



PEP Ecopassport[®]

Product Environmental Profile – Precedent[™] Heat Pump Rooftop Units

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Product Environmental Profile - PEP Ecopassport.
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Company Description

Trane Technologies® is a world leader in heating and cooling systems, services, and solutions. Together with our brands, Trane® and Thermo King®, we bring efficient and sustainable climate innovations to buildings, homes, and transportation.

Trane helps customers succeed by providing innovative solutions that optimize indoor environments through a broad portfolio of energy-efficient heating, ventilating, and air conditioning systems, buildings, contracting and energy services, parts support, and advanced controls for homes and commercial buildings.

Trane serves engineers, contractors, and building owners on all continents and in an array of markets including education, healthcare, government, industrial/ manufacturing, data centers, lodging, retail, and commercial real estate. With more than 900 U.S. patents to date, Trane creates comfortable and energy-efficient environments around the world.

Trane systems and services have a reputation for reliability, high quality, and advanced innovation; and are available through a powerful distribution network. Trane employees and distributors are respected industry-wide for their skills and performance in designing, manufacturing, marketing, and supporting commercial and residential systems.

Product Information	
Reference Product	Precedent™ Heat Pump Rooftop Units - DHK300
Product Description	<p>Precedent Rooftop Units are light commercial packaged systems ideal for heating and cooling smaller structures, such as commercial office buildings, retail and restaurants, school facilities, warehouses and government buildings. Installed on the roof, they save space and allow you to use every square foot of your business for your operations. Plus, because all parts are housed in a single cabinet on the rooftop, they're easier to maintain and repair, and it's less disruptive when the unit needs servicing. Trane's upgraded Precedent product line offers a comprehensive range of capacities and efficiency ratings, as well as heating types. Every model delivers industry-leading performance, low-GWP refrigerant, the most advanced controls and new features and options to meet your current and future needs.</p> <p>Modular architecture for efficient servicing and parts management</p> <p>We put a lot of thought into how to make Precedent units easier to install and maintain. First, we created a new modular component architecture to increase commonality across the product line. Compressors, coils, motors, fans and other components are standardized across the portfolio, which helps boost efficiencies in servicing as well as parts inventory management.</p> <p>Symbio 700® controls with an intuitive onboard interface and Service and Installation App are standard on every unit</p> <p>We also included factory-installed Symbio® 700 controls as standard equipment on every Precedent unit. With its intuitive onboard display and Service & Installation App, the controller makes installation and service quick and simple. Plus, every unit is compatible with optional Symbio expansion modules and/or custom programming to enable your HVAC system to grow with your needs. By adding custom programming in the field, you can adapt to emerging requirements or aftermarket changes as necessary. The adaptability of a Symbio 700 controller can also help save you money by avoiding complete system overhauls.</p> <p>A full range of models to help you reach your sustainability goals</p> <p>For building owners seeking to help reduce their carbon emissions and/or meet local electrification mandates, the Precedent product line offers models to fit your budget, efficiency goals and climate. Increasingly, buildings are turning to electrification of heat as a solution to help achieve net zero carbon emissions. An electric heat pump can be up to 450% more efficient than a gas furnace. Available up to 25 tons, in both standard and high efficiency, Precedent Heat Pumps meet or exceed all new standards for energy efficiency. Hybrid dual fuel units use electric as a primary heating source, while activating gas as needed. Precedent Dual Fuel systems offer an ideal solution for cold climates where a conventional heat pump may struggle to deliver enough heat for occupant comfort during extreme temperatures.</p> <p>Specifications</p> <ul style="list-style-type: none"> • Capacity range: 3-25 tons • Refrigerant: R-454B • Controls: Symbio® 800
Functional Unit	To produce 1 kW of heating or 1 kW of cooling, according to the appropriate usage scenario defined the AHRI 340/360 standard and during the 22-year reference lifetime of the product
Declared Unit	To produce heating or cooling thanks to air-to-water heating of 69.8 kW according to the appropriate usage scenario and during the 22-year lifetime of the product. <i>Note: the mathematical relationship between the functional and declared unit is such that the declared unit divided by its capacity in kW equals the functional unit.</i>
Other Products Covered	List of other products covered in this PEP is presented in the section which concerned the extrapolation rules
Reference Lifetime*	22 Years

*Reference lifetime was defined as 22 years by the Product Category Rules which governed this analysis.

