Environmental Product Declaration

EPD of multiple products, based on a representative product, in accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Lincoln LED panels

from

NVC Lighting Ltd

Programme:	The International EPD® System, www.environdec.com
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This EPD covers multiple products listed on page 4. An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): EPD International Product Category Rules (PCR) for construction products (PCR 2019:14 v1.3.4). The product group classification for the assessed products is UN CPC 46539.
PCR review was conducted by: The Technical Committee of the International EPD System. See https://www.environdec.com/about-us/the-international-epd-system-about-the-system for a list of members. Review chair: Claudia Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat https://www.environdec.com/contact-us.
Life Cycle Assessment (LCA)
LCA accountability: Dr Matthew Fishwick, Fishwick Environmental Ltd
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: Dr Hüdai Kara – Managing Director at Metsims Sustainability Consulting Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same version number up to the first two digits) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent

content declarations; and be valid at the time of comparison. This EPD follows additional requirements for construction products considered as Electronic or Electric Equipment.

Company information

Owner of the EPD: NVC Lighting Ltd.

Contact: Paul Eykyn, Quality, Sustainability & Business Continuity Manager, NVC Park 201 Hollymoor Way, Rubery, Birmingham, England, B31 5HE, United Kingdom. +44(0) 1214 576340. info@nvcuk.com.

Description of the organisation: NVC Lighting Ltd designs, manufactures and markets innovative, quality lighting products.

Name and location of production site(s): The product assessed in this study is manufactured by a confidential contract manufacturer of NVC Lighting Ltd.

Product information

EPD type: EPD of multiple products, based on a representative product.

Product group name: Lincoln LED panels.

Product identification: Lincoln LED panels are represented by the recessed, modular Lincoln LED panel 600 mm x 600 mm TPA Rated 840 (NLN/66/840). The justification for the choice of this representative product is that it is the most commonly sold product variant within this range. The table below provides the full list of components for the Lincoln LED panel NLN/66/840.

Component	Material	Quantity	Weight each (g)	Weight total (g)
LED Chips	N/A	66	0.05	3
LED Strip	Aluminium	6	9	54
Driver	N/A	1	100	100
Terminal Block	Plastic	1	10	10
Terminal Block Case	Plastic	1	15	15
Connector	Plastic	1	5	5
Connector	Plastic	1	5	5
2 Core Cable	Plastic	1	15	15
Frame	Painted aluminium	1	690	690
Diffuser	Polycarbonate	2	157	314
Diffuser	Polycarbonate	2	67	134
Diffuser	Polycarbonate	1	60	60
Diffuser	Polycarbonate	1	75	75

Component	Material	Quantity	Weight each (g)	Weight total (g)
Lens Cover	Polycarbonate	66	0.5	33
Paper Back Sheet	Paper	1	57	57
Diff Seperators	Painted aluminium	2	60	120
Base	Painted aluminium	1	858	858
Screws	Stainless steel	32	0.4	13

Product description: Lincoln LED panels are TPA (fire) rated, IP40 (not waterproof) edge-lit LED panels with a micro-prismatic controller for Unified Glare Rating (UGR)<19 compliant lighting schemes. Lincoln LED panels have a flicker free driver and are available in three wattages: 18W, 28W and 35W, with a correlated colour temperature (CCT) of 4000K, and with a dimmable version available. The panels are suitable for recessed installation, offering ideal lighting solutions for offices, corridors and a wide range of commercial spaces.

Products in Lincoln LED panel lighting range
NLN/66/840, NLN/66/HO/840, NLN/66/LO/840, NLN/66/DD/840, NLN/66/CF/840, NLN/66/DD/DAM3/840, NLN/66/CF/DAM3/840, NLN/66/LO/DD/840, NLN/66/HO/DD/840, NLN/66/850, NLN/66/DD/850, NLN/66/DAM3/840, NLN/66/LO/DD/DAM3/840, NLN/66/HO/DD/DAM3/840, NLN/66/MM/840, NLN/66/MM/DAM3/840, NLN/66/HO/MC/840 , NLN/66/HS/840, NLN/66/LO/HS/840, NLN/66/HO/HS/840, NLN/66/HS/HSDAM3/840, NLN/66/LO/HS/HSDAM3/840, NLN/66/HO/HS/HSDAM3/840, NLN/66/HSDAM3/840, NLN/66/LO/HSDAM3/840, NLN/66/HO/HSDAM3/840

UN CPC code: The product group classification for the assessed product is UN CPC 46539 (Other electric lamps and lighting fittings [including lamps and lighting fittings of a kind used for lighting public open spaces or thorough-fares]).

