ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 for:

The low temperature district heating grid in Brunnshög, Lund from Kraftringen

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-06688
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PROGRAMME INFORMATION

PROGRAMME: The International EPD® System

EPD International AB
Box 210 60
SE-100 31 Stockholm
Sweden

www.environdec.com
info@environdec.com

Product category rules (PCR): Electricity, steam and hot water generation and distribution, 2007:08, version 4.2, UN CPC 171, 153.

PCR review was conducted by: The Technical Committee of the International EPD® System.
A full list of members available on www.environdec.com. The review panel may be contacted via info@environdec.com.

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

☐ EPD process certification ☒ EPD verification

Third party verifier: Daniel Böckin (Daniel@miljogiraff.se), under the guidance of Pär Lindman, Miljögiraff AB.
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.

Company information

Owner of the EPD:
Kraftringen Energi AB
Box 25
221 00 Lund
Sweden

Company number: 556100-9852

Contact information: Martin Gierow, +46702767794, martin.gierow@kraftringen.se

Description of the organisation:
Kraftringen is a regional energy company in the south of Sweden, owned by the municipalities of Lund, Eslöv, Hörby and Lomma, headquartered in Lund.

Our vision is "Energy for future generations". We strive to deliver electricity, heat, cooling, communications and other services with minimal impact on the environment. Work on a district heating grid in the city started in the early 1960's, replacing local boilers and thereby lowering overall emissions. Over the years, a gradual move away from fossil fuels have meant that the citizens of Lund, Lomma and Eslöv have kept warm in an ever more sustainable fashion. Waste incineration, electric boilers, heat pumps producing heat from sewage water are some examples. In 1985, a unique geothermal system was brought online, supplying 25 % of the overall heating need in the cities. In 2018, the last fraction of fossil fuels was removed from the mix. Contributing to the fact that the City of Lund reached its climate goals for 2020 a full two years early.

Kraftringen implements a certified environmental management system. The system is based on the standard ISO 14001:2015.

Name and location of production site:
The production site "Brunnshög" is located in the district of Brunnshög, Lund.

Product information

Product name:
The low temperature district heating grid in Brunnshög, Lund.

Product identification:

Product description:

Brunnshög – where science heats the city! The world's largest low temperature district heating grid was inaugurated in Lund, Sweden, in the fall of 2019. The grid is owned by Kraftringen and is based on fossil free energy from recovered waste heat.

The research facility MAX IV Laboratory generates a considerable amount of residual heat through its processes. To make sure that energy is put to good use, the city of Lund and Kraftringen committed to building a next-generation low temperature district heating (LTDH) grid in Brunnshög. The system provides heat for the entire city district through innovative technical solutions as well as novel business models.

The production site has an estimated technical lifetime of 25 years and the infrastructure consisting of district heating pipes has an estimated lifetime of 70 years. In addition to the technical service lifetime, the specific reinvestment rates of the various materials and components are included in the assessment.

UN CPC code: 173 – steam and hot water supply.

Geographical scope: Sweden

LCA information

Functional unit / declared unit: 1 kWh of hot water generated and thereafter distributed to a customer.

Time representativeness: Production data is based on year 2020.

Database(s) and LCA software used: GaBi software and database, also Ecoinvent database.

Description of system boundaries: Cradle-to-grave, excluding the end use of the heat.

