PHILIPS

TrueLine

Product declaration

Environmental Product Declaration of the TrueLine Circular Economy ready luminaire

(ISO 14021, based on ISO 14040/14044, EN 15804)

About

This document intends to describe the environmental performance of the TrueLine Circular Economy Ready luminaire. The LCA (Life Cycle Assessment) is carried out according to ISO 14040/14044. The CEN Norm EN 15804 serves as the core PCR.

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“A Circular Economy is one that is restorative and regenerative by design, and which aims to keep products, components and materials at their highest utility and value at all times, distinguishing between technical and biological cycles.”

(www.ellenmacarthurfoundation.org)

Introduction to
Circular Economy

For a sustainable world, the transition from a linear to a Circular Economy is essential. A Circular Economy is an economic system that maximizes the re-usability of products and raw materials and minimizes value destruction.

Why Circular?

The current, linear method of production is using up raw materials and producing ever more waste. This is exhausting the planet’s resources, driving up the price of materials, and generating more polluting landfills. But simply using fewer raw materials is not enough. We need to change from the linear system to a circular one, to ensure that raw materials, components and products are kept in circulation.

Introduction to **TrueLine** Circular Economy Ready luminaire

The aesthetically appealing and office-compliant Philips TrueLine is bringing the combination of design and efficiency (up to 126 lm/W) to office spaces. The luminaire offers various benefits such as flexible mounting options, high quality of light and option of delivering both direct and indirect illumination. TrueLine is also offering the option of getting it connected to various Philips controls as well as software based lighting management systems such as Interact Office. By making the luminaire part of the connected infrastructure, it then becomes an IoT enabled device ready to be used for data collection and other IoT enabled services and innovations that the future brings.

The luminaire is designed to use natural resources in a much more effective and regenerative way, closing the materials loop according to Circular Economy design principles. Thanks to modular assembly and design, maintenance is easy, and it is simple to upgrade.

TrueLine is designed for Circular Economy

The product introduces a range of environmental features that make it ideally suited to the Circular Economy.

Optimized performance:

- Improved optical performance, excellent quality of light and superior application efficiency
- Compliant with office lighting norms
- Combination of direct and indirect light
- Extended lifetime of 50 khrs
- Reduced failure rate of 0.5%
- Over 60% savings when combined with lighting controls compared to conventional lighting

Extended product life through ease of upgradability and integration options:

- Luminaire can be combined with ActiLume controls and connected to Philips SpaceWise lighting systems and even to cloud based lighting management software like Interact Office
- Luminaire upgrade are conducted wirelessly

Ease of serviceability and maintenance:

- Product can be treated on the ceiling without taking it down
- Components are easily accessible
- Spare part tracking and accessing information at factory level thanks to the Philips Service tag

The **Philips Service tag** application enables smoother maintenance and installation by:

- Providing access to critical lighting component information where and when you need it. By simply scanning the QR code on a luminaire, you can view relevant troubleshooting information
- Providing relevant luminaire configuration information and identifying spare parts needed
- Allowing digital spare parts such as LED drivers to be programmed to factory settings using Near Field Communication (NFC) technology
- Enabling you to create your own digital library of lighting assets installed

Ease of recycling:

- No glue, no potted drivers and easy disassembly
- Re-usable gear tray, clips and brackets

Ease of disassembly:

- Possible to disassemble the product in a few steps.
- Individual spare parts such as drivers, housing module, LED board, and light distribution parts can be detached, individually replaced and even reused between different generations and/or product families

Designed for **Circular Economy**

Many terms are used in the market to describe sustainable or so-called Circular Economy Ready products. Below are the key building blocks of design features that Philips' Circular Economy Ready luminaires are measured against. Each Circular Economy Ready product is designed with these product features in mind.