Technical Characteristics	
Data Point	Precedent™ Heat Pump Rooftop Units
Product Category	Rooftop Unit
Chiller Technology	Air to Air
Reversible or non-reversible	Reversible
Heating Capacity*	238,000 BTU 69.8 kW
COP*	3.3 kW/kW
Cooling Capacity*	258,000 BTU 75.6 kW
IEER*	15 BTU/W-hr 4.45 kW/kW
Refrigerant Used	R-454B
Refill Threshold**	90%

*Capacity and COP/IEER at AHRI 340/360 conditions

**Refill threshold denotes the ratio of refrigerant (expressed as a %) at which a refill back up to the original charge takes place. Per the Product Category Rules, the refill threshold is considered 90% by default.

Constituent Materials >> Total weight of the reference product: 1,245 kg					
Plastics as % of weight		Metals as % of weight		Others as % of weight	
Product only: 1,145 kg					
Nylon	0.6%	Steel	58.7%	Refrigerant	1.3%
Various Plastics	0.7%	Aluminum	11.1%	Electronic Components	3.4%
		Copper	7.0%	Various Other	1.0%
		Cast Iron	6.5%		
		Other Metals	1.7%		
Packaging only: 100 kg					
Polyethylene Packaging	0.1%				
		Steel Packaging	1.2%		
				Wood Packaging	6.8%
Total plastics	1.38%	Total metals	86.15%	Total others	12.47%

Life Cycle Stages	
Manufacturing	The manufacturing stage includes the production of raw and intermediate materials, as well as transportation to the manufacturer's last logistic platform for Ascend™ Heat pump. The final assembly of the product is carried out at Trane's plant in Clarksville, Tennessee, USA. As a member of Steel Zero, Trane has pledged to procure, specify or stock 50% net-zero steel by 2030 and 100% net-zero steel by 2050. The main process steps for production include cutting, rolling, machining, brazing, welding, painting, sub- and final assemblies, and end-of-the-line testing.
Distribution	The transport from Trane's manufacturing facility to the customer was considered. The distance was calculated using averages for all shipped orders in 2024.
Installation	The installation stage includes diesel consumed by machinery used to move and place the product during installation.
Use	The use stage is conducted in alignment with the PSR, which models energy use of this air-to water heat pump associated with comfort heating applications over its 22-year lifetime. The conditions outlined AHRI Standard 340/360 were used to set product capacity and efficiency. Refrigerant leak and electricity usage are considered in this stage. Default refrigerant leak amounts from the PSR were used.
End of Life	The end-of-life stage includes transportation to the end-of-life facility of the disposal of product. End of life fates were modeled by material for the region where they are being disposed, in this case the United States.
Benefits and loads beyond the system boundaries	Throughout the life cycle of the product, net loads and benefits beyond system boundaries are included.

Data Quality and Software	
Geographical Representativeness	The geographical scope of this PEP across all life cycle stages (manufacturing, distribution, installation, customer use, and end of life) is North America (United States and Canada). Overall geographical representativeness is considered good.
Temporal Representativeness	Primary data was collected from 2024. Secondary data refers to the Ecoinvent database published in 2023. The temporal coverage for each secondary process used in the LCA model is specified in the documentation section of individual Ecoinvent datasets.
Technological Representativeness	Overall technology representativeness is considered good.
Software and Database Used	Sima Pro desktop 9.6.0.1 Ecoinvent Database Version 3.10

Energy Model Used	
Manufacturing	Manufacturing electricity considers the eGRID specific region from which the product is being manufactured in Ecoinvent's datasets (market for electricity, medium voltage {US-SERC}).
Distribution	No energy consumption occurs during the distribution stage.
Installation	No energy consumption occurs during the installation stage.
Use	Use stage electricity is modeled using an average North American grid mix dataset (market group for electricity, medium voltage {RNA}).
End of Life	No energy consumption occurs during the end-of-life stage.
Benefits and loads beyond the system boundaries	End of life benefits consider average North American electricity (market group for electricity, medium voltage {RNA}).

