ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

UPONOR COMFORT PIPE PLUS

DIAMETER RANGE 14-25 MM

UPONOR CORPORATION

GENERAL INFORMATION

MANUFACTURER INFORMATION

Manufacturer	Uponor Oyj
Address	Äyritie 20, 01510 Vantaa, Finland
Contact details	qian.wang@uponor.com
Website	https://www.uponor.se/

PRODUCT IDENTIFICATION

Product name	Comfort Pipe Plus
Product number / reference	1009224 1009226 1009227 1009228 1009229 1009230 1009231 1009232 1034535 1062044 1062045 1062046 1062883 1062884 1062885 1062887 1062888 1062889 1063907 1086340 1086565 1087302 1087303 1088166 1088479 1088480 1088578 1091785 1091786 1091787 1091788 1091790 1091791 1091792 1091793 1091795
Place(s) of production	Nordanövägen 2, 73061, Virsbo, Sweden

The Building Information Foundation RTS sr

EPDs within the same product category but from different programmes may not be comparable.

Jukka Seppänen
RTS EPD Committee Secretary

Laura Apilo
Managing Director

EPD INFORMATION

The EPD owner has the sole ownership, liability, and responsibility for the EPD. Construction products EPDs may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

EPD program operator	Rakennustietosäätiö RTS, Building Information Foundation RTS, Malminkatu 16 A, A00100 Helsinki, Finland http://cer.rts.fi
EPD standards	This EPD is in accordance with EN 15804+A2 and ISO 14025 standards.
Product category rules	The CEN standard EN 15804 serves as the core PCR. In addition, the RTS PCR (English version, 22.12.2020) is used.
EPD author	Dr. Qian Wang, Uponor Corporation
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
Verification date	21.02.2022
EPD verifier	Silvia Vilčeková, Silcert, s.r.o.
EPD number	RTS_174_22
ECO Platform nr.	-
Publishing date	January 25, 2022
EPD valid until	January 25, 2027

PRODUCT INFORMATION

PRODUCT DESCRIPTION

As one of the leading suppliers of plastic pipe systems, Uponor attaches great importance to product development. The new Uponor Comfort Pipe PLUS is manufactured based on the innovative UAXTM Technology. This production process is the latest step in the consistent further development of the PE-Xa pipe, now in existence for over forty years.

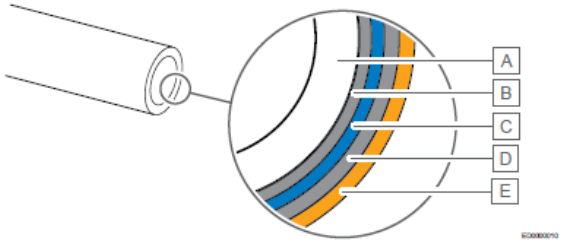
PRODUCT APPLICATION

Uponor Comfort Pipe PLUS is a pipe used for heating applications as under floor heating systems. The pipe is equipped with a hook fastening tape wound wrapped around it. When the pipe is pressed into the correct position against the special laminated panel used for the installation, the hooks catch the foil loops and secure the pipe, guaranteeing maximum fixture.

TECHNICAL SPECIFICATIONS

Uponor Comfort Pipe PLUS is a pipe with an oxygen diffusion barrier. This barrier consists of a layer of ethyl vinyl alcohol (EVOH) extruded on the outside of the PEX pipe. The outermost layer is polyethylene (PE). This layer is very flexible and does not affect the flexibility and pliability of the basic pipe.
Detailed technical specifications please find the table and figure below.

Pipe layers



Item	Description
A	Basic pipe of cross-linked polyethylene (PE-Xa)
B	Adhesive layer of modified polyethylene (PE)
C	Diffusion barrier of ethyl vinyl alcohol (EVOH)
D	Adhesive layer of modified polyethylene (PE)
E	Outer layer of polyethylene (PE)

PRODUCT STANDARDS

Uponor Comfort Pipe PLUS fulfils the requirements for oxygen diffusion resistance as per DIN 4726 and ISO 17455.

PHYSICAL PROPERTIES OF THE PRODUCT

Pipe OD x material thickness, mm	Pipe ID, mm	Weight, kg/ 100 m	Volume, l/ 100 m
14x2.0	10.0	7.1	7.9
16x2.0	12.0	8.3	11.3
17x2.0	13.0	10.4	13.3
20x2.0	16.0	10.7	20.1
25x2.3	20.4	15.4	32.7

ADDITIONAL TECHNICAL INFORMATION

Further information can be found at https://www.uponor.se/.

