GlobalEPD

A VERIFIED ENVIRONMENTAL DECLARATION

AENOR

Environmental product declaration

**EN ISO 14025:2010**

**EN 50693:2019**

## Cable Family N1VV-K Unipolar

| | |
|---|---|
| 2025-10-28 | 2025-10-28 |
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# Bruno Baldassari & F.lli S.p.A.

**N1VV-K UE 0,6/1 kV**

The holder of this Declaration is responsible for its contents and for keeping the records and the documentation that supports data and statements included during the validity period.

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|---|
| The European standard EN 50693:2019 serves as PCR for this EPD |
| Independent verification of the declaration and data in accordance with EN ISO 14025:2010<br><br>☐Internal ☒External |
| Verification body<br><br>AENOR |

# 1. General Information

## 1.1. The organization

Baldassari Cavi, founded in 1963, is one of the leading manufacturers of low voltage electrical cables, confirming the path taken of constant growth over the years in terms of turnover and production range.

Baldassari Cavi products represent the qualitative excellence achieved through years of research and experimentation, starting from raw materials selected and transformed with the most modern production processes to create cables that exceed all the requirements of the regulations. The quality of the products, which has always been a priority of the company, is recognized nationally and internationally and is confirmed by the numerous approvals obtained over the years.

Baldassari Cavi produces a wide range of cables that can be used for all types of use and works with the most important certification bodies in the cable market such as IMQ, AENOR, LCIE, VDE, CEBEC and others.

The company has been ISO 9001 certified since 1996 and ISO 14001 since 2014.

## 1.2. Scope of the declaration

This declaration describes N1VV-K Unipolar cable family, manufactured in the palnts of the Bruno Baldassari & F.lli company, located in:

- Marlia (Lucca, Italy) for the copper conductor
- Lammari (Lucca, Italy) for the insulation
- Salanetti (Lucca, Italy) for the packaging.

This declaration refers to the year 2023.

**Reference rules for product selection**

- In the absence of sales data for the inventory reference year, data from years with available sales are used (2024 and 2025).
- Where it is not possible to identify the best-selling product, the selection is based on the best-selling section of the formation with the closest technical and dimensional characteristics.
- If the largest or smallest product has never been sold, quantities are estimated by assuming 1 km of product as the functional unit, with the corresponding weight expressed in tonnes.

This approach ensures a balance between representativeness, accuracy, and practicality of analysis, in accordance with the principles of standard EN 50693 and the guidelines of the GlobalEPD program by AENOR.

For each selected subfamily, the LCA assessment was conducted on the configurations with the smallest, best-selling, and largest cross-sections.

Therefore, to describe the cable family, the data of the following cables are reported:

Subfamily with one conductor (1x):

- N1VV-K 1x35, the cable with the smallest cross-section;
- N1VV-K 1x240, the representative cable of the subfamily;
- N1VV-K 1x630, The cable with the largest section;

### 1.3. Lifecycle and compliance.

This EPD has been developed and verified in accordance with EN ISO 14025:2010 and EN 50693:2019 standards and the following Category Rule:

| *ABOUT CATEGORY RULES PRODUCT* | |
|---|---|
| **Title** | Product category rules for life cycle assessments of electronic and electrical products and systems |
| **Registration code and version** | EN 50693:2019. |
| **Issue Date** | March 2020 |
| **Compliance** | EN 50693:2019 |
| **Program Operator** | AENOR |

This Environmental Statement covers the following life cycle phases:

**System limitations. Modules considered**

| | | |
|---|---|---|
| **Manufacturing** | Raw materials | X |
| | Raw materials transport | X |
| | Manufacturing | X |
| **Distribution** | Distribution | X |
| **Installation** | Installation, process and waste | X |
| **Use** | Use | X |
| | Maintenance | NA |
| **End of life stage** | Deinstallation | NA |
| | Transport | X |
| | Waste treatment | X |
| | Waste disposal | X |
| | Benefits and loads beyond the life cycle | X |

*NA: Not Aplicable

This EPD may not be comparable with those developed in other programs or according to different reference documents, in particular it may not be comparable with EPDs not drafted in accordance with the EN 50693:2019.

Similarly, this EPD may not be comparable if the source of the data is different (e.g. databases), if not all relevant modules are included, or if they are not based on the same scenarios.

The comparison of construction products must be carried out on the same function, applying the same functional unit and at the level of the building (or the architectural work or engineering), i.e. including the behavior of the product throughout its life cycle, as well as the specifications of section 6.7.2 of the EN ISO 14025 standard.

# 2.The product

### 2.1 Product Identification

The N1VV-K family of cables consists of power cables PVC insulated with PVC sheath, not propagating fire with reduced corrosive gas emission, with special fire reaction characteristics according to Construction Products Regulation (CPR).

The CPC code is 4634.

The applicable regulations are:

- Construction Products Regulation: EU Reg. 305/11.
- Class in accordance with EN 50575:2014 + A1:2016 and EN 13501-6:2014: Eca
- Build and requirements: XP C 32-321:2014
- Flame spread: NF EN 60332-1-2
- Low Voltage Directive: 2014/35/EU

