

Looking for Thermonet partners

- Easier to install and more efficient geothermal systems for retrofitting buildings

Horizon 2020 call, LCE-17-2017, 7. September.

Danish partners are looking for European partners with interest in coupling geothermal systems and thereby supplying existing buildings with heating and cooling from heatpumps.

We are looking for European partners who have passion and interest in following objectives:

- Finding and implementing test site for thermonet, coupling of geothermal systems, in buildings (from few buildings to complete villages).
- Maintaining, managing and testing the local thermonet.
- Research the collected data.
- Building knowledge about financial and organizational conditions for progressive dissemination.

Thermonet can be described as "Cold District Heating", and seems a perfect solution for heating/cooling existing buildings. The ambition is to couple the way of thinking energy planning with heatpump technology in real life.

Thermonet as technology is an interesting innovation that addresses technical and organizational issues. By combining partners from public planning sector, research, and private providers there will be established public demand for solutions and private interests in supplying cost-efficient heat-pump systems. The project will focus on systems using energy generated by coupled geothermal systems (depth 70-100 meters).

The coupling, sustained by public planning, will increase possibilities for economies of scale also by examining and giving relevant permissions for establishing thermonet, also in historical buildings, in an early phase. The technical aspects in drilling in built environments will be taken into consideration and properly addressed in the process of finding and implementing test-sites in the project.

The perspectives in the project are tremendous as many buildings and villages in Europe are searching for cost-effective and sustainable heating and cooling. Same time the European Union needs more pace in transition towards a low emission society.

This is also very relevant for rural areas as a large transition potential is found here.

Possibilities with Thermonet

For a long time, many villages in the rural areas have witnessed an unfortunate decline in their population due to people moving to the larger cities. This trend leads to more abandoned houses in the countryside, often resulting in decay and ultimately demolition. In the large cities however, the demand for housing is on the rise. This leads to higher housing prices and an increase in the construction of new homes in order to satisfy the demand.

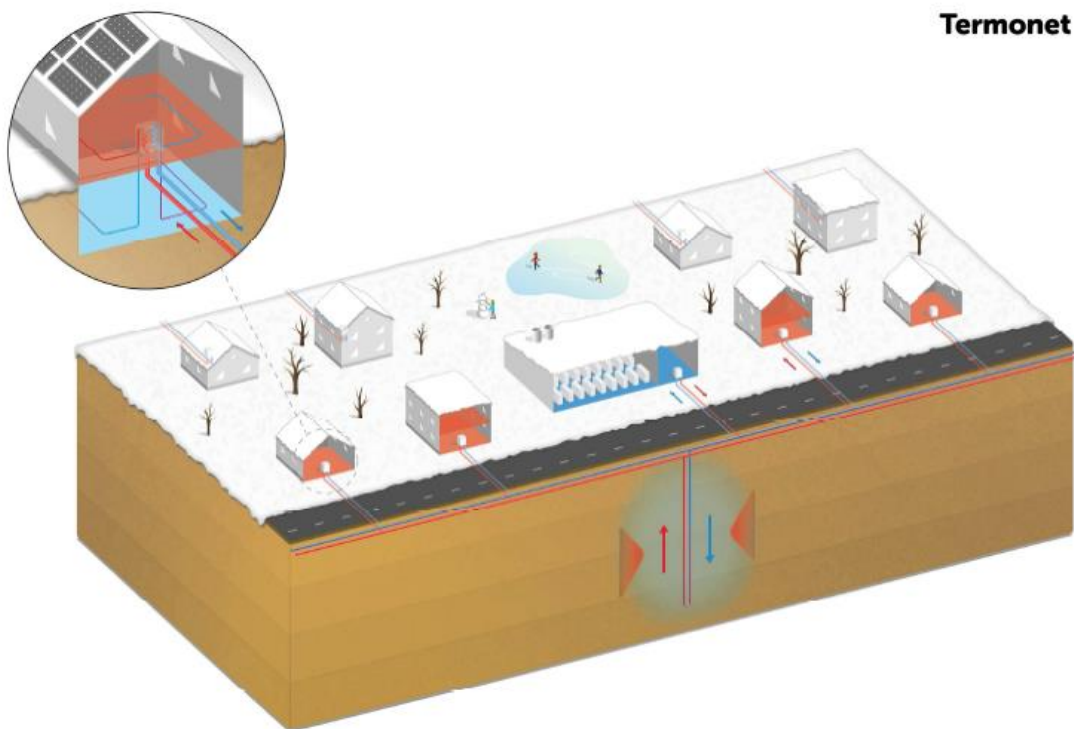
We believe that this trend will be reversed in the near future thanks to the spread of circular economy. Currently, the main problem for the rural districts is the lack of basic infrastructure, which - within the 24-hour limit of the day - can meet the needs of today's modern humans.

