



# noos

## ENVIRONMENTAL PRODUCT DECLARATION

according to: ISO 14025:2010, EN 50693:2019

**Program Operator:** EPDIItaly

**Publisher:** EPDIItaly

**Declaration number:** EPD\_AEC\_008

**EPDIItaly – Registration number:** EPDITALY0995

**Publication date:** 28.05.2025

**Valid until:** 28.05.2030

**Product name:**

NOOS

**Product family:**

NOOS

**Model:**

NOOS 1 XXX YYY-Y WWZZ.040-1M

NOOS 1 XXX YYY-Y WWZZ.200-2M

NOOS 2 XXX YYY-Y WWZZ.040-1M

NOOS 2 XXX YYY-Y WWZZ.200-4M

**Manufacturing plant:**

AEC Illuminazione SRL

Via A. Righi, n.4 Subbiano (AR) 52010

Via E. Fermi, n.93 Subbiano (AR) 52010



# GENERAL INFORMATIONS

|                                            |                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EPD owner:</b>                          | AEC Illuminazione S.r.l.<br>Headquarters: Via A. Righi, 4 – Z.I. Castelnuovo – 52010 – Subbiano, Arezzo (IT)                                                                                                                                                                                                                         |
| <b>Production site:</b>                    | Headquarters: Via A. Righi, 4 – Z.I. Castelnuovo – 52010 – Subbiano, Arezzo (IT)<br>Pole Division: Via E. Fermi, 93 – Z.I. Castelnuovo – 52010 – Subbiano, Arezzo (IT)                                                                                                                                                               |
| <b>Contact for information on EPD:</b>     | <a href="mailto:assistentatecnica@aecilluminazione.it">assistentatecnica@aecilluminazione.it</a>                                                                                                                                                                                                                                     |
| <b>Program Operator:</b>                   | EPDItaly ( <a href="http://www.epditaly.it">www.epditaly.it</a> )<br>via Gaetano De Castillia n° 10 - 20124 Milano, Italia                                                                                                                                                                                                           |
| <b>Scope of application:</b>               | Outdoor lighting                                                                                                                                                                                                                                                                                                                     |
| <b>Product reference standards:</b>        | EN 60598-1, EN 60598-2-3, EN 62471, EN 55015, EN 61547, EN 61000-3-2, EN 61000-3-3                                                                                                                                                                                                                                                   |
| <b>CPC code:</b>                           | 465 “Electric filament or discharge lamps; arc lamps; lighting equipment; parts thereof”.                                                                                                                                                                                                                                            |
| <b>PCR:</b>                                | CORE PCR – EPDItaly007 – “Electronic and electrical products and systems” – REV. 3.1 – 12/11/2024.<br>Sub PCR – EPDItaly020 – “Electronic and electrical products and systems public lighting equipment” – Rev.2 – 03/10/2024”                                                                                                       |
| <b>EPDItaly Regulation:</b>                | Regolamento EPDItaly 6.0 version of 30/10/2023, available at <a href="http://www.epditaly.it">www.epditaly.it</a>                                                                                                                                                                                                                    |
| <b>Project report LCA:</b>                 | M-LCA-004 LCA-Tool - Report LCA_AEC Illuminazione                                                                                                                                                                                                                                                                                    |
| <b>Statement independent verification:</b> | Independent verification of the declaration and data performed according to ISO 14025:2010.<br><input type="checkbox"/> Internal <input checked="" type="checkbox"/> External<br>Third party verification performed by: ICMQ S.p.A., via Gaetano De Castillia n° 10 - 20124 Milan, Italy. Accredited by Accredia.                    |
| <b>Statement comparability:</b>            | Environmental Declarations published within the same product category, but from different programmes, may not be comparable.                                                                                                                                                                                                         |
| <b>Statement responsibility:</b>           | AEC Illuminazione S.r.l. releases EPDItaly from any non-compliance with environmental legislation. The holder of the declaration shall be responsible for the supporting information and evidence; EPDItaly accepts no responsibility for the information, data and results provided by the EPD Owner for the life cycle assessment. |
| <b>Technical support:</b>                  | Greenwich Srl<br>Via Presolana 2/4 - 24030 - Medolago, Bergamo, Italia<br>Contacts: <a href="mailto:info@greenwichsrl.it">info@greenwichsrl.it</a><br>Web site: <a href="https://greenwichsrl.it">https://greenwichsrl.it</a>                                                                                                        |

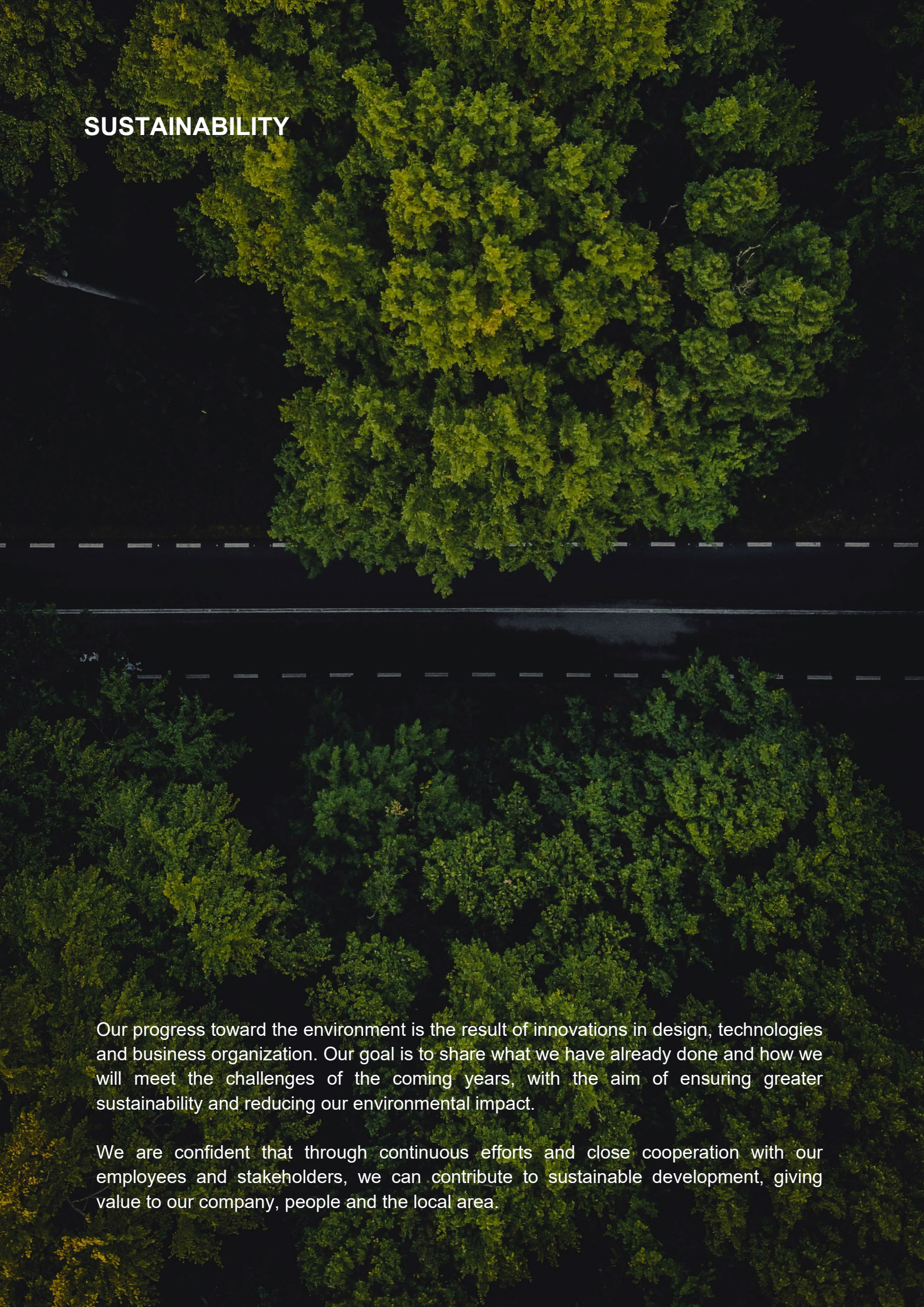
# SUMMARY

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## THE COMPANY



AEC Illuminazione is a luminaire manufacturer with an approach based on a combination of product quality and environmental responsibility. Today the company is an important example of Italian industrial excellence, known and appreciated all over the world. The company's awareness is such that its every effort is aimed at reducing its impacts towards the environment. This commitment translates into designing increasingly efficient and sustainable products, which therefore go to minimize energy consumption and resource use, promoting new technologies to protect the environment.

An aerial photograph of a two-lane asphalt road with white dashed center and edge lines, stretching horizontally across the middle of the frame. The road is flanked on both sides by a dense, lush green forest. The trees are tall and their canopies are thick, creating a vibrant green texture. The lighting is soft, suggesting an overcast day or early morning/late afternoon. The overall composition is symmetrical and emphasizes the integration of infrastructure and nature.

## SUSTAINABILITY

Our progress toward the environment is the result of innovations in design, technologies and business organization. Our goal is to share what we have already done and how we will meet the challenges of the coming years, with the aim of ensuring greater sustainability and reducing our environmental impact.

We are confident that through continuous efforts and close cooperation with our employees and stakeholders, we can contribute to sustainable development, giving value to our company, people and the local area.

