

SARAY®

ENVIRONMENTAL PRODUCT DECLARATION

In accordance
with ISO 14025 and EN 15804:2012+A2:2019 for

Aluminium Profiles

Programme:

The International EPD® System
www.environdec.com

Programme Operator:

EPD International AB

Local Operator:

EPD Turkey

S-P Code:

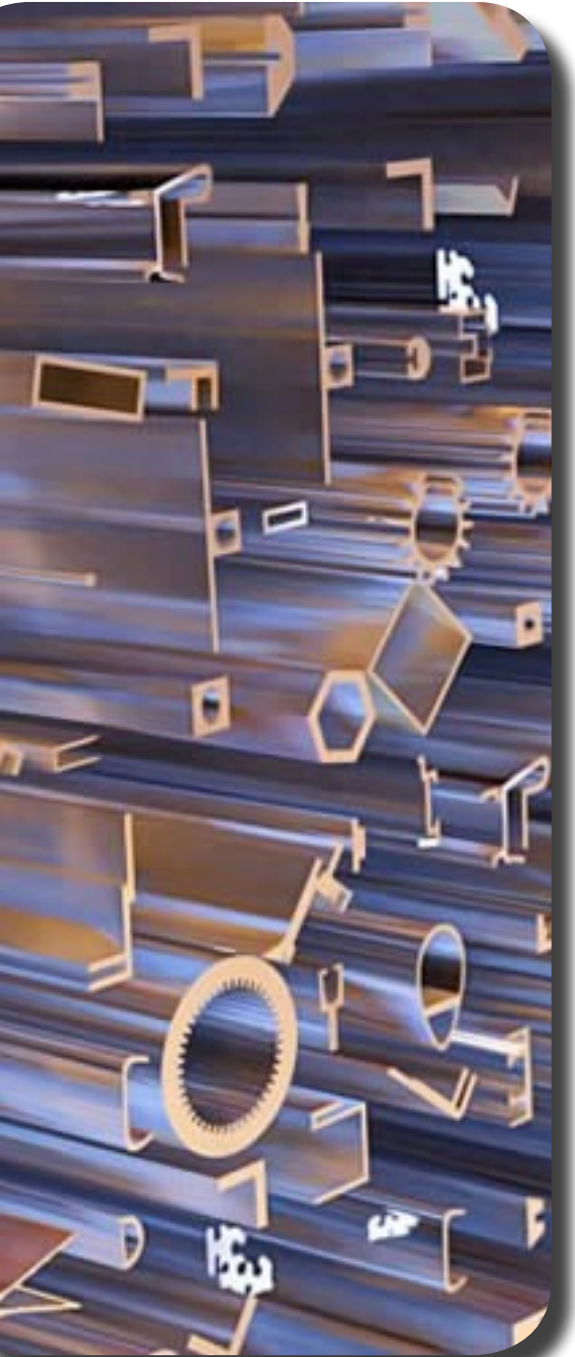
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Programme Information

Programme

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Product Category Rules (PCR): 2019:14 Version 1.11, 2021-02-05, Construction Products and CPC 54 Construction Services, EN 15804:2012 + A2:2019 Sustainability of Construction Works

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

EPD process certification

EPD verification

Third party verifier: Prof. Vladimír Kocí

Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes

No

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

About the Company

Since 1980, Saray Aluminium has been playing a major role in the construction of future architectural buildings with its leading and innovative interior & exterior construction solutions.

Saray manufactures aluminium door&window, curtain wall (facade) and handrail systems, aluminium composite panel, PVC door&window systems, shutter systems, various types of industrial profiles for the sectors such as machinery, lighting, elevator etc. and standard section profiles in various shapes and sizes.

Saray is among the first Turkey's Top 200 Industrial Enterprises and exports %55 of total production more than 60 countries in Europe,Asia, Africa; with its high export amounts Saray receives the "Export Stars of Turkey" award in every year.

Saray Aluminium has CE, ISO 9001, ISO 14001 Qualanod, Qualicoat, TS EN 755, TS EN 12020, SEPRO and GOST-R quality certificates. Saray is a fully integrated enterprise with its aluminium powder coating, aluminium anodizing, extrusion, casting, aluminium composite panel and pvc extrusion, shutter production facilities. With a total of 100.000 sqm covered area, production facilities are located in Cerkezkoy/Tekirdag and Gunesli/Istanbul.