| Formazione | Ø indicativo conduttore | Spessore medio isolante | Spessore medio guaina | Ø esterno max | Resistenza elettrica max a 20°C | Peso indicativo cavo | Portata di corrente A | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | interrato a 20°C | | tubo interrato a 20°C | |
| n° x mm² | mm | mm | mm | mm | Ω/km | kg/km | in aria a 30°C | in tubo in aria a 30°C | K = 1 | K = 1,5 | K = 1 | K = 1,5 |
| 1 x 1,5 | 1,5 | 0,7 | 1,4 | 8,2 | 13,3 | 55 | 24 | 20 | 26 | 24 | 23 | 21 |
| 1 x 2,5 | 2,0 | 0,7 | 1,4 | 8,7 | 7,98 | 69 | 33 | 28 | 34 | 31 | 29 | 27 |
| 1 x 4 | 2,5 | 0,7 | 1,4 | 9,3 | 4,95 | 84 | 45 | 37 | 43 | 40 | 38 | 35 |
| 1 x 6 | 3,0 | 0,7 | 1,4 | 9,9 | 3,30 | 115 | 58 | 48 | 55 | 51 | 48 | 44 |
| 1 x 10 | 4,0 | 0,7 | 1,4 | 10,9 | 1,91 | 155 | 80 | 66 | 73 | 68 | 64 | 59 |
| 1 x 16 | 5,0 | 0,7 | 1,4 | 11,4 | 1,21 | 225 | 107 | 88 | 96 | 89 | 83 | 77 |
| 1 x 25 | 6,2 | 0,9 | 1,4 | 13,2 | 0,780 | 320 | 141 | 117 | 124 | 115 | 108 | 100 |
| 1 x 35 | 7,4 | 0,9 | 1,4 | 14,6 | 0,554 | 420 | 176 | 144 | 150 | 139 | 131 | 121 |
| 1 x 50 | 8,9 | 1,0 | 1,4 | 16,4 | 0,386 | 585 | 216 | 175 | 186 | 173 | 162 | 150 |
| 1 x 70 | 10,5 | 1,1 | 1,4 | 18,3 | 0,272 | 790 | 279 | 222 | 229 | 212 | 199 | 184 |
| 1 x 95 | 12,2 | 1,1 | 1,5 | 20,4 | 0,206 | 990 | 342 | 269 | 270 | 250 | 234 | 217 |
| 1 x 120 | 13,8 | 1,2 | 1,5 | 22,4 | 0,161 | 1020 | 400 | 312 | 312 | 289 | 271 | 251 |
| 1 x 150 | 15,4 | 1,4 | 1,6 | 24,8 | 0,129 | 1550 | 464 | 355 | 356 | 330 | 310 | 287 |
| 1 x 185 | 16,9 | 1,7 | 1,7 | 27,2 | 0,106 | 1870 | 533 | 417 | 401 | 371 | 349 | 323 |
| 1 x 240 | 19,5 | 1,8 | 1,8 | 30,4 | 0,0801 | 2400 | 634 | 490 | 471 | 436 | 409 | 379 |
| 1 x 300 | 23,0 | 1,8 | 1,8 | 33,0 | 0,0641 | 2955 | 736 | - | 533 | 493 | 463 | 429 |
| 1 x 400 | 26,5 | 2,0 | 2,0 | 37,7 | 0,0486 | 3835 | 868 | - | 621 | 575 | 540 | 500 |
| 1 x 500 (*) | 28,5 | 2,2 | 2,1 | 45,0 | 0,0384 | 4785 | 998 | - | 689 | 650 | 599 | 565 |
| 1 x 630 (*) | 32,8 | 2,4 | 2,3 | 51,1 | 0,0287 | 6465 | 1151 | - | 785 | 741 | 683 | 645 |

## 2.2 Product Performance

The environmental performance of the cable are shown for 1 km of cable for each module (upstream, core, downstream) and for each stage (Manufacturing, Distribution, Installation, Use and End-oflife) of the life cycle.

The environmental impact indicators are quantified using the characterisation factors and impact assessment methods specified in EN 50693:2019 (Table B.1, Annex B).

The manufacturer declares the following information on the technical specifications of the product:

**Product Performance**

| ***Cable*** | **1x35** | **1x240** | **1x630** |
|---|---|---|---|
| Electrical resistance 20°C (ohm/km) | 0,554 | 0,0801 | 0,0287 |
| Useful life (a) | 30 | 30 | 30 |
| Utilization Percentage | 70% | 70% | 70% |
| Actual use life (a) | 21 | 21 | 21 |

## 2.3 Product composition

The composition declared by the manufacturer is as follows:

**Product composition**

| ***Cable*** | **1x35** | **1x240** | **1x630** |
|---|---|---|---|
| Copper | 69,1% | 79,6% | 81,9% |
| PE | 0% | 0% | 0% |
| PVC | 30,9% | 20,4% | 18,1% |
| Cable weight (kg/km) | 403,69 | 2463,89 | 6707,15 |

# 3. LCA information

### 3.1 Life cycle analysis

This environmental statement aims to analyze the environmental impact of N1VV-K Unipolar Range® cables.

The life cycle analysis of the cable family was carried out using a special software developed for Bruno Baldassari S.p.A. by the consulting firm LCE, based on the EN ISO 14040:2006/A1:2020 standard, and the EN 50693:2019.

The software is called “Baldassari WebTool”. The version used is the (1.3.1) and it’s based on the processes of Ecoinvent 3.10. This software has been verified by AENOR.

This EPD has been developed according to the GlobalEPD program.

### 3.2 Declared unit

The functional unit used for energy wires and cables is defined as follow:

“To transmit energy expressed for 1A over a distance of 1 km during 30 years and a 70% use rate in accordance with the relevant standard”

Therefore, this report has been drawn up considering the following parameters for functional unit definition:

- 1km for manufacturing, distribution, and end of life stages,
- 1km and 1 A for the usage stage, as suggested by the norm.

For all the aggregate data has been considered as allocation rule the percentage of production of the specific cable compared to the total production of the company

### 3.3 Reference Useful Life (RSL)

The useful life of the product has been considered in accordance with the reference as defined in the table given in Appendix 1 of the specific rules for wire cables and accessories (PSR0001-ed.4-EN-2022 11 16), considering that the company produces building cable for residential, tertiary and industrial use (except LAN), therefore a useful life of 30 years with a use of 70% (therefore 21 effective years).

