

Potential use of geothermal energy from mine water in Europe for cooling and heating

E. Demollin-Schneiders

Projectmanager Minewater, Gemeente Heerlen

Z. Malolepszy

University of Silizie, Poland

D. Bowers

PB Bowers, London

INTRODUCTION

Abandoned and flooded mines are present high potential for geothermal utilization of low-temperature water from remaining underground spaces. Some examples of use of mine water in heat pumps installations are known from Germany, Scotland and Canada. Further development of this technology is ongoing in face of restructuring of coal mining industry in Europe causing closure of mines in many regions. Use of heat from mine waters is one of the important aspects of rational and sustainable utilization of post mining infrastructure and may bring positive socio-economic results for communities living in European areas of former mining activity.

1. IDENTITY

Energy is the identity of old coal-mine regions that look black and ugly. Transformation of this into new renewable and green energy from mine waters is not only good as an action against climate change but also good for the feeling of people who live in the former mining areas and worked in the mines.

On the other hand, energy is an obligation for a normal, functioning social society. Without energy there is nothing. But climate change is a case of us all. With using the bridge from the past to the future and feel that energy is your identity it is easier to create awareness about a subject as energy.

2. EUROPEAN PROJECT

In June 2004 the minewater project was funded by the Interreg IIIB North West Europe. Total budget of the project is 20,9 million Euro's and Interreg gave a budget of 10 million euro's.

Europe's interest in this project is to see which changes there are in the developing of old and abandoned minefields that are usually very difficult to develop. Furthermore, many locations have a problem of rising waterlevels when the mining is closed.

Besides this Europe knows that the gap between the policy of security of energy supply and the policy of the actions against climate change is very big. Europe therefore is keen on a project that transform a problem into a change.

3. PILOTS

In **Czeladz** town of the Upper Silesian Coal Basin (**Poland**) there is planned a utilization of mine waters from a coal mine that was abandoned in 1992 out of the level of 200 meter below ground level. Dewatering of the mine is still maintained for safety of adjacent mining areas. Water at temperature of 14 degrees C is pumped out with an average outflow of 400 kg/s. Estimated thermal output power of a heatpump installation using mine water as heat source is 2,5 MW. The energy from mine water will be used for heating of historical complex of old houses of mineworkers, which will be renovated.

Heerlen is situated in the south of **the Netherlands**. The last mine closed 30 years

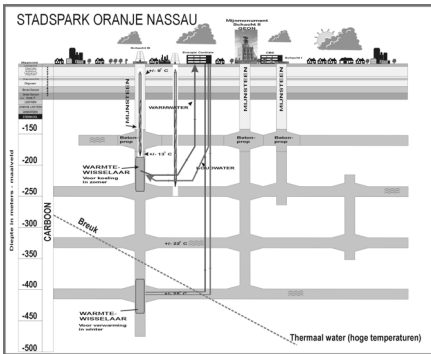
ago and all mines are flooded. Heerlen is still struggling with the closure.

There are 2 development locations in the city where mine water will be used as source for cooling and heating the new dwellings and offices. The 2 mines involved are the Oranje Nassau 1 (400 meters) and the Oranje Nassau 3 (800 meters).

There is no water coming out of the mines just like in Czeladz and Midlothian. Heerlen needs to drill to the water (800 meters below) to pump up the water, use the geothermal energy and then pump it back into the mine again, where the stone can warm the water again.

Buildings will be designed with low temperature heating and high temperature cooling. Heerlen is aware that **cooling** will be a bigger problem in the future than heating because of the strict insulation regulations in our national building law. This law will be stricter by January 2006 when the EPBD is implemented in our national law.

Mine water is a sustainable source out of a familiar source.



In **Scotland, Midlothian** council is developing a new village named Shawfair on the former biggest mine in Scotland, Monkton hall south-east of the capital Edinburgh. Monktonhall was ceased in the early 1990's and the mine is still dewatered to prevent groundwater rebound and approximately 100 kg/s of minewater of 13 degrees. Shawfair is a new town of 4.400 houses with all facilities (schools, leisure, transport, etc.)

Midlothian council intend is that Shawfair should be a model of sustainable development and supplying the town's energy from a sustainable source is a key element in

delivering this aspiration. Within this

4. EUROPEAN POLICY

In January 2004 the EPBD (Energy performance directive for buildings) was agreed. All European countries must implement this directive in their own national legal system. The result of this directive is that buildings must have a higher energy performance in the future which means lower energy use but higher initial costs in the building phase.

By combining the heat and cooling system a new kind of system is implemented in houses that is cheaper than a separate heating and a separate cooling system. Another advantage is that it is possible to use sustainable geothermal energy with this system (e.g. minewater).

5. RESULTS

The result of this project cannot be seen as one result. In Scotland and Poland a water problem is transferred into a change for the use of sustainable energy. In the Netherlands there is no water problem but every Council has its task to look for sources of sustainable energy.

Results of using sustainable geothermal energy for buildings are known, but in this project we want to get results of using this kind of geothermal energy for whole quarters of a city.

The results cannot only be found in the field of techniques. The project has a big social influence which can be used to bring awareness about a vague subject as energy.

With techniques alone we are not able to fight the problems of climate change and give people the security of energy supply.

6. CONCLUSIONS

REAL SUSTAINABILITY

Only by using sustainable installations sustainable there will be real sustainability.

The aspect of behaviour will be a key element in the future development of techniques and solutions for the problem of climate change.

Sustainability is explained by the 3 p's, i.e.

people, planet and profit. But actually we must speak about 4 p's, i.e. people, planet, profit and place. Every human being needs a place on this world and has the right for a place on this world. Everybody wants to have a home to feel safe and at home. And because people like to cherish this place they can become aware of the real value of this place. By that we can establish a change of behaviour.

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