ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	Bosch Thermotechnik GmbH
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-BSC-20260652-IBC1-EN
Issue date	15/10/2026
Valid to	14/10/2031

CS7801iLW 13 M liquid-to-water heat pump

Bosch Thermotechnik GmbH

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

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1. General Information

Bosch Thermotechnik GmbH

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-BSC-20260652-IBC1-EN

This declaration is based on the product category rules:

HVAC Appliances, 18/08/2023
(PCR checked and approved by the SVR)

Issue date

15/10/2026

Valid to

14/10/2031

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Dr. Martina Bender
(Managing Director Institut Bauen und Umwelt e.V.)

CS7801iLW 13 M liquid-to-water heat pump

Owner of the declaration

Bosch Thermotechnik GmbH
Sophienstraße 30-32
35576 Wetzlar
Germany

Declared product / declared unit

The declared unit is one heat pump unit CS7801iLW 13 M.

Scope:

This EPD refers to one heat pump unit CS7801iLW 13 M manufactured in Tranås, Sweden at the production facility of Bosch Thermotechnik GmbH to be used in Europe. The reference year of production is 2024.
The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally

Dr.-Ing. Nikolay Minkov,
(Independent verifier)

2. Product

2.1 Product description/Product definition

The product in scope is one CS7801iLW 13 M, which belongs to the liquid-to-water heat pump family Compress 7801iLW (CS7801iLW).
Heat pumps are encased assemblies designed as a unit, using a vapor compression cycle (refrigerant R290 (Propane)) driven by an electric compressor, to provide delivery of heat according to DIN EN 14511-1. The heat pumps turn heat from the ground into energy and can be used for heating purposes via the heating circuit of a building. The accessories needed for the installation are accounted for with the heat pump unit.
The following trade numbers and product codes are to be covered with this EPD:
CS7801iLW 13 M (8-738-218-636)
CS7801iLW 13 M (8-738-218-663)
CS7801iLW 13 MF (8-738-218-628)

The following units are identical except for the power output and related electrical consumption. The respective information and scenarios are described in sections 3.1 and 4:
CS7801iLW 17 M (8-738-218-637)
CS7801iLW 17 M (8-738-218-664)
CS7801iLW 17 MF (8-738-218-629)
For the placing on the market in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) the following legal provisions apply:
LVD 2014/35/EU
IEC 60335-2-40:2024
IEC 60335-1:2020+A1
EN 62233:2008+AC:2008

EMC 2014/30/EU
EN IEC 55014-1:2021EN
IEC 55014-2:2021
EN 61000-3-3:2013+A1+A2EN
IEC 61000-3-11:2019
EN 61000-3-12:2011+A1

RoHS 2011/65/EU + (EU)2015/863
EN IEC 63000:2018

PED 2014/68/EU
EN 378-2:2016

ErP 2009/125/EC + (EU) 813/2013
EN 14825:2022
EN 14511:2022
EN 12102:2022

The design and operating characteristics of this product comply with the European and supplementary national requirements. The CE marking declares that the product complies with all the applicable EU legislation, which is stipulated by attaching this marking. The complete text of the Declaration of Conformity is available on the Internet: www.bosch-einfach-heizen.de

2.2 Application

The CS7801iLW heat pumps belong to heating, ventilation, and air conditioning (HVAC) appliances. The main function is the supply of domestic hot water and regulating air temperature in heating mode with a specific seasonal coefficient of performance (SCOP) according to *DIN EN 14825*. Liquid-to-water heat pumps can provide many times more heat energy by consuming one kWh of electricity. The technical data of the heat pumps are presented in the respective EPD documents.

2.3 Technical Data

The CS7801iLW 13 M has the following technical properties:

Technical properties

Name	Value	Unit
Area of application	Supply of domestic hot water and regulating air temperature in heating mode	
Type of appliance in terms of working fluids (the first fluid identifies the heat source, the second the heat delivery fluid)	Liquid-to-water	
Number of appliances considered in the EPD	1	pce.
Weight	271	kg
Overall dimension (HxWxD)	1780 x 600 x 610	mm
Water heating energy efficiency class	A+	
Power output at A7/W35 nominal	8.62	kW
Seasonal coefficient of performance (SCOP), average climate conditions, LT-system (35°)	5.21	
Working pressure permissible	2.5	bar
Type of refrigerant	R290	
Refrigerant charge	1.0	kg

Performance data of the product according to the harmonised standards, based on provisions for harmonization.