### 3.4 Allocation criteria

Some parameters have been assigned in proportion to the tons of cable produced compared to the total tons produced.

These parameters are:

- The auxiliary materials used in the production
- Emissions from the manufacturing process
- Internal transport
- The waste produced
- Production waste
- The shipping packaging of the cables.
- Water consumption

### 3.5 Representativeness, quality and selection of data

For the development of this study, we have taken into account the data quality requirements established by the standards:

- EN 50693:2019
- EN ISO 14040:2006/A1:2020;
- EN ISO 14044:2006/A2:2020;

Global EPD (managed by Aenor) with reference to PCR of PEP Ecopassport: PCR, PSR wire and cables. The software used for LCA calculations is the “Baldassari Webtool” as describes in 3.1.

Primary inventory data was collected through questionnaires filled out and entered into the tool. The entire product covered by this EPD was manufactured in Italy and distributed in Italy.

The Ecoinvent database 3.10 was used for secondary data.

### 3.6 Quality data evaluation

Data quality can be classified as follows:

- Primary data: quantified value of a process or an activity obtained from a direct measurement, or a calculation based on direct measurements.
- Site-specific data: primary data obtained within the product system.
- Secondary data: data which do not fulfil the requirements for primary data. They can include data from databases and published literature, default emission factors from national inventories, calculated data, estimates or other representative data, validated by competent authorities.

The aspects of accuracy, completeness, representativeness (temporal, geographical, and technological scope) and consistency have been addressed in the data quality analysis.
Background database to model each involved material and energy flow and other data is Ecoinvent 3.10, implemented in SimaPro 9.6.0.1 software. The evaluation of the used process is reported in LCA report.

Further details on data quality are specified in the following paragraphs, per each phase considered.

### 3.7 Cut-off criteria

Cut-off criteria are used to exclude from the analysis critical aspects which impact is expected to be low or negligible and which primary data are rather hard to collect. In this study the following flows have been included in the cut-off:

- Packaging of raw materials as they are delivered to the manufacturer.
- Temporary packaging for internal transport.
- Wastewater from core processes.
- Considering the wide range of possible installation of the products, as suggested by reference PCR, installation processes are excluded from the system boundaries. Yet, the packaging treatment of the product is considered as a waste flow in this phase.
- Maintenance, Repair, Replacement and Refurbishment are not part of the life cycle of these products. Their contribution to cable life cycle impacts is considered negligible according to technology review provided by cable manufacturers.
- Considering the wide range of possible removal process of these products, the removal process and/or dismantling of cables are excluded from the perimeter.

### 3.8 Other calculation Criteria and hypotheses

The main assumptions made during the study are detailed below.

- For Ecoinvent processes, the "Cut-off" criterion applies.
- The analysis refers to the complementary national electricity mix, based on the average composition of energy sources used for electricity generation in the country (e.g., share of renewable energy, natural gas, etc.).
- For the consumption and energy mix data related to the cable manufacturing process, the complementary national electricity mix was used. The company has a self-generated energy only for self-consumption. The impact of the energy is:

  0,7843 kgCO2/Kwh

- For the end-of-life scenario of the waste generated at different stages of the life cycle, recycling landfill and incineration percentages have been applied,
- In the use phase, it was held that energy dissipated on the basis of electrical resistance and service life of each Cable according to the following formula:

  $E[J.km-1] = R[\Omega.km-1] \times I2\ [A2] \times \Delta t\ [s]$

Consumption is expressed in J*km-1, considering that the functional unit is given for 1A and 1km of cable. Electrical resistance is a characteristic of the cable, described in the data sheets. A service life of 30 years is taken into account, and usage ratio of 70%, as indicated on by the SPECIFIC RULES FOR Wires, Cables and Appendix 1 of PEP ecopassport® – PSR.

**Energy consumption**

| *Cable* | 1x35 | 1x240 | 1x630 |
|---|---|---|---|
| Electrical resistance 20°C (ohm/km) | 0,554 | 0,0801 | 0,0287 |
| Useful life (a) | 30 | 30 | 30 |
| Utilization Percentage | 70% | 70% | 70% |
| Actual use life (a) | 21 | 21 | 21 |
| Energy consumption during the use stage expressed in J.km-1 | 3,7x10^8 | 5,3x10^7 | 1,9x10^7 |

# 4.System boundaries, Scenarios and Additional Technical info

## 4.1 Manufactoring

Raw Materials:

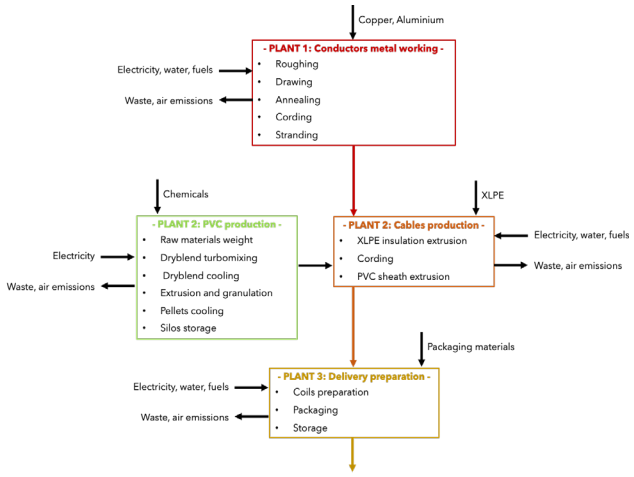
All raw materials used in the production of all cable components were considered. **The total recycled copper content amounts to 12.7%.** The cables in question are manufactured in the factories of Bruno Baldassari & F.lli S.p.A. located in Capannori, in the province of Lucca, Italy.