Key environmental features

Energy

- Increased energy efficiency, at least 10% higher than EU EE Class A product (66 lm/W)

Substances

- EU RoHS and REACH compliance

Weight and Materials

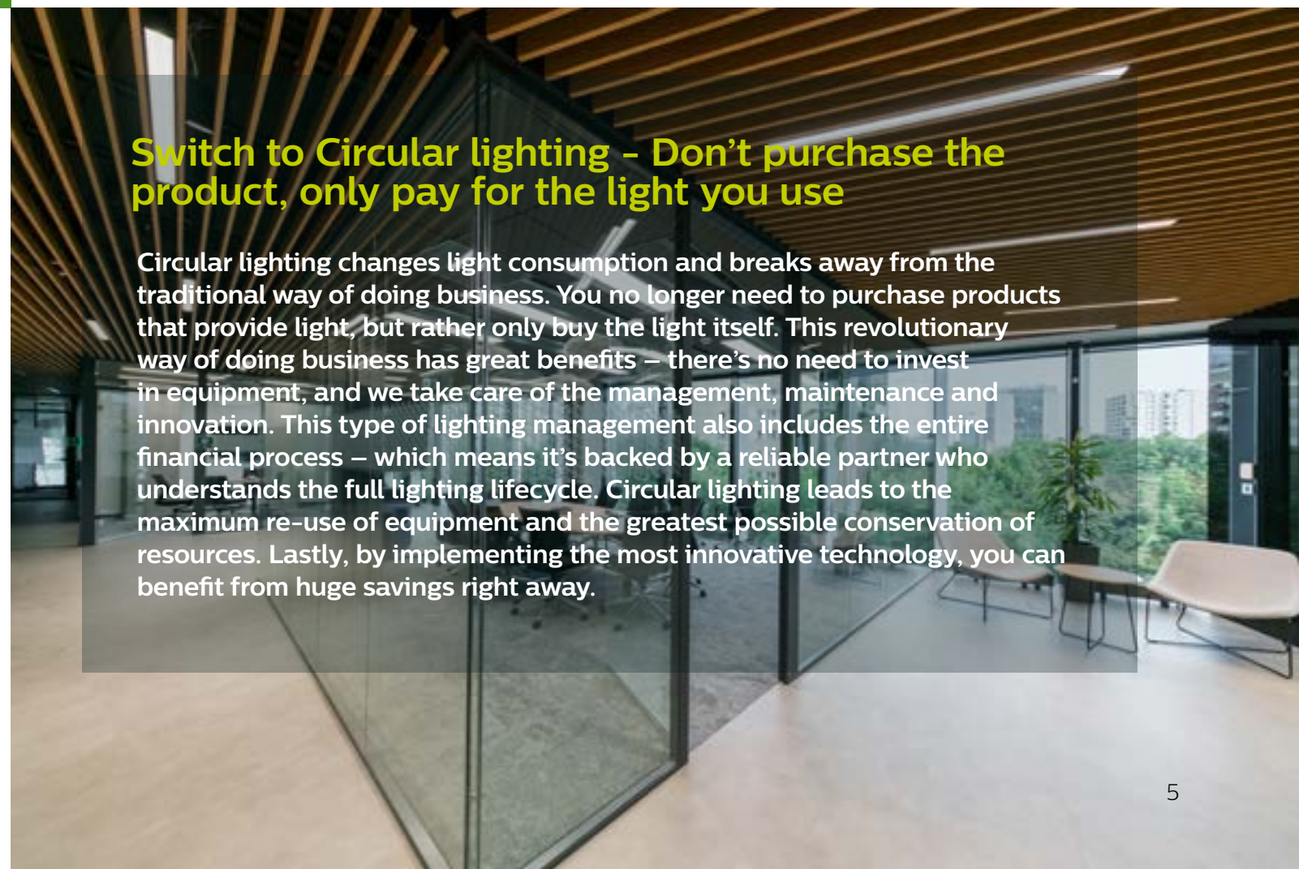
- Reduced product weight; use of renewable materials
- Composition: See TrueLine's material composition in Table 1

Packaging

- Reduced packaging weight or volume through the use of at least 80% recycled paper and 25% recycled plastics

Circularity

- Increased ability to contribute to the Circular Economy through extended useful life



Switch to Circular lighting - Don't purchase the product, only pay for the light you use

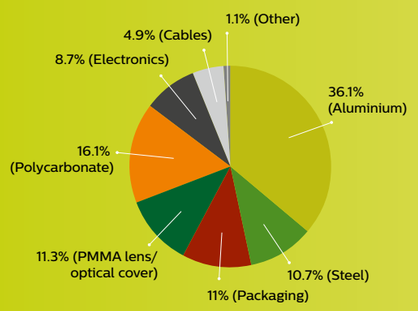
Circular lighting changes light consumption and breaks away from the traditional way of doing business. You no longer need to purchase products that provide light, but rather only buy the light itself. This revolutionary way of doing business has great benefits – there's no need to invest in equipment, and we take care of the management, maintenance and innovation. This type of lighting management also includes the entire financial process – which means it's backed by a reliable partner who understands the full lighting lifecycle. Circular lighting leads to the maximum re-use of equipment and the greatest possible conservation of resources. Lastly, by implementing the most innovative technology, you can benefit from huge savings right away.