PRODUCT RAW MATERIAL COMPOSITION

Material	Amount %	Usability			Origin
		Renewable	Non-renewable	Recycled	
High Density Polyethylene (HDPE)	97,00		x		Sweden
Others	3,00		X		Belgium
Total	100%				

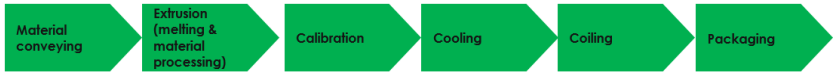
PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Fossil materials	100	EU

PRODUCT LIFE-CYCLE

MANUFACTURING AND PACKAGING (A1-A3)

Uponor Comfort Pipe PLUS Blue is a pipe, manufactured by polyethylene (PE), crosslinking additive and stabilizers. The materials are mixed after which the mix is fed into an extruder where the material melts and is crosslinked. The crosslinked pipe is calibrated to correct dimension, cooled, coiled and packaged. The finished product is packed with plastic films and papers. Ready and packed products are supplied to construction site on pallets.



Manufacturing flowchart

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

The transportation distance is defined according to the PCR. Average distance of transportation from production plant to building site is based on the actual sales average figures of the company in of the local markets and the transportation method is assumed to be lorry. Vehicle capacity utilization volume factor is assumed to be 100 which means full load. In reality, it may vary but as role of transportation emissions in total results is small, the variety in load is assumed to be negligible. Empty returns are not taken into account as it is assumed that return trip is used by the transportation company to serve the needs of other clients. Transportation does not cause losses as product are packaged properly. Also, volume capacity utilisation factor is assumed to be <1 for the nested packaged products. Each wooden pallet is assumed to be re-used for 120 times based on the actual re-use scenarios.
Environmental impacts from installation into the building include a 0,16% product installation loss, waste packaging materials (A5) and release of biogenic carbon dioxide from wood pallets. The impacts of material production, its processing and its disposal as installation waste are also included.

PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase. Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

Since the consumption of energy and natural resources is negligible for disassembling of the end-of-life product, the impacts of demolition are assumed zero (C1). The end-of-life product is assumed to be sent to the closest facilities by lorry and is assumed to be 50 km away (C2). 100% of the end-of-life product is collected separately from the demolition site while 63% sent to recycling and 36% to incineration facilities (C3). Only 1% of the end-of-life product goes to landfill (C4). Due to the recycling and incineration potential of Polyethylene, the end-of-life product is converted into the recycled PE while energy and heat is produced from its incineration (D). The benefits and loads of waste packaging materials in A5 are also considered in module D.

LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	2020

DECLARED AND FUNCTIONAL UNIT

Declared unit	1 kg of pipe
Mass per declared unit	1 kg

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0.017

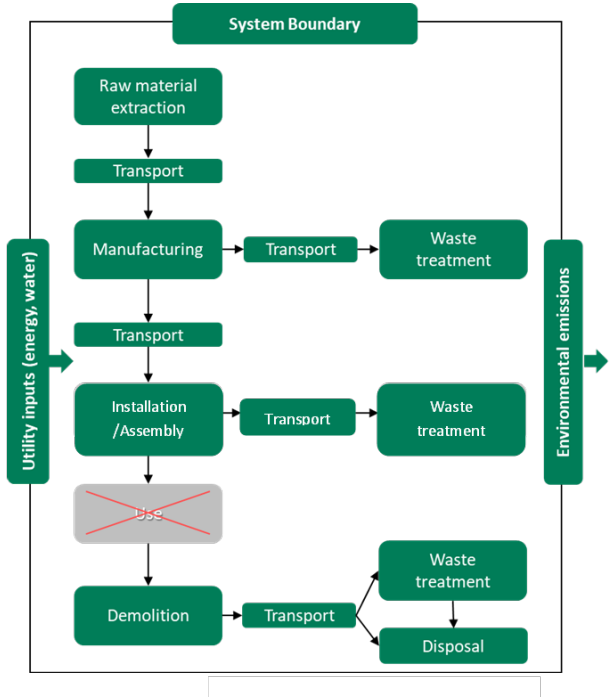
SYSTEM BOUNDARY

This EPD covers the *cradle to gate* scope with following modules; A1 (Raw material supply), A2 (Transport) and A3 (Manufacturing), A4 (Transport), A5 (Assembly) as well as C1 (Deconstruction), C2 (Transport at end-of-life), C3 (Waste processing) and C4 (Disposal). In addition, module D - benefits and loads beyond the system boundary is included.

The type of scope of this study is cradle to gate and covers impacts of raw materials' production, their transportation to the production plant, manufacturing process, transportation of the products to the installation site, installation processes and end-of-life stage. Stages included in the study are marked in figure below.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
X	x	x	x	x	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x	x	x
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR



CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 and the applied PCR. The study does not exclude any hazardous materials or substances.

The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

For easier modelling and because of lack of accuracy in available modelling resources some constituents under 0,1% of product mass are excluded. These include some additives which are all present in the product only in very small amounts and have no serious impact on the emissions of the product. These raw materials include: antioxidant 1076, peroxid trigonox 145-E85, peroxid DTBP, Remafin-white PEZ121740Q. REMAFIN-WHITE. Their sum is below the cut-off criteria.

The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation.