Raw material transport

The transport of raw materials was calculated on the basis of the distance between the suppliers and the Bruno Baldassari & F.lli S.p.A. plant. Transport was modelled using Ecoinvent datasets for lorries Euro 3–6, according to the vehicle distribution reported by ACI (2023).

Manufactoring

This module includes all the production that takes place within the Bruno Baldassari & F.lli S.p.A. plants, including the use of auxiliary materials, water, natural gas, production waste, which have been considered in proportion to the production of the cables considered. The scheme below shows the main steps inside each plant, where plants 1 is Marlia, plants 2 is Lammari and plants 3 is Salanetti.




## 4.2 Distribution

Transport by truck to the cable's reference country, in this case Italy, was considered. We considered an average distance of 400km

## 4.3 Installation

The installation of the cables was not considered due to the possible different method, but the packaging waste are considered in this phase.

## 4.4 Use

For the use phase, the energy consumption during the use of the cable that is based on the dissipated energy calculated on the basis of the electrical resistance and the useful life of the product, as specified in point 3.3, with the energy mix of the reference country, in this case Italy.

## 4.5 End of life stage

The product is highly disassemblable at the end of its life cycle.

After shredding, metallic and plastic components can be mechanically separated.
The end of life of the product has been established as follows following the % suggested by the PEP for recovery, recycling, incineration and landfill.

- Everything that is identified as SHEATH: 50% energy recovery, 50% in landfill.
- Everything that is identified as METAL: 60% recycling, 40% landfill (conservative hypothesis of copper, aluminium associated with this hypothesis for simplicity).

In addition, the entire cable is associated with a 50km transport by road with light vehicle and a manual disassembly process.

All the stages in the module are added in a unique result in chapter 5.

### 4.6 Benefits and burdens beyond the system

This considers the advantages of recycling beyond the boundaries of the system, representing the amount of virgin raw material replaced by recycled raw material, and therefore with a positive impact, but outside the limits of the system. To logically evaluate this module, the criteria of the EN 50693 standard are followed, applying the recyclability values recommended by the European Commission. In addition, it is considered a parameter that identifies the quality of the waste leaving as recyclable material on the market.

# 5. LCA and Environmental Parameters Declaration

**Environmental impacts**

**N1VV-K 1X35**

Estimated impact results are relative and do not indicate the final value of impact categories, nor do they refer to threshold values, safety margins or risks

| Parameter | Unit | Manufactoring | Distribution | Installation | Use | End of life stage | Benefits |
|---|---|---|---|---|---|---|---|
| GWP-Total | kg CO2 eq | 3.519,41 | 32,25 | 0,38 | 36,44 | 210,44 | -1.016,72 |
| GWP-fossil | kg CO2 eq | 3.494,35 | 32,24 | 0,28 | 36,28 | 210,32 | -1.013,60 |
| GWP-biogenic | kg CO2 eq | 20,13 | 1,09E-03 | 0,10 | 0,16 | 0,04 | -1,14 |
| GWP-luluc | kg CO2 eq | 4,93 | 7,87E-04 | 1,15E-05 | 2,29E-03 | 0,07 | -1,98 |
| ODP | kg CFC11 eq | 8,61E-05 | 6,53E-07 | 2,87E-09 | 7,59E-07 | 5,51E-07 | -9,96E-06 |
| AP | Equalizer of mole H+ | 261,60 | 0,11 | 6,89E-04 | 0,12 | 0,32 | -13,10 |
| EP-water sweet | kg P eq | 0,82 | 2,68E-05 | 4,47E-07 | 6,18E-04 | 2,54E-03 | -0,14 |
| EP-marine | kg N eq | 10,10 | 0,05 | 3,59E-04 | 0,02 | 0,08 | -2,07 |
| EP-terrestrial | Mole N eq | 144,90 | 0,51 | 3,28E-03 | 0,21 | 0,83 | -28,48 |
| POCP | Kg NMVOC eq | 45,08 | 0,18 | 1,08E-03 | 0,10 | 0,25 | -6,83 |
| ADP-Minerals and metals [2] | kg Sb eq | 3,65 | 1,06E-06 | 1,54E-08 | 5,28E-07 | 3,75E-06 | -0,65 |
| ADP-fossil [2] | MJ | 48.263,55 | 422,92 | 1,93 | 598,66 | 831,19 | -12.205,50 |
| WDP [2] | m3 | 4.287,79 | 0,18 | -0,21 | 26,77 | 12,66 | -591,50 |

**GWP - total**: global warming potential; **GWP - fossil**: Global warming potential of fossil fuels; **GWP - biogenic**: Biogenic global warming potential; **GWP - luluc** : Global warming potential of land use and land use change; **ODP**: Stratospheric Ozone Depletion Potential; **AP:** Acidification potential, accumulated surplus; **EP-freshwater**: Eutrophication potential, fraction of nutrients that reach the final freshwater compartment; **EP-marine**: Eutrophication potential, fraction of nutrients reaching the final seawater compartment; **EP-terrestrial**: eutrophication potential, accumulated surplus; **POCP:** Ground-level ozone formation potential; **ADP-minerals and metalsPotential for depletion of abiotic resources for non-fossil resources; APD-fossil**: potential for depletion of abiotic resources for fossil resources; **WDP**: Water deprivation potential (user), weighted deprivation consumption for water. **NR:** Not relevant