Life Cycle Assessment results

Table 1. Material content (base/ancillary materials) for TrueLine

Aluminium	36.1%
Steel	10.7%
Packaging (cardboard, paper, labels)	11.0%
PMMA lens/optical cover	11.3%
Polycarbonate (PC)	16.1%
Electronics (driver, LED board)	8.7%
Cables	4.9%
Other (plastics, silicon, connectors)	1.1%

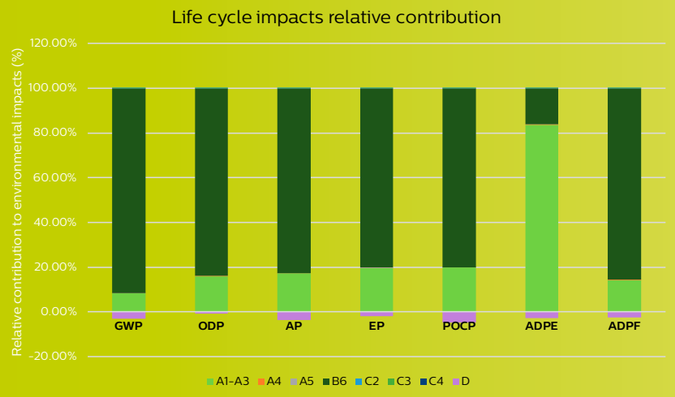
Product weight (including rail and packaging): 5.6 kg



Graph 1:
Material content (base/ancillary materials) for TrueLine

Table 2. Life Cycle Assessment (LCA) boundaries of TrueLine

Product stage	Raw material supply	A1
	Transport	A2
	Manufacturing	A3
Construction process stage	Transport from the gate to the site	A4
	Assembly	A5
Use stage	Operational energy use	B6
End of life stage	Transport	C2
	Waste processing	C3
	Disposal	C4
Benefits and loads beyond the system boundaries	Reuse - Recovery- Recycling - potential	D



Graph 2: Life cycle impacts, relative contribution

Life Cycle Assessment results

To measure the environmental footprint of the luminaire, a Life Cycle Assessment was carried out according to ISO 14040/14044. The CEN Norm EN 15804 serves as the core PCR. Environmental impacts of reference products are representative of the product family.

Graph 1 features the original material composition of TrueLine. It shows the composition of material content with the biggest environmental impact.

Graph 2 shows the results of the Life Cycle Assessment. For module B6, the RSL (Reference Service Life) is defined as 50,000 hours, equivalent to 12.5 years in operation in office applications. The graph demonstrates that all impact categories except the Abiotic Depletion Potential (ADPE, non-fossil), have an environmental impact during their use or once they are put in an application. In particular, the contribution to global warming potential (GWP) is for 91% associated with the use phase and 8% with the production phase. The production phase has a lower contribution to the overall environmental impact but is nevertheless the main contributor to the ADPE. This arises from the extraction of virgin material, mainly gold, silver and copper used to make electronic components.

Improved collection is secured (from 85% to 100%) as part of a Circular lighting contract and results in a higher material recovery rate at the end of life.

Life Cycle Assessment (input data)

Declared product
1x TrueLine
12NC: 91050 410 0603

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:

- 1x built-in Xitanium driver
- 8x LED boards, containing 22 LEDs
- 1x polymethyl metacrylate optical cover
- Aluminium housing
- Mechanical parts made of steel or plastic (driver box, mounting elements etc.)
- Connectors
- Cables

Delivery
Product weight: 5.6 kg (incl. 0.61 kg packaging).

Table 3. Construction data

Name	Value	Unit
Dimension luminaire	1449 x 55 x 88	mm
Dimension driver	360 x 30 x 22	mm
Dimension LED board	280 x 40	mm
Luminous flux	7700	lm
Luminous efficacy	126	lm/W
Color temperature	4000	K
Power	61	W
Lifetime L80 Ta=25C	50	khrs

Manufacturing
Manufacturing of the product is divided between Signify Poland in Pila (for the drivers), Signify Netherlands in Winterswijk (for the final assembly of the product), and suppliers located in other (non-) European countries.