Product Information

Aluminium Profiles are mainly made of 99.7% purity of raw aluminium blocks. Aluminium profiles can be produced as standard or custom design.

All products groups may also contain other raw materials such as silicon, magnesium etc..

Saray products are also certified to local and international standards. Saray is an integrated enterprise with its with foundry, casting, extrusion anodizing and powder coating facilities.

Saray can operate in profile production of architectural systems as well as industrial profiles, automotive profiles, machinery-manufacturing profiles, heating and cooling profiles, ship and aircraft industries.

The UN CPC code of the product is 42532, bars, rods and profiles, of aluminium.

| Raw Material | % |
|--------------------------|----------|
| Aluminium Ingot, kg | 90-99 |
| Magnesium, kg | 0-3 |
| Silicon, kg | 0-3 |
| Agents and chemicals, kg | 2-7 |

Technical Specifications

| Propoerties | Unit | Value |
|----------------------|---------------------|--------------|
| Density | gr/cm ³ | 2.5 - 2.7 |
| Melting Range | °C | 585 - 650 |
| Thermal Conductivity | W/mK | 200 - 220 |
| Thermal Expansion | 10 ⁻⁶ /K | 23.2 - 23.4 |
| Elastic Modulus | MPa | 69500 |
| Modulus of Rapture | MPa | 26100 |

LCA Informations

Declared Unit 1 kg of Aluminium Profile

Time Representativeness 2020

Database(s) and LCA Software Used Ecoinvent 3.6, SimaPro 9.1

The inventory for the LCA study is based on the 2020 production figures for Aluminium Profile by SARAY production plants in Çerkezköy, Turkey.

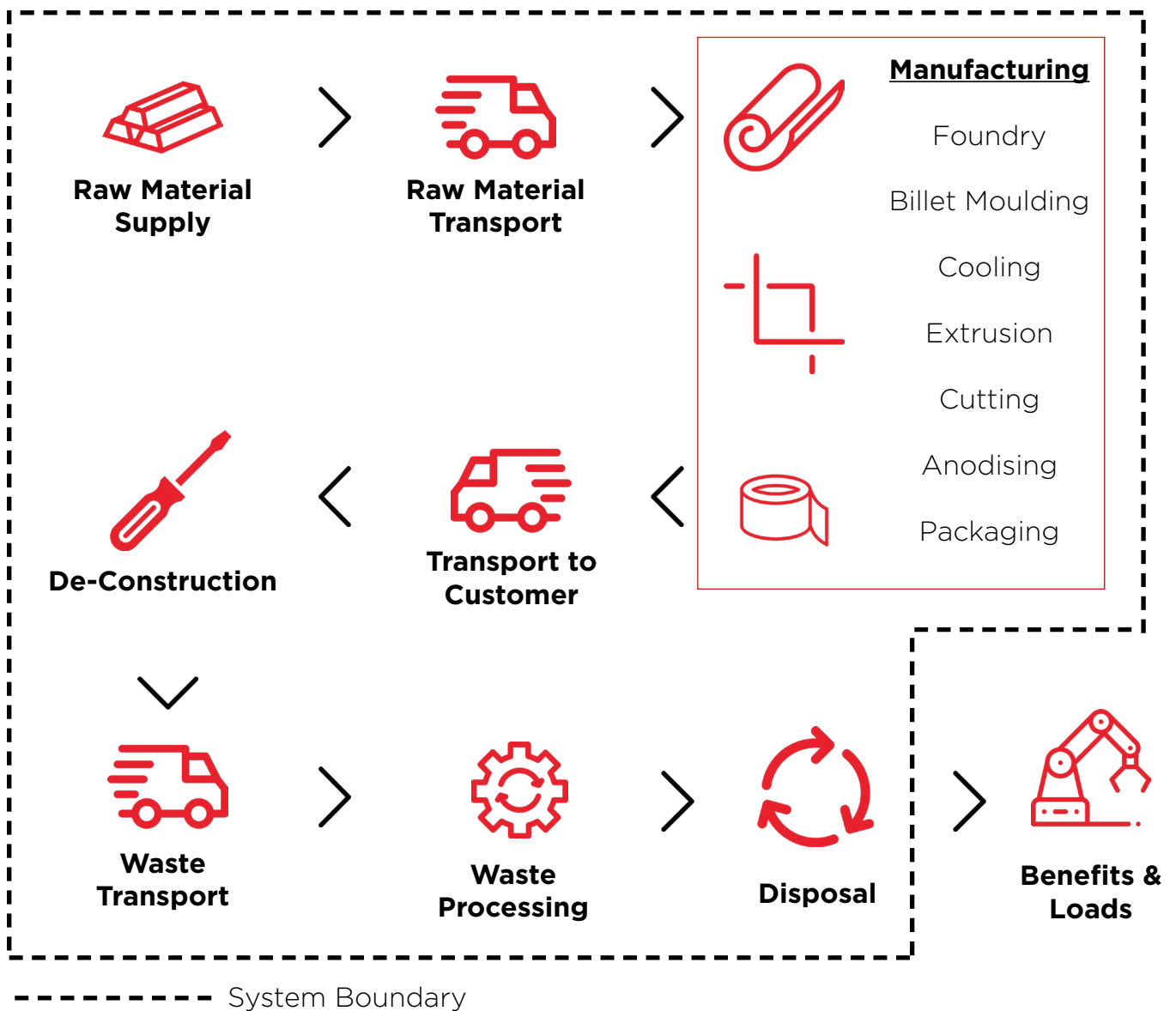
This EPD's system boundary is cradle to grave. The results of the LCA with the indicators as per EPD requirement are given in the following tables for product manufacture (A1, A2, A3), construction process stage (A4), end of life stage (C1, C2, C3, C4) and benefits and load stage (D).