## Additional environmental impacts

### N1VV-K 1X35

| Parameter | Unit | Manufactoring | Distribution | Installation | Use | End of life stage | Benefits |
|---|---|---|---|---|---|---|---|
| PM | Incidence of diseases | 5,17E-04 | 2,70E-06 | 1,05E-08 | 4,66E-07 | 2,96E-06 | -9,20E-05 |
| IRP [1] | kBq U235 eq | 185,14 | 0,06 | 3,45E-04 | 1,25 | 2,77 | -32,23 |
| ETP-fw [2] | CTUe | 226.311,62 | 16,30 | 1,75 | 27,84 | 397,24 | -31.433,20 |
| HTP-c [2] | CTUh | 3,71E-05 | 2,48E-09 | 9,75E-11 | 9,08E-09 | 2,85E-08 | -1,85E-06 |
| HTP-nc [2] | CTUh | 3,06E-03 | 2,67E-07 | 3,75E-09 | 9,27E-08 | 7,30E-07 | 1,25E-05 |
| SQP [2] | - | 76.340,97 | 0,95 | 0,76 | 78,04 | 100,02 | -12.961,81 |

PM: Potential incidence of diseases due to emissions of particulate matter (PM); IRP : Human potential exposure efficiency relative to U235; ETP-fw : Comparative potential of toxic unit for ecosystems - freshwater; HTP-c : Comparative potential of toxic unit for ecosystems - carcinogenic effects; HTP-nc : Comparative potential of toxic unit for ecosystems non-carcinogenic effects; SQP : Soil quality potential index; NR: Not relevant

Notice 1: This impact category deals mainly with the eventual impacts of low doses of ionizing radiation on human health, of the nuclear fuel cycle. It does not consider the effects due to possible nuclear accidents or occupational exposure due to the disposal of radioactive waste in underground facilities. The potential for ionizing radiation of the soil, due to radon or some building materials is not measured with this parameter either.

Notice 2: The results of this environmental impact indicator should be used with caution, as the uncertainties of the results are high and experience with this parameter is limited

## Resource Utilization

### N1VV-K 1X35

| Parameter | Unit | Manufactoring | Distribution | Installation | Use | End of life stage | Benefits |
|---|---|---|---|---|---|---|---|
| PERE | MJ | 10.061,91 | 1,47 | 0,01 | 207,45 | 78,92 | -2.998,73 |
| PERM | MJ | 55,12 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| PERT | MJ | 10.117,03 | 1,47 | 0,01 | 207,45 | 78,92 | -2.998,73 |
| PENRE | MJ | 46.562,23 | 422,92 | 1,93 | 598,66 | 831,19 | -12.205,50 |
| PENRM | MJ | 1.701,32 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| PENRT | MJ | 48.263,55 | 422,92 | 1,93 | 598,66 | 831,19 | -12.205,50 |
| SM | Kg | 0,17 | 0,00 | 0,00 | 0,00 | 0,00 | 61,56 |
| RSF (RSF) | MJ | 0,11 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| NRSF | MJ | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| FW | m3 | 103,67 | 0,01 | -4,66E-03 | 0,70 | 0,48 | -24,71 |

**PERE:** Use of renewable primary energy, excluding renewable primary energy resources used as feedstocks; **PERM:** Use of renewable primary energy used as a feedstock; **PERT:** Total use of renewable primary energy; **PENRE:** Use of non-renewable primary energy, excluding non-renewable primary energy resources used as feedstocks; **PENRM:** Use of non-renewable primary energy used as a feedstock; **PENRT:** Total use of non-renewable primary energy; **SM:** Use of secondary materials; **RSF:** Use of renewable secondary fuels; **NRSF:** use of non-renewable secondary fuels; **FW:** Net use of piped water resources; **NR:** Not relevant

## Waste Categories

### N1VV-K 1X35

| Parameter | Unit | Manufactoring | Distribution | Installation | Use | End of life stage | Benefits |
|---|---|---|---|---|---|---|---|
| HWD | Kg | 0,04 | 0,00 | 0,00 | 0,00 | 0,00 | -0,23 |
| NHWD | Kg | 1,07 | 0,00 | 0,02 | 0,00 | 175,52 | -55,93 |
| RWD | Kg | 3,84E-07 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |

**HWD**: Hazardous waste disposed of; **NHWD**: Non-hazardous waste disposed of; **RWD**: Radioactive waste disposed of; **NR:** Not relevant

## Output flows

| Parameter | Unit | Manufactoring | Distribution | Installation | Use | End of life stage | Benefits |
|---|---|---|---|---|---|---|---|
| CRU | Kg | 0,06 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| MFR | Kg | 3,11 | 0,00 | 0,12 | 0,00 | 169,68 | 1,49 |
| MER | Kg | 0,24 | 0,00 | 0,00 | 0,00 | 62,40 | 0,00 |
| USA | MJ | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |

**CRU:** Components for reuse; **MFRs**: Recycling Materials; **MER:** Materials for energy recovery; **EE:** Exported energy; **NR:** Not relevant

## Biogenic Carbon Content Information

| Biogenic carbon content | Unit | Profit per reported functional unit |
|---|---|---|
| Biogenic carbon content product - KgC | Kg C | |
| Biogenic carbon content packaging- KgC | Kg C | 1,23 |

