

Luxembourg, 16/04/2024

Public

Environmental and Social Data Sheet¹

Overview

Project Name:	EAVOR LOOP
Project Number:	2023-0481
Country:	Germany
Project Description:	The Eavor Geretsried Project is the first commercial scale implementation of an innovative closed loop geothermal technology aiming at generating baseload combined heat and power, through heat conduction transfer between rocks in the subsurface and a wellbore-isolated cycling fluid. The Project is expected to progress the feasibility, competitiveness and scalability of the technology by demonstrating its application to diverse geological settings, with the potential to be applied to a wider range of locations compared to conventional geothermal energy.
EIA required:	no
Invest EU sustainability proofing required	yes
Project included in Carbon Footprint Exercise ² :	yes

(Details for projects included are provided in section: "EIB Carbon Footprint Exercise")

Environmental and Social Assessment

Environmental Assessment

The proposed Project entails the design, construction and operation of the first phase of a combined geothermal heat and power system in Geretsried (Germany), consisting of the construction of four Eavor-Loops (constituted of 2 deep vertical wells at ca. 4.5 kms depth and 12 laterals of ca. 2.7 kms each and interconnected by pairs to form closed loops between the 2 vertical wells). The Project's target thermal output is 59 MWth, equivalent to ca. 8 MWe for gross electricity capacity, on average over the Project's lifetime. The Project is expected to supply ca. 34 000 households with electricity injected to the grid and with heat fed to a newly built district heating (DH) network at completion.

¹ The information contained in the document reflects the requirement related to the environmental, social and climate information to be provided to Investment Committee as required by the Invest EU Regulation and it represents the equivalent of the information required in the template of the InvestEU sustainability proofing summary.

² Only projects that meet the scope of the Carbon Footprint Exercise, as defined in the EIB Carbon Footprint Methodologies, are included, provided estimated emissions exceed the methodology thresholds: 20 000 tonnes CO₂e/year absolute (gross) or 20 000 tonnes CO₂e/year relative (net) – both increases and savings.



Luxembourg, 16/04/2024

The Project will complement intermittent renewable electricity supplies and allow the replacement of individual heat supplies from fossil-fuels, whilst progressing the development of innovations to support the energy transition in the country and beyond.

As deep geothermal wells, the subsurface components of the Project fall within Annex II³ of the EIA Directive 2011/92/EC amended by Directive 2014/52/EU thus further requiring a review by the competent authorities at the planning/consent stage. An EIA screening-out decision was issued on the 18th of May 2021 on the basis of a previous full EIA undertaken a decade ago by Enex for a previous conventional geothermal project which drilling was unsuccessful for the purpose of this company at the time, as well as on the basis of an updated biodiversity assessment plan and a preliminary EIA study undertaken in 2021 for the full Project scope.

The Main Operating Plan (Hauptbetriebsplan) for the Project was approved on the 27th of January 2022 Project. The Project is also located in an area which has been designated as special area geothermal energy in the land use plan of the Municipality of Geretstried since October 2009, amended in 2020 to incorporate some extensions related to the Project and which is referred to in the building permit process.

The district heating network facilities, although not part of the Project scope, are considered associated facilities to the Project as these would not be implemented shall there be no project. Some sections of the network have already been built and some sections will be built to complete the network and offtake and supply heat from the Project to customers.

The district heating network also benefits from the previous full EIA undertaken by Enex as it is understood that this EIA also covers the existing sections of the district heating network passing through the only protected biodiversity areas at national level (Breitenbach river, not categorised as Natura 2000). The rest of the sections of the network will pass through urban areas where no site of nature conservation importance is believed to be present. The district heating network is subject to Annex II(b) of the EIA Directive. As the implementation of the network is at preliminary development stage, the environmental and permitting processes have not started yet and the EIA screening process is still to be undertaken by the district heating network developer. The Bank will be kept informed on those aspects during the Project's monitoring stage.

The environmental impacts of the Project are overall expected to be minor, given that most of the project elements are in the subsurface, except for the power plant and the associated district heating network facilities. Some of the associated infrastructure such as road access, electrical grid connection and water lines to the site are pre-existing from Enex's earlier development. The environmental impacts of the Project are thus expected to be mostly temporary during construction and related mainly to noise, vibration, dust, and traffic disruption. The specific impacts related to geothermal drilling, such as aquifer contamination, air emissions or potential blow-outs are also expected to be limited with appropriate mitigation measures. The site will be managed to accommodate the day and night wildlife with applied measures such as noise reduction and keeping light to a minimum. There will be some relatively minor land disturbances to accommodate the drill pad and surface facilities, which will be subject to compensation measures, expected to be conducted during implementation.

The Project is not expected to impact underground aquifers per the Promoter's information and as the geothermal subsurface system will operate as a closed loop.

³ Geothermal deep drilling is subject to Annex II(2)(d)(i) of the EIA Directive and industrial installations for the production of electricity and hot water are subject to Annex II(3)(a).



Luxembourg, 16/04/2024

The subsurface and surface working fluids⁴ are relatively benign and will circulate in closed loops with minimal expected leakage. Wastewater will be treated before being evacuated either to the Breitenbach river or will be drained into the sewage system of the Municipality of Gerestried under specific water law permits.

The Organic Rankine Cycle (ORC) facilities are commonly used for geothermal energy production and have a safe and reliable operational track record.