2.4 Delivery status

Each heat pump unit is delivered individually packaged with the following dimensions (HxWxD): 1780 mm x 600 mm x 610 mm.

2.5 Base materials/Ancillary materials

Base materials

The main constituents of the product and its accessories are indicated as mass percentages.

Name	Value	Unit
Aluminium	4.40	%
Steel	73.55	%
Brass	3.72	%
Copper	2.83	%
Other metals	0.16	%
PE component	1.36	%
EPS component	1.15	%
Other plastics	4.68	%
Electronics/complex	5.39	%
Others	2.38	%

This product/article/at least one partial article contains substances listed in the *ECHA candidate list* **(date: 19.05.2026)** (according to *REACH Regulation (EC 1907/2006)*) exceeding 0.1 percentage by mass: yes
The SVHC substance concentration is available per component only. A summary of the SVHC substances per appliance and respective CAS number is provided below.

SVHC CS7801iLW 13 M duty to declare:
1,1'-(ethane-1,2-diyl)bis[pentabromobenzene] (84852-53-9)
6,6'-di-tert-butyl-2,2'-methylenedi-p-cresol (119-47-1)
2-methyl-1-(4-methylthiophenyl)-2-morpholinopropan-1-one

(71868-10-5)
Bis(α,α-dimethylbenzyl) peroxide (80-43-3)
C,C'-azodi(formamide) (123-77-3)
Cd (7440-43-9)
Chromium (VI) Oxide (1333-82-0)
Diboron-trioxide (1303-86-2)
Diimethylmethylene-p,p'- (80-05-7)
C,C'-azodi(formamide) (2,4,6- (75980-60-8)
Lead (7439-92-1)
Lead dibasic acetate (301-04-2)
Lead-monoxide (1317-36-8)
tris(4-nonylphenyl, branched) phosphite (701-028-2)

2.6 Manufacture

The heat pump units are manufactured and assembled at the production plant in Tranås, Sweden. Individual parts and materials are sourced from suppliers or manufactured within Bosch plants and assembled into heat pump units. The assembled heat pump units are then tested and packaged with an installation manual for shipment. The accessories are packed and delivered separately. The Bosch Home Comfort production plants are certified according to *ISO 9001:2015* Quality Management System.

2.7 Environment and health during manufacturing

The Bosch Home Comfort production plants are certified according to: *ISO 14001:2015* Environmental Management System and *ISO 45001:2018* Occupational Health and Safety Management

2.8 Product processing/Installation

The product may only be installed, brought into operation, and maintained by trained personnel. The document 6721830031 contains information about the applicable national and regional regulations: https://www.docs.bosch-thermotechnology.com/doc/67218xxxxx.

The installation process covered in the EPD includes the assembly of the pre-assembled heat pump unit, set-up of the electrical connection, the filling and venting and the commissioning. Insulation material and stainless steel pipes are needed for the installation and connection of the heat pump unit to the closed heating system of the building.

2.9 Packaging

The packaging consists of wood pallets, cardboard, plastic foil, paper and wood. Bosch Home Comfort participates in country-specific recycling processes that ensure optimum recycling. All the packaging materials are environmentally compatible and can be recycled.

2.10 Condition of use

There is no change of use in the material composition over the service life of the product and/or regarding environmentally relevant material inherent properties over the service life of the product. Units are repaired/components are replaced if required. Rebuilds and repairs may only be performed by trained installers. Inspections and maintenance are necessary for ensuring safe and environmentally friendly operation.

2.11 Environment and health during use

The heat pump may only be installed, brought into operation, and maintained by authorised personnel. Information on the rules of technology as well as on workers' safety and environmental protection is provided in the installation manual. All instructions from the installation manual must be observed. Failure to comply with instructions may result in material damage and personal injury, including danger to life.

2.12 Reference service life

The RSL is set to 20 years based on the *PCR IBU Part B*.