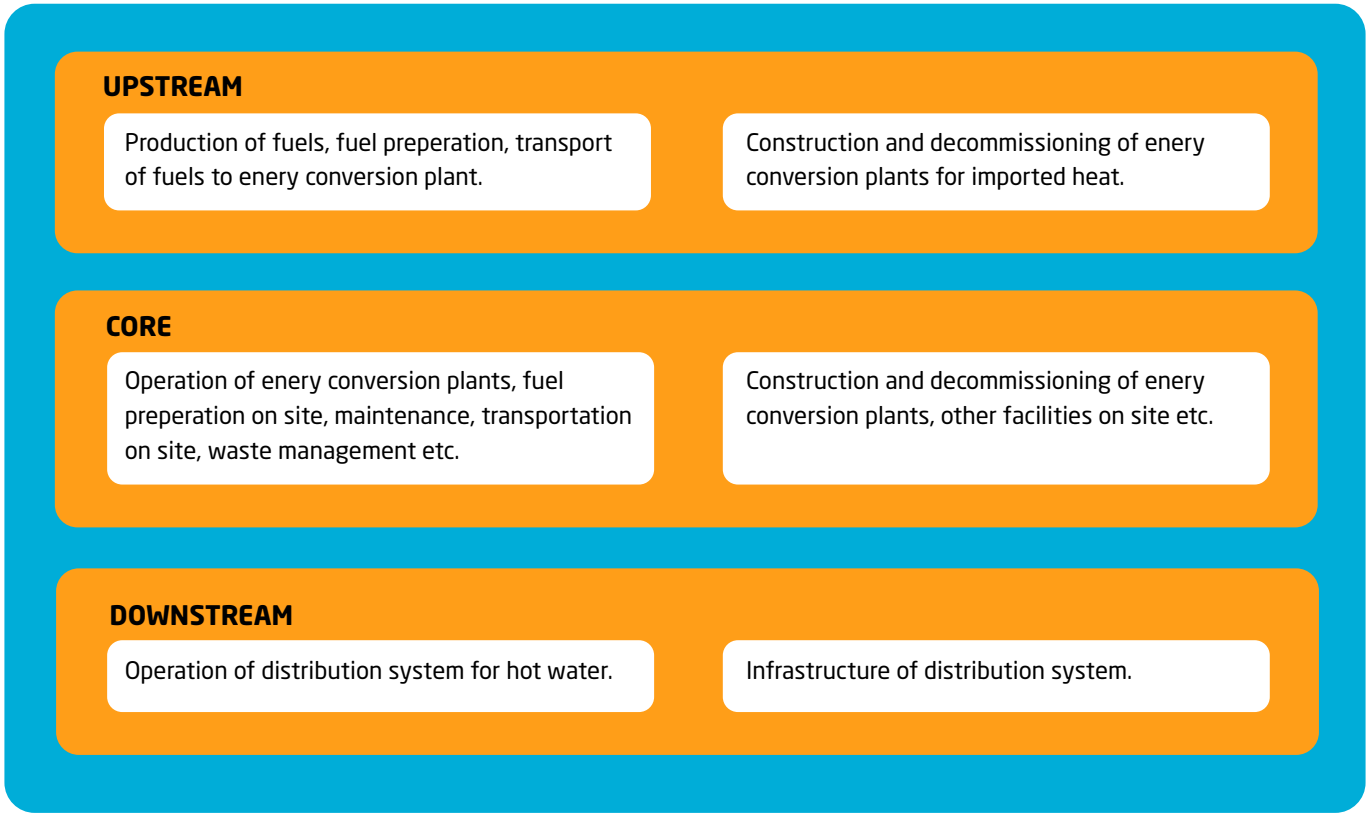
Excluded lifecycle stages: -

System diagram: See figure below.

Upstream:
Includes production and transports of fuels and purchased materials used in the core process. Imported heat is also included here.

Core:
Includes the operation of Kraftringen's energy production sites. Construction and decommissioning of the infrastructure are also included here.

Downstream:
Includes distribution of heat to the customer meter. Infrastructure is also included. Distribution losses are 39% according to Kraftringen