The system boundaries in tabular form for all modules are shown in the table above.

| Product Stage | | | Construction Process Stage | | Use Stage | | | | | | | End of Life Stage | | | | Benefits and Loads |
|---------------------|-----------|---------------|----------------------------|---------------------------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|----------------------------|-----------|------------------|----------|---|
| Raw Material Supply | Transport | Manufacturing | Transport | Construction Installation | Use | Maintenance | Repair | Replacement | Refurbishment | Operational Energy Use | Operational Water Use | Deconstruction, demolition | Transport | Waste Processing | Disposal | Future reuse, recycling or energy recovery potentials |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| X | X | X | X | ND | ND | ND | ND | ND | ND | ND | ND | X | X | X | X | X |

X = Included in LCA, ND = Not Declared

System Boundary



A1: Raw Material Supply

Production for each product starts with mainly locally sourced but some transported from other parts of the world. 'Raw material supply' includes raw material extraction and pretreatment processes before production.

A2: Raw Material Transport

Transport is relevant for delivery of raw materials and other materials to the plant and the transport of materials within the plant. Transport of raw materials to production site is taken as the weight average values for transport from raw materials supplier in 2020.

A3: Manufacturing

Aluminium profile production starts with foundry of billets by melting down raw aluminium blocks and continuous with extrusion, cooling and cutting for the desired length. Electricity and natural gas are consumed at aluminium profile production processes.

A4: Transport to Customer

Transport of final product to construction site is taken as the weight average values for transport to customers in 2020. The product shipment distance is calculated according to the domestic and international sales rates over the assumed distances. It has been accepted as an average of 500 km by road for domestic and 2000 km by sea for abroad.

C1 : Deconstruction and Demolition

For deconstruction stage, 0.239 MJ electricity use per kg of material was assumed (Gervasio et al., 2018).

C2 : Transport

This stage includes the transportation of the discarded conductors to final disposal. Average distance from demolition site to waste processing site for final disposal is assumed to be 100 km.

C3 : Waste Processing

Wastes can be recycled directly or disposed of according to different scenarios. No process is needed.

C4 : Disposal

Disposal is the final stage of product life. Aluminium profiles end up at recycling plant after construction and demolition as their final fate and modelled as such for this EPD. It is assumed that only 5% of the products send to the landfill.