In this study, as per EN 15804, allocation is conducted in the following order;

1. Allocation should be avoided.
2. Allocation should be based on physical properties (e.g. mass, volume) when the difference in revenue is small.

3. Allocation should be based on economic values.

In this study allocation could not be avoided for raw materials, packaging, ancillary material, energy consumption and waste production as the information was only measured on factory or production process level. The inputs were allocated to studied product based on annual production volume (mass). The values for 1 kg of pipe are calculated by considering the total product weight per annual production. In the factory, several kinds of plastic pipes are produced; since the production processes of these products are similar, the annual production percentages are taken into consideration for allocation. According to the ratio of the annual production of the declared product to the total annual production at the factory, the annual total raw materials, energy consumption, packaging materials and the generated waste per the declared product are allocated. Subsequently, the product output fixed to 1kg and the corresponding amount of product is used in the calculations.

Distribution distance was calculated as a sales volume-based weighted average according to the percentage ratios for each destination point. This LCA study is conducted in accordance with all methodological considerations, such as performance, system boundaries, data quality, allocation procedures, and decision rules to evaluate inputs and outputs.

All estimations and assumptions regarding the cut off criteria and the allocation are declared in the part "Cut-off Criteria" except the estimations/assumptions below:

- Module A2, A4 & C2: Vehicle capacity utilization volume factor is assumed to be 1 which means full load. It may vary but as the role of transportation emission in total results is small, the variety in load is assumed to be negligible. Empty returns are not considered as it is assumed that return trip is used by transportation companies to serve the needs of other clients.
- Module A4: Transportation does not cause losses as products are packaged properly. Also, volume capacity utilisation factor is assumed to be <1 for the nested packaged products. Additionally, transportation distances are based on average sales across Europe that is 1600 km in this study.
- Module A5 - 0,16% of the product is assumed to be lost as installation waste and is incinerated without energy recovery.
- Module C2: Transportation distance to waste handling facility is estimated as 50 km and the transportation method is assumed as lorry.
- Module C3, C4, D: The product undergoes separate collection and 63% is assumed to be recycled, 36% incinerated and 1% landfilled. Ash from incineration processes is assumed negligible. The recycled end-of-life materials are assumed to serve as secondary raw materials in manufacturing while the materials incinerated displace electricity and heat production.

Allocation used in Ecoinvent 3.6 environmental data sources follows the methodology 'allocation, cut-off by classification'. This methodology is in line with the requirements of the EN 15804 - standard.

AVERAGES AND VARIABILITY

There is no average result considered in this study since this EPD refers to one specific product produced in one production plant. Primary data represents the manufacturer's manufacturing site at Virsbo, Sweden.

ENVIRONMENTAL IMPACT DATA

Note: additional environmental impact data may be presented in annexes.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total	kg CO_2e	2,11E0	7,26E-2	5,84E-1	2,76E0	2,83E-1	9,56E-2	MND	MND	MND	MND	MND	MND	MND	0E0	6,62E-3	3,32E-1	1,48E-3	-3,13E-1
GWP – fossil	kg CO_2e	2,09E0	7,25E-2	4,5E-1	2,62E0	2,85E-1	3,09E-2	MND	MND	MND	MND	MND	MND	MND	0E0	6,62E-3	3,27E-1	1,48E-3	-3,62E-1
GWP – biogenic	kg CO_2e	1,05E-2	4,38E-5	1,34E-1	1,45E-1	1,75E-4	6,47E-2	MND	MND	MND	MND	MND	MND	MND	0E0	3E-6	4,63E-3	1,14E-6	4,9E-2
GWP – LULUC	kg CO_2e	6,53E-4	2,58E-5	9,47E-5	7,74E-4	1,01E-4	1,39E-5	MND	MND	MND	MND	MND	MND	MND	0E0	2,44E-6	2,23E-4	5,67E-8	1,93E-4
Ozone depletion pot.	kg CFC_{-11}e	5,51E-8	1,66E-8	5,11E-9	7,68E-8	6,54E-8	2,16E-9	MND	MND	MND	MND	MND	MND	MND	0E0	1,45E-9	2,64E-8	3,28E-11	-3,33E-8
Acidification potential	mol H^+e	7,53E-3	3,11E-4	5,35E-4	8,38E-3	1,18E-3	1,15E-4	MND	MND	MND	MND	MND	MND	MND	0E0	2,77E-5	1,08E-3	9,24E-7	-4,29E-3
EP-freshwater[2)]	kg Pe	3,62E-5	6,25E-7	5,07E-6	4,19E-5	2,47E-6	9,84E-7	MND	MND	MND	MND	MND	MND	MND	0E0	6,61E-8	6,05E-6	1,99E-9	-1,81E-5
EP-marine	kg Ne	1,29E-3	9,11E-5	1,39E-4	1,52E-3	3,48E-4	2,8E-5	MND	MND	MND	MND	MND	MND	MND	0E0	8,04E-6	3,06E-4	5,65E-7	-5,97E-4
EP-terrestrial	mol Ne	1,44E-2	1,01E-3	1,71E-3	1,71E-2	3,85E-3	2,99E-4	MND	MND	MND	MND	MND	MND	MND	0E0	8,89E-5	3,27E-3	3,4E-6	-7,3E-3
POCP ("smog")	kg NMVOCe	6,97E-3	3,14E-4	4,91E-4	7,78E-3	1,21E-3	1,13E-4	MND	MND	MND	MND	MND	MND	MND	0E0	2,78E-5	1,06E-3	1,3E-6	-3,84E-3
ADP-minerals & metals	kg Sbe	1,9E-5	1,8E-6	3,92E-6	2,47E-5	7,12E-6	4,62E-7	MND	MND	MND	MND	MND	MND	MND	0E0	1,61E-7	4,48E-6	1,14E-9	-8,42E-6
ADP-fossil resources	MJ	7,38E1	1,1E0	9,38E-1	7,58E1	4,36E0	3,77E-1	MND	MND	MND	MND	MND	MND	MND	0E0	9,88E-2	3,6E0	2,51E-3	-4,69E1
Water use[1)]	m^3e depr.	1,56E0	3,92E-3	2,54E-2	1,59E0	1,55E-2	1,44E-2	MND	MND	MND	MND	MND	MND	MND	0E0	4,09E-4	7,7E-2	1,11E-4	-5,23E-1

1) GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential. 2) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator. 3) Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO_4e.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	6,24E-8	5,57E-9	2,6E-8	9,4E-8	2,2E-8	1,62E-9	MND	MND	MND	MND	MND	MND	MND	0E0	5,04E-10	2,31E-8	1,74E-11	-1,47E-8
Ionizing radiation[3)]	kBq U235e	4,93E-2	4,83E-3	3,33E-3	5,74E-2	1,9E-2	1,17E-3	MND	MND	MND	MND	MND	MND	MND	0E0	4,12E-4	1,01E-2	9,82E-6	-6,04E-3
Ecotoxicity (freshwater)	CTUe	1,18E1	8,62E-1	2,95E0	1,56E1	3,4E0	5,4E-1	MND	MND	MND	MND	MND	MND	MND	0E0	8,45E-2	4,23E0	2,61E-3	-9,2E0
Human toxicity, cancer	CTUh	5,56E-10	2,46E-11	2,27E-10	8,08E-10	9,63E-11	5,87E-11	MND	MND	MND	MND	MND	MND	MND	0E0	2,2E-12	4,59E-10	6,98E-14	5,99E-11
Human tox. non-cancer	CTUh	1,3E-8	9,87E-10	4,13E-9	1,81E-8	3,9E-9	6,1E-10	MND	MND	MND	MND	MND	MND	MND	0E0	8,94E-11	5,59E-9	1,74E-12	-2,97E-9
SQP	-	5,41E-1	1,22E0	5,91E-1	2,36E0	4,85E0	5,96E-2	MND	MND	MND	MND	MND	MND	MND	0E0	1,09E-1	2,2E0	8,85E-3	9,03E-1

4) SQP = Land use related impacts/soil quality.5) EN 15804+A2 disclaimer for Ionizing radiation, human health. 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.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy	MJ	1,24E0	1,56E-2	8,36E0	9,62E0	6,18E-2	3,37E-2	MND	MND	MND	MND	MND	MND	MND	0E0	1,13E-3	1,71E-1	4,44E-5	-3,1E-1
Renew. PER as material	MJ	0E0	0E0	4,14E-2	4,14E-2	0E0	6,62E-5	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of renew. PER	MJ	1,24E0	1,56E-2	8,41E0	9,66E0	6,18E-2	3,38E-2	MND	MND	MND	MND	MND	MND	MND	0E0	1,13E-3	1,71E-1	4,44E-5	-3,1E-1
Non-re. PER as energy	MJ	2,39E1	1,1E0	8,18E-1	2,59E1	4,36E0	2,97E-1	MND	MND	MND	MND	MND	MND	MND	0E0	9,88E-2	3,6E0	2,51E-3	-1,74E1
Non-re. PER as material	MJ	4,98E1	0E0	1,2E-1	4,99E1	0E0	7,99E-2	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	-2,94E1
Total use of non-re. PER	MJ	7,38E1	1,1E0	9,38E-1	7,58E1	4,36E0	3,77E-1	MND	MND	MND	MND	MND	MND	MND	0E0	9,88E-2	3,6E0	2,51E-3	-4,69E1
Secondary materials	kg	4,72E-3	0E0	2,94E-5	4,75E-3	0E0	1,3E-3	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	6,27E-1
Renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	5,83E-3	2,09E-4	6,06E-4	6,65E-3	8,25E-4	6,2E-4	MND	MND	MND	MND	MND	MND	MND	0E0	1,89E-5	1,01E-3	2,81E-6	-3,29E-3