Environmental Impacts

EN 15804 + A2 Environmental Impact Indicators, per kW corresponding to the functional unit											
		Total Life Cycle Impacts (Excluding Module D)		Manufacturing A1-A3	Distribution A4	Installation A5	Use B1	Maintenance B2	Operational Energy Use B6	End of Life C1-C4	Module D
Climate change - total	GWP	7.39E+03	kg CO2 eq	1.16E+02	2.47E+00	1.86E+00	8.37E-01	2.35E+01	7.22E+03	1.77E+01	-2.30E+01
Climate change - fossil fuels	GWPf	7.32E+03	kg CO2 eq	1.17E+02	2.47E+00	1.28E+00	8.37E-01	2.21E+01	7.16E+03	1.49E+01	-2.34E+01
Climate change - biogenics	GWPb	4.69E+01	kg CO2 eq	-1.82E+00	2.88E-04	5.82E-01	0.00E+00	1.43E+00	4.39E+01	2.80E+00	5.52E-01
Climate change - land use and land use transformation	GWPlu	2.21E+01	kg CO2 eq	3.34E-01	7.13E-05	4.64E-05	0.00E+00	1.80E-02	2.17E+01	3.68E-04	-1.57E-01
Ozone depletion	ODP	2.18E-04	kg CFC-11 eq	1.80E-04	3.27E-08	1.71E-08	0.00E+00	1.80E-07	3.82E-05	3.13E-08	-1.73E-07
Acidification	AP	2.08E+01	mole of H+ eq	1.80E+00	6.49E-03	3.63E-03	0.00E+00	1.22E-01	1.89E+01	7.30E-03	-7.42E-01
Eutrophication, freshwater	Epf	5.06E-01	kg P eq	1.24E-02	6.03E-06	3.30E-06	0.00E+00	7.90E-04	4.93E-01	7.82E-05	-2.30E-03
Eutrophication, marine aquatic	Epm	3.04E+00	kg of N eq	1.61E-01	2.33E-03	1.36E-03	0.00E+00	2.65E-02	2.85E+00	5.80E-03	-3.73E-02
Eutrophication, terrestrial	Ept	3.44E+01	mole of N eq	2.00E+00	2.56E-02	1.48E-02	0.00E+00	2.75E-01	3.21E+01	2.52E-02	-4.89E-01
Photochemical ozone formation	POCP	1.40E+01	kg NMVOC eq	6.60E-01	9.68E-03	5.45E-03	0.00E+00	8.89E-02	1.32E+01	9.59E-03	-1.62E-01
Abiotic resource depletion – elements	ADPe	2.81E-02	kg Sb eq	2.72E-02	1.45E-07	7.56E-08	0.00E+00	5.11E-04	3.58E-04	6.07E-06	-8.60E-03
Abiotic resource depletion – fossil fuels	ADPf	1.38E+05	MJ	1.38E+03	3.26E+01	1.68E+01	0.00E+00	2.79E+02	1.37E+05	2.69E+01	-2.50E+02
Water use	WU	1.79E+03	m3 world eq	4.20E+01	3.00E-02	-5.62E-02	0.00E+00	2.43E+00	1.75E+03	-6.14E-01	-1.21E+01

Note: characterization factors use the -1/+1 biogenic carbon storage assessment methodology