## EPD SCOPE AND TYPE

This Environmental Product Declaration is of the 'from cradle to grave' type and analyses all phases of the product life cycle, from the extraction of raw materials to the decommissioning and disposal of the product once it has reached the end of its life. As dictated by the PCR itself, the UPSTREAM phases of procurement (A1) and transport of raw materials (A2), the CORE phase of internal production (A3), the DOWNSTREAM phases of distribution (A4 - A5), use (B1 - B7), end-of-life of the product (C1-C4) and the resource recovery phase (D) were considered for the evaluation.

| Production Stage         |                        |                   | Distribution Stage | Use Stage    |     |             |        |             |                |            |           | End-of-life Stage |           |                   |                  | Resource recovery Stage              |
|--------------------------|------------------------|-------------------|--------------------|--------------|-----|-------------|--------|-------------|----------------|------------|-----------|-------------------|-----------|-------------------|------------------|--------------------------------------|
| Upstream Module          | Core Module            | Downstream Module |                    |              |     |             |        |             |                |            |           |                   |           |                   |                  |                                      |
| Raw material procurement | Raw material transport | Production        | Transport          | Installation | Use | Maintenance | Ripair | Replacement | Rehabilitation | Energy use | Water use | Disassembly       | Transport | Recycling process | Disposal process | 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            | X   | X           | X      | X           | X              | X          | X         | X                 | X         | X                 | X                | X                                    |

Legend: X = included in the LCA, MND = the module is not included in the LCA and is not declared.

# LCA GENERAL INFORMATIONS

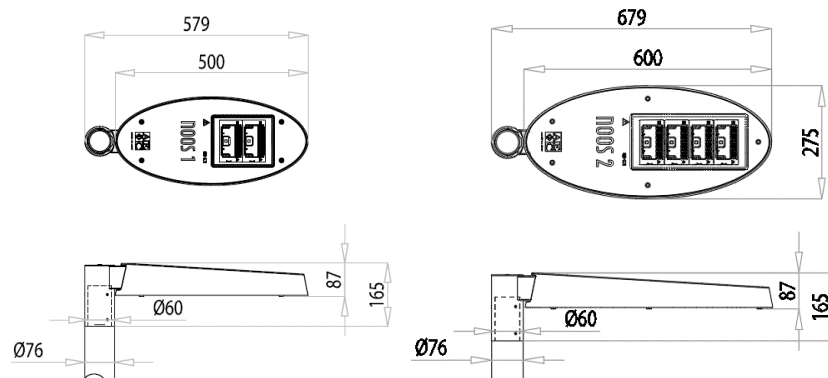
|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EPD type</b>              | Product EPD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>System boundaries</b>     | From Cradle to grave and benefits beyond product life cycle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Declared unit</b>         | The declared unit taken into consideration is a single street luminaire belonging to the NOOS 1 and NOOS 2 series respectively, operating during a reference life of 40,000 operating hours in accordance with Sub PCR 020 "Electronic and electrical products and systems - Home appliances".                                                                                                                                                                                                                                                                                                   |
| <b>Temporal validity</b>     | The reference period is the calendar year 2024.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Geographical validity</b> | The performances have been calculated with reference to the main plant of AEC Illuminazione S.r.l. in via A. Righi, n.4 Subbiano, Arezzo - 52010 (IT) and the Pole Division branch in Via E. Fermi, 93 - Z.I. Castelnuovo - 52010 - Subbiano, Arezzo (IT).<br>The reference market is the global one.                                                                                                                                                                                                                                                                                            |
| <b>Database used</b>         | Ecoinvent 3.9.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>LCA software</b>          | SimaPro 9.5.0.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>LCA Tool</b>              | M-LCA-018-Tool AEC_01, 16/12/24                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Exclusion criteria</b>    | They were excluded from the following study: <ul style="list-style-type: none"> <li>▪ employee travel.</li> <li>▪ the packaging of the auxiliary material.</li> <li>▪ replacement parts for machinery used during routine and extraordinary maintenance.</li> </ul>                                                                                                                                                                                                                                                                                                                              |
| <b>Data quality</b>          | All data related to the company's CORE activities and therefore falling under A3, were derived directly from the company's databases and are therefore site-specific.<br>The UPSTREAM data, linked to phases A1 and A2 (for which the standard envisages the use of generic data), the data relating to weight, quantity, raw materials, and waste are derived from the company's databases or from reprocessing supplied directly and summarised in a 'Data Collection Checklist' and are therefore to be understood as site-specific.                                                          |
| <b>Generic data</b>          | Criteria were applied throughout the analysis: <ul style="list-style-type: none"> <li>▪ geographical equivalence, considering similar Italian or at most European systems.</li> <li>▪ technological equivalence, considering comparable technological systems through literature research.</li> <li>▪ equivalence with respect to system boundaries, considering systems that take similar inputs, outputs and stages.</li> </ul> Site-specific data refer to the year 2024, while for generic data, information between 2010 and 2020 was considered.                                           |
| <b>Cut-off rules</b>         | As stipulated in EN 15804:2012 + A2:2019, the cut-off criterion must be a maximum of: <ul style="list-style-type: none"> <li>▪ 1% on the use of primary energy from renewable and non-renewable sources, and 1% of the total mass of each process unit.</li> <li>▪ 5% on the total flows for each unit (both in terms of energy and mass).</li> </ul> The following inputs were cut-off in this study: <ul style="list-style-type: none"> <li>▪ Galvanising treatment carried out on hardware, small parts and bolts.</li> </ul>                                                                 |
| <b>Data validation</b>       | The check of the validity and correctness of the specific data used for the CORE phases (phases A2 and A3) supplied by AEC Illuminazione S.r.l. was carried out through the punctual verification of the mass balances and the plant authorisation documentation, as well as the critical consultation of other EPD studies produced in compliance with the reference PCR.<br>About the generic data used for the UPSTRESAM (A1) and DOWNSTREAM (C1, C2, C3, C4) phases, on the other hand, reference was made to the validation models required in Annex E of standard EN 15804:2012 + A2:2019. |

# PRODUCT DESCRIPTION

## CHARACTERISTICS

## NOOS series

### DIMENSIONS



### PRODUCT DESCRIPTION

The luminaires in the NOOS series consist of:  
Aluminium body, LED modules, driver LED, supply cables, connectors, SPD (optional), screws and everything else needed for correct connection and installation.

### ELECTRICAL AND MECHANICAL CHARACTERISTICS

| Luminaire:                   | Power: | Weight: |
|------------------------------|--------|---------|
| NOOS 1 XXX YYY-Y WWZZ.040-1M | 8.5 W  | 4.4 kg  |
| NOOS 1 XXX YYY-Y WWZZ.200-2M | 75.6 W | 5.1 kg  |
| NOOS 2 XXX YYY-Y WWZZ.040-1M | 8.5 W  | 5.5 kg  |
| NOOS 2 XXX YYY-Y WWZZ.200-4M | 147 W  | 6.6 kg  |

Rated voltage: 220÷240V.  
Rated frequency: 50/60Hz.  
040 ÷ 200: LED current range (mA).

### LED MODULE

XXX: 5P5, 4P4.  
1M ÷ 4M: number of LED modules.

### AVAILABLE OPTICS (YYY-Y)

|                                                                                            |                                                                                                   |
|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <p>STE-M/S</p> <p>Asymmetrical optic for suburban street lighting.</p>                     | <p>SV</p> <p>Asymmetrical optic for very narrow urban streets or highway entrance/exit turns.</p> |
| <p>STU-M/S</p> <p>Asymmetrical optic for street, urban and cycle-path lighting.</p>        | <p>S05/S07</p> <p>Asymmetrical optic for street, urban and green areas lighting.</p>              |
| <p>STW</p> <p>Asymmetrical optic for wide streets lighting, specific for wet asphalts.</p> | <p>STA</p> <p>Asymmetrical optic for wide urban streets and cycle-path lighting.</p>              |

N.B. other optics available on request.

### COLOUR TEMPERATURE

CRI (WW): 70 = CRI70, 80 = CRI80, 90 = CRI90  
CCT (ZZ): 18 = 1800K, 22 = 2200K, 27 = 2700K, 30 = 3000K, 40 = 4000K, 57 = 5700K

### INSULATIONS CLASS



### CONTROL SYSTEM

F DA DAC FLC Nema ZHAGA

### CERTIFICAZIONS



# MATERIC TABLES

NOOS 1 XXX YYY-Y WWZZ.040-1M

| Components                           | Materials (input)                | % Weight |
|--------------------------------------|----------------------------------|----------|
| LED driver                           | WEEE compliant electronic device | 3,4%     |
| LED                                  | WEEE compliant electronic device | < 0,1%   |
| PCB                                  | Aluminium - Ceramic - Copper     | 0,7%     |
| Optical modules                      | Polycarbonate + Aluminium        | 0,7%     |
| Luminaire body                       | Die-Cast Aluminium               | 45,6%    |
| Post-top                             | Die-Cast Aluminium               | 14,4%    |
| Gasket                               | Polyurethane                     | 1,1%     |
| Plastic fixing/support accessories   | PA                               | 0,2%     |
| Steel fixing/support accessories     | Stainless steel/Galvanised steel | 2,4%     |
| Aluminium fixing/support accessories | Aluminium                        | 0,8%     |
| Cable gland                          | PA                               | 0,3%     |
| Internal wiring                      | Copper - FEP                     | 0,1%     |
| Supply cable                         | Copper - FEP                     | 4,0%     |
| Screws                               | Stainless steel/Galvanised steel | 1,4%     |
| Compensation valve                   | PBT                              | < 0,1%   |
| Optical screen                       | Tempered glass                   | 24,8%    |