2.13 Extraordinary effects

Fire

-

Water

-

Mechanical destruction

Measures against mechanical deconstruction are described in the installation manual.

2.14 Re-use phase

Used appliances contain valuable materials that can be recycled. The various assemblies can be easily dismantled. Synthetic materials are marked accordingly. Assemblies can therefore be sorted by composition and passed on for recycling or disposal.

2.15 Disposal

The product must not be disposed of with other waste. It must be dispoded of in an environmentally sound manner, in accordance with the EU Directive 2012/19/EU on waste electrical and electronic equipment, and classified as 20 01 35* according to the Decision 2014/955/EU. Electrical and electronic equipment shall be disposed of through the respective country's return and collection systems.

2.16 Further information

More information is available here: https://www.bosch-homecomfortgroup.com/en/company/legal-topics/weee/ .

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit is one indoor heat pump unit CS7801iLW 13 M.

CS7801iLW 13 M

Name	Value	Unit
Declared unit 1	1	pce.
Mass reference	271	kg/pce
SCOP	5.21	
P"heat, design"	8.62	
E"heating"	3,418.22	kWh/a
E"use"	246,111.75	MJ

The accessories delivered with the heat pump unit are considered in this EPD as well and have a weight of 11.771 kg. The packaging has a weight of 9.117 kg.

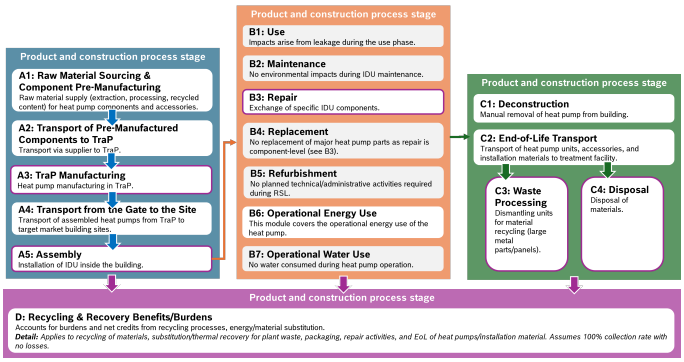
Scenario - CS7801iLW 17 M

SCOP: 5.01
P"heat, design": 8.62
E "heating": 3,554.67 kWh/a
E "use": 255,936.57 MJ

3.2 System boundary

Type of the EPD: cradle to grave.
The EPD includes cradle to grave and module D (A+B+C+D) and follows the modular structure according to *EN15804*

(option c) according to the *PCR Part A,*and follows additional requirements for construction products considered as Electronic or Electric Equipment.



Module A1-A3: Raw material supply (extraction, processing, and recycled content) for the components the heat pump units comprise. This includes transport from raw material extraction to the supplier and from the supplier to the Bosch plant. Manufacturing processes at the Bosch plant are also covered, considering energy use, required consumables, production waste and its treatment, as well as internal transport.
Module A4: Transport from the Bosch plant to the building sites of all target markets.
Module A5: Installation of the heat pump systems into the building. Manufacturing of installation material purchased by the installers, energy consumption and disposal of packaging are considered in this module.
Module B1: Propane leakage during the use phase.
Module B2: Covers the maintenance as described in the service manual.
Module B3: Covers the replacement of specific components with spare parts in case of errors.
Module B4: No foreseen replacement of major heat pump parts is required during the RSL. The heat pump unit can be repaired at component level in the event of errors. Hence, no impacts arise from replacement.
Module B5: Refurbishment does not take place.
Module B6: Operational energy use.
Module B7: There is no operational water use.
Module C1: No environmental impacts arise from deconstruction or demolition.
Module C2: Transport to the treatment facility.
Module C3: Disassembly to separate large metal parts for material recycling.
Module C4: The materials which are meant to be disposed are either going to be incinerated without energy recovery or landfilled.

For the environmental impact during manufacturing, the use of green electricity was calculated considering the residual electricity mix for the remaining electricity. The proportion of the electricity demand covered by green electricity in the total electricity demand is 100 %.
The GWP-total emissions of the modeled grid mix for A1-A3 manufacturing result in ~0.0058 kg CO_2eq./kWh.

