

○ Balmatt geothermal power plant

Geothermal plant for heat production in Belgium

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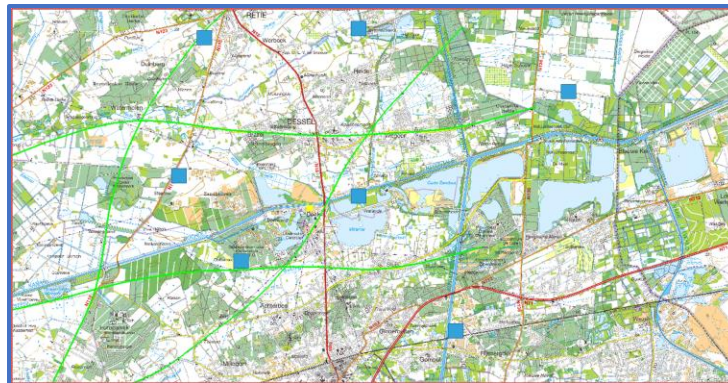


LCA of the geothermal plant

1. Overview of the geothermal system
2. Definition of the LCA reference model

○ PROJET CONTEXT

- Project started in 2009
- VITO demonstration project in Mol
- Connection to existing District Heating
 - Heat users: VITO - SCK-CEN- Belgoprocess
 - Heat demand: 25.000 MWh/year
 - Temperature regime: 95 – 70°C
- Geothermal capacity installed
 - Electrical capacity installed: ORC demonstration (0,25 MWe)
 - Thermal capacity installed: 6,6 MWth



○ RESERVOIR CHARACTERISTICS

- Reservoir depth: 3200-3600m
- Fractured carboniferous limestone
- Bottom hole temperature: 139°C
- 2 operational wells + 1 well foreseen for production
 - 1 production well: GT-01 (3610 m MD, 3608m TVD; January 2016)
 - 1 injection well: GT-02 (4341m MD, 3830m TVD; September 2016)
 - 1 extra (production) well: GT-03 (4905m MD, 4236 m TVD; july 2018)
- Wells treatment after drilling:
 - GT-01: 1 Chemical stimulations
 - GT-02: 2 Chemical stimulation
- Brine type Na-(Ca)-Cl
- TDS:165 g/l and GLR: 2,3 Nm³ gas/m³
- CO₂: 75 vol.%, other mainly CH₄



(Baujard et al., 2017)

○ PLANT DESCRIPTION

- Build of the plant started in 2017
- In testing phase since November 2018
 - Production temperature: 121-126°C
 - Average production flowrate: 70-150 m³/h
- 1 primary loop (brine) and 1 transport loop (fresh water)
- Pressurized geothermal loop (40 bar) to avoid NCG emission
- 1 Downhole production ESP Pump
- 2 heat exchangers with 6,6 MW total capacity
- **Once in full operation, the plant will be used to supply 50 GWh/year.**
 - 50% for heat delivery: 25.000 MWh
 - 50% electricity production, 10% efficiency: 2.500 MWhe
 - Amount of electricity consumed: 3.300 MWh



LCA Reference model

- Simplified scheme of the LCA reference model
- Main variables used highlighted in blue