**NOOS 1 XXX YYY-Y WWZZ.200-2M**

| <b>Components</b>                    | <b>Materials (input)</b>         | <b>% Weight</b> |
|--------------------------------------|----------------------------------|-----------------|
| LED driver                           | WEEE compliant electronic device | 10,3%           |
| LED                                  | WEEE compliant electronic device | < 0,1%          |
| PCB                                  | Aluminium - Ceramic - Copper     | 1,2%            |
| Optical modules                      | Polycarbonate + Aluminium        | 1,1%            |
| SPD                                  | WEEE compliant electronic device | 0,7%            |
| Luminaire body                       | Die-Cast Aluminium               | 39,3%           |
| Post-top                             | Die-Cast Aluminium               | 12,4%           |
| Telecontrol device                   | WEEE compliant electronic device | 1,3%            |
| Gasket                               | Polyurethane                     | 1,0%            |
| Plastic fixing/support accessories   | PA                               | 0,2%            |
| Steel fixing/support accessories     | Stainless steel/Galvanised steel | 2,3%            |
| Aluminium fixing/support accessories | Aluminium                        | 0,7%            |
| Cable gland                          | PA                               | 0,2%            |
| Internal wiring                      | Copper - FEP                     | 0,2%            |
| Supply cable                         | Copper - FEP                     | 6,5%            |
| Screws                               | Stainless steel/Galvanised steel | 1,2%            |
| Compensation valve                   | PBT                              | < 0,1%          |
| Optical screen                       | Tempered glass                   | 21,3%           |

**NOOS 2 XXX YYY-Y WWZZ.040-1M**

| <b>Components</b>                    | <b>Materials (input)</b>         | <b>% Weight</b> |
|--------------------------------------|----------------------------------|-----------------|
| LED driver                           | WEEE compliant electronic device | 2,7%            |
| LED                                  | WEEE compliant electronic device | < 0,1%          |
| PCB                                  | Aluminium - Ceramic - Copper     | 0,5%            |
| Optical modules                      | Polycarbonate + Aluminium        | 0,5%            |
| Luminaire body                       | Die-Cast Aluminium               | 47,6%           |
| Post-top                             | Die-Cast Aluminium               | 11,5%           |
| Gasket                               | Polyurethane                     | 1,1%            |
| Plastic fixing/support accessories   | PA                               | 0,2%            |
| Steel fixing/support accessories     | Stainless steel/Galvanised steel | 2,0%            |
| Aluminium fixing/support accessories | Aluminium                        | 0,7%            |
| Cable gland                          | PA                               | 0,2%            |
| Internal wiring                      | Copper - FEP                     | 0,1%            |
| Supply cable                         | Copper - FEP                     | 3,2%            |
| Screws                               | Stainless steel/Galvanised steel | 1,1%            |
| Compensation valve                   | PBT                              | < 0,1%          |
| Optical screen                       | Tempered glass                   | 28,5%           |

**NOOS 2 XXX YYY-Y WWZZ.200-4M**

| <b>Components</b>                    | <b>Materials (input)</b>         | <b>% Weight</b> |
|--------------------------------------|----------------------------------|-----------------|
| LED driver                           | WEEE compliant electronic device | 11,6%           |
| LED                                  | WEEE compliant electronic device | < 0,1%          |
| PCB                                  | Aluminium - Ceramic - Copper     | 1,8%            |
| Optical modules                      | Polycarbonate + Aluminium        | 1,8%            |
| SPD                                  | WEEE compliant electronic device | 0,5%            |
| Luminaire body                       | Die-Cast Aluminium               | 39,8%           |
| Post-top                             | Die-Cast Aluminium               | 9,7%            |
| Telecontrol device                   | WEEE compliant electronic device | 1,0%            |
| Gasket                               | Polyurethane                     | 0,9%            |
| Plastic fixing/support accessories   | PA                               | 0,2%            |
| Steel fixing/support accessories     | Stainless steel/Galvanised steel | 1,9%            |
| Aluminium fixing/support accessories | Aluminium                        | 0,6%            |
| Cable gland                          | PA                               | 0,2%            |
| Internal wiring                      | Copper - FEP                     | 0,1%            |
| Supply cable                         |                                  | 5,0%            |
| Screws                               | Stainless steel/Galvanised steel | 1,0%            |
| Compensation valve                   | PBT                              | < 0,1%          |
| Optical screen                       | Tempered glass                   | 23,8%           |

**N.B.** The components indicated in the material balance table and their weight percentages may be subject to change if configurations other than those indicated are considered.

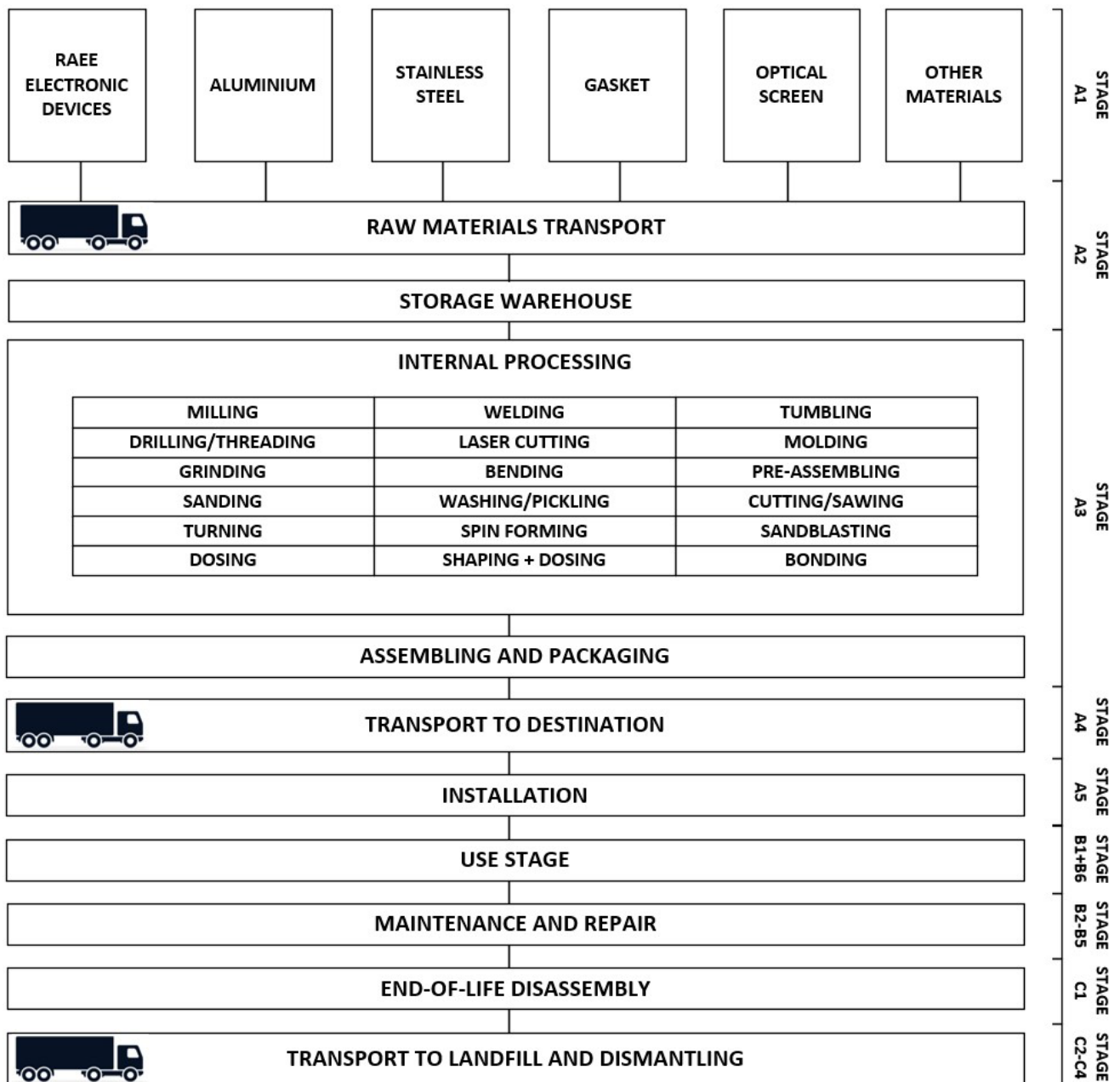
# DESCRIPTION OF THE PRODUCTION PROCESS

The reality of AEC Illuminazione S.r.l. is highly technological thanks to the investments made in recent years in brand new machinery, collaborative robots, automated plants, and digital data transmission technologies, guaranteeing greater production efficiency and industrial competitiveness.

The design and production processes take place within the company headquarters and begin with the receipt of raw materials (metals) and semi-finished products (electrical and electronic components, glass, and crystal), which undergo quality control before being stored in the automated warehouse.

The production of an appliance is made up of various internal and external phases at subcontractors, in particular, the internal phases include:

- Production processes of cast iron components.
- Production processes of steel and aluminium components.
- Pre-assembly of components and assembly of the finished product.
- Testing: safety and functionality tests of the luminaire.
- Finished product packaging.



# SCENARIOS

## MODULES

### Production Stage

### Distribution Stage

### Installation Stage

### Use Stage

### End-of-life Stage

### Resource recovery Stage

## SCENARIOS USED

**A2.Transport of raw materials.** For the component transport phase, the distances and relative quantities transported from the production site to the AEC Illuminazione S.r.l. factory were considered. For the calculation of distances by road, the distance between the company headquarters and the address of the various suppliers was used. For air and sea routes, the Ecotransit website (<https://www.ecotransit.org/en/>) was used instead.

**A4.Transport.** For the distribution phase, a distance of **832 km** by road and **1271 km** by ship was considered based on a weighted average of the countries of installation during the reference year.

**A5.Installation process.** For the installation of the luminaires, the use of a diesel lifting platform was considered for a time of 20 min, considering both the movement of the vehicle and the actual installation time of the luminaire. For fixing the luminaire to the pole, on the other hand, the use of an electric screwdriver was considered. During the installation phase, the disposal of the final packaging materials is considered by identifying a disposal scenario in European and non-European territory, based on the weighted average of the devices sold by AEC during the reference year.