3.3 Estimates and assumptions

For installation, it was assumed no previous heat pump unit was connected to the building; thus, pipes connecting the heat pump unit to the building's heating system were considered.

Transport data for materials, waste, and heat pump units utilized information on supplier locations, treatment facilities, and internal distribution channels/routes. However, a few assumptions filled gaps. A 300 km road distribution scenario per heat pump unit was adopted for transport from regional distribution centers to the building site, as per *PCR EPDItaly019*.
No special storage conditions are required, so heat pump storage was neglected.

For spare parts replaced during heat pump unit repairs (A3) and packaging waste, a 100 km road distribution scenario (200 km round trip) to the End-of-Life (EoL) treatment facility was applied. Average European recycling shares and substitution factors (*European Commission, 2022*) were used for packaging EoL.

The heat pump unit's transport to the treatment facility was assumed to be 50 km (100 km round trip) and occurs directly. A collection rate of 100 % without any losses due to the shredding of the material is assumed. *PEP ecopassport PSR, 2021* default EoL routes for specific materials were considered for calculations. Thermal recovery of materials was generally assumed to take place in a MSWI facility with 15 % electrical and 35 % heat utilisation. Following *PCR Part A*, with an R1 value for Ew > 0.6, impacts are reported in module C3. Material neither recycled nor incinerated with energy recovery is assumed to be disposed of via incineration without energy recovery or landfill (50/50 distribution).

3.4 Cut-off criteria

Module A1-A3: Material and energy flows accounting for at least 1 % of renewable or non-renewable primary energy or mass were assessed. The total sum of flows not considered per module did not exceed 5 %. Infrastructure expenses (machinery, buildings, etc.) for the entire new system were not included, assuming their construction and maintenance impacts do not exceed 1 % of total impacts. Heat provision was excluded as it does not directly contribute to product manufacturing. Conversely, electricity for operating the manufacturing infrastructure was considered. Plant production waste, primarily packaging and small metal parts from manufacturing, was subject to a 5 % cut-off criterion to ensure calculation feasibility.

Module C1: Due to the minor electricity consumption during the manual removal (less than 5 %) in C1 compared to all other C modules, the activities related to module C1 were cut off. Hence, no processes are allocated to module C1.

3.5 Background data

The LCA model was developed with the *LCA for Experts* software with the support of the *ecoinvent 3.9.1 database* used for the background datasets.

3.6 Data quality

Product-specific data were collected for all life cycle phases and processes within Bosch HC's sphere of influence. This foreground data, characterised by a high level of detail (detailed bills of materials, direct measurements, waste and energy reports, technical datasheets, service manuals, and expert knowledge), corresponds to 'very good quality' as defined in *EN 15804 Annex E*.

Generic data were used for:
- **Upstream processes:** Extraction and pre-processing of raw materials prior to their arrival at the Bosch plant.
- **Downstream processes:** Utilizing additional technical data according to *EN 15804,* chapter 7.3, and encompassing all life cycle stages (cradle to grave), impacts (and benefits) of waste treatment (incineration, recycling, and substituted processes) were calculated. This calculation used generic data, supplemented by product-specific information on calorific values and/or treatment type.

The background data (*ecoinvent v.3.9.1*) correspond to 'good quality' as defined in *EN 15804 Annex E*. This is because the best available background datasets were selected based on factors like supplier location or energy consumption, and the technology for processing the materials employed was also considered.

3.7 Period under review

The LCA study was developed between March and December 2025, with data referring to the year 2024. The distribution scenario is approximated for the year 2026.

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Europe

3.9 Allocation

There are no co-products generated during the heat pump unit production. Concerning allocations in the foreground system to allocate plant-related activities such as energy consumption, internal transport, and waste production as well as related loads and benefits product- and plant-specific allocation keys are used. The allocation key is used in A1-A3 and module D only.

3.10 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account. The LCA model was developed based on the support of the *ecoinvent 3.9.1* database used for the background datasets.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The total mass of biogenic carbon-containing materials of the heat pump unit is less than 5 % of the total mass of the product. The total mass of biogenic carbon-containing materials in the accompanying packaging is presented in the following table.

Information on describing the biogenic carbon content at factory gate

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	4.748	kg C

The disposal of the packaging material on the construction site is declared in A5.