Inventory Flow Indicators, per kW corresponding to the functional unit

		Total Life Cycle Impacts (Excluding Module D)		Manufacturing A1-A3	Distribution A4	Installation A5	Use B1	Maintenance B2	Operational Energy Use B6	End of Life C1-C4	Module D
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	PERE	1.93E+04	MJ	2.44E+02	5.23E-02	3.99E-02	0.00E+00	2.46E+01	1.90E+04	4.77E-01	-8.35E+01
Use of renewable primary energy resources used as raw materials	PERM	3.10E+01	MJ	3.10E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.14E+01
Total use of renewable primary energy resources	PERT	1.93E+04	MJ	2.75E+02	5.23E-02	3.99E-02	0.00E+00	2.46E+01	1.90E+04	4.77E-01	-9.49E+01
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	PENRM	2.38E+01	MJ	2.38E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-6.39E+00
Use of non-renewable primary energy resources used as raw materials	PENRE	1.38E+05	MJ	1.35E+03	3.26E+01	1.68E+01	0.00E+00	2.79E+02	1.37E+05	2.69E+01	-2.44E+02
Total use of non-renewable primary energy resources	PENRT	1.38E+05	MJ	1.38E+03	3.26E+01	1.68E+01	0.00E+00	2.79E+02	1.37E+05	2.69E+01	-2.50E+02
Use of secondary materials	USM	3.11E+00	kg	3.11E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	URSF	0.00E+00	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	UNRSF	0.00E+00	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	NUFW	8.65E+01	m3	1.55E+00	1.09E-03	-1.07E-03	0.00E+00	9.52E-02	8.49E+01	-1.33E-02	-5.35E-01
Hazardous waste disposed	HWD	3.81E+00	kg	5.23E-02	2.65E-04	3.22E-03	0.00E+00	7.08E-03	3.55E+00	2.00E-01	-2.71E-03
Non-hazardous waste disposed	NHWD	9.16E+01	kg	4.23E+00	1.35E-03	1.05E+00	0.00E+00	2.11E+00	6.80E+01	1.62E+01	-5.80E-01
Radioactive waste disposed	RWD	7.65E-01	kg	2.11E-03	1.17E-06	8.84E-07	0.00E+00	5.11E-04	7.62E-01	1.04E-05	-3.24E-04
Components for re-use	CRU	0.00E+00	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	MFR	0.00E+00	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	MER	1.43E+01	kg	2.10E+00	0.00E+00	5.37E-01	0.00E+00	0.00E+00	0.00E+00	1.17E+01	0.00E+00
Exported energy	EE	2.60E+00	MJ	0.00E+00	0.00E+00	3.36E-02	0.00E+00	0.00E+00	0.00E+00	2.57E+00	0.00E+00
Biogenic carbon content - packaging	BCCP	5.89E-01	kg C	5.89E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-4.84E-01

TRACI 2.1 Environmental Impact Indicators, per kW corresponding to the functional unit

		Total Life Cycle Impacts (Excluding Module D)		Manufacturing A1-A3	Distribution A4	Installation A5	Use B1	Maintenance B2	Operational Energy Use B6	End of Life C1-C4	Module D
Ozone depletion	OD	3.04E-04	kg CFC-11 eq	2.23E-04	3.46E-08	1.82E-08	0.00E+00	2.52E-07	8.07E-05	3.42E-08	-2.36E-07
Global warming	GW	7.27E+03	kg CO2 eq	1.16E+02	2.44E+00	1.29E+00	7.33E-01	2.25E+01	7.11E+03	1.50E+01	-2.33E+01
Smog	SG	1.89E+02	kg O3 eq	9.88E+00	1.48E-01	8.60E-02	1.37E-04	1.58E+00	1.77E+02	1.44E-01	-2.31E+00
Acidification	A	1.75E+01	kg SO2 eq	1.43E+00	5.83E-03	3.27E-03	0.00E+00	1.05E-01	1.60E+01	6.56E-03	-5.81E-01
Eutrophication	E	4.13E+00	kg N eq	1.25E-01	3.97E-04	2.57E-04	0.00E+00	1.10E-02	3.99E+00	5.08E-03	-2.29E-02
Carcinogens	C	1.96E-05	CTUh	5.17E-08	1.78E-09	1.15E-09	0.00E+00	8.59E-08	1.94E-05	2.91E-08	-1.45E-06
Non carcinogens	NC	4.01E-04	CTUh	1.10E-04	3.88E-07	1.90E-07	0.00E+00	2.63E-06	2.87E-04	6.17E-07	-4.88E-05
Respiratory effects	RE	1.13E+01	kg PM2.5 eq	2.05E-01	9.90E-04	5.21E-04	0.00E+00	2.14E-02	1.11E+01	1.22E-03	-6.84E-02
Ecotoxicity	EX	1.61E+03	CTUe	5.62E+02	8.08E+00	3.82E+00	0.00E+00	1.31E+01	1.02E+03	7.02E+00	-1.07E+02
Fossil fuel depletion	FFD	8.73E+03	MJ surplus	1.06E+02	4.59E+00	2.36E+00	0.00E+00	2.23E+01	8.59E+03	3.52E+00	-1.80E+01