**B1.Use.** This phase has already been accounted for in B6.

**B2.Maintenance.** No ordinary maintenance of the product by the company was considered during its useful life.

**B3.Repair.** Routine repairs of the product during its useful life are not considered. The operations relating to the LED power supply were accounted for in phase B4.

**B4.Replacement.** It's planned to replace LED driver at a rate of 4% based on the respective failure rates defined in the data sheets.

**B5.Rehabilitation.** Rehabilitation operations of the product or its components by the company during its useful life are not considered.

**B6.Energy used.** During the use phase the devices are powered by low voltage electricity. As indicated in the reference PCR 020 Sub-category, a Reference Life Service (RLS) of 40,000h and the nominal power of the appliance are considered. The energy mix considered for the consumption analysis is a weighted average of the countries of installation for the reference year, with an effective value equal to **0.432 kgCO<sub>2</sub>/kWh**. The input data used comes from the Ecoinvent 3.9.1 database.

**B7.Water used.** No water consumption is expected from the product during its lifetime.

**C1.Disassembly.** For the disassembly phase, the same impacts were considered as for the installation phase (operation of the diesel lifting platform and electric screwdriver).

**C2.Transport.** For the transport phase of the equipment to specialised treatment plants, reference was made to a precautionary default average distance of 100 km.

**C3.Recycling Processes.** For all information related to the treatment process of end-of-life appliances, reference has been made to Table G.4 in Annex G of EN 50693:2019.

**C4.Disposal processes.** For disposal processes, as for the previous paragraph, reference has been made to the same Annex G of EN 50693:2019.

**D. Re-use, recovery, recycling potential.** They were considered the C3 phase waste flows sent for recycling as recovered materials matter.

# NOOS 1 RESULTS

The following tables summarize the total environmental impacts calculated through AEC Illuminazione proprietary LCA-Tool for the NOOS 1 street luminaire.

Size: **NOOS 1 XXX YYY-Y WWZZ.040-1M**

**Main Environmental Impact Indicators – Results per declared unit**

| Indicator           | Unit of measure   | Manufacturing Stage |                 | Distribution Stage | Installation Stage | Use Stage       | End-of-life Stage | Resource recovery stage |
|---------------------|-------------------|---------------------|-----------------|--------------------|--------------------|-----------------|-------------------|-------------------------|
|                     |                   | A1-A2               | A3              | A4                 | A5                 | B1-B7           | C1-C4             | D                       |
| GWP-Fossil          | kg CO2 eq.        | 2,50E+01            | 2,13E+00        | 1,06E+00           | 1,45E+00           | 1,40E+02        | 1,95E+00          | -2,24E+00               |
| GWP-Biogenic        | kg CO2 eq.        | 4,11E-01            | -9,67E-01       | 8,76E-04           | 7,20E-01           | 6,82E+00        | 4,28E-02          | -4,36E-03               |
| GWP-Land use        | kg CO2 eq.        | 3,95E-02            | 2,67E-02        | 5,42E-04           | 2,42E-04           | 2,06E-01        | 3,87E-04          | -3,15E-02               |
| <b>GWP Total</b>    | <b>kg CO2 eq.</b> | <b>2,54E+01</b>     | <b>1,19E+00</b> | <b>1,06E+00</b>    | <b>2,17E+00</b>    | <b>1,47E+02</b> | <b>2,00E+00</b>   | <b>-2,28E+00</b>        |
| ODP                 | kg CFC 11 eq.     | 6,58E-07            | 5,49E-08        | 2,27E-08           | 2,29E-08           | 2,68E-06        | 2,62E-08          | -5,57E-08               |
| AP                  | mol H+ eq.        | 2,62E-01            | 9,25E-03        | 6,48E-03           | 7,03E-03           | 7,56E-01        | 7,77E-03          | -5,22E-02               |
| EP-Freshwater       | kg P eq.          | 1,65E-02            | 9,66E-04        | 7,18E-05           | 5,89E-05           | 6,79E-02        | 1,04E-04          | -4,05E-03               |
| EP-Marine           | kg N eq.          | 2,94E-02            | 4,91E-03        | 2,15E-03           | 3,19E-03           | 1,12E-01        | 3,51E-03          | -3,96E-03               |
| EP-Terrestrial      | mol N eq.         | 3,32E-01            | 2,88E-02        | 2,32E-02           | 3,25E-02           | 1,15E+00        | 3,47E-02          | -4,84E-02               |
| POCP                | kg NMVOC eq.      | 1,12E-01            | 2,56E-02        | 7,75E-03           | 1,08E-02           | 4,25E-01        | 1,13E-02          | -1,52E-02               |
| ADPE <sup>(2)</sup> | kg Sb eq.         | 3,00E-03            | 9,79E-06        | 3,25E-06           | 1,08E-06           | 1,51E-03        | 1,96E-06          | -4,83E-04               |
| ADPF <sup>(2)</sup> | MJ                | 3,18E+02            | 2,63E+01        | 1,50E+01           | 1,90E+01           | 2,35E+03        | 2,08E+01          | -3,01E+01               |
| WDP <sup>(2)</sup>  | m³                | 1,19E+01            | 9,38E-01        | 5,93E-02           | 5,41E-02           | 5,30E+01        | 1,78E-01          | -5,95E-01               |

## ACRONYMES

**GWP-Fossil** = One Hundred Year Global Warming Potential - Fossil. **GWP-Biogenic** = One Hundred Year Global Warming Potential - Biogenic. **GWP-Land use** = One Hundred Year global warming potential - Land use and land-use change. **ODP** = Ozone Depletion Potential in the stratosphere. **AP** = Acidification Potential of Soil and Water. **EP-Freshwater** = Eutrophication potential, for freshwater. **EP-Marine** = Eutrophication potential, for salt water. **EP-Terrestrial** = Terrestrial eutrophication potential. **POCP** = Photochemical Ozone Formation. **ADPE** = Abiotic Non-Fossil Resource Depletion Potential. **ADP-Fossil** = Depletion potential of abiotic fossil resources. **WDP** = Water Deprivation Potential (user), deprivation-weighted water consumption.

**Disclaimer (1)** = This impact category mainly concerns the possible impact of low-dose ionising radiation on humans from the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure, or underground radioactive waste disposal facilities. **Disclaimer (2)** = The results of this environmental impact indicator should be used with caution, as uncertainties about the results are high or experience with the indicator is limited.

**Additional Environmental Impact Indicators – Results per declared unit**

| Indicator             | Unit of measure | Manufacturing Stage |          | Distribution Stage | Installation Stage | Use Stage | End-of-life Stage | Resource recovery stage |
|-----------------------|-----------------|---------------------|----------|--------------------|--------------------|-----------|-------------------|-------------------------|
|                       |                 | A1-A2               | A3       | A4                 | A5                 | B1-B7     | C1-C4             | D                       |
| PM                    | disease inc.    | 1,67E-06            | 1,37E-07 | 5,16E-02           | 2,09E-07           | 1,66E-02  | 5,35E-02          | -1,90E-01               |
| IRP <sup>(1)</sup>    | kBq U235 eq.    | 1,88E+00            | 1,86E-01 | 1,92E-02           | 1,28E-02           | 3,39E+01  | 2,62E-02          | -3,85E-01               |
| ETP-FW <sup>(2)</sup> | CTUe            | 3,86E+02            | 1,59E+02 | 7,39E+00           | 1,04E+01           | 4,43E+02  | 2,82E+01          | -5,26E+01               |
| HTP-NC <sup>(2)</sup> | CTUh            | 1,73E-06            | 9,42E-08 | 6,86E-01           | 4,93E-01           | 9,81E-03  | 3,09E+00          | -6,06E-01               |
| HTP-C <sup>(2)</sup>  | CTUh            | 5,74E-08            | 5,30E-05 | 4,83E-10           | 1,96E-09           | 5,63E-08  | 1,64E-09          | -8,65E-09               |
| SQP <sup>(2)</sup>    | Pt              | 1,50E+02            | 1,17E+02 | 8,40E+00           | 2,18E+00           | 5,34E+02  | 5,84E+00          | -1,42E+01               |

## ACRONYMES

**PM** = Particulate Matter Emissions - Potential incidence of disease due to PM emissions. **IRP** = Ionising radiation, human health - Potential efficiency of human exposure to U235. **ETP-FW** = Ecotoxicity (freshwater) - Potential comparative toxicity unit for ecosystems. **HTP-NC** = Human toxicity, non-carcinogenic effects - Potential comparative toxicity unit for humans. **HTP-C** = Human toxicity, cancer - Potential comparative toxicity unit for CTUh. **SQP** = Land use related impacts / Soil quality - Potential soil quality index.

**Disclaimer (1)** = This impact category mainly concerns the possible impact of low-dose ionising radiation on humans from the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure, or underground radioactive waste disposal facilities. **Disclaimer (2)** = The results of this environmental impact indicator should be used with caution, as uncertainties about the results are high or experience with the indicator is limited.