Environment and health during manufacturing
The manufacturing plants of Pila and Winterswijk are certified according to ISO 14001 (Environment).

In addition, Pila and Winterswijk are certified according to OHSAS 18001 (Health and Safety).

Packaging
Packaging materials are cardboard and polyethylene (PE). Packaging weight is 0.61 kg (with a recycled paper content > 80%).

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.

Reference Service Life
The RSL is established as 50,000 hours operation, equivalent to 12.5 years in operation in the case of an office application. During the lifetime, no component is replaced.

End of Life
In the European Union, luminaires are in scope of the Waste Electrical and Electronic Equipment Directive (WEEE Directive). Efforts are made to improve collection, reuse and recycling of the product mainly via collective Collection & Recycling Service Organizations (CRSOs). According to Eurostat and other official collection systems, the collection rate of WEEEs via CRSOs is 85% at maximum. End of life scenario is further based on a material split and respective recycling rates. Recovery potential for steel and precious metals is evaluated. The energy required for treatment of materials (shredding) is included. If TrueLine is used as part of a Circular lighting contract, end-of-contract management is secured by Signify.

Further information
Details of the product are published on:
http://www.lighting.philips.com/main/prof/indoor-luminaires/suspended/trueline-suspended

Life Cycle Assessment calculation rules

Declared unit
The declared unit is a luminaire system, with a total weight of 5.6 kilograms including packaging, and providing a luminous flux of 7,700 lumens. This luminaire provides sufficient light for office and/or retail applications, operated in Europe for 50,000 hours (electricity consumption of 3,050 kWh).

System boundaries
Type of environmental declaration: cradle-to-grave, including recycling benefits (avoided burden).
The following life stages are included:
- Production: raw material extraction, processing, energy and materials; manufacture of modules; assembly and packaging
- Operational energy use (average European energy mix)
- Transport to the area of the user
- Waste processing
- Final disposal for WEEE fraction not recycled
- Recycling of metals from PCBs

Estimates and assumptions
- Background data are used for suppliers' specific processes
- Foreground data are used for the assembly of the luminaire and drivers
- Data on collection and recycling are based on readily available data taken from generic national statistics

Cut-off criteria
Where no data was available, items that represented 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 Ecoinvent database v3.3.

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.

Allocation
In the aggregated module A1-A3, allocation of energy and auxiliaries was used for assembly of the driver and the luminaire in the Winterswijk factory.

Methods
CML - IA baseline V3.04/EU25 /Characterization/ Excluding long-term emissions.

Cumulative energy demand V1.1.

Requisite evidence
Data is based on documentation and bill of materials of the product.

References
- Ecoinvent www.ecoinvent.org
- Life Cycle Assessment - Principles and framework (ISO 14040:2006)
- Life Cycle Assessment - Requirements and guidelines (ISO 14044:2006)

Disclaimer
All environmental calculations are made in a European context. The calculations are performed on the most commonly used luminaire in the range. The LCA has been performed in accordance with the processes as used by Signify. Note that the information provided herein is subject to change. Signify does not give any representation or warranty as to the accuracy or completeness of the information included herein and shall not be liable for any action in reliance thereon. The information presented in this document is not intended as any commercial offer and does not form part of any quotation or contract. Signify assumes no legal liability or responsibility for any loss or damage resulting from the use of the information thereto given here. For purposes hereof "Signify" means Signify B.V. and its subsidiaries and associated companies (directly or indirectly).

Table 4. Life Cycle Assessment scenarios

Name	Value	Unit
Transport to the building site (A4): Road transport from manufacturing plant to the customer		
Transport distance	2200	km
Capacity utilization (including empty runs)	90	%
Installation into the building (A5):		
Packaging	0.61	kg
Operational energy use (B6)		
Electricity consumption	3,050	kWh
Equipment output	0.061	kW
End of life (C1-C4)		
Collected separately	4.3	kg
Recycling	3.2	kg
Incineration	1.8	kg
Reference Service Life In the example of an office and/or retail application		
Reference Service Life	12.5	a

Further information
Please contact: sustainability.lighting@philips.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.

ODP (Ozone Depletion Potential): Potential of emissions of chlorofluorohydrocarbons (CFCs) and chlorinated hydrocarbons (HCs) for depleting the ozone layer.

PCR: Product Category Rules.

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.

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