Environmental performance

Potential environmental impact

PARAMETER		UNIT	Upstream operation	Upstream infra.	Core operation	Core infra.	Downstream operation	Downstream infra.	TOTAL
Global warming potential (GWP)	Fossil	kg CO_2 eq.	0.00E+00	0.00E+00	1.37E-02	4.25E-04	2.27E-05	2.57E-04	1.44E-02
	Biogenic	kg CO_2 eq.	0.00E+00	0.00E+00	7.75E-04	-2.70E-08	-2.19E-08	4.29E-07	7.75E-04
	Land use and land transformation	kg CO_2 eq.	0.00E+00	0.00E+00	4.27E-04	1.01E-06	1.81E-07	9.78E-08	4.28E-04
	TOTAL	kg CO_2 eq.	0.00E+00	0.00E+00	1.49E-02	4.26E-04	2.29E-05	2.57E-04	1.56E-02
Acidification potential (AP)		Mol H+ eq	0.00E+00	0.00E+00	5.12E-04	1.29E-06	1.19E-07	6.14E-07	5.14E-04
Eutrophication potential, freshwater (EP-freshwater)		kg P eq.	0.00E+00	0.00E+00	3.76E-06	7.35E-10	6.61E-11	4.84E-10	3.76E-06
Eutrophication potential, marine (EP-marine)		kg N eq.	0.00E+00	0.00E+00	1.44E-04	3.33E-07	6.24E-08	1.53E-07	1.45E-04
Eutrophication potential, terrestrial (EP-terrestrial)		Mol N eq.	0.00E+00	0.00E+00	1.11E-03	3.67E-06	6.91E-07	1.61E-06	1.12E-03
Photochemical oxidant creation potential (POCP)		kg NMVOC eq.	0.00E+00	0.00E+00	2.89E-04	1.14E-06	1.20E-07	5.33E-07	2.91E-04
Ozone depletion potential (ODP)		kg CFC 11 eq.	0.00E+00	0.00E+00	1.58E-16	8.76E-19	3.13E-21	2.65E-13	2.65E-13
Abiotic depletion potential - Elements*		kg Sb eg	0.00E+00	0.00E+00	2.82E-08	2.31E-09	2.06E-12	4.79E-10	3.10E-08
Abiotic depletion potential - Fossil resources*		MJ, net calorific value	0.00E+00	0.00E+00	1.23E-01	4.73E-03	3.03E-04	3.98E-03	1.32E-01
Water scarcity potential*		m^3 eq.	0.00E+00	0.00E+00	2.29E-02	6.98E-04	2.11E-07	1.05E-03	2.46E-02

* The results of this environmental impact indicator shall be used with care as the uncertainties of the results are high and as there is limited experience with the indicator.

Use of resources

PARAMETER		UNIT	Upstream operation	Upstream infra.	Core operation	Core infra.	Downstream operation	Downstream infra.	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	0.00E+00	0.00E+00	2.76E+00	5.68E-04	1.70E-05	1.28E-04	2.76E+00
	Used as raw materials	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	TOTAL	MJ, net calorific value	0.00E+00	0.00E+00	2.76E+00	5.68E-04	1.70E-05	1.28E-04	2.76E+00
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	0.00E+00	0.00E+00	1.33E-01	4.93E-03	3.05E-04	4.12E-03	1.43E-01
	Used as raw materials	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	TOTAL	MJ, net calorific value	0.00E+00	0.00E+00	1.33E-01	4.93E-03	3.05E-04	4.12E-03	1.43E-01
Secondary material		kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels		MJ, net calorific value	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		m^3	0.00E+00	0.00E+00	8.23E-04	3.29E-06	1.99E-08	1.12E-06	8.27E-04

Waste production and output flows

Waste production

PARAMETER	UNIT	Upstream operation	Upstream infra.	Core operation	Core infra.	Downstream operation	Downstream infra.	TOTAL
Hazardous waste disposed	kg	0.00E+00	0.00E+00	4.28E-09	7.56E-09	1.79E-14	5.78E-11	1.19E-08
Non-hazardous waste disposed	kg	0.00E+00	0.00E+00	2.24E-03	9.92E-04	7.56E-08	1.02E-05	3.24E-03
Radioactive waste disposed	kg	0.00E+00	0.00E+00	3.68E-06	7.73E-08	6.02E-10	2.73E-08	3.79E-06

Output flows

PARAMETER	UNIT	Upstream operation	Upstream infra.	Core operation	Core infra.	Downstream operation	Downstream infra.	TOTAL
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.75E-06	9.18E-05	9.75E-05
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

References

General Programme Instructions of the International EPD® System. Version 3.01.

PCR 2007:08. Electricity, steam and hot water generation and distribution. Version 4.2.

GaBi LCA software (10.6) and database version 2021.2.

Ecoinvent database version 3.8, 2022.

Johansson, K., Molin, E. 2022. LCA methodology report for district heating delivered by Kraftringen.
IVL Swedish Environmental Research Institute, Stockholm 2022.