### Resource use - Results per declared unit

| Indicator | Unit of measure | Manufacturing Stage |           | Distribution Stage | Installation Stage | Use Stage | End-of-life Stage | Resource recovery stage |
|-----------|-----------------|---------------------|-----------|--------------------|--------------------|-----------|-------------------|-------------------------|
|           |                 | A1-A2               | A3        | A4                 | A5                 | B1-B7     | C1-C4             | D                       |
| PERE      | MJ              | 5,77E+01            | -1,41E+00 | 2,24E-01           | 1,81E-01           | 6,27E+02  | 3,44E-01          | -9,78E+00               |
| PERM      | MJ              | 6,17E-01            | 2,50E+01  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| PERT      | MJ              | 5,83E+01            | 2,36E+01  | 2,24E-01           | 1,81E-01           | 6,27E+02  | 3,44E-01          | -9,78E+00               |
| PENRE     | MJ              | 3,09E+02            | 7,50E-01  | 1,50E+01           | 1,90E+01           | 2,35E+03  | 2,08E+01          | -3,01E+01               |
| PENRM     | MJ              | 8,96E+00            | 1,69E+00  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| PENRT     | MJ              | 3,18E+02            | 2,44E+00  | 1,50E+01           | 1,90E+01           | 2,35E+03  | 2,08E+01          | -3,01E+01               |
| SM        | kg              | 2,38E+00            | 0,00E+00  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| RSF       | MJ              | 0,00E+00            | 0,00E+00  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| NRSF      | MJ              | 0,00E+00            | 0,00E+00  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| FW        | m <sup>3</sup>  | 3,70E-01            | 2,82E-02  | 2,07E-03           | 1,92E-03           | 2,32E+00  | 5,78E-03          | -6,83E-02               |

#### ACRONYMES

**PERE** = Use of renewable primary energy resources excluding primary renewable energy resources used as feedstocks.  
**PERM** = Use of renewable primary energy resources used as feedstocks. **PERT** = Use of renewable primary energy resources.  
**PENRE** = Use of non-renewable primary energy resources excluding non-renewable primary energy resources used as feedstocks.  
**PENRM** = Use of non-renewable primary energy resources as feedstocks. **PENRT** = Use of non-renewable primary energy resources.  
**SM** = Use of secondary materials. **RSF** = Use of renewable secondary fuels. **NRSF** = Use of non-renewable secondary fuels. **FW** = Net use of fresh water.

### Waste generated - Results per declared unit

| Indicator | Unit of measure | Manufacturing Stage |          | Distribution Stage | Installation Stage | Use Stage | End-of-life Stage | Resource recovery stage |
|-----------|-----------------|---------------------|----------|--------------------|--------------------|-----------|-------------------|-------------------------|
|           |                 | A1-A2               | A3       | A4                 | A5                 | B1-B7     | C1-C4             | D                       |
| HWD       | kg              | 2,26E-02            | 1,09E-04 | 9,40E-05           | 1,26E-04           | 7,24E-03  | 1,33E-04          | 1,28E-03                |
| NHWD      | kg              | 4,02E+00            | 4,79E-01 | 6,86E-01           | 4,93E-01           | 1,09E+01  | 3,09E+00          | 0,00E+00                |
| RWD       | kg              | 4,76E-04            | 4,72E-05 | 4,65E-06           | 3,06E-06           | 8,72E-03  | 6,41E-06          | -1,02E-04               |

#### ACRONYMES

**HWD** = Hazardous Waste Disposed. **NHWD** = Non-Hazardous Waste Disposed. **RWD** = Radioactive Waste Disposed.

### Outflows - Results per declared unit

| Indicator | Unit of measure | Manufacturing Stage |          | Distribution Stage | Installation Stage | Use Stage | End-of-life Stage | Resource recovery stage |
|-----------|-----------------|---------------------|----------|--------------------|--------------------|-----------|-------------------|-------------------------|
|           |                 | A1-A2               | A3       | A4                 | A5                 | B1-B7     | C1-C4             | D                       |
| CRU       | kg              | 0,00E+00            | 0,00E+00 | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| MFR       | kg              | 0,00E+00            | 6,34E-01 | 0,00E+00           | 1,21E+00           | 0,00E+00  | 2,77E+00          | 1,02E+00                |
| MER       | kg              | 0,00E+00            | 0,00E+00 | 0,00E+00           | 0,00E+00           | 0,00E+00  | 1,21E-01          | 0,00E+00                |
| EEE       | MJ              | 0,00E+00            | 0,00E+00 | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| EET       | MJ              | 0,00E+00            | 0,00E+00 | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |

#### ACRONYMES

**CRU** = Components for Reuse. **MFR** = Materials for Recycling. **MER** = Materials for Energy Recovery. **EEE** = Exported Electrical Energy. **EET** = Exported Thermal Energy.

## Main Environmental Impact Indicators – Results per declared unit

| Indicator           | Unit of measure   | Manufacturing Stage |                 | Distribution Stage | Installation Stage | Use Stage       | End-of-life Stage | Resource recovery stage |
|---------------------|-------------------|---------------------|-----------------|--------------------|--------------------|-----------------|-------------------|-------------------------|
|                     |                   | A1-A2               | A3              | A4                 | A5                 | B1-B7           | C1-C4             | D                       |
| GWP-Fossil          | kg CO2 eq.        | 2,91E+01            | 2,22E+00        | 1,18E+00           | 1,45E+00           | 1,24E+03        | 2,68E+00          | -2,72E+00               |
| GWP-Biogenic        | kg CO2 eq.        | 4,14E-01            | -9,64E-01       | 9,75E-04           | 7,20E-01           | 6,06E+01        | 4,38E-02          | -4,23E-03               |
| GWP-Land use        | kg CO2 eq.        | 5,03E-02            | 2,67E-02        | 6,03E-04           | 2,42E-04           | 1,83E+00        | 4,33E-04          | -3,54E-02               |
| <b>GWP Total</b>    | <b>kg CO2 eq.</b> | <b>2,96E+01</b>     | <b>1,28E+00</b> | <b>1,18E+00</b>    | <b>2,17E+00</b>    | <b>1,31E+03</b> | <b>2,72E+00</b>   | <b>-2,76E+00</b>        |
| ODP                 | kg CFC 11 eq.     | 3,24E-06            | 5,54E-08        | 2,53E-08           | 2,29E-08           | 2,39E-05        | 2,81E-08          | -6,34E-08               |
| AP                  | mol H+ eq.        | 3,68E-01            | 9,37E-03        | 7,22E-03           | 7,03E-03           | 6,71E+00        | 8,09E-03          | -8,55E-02               |
| EP-Freshwater       | kg P eq.          | 2,33E-02            | 9,73E-04        | 7,99E-05           | 5,89E-05           | 6,02E-01        | 1,15E-04          | -6,88E-03               |
| EP-Marine           | kg N eq.          | 3,70E-02            | 4,93E-03        | 2,40E-03           | 3,19E-03           | 9,98E-01        | 4,18E-03          | -5,68E-03               |
| EP-Terrestrial      | mol N eq.         | 4,25E-01            | 2,91E-02        | 2,59E-02           | 3,25E-02           | 1,02E+01        | 3,59E-02          | -7,22E-02               |
| POCP                | kg NMVOC eq.      | 1,41E-01            | 2,84E-02        | 8,63E-03           | 1,08E-02           | 3,77E+00        | 1,17E-02          | -2,20E-02               |
| ADPE <sup>(2)</sup> | kg Sb eq.         | 4,24E-03            | 1,03E-05        | 3,61E-06           | 1,08E-06           | 1,30E-02        | 2,10E-06          | -9,01E-04               |
| ADPF <sup>(2)</sup> | MJ                | 3,81E+02            | 2,67E+01        | 1,67E+01           | 1,90E+01           | 2,09E+04        | 2,14E+01          | -3,62E+01               |
| WDP <sup>(2)</sup>  | m <sup>3</sup>    | 1,50E+01            | 9,41E-01        | 6,60E-02           | 5,41E-02           | 4,71E+02        | 2,71E-01          | -1,04E+00               |

## ACRONYMES

**GWP-Fossil** = One Hundred Year Global Warming Potential - Fossil. **GWP-Biogenic** = One Hundred Year Global Warming Potential - Biogenic. **GWP-Land use** = One Hundred Year global warming potential - Land use and land-use change. **ODP** = Ozone Depletion Potential in the stratosphere. **AP** = Acidification Potential of Soil and Water. **EP-Freshwater** = Eutrophication potential, for freshwater. **EP-Marine** = Eutrophication potential, for salt water. **EP-Terrestrial** = Terrestrial eutrophication potential. **POCP** = Photochemical Ozone Formation. **ADPE** = Abiotic Non-Fossil Resource Depletion Potential. **ADP-Fossil** = Depletion potential of abiotic fossil resources. **WDP** = Water Deprivation Potential (user), deprivation-weighted water consumption.

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## Additional Environmental Impact Indicators – Results per declared unit

| Indicator             | Unit of measure | Manufacturing Stage |          | Distribution Stage | Installation Stage | Use Stage | End-of-life Stage | Resource recovery stage |
|-----------------------|-----------------|---------------------|----------|--------------------|--------------------|-----------|-------------------|-------------------------|
|                       |                 | A1-A2               | A3       | A4                 | A5                 | B1-B7     | C1-C4             | D                       |
| PM                    | disease inc.    | 2,03E-06            | 1,39E-07 | 5,75E-02           | 2,09E-07           | 1,93E-02  | 5,85E-02          | -2,73E-01               |
| IRP <sup>(1)</sup>    | kBq U235 eq.    | 2,19E+00            | 1,87E-01 | 2,14E-02           | 1,28E-02           | 3,02E+02  | 2,89E-02          | -4,46E-01               |
| ETP-FW <sup>(2)</sup> | CTUe            | 4,79E+02            | 1,83E+02 | 8,23E+00           | 1,04E+01           | 3,92E+03  | 3,20E+01          | -9,24E+01               |
| HTP-NC <sup>(2)</sup> | CTUh            | 2,86E-06            | 1,07E-07 | 7,64E-01           | 4,93E-01           | 1,92E-02  | 3,50E+00          | -8,17E-01               |
| HTP-C <sup>(2)</sup>  | CTUh            | 7,38E-08            | 6,16E-05 | 5,38E-10           | 1,96E-09           | 5,00E-07  | 1,72E-09          | -1,37E-08               |
| SQP <sup>(2)</sup>    | Pt              | 1,88E+02            | 1,17E+02 | 9,35E+00           | 2,18E+00           | 4,75E+03  | 6,29E+00          | -2,42E+01               |

## ACRONYMES

**PM** = Particulate Matter Emissions - Potential incidence of disease due to PM emissions. **IRP** = Ionising radiation, human health - Potential efficiency of human exposure to U235. **ETP-FW** = Ecotoxicity (freshwater) - Potential comparative toxicity unit for ecosystems. **HTP-NC** = Human toxicity, non-carcinogenic effects - Potential comparative toxicity unit for humans. **HTP-C** = Human toxicity, cancer - Potential comparative toxicity unit for CTUh. **SQP** = Land use related impacts / Soil quality - Potential soil quality index.