Geographical scope: China (A1-A3), UK and Republic of Ireland (A4-A5, B, C1-4, D).

Further product information: https://www.nvcuk.com/

LCA information

Declared unit: One unit of Lincoln LED panel (NLN/66/840).

Reference service life: 20 years.

Version history: Version 2 updates comprise an update of the front cover image and correction to GWP-GHG C2, C4 and D, PERT A5 and PENRT C4 results.

Time representativeness: 2023/2024.

Database(s) and LCA software used: All secondary data were from ecoinvent v3.10 (cut-off), EN15804. The LCA software SimaPro v9.6.0.1 and Microsoft Excel were used for modelling.

Description of system boundaries: The system boundary of a product system determines the unit processes to be included in the LCA study and which data as inputs and/or outputs to/from the system can be omitted. In this LCA study and resulting EPD, the system boundary includes extraction/cultivation of raw materials, processing of raw materials, production of the finished product, operational energy use, end-of-life and all transportation and waste stages until the grave stage. This "cradle-to-gate with options" boundary comprises the following modules given in EN 15804:2012+A2:2019: the product, construction, use stage, and end-of-life stages and benefits/loads beyond the system boundary (modules A1-A5, B, C1-C4, D). As specified in EN 15804:2012+A2:2019 and the PCR 2019:14 v1.3.4, the environmental impacts are declared and reported using the baseline characterisation factors from the EC-JRC using EN 15804 reference package based on EF 3.1.

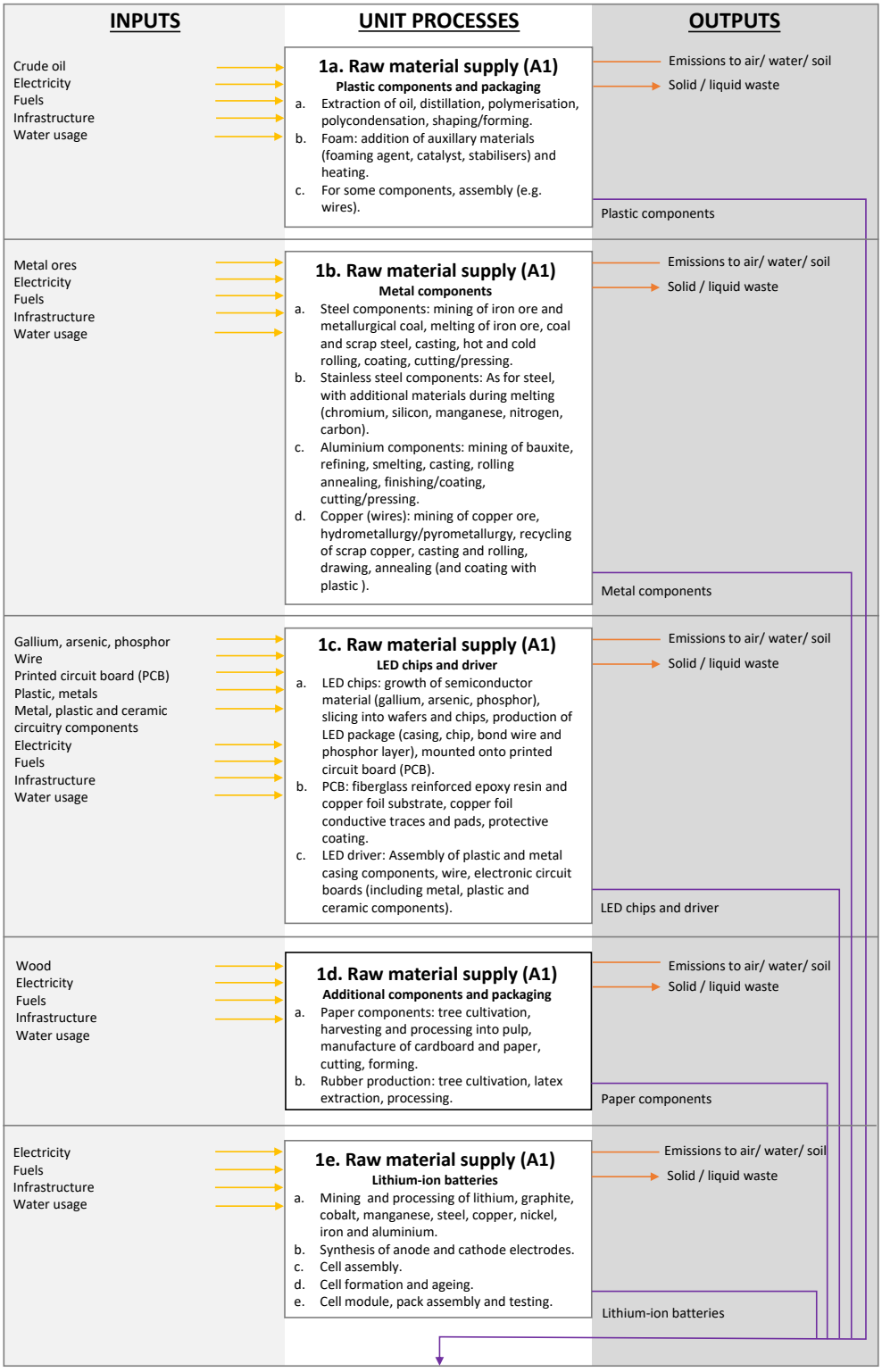
Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			**Construction process stage**		**Use stage**							**End of life stage**				**Resource recovery stage**
Module	Raw material supply **A1**	Transport **A2**	Manufacturing **A3**	Transport **A4**	Construction installation **A5**	Use **B1**	Maintenance **B2**	Repair **B3**	Replacement **B4**	Refurbishment **B5**	Operational energy use **B6**	Operational water use **B7**	De-construction demolition **C1**	Transport **C2**	Waste processing **C3**	Disposal **C4**	Reuse-Recovery-Recycling-potential **D**
Modules declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	CN	CN	CN	UK / ROI	UK / ROI	UK / ROI							UK / ROI				UK / ROI
Specific data used	0.4%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%*			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