As stated, the biggest problem is the logistic challenges. Jobs as well as the recreational activities are located primarily in the large cities. With the introduction and spread of circular economy, these problems will be solved by driverless cars. However, it is possible to lend the development a helping hand by preparing the rural districts for the future. Another challenge for the rural districts is the supply of heating. Without district heating available, every household have to have their own heating supply. Our idea will introduce circular economy to the heating sector in the rural districts, so that it may be used to revitalize these areas. Through Thermonet, it becomes easier to achieve the government's climate goals, since 30% of the total, Danish energy consumption is in the households, 80% of which is used for heating of buildings.

What is Thermonet?

We can increase the district heating supply in Denmark from 64% to close to 100% by combining existing technologies in a new way. This is done by fusing the collective organization known from district heating companies with individual geothermal heat pumps. This is done with help from a supply network based on heat absorbing vertical and horizontal plastic tubes. We call this network **Thermonet**.

Thermonet can be used for both heating and cooling as shown in the illustration below. It shows how Thermonet can supply heating for a small group of houses, while cooling a wine cellar and a data center.



Exchange of thermal energy

Thermonet takes its name from the Greek "Thermos" meaning warm. The term thermo is used in Denmark as well as internationally as a prefix indicating that something has to do with heating. In this respect it should be noted that only heat energy exists. There is no such thing as cooling energy. Heat can either be absorbed or delivered. When we move heat from one place to another, we call it cooling. A refrigerator, for example, moves heat from the inside of the refrigerator to the outside.

Today, heating and cooling is processed separately, which is a waste of useful resources. When we burn oil to produce heat, we get approximately 10 kWh heat from 1 liter of oil. If the same liter of oil was burned in a electricity producing power plant, it would produce approximately 5 kWh electricity and 5 kWh heat. With 5 kWh electricity, it is possible through geothermal heat pumps to produce 15 kWh of heat by obtaining 10 kWh from energy contained in the ground. This means that the same amount of oil can produce twice the amount of heat in a collective system compared to an individual installation.

When extracting energy from earth, we cool it, thus giving it cooling capabilities. Normally cooling capabilities entails a refrigeration compressor, which is technically almost identical to an air/water heat pump. Both use air as a medium for exchange of energy, but encounters difficulties in performance, since you need hot air when it's cold and cold air when it's hot.

With Thermonet, we use the earth as a buffer, which means that the refrigeration compressor can be omitted for many cooling purposes. This means fewer capital investments; noticeably cheaper cooling and also that we can recycle excess heat with the heating pumps that are part of the collective system.

Circular aspects with the solution

Thermonet enables different ways of using circular economy and thereby contributing to better resource management, a better environment and better economy. Both short term and long term benefits can be identified, where the short term benefits are among the following:

- By introducing Thermonet, it becomes possible to supply existing houses in the rural district with cheap and easy heating solutions, making it more attractive to live in these areas instead of demolishing rural housing and expanding the larger cities.
- The capacity of Thermonet is variable and easy to adjust according to needs and opportunities.
 - By retrofitting housing in the rural districts, it is possible to release heating/cooling capacity in Thermonet, thereby opening up for further expansion of the network by connecting more consumers. Refurbishing of houses also means urban renewal and increased house prices in the rural district making these areas more attractive.
 - With Thermonet it is also possible to exploit excess heat in the system instead of discharging it into the atmosphere.
 - It is always possible to expand the network with more drillings, if necessary.
- The amount of pellet stoves in rural areas can be reduced. Not only is large scale co-generating power plants more efficient when burning biomass, they also reuse the ash as fertilizer instead of disposing of it.
- With Thermonet managed by district heating companies, many individual heat pumps can have their lifespan extended and their efficiency increased. Uniform components, modular structure and ongoing monitoring will ensure a long life span, ongoing maintenance and occasional replacement of the equipment when needed secures an optimal operation of the system.

An European perspective.

A large European market is lying in front of thermonet. The organizational models and planning principles are known from district heating, specially in northern Europe. The technology and experiences with deep drillings and mainly heatpumps is well known specially in main- and southern Europe.

With thermonet we wish to combine the best from the European traditions in a new and innovative way.

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