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### Resource use - Results per declared unit

| Indicator | Unit of measure | Manufacturing Stage |           | Distribution Stage | Installation Stage | Use Stage | End-of-life Stage | Resource recovery stage |
|-----------|-----------------|---------------------|-----------|--------------------|--------------------|-----------|-------------------|-------------------------|
|           |                 | A1-A2               | A3        | A4                 | A5                 | B1-B7     | C1-C4             | D                       |
| PERE      | MJ              | 6,75E+01            | -1,39E+00 | 2,49E-01           | 1,81E-01           | 5,58E+03  | 3,80E-01          | -1,19E+01               |
| PERM      | MJ              | 7,18E-01            | 2,50E+01  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| PERT      | MJ              | 6,82E+01            | 2,36E+01  | 2,49E-01           | 1,81E-01           | 5,58E+03  | 3,80E-01          | -1,19E+01               |
| PENRE     | MJ              | 3,63E+02            | 1,01E+00  | 1,67E+01           | 1,90E+01           | 2,09E+04  | 2,14E+01          | -3,62E+01               |
| PENRM     | MJ              | 1,79E+01            | 1,83E+00  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| PENRT     | MJ              | 3,81E+02            | 2,84E+00  | 1,67E+01           | 1,90E+01           | 2,09E+04  | 2,14E+01          | -3,62E+01               |
| SM        | kg              | 2,38E+00            | 0,00E+00  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| RSF       | MJ              | 0,00E+00            | 0,00E+00  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| NRSF      | MJ              | 0,00E+00            | 0,00E+00  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| FW        | m <sup>3</sup>  | 4,59E-01            | 2,83E-02  | 2,31E-03           | 1,92E-03           | 2,06E+01  | 8,67E-03          | -8,45E-02               |

#### ACRONYMES

**PERE** = Use of renewable primary energy resources excluding primary renewable energy resources used as feedstocks.  
**PERM** = Use of renewable primary energy resources used as feedstocks. **PERT** = Use of renewable primary energy resources.  
**PENRE** = Use of non-renewable primary energy resources excluding non-renewable primary energy resources used as feedstocks.  
**PENRM** = Use of non-renewable primary energy resources as feedstocks. **PENRT** = Use of non-renewable primary energy resources.  
**SM** = Use of secondary materials. **RSF** = Use of renewable secondary fuels. **NRSF** = Use of non-renewable secondary fuels. **FW** = Net use of fresh water.

### Waste generated - Results per declared unit

| Indicator | Unit of measure | Manufacturing Stage |          | Distribution Stage | Installation Stage | Use Stage | End-of-life Stage | Resource recovery stage |
|-----------|-----------------|---------------------|----------|--------------------|--------------------|-----------|-------------------|-------------------------|
|           |                 | A1-A2               | A3       | A4                 | A5                 | B1-B7     | C1-C4             | D                       |
| HWD       | kg              | 2,45E-02            | 1,10E-04 | 1,05E-04           | 1,26E-04           | 6,43E-02  | 1,36E-04          | 1,40E-03                |
| NHWD      | kg              | 4,87E+00            | 4,85E-01 | 7,64E-01           | 4,93E-01           | 9,65E+01  | 3,50E+00          | 0,00E+00                |
| RWD       | kg              | 5,56E-04            | 4,75E-05 | 5,18E-06           | 3,06E-06           | 7,75E-02  | 7,07E-06          | -1,18E-04               |

#### ACRONYMES

**HWD** = Hazardous Waste Disposed. **NHWD** = Non-Hazardous Waste Disposed. **RWD** = Radioactive Waste Disposed.

### Outflows - Results per declared unit

| Indicator | Unit of measure | Manufacturing Stage |          | Distribution Stage | Installation Stage | Use Stage | End-of-life Stage | Resource recovery stage |
|-----------|-----------------|---------------------|----------|--------------------|--------------------|-----------|-------------------|-------------------------|
|           |                 | A1-A2               | A3       | A4                 | A5                 | B1-B7     | C1-C4             | D                       |
| CRU       | kg              | 0,00E+00            | 0,00E+00 | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| MFR       | kg              | 0,00E+00            | 7,38E-01 | 0,00E+00           | 1,21E+00           | 0,00E+00  | 2,89E+00          | 1,14E+00                |
| MER       | kg              | 0,00E+00            | 0,00E+00 | 0,00E+00           | 0,00E+00           | 0,00E+00  | 3,73E-01          | 0,00E+00                |
| EEE       | MJ              | 0,00E+00            | 0,00E+00 | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| EET       | MJ              | 0,00E+00            | 0,00E+00 | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |

#### ACRONYMES

**CRU** = Components for Reuse. **MFR** = Materials for Recycling. **MER** = Materials for Energy Recovery. **EEE** = Exported Electrical Energy. **EET** = Exported Thermal Energy.

# NOOS 2 RESULTS

The following tables summarize the total environmental impacts calculated through AEC Illuminazione proprietary LCA-Tool for the NOOS 2 street luminaire.

Size: **NOOS 2 XXX YYY-Y WWZZ.040-1M**

**Main Environmental Impact Indicators – Results per declared unit**

| Indicator           | Unit of measure   | Manufacturing Stage |                 | Distribution Stage | Installation Stage | Use Stage       | End-of-life Stage | Resource recovery stage |
|---------------------|-------------------|---------------------|-----------------|--------------------|--------------------|-----------------|-------------------|-------------------------|
|                     |                   | A1-A2               | A3              | A4                 | A5                 | B1-B7           | C1-C4             | D                       |
| GWP-Fossil          | kg CO2 eq.        | 3,02E+01            | 2,26E+00        | 1,25E+00           | 1,45E+00           | 1,40E+02        | 2,02E+00          | -2,73E+00               |
| GWP-Biogenic        | kg CO2 eq.        | 4,96E-01            | -9,62E-01       | 1,03E-03           | 7,20E-01           | 6,82E+00        | 5,23E-02          | -5,61E-03               |
| GWP-Land use        | kg CO2 eq.        | 4,56E-02            | 2,67E-02        | 6,37E-04           | 2,42E-04           | 2,06E-01        | 4,33E-04          | -3,77E-02               |
| <b>GWP Total</b>    | <b>kg CO2 eq.</b> | <b>3,08E+01</b>     | <b>1,33E+00</b> | <b>1,25E+00</b>    | <b>2,17E+00</b>    | <b>1,47E+02</b> | <b>2,08E+00</b>   | <b>-2,77E+00</b>        |
| ODP                 | kg CFC 11 eq.     | 7,79E-07            | 5,57E-08        | 2,67E-08           | 2,29E-08           | 2,68E-06        | 2,71E-08          | -6,87E-08               |
| AP                  | mol H+ eq.        | 2,97E-01            | 9,43E-03        | 7,61E-03           | 7,03E-03           | 7,56E-01        | 8,06E-03          | -5,63E-02               |
| EP-Freshwater       | kg P eq.          | 1,81E-02            | 9,76E-04        | 8,43E-05           | 5,89E-05           | 6,79E-02        | 1,15E-04          | -4,21E-03               |
| EP-Marine           | kg N eq.          | 3,47E-02            | 4,95E-03        | 2,53E-03           | 3,19E-03           | 1,12E-01        | 3,62E-03          | -4,59E-03               |
| EP-Terrestrial      | mol N eq.         | 3,90E-01            | 2,92E-02        | 2,73E-02           | 3,25E-02           | 1,15E+00        | 3,57E-02          | -5,54E-02               |
| POCP                | kg NMVOC eq.      | 1,32E-01            | 3,00E-02        | 9,11E-03           | 1,08E-02           | 4,25E-01        | 1,17E-02          | -1,75E-02               |
| ADPE <sup>(2)</sup> | kg Sb eq.         | 3,17E-03            | 1,06E-05        | 3,81E-06           | 1,08E-06           | 1,51E-03        | 2,26E-06          | -4,82E-04               |
| ADPF <sup>(2)</sup> | MJ                | 3,83E+02            | 2,69E+01        | 1,76E+01           | 1,90E+01           | 2,35E+03        | 2,15E+01          | -3,65E+01               |
| WDP <sup>(2)</sup>  | m³                | 1,42E+01            | 9,43E-01        | 6,96E-02           | 5,41E-02           | 5,30E+01        | 1,92E-01          | -6,38E-01               |

## ACRONYMES

**GWP-Fossil** = One Hundred Year Global Warming Potential - Fossil. **GWP-Biogenic** = One Hundred Year Global Warming Potential - Biogenic. **GWP-Land use** = One Hundred Year global warming potential - Land use and land-use change. **ODP** = Ozone Depletion Potential in the stratosphere. **AP** = Acidification Potential of Soil and Water. **EP-Freshwater** = Eutrophication potential, for freshwater. **EP-Marine** = Eutrophication potential, for salt water. **EP-Terrestrial** = Terrestrial eutrophication potential. **POCP** = Photochemical Ozone Formation. **ADPE** = Abiotic Non-Fossil Resource Depletion Potential. **ADP-Fossil** = Depletion potential of abiotic fossil resources. **WDP** = Water Deprivation Potential (user), deprivation-weighted water consumption.