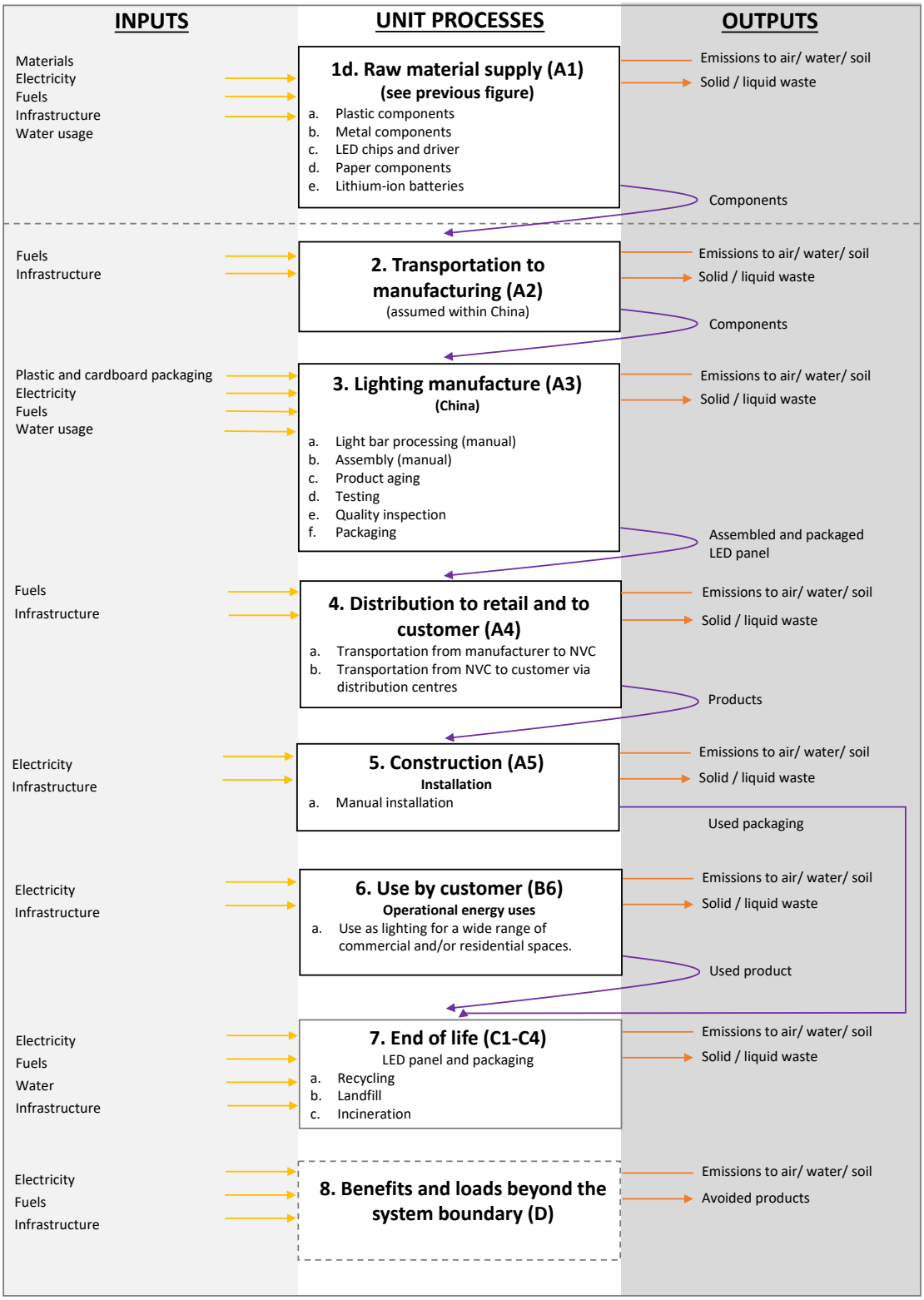
*X = module included, ND = module not declared, CN = China, UK = United Kingdom, ROI = Republic of Ireland. Specific data used and variations are based on the GWP-GHG indicator. *The difference between products is in the programming rather than the components hence the variance in A1-A3 is 0%.*