EN 15804 + A2 Environmental Impact Indicators, per device corresponding to the reference product

		Total Life Cycle Impacts (Excluding Module D)		Manufacturing A1-A3	Distribution A4	Installation A5	Use B1	Maintenanc e B2	Operational Energy Use B6	End of Life C1-C4	Module D
Climate change - total	GWP	5.15E+05	kg CO2 eq	8.08E+03	1.73E+02	1.30E+02	5.85E+01	1.64E+03	5.04E+05	1.23E+03	-1.60E+03
Climate change - fossil fuels	GWPF	5.11E+05	kg CO2 eq	8.19E+03	1.73E+02	8.94E+01	5.85E+01	1.54E+03	5.00E+05	1.04E+03	-1.63E+03
Climate change - biogenics	GWPB	3.27E+03	kg CO2 eq	-1.27E+02	2.01E-02	4.06E+01	0.00E+00	9.95E+01	3.06E+03	1.95E+02	3.85E+01
Climate change - land use and land use transformation	GWPLU	1.54E+03	kg CO2 eq	2.33E+01	4.97E-03	3.24E-03	0.00E+00	1.25E+00	1.52E+03	2.57E-02	-1.09E+01
Ozone depletion	ODP	1.52E-02	kg CFC-11 eq	1.25E-02	2.28E-06	1.20E-06	0.00E+00	1.26E-05	2.67E-03	2.19E-06	-1.21E-05
Acidification	AP	1.45E+03	mole of H+ eq	1.26E+02	4.53E-01	2.53E-01	0.00E+00	8.50E+00	1.32E+03	5.10E-01	-5.18E+01
Eutrophication, freshwater	Epf	3.54E+01	kg P eq	8.64E-01	4.21E-04	2.30E-04	0.00E+00	5.51E-02	3.44E+01	5.46E-03	-1.61E-01
Eutrophication, marine aquatic	Epm	2.12E+02	kg of N eq	1.12E+01	1.63E-01	9.51E-02	0.00E+00	1.85E+00	1.99E+02	4.05E-01	-2.61E+00
Eutrophication, terrestrial	Ept	2.40E+03	mole of N eq	1.39E+02	1.79E+00	1.03E+00	0.00E+00	1.92E+01	2.24E+03	1.76E+00	-3.42E+01
Photochemical ozone formation	POCP	9.75E+02	kg NMVOC eq	4.61E+01	6.75E-01	3.81E-01	0.00E+00	6.20E+00	9.21E+02	6.69E-01	-1.13E+01
Abiotic resource depletion – elements	ADPe	1.96E+00	kg Sb eq	1.90E+00	1.01E-05	5.28E-06	0.00E+00	3.57E-02	2.50E-02	4.23E-04	-6.01E-01
Abiotic resource depletion – fossil fuels	ADPF	9.66E+06	MJ	9.62E+04	2.27E+03	1.17E+03	0.00E+00	1.95E+04	9.54E+06	1.88E+03	-1.75E+04
Water use	WU	1.25E+05	m3 world eq	2.93E+03	2.10E+00	-3.93E+00	0.00E+00	1.69E+02	1.22E+05	-4.28E+01	-8.44E+02

Note: characterization factors use the -1/+1 biogenic carbon storage assessment methodology