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**Additional Environmental Impact Indicators – Results per declared unit**

| Indicator             | Unit of measure | Manufacturing Stage |          | Distribution Stage | Installation Stage | Use Stage | End-of-life Stage | Resource recovery stage |
|-----------------------|-----------------|---------------------|----------|--------------------|--------------------|-----------|-------------------|-------------------------|
|                       |                 | A1-A2               | A3       | A4                 | A5                 | B1-B7     | C1-C4             | D                       |
| PM                    | disease inc.    | 2,00E-06            | 1,41E-07 | 6,06E-02           | 2,09E-07           | 1,66E-02  | 6,15E-02          | -2,15E-01               |
| IRP <sup>(1)</sup>    | kBq U235 eq.    | 2,24E+00            | 1,88E-01 | 2,26E-02           | 1,28E-02           | 3,39E+01  | 2,92E-02          | -4,63E-01               |
| ETP-FW <sup>(2)</sup> | CTUe            | 4,39E+02            | 1,96E+02 | 8,68E+00           | 1,04E+01           | 4,43E+02  | 3,21E+01          | -5,51E+01               |
| HTP-NC <sup>(2)</sup> | CTUh            | 1,84E-06            | 1,14E-07 | 8,06E-01           | 4,93E-01           | 9,81E-03  | 3,85E+00          | -6,85E-01               |
| HTP-C <sup>(2)</sup>  | CTUh            | 6,57E-08            | 6,63E-05 | 5,68E-10           | 1,96E-09           | 5,63E-08  | 1,69E-09          | -9,51E-09               |
| SQP <sup>(2)</sup>    | Pt              | 1,77E+02            | 1,18E+02 | 9,87E+00           | 2,18E+00           | 5,34E+02  | 6,92E+00          | -1,50E+01               |

## ACRONYMES

**PM** = Particulate Matter Emissions - Potential incidence of disease due to PM emissions. **IRP** = Ionising radiation, human health - Potential efficiency of human exposure to U235. **ETP-FW** = Ecotoxicity (freshwater) - Potential comparative toxicity unit for ecosystems. **HTP-NC** = Human toxicity, non-carcinogenic effects - Potential comparative toxicity unit for humans. **HTP-C** = Human toxicity, cancer - Potential comparative toxicity unit for CTUh. **SQP** = Land use related impacts / Soil quality - Potential soil quality index.

**Disclaimer (1)** = This impact category mainly concerns the possible impact of low-dose ionising radiation on humans from the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure, or underground radioactive waste disposal facilities. **Disclaimer (2)** = The results of this environmental impact indicator should be used with caution, as uncertainties about the results are high or experience with the indicator is limited.

### Resource use - Results per declared unit

| Indicator | Unit of measure | Manufacturing Stage |           | Distribution Stage | Installation Stage | Use Stage | End-of-life Stage | Resource recovery stage |
|-----------|-----------------|---------------------|-----------|--------------------|--------------------|-----------|-------------------|-------------------------|
|           |                 | A1-A2               | A3        | A4                 | A5                 | B1-B7     | C1-C4             | D                       |
| PERE      | MJ              | 6,92E+01            | -1,38E+00 | 2,63E-01           | 1,81E-01           | 6,27E+02  | 3,82E-01          | -1,15E+01               |
| PERM      | MJ              | 7,72E-01            | 2,50E+01  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| PERT      | MJ              | 7,00E+01            | 2,36E+01  | 2,63E-01           | 1,81E-01           | 6,27E+02  | 3,82E-01          | -1,15E+01               |
| PENRE     | MJ              | 3,73E+02            | 1,15E+00  | 1,76E+01           | 1,90E+01           | 2,35E+03  | 2,15E+01          | -3,65E+01               |
| PENRM     | MJ              | 9,84E+00            | 1,91E+00  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| PENRT     | MJ              | 3,83E+02            | 3,05E+00  | 1,76E+01           | 1,90E+01           | 2,35E+03  | 2,15E+01          | -3,65E+01               |
| SM        | kg              | 2,94E+00            | 0,00E+00  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| RSF       | MJ              | 0,00E+00            | 0,00E+00  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| NRSF      | MJ              | 0,00E+00            | 0,00E+00  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| FW        | m <sup>3</sup>  | 4,41E-01            | 2,84E-02  | 2,44E-03           | 1,92E-03           | 2,32E+00  | 6,20E-03          | -8,03E-02               |

#### ACRONYMES

**PERE** = Use of renewable primary energy resources excluding primary renewable energy resources used as feedstocks.  
**PERM** = Use of renewable primary energy resources used as feedstocks. **PERT** = Use of renewable primary energy resources.  
**PENRE** = Use of non-renewable primary energy resources excluding non-renewable primary energy resources used as feedstocks.  
**PENRM** = Use of non-renewable primary energy resources as feedstocks. **PENRT** = Use of non-renewable primary energy resources.  
**SM** = Use of secondary materials. **RSF** = Use of renewable secondary fuels. **NRSF** = Use of non-renewable secondary fuels. **FW** = Net use of fresh water.

### Waste generated - Results per declared unit

| Indicator | Unit of measure | Manufacturing Stage |          | Distribution Stage | Installation Stage | Use Stage | End-of-life Stage | Resource recovery stage |
|-----------|-----------------|---------------------|----------|--------------------|--------------------|-----------|-------------------|-------------------------|
|           |                 | A1-A2               | A3       | A4                 | A5                 | B1-B7     | C1-C4             | D                       |
| HWD       | kg              | 2,72E-02            | 1,11E-04 | 1,10E-04           | 1,26E-04           | 7,24E-03  | 1,36E-04          | 1,55E-03                |
| NHWD      | kg              | 4,67E+00            | 4,88E-01 | 8,06E-01           | 4,93E-01           | 1,09E+01  | 3,85E+00          | 0,00E+00                |
| RWD       | kg              | 5,67E-04            | 4,77E-05 | 5,47E-06           | 3,06E-06           | 8,72E-03  | 7,16E-06          | -1,22E-04               |

#### ACRONYMES

**HWD** = Hazardous Waste Disposed. **NHWD** = Non-Hazardous Waste Disposed. **RWD** = Radioactive Waste Disposed.

### Outflows - Results per declared unit

| Indicator | Unit of measure | Manufacturing Stage |          | Distribution Stage | Installation Stage | Use Stage | End-of-life Stage | Resource recovery stage |
|-----------|-----------------|---------------------|----------|--------------------|--------------------|-----------|-------------------|-------------------------|
|           |                 | A1-A2               | A3       | A4                 | A5                 | B1-B7     | C1-C4             | D                       |
| CRU       | kg              | 0,00E+00            | 0,00E+00 | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| MFR       | kg              | 0,00E+00            | 7,94E-01 | 0,00E+00           | 1,21E+00           | 0,00E+00  | 3,48E+00          | 1,35E+00                |
| MER       | kg              | 0,00E+00            | 0,00E+00 | 0,00E+00           | 0,00E+00           | 0,00E+00  | 1,26E-01          | 0,00E+00                |
| EEE       | MJ              | 0,00E+00            | 0,00E+00 | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| EET       | MJ              | 0,00E+00            | 0,00E+00 | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |

#### ACRONYMES

**CRU** = Components for Reuse. **MFR** = Materials for Recycling. **MER** = Materials for Energy Recovery. **EEE** = Exported Electrical Energy. **EET** = Exported Thermal Energy.

## Main Environmental Impact Indicators – Results per declared unit

| Indicator           | Unit of measure   | Manufacturing Stage |                 | Distribution Stage | Installation Stage | Use Stage       | End-of-life Stage | Resource recovery stage |
|---------------------|-------------------|---------------------|-----------------|--------------------|--------------------|-----------------|-------------------|-------------------------|
|                     |                   | A1-A2               | A3              | A4                 | A5                 | B1-B7           | C1-C4             | D                       |
| GWP-Fossil          | kg CO2 eq.        | 3,75E+01            | 2,39E+00        | 1,43E+00           | 1,45E+00           | 2,42E+03        | 3,11E+00          | -3,45E+00               |
| GWP-Biogenic        | kg CO2 eq.        | 5,10E-01            | -9,57E-01       | 1,18E-03           | 7,20E-01           | 1,18E+02        | 5,43E-02          | -6,39E-03               |
| GWP-Land use        | kg CO2 eq.        | 7,27E-02            | 2,67E-02        | 7,30E-04           | 2,42E-04           | 3,55E+00        | 4,88E-04          | -4,78E-02               |
| <b>GWP Total</b>    | <b>kg CO2 eq.</b> | <b>3,80E+01</b>     | <b>1,46E+00</b> | <b>1,43E+00</b>    | <b>2,17E+00</b>    | <b>2,54E+03</b> | <b>3,16E+00</b>   | <b>-3,51E+00</b>        |
| ODP                 | kg CFC 11 eq.     | 4,23E-06            | 5,64E-08        | 3,06E-08           | 2,29E-08           | 4,64E-05        | 2,97E-08          | -8,39E-08               |
| AP                  | mol H+ eq.        | 4,45E-01            | 9,62E-03        | 8,73E-03           | 7,03E-03           | 1,30E+01        | 8,52E-03          | -9,12E-02               |
| EP-Freshwater       | kg P eq.          | 2,78E-02            | 9,86E-04        | 9,66E-05           | 5,89E-05           | 1,17E+00        | 1,29E-04          | -7,19E-03               |
| EP-Marine           | kg N eq.          | 4,68E-02            | 4,99E-03        | 2,90E-03           | 3,19E-03           | 1,94E+00        | 4,66E-03          | -6,52E-03               |
| EP-Terrestrial      | mol N eq.         | 5,34E-01            | 2,96E-02        | 3,13E-02           | 3,25E-02           | 1,99E+01        | 3,75E-02          | -8,11E-02               |
| POCP                | kg NMVOC eq.      | 1,77E-01            | 3,44E-02        | 1,04E-02           | 1,08E-02           | 7,34E+00        | 1,22E-02          | -2,51E-02               |
| ADPE <sup>(2)</sup> | kg Sb eq.         | 5,20E-03            | 1,15E-05        | 4,37E-06           | 1,08E-06           | 2,52E-02        | 2,47E-06          | -8,97E-04               |
| ADPF <sup>(2)</sup> | MJ                | 4,92E+02            | 2,75E+01        | 2,02E+01           | 1,90E+01           | 4,06E+04        | 2,24E+01          | -4,64E+01               |
| WDP <sup>(2)</sup>  | m <sup>3</sup>    | 1,89E+01            | 9,48E-01        | 7,98E-02           | 5,41E-02           | 9,16E+02        | 3,03E-01          | -1,07E+00               |