D : Benefits and Loads

It is assumed that 95% of the waste goes to recycling and recycling efficiency ratio was assumed to be 76%.

More Information

Allocations

Water consumption, energy consumption and raw material transportation were weighted according to 2020 production figures.

In addition, hazardous and non-hazardous waste amounts were also allocated from the 2020 total waste generation.

Cut-Off Criteria

1% cut-off applied. Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts have been included.

REACH Regulation

No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in this product either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).

LCA Modelling, Calculation and Data Quality

The results of the LCA with the indicators as per EPD requirement are given in the LCA result tables. All energy calculations were obtained using Cumulative Energy Demand (LHV) methodology, while fresh water use is calculated with selected inventory flows in SimaPro according to the PCR.

There are no co-product allocations within the LCA study underlying this EPD.

The SimaPro 9.1 LCA software and the Ecoinvent 3.6 LCA database were used to calculate the environmental impacts. The regional energy datasets were used for all energy calculations.

Geographical Scope

The geographical scope of this EPD is global.



LCA Results

Environmental Impacts

| Impact Category | Unit | A1-A3 | A4 | C1 | C2 | C3 | C4 | D |
|------------------|---|---------|----------|----------|----------|----|----------|----------|
| GWP - Fossil | kg CO ₂ eq | 9.66 | 0.019 | 0.039 | 0.009 | 0 | 0.002 | -6.54 |
| GWP - Biogenic | kg CO ₂ eq | 0.018 | 12.9E-6 | 357E-6 | 6.60E-6 | 0 | 4.51E-4 | -0.013 |
| GWP - Luluc | kg CO ₂ eq | 0.185 | 6.09E-6 | 373E-6 | 2.65E-6 | 0 | 1.86E-6 | -0.134 |
| GWP - Total | kg CO ₂ eq | 9.87 | 0.019 | 0.040 | 0.009 | 0 | 0.002 | -6.69 |
| ODP | kg CFC-11 eq | 760E-9 | 4.50E-9 | 1.10E-9 | 2.14E-9 | 0 | 227E-12 | -511E-9 |
| AP | mol H+ eq | 0.075 | 92.8E-6 | 257E-6 | 28.0E-6 | 0 | 13.4E-6 | -0.052 |
| EP - Freshwater | kg P eq | 0.004 | 1.33E-6 | 41.2E-6 | 643E-9 | 0 | 632E-9 | -0.002 |
| *EP - Freshwater | kg PO ₄ eq | 0.011 | 4.07E-6 | 126E-6 | 1.97E-6 | 0 | 1.94E-6 | -0.007 |
| EP - Marine | kg N eq | 0.010 | 21.6E-6 | 41.8E-6 | 6.26E-6 | 0 | 4.09E-6 | -0.007 |
| EP - Terrestrial | mol N eq | 0.102 | 237E-6 | 379E-6 | 68.5E-6 | 0 | 35.1E-6 | -0.069 |
| POCP | kg NMVOC | 0.034 | 79.8E-6 | 104E-6 | 26.9E-6 | 0 | 10.5E-6 | -0.023 |
| ADPE | kg Sb eq | 46.2E-6 | 318E-9 | 94.2E-9 | 155E-9 | 0 | 15.4E-9 | -30.1E-6 |
| ADPF | MJ | 95.0 | 0.297 | 0.430 | 0.141 | 0 | 0.028 | -62.4 |
| WDP | m ³ depriv. | 3.42 | 0.001 | 0.018 | 459E-6 | 0 | 0.001 | -1.67 |
| PM | disease inc. | 1.01E-6 | 1.57E-9 | 1.10E-9 | 766E-12 | 0 | 183E-12 | -635E-9 |
| IR | kBq U-235 eq | 1.04 | 0.002 | 0.001 | 0.001 | 0 | 165E-6 | -0.706 |
| ETP - FW | CTUe | 276 | 0.235 | 376E-3 | 113E-3 | 0 | 30.9 | -192 |
| HTTP - C | CTUh | 27.3E-9 | 6.11E-12 | 6.90E-12 | 2.73E-12 | 0 | 1.75E-12 | -19.0E-9 |
| HTTP - NC | CTUh | 390E-9 | 254E-12 | 330E-12 | 123E-12 | 0 | 49.8E-12 | -276E-9 |
| SQP | Pt | 18.6 | 0.326 | 0.025 | 0.162 | 0 | 0.035 | -11.1 |
| Acronyms | GWP-total: Climate change, GWP-fossil: Climate change- fossil, GWP-biogenic: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-marine: Eutrophication marine, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - fossil resources, WDP: Water scarcity, PM: Respiratory inorganics - particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshwater, HTP-c: Cancer human health effects, HTP-nc: Non-cancer human health effects, SQP: Land use related impacts, soil quality. | | | | | | | |
| Legend | A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site, C1: De-Construction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary. | | | | | | | |
| Disclaimer 1 | This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator. | | | | | | | |
| Disclaimer 2 | The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator. | | | | | | | |
| *Disclaimer 3 | EP-freshwater: This indicator has been calculated as "kg P eq" as required in the characterization model. (EUTREND model, Struijs et al, 2009b, as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml) | | | | | | | |