The Project is located in a region where induced seismicity due to geothermal activities occurred in the past. However Eavor technology is expected to be relatively less invasive than other subsurface technologies, as the technology does not involve fracking and does not inject nor produce fluids into/from the rock formations, with the risk of induced seismicity in particular expected to be low, based on the assessment from a consultant mandated by the Promoter. Since drilling started in July 2023, there was no record of any induced seismicity event due to the Project's drilling activities. Two seismic monitoring networks, one under regional authorities' control and a refined mesh installed by the Promoter at local level, will be in place, as per the project permitting requirements. The refined mesh is expected to be dismantled once the Project implementation is completed, which will be confirmed by the regional authorities.

It is to be noted that a small-scale pilot of the technology has been operating in Canada for four years and has not recorded any major environmental, health or safety impacts nor incidents so far.

Based on the Lenders' Technical Advisor's evaluation and the Bank's visit of the site during the drilling phase, the Promoter, supported by the Project's contractors, consultants and partners, is deemed to have the experience and capacity to implement the necessary mitigation measures at design, construction and operational stages. These include appropriate site organisation, construction and interface management to minimize damages and disturbance, soil and flora restoration, traffic management measures and appropriate waste collection procedures.

Climate Assessment

The Project will generate environmental benefits by reducing emissions of greenhouse gases through the replacement of individual natural gas heat sources with a centralised renewable heat generation and the integration of a baseload renewable source of power into the German grid. It will therefore support Germany in progressing its RES share targets in both the power and heat sectors.

As such, the Project contributes to the Bank's lending priority objectives on renewable energy (100%) as well as on climate action (100% climate mitigation).

The Project has been assessed for Paris alignment and is considered to be aligned both against low carbon and resilience goals against the policies set out in the Climate Bank Roadmap and in the EIB Energy Lending Policy (heating and power generation technologies using renewable sources). The Project physical climate risk has been assessed as low.

EIB Carbon Footprint Exercise

The estimated annual absolute emissions of the Project in a standard year of operation are ca. 3 850 tonnes of CO₂ equivalent per year and the estimated emissions savings are ca. 22 600 tonnes of CO₂ equivalent per year, through the substitution of natural gas by geothermal

⁴ Respectively, water-based fluid and isobutane. Storage of the isobutane is regulated by the Federal Immission Control Act (BImSchG) and corresponding permit was issued on the 13th of February 2024.



Luxembourg, 16/04/2024

heating, as well as through the integration of a baseload source of power supply into the German electricity grid, which will reduce the intensity of emission of greenhouse gases and other air pollutants due to heating and power generations.

The absolute emissions include the emissions related to electricity consumption to operate the ORC power plant and minor emissions from estimated leakage rate of the ORC working fluid from the power plant's vendor. There was no data on the district heating network potential emissions at the time of writing, but these are expected to be relatively minor compared to the emissions pertaining to the heat generation operations.

The baseline comprises emissions related to the new DH connections which could be supplied by individual air or water heat pumps (electricity consumption)⁵ and Germany's combined operating and build margins in the context of integrating baseload power generation.

For the annual accounting purposes of the EIB Carbon Footprint, the project emissions will be prorated according to the EIB lending amount signed in that year, as a proportion of project cost.

Social Assessment

The Promoter and its external partners follow the national regulations and industrial standards for the design, engineering and operations of this Project. In addition to procedures to meet regulatory requirements, the Promoter has a safety, health, emergency, environmental and risk management organisation in place on site.

Interface coordination between the different ongoing activities and managing the several contractors on site will remain within the Promoter's execution team and will be based on a simultaneous operation plan, interface management plan, risk management plan and HSE bridging documentation.

Specific detailed risk assessments will be undertaken with each concerned contractor.

Public Consultation and Stakeholder Engagement

As per the German environmental legislation, the previous environmental impact studies undertaken by Enex on their conventional geothermal project implementation was subject to public consultation and stakeholder management activities as part of the EIA process.

In the context of the present Project, the Promoter and Enex performed joined stakeholder engagement activities and was particularly presented in a scoping meeting to all concerned competent authorities and to a town hall meeting to the public.

No objection was raised during the Enex's public consultation activities in the past nor during the recent activities specific to the Project.

More recent stakeholder engagement activities consisted of finalising the visitor center on the site, interventions in community forums, town hall meetings and schools, as well as to reporting progress in the media, in order to support the public's education and understanding of the technology.

A grievance mechanism will also be implemented.

⁵ A conservative proportion of 50% air heat pumps (COP 3) and 50% water heat pumps (COP 4) is assumed.



Luxembourg, 16/04/2024

Other Environmental and Social Aspects

The Promoter, with the support of its partners, is deemed experienced in conducting works of this nature. In addition to procedures to meet regulatory requirements, appropriate quality, safety, as well as environmental and risk management systems are in place for this Project, as confirmed by the Lenders' Technical Advisor.

The Promoter is thus deemed to have the experience and capacity to manage the Project in line with EIB environmental and social standards and requirements.

Conclusions and Recommendations

The environmental approach, organisation, processes and procedures taken by the Promoter has been assessed by the Bank supported by Lenders' Technical Advisor as satisfactory. Based on the information available, the Project is expected to have minor negative residual impacts. The entire programme of the Project was screened out from undertaking a full EIA. Climate and social risks were assessed as low.

The Project is thus considered environmentally and socially acceptable and in line with the relevant EU and national environmental legislative frameworks.

The finance documentation includes a number of environmental and social conditions, which provide subsequent measures and actions required in line with the Bank's Environmental and Social Standards. Progress monitoring on compliance with such environmental and social conditions is included as a requirement in the finance documentation.

Provided the actions above are implemented, the Project is deemed acceptable for EIB's financing in Environmental, Climate and Social terms.