## ACRONYMES

**GWP-Fossil** = One Hundred Year Global Warming Potential - Fossil. **GWP-Biogenic** = One Hundred Year Global Warming Potential - Biogenic. **GWP-Land use** = One Hundred Year global warming potential - Land use and land-use change. **ODP** = Ozone Depletion Potential in the stratosphere. **AP** = Acidification Potential of Soil and Water. **EP-Freshwater** = Eutrophication potential, for freshwater. **EP-Marine** = Eutrophication potential, for salt water. **EP-Terrestrial** = Terrestrial eutrophication potential. **POCP** = Photochemical Ozone Formation. **ADPE** = Abiotic Non-Fossil Resource Depletion Potential. **ADP-Fossil** = Depletion potential of abiotic fossil resources. **WDP** = Water Deprivation Potential (user), deprivation-weighted water consumption.

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## Additional Environmental Impact Indicators – Results per declared unit

| Indicator             | Unit of measure | Manufacturing Stage |          | Distribution Stage | Installation Stage | Use Stage | End-of-life Stage | Resource recovery stage |
|-----------------------|-----------------|---------------------|----------|--------------------|--------------------|-----------|-------------------|-------------------------|
|                       |                 | A1-A2               | A3       | A4                 | A5                 | B1-B7     | C1-C4             | D                       |
| PM                    | disease inc.    | 2,58E-06            | 1,45E-07 | 6,95E-02           | 2,09E-07           | 2,83E-02  | 6,80E-02          | -3,13E-01               |
| IRP <sup>(1)</sup>    | kBq U235 eq.    | 2,84E+00            | 1,90E-01 | 2,59E-02           | 1,28E-02           | 5,87E+02  | 3,24E-02          | -5,91E-01               |
| ETP-FW <sup>(2)</sup> | CTUe            | 5,93E+02            | 2,32E+02 | 9,96E+00           | 1,04E+01           | 7,62E+03  | 3,67E+01          | -9,50E+01               |
| HTP-NC <sup>(2)</sup> | CTUh            | 3,20E-06            | 1,33E-07 | 9,24E-01           | 4,93E-01           | 2,85E-02  | 4,47E+00          | -9,71E-01               |
| HTP-C <sup>(2)</sup>  | CTUh            | 8,98E-08            | 7,95E-05 | 6,51E-10           | 1,96E-09           | 9,72E-07  | 1,80E-09          | -1,53E-08               |
| SQP <sup>(2)</sup>    | Pt              | 2,29E+02            | 1,18E+02 | 1,13E+01           | 2,18E+00           | 9,24E+03  | 7,61E+00          | -2,51E+01               |

## ACRONYMES

**PM** = Particulate Matter Emissions - Potential incidence of disease due to PM emissions. **IRP** = Ionising radiation, human health - Potential efficiency of human exposure to U235. **ETP-FW** = Ecotoxicity (freshwater) - Potential comparative toxicity unit for ecosystems. **HTP-NC** = Human toxicity, non-carcinogenic effects - Potential comparative toxicity unit for humans. **HTP-C** = Human toxicity, cancer - Potential comparative toxicity unit for CTUh. **SQP** = Land use related impacts / Soil quality - Potential soil quality index.

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### Resource use - Results per declared unit

| Indicator | Unit of measure | Manufacturing Stage |           | Distribution Stage | Installation Stage | Use Stage | End-of-life Stage | Resource recovery stage |
|-----------|-----------------|---------------------|-----------|--------------------|--------------------|-----------|-------------------|-------------------------|
|           |                 | A1-A2               | A3        | A4                 | A5                 | B1-B7     | C1-C4             | D                       |
| PERE      | MJ              | 8,66E+01            | -1,35E+00 | 3,02E-01           | 1,81E-01           | 1,08E+04  | 4,24E-01          | -1,52E+01               |
| PERM      | MJ              | 9,26E-01            | 2,50E+01  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| PERT      | MJ              | 8,75E+01            | 2,37E+01  | 3,02E-01           | 1,81E-01           | 1,08E+04  | 4,24E-01          | -1,52E+01               |
| PENRE     | MJ              | 4,69E+02            | 1,54E+00  | 2,02E+01           | 1,90E+01           | 4,05E+04  | 2,24E+01          | -4,64E+01               |
| PENRM     | MJ              | 2,25E+01            | 2,12E+00  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| PENRT     | MJ              | 4,91E+02            | 3,66E+00  | 2,02E+01           | 1,90E+01           | 4,05E+04  | 2,24E+01          | -4,64E+01               |
| SM        | kg              | 2,94E+00            | 0,00E+00  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| RSF       | MJ              | 0,00E+00            | 0,00E+00  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| NRSF      | MJ              | 0,00E+00            | 0,00E+00  | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| FW        | m <sup>3</sup>  | 5,89E-01            | 2,85E-02  | 2,79E-03           | 1,92E-03           | 4,00E+01  | 9,65E-03          | -1,07E-01               |

#### ACRONYMES

**PERE** = Use of renewable primary energy resources excluding primary renewable energy resources used as feedstocks.  
**PERM** = Use of renewable primary energy resources used as feedstocks. **PERT** = Use of renewable primary energy resources.  
**PENRE** = Use of non-renewable primary energy resources excluding non-renewable primary energy resources used as feedstocks.  
**PENRM** = Use of non-renewable primary energy resources as feedstocks. **PENRT** = Use of non-renewable primary energy resources.  
**SM** = Use of secondary materials. **RSF** = Use of renewable secondary fuels. **NRSF** = Use of non-renewable secondary fuels. **FW** = Net use of fresh water.

### Waste generated - Results per declared unit

| Indicator | Unit of measure | Manufacturing Stage |          | Distribution Stage | Installation Stage | Use Stage | End-of-life Stage | Resource recovery stage |
|-----------|-----------------|---------------------|----------|--------------------|--------------------|-----------|-------------------|-------------------------|
|           |                 | A1-A2               | A3       | A4                 | A5                 | B1-B7     | C1-C4             | D                       |
| HWD       | kg              | 2,98E-02            | 1,12E-04 | 1,27E-04           | 1,26E-04           | 1,25E-01  | 1,41E-04          | 1,94E-03                |
| NHWD      | kg              | 6,12E+00            | 4,98E-01 | 9,24E-01           | 4,93E-01           | 1,88E+02  | 4,47E+00          | 0,00E+00                |
| RWD       | kg              | 7,19E-04            | 4,82E-05 | 6,27E-06           | 3,06E-06           | 1,51E-01  | 7,94E-06          | -1,57E-04               |

#### ACRONYMES

**HWD** = Hazardous Waste Disposed. **NHWD** = Non-Hazardous Waste Disposed. **RWD** = Radioactive Waste Disposed.

### Outflows - Results per declared unit

| Indicator | Unit of measure | Manufacturing Stage |          | Distribution Stage | Installation Stage | Use Stage | End-of-life Stage | Resource recovery stage |
|-----------|-----------------|---------------------|----------|--------------------|--------------------|-----------|-------------------|-------------------------|
|           |                 | A1-A2               | A3       | A4                 | A5                 | B1-B7     | C1-C4             | D                       |
| CRU       | kg              | 0,00E+00            | 0,00E+00 | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| MFR       | kg              | 0,00E+00            | 9,51E-01 | 0,00E+00           | 1,21E+00           | 0,00E+00  | 3,66E+00          | 1,51E+00                |
| MER       | kg              | 0,00E+00            | 0,00E+00 | 0,00E+00           | 0,00E+00           | 0,00E+00  | 5,21E-01          | 0,00E+00                |
| EEE       | MJ              | 0,00E+00            | 0,00E+00 | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |
| EET       | MJ              | 0,00E+00            | 0,00E+00 | 0,00E+00           | 0,00E+00           | 0,00E+00  | 0,00E+00          | 0,00E+00                |

#### ACRONYMES

**CRU** = Components for Reuse. **MFR** = Materials for Recycling. **MER** = Materials for Energy Recovery. **EEE** = Exported Electrical Energy. **EET** = Exported Thermal Energy.

## SUMMARY TABLES

**Total CO<sub>2</sub> equivalent production of the luminaire**

| Model  | Size                         | GWP Total<br>A1-A3<br>[kgCO <sub>2</sub> eq] | GWP Total<br>A1-C4<br>[kgCO <sub>2</sub> eq] |
|--------|------------------------------|----------------------------------------------|----------------------------------------------|
| NOOS 1 | NOOS 1 XXX YYY-Y WWZZ.040-1M | 2,66E+01                                     | 1,79E+02*                                    |
|        | NOOS 1 XXX YYY-Y WWZZ.200-4M | 3,08E+01                                     | 1,34E+03*                                    |
| NOOS 2 | NOOS 2 XXX YYY-Y WWZZ.060-5M | 3,21E+01                                     | 1,85E+02*                                    |
|        | NOOS 2 XXX YYY-Y WWZZ.200-8M | 3,95E+01                                     | 2,59E+03*                                    |

\* Results for the GWP Total indicator refer to the functional units analysed and may be subject to change if configurations other than those indicated are considered.

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