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The Heerlen Minewater Project - cold/heat storage in an abandoned coal mine

P. van Tongeren, B. Laenen, A. Hildenbrand
VITO - Flemish Institute for Technological Research, Mol, Belgium

The Minewater Project in Heerlen (The Netherlands) aims to demonstrate how an abandoned and flooded coal mine can be used as a safe and ecological way to heat and cool buildings. The project is supported by a grant from the European Union under the framework of the INTERREG IIIB NWE Program. The concept is to use the flooded workings and void volumes of the coal mine as a thermal reservoir for large-scale, subsurface cold/heat storage. Depending on seasonal demand, heat will be withdrawn from or transferred to the mine water by means of a heat pump, which will thereafter be re-injected.

The municipality of Heerlen is located directly above the Oranje Nassau coal mines, which were decommissioned in 1974 and flooded thereafter. Interconnected by a huge network of shafts and stone drifts the four different mines form one large water reservoir of approximately 11 million m^3. With the stone drifts located between ca. 60 and 600 m the cold and warm water reservoirs have temperatures of approximately 14-18 ^oC and 25-29 ^oC, respectively.

Altogether 5 different wells are planned to serve as production/injection locations: Two warm-water wells (completed in 2006, ca. 690 m depth), two cold-water wells and one intermediate well. One warm- and one cold-water well serve both as production wells during peak consumption and as re-injection wells for the reestablishment of the warm/cold water reservoir. The intermediate well is planned as a 'waste well' for intermediate warm water. The wells are directly placed in stone drifts in order to ensure a high production rate (> 80 m^3/h). Due to their high conductivity the stone drifts represent the main effective reservoir volume accessed during production and re-injection . Because of high flow rates and the small contact area with the surrounding rock, geothermal heating of the injected water is negligible. Therefore, the three

different zones must be placed at an appropriate distance in order to avoid a ‘cross-contamination’.

Test locations which will be supplied with the warm/cold water are a new complex of social and council houses in the ‘Heerlerheide Centrum’ district (located in the north-west) and an area dominated by office buildings in the ‘Stadspark Oranje Nassau’ district (located some 4 km further south). The water, coming from different production and injection points, will be transported through isolated horizontal pipes. In both districts energy centers will be built, which will control the cold/warm water supply and switch to conventional ‘back-up’ systems if required.