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

Transport from the gate to the site (A4)

The following information regarding shipping from Bosch plants to regional distribution centers (RDCs) is reported: RDC locations, distances between dispatch points and RDCs, transportation types, and the number of units shipped to RDCs (including the weight of products, accessories, and packaging). The target market weighted average tkm per heat pump unit was calculated based on the respective weight of the heat pump unit including packaging. In line with Science Based Targets initiative (SBTi) reporting, a 70 % capacity utilisation was considered. As no special storage conditions are required, the storage of the heat pumps was neglected.

Assembly (A5)

Name	Value	Unit
to connect heat pump unit to the heating system (stainless steel)	8.82	kg
Insulation material	2.5	kg
Electricity consumption	0.5832	MJ

Disposal of packaging materials occurs in module A5. As End-of-Life (EoL) treatment varies by country, an average European EoL scenario was calculated across all target countries. Average European recycling shares and substitution factors from the EF3.0 method were applied (*European Commission, 2022*).

Use (B1)

PCR Part B states that only in the case of hermetically sealed HVAC, no releases shall be considered during use phase, otherwise an entire refill of refrigerant gas must be considered. However, a minimal annual release (emitted to the air) is accounted for in the EPD, as specific measured values were available. Due to this low leakage rate, no refrigerant needs to be refilled during the RSL.

Repair (B3)

Units are repaired or components replaced as required. This module includes all input materials, components, energy, packaging, and transport for replacing heat pump unit components and their End-of-Life (EoL) treatment.

Name	Value	Unit
Repair cycle	only in case of errors	Number/RSL
Electricity consumption	0.0379	MJ

The RSL is set to 20 years based on the *PCR IBU Part B.*

Reference service life

Name	Value	Unit
Reference service life	20	a

Operational energy use (B6)

The CS7801iLW 13 M and 17 M differ in terms of operational energy use.

Name	Value	Unit
Electricity consumption - 13 M	246,111.75	MJ
Electricity consumption - 17 M	255,936.57	MJ

End of life (C1-C4)

Module C1: No impacts on site as disassembly occurs at the treatment facility.
Module C2: To account for the transportation of the heat pumps, accessories, and installation material to the EoL treatment facility, a 100 km road distribution scenario was applied (assuming 50 km outward and 50 km return journey).
Module C3: After disassembling the cover panels, the remaining heat pump units and accessories are shredded in an electronic waste shredding process. Metals and plastics are then either recycled or incinerated with energy recovery
Module C4: Material that is neither recycled nor incinerated with energy recovery is assumed to be disposed of either by incineration without energy recovery or in a landfill.

Name	Value	Unit
Recycling	190.934	kg
Energy recovery	10.4	kg
Disposal	75.233	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

This module covers burdens from recycling processes and net credits from energy or material substitution. These burdens and credits arise from the recycling, substitution, or thermal recovery of: production plant waste, packaging of heat pump systems and accessories, repair activity waste, and End-of-Life (EoL) heat pump systems and installation material. In general, thermal recovery of materials was assumed to take place in a MSWI facility with 15 % electrical and 35 % heat utilisation. The exported energy substitutes fossil fuels. It is assumed that thermal energy is generated from natural gas and substituted electricity corresponds to the European electricity mix. Specifically, the generated energy is assumed to replace impacts from the following *ecoinvent database v.3.9.1* datasets (Europe without Switzerland): 'market for heat, district or industrial, natural gas' and 'market group for electricity, high voltage'. Recycled materials are assumed to substitute functionally equivalent primary materials. The share of secondary material (according to ecoinvent 3.9.1 system model *EN 15804*, inventory indicator *ISO 21930* use of secondary material) and material substitution were accounted for. Average European substitution factors were applied (*European Commission, 2022*).