A3 electricity mix China: "Electricity, medium voltage {CN}| market group for electricity, medium voltage | EN15804, U" – ecoinvent v3.10, EN15804. GHG-GWP intensity: 0.93 kg CO_2e / kWh. Electricity fuel mix: 74% coal, 8% natural gas, 7% nuclear, and 11% other. Note that the Guarantees of Origin market in China represents an extremely small proportion of production and consumption, and therefore the consumption mix is effectively the same as the residual mix.

System diagram:



Yellow line = input of material/energy, orange line = output of waste/direct emission, purple line = output of product/co-product, arrowhead on line = transportation stage considered.



Yellow line = input of material/energy, orange line = output of waste/direct emission, purple line = output of product/co-product, arrowhead on line = transportation stage considered. Note B1-B5 and B7 have no associated activities or impact.

Module A1 – Raw material supply, comprising:

- Extraction and production of all raw materials for the production of Lincoln LED panels, including:
    - Reuse of products or materials from a previous product system;
    - Processing of secondary materials used as input for manufacturing the product, but not including those processes that are part of the waste processing in the previous product system;
    - Generation of electricity, steam, and heat from primary energy resources, also including their extraction, refining and transport; and
    - Energy recovery and other recovery processes from secondary fuels, but not including those processes that are part of waste processing in the previous product system.

Module A2 – Transport, comprising:

- Transportation of raw materials to manufacturing site from direct suppliers, i.e. from previous production or extraction process.

Module A3 – Manufacturing:

- Manufacturing of Lincoln LED panels ready for transportation to customer, including:
    - Production and use of operating and auxiliary materials consumed;
        - Light bar processing (manual)
        - Assembly (manual)
        - Product aging
        - Testing
        - Quality inspection
        - Packaging
    - Production of packaging materials, incl. such that are necessary to protect the products during their transport from the manufacturing site to retail and the customer;
    - Direct emissions to air, water or soils; and
    - Treatment of waste generated from the manufacturing and assembly of main parts.

Module A4 – Transport:

- Transportation of Lincoln LED panels from manufacturing site to the project site.
- Transportation to customer scenario parameters modelled in this EPD comprise:
    - Vehicle type used for transport: >32 tonne EURO 4 lorry (road) and container ship (sea).
    - Distance: 862 km road and 17,646 km sea.
    - Capacity utilisation, including return trips: 37% (road) and 70% (sea).
    - Bulk density of transported products: <1,000 kg / m^3.
    - Volume capacity utilisation factor: 1.

Module A5 – Installation:

- NVC Lighting products are installed manually, therefore, zero impact is assumed for installation.
- The only contribution to A5 considered is from the disposal of product packaging, assuming 68.9% recycling and 31.1% landfill.

Module B6 – Operational energy use:

- Energy use by customer over the lifetime of the product.
- Lincoln LED panels are suitable for offices, corridors and commercial spaces.

- The use scenario for commercial applications of lighting was based on EN15193-1:2017 and comprised 4,000 hours per year for 20 years at the power rating of the representative product (28 W).