Resource Use

| Impact Category | Unit | A1-A3 | A4 | C1 | C2 | C3 | C4 | D |
|-----------------|---|-------|---------|--------|---------|----|---------|--------|
| PERE | MJ | 66.9 | 3.66E-3 | 103E-3 | 1.78E-3 | 0 | 1.67E-3 | -47.0 |
| PERM | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PERT | MJ | 66.9 | 3.66E-3 | 103E-3 | 1.78E-3 | 0 | 1.67E-3 | -47.0 |
| PENRE | MJ | 95.0 | 297E-3 | 430E-3 | 141E-3 | 0 | 28.3E-3 | -62.4 |
| PENRM | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PENRT | MJ | 95.0 | 297E-3 | 430E-3 | 141E-3 | 0 | 28.3E-3 | -62.4 |
| SM | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| RSF | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NRSF | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FW | m ³ | 0.057 | 60.2E-6 | 164E-6 | 29.4E-6 | 0 | 22.6E-6 | -0.036 |
| Acronyms | PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy, PENRE: Use of non-renewable primary energy excluding resources used as raw materials, PENRM: Use of non-renewable primary energy resources used as raw materials, PENRT: Total use of non-renewable primary energy, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water. | | | | | | | |
| Legend | A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site, C1: De-Construction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary. | | | | | | | |

Output Flows

| Impact Category | Unit | A1-A3 | A4 | C1 | C2 | C3 | C4 | D |
|-----------------|--|-------|----|----|----|----|----|---|
| HWD | kg | 0.013 | 0 | 0 | 0 | 0 | 0 | 0 |
| NHWD | kg | 0.061 | 0 | 0 | 0 | 0 | 0 | 0 |
| RWD | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CRU | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MFR | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MER | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| EE (Electrical) | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| EE (Thermal) | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Acronyms | HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy, Thermal. | | | | | | | |
| Legend | A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site, C1: De-Construction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary. | | | | | | | |

References

/GPI/ General Programme Instructions of the International EPD® System. Version 4.0.

/EN ISO 9001/ Quality Management Systems - Requirements

/EN ISO 14001/ Environmental Management Systems - Requirements

/EN ISO 50001/ Energy Management Systems - Requirements

/ISO 14020:2000/ Environmental Labels and Declarations — General principles

/EN 15804:2012+A2:2019/ Sustainability of construction works - Environmental Product Declarations — Core rules for the product category of construction products

/ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental declarations — Principles and procedures

/ISO 14040/44/ DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework (ISO14040:2006) and Requirements and guidelines (ISO 14044:2006)



/PCR for Construction Products and CPC 54 Construction Services/ Prepared by IVL Swedish Environmental Research Institute, Swedish Environmental Protection Agency, SP Trä, Swedish Wood Preservation Institute, Swedisol, SCDA, Svenskt Limträ AB, SSAB, The International EPD System, 2019:14 Version 1.11 DATE 2019-12-20

/The International EPD® System/ The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. www.environdec.com