Inventory Flow Indicators, per device corresponding to the reference product

		Total Life Cycle Impacts (Excluding Module D)		Manufacturing A1-A3	Distribution A4	Installation A5	Use B1	Maintenance B2	Operational Energy Use B6	End of Life C1-C4	Module D
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	PERE	1.35E+06	MJ	1.70E+04	3.65E+00	2.79E+00	0.00E+00	1.72E+03	1.33E+06	3.33E+01	-5.83E+03
Use of renewable primary energy resources used as raw materials	PERM	2.17E+03	MJ	2.17E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-7.93E+02
Total use of renewable primary energy resources	PERT	1.35E+06	MJ	1.92E+04	3.65E+00	2.79E+00	0.00E+00	1.72E+03	1.33E+06	3.33E+01	-6.62E+03
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	PENRM	1.66E+03	MJ	1.66E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-4.46E+02
Use of non-renewable primary energy resources used as raw materials	PENRE	9.66E+06	MJ	9.46E+04	2.27E+03	1.17E+03	0.00E+00	1.95E+04	9.54E+06	1.88E+03	-1.70E+04
Total use of non-renewable primary energy resources	PENRT	9.66E+06	MJ	9.62E+04	2.27E+03	1.17E+03	0.00E+00	1.95E+04	9.54E+06	1.88E+03	-1.75E+04
Use of secondary materials	USM	2.17E+02	kg	2.17E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	URSF	0.00E+00	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	UNRSF	0.00E+00	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	NUFW	6.04E+03	m3	1.08E+02	7.64E-02	-7.46E-02	0.00E+00	6.64E+00	5.93E+03	-9.31E-01	-3.73E+01
Hazardous waste disposed	HWD	2.66E+02	kg	3.65E+00	1.85E-02	2.25E-01	0.00E+00	4.94E-01	2.48E+02	1.40E+01	-1.89E-01
Non-hazardous waste disposed	NHWD	6.39E+03	kg	2.95E+02	9.44E-02	7.34E+01	0.00E+00	1.47E+02	4.75E+03	1.13E+03	-4.05E+01
Radioactive waste disposed	RWD	5.34E+01	kg	1.47E-01	8.18E-05	6.17E-05	0.00E+00	3.57E-02	5.32E+01	7.24E-04	-2.26E-02
Components for re-use	CRU	0.00E+00	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	MFR	0.00E+00	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	MER	1.00E+03	kg	1.46E+02	0.00E+00	3.75E+01	0.00E+00	0.00E+00	0.00E+00	8.17E+02	0.00E+00
Exported energy	EE	1.82E+02	MJ	0.00E+00	0.00E+00	2.34E+00	0.00E+00	0.00E+00	0.00E+00	1.79E+02	0.00E+00
Biogenic carbon content - packaging	BCCP	4.11E+01	kg C	4.11E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-3.38E+01

TRACI 2.1 Environmental Impact Indicators, per device corresponding to the reference product

		Total Life Cycle Impacts (Excluding Module D)		Manufacturing A1-A3	Distribution A4	Installation A5	Use B1	Maintenance B2	Operational Energy Use B6	End of Life C1-C4	Module D
Ozone depletion	OD	2.12E-02	kg CFC-11 eq	1.56E-02	2.42E-06	1.27E-06	0.00E+00	1.76E-05	5.63E-03	2.38E-06	-1.65E-05
Global warming	GW	5.07E+05	kg CO2 eq	8.12E+03	1.71E+02	8.98E+01	5.12E+01	1.57E+03	4.96E+05	1.05E+03	-1.62E+03
Smog	SG	1.32E+04	kg O3 eq	6.90E+02	1.04E+01	6.00E+00	9.53E-03	1.10E+02	1.24E+04	1.01E+01	-1.61E+02
Acidification	A	1.22E+03	kg SO2 eq	1.00E+02	4.07E-01	2.28E-01	0.00E+00	7.32E+00	1.12E+03	4.58E-01	-4.05E+01
Eutrophication	E	2.88E+02	kg N eq	8.74E+00	2.77E-02	1.80E-02	0.00E+00	7.66E-01	2.78E+02	3.55E-01	-1.60E+00
Carcinogens	C	1.36E-03	CTUh	3.61E-06	1.24E-07	8.05E-08	0.00E+00	5.99E-06	1.35E-03	2.03E-06	-1.01E-04
Non carcinogens	NC	2.80E-02	CTUh	7.70E-03	2.71E-05	1.33E-05	0.00E+00	1.84E-04	2.00E-02	4.31E-05	-3.41E-03
Respiratory effects	RE	7.89E+02	kg PM2.5 eq	1.43E+01	6.91E-02	3.64E-02	0.00E+00	1.49E+00	7.73E+02	8.51E-02	-4.77E+00
Ecotoxicity	EX	1.12E+05	CTUe	3.93E+04	5.64E+02	2.66E+02	0.00E+00	9.16E+02	7.10E+04	4.90E+02	-7.44E+03
Fossil fuel depletion	FFD	6.09E+05	MJ surplus	7.42E+03	3.21E+02	1.65E+02	0.00E+00	1.56E+03	6.00E+05	2.46E+02	-1.25E+03

Extrapolation Factors

Precedent™ products are part of a homogenous family of Trane heat pumps. Additional products covered by this PEP are detailed below, with the reference product denoted in blue.