Module B1-B5 and B7 – Other use stage modules:

- Use (B1), maintenance (B2), repair (B3), replacement (B4), refurbishment (B5), or water use (B7) are not relevant for this product and therefore have no associated activities or impact.

Module C1-C4 – End-of-life:

- Lincoln LED panels are removed using a manual process.
- Transportation of deconstructed product from the project site to the waste processing site 50 km.
- It was assumed that aluminium, steel, and plastic components and batteries were 100% recycled and all electronic components were 100% incinerated (without energy recovery).
- End-of-life (C1-C4) scenario parameters modelled in this EPD comprise:
  - Collection process specific by type: 2.56 kg collected separately and no materials collected with mixed construction waste.
  - Recovery system specified by type: no materials for re-use, 2.38 kg for recycling, and no materials for energy recovery.
  - Disposal specific by type: 0.19 kg materials for incineration without energy recovery and no materials for final disposal (landfill).

Module D – Reuse, recovery, recycling potential:

- For aluminium, steel, and plastic recycling, benefits were calculated using by subtracting the scrap input in A1-A3 (from the scrap output in module C. The avoided impact of this net scrap amount was modelled using ecoinvent data for primary aluminium ingot, pig iron, and polycarbonate granulate. Loads from sorting, cleaning, recycling were considered using ecoinvent data.

<u>Cut-off criteria and exclusions:</u>

In the process of building an LCI it is typical to exclude items considered to have a negligible contribution to results. In order to do this in a consistent and robust manner there must be confidence that the exclusion is fair and reasonable. To this end, cut-off criteria were defined in this study, which allow items to be neglected if they meet the criteria. In accordance with EPD International's PCR for construction products (PCR 2019:14), exclusions could be made if they were expected to be within the below criteria:

- A process can be excluded if it contributes to <1% of the total mass or energy input of a unit process;
- A maximum of 5% of the total mass or energy of the lifecycle can be excluded; and
- The excluded process doesn't meet the following exceptions:
  - Significant effects on energy use in extraction, use or disposal;
  - Significant environmental relevance (i.e. likely to contribute to an increase/decrease in impacts of more than 1%); and
  - Are classed as hazardous waste.

The follow exclusions from the scope of the study were made:

- Human and animal energy inputs to processes;
- Transport of employees to and from their normal place of work and business travel;

- Environmental impacts associated with support functions (e.g. R&D, marketing, finance, management etc.);
- Packaging of incoming raw materials and ancillary materials (immaterial [calculated to be <1% of lifecycle impact for carbon footprint, which is a good proxy for many other impact categories]); and
- Storage of Lincoln LED panels (assumed to be immaterial as can be stored ambiently).

Allocation procedures:

For cases where there is more than one product in the system being studied, EPD International's PCR for construction products (PCR 2019:14) prescribes the following procedure for the allocation of material and energy flows and environmental emissions.

- In the first instance, allocation should be avoided, by process sub-division.
- Where these methods are not applicable, the ISO 14040/44 requires that allocation reflects the physical relationships of the different products or functions. Allocation based on physical relationships such as mass or energy is a practical interpretation of this and is an approach often used in LCA.
- For some processes, allocation based on mass is not considered appropriate and, in these cases, economic allocation is used.

In this study, allocation procedures for multi-product processes followed the approach above, where economic allocation was used to allocate site level inputs and outputs at manufacturing site to the product under investigation. In terms of co-product allocation of generic data, the main database used, ecoinvent v3.10 (cut-off), defaults to an economic allocation for most processes. However, in some cases a mass-based allocation is used, where there is a direct physical relationship. The allocation approach of specific ecoinvent modules is documented on their website and method reports (see www.ecoinvent.org).

In this study a "cut-off" method (aka recycled content or 100:0 approach) was applied to all cases of end-of-life allocation, including in the case of generic data, where the ecoinvent v3.10 with a cut-off by classification end-of-life allocation method was used. In this approach, environmental burdens and benefits of recycled / reused materials are given to the product system consuming them, rather than the system providing them and are quantified based on recycling content of the material under investigation. The cut-off point is where an end-of-waste state is reached, including any sorting, cleaning, and processing of waste prior to recycling, reuse, or following energy recovery, following the "polluter pays principle". This is a common approach in LCA for materials where there is a loss in inherent properties during recycling, the supply of recycled material exceeds demand and recycled content of the product is independent of whether it is recycled downstream. It is in conformance with the ISO standards on LCA, EN 15804, EN 15978 and is prescribed in EPD International's PCR for construction products (PCR 2019:14). The exception to the use of this end-of-life allocation method was for module D, where net loads and benefits beyond the system boundary, are presented separately. The end-of-life scenario for Lincoln LED panels, is assumed to be 100% recycled for aluminium, steel and plastic components, and 100% incinerated with energy recovery (with thermal efficiency >60%) for the electronic components and paper components.