6) PER = Primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	4,68E-2	1,15E-3	9,86E-3	5,78E-2	4,53E-3	2,46E-3	MND	MND	MND	MND	MND	MND	MND	0E0	1,3E-4	0E0	4,58E-6	-2,09E-2
Non-hazardous waste	kg	1,61E0	9,51E-2	3,28E-1	2,04E0	3,77E-1	4,63E-2	MND	MND	MND	MND	MND	MND	MND	0E0	8,81E-3	0E0	1E-2	-1,99E-1
Radioactive waste	kg	4,11E-5	7,56E-6	3,07E-6	5,18E-5	2,98E-5	1,22E-6	MND	MND	MND	MND	MND	MND	MND	0E0	6,54E-7	0E0	1,5E-8	-1,72E-6

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	0E0	0E0	2,44E-2	2,44E-2	0E0	1,79E-1	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	6,3E-1	0E0	0E0
Materials for energy rec	kg	0E0	0E0	1,3E-1	1,3E-1	0E0	3,8E-3	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	3,6E-1	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0

KEY INFORMATION TABLE (RTS) – KEY INFORMATION PER KG OF PRODUCT

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total	kg CO_2e	2,11E0	7,26E-2	5,84E-1	2,76E0	2,86E-1	9,56E-2	MND	MND	MND	MND	MND	MND	MND	0E0	6,62E-3	3,32E-1	1,48E-3	-3,13E-1
ADP-minerals & metals	kg Sbe	1,9E-5	1,8E-6	3,92E-6	2,47E-5	7,12E-6	4,62E-7	MND	MND	MND	MND	MND	MND	MND	0E0	1,61E-7	4,48E-6	1,14E-9	-8,42E-6
ADP-fossil	MJ	7,38E1	1,1E0	9,38E-1	7,58E1	4,36E0	3,77E-1	MND	MND	MND	MND	MND	MND	MND	0E0	9,88E-2	3,6E0	2,51E-3	-4,69E1
Water use	m^3e depr.	1,56E0	3,92E-3	2,54E-2	1,59E0	1,55E-2	1,44E-2	MND	MND	MND	MND	MND	MND	MND	0E0	4,09E-4	7,7E-2	1,11E-4	-5,23E-1
Secondary materials	kg	4,72E-3	0E0	2,94E-5	4,75E-3	0E0	1,3E-3	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	6,27E-1
Biog. C in product	kg C	N/A	N/A	0E0	0E0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biog. C in packaging	kg C	N/A	N/A	1,7E-2	1,7E-2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

7) Biog. C in product = Biogenic carbon content in product

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Electricity production, wind, 1-3mw turbine, onshore (Reference product: electricity, high voltage). Country: Sweden
Electricity CO_2e / kWh	0,0148
District heating data source and quality	Heat and power co-generation, biogas, gas engine (Reference product: electricity, high voltage). Country: Sweden
District heating CO_2e / kWh	0,24

Transport scenario documentation (A4)

Scenario parameter	Value
Specific transport CO_2e emissions, kg CO_2e / tkm	0,13
Average transport distance, km	1600
Capacity utilization (including empty return) %	100
Bulk density of transported products	-
Volume capacity utilization factor	<1

End of life scenario documentation

Scenario parameter	Value
Collection process – kg collected separately	1
Collection process – kg collected with mixed waste	0
Recovery process – kg for re-use	0
Recovery process – kg for recycling	0,63
Recovery process – kg for energy recovery	0,36
Disposal (total) – kg for final deposition	0,01
Scenario assumptions e.g. transportation	End-of-life product is transported 50 km with an average lorry

BIBLIOGRAPHY

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations. Principles and procedures.

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

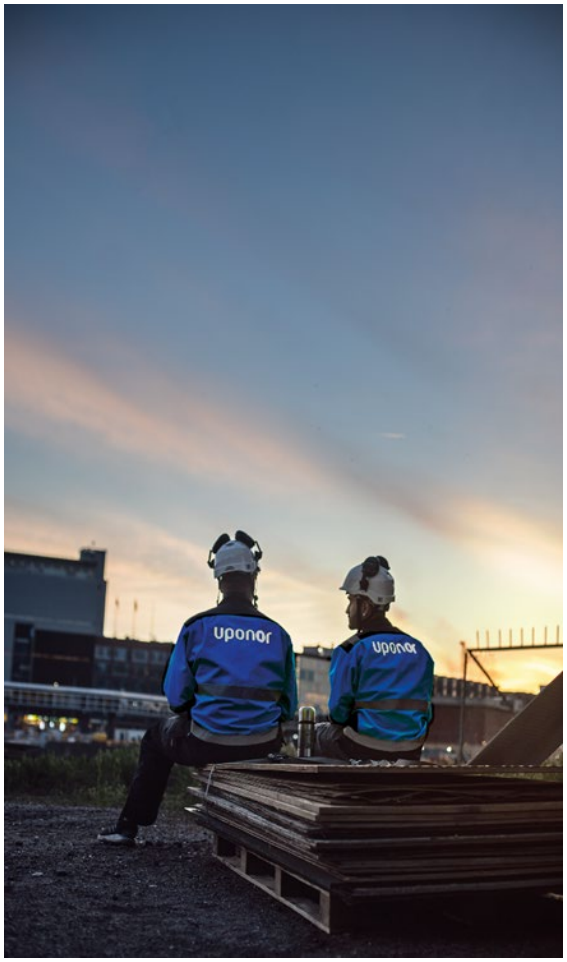
ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

Ecoinvent database v3.6 (2019) and One Click LCA database.