5. LCA: Results

The LCA results are presented below.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 pce CS7801iLW 13 M

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	1.74E+03	7.15E+01	6.2E+01	2.68E-03	0	1.03E+00	0	0	2.48E+04	0	0	4.69E+00	5.84E+01	4.62E+01	-2.78E+02
GWP-fossil	kg CO_2 eq	1.73E+03	7.15E+01	6.12E+01	2.68E-03	0	1.01E+00	0	0	2.46E+04	0	0	4.68E+00	5.53E+01	3.74E+01	-2.77E+02
GWP-biogenic	kg CO_2 eq	5.61E+00	2.07E-02	6.51E-01	0	0	1.47E-02	0	0	1.22E+02	0	0	1.37E-03	3.12E+00	8.81E+00	-1.24E-01
GWP-luluc	kg CO_2 eq	5.03E+00	3.58E-02	1.45E-01	0	0	1.98E-03	0	0	6.14E+01	0	0	2.31E-03	3.5E-02	5.19E-03	-3.12E-01
ODP	kg CFC11 eq	3.84E-05	1.54E-06	1.01E-06	0	0	2.56E-08	0	0	4.67E-04	0	0	1.02E-07	2.84E-07	1.39E-06	-5.66E-06
AP	mol H^+ eq	6.98E+00	1.51E-01	1.36E-01	0	0	4.2E-03	0	0	4.12E+01	0	0	8.26E-03	7.96E-02	2.13E-02	-1.13E+00
EP-freshwater	kg P eq	1.74E+00	5.01E-03	2.08E-02	0	0	1.02E-03	0	0	2.33E+01	0	0	3.33E-04	9.23E-03	6.61E-03	-2.57E-01
EP-marine	kg N eq	2.88E+00	5.29E-02	6.56E-02	0	0	1.52E-03	0	0	2.29E+01	0	0	2.6E-03	3.9E-02	2.96E-02	-3.4E-01
EP-terrestrial	mol N eq	2.95E+01	5.48E-01	6.53E-01	0	0	1.63E-02	0	0	2.06E+02	0	0	2.63E-02	3.81E-01	9.42E-02	-3.85E+00
POCP	kg NMVOC eq	9.94E+00	2.79E-01	2.41E-01	3.98E-02	0	5.6E-03	0	0	6.63E+01	0	0	1.59E-02	9.93E-02	3.66E-02	-1.57E+00
ADPE	kg Sb eq	2.6E-01	2.29E-04	1.26E-03	0	0	1.93E-04	0	0	2.94E-01	0	0	1.53E-05	2.62E-04	2.68E-05	-3.49E-02
ADPF	MJ	2.4E+04	1E+03	8.73E+02	0	0	1.35E+01	0	0	3.43E+05	0	0	6.58E+01	2.8E+02	1.07E+02	-3.84E+03
WDP	m^3 world eq deprived	9.19E+02	6.19E+00	2.72E+01	0	0	6.96E-01	0	0	1.89E+04	0	0	4.12E-01	6.67E+00	3E+00	-1.64E+02

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 pce CS7801iLW 13 M

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	4.64E+03	1.57E+01	1.33E+02	0	0	2.49E+00	0	0	1.22E+05	0	0	1.05E+00	3.68E+01	4.46E+00	-6.34E+02
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	4.64E+03	1.57E+01	1.33E+02	0	0	2.49E+00	0	0	1.22E+05	0	0	1.05E+00	3.68E+01	4.46E+00	-6.34E+02
PENRE	MJ	2.62E+04	1.02E+03	9.41E+02	0	0	1.51E+01	0	0	6.15E+05	0	0	6.72E+01	3.21E+02	1.13E+02	-3.97E+03
PENRM	MJ	4.25E+00	3.06E-02	1.33E-01	0	0	6.64E-04	0	0	3.57E+00	0	0	1.98E-03	1.23E-02	3.86E-03	-5.38E-02
PENRT	MJ	2.62E+04	1.02E+03	9.42E+02	0	0	1.51E+01	0	0	6.15E+05	0	0	6.72E+01	3.21E+02	1.13E+02	-3.97E+03
SM	kg	9.23E+01	0	3.22E+00	0	0	2.06E-03	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m^3	2.14E+01	1.44E-01	6.34E-01	0	0	1.62E-02	0	0	4.4E+02	0	0	9.58E-03	1.55E-01	6.99E-02	-3.82E+00