## Environmental impacts

### N1VV-K 1X240

The estimated impact results are relative and do not indicate the final value of the impact categories, nor do they refer to threshold values, safety margins or risks

| Parameter | Unit | Manufactoring | Distribution | Installation | Use | End of life stage | Benefits |
|---|---|---|---|---|---|---|---|
| GWP-total | kg CO2 eq | 23.350,47 | 78,82 | 0,38 | 5,27 | 974,17 | -6.910,29 |
| GWP-fossil | kg CO2 eq | 23.178,09 | 78,82 | 0,28 | 5,25 | 973,50 | -6.888,93 |
| -biogenic | kg CO2 eq | 138,76 | 2,67E-03 | 0,10 | 0,02 | 0,24 | -7,81 |
| GWP-luluc | kg CO2 eq | 33,63 | 1,92E-03 | 1,15E-05 | 3,30E-04 | 0,43 | -13,55 |
| ODP | kg CFC11 eq | 4,42E-04 | 1,60E-06 | 2,87E-09 | 1,10E-07 | 3,23E-06 | -6,47E-05 |
| AP | Mole Equalizer H+ | 1.808,45 | 0,27 | 6,89E-04 | 0,02 | 1,86 | -90,49 |
| EP-fresh water | kg P eq | 5,67 | 6,56E-05 | 4,47E-07 | 8,93E-05 | 0,02 | -0,95 |
| EP-marine | kg N eq | 69,24 | 0,11 | 3,59E-04 | 2,64E-03 | 0,43 | -14,27 |
| EP-terrestrial | Mole N eq | 995,86 | 1,24 | 3,28E-03 | 0,03 | 4,69 | -196,81 |
| POCP | Kg NMVOC eq | 309,32 | 0,44 | 1,08E-03 | 0,01 | 1,41 | -47,10 |
| ADP-Minerals and metals [2] | kg Sb eq | 25,28 | 2,59E-06 | 1,54E-08 | 7,63E-08 | 1,86E-05 | -4,50 |
| ADP-fossil [2] | MJ | 313.467,12 | 1.033,78 | 1,93 | 86,56 | 4.971,62 | -82.053,03 |
| WDP [2] | m3 | 29.379,24 | 0,44 | -0,21 | 3,87 | 67,15 | -4.085,54 |

**GWP - total**: global warming potential; **GWP - fossil**: Global warming potential of fossil fuels; **GWP - biogenic**: Biogenic global warming potential; **GWP - luluc** : Global warming potential of land use and land use change; **ODP**: Stratospheric Ozone Depletion Potential; **AP:** Acidification potential, accumulated surplus; **EP-freshwater**: Eutrophication potential, fraction of nutrients that reach the final freshwater compartment; **EP-marine**: Eutrophication potential, fraction of nutrients reaching the final seawater compartment; **EP-terrestrial**: eutrophication potential, accumulated surplus; **POCP:** Ground-level ozone formation potential; **ADP-minerals and metalsPotential for depletion of abiotic resources for non-fossil resources; APD-fossil**: potential for depletion of abiotic resources for fossil resources; **WDP**: Water deprivation potential (user), weighted deprivation consumption for water. **NR:** Not relevant

## Additional environmental impacts

### N1VV-K 1X240

| Parameter | Unit | Manufactoring | Distribution | Installation | Use | End of life stage | Benefits |
|---|---|---|---|---|---|---|---|
| PM | Incidence of diseases | 3,54E-03 | 6,61E-06 | 1,05E-08 | 6,74E-08 | 1,76E-05 | -6,37E-04 |
| IRP [1] | kBq U235 eq | 1.229,17 | 0,14 | 3,45E-04 | 0,18 | 16,73 | -212,83 |
| ETP-fw [2] | CTUe | 1.560.297,66 | 39,84 | 1,75 | 4,03 | 1.814,94 | -217.683,13 |
| HTP-c [2] | CTUh | 2,56E-04 | 6,05E-09 | 9,75E-11 | 1,31E-09 | 1,38E-07 | -1,28E-05 |
| HTP-nc [2] | CTUh | 0,02 | 6,52E-07 | 3,75E-09 | 1,34E-08 | 3,53E-06 | 8,71E-05 |
| SQP [2] | - | 522.493,83 | 2,31 | 0,76 | 11,28 | 593,02 | -89.642,11 |

PM: Potential incidence of diseases due to emissions of particulate matter (PM); IRP : Human potential exposure efficiency relative to U235; ETP-fw : Comparative potential of toxic unit for ecosystems - freshwater; HTP-c : Comparative potential of toxic unit for ecosystems - carcinogenic effects; HTP-nc : Comparative potential of toxic unit for ecosystems non-carcinogenic effects; SQP : Soil quality potential index; NR: Not relevant

Notice 1: This impact category deals mainly with the eventual impacts of low doses of ionizing radiation on human health, of the nuclear fuel cycle. It does not consider the effects due to possible nuclear accidents or occupational exposure due to the disposal of radioactive waste in underground facilities. The potential for ionizing radiation of the soil, due to radon or some building materials is not measured with this parameter either.

Notice 2: The results of this environmental impact indicator should be used with caution, as the uncertainties of the results are high and experience with this parameter is limited

## Resource Utilization

### N1VV-K 1X240

| Parameter | Unit | Manufactoring | Distribution | Installation | Use | End of life stage | Benefits |
|---|---|---|---|---|---|---|---|
| PERE | MJ | 69.016,38 | 3,59 | 0,01 | 29,99 | 475,20 | -20.507,06 |
| PERM | MJ | 55,12 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| PERT | MJ | 69.071,50 | 3,59 | 0,01 | 29,99 | 475,20 | -20.507,06 |
| PENRE | MJ | 306.531,62 | 1.033,80 | 1,93 | 86,56 | 4.971,62 | -82.053,03 |
| PENRM | MJ | 6.935,50 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| PENRT | MJ | 313.467,12 | 1.033,80 | 1,93 | 86,56 | 4.971,62 | -82.053,03 |
| SM | Kg | 0,17 | 0,00 | 0,00 | 0,00 | 0,00 | 426,56 |
| RSF (RSF) | MJ | 0,11 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| NRSF | MJ | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| FW | m3 | 710,26 | 0,03 | -4,66E-03 | 0,10 | 2,58 | -170,23 |