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

RTS PCR (English version, 22.12.2020)

Comfort Pipe Plus LCA background report 27.01.2022



ABOUT THE MANUFACTURER

Uponor is rethinking water for future generations. Our offering, including safe drinking water delivery, energy-efficient radiant heating and cooling and reliable infrastructure, enables a more sustainable living environment. We help our customers in residential and commercial construction, municipalities and utilities, as well as different industries to work faster and smarter. We employ about 3,800 professionals in 26 countries in Europe and North America. Over 100 years of expertise and trust form the basis of any successful partnership. This is the basis, on which they can build, in a literal and metaphorical sense. We create trust together with our partners: Customers, prospective customers and suppliers. We establish this with shared knowledge, quality and sustainable results.

EPD AUTHOR AND CONTRIBUTORS

Manufacturer	Uponor Oyj
EPD author	Dr. Qian Wang, Uponor Corporation
EPD verifier	Silvia Vilčeková, Silcert, s.r.o.
EPD program operator	The Building Information Foundation RTS sr
Background data	This EPD is based on Ecoinvent 3.6 (cut-off) and One Click LCA databases.
LCA software	The LCA and EPD have been created using One Click LCA Pre-Verified EPD Generator for Plumbing Products, Components, Equipment and Systems

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with EN 15804, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The background report (project report) for this EPD

Why does verification transparency matter? Read more online.

VERIFICATION OVERVIEW

Following independent third party has verified this specific EPD:

EPD verification information	Answer
Independent EPD verifier rd-party verifier for EPD	Silvia Vilčeková, Silcert, s.r.o.
EPD verification started on	10.02.2022
EPD verification completed on	21.02.2022
Approver of the EPD verifier	The Building Information Foundation RTS sr

Author & tool verification	Answer
EPD author	Dr. Qian Wang, Uponor
EPD author training completion	2021-09-07
EPD Generator module	Plumbing Products,
Independent software verifier	Anni Oviir, Rangi Maja OÜ
Software verification date	2020-06-20

THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of

- the data collected and used in the LCA calculations,
- the way the LCA-based calculations have been carried out,
- the presentation of environmental data in the EPD, and
- other additional environmental information, as present

with respect to the procedural and methodological requirements in ISO 14025:2010 and EN 15804:2012+A2:2019.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance. I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification. I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Silvia Vilčeková, Silcert, s.r.o.