Data sources:

Quantitative and qualitative data were collected for all processes within the system boundary and these data were used to compile the LCI. These comprised specific data (primary data) and generic data (secondary data). To explain the distinction between these categories, specific data directly refer to the product under investigation, for example the amount of electricity consumed at an NVC Lighting Ltd

contract manufacturer's site. Generic data do not directly refer to the product under investigation but refer to a similar process and fulfil the data quality criteria defined for this study.

Primary/specific data were sought as a preference and were collected from NVC Lighting Ltd's contract manufacturers. These specific data were collected using data collection sheets via an iterative process and represent a time period spanning 2023.01.01 to 2023.12.31. Generic data were collected for all other lifecycle stages from ecoinvent v3.10 (cut-off), EN15804.
Secondary/generic data were chosen to be to be as geographically specific as possible, however, this was not always possible. In these cases, a geography was selected to match the technology, feedstock source etc., as closely as possible.

Note that no energy values were calculated from volumes or masses of fuels by the LCA practitioners as they were provided in units of energy, however, volume and mass to energy unit conversions have been carried out in the ecoinvent v3.10 (cut-off) database and for this the lower heating value was used throughout.

Data quality: To ensure the quality of data were sufficient, data quality checks were completed in relation to time-related coverage, geographical coverage, technology coverage, completeness, and representativeness. Data quality indicators were applied using a data quality matrix whereby key data were assigned scores between 1 (best) and 5 (worst). All data scored between 1-3.

Content declaration

Product content	Mass, kg per declared unit	Post-consumer material, mass-% per declared unit	Biogenic material, mass-% per declared unit	Biogenic material, kg C per declared unit
Aluminium	1.722	0 [1]	0	0
Driver	0.100	0	0	0
Electronic parts (cables, connectors, contacts etc.)	0.025	0 [1]	0	0
LED Chips	0.003	0	0	0
Paper	0.057	0	1.113	0.0285
Plastic	0.641	0	0	0
Stainless steel	0.013	0 [1]	0	0
TOTAL	**2.561**	**0**	**1.113**	**0.0285**

[1]*Secondary data used for steel, aluminium and electronics materials (e.g. copper) contains assumptions regarding recycled content based on market averages, however, it is not certain what proportion is post-consumer. Therefore, to adopt a conservative approach, no post-consumer recycled content is declared here.*

Packaging materials	Mass, kg per declared unit	Mass-% (versus product)	Biogenic material, kg C per declared unit
Cardboard	0.200	7.8	0.100
TOTAL	**0.200**	**7.8**	**0.100**

No substances that are listed in the “Candidate List of Substances of very high concern for authorisation” are contained in the declared unit. Lincoln LED panels do not contain any substances hazardous to health or the environment (in particular carcinogenic, mutagenic, toxic to reproduction, allergic, PBT5 or vPvB6 substances).

Results of the environmental performance indicators

The environmental performance of one Lincoln LED panel is declared and reported using the parameters and units as specified in PCR 2019:14 v1.3.4. These life cycle impact assessment results and other environmental results are presented in the tables below per declared unit, broken down by module.

Note that the LCIA results are relative expressions and do not predict impacts on category end-points, the exceeding of thresholds, safety margins or risks. It is discouraged to use the results of Modules A1-A3 without considering the results of other modules, particularly, Module C.

