

Figure 1: Geological map of Belgium (modified from OneGeology map) and main deep geothermal zones of interest.

Hainaut Basin

In Wallonia, the use of deep geothermal energy is currently limited to the Mons-Borinage area, in the central part of Hainaut. **Three heating networks operate** using existing unique deep wells in Saint-Ghislain, Douvrain and Ghlin (Figure 1).

Thanks to ERDF, a new geothermal plant will be implemented by IDEA in the city of Mons in the "Porte de Nimy" area, especially for the heating supply of the Ambroise Paré hospital. **An important seismic survey of about 90 km on 5 profiles was realized in February 2019 (Figure 3).** The drilling and completion of the geothermal doublet is planned in 2020, the geothermal plant building in 2021 and the heating network deployment in 2022.

Thermal power estimation: **7 MW**

The thermal energy distributed should reach **10.5 to 14 GWh per year**.

Campine Basin



Figure 4: Drilling site of Mol-GT-01-S1 (depth of 3600m) at Mol-Donk and District Heating network in construction



- In January 2016, VITO completed the geothermal exploration well **MOL-GT-01-S1** in Mol-Donk, northern Belgium (Figure 1 and 4).
 - Target: Lower Carboniferous fractured carbonate reservoir**
 - Depth between 3000 and 3600 m. Reservoir temperatures encountered at 3600 m were 138 – 142°C**
- Well MOL-GT-02** (summer 2016). A heating network of VITO and surrounding companies is under construction (Figure 4). The geothermal plant also includes facilities for research on materials (corrosion testing and development of coatings) as well as test facilities for heat exchangers and binary systems. Next to the heat delivery, **electricity production is foreseen using the Organic Rankine Cycle (ORC) technology**. The initial thermal power output of the geothermal plant will only be **about 8-9 MW** since the return temperature **is as high as 80°C**, imposed by the existing high temperature heating grid already in place on the location. Connecting low temperature heating networks, that could go as low as 30°C, would double the thermal output.
- VITO drilled a 3rd well in 2018, **MOL-GT-03 targeting** the same faulted and fractured zone as MOL-GT-01-S1, although now in a SE direction at 1.6km distance to MOL-GT-01-S1 and furthermore explored the potential of lower lying Devonian strata. **Comparable reservoir characteristics were expected in MOL-GT-03, however, the results of the well test were lower than expected.**

Shallow Geothermal

Belgium needs all possible shallow geothermal technologies to apply this renewable energy form for new construction or renovation. Every type of geothermal system is applied, this is mainly caused by the very diverse geological structure with big local differences and rapid succession of different sediments. **The largest differences manifest themselves between the North (Flanders) and the South (Wallonia)** of the country with mostly sand/clay in Flanders and Brussels versus schist/sandstone/limestone in Wallonia.

A clear revival can now be observed in the shallow geothermal sector (Figure 5).

In Flanders this is mainly due to the tightening of the E-level (max E40 from 2018) and the obligation to produce at least 15 kWh/m² renewable energy. This is also encouraged in Brussels where passive construction has been mandatory since 2015 with an obliged heat demand not exceeding 15 kWh/m².

As a result, there is a boost in the use of heat pumps. Although air/water systems have the upper hand, more and more geothermal heat pumps are being installed.