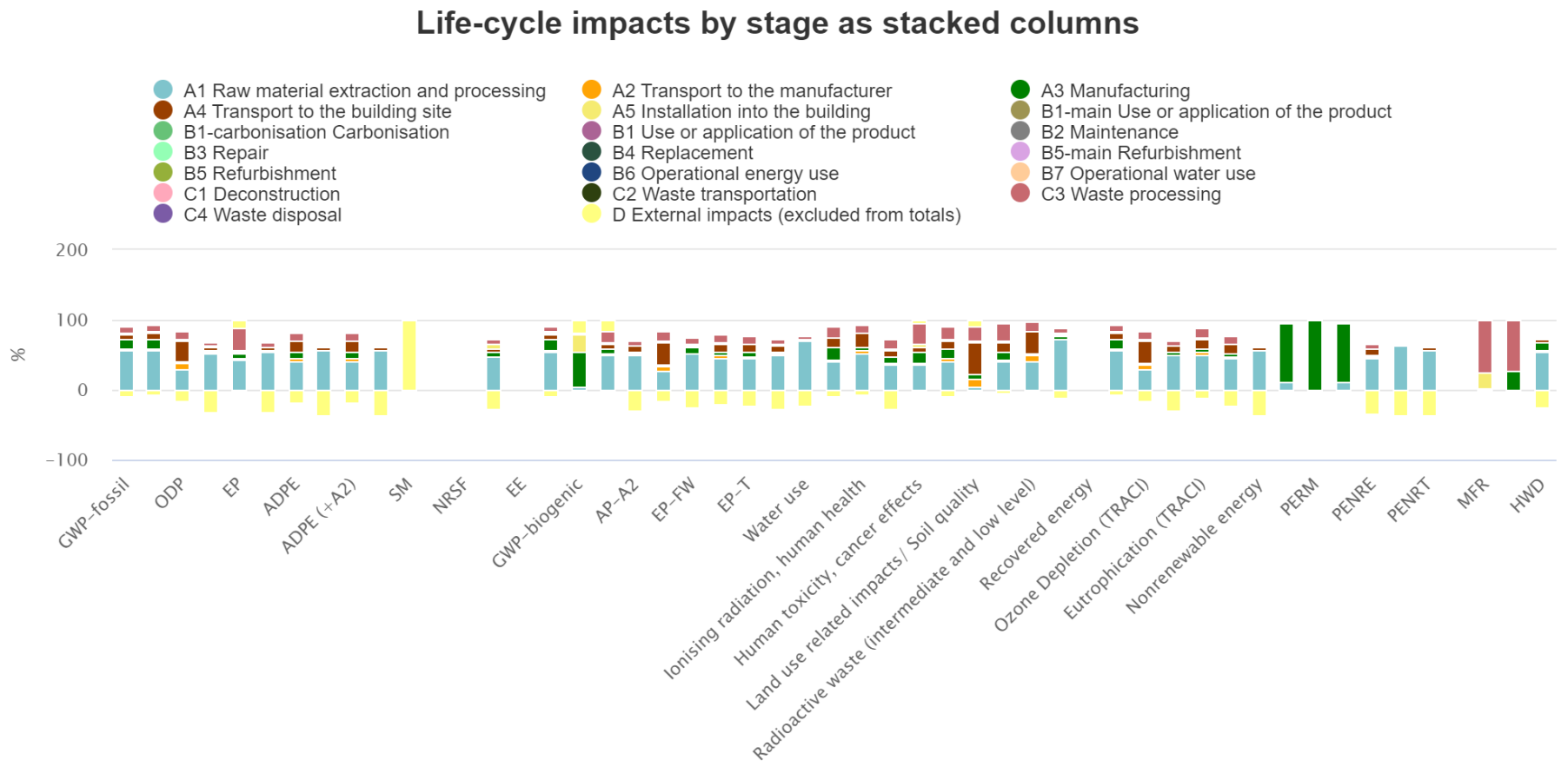
ANNEX 1 : ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	1,93E0	7,19E-2	4,52E-1	2,46E0	2,83E-1	3,07E-2	MND	MND	MND	MND	MND	MND	MND	0E0	6,55E-3	3,21E-1	1,05E-3	-2,41E-1
Ozone depletion Pot.	kg CFC_{-11}e	5,4E-8	1,32E-8	4,79E-9	7,2E-8	5,21E-8	1,9E-9	MND	MND	MND	MND	MND	MND	MND	0E0	1,15E-9	2,18E-8	2,61E-11	-2,83E-8
Acidification	kg SO_2e	6,34E-3	1,59E-4	3,96E-4	6,89E-3	5,82E-4	8,92E-5	MND	MND	MND	MND	MND	MND	MND	0E0	2,01E-5	7,62E-4	9,99E-7	-3,77E-3
Eutrophication	kg PO_4^3e	1,54E-3	3,18E-5	2,4E-4	1,81E-3	1,21E-4	5,57E-5	MND	MND	MND	MND	MND	MND	MND	0E0	4,61E-6	1,09E-3	5,22E-5	3,84E-4
POCP (“smog”)	kg C_2H_4e	6,28E-4	9,82E-6	2,57E-5	6,64E-4	3,76E-5	9,44E-6	MND	MND	MND	MND	MND	MND	MND	0E0	8,7E-7	6,95E-5	2,18E-7	-3,64E-4
ADP-elements	kg Sbe	1,9E-5	1,8E-6	3,92E-6	2,47E-5	7,12E-6	4,62E-7	MND	MND	MND	MND	MND	MND	MND	0E0	1,61E-7	4,48E-6	1,14E-9	-8,42E-6
ADP-fossil	MJ	7,38E1	1,1E0	9,38E-1	7,58E1	4,36E0	3,77E-1	MND	MND	MND	MND	MND	MND	MND	0E0	9,88E-2	3,6E0	2,51E-3	-4,69E1