Mandatory impact category indicators according to EN 15804

Results per one unit of Lincoln LED panel (NLN/66/840)											
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B5, B7**	**B6**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	5.01E+01	6.07E-01	1.42E-02	0.00E+00	5.19E+02	0.00E+00	1.71E-01	0.00E+00	5.72E-01	-4.13E+01
GWP-biogenic	kg CO_2 eq.	-4.71E-01	0.00E+00	3.67E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-01	0.00E+00
GWP-luluc	kg CO_2 eq.	7.41E-02	1.80E-05	4.68E-07	0.00E+00	6.23E-01	0.00E+00	5.14E-06	0.00E+00	1.78E-06	-5.21E-02
GWP-total	kg CO_2 eq.	4.97E+01	6.07E-01	3.81E-01	0.00E+00	5.20E+02	0.00E+00	1.71E-01	0.00E+00	6.77E-01	-4.14E+01
ODP	kg CFC 11 eq.	4.13E-07	8.92E-09	2.30E-10	0.00E+00	2.53E-05	0.00E+00	2.66E-09	0.00E+00	1.49E-10	-2.76E-07
AP	mol H^+ eq.	3.45E-01	1.41E-02	8.19E-05	0.00E+00	1.24E+00	0.00E+00	9.02E-04	0.00E+00	1.38E-04	-2.56E-01
EP-freshwater	kg P eq.	1.82E-03	7.64E-07	1.30E-08	0.00E+00	5.69E-03	0.00E+00	1.28E-07	0.00E+00	1.02E-07	-1.25E-03
EP-marine	kg N eq.	4.96E-02	3.61E-03	9.83E-05	0.00E+00	3.50E-01	0.00E+00	3.99E-04	0.00E+00	7.35E-05	-4.06E-02
EP-terrestrial	mol N eq.	5.52E-01	4.01E-02	3.68E-04	0.00E+00	4.32E+00	0.00E+00	4.37E-03	0.00E+00	7.34E-04	-4.48E-01
POCP	kg NMVOC eq.	1.83E-01	1.09E-02	1.75E-04	0.00E+00	1.16E+00	0.00E+00	1.74E-03	0.00E+00	1.80E-04	-1.43E-01
ADP-minerals&metals*	kg Sb eq.	6.68E-04	1.50E-08	7.37E-10	0.00E+00	2.68E-05	0.00E+00	5.74E-09	0.00E+00	5.93E-09	2.41E-06
ADP-fossil*	MJ	5.36E+02	7.64E+00	1.90E-01	0.00E+00	1.49E+04	0.00E+00	2.21E+00	0.00E+00	9.28E-02	-4.22E+02
WDP*	m^3	7.69E+00	7.89E-03	-1.17E-02	0.00E+00	9.94E+01	0.00E+00	2.58E-03	0.00E+00	1.27E-02	-5.03E+00
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption										

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*
***Disclaimer: This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.*

Additional mandatory and voluntary impact category indicators

Results per one unit of Lincoln LED panel (NLN/66/840)											
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B5, B7**	**B6**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	5.01E+01	6.07E-01	1.42E-02	0.00E+00	5.19E+02	0.00E+00	1.71E-01	0.00E+00	5.72E-01	-4.13E+01
PM	Disease incidence	3.72E-06	2.51E-08	1.86E-09	0.00E+00	6.31E-06	0.00E+00	2.24E-08	0.00E+00	4.92E-10	-3.25E-06
IRP**	kBq U235 eq.	4.40E-01	5.90E-04	6.06E-05	0.00E+00	2.63E+02	0.00E+00	1.78E-04	0.00E+00	3.28E-05	-1.71E-01
ETP-fw*	CTUe	3.59E+02	3.56E-01	2.03E-01	0.00E+00	2.68E+02	0.00E+00	7.60E-02	0.00E+00	6.72E+00	-2.72E+02
HTP-c*	CTUh	1.06E-07	8.15E-11	2.04E-12	0.00E+00	7.89E-08	0.00E+00	8.87E-12	0.00E+00	9.76E-11	-9.36E-08
HTP-nc*	CTUh	4.48E-07	2.34E-09	2.22E-10	0.00E+00	1.92E-06	0.00E+00	2.23E-10	0.00E+00	1.52E-08	-2.52E-07
SQP*	dimensionless	7.48E+01	1.78E-02	3.43E-02	0.00E+00	7.42E+03	0.00E+00	3.56E-03	0.00E+00	1.05E-02	-3.76E+01

Resource use indicators

Results per one unit of Lincoln LED panel (NLN/66/840)											
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B5, B7**	**B6**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	3.03E+01	1.42E-02	2.61E-03	0.00E+00	5.11E+03	0.00E+00	4.27E-03	0.00E+00	1.72E-03	-2.03E+01
PERM	MJ	3.20E+00	0.00E+00	-3.20E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	3.35E+01	1.42E-02	-3.20E+00	0.00E+00	5.11E+03	0.00E+00	4.27E-03	0.00E+00	1.72E-03	-2.03E+01
PENRE	MJ	5.10E+02	7.64E+00	1.90E-01	0.00E+00	1.49E+04	0.00E+00	2.21E+00	0.00E+00	9.28E-02	-3.99E+02
PENRM	MJ	2.63E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.63E+01	-2.24E+01
PENRT	MJ	5.36E+02	7.64E+00	1.90E-01	0.00E+00	1.49E+04	0.00E+00	2.21E+00	0.00E+00	-2.62E+01	-4.22E+02
SM	kg	4.05E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-05	0.00E+00

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.