**PERE:** Use of renewable primary energy, excluding renewable primary energy resources used as feedstocks; **PERM:** Use of renewable primary energy used as a feedstock; **PERT:** Total use of renewable primary energy; **PENRE:** Use of non-renewable primary energy, excluding non-renewable primary energy resources used as feedstocks; **PENRM:** Use of non-renewable primary energy used as a feedstock; **PENRT:** Total use of non-renewable primary energy; **SM:** Use of secondary materials; **RSF:** Use of renewable secondary fuels; **NRSF:** use of non-renewable secondary fuels; **FW:** Net use of piped water resources; **NR:** Not relevant

## Waste Categories

### N1VV-K 1X240

| Parametro | Unit | Manufactoring | Distribution | Installation | Use | End of life stage | Benefits |
|---|---|---|---|---|---|---|---|
| HWD | Kg | 0,04 | 0,00 | 0,00 | 0,00 | 0,00 | -1,57 |
| NHWD | Kg | 1,13 | 0,00 | 0,02 | 0,00 | 1.035,61 | -387,51 |
| RWD | Kg | 3,84E-07 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |

**HWD**: Hazardous waste disposed of; **NHWD**: Non-hazardous waste disposed of; **RWD**: Radioactive waste disposed of; **NR:** Not relevant

## Output flows

| Parameter | Unit | Manufactoring | Distribution | Installation | Use | End of life stage | Benefits |
|---|---|---|---|---|---|---|---|
| CRU | Kg | 0,06 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| MFR | Kg | 3,11 | 0,00 | 0,12 | 0,00 | 1.175,65 | 10,33 |
| MER | Kg | 0,24 | 0,00 | 0,00 | 0,00 | 251,85 | 0,00 |
| USA | MJ | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |

**CRU:** Components for reuse; **MFRs**: Recycling Materials; **MER:** Materials for energy recovery; **EE:** Exported energy; **NR:** Not relevant

## Biogenic Carbon Content Information

| Biogenic carbon content | Unit | Profit per reported functional unit |
|---|---|---|
| Biogenic carbon content product - KgC | Kg C | |
| Biogenic carbon content packaging- KgC | Kg C | 4,3 |

## Environmental impacts

### N1VV-K 1X630

The estimated impact results are relative and do not indicate the final value of the impact categories, nor do they refer to threshold values, safety margins or risks

| Parameter | Unit | Manufactoring | Distribution | Installation | Use | End of life stage | Benefits |
|---|---|---|---|---|---|---|---|
| GWP-total | kg CO2 eq | 67.546,43 | 204,62 | 0,38 | 1,89 | 2.502,93 | -20.044,76 |
| GWP-fossil | kg CO2 eq | 67.044,88 | 204,61 | 0,28 | 1,88 | 2.501,06 | -19.982,70 |
| GWP-biogenic | kg CO2 eq | 403,92 | 6,94E-03 | 0,10 | 8,09E-03 | 0,67 | -22,68 |
| GWP-luluc | kg CO2 eq | 97,63 | 4,99E-03 | 1,15E-05 | 1,18E-04 | 1,20 | -39,38 |
| ODP | kg CFC11 eq | 1,18E-03 | 4,15E-06 | 2,87E-09 | 3,93E-08 | 8,99E-06 | -1,85E-04 |
| AP | Mole Equalizer H+ | 5.267,92 | 0,70 | 6,89E-04 | 6,13E-03 | 5,17 | -263,53 |
| EP-freash water | kg P eq | 16,52 | 1,70E-04 | 4,47E-07 | 3,20E-05 | 0,04 | -2,78 |
| EP-marine | kg N eq | 201,38 | 0,29 | 3,59E-04 | 9,45E-04 | 1,18 | -41,54 |
| EP-terrestrial | Mole N eq | 2.897,72 | 3,22 | 3,28E-03 | 0,01 | 12,93 | -573,17 |
| POCP | Kg NMVOC eq | 899,84 | 1,14 | 1,08E-03 | 5,00E-03 | 3,91 | -137,09 |
| ADP-Minerals and metals [2] | kg Sb eq | 73,68 | 6,71E-06 | 1,54E-08 | 2,73E-08 | 4,91E-05 | -13,13 |
| ADP-fossil [2] | MJ | 901.711,91 | 2.683,80 | 1,93 | 31,01 | 13.941,52 | -237.372,87 |
| WDP [2] | m3 | 85.422,06 | 1,14 | -0,21 | 1,39 | 181,41 | -11.897,22 |

**GWP - total**: global warming potential; **GWP - fossil**: Global warming potential of fossil fuels; **GWP - biogenic**: Biogenic global warming potential; **GWP - luluc** : Global warming potential of land use and land use change; **ODP**: Stratospheric Ozone Depletion Potential; **AP:** Acidification potential, accumulated surplus; **EP-freshwater**: Eutrophication potential, fraction of nutrients that reach the final freshwater compartment; **EP-marine**: Eutrophication potential, fraction of nutrients reaching the final seawater compartment; **EP-terrestrial**: eutrophication potential, accumulated surplus; **POCP:** Ground-level ozone formation potential; **ADP-minerals and metalsPotential for depletion of abiotic resources for non-fossil resources; APD-fossil**: potential for depletion of abiotic resources for fossil resources; **WDP**: Water deprivation potential (user), weighted deprivation consumption for water. **NR:** Not relevant