DHK036
DHK048
DHK060
DHK072
DHK090
DHK102
DHK120
DHK150
DHK180
DHK210
DHK240
DHK300

For products other than the reference product, the environmental impacts can be calculated using the extrapolation rules below. The following tables contain factors to be used in the extrapolation of LCIA results for the Precedent™ Packaged Rooftop Units-DHK300 covered in this report. These scaling factors are intended to allow interested parties to determine the environmental impacts of Precedent™ products of interest.

Extrapolation coefficients are given for the environmental impact of the functional unit, i.e. the emission of 1 kW heating power. For each stage of the life cycle, the environmental impacts of the product concerned are calculated by multiplying the impacts of the declaration corresponding to the reference product by the extrapolation coefficient. The “Total” column should be calculated by adding the environmental impacts of each stage of the life cycle.

To use these scaling factors, individuals should:

1. Identify the LCIA result of interest and product of interest.
2. Multiply the results in the reference product’s environmental impact indicator table, found on page 4-7, by the corresponding cell in the table that pertains to the product of interest, found below.

Product	Extrapolation Factors – Declared Unit								Extrapolation Factors – Functional Unit							
	A1-A3	A4	A5	B1	B2	B6	C1-C4	D	A1-A3	A4	A5	B1	B2	B6	C1-C4	D
DHK036	0.35	0.35	1.00	1.00	1.00	0.12	0.35	0.35	2.55	2.55	7.35	7.35	7.35	0.88	2.55	2.55
DHK048	0.36	0.36	1.00	1.00	1.00	0.16	0.36	0.36	1.98	1.98	5.53	5.53	5.53	0.88	1.98	1.98
DHK060	0.36	0.36	1.00	1.00	1.00	0.20	0.36	0.36	1.61	1.61	4.45	4.45	4.45	0.89	1.61	1.61
DHK072	0.39	0.39	1.00	1.00	1.00	0.27	0.39	0.39	1.39	1.39	3.55	3.55	3.55	0.97	1.39	1.39
DHK090	0.41	0.41	1.00	1.00	1.00	0.32	0.41	0.41	1.21	1.21	2.98	2.98	2.98	0.96	1.21	1.21
DHK102	0.41	0.41	1.00	1.00	1.00	0.38	0.41	0.41	1.03	1.03	2.48	2.48	2.48	0.95	1.03	1.03
DHK120	0.53	0.53	1.00	1.00	1.00	0.41	0.53	0.53	1.24	1.24	2.33	2.33	2.33	0.97	1.24	1.24
DHK150	0.87	0.87	1.00	1.00	1.00	0.52	0.87	0.87	1.55	1.55	1.79	1.79	1.79	0.93	1.55	1.55
DHK180	0.87	0.87	1.00	1.00	1.00	0.62	0.87	0.87	1.30	1.30	1.49	1.49	1.49	0.92	1.30	1.30
DHK210	0.88	0.88	1.00	1.00	1.00	0.75	0.88	0.88	1.10	1.10	1.25	1.25	1.25	0.94	1.10	1.10
DHK240	0.94	0.94	1.00	1.00	1.00	0.88	0.94	0.94	1.02	1.02	1.09	1.09	1.09	0.97	1.02	1.02
DHK300	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Comparability

EPDs published within the same product category, though originating from different programs, may not be comparable. Full conformance with a PCR allows PEP comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible.

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PEPs are compliant with XP C08-100-1:2016 and EN 50693:2019 The components of the present PEP may not be compared with components from any other program.	
Document complies with ISO 14025:2006 “Environmental labels and declarations. Type III environmental declarations”	



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