/Ecoinvent / Ecoinvent Centre, www.ecoinvent.org


/SimaPro/ SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com

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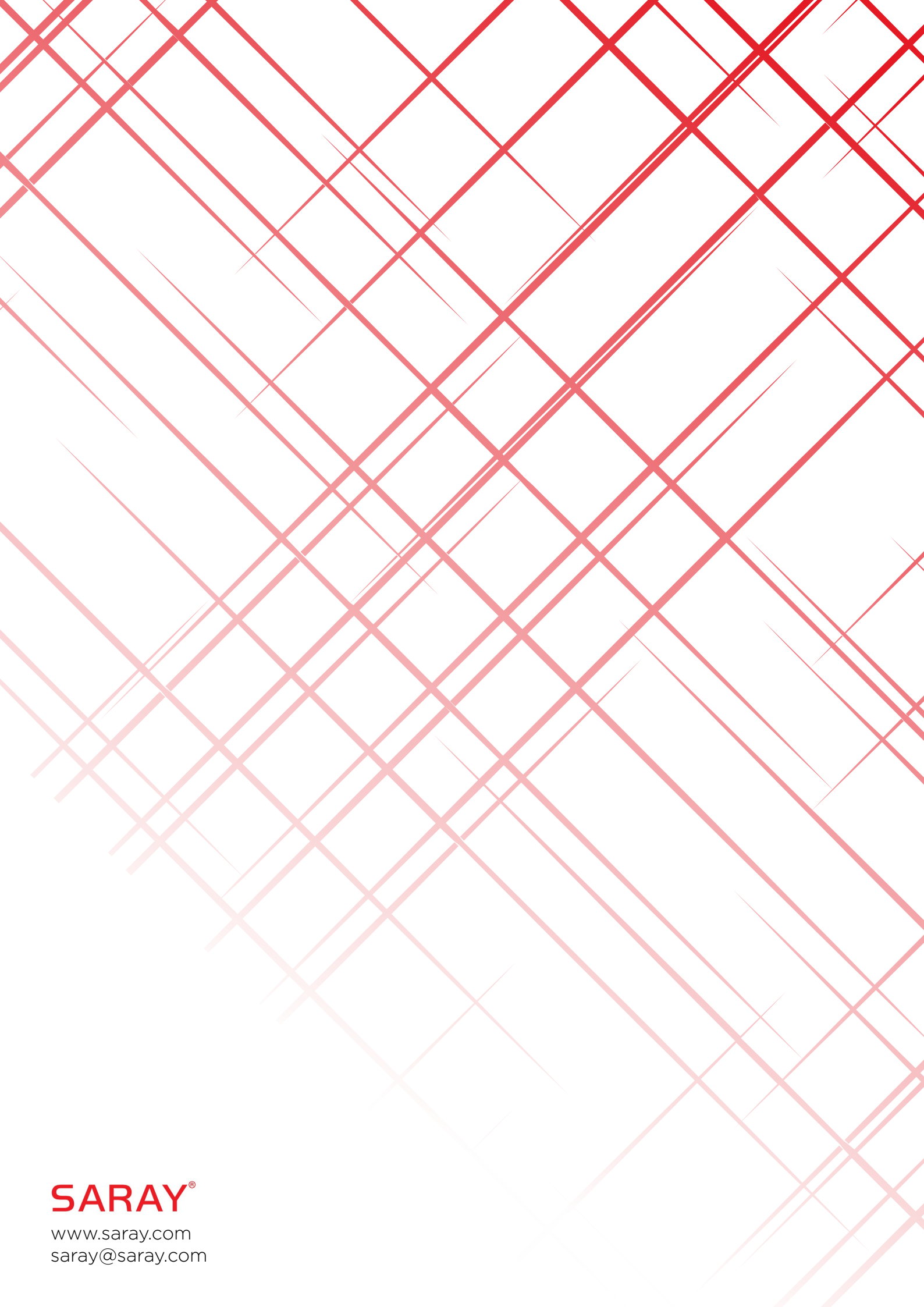
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|-----------|---|--|
| Programme | EPD registered through fully aligned regional programme: EPD Turkey: www.epdturkey.org | The International EPD® System www.environdec.com |
| |  ENVIRONMENTAL PRODUCT DECLARATIONS |  THE INTERNATIONAL EPD® SYSTEM |

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