## Additional environmental impacts

### N1VV-K 1X630

| Parameter | Parameter | Manufactoring | Distribution | Installation | Use | End of life stage | Benefits |
|---|---|---|---|---|---|---|---|
| PM | Incidence of diseases | 0,01 | 1,72E-05 | 1,05E-08 | 2,42E-08 | 4,92E-05 | -1,86E-03 |
| IRP [1] | kBq U235 eq | 3.544,60 | 0,37 | 3,45E-04 | 0,06 | 47,04 | -612,96 |
| ETP-fw [2] | CTUe | 4.541.893,80 | 103,43 | 1,75 | 1,44 | 4.638,18 | -634.298,35 |
| HTP-c [2] | CTUh | 7,46E-04 | 1,57E-08 | 9,75E-11 | 4,70E-10 | 3,62E-07 | -3,73E-05 |
| HTP-nc [2] | CTUh | 0,06 | 1,69E-06 | 3,75E-09 | 4,80E-09 | 9,23E-06 | 2,54E-04 |
| SQP [2] | - | 1.519.027,82 | 6,01 | 0,76 | 4,04 | 1.658,76 | -261.120,00 |

PM: Potential incidence of diseases due to emissions of particulate matter (PM); IRP : Human potential exposure efficiency relative to U235; ETP-fw : Comparative potential of toxic unit for ecosystems - freshwater; HTP-c : Comparative potential of toxic unit for ecosystems - carcinogenic effects; HTP-nc : Comparative potential of toxic unit for ecosystems non-carcinogenic effects; SQP : Soil quality potential index; NR: Not relevant

Notice 1: This impact category deals mainly with the eventual impacts of low doses of ionizing radiation on human health, of the nuclear fuel cycle. It does not consider the effects due to possible nuclear accidents or occupational exposure due to the disposal of radioactive waste in underground facilities. The potential for ionizing radiation of the soil, due to radon or some building materials is not measured with this parameter either.

Notice 2: The results of this environmental impact indicator should be used with caution, as the uncertainties of the results are high and experience with this parameter is limited

## Resource Usage

### N1VV-K 1X630

| Parameter | Unit | Manufactoring | Distribution | Installation | Use | End of life stage | Benefits |
|---|---|---|---|---|---|---|---|
| PERE | MJ | 200.741,49 | 9,32 | 0,01 | 10,75 | 1.335,13 | -59.574,16 |
| PERM | MJ | 55,12 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| PERT | MJ | 200.796,61 | 9,32 | 0,01 | 10,75 | 1.335,13 | -59.574,16 |
| PENRE | MJ | 884.925,38 | 2.683,80 | 1,93 | 31,01 | 13.941,52 | -237.372,87 |
| PENRM | MJ | 16.786,52 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| PENRT | MJ | 901.711,91 | 2.683,80 | 1,93 | 31,01 | 13.941,52 | -237.372,87 |
| SM | Kg | 0,17 | 0,00 | 0,00 | 0,00 | 0,00 | 1.243,09 |
| RSF (RSF) | MJ | 0,11 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| NRSF | MJ | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| FW | m3 | 2.065,10 | 0,07 | -4,66E-03 | 0,04 | 6,98 | -495,40 |

**PERE:** Use of renewable primary energy, excluding renewable primary energy resources used as feedstocks; **PERM:** Use of renewable primary energy used as a feedstock; **PERT:** Total use of renewable primary energy; **PENRE:** Use of non-renewable primary energy, excluding non-renewable primary energy resources used as feedstocks; **PENRM:** Use of non-renewable primary energy used as a feedstock; **PENRT:** Total use of non-renewable primary energy; **SM:** Use of secondary materials; **RSF:** Use of renewable secondary fuels; **NRSF:** use of non-renewable secondary fuels; **FW:** Net use of piped water resources; **NR:** Not relevant

## Waste Categories

### N1VV-K 1X630

| Parameter | Unit | Manufactoring | Distribution | Installation | Use | End of life stage | Benefits |
|---|---|---|---|---|---|---|---|
| HWD | Kg | 0,04 | 0,00 | 0,00 | 0,00 | 0,00 | -4,58 |
| NHWD | Kg | 1,25 | 0,00 | 0,02 | 0,00 | 2.892,64 | -1.129,30 |
| RWD | Kg | 3,84E-07 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |

**HWD**: Hazardous waste disposed of; **NHWD**: Non-hazardous waste disposed of; **RWD**: Radioactive waste disposed of; **NR:** Not relevant

## Output flows

| Parameter | Unit | Manufactoring | Distribution | Installation | Use | End of life stage | Benefits |
|---|---|---|---|---|---|---|---|
| CRU | Kg | 0,06 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| MFR | Kg | 3,11 | 0,00 | 0,12 | 0,00 | 3.426,08 | 30,11 |
| MER | Kg | 0,24 | 0,00 | 0,00 | 0,00 | 608,58 | 0,00 |
| USA | MJ | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |

**CRU:** Components for reuse; **MFRs**: Recycling Materials; **MER:** Materials for energy recovery; **EE:** Exported energy; **NR:** Not relevant

## Biogenic Carbon Content Information

| Biogenic carbon content | Unit | Profit per reported functional unit |
|---|---|---|
| Biogenic carbon content product - KgC | Kg C | |
| Biogenic carbon content packaging- KgC | Kg C | 1,23 |

## References

(1) General Instructions of GlobalEPD Programme 3rd revision (09-10-2023)

(2) EN ISO 14025:2010 Environmental labels. Type III environmental claims. Principles and procedures (ISO 14025:2006).

(3) Standard EN 50693:2019 Product category rules for life cycle assessments of electronic and electrical products and systems

(4) EN ISO 14040:2006/A1:2020 standard. Environmental management. Life cycle analysis. Principles and framework. 2006.

(5) EN ISO 14044:2006/A1:2020 standard. Environmental management. Life cycle analysis. Requirements and guidelines. 2006

(6) Functional analysis WebTool manual, version 4, 1.3.1, date 17/09/2025.

(7) PCR PEP Ecopassport V4 e PSR-0001 wire and cables.

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