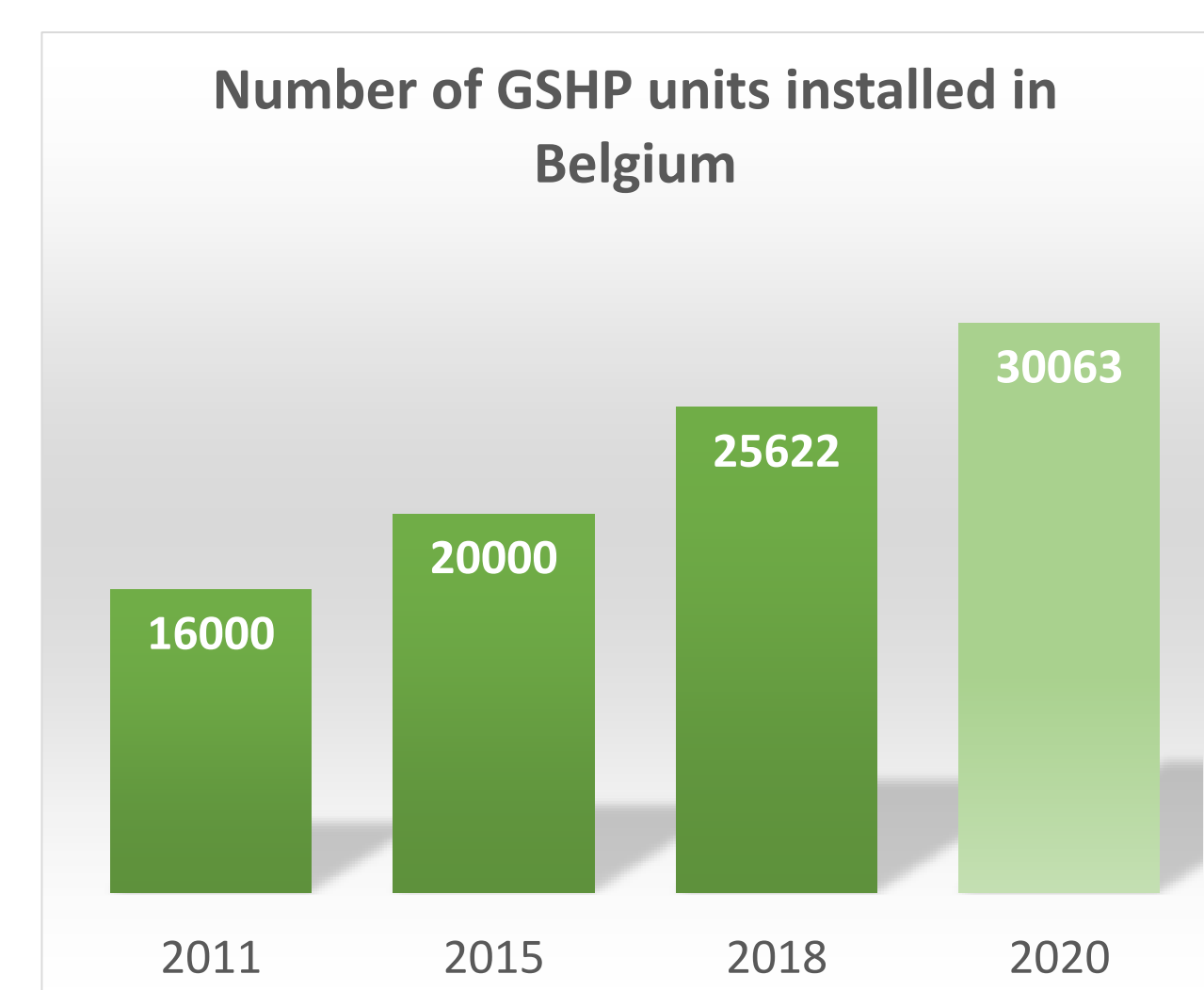
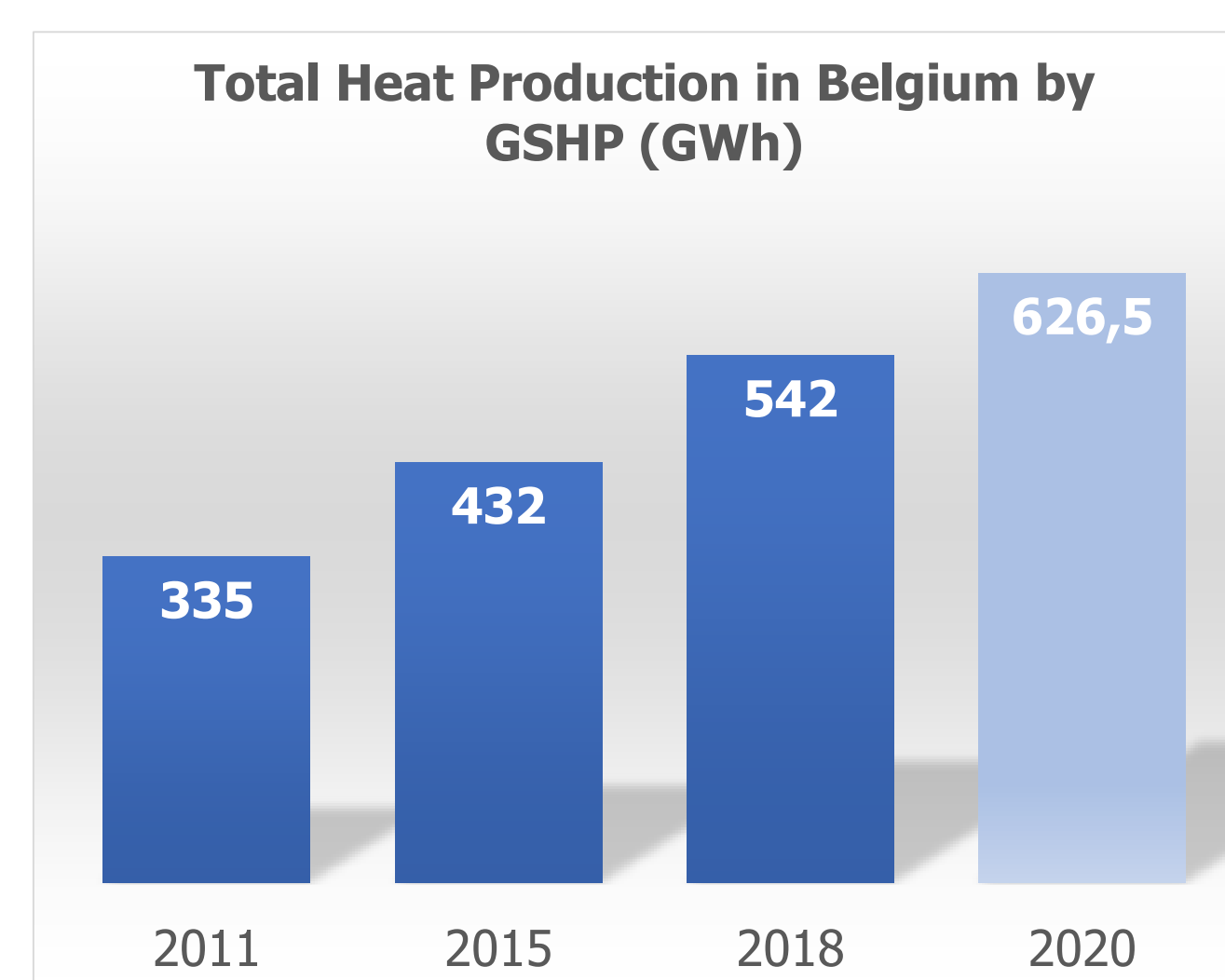


Figure 5: Total Heat production by GSHP and Number of GSHP units installed in Belgium and estimation for 2020

Conclusions

Unless the fact that effective geothermal energy production is still low in Belgium, promising activities are on their way. For deep geothermal energy production, we have the pilot plant (Balmatt) and the projects in the Hainaut area. Different exploration activities are planned (geophysical prospection).

Because of different government measures, the shallow geothermal sector has a revival, more and more geothermal heat pumps are being installed.

Policy (new or adapted decrees, insurances) in the different regions will support further development of both deep and shallow geothermal projects in the coming years. Belgian institutes and universities are involved in various national, European geothermal research projects, which aim to further develop geothermal energy.

Research projects in Belgium

We assist recently to a promising development in geothermal R&D and exploration surveys in Belgium with regional or EU funding (ERDF, H2020, GEOERA): MORE-GEO, "Porte de Nimy", Balmatt, MEET, DGE-ROLLOUT, BRUGEO, MUZE, GEOCONNECT3D, geothermal potential of the Walloon old mines....