RSF	MJ	1.03E-02	2.64E-07	7.25E-08	0.00E+00	5.02E-04	0.00E+00	8.73E-08	0.00E+00	1.17E-06	-5.65E-04
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.02E-01	1.91E-04	-2.70E-04	0.00E+00	2.64E+00	0.00E+00	6.21E-05	0.00E+00	2.97E-04	-1.35E-01
Acronyms	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water										

Note – Option A of Appendix 3 of the PCR was used to balance energy indicators across the lifecycle, whereby energy used as raw material is declared as an input to the module where it enters the product system (in module A1-A3) and as an equally large output from the product system where it exits the product system for use in another product system or as waste.

Waste indicators

Results per one unit of Lincoln LED panel (NLN/66/840)										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B5, B7**	**B6**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	8.76E+00	1.24E-03	2.65E-05	0.00E+00	1.32E+01	0.00E+00	1.82E-04	0.00E+00	1.01E-02	-7.81E+00
Non-hazardous waste disposed	kg	7.74E+01	3.49E-02	3.64E-01	0.00E+00	2.18E+02	0.00E+00	6.86E-03	0.00E+00	2.05E-01	-5.39E+01
Radioactive waste disposed	kg	2.74E-04	3.21E-07	3.56E-08	0.00E+00	1.18E-01	0.00E+00	9.94E-08	0.00E+00	2.14E-08	-1.05E-04

Output flow indicators

Results per one unit of Lincoln LED panel (NLN/66/840)										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B5, B7**	**B6**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	6.88E-03	0.00E+00	6.76E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	5.31E-05	0.00E+00	3.28E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	1.02E-01	0.00E+00	2.15E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	6.01E-02	0.00E+00	9.56E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Additional environmental information

This EPD provides results for one unit of Lincoln LED panel NLN/66/840, which represents the Lincoln LED panel product group. The difference between declared results and those from product variant that is furthest away from these results are provided below for mandatory LCIA impact results (A1-A3). The difference in this case is 0% because there is no variance in the materials used, only the programming differs for each variant.

Indicator	Unit	A1-A3 (%)
GWP-fossil	kg CO_2 eq.	0%
GWP-biogenic	kg CO_2 eq.	0%
GWP-luluc	kg CO_2 eq.	0%
GWP-total	kg CO_2 eq.	0%
ODP	kg CFC 11 eq.	0%
AP	mol H^+ eq.	0%
EP-freshwater	kg P eq.	0%
EP-marine	kg N eq.	0%
EP-terrestrial	mol N eq.	0%
POCP	kg NMVOC eq.	0%
ADP-minerals&metals*	kg Sb eq.	0%
ADP-fossil*	MJ	0%
WDP*	m^3	0%

Impact results for B6 presented in this EPD represent use of the product for 20 years. To convert to annual impacts for B6, divide by 20. To convert impact results for B6 presented in this EPD for the representative product to other variants in the range, scale by the respective power ratings of the two product variants.

References

BSI (2017): BS EN 15193-1:2017+A1:2021 Energy performance of buildings. Energy requirements for lighting - Specifications, Module M9. BSI, London.

CEN, 2013. EN 15804:2012+A1:2013, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products

CEN, 2019. EN 15804:2012+A2:2019, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products

Ecoinvent, 2023. Ecoinvent v3.10, Swiss Centre for Life Cycle Inventories. Available from www.ecoinvent.ch

EPD International, 2019. PCR 2019:14 Construction products and construction services, version 1.3.4.

EPD International, 2019: General Programme Instructions for the International EPD System. Version 4.0, dated 2021-03-29. www.environdec.com

ERM, 2006: Carbon Balances and Energy impacts of the Management of UK wastes. ERM, London

Green Delta, 2023. openLCA 1.10.3. Green Delta, Berlin

ISO, 2006. ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures

ISO, 2006. ISO 14040:2006/Amd 1:2020, Environmental management – Life cycle assessment – Principles and framework

ISO, 2020. ISO 14044:2006/Amd 1:2020, Environmental management – Life cycle assessment – Requirements and guidelines

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