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2:
1 pce CS7801iLW 13 M

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NHWD	kg	0	0	3.37E+00	0	0	2.77E-02	0	0	0	0	0	0	0	7.52E+01	0
RWD	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	2.13E+01	0	3.76E+00	0	0	1.31E-02	0	0	0	0	0	0	1.71E+02	0	0
MER	kg	2.58E+01	0	2.79E+00	0	0	3.87E-04	0	0	0	0	0	0	9.99E+00	0	0
EEE	MJ	7.58E+01	0	1.17E+01	0	0	0	0	0	0	0	0	0	4.48E+01	0	0
EET	MJ	1.77E+02	0	2.72E+01	0	0	0	0	0	0	0	0	0	1.05E+02	0	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1 pce CS7801iLW 13 M

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	1.31E-04	4.17E-06	4.57E-06	0	0	7.39E-08	0	0	4.74E-04	0	0	2.77E-07	1.57E-06	3.96E-07	-2.01E-05
IR	kBq U235 eq	1.29E+02	1.35E+00	4.04E+00	0	0	9.19E-02	0	0	1.56E+04	0	0	9.01E-02	2.49E+00	3.75E-01	-6.84E +00
ETP-fw	CTUe	1.91E+05	1.03E+03	1.94E+03	0	0	1.17E+02	0	0	4.81E+05	0	0	6.78E+01	1.37E+03	8.73E+02	-2.68E +04
HTP-c	CTUh	1.54E-05	3.46E-08	1.04E-06	0	0	7.67E-09	0	0	1.37E-05	0	0	2.25E-09	3.37E-08	1.56E-08	8.43E-07
HTP-nc	CTUh	2.49E-04	8.3E-07	1.55E-06	0	0	1.57E-07	0	0	5.18E-04	0	0	5.51E-08	1.47E-06	5.42E-07	-3.58E-05
SQP	SQP	1.7E+04	5.99E+02	3.1E+02	0	0	6.7E+00	0	0	1.12E+05	0	0	4.02E+01	3.76E+02	3.42E+01	-1.36E +03

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. 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 or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

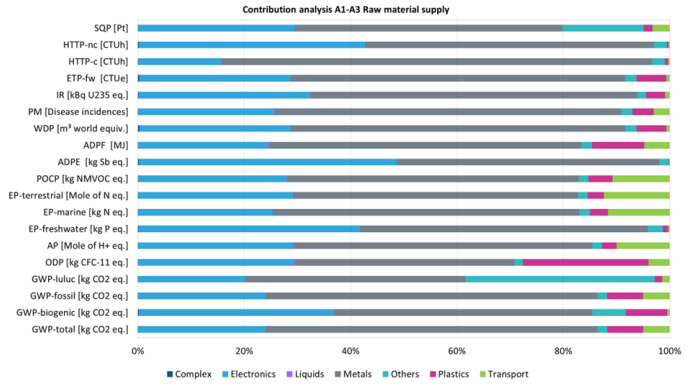
6. LCA: Interpretation

The operational energy use (B6) contributes >80% to most impact indicators. To allow for a detailed interpretation, the energy use was thus excluded.

Over 80% of the heat pump units' overall impacts are related to A1-A3 Raw material supply, except for GWP-biogenic, GWP-luluc and SQP. The GWP-biogenic exception arises from the use of grease, wheras for SQP and Land Use, excess wood and cardboard significantly influence the results.

The combined contribution of metals and electronics accounts for over 80 % of the impacts in most impact categories. Exceptions include GWP-luluc, due to the use of grease and SQP and ODP. For SQP, wooden packaging is a significant factor, whereas for ODP, plastics (specifically PE and LDPE) are responsible. For each of these indicators, the contribution exceeds 15 %.

Except for HTP-c, whose burdens are attributed to the steel recycling process, Module D generates environmental credits across all LCIA indicators, stemming from the substitution of market (virgin) materials with recycled metals (aluminium, copper, brass, and steel).
In terms of waste categories and output flows, C3 contains the highest proportion of MFR (attributed to the high share of metals in the heat pump units and stainless steel pipes used for installation), MER, EEE and EET.



7. Requisite evidence

The technical documentation related to the heat pump unit is available here: www.bosch-homecomfort.com.
The product family contains the refrigerant R290. According to *ISO 817*, propane is classified as class A (lower toxicity) and 3 (higher flammability). The operation of the heat pump unit does not generate waste gas.

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