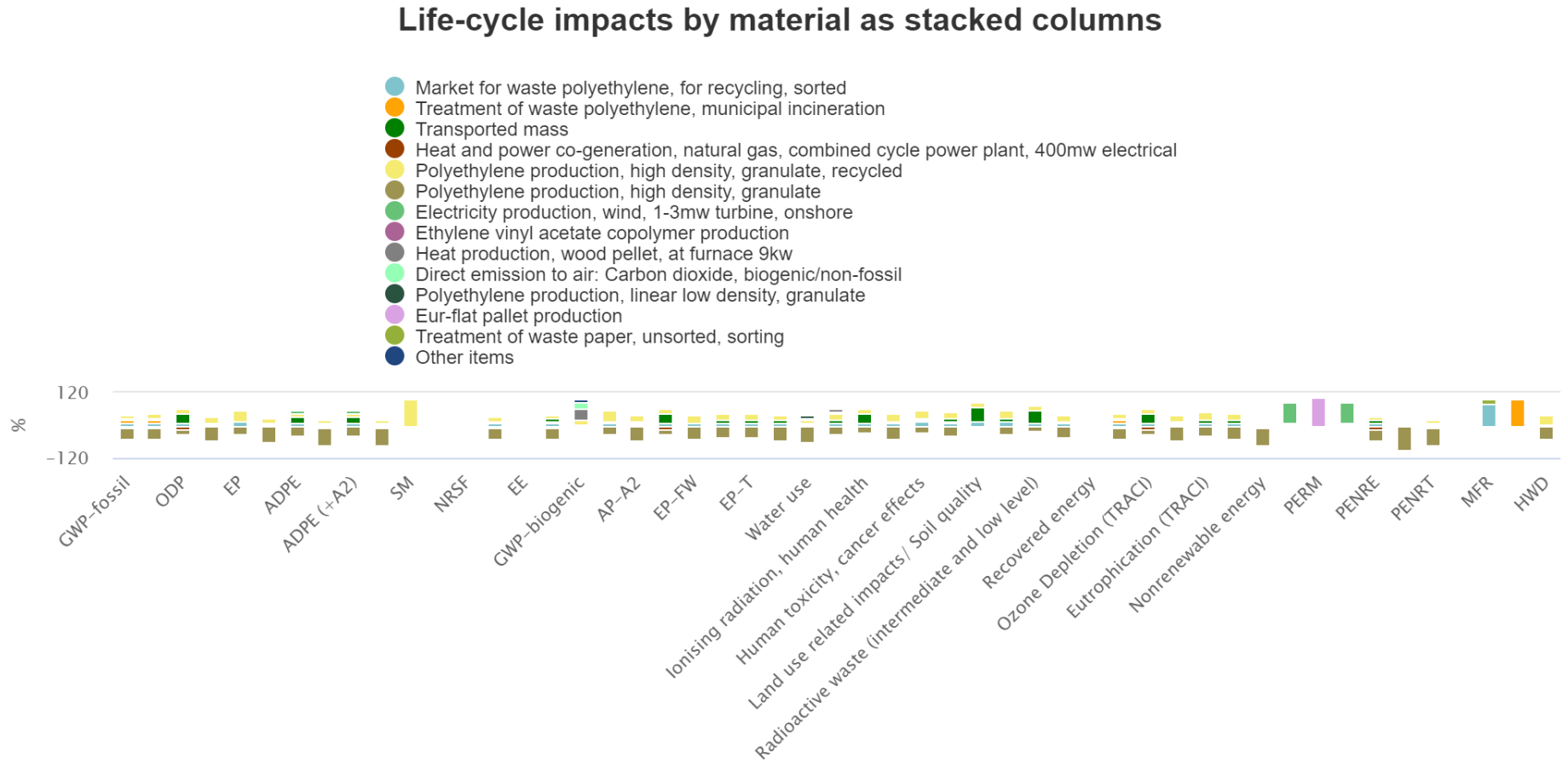
ANNEX 2 : ENVIRONMENTAL IMPACTS – TRACI 2.1. / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	1,95E0	7,17E-2	4,53E-1	2,48E0	2,82E-1	3,06E-2	MND	MND	MND	MND	MND	MND	MND	0E0	6,54E-3	3,21E-1	1,11E-3	-2,51E-1
Ozone Depletion	kg CFC_{-11}e	6,73E-8	1,76E-8	5,96E-9	9,08E-8	6,93E-8	2,49E-9	MND	MND	MND	MND	MND	MND	MND	0E0	1,54E-9	2,88E-8	3,49E-11	-3,59E-8
Acidification	kg SO_2e	6,24E-3	2,7E-4	4,52E-4	6,96E-3	1,02E-3	9,8E-5	MND	MND	MND	MND	MND	MND	MND	0E0	2,42E-5	9,83E-4	8,25E-7	-3,65E-3
Eutrophication	kg Ne	5,22E-4	3,69E-5	6,01E-5	6,19E-4	1,44E-4	1,55E-5	MND	MND	MND	MND	MND	MND	MND	0E0	3,36E-6	1,33E-4	4,55E-7	-1,25E-4
POCP (“smog”)	kg O_3e	8,32E-2	5,77E-3	8,08E-3	9,7E-2	2,21E-2	1,61E-3	MND	MND	MND	MND	MND	MND	MND	0E0	5,1E-4	1,86E-2	1,96E-5	-4,29E-2
ADP-fossil	MJ	1,06E1	1,58E-1	8,87E-2	1,08E1	6,21E-1	3,78E-2	MND	MND	MND	MND	MND	MND	MND	0E0	1,39E-2	4,45E-1	3,44E-4	-6,94E0

ANNEX 3 : LIFE-CYCLE ASSESSMENT RESULT VISUALIZATION



Life-cycle impacts by stage as stacked columns



Life-cycle impacts by material as stacked columns