6.9E-02	5.5E+00	1.2E+04	1.6E-02	8.0E-01	7.5E-01	-3.6E+01
PERM	[MJ]	1.3E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-9.8E+00
PERT	[MJ]	1.3E+02	2.0E-01	6.9E-02	5.5E+00	1.2E+04	1.6E-02	8.0E-01	7.5E-01	-4.6E+01
PENRE	[MJ]	9.8E+02	1.5E+01	7.0E-01	9.6E+01	7.0E+04	1.2E+00	9.9E+00	1.4E+00	-2.5E+02
PENRM	[MJ]	7.5E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-4.4E+00
PENRT	[MJ]	1.1E+03	1.5E+01	7.0E-01	9.6E+01	7.0E+04	1.2E+00	9.9E+00	1.4E+00	-2.6E+02
SM	[kg]	IND	IND	IND	IND	IND	IND	IND	IND	IND
RSF	[MJ]	IND	IND	IND	IND	IND	IND	IND	IND	IND
NRSF	[MJ]	IND	IND	IND	IND	IND	IND	IND	IND	IND
FW	[m3]	IND	IND	IND	IND	IND	IND	IND	IND	IND
Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water									

Results of the LCA – output flows and waste categories

Parameter	Unit	A1-A3	A4	A5	B3	B6	C2	C3	C4	D
HWD	[kg]	IND	IND	IND	IND	IND	IND	IND	IND	IND
NHWD	[kg]	IND	IND	IND	IND	IND	IND	IND	IND	IND
RWD	[kg]	IND	IND	IND	IND	IND	IND	IND	IND	IND
CRU	[kg]	IND	IND	IND	IND	IND	IND	IND	IND	IND
MFR	[kg]	IND	IND	IND	IND	IND	IND	IND	IND	3.38
MER	[kg]	IND	IND	IND	IND	IND	IND	IND	0.85	IND
EEE	[MJ]	IND	IND	IND	IND	IND	IND	IND	IND	IND
EET	[MJ]	IND	IND	IND	IND	IND	IND	IND	IND	IND
Caption	HWD = Hazardous waste disposed; NHWD = Non hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for reuse; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy									

Not all background datasets support the methodical approach of the water and waste indicators. The value of the indicator is therefore subject to greater uncertainty. These indicators are thus not declared. IND is used in cases where the inventory does not support the methodological approach or the calculation of the specific indicator.

The life cycle impact assessment by stage (contribution analysis) is illustrated on the figure on the right:

Use phase of the product associated with electricity consumption for lighting (stage B6 on the chart), have the highest and most significant contribution to the overall environmental impacts of the product over its life cycle, in all impact categories. In particular, impacts in global warming potential (GWP), acidification potential (AP), eutrophication potential (EP), photochemical ozone formation potential (POCP), and abiotic depletion potential (fossil) (APDF) categories are attributed to the electricity consumption at the rate above 95.7%. Of the abiotic depletion potential (elements) (ADPE), a considerable proportion of the impact (31%) is related to raw materials extraction and processing and product manufacturing (stage A1-A3 on the chart). This is mostly caused by the sourcing of precious metals for the wiring board in the driver and the PCBA LED board. The rest of the ADPE impact is again caused mainly by electricity consumption for lighting. The considerable ozone depletion potential impacts of the stage A1-A3 could be attributed to sourcing of temperature-resistant polymers. End of life of the product has a marginal contribution to the reduction of overall impacts in all categories apart from ADPE. There, recycling in the end of life reduces the cumulative impact of production (A1-A3), distribution and installation (A4-A5), use (B3, B6), and end of life (C2-C4) by 6.89%, relating to -7.40% of the total ADPE over the life cycle. This is achieved by high rates of luminaires collection in the end of their service, and high rates of recycling of the metals in the end of life of the luminaire.

Requisite evidence

The measurements are based on documentation and bill of materials of the product.

References

EN 15804:2012-04+A1 2013, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

ISO 14021:2016, Environmental labels and declarations — Self-declared environmental claims (Type II environmental labelling)

ISO 14040:2006, Environmental management — Life cycle assessment — Principles and framework

ISO 14044:2006, Environmental management — Life cycle assessment — Requirements and guidelines

Disclaimer

All environmental calculations are based on a luminaire used in European context. The calculations are performed on the most commonly used luminaire in the range. The implemented life cycle analysis is compliant with DIN EN ISO 14040:2006: Environmental management - Life Cycle Assessment - Principles and framework. The LCA has been performed to the best of Signify's knowledge. No right or claim might be derived from this. Signify disclaims any and all claims with respect thereto.

Further information Please contact:

sustainability@signify.com

Collection and Recycling (brochure)

Ecoinvent (website)

Glossary

ADP (Abiotic Depletion Potential): Impact related to the depletion of non-renewable resources, i.e. fossil fuels (ADPF), metals and minerals (ADPE).

AP (Acidification Potential): Contributions of SO2, NOx, HCl, NH3 and HF to the potential acid deposition, causing a wide range of impacts on soil, groundwater, surface water, organisms, ecosystems and buildings.

EP (Eutrophication Potential): Potential to cause over-fertilization of water and soil, which can result in increased growth of biomass.

GWP (Global Warming Potential): Relative measure of how much heat a greenhouse gas (CO2, N2O, CH4...) traps in the atmosphere. It is calculated over a specific time interval, commonly 20, 100 or 500 years.

LCA: Life cycle assessment.

PCR: Product Category Rules.

PERE: Use of renewable primary energy excluding renewable primary energy resources used as raw materials.

PERM: Use of renewable primary energy resources used as raw materials.

PERT: Total use of renewable primary energy resources.

PENRE: Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials.

PENRM: Use of non-renewable primary energy resources used as raw materials.

PENRT: Total use of non-renewable primary energy resources.

POCP (Photo-chemical Oxidation Potential or photochemical smog): Formation of reactive substances (mainly ozone) which are injurious to human health and ecosystems and which also may damage crops.

RSL: Reference service life.

www.lighting.philips.com