The Potential of Seawater Heating in the UK: An Example of The Hague, Netherlands

Summary Report

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Challenging Lock-in through Urban Energy Systems Project Workshop

THE POTENTIAL OF SEAWATER HEATING IN THE UK: AN EXAMPLE OF THE HAGUE, NETHERLANDS

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As a part of the CLUES project, we are conducting a series of innovative international case studies on unique approaches to decentralised energy systems which can be applicable in the UK but have not yet been attempted. In order to present each case study in the UK, we are conducting a short series of workshops. On November 23rd, 2011 we successfully held our first out of four short workshops – “The potential of seawater district heating in the UK: an example of The Hague, Netherlands”.

The aim of the workshop was to introduce the seawater heating system used in The Hague to the UK, and discuss its potential to be implemented wider in the UK, as well as to share experience regarding seawater heating and cooling systems.

Attendees of the workshop included representatives from the City of the Hague and Deerns Engineering Consultancy (Netherlands); representatives of Portsmouth International Port, Cofely and Lighthouse Leadership (UK) as well as academics from UK universities and the University of West Indies (Barbados).

During the morning session of the workshop four presentations were given. The first presentation 1 by Dr Thomas Rogers from the University of West Indies introduced the potential of seawater cooling and ocean thermal energy conversion in the tropics and gave examples of new developments in Hawaii.

The second presentation 2 was given by Mr Andrew Morton, Senior Building Surveyor at Portsmouth International Port. Andrew introduced a new seawater heating plant installed in Portsmouth Ferry and Cruise Terminal Building – the first seawater heating plant of its kind in the UK. He gave an insight into the overall design philosophy of the new Terminal Building and presented some technical details of the seawater heating system used in the Port. Andrew also covered the drivers and barriers to installation and use of this system in Portsmouth.

1 Dr Tom Roger’s presentation can be found at http://www-staff.lboro.ac.uk/~cvkc2/CLUES_SWH_workshop_TRogers.pdf
2 Mr Andrew Morton’s presentation can be found at http://www-staff.lboro.ac.uk/~cvkc2/CLUES_SWH_workshop_AMorton.pdf
The third presentation was by Mr Henk Heijkers, Senior Sustainability Officer in the City of The Hague. He has been involved into the seawater district heating project in Duindorp since its very beginning in 1999. Henk gave an introduction to The Hague and its plans on sustainability and talked about the role of seawater district heating system in achieving sustainable targets for the City. He also shared the experience of coming up with the idea of seawater district heating and explained the drivers to installation of the seawater district heating system.

More technical details about seawater heating system in the Hague were presented by Mr Paul Stoelinga in the last presentation of the morning session. Paul is a Senior Energy Consultant in Deerns Engineering Consultancy – a company contracted to develop a sustainable plant concept based on a seawater thermal power plant in combination with individual heat pumps in the homes. Paul introduced the concept of seawater district heating system in The Hague and explained how this system leads to reducing energy consumption. He also talked about technical and other barriers which arose when constructing the system in Duindorp. The presentation of Mr Paul Stoelinga concluded the morning session.

The afternoon session of the workshop was carried out in a form of a roundtable discussion. The aim was to look at the potential of using similar systems in the UK, taking into account the similarities and differences in context of the UK and Netherlands, and to address possible drivers that could encourage the implementation of the seawater district heating and to find the solutions to barriers which may appear if the system is to be implemented widely in the UK.
The following four themes were addressed and debated.

1. **Similarities and differences**

Apart from both being seawater heating schemes, the UK Portsmouth Port and The Hague systems differ greatly - the only similarity they share is the fact that they both have been designed for newly built buildings. Starting from the obvious differences, currently in the UK the Portsmouth Port Terminal Building is the only user of the seawater heating system, whereas in The Hague the system is connected to 800 houses. Moreover, in the UK the system is used in a commercial building whereas in the Hague it is used for residential purposes, therefore presenting different business cases in terms of investment and implementation. The systems are also introduced in different regulatory environments, and their financing schemes are also very different: in The Hague, although the main investment is carried out by the housing corporation Vestia, there is a group of stakeholders involved in the decision making and technology choosing process, whereas in Portsmouth the decision has been very much made by a single stakeholder.

2. **Drivers**

The discussion brought up a list of drivers that could potentially encourage the implementation of seawater district heating systems in the UK. One of the main drivers is the location of many UK cities near the sea; by using this type of heating system the local residents can enjoy locally produced heat. In addition, social background (such as fisherman families and their historical relationship with the sea) can be used as a facilitating tool to help connect end-users with the new seawater heating system. An important driver is carbon emissions reduction, often particularly supported by another important driver – political will. However, political will often requires economic drivers, or requires a strong belief in innovation, or seeks publicity and an enhanced sustainable reputation. Political will can also be encouraged by social drivers, such as fuel poverty. Awareness raising among the end-users and social marketing also play important roles when talking about new types of heating systems: end-users should not feel threatened by the technology. Social acceptance of seawater heating can encourage other communities to use this system.

3. **Barriers**

Some drivers can at the same time be barriers: for example, planning permissions can create a bottleneck for the system or encourage its installation. The same refers to the lack of regulations on a national level – some local governments might use this opportunity to promote a new type of heating system. Political will can also act as a barrier.

The main barriers discussed in these examples included a lack of familiarity with seawater heating systems and an inability of many end-users to think ahead. The
solution to this problem was educational campaigns and the development of skills. The behavioural changes need to be made not only among end users but also among governments and businesses, as some find it hard to accept innovation and allow the new technology to mature.

District heating is often seen in the UK as a form of lock-in, as once connected it is impossible to change the chosen way of heating the house. The fact that the price for the heat received from seawater district heating is currently higher when compared to conventional is only a barrier. These barriers can again be removed through the PR campaigns explaining the benefits of district heating.

Seawater itself was listed as a barrier, due to its corrosive nature the infrastructure requires special (and often expensive) materials. The development of seawater heating system infrastructure might create problems, as it requires technical interference that might be objected by environmental and planning organisations. The execution of the system also requires highly skilled labour.

As with any new technology, a seawater heating system is risky and requires high levels of investment and support. This again can be changed by using various financial incentives and economic drivers.

Negative publicity about climate change also does not help the maturity of new innovative technologies and reduces social acceptance and political will which are so important when it comes to innovation.

4. Future

Thinking about 2050 carbon reduction targets, it was discussed that in the future heat pumps in general will be used more widely, as their efficiency will be improved and they will reach their technological maturity. The heat pumps will be used wider as electricity will be seen as a way to sustainable generation. The increased use of heat pumps will be encouraged by decarbonisation and also by high fuel prices that will lead to energy consumption reductions. However it has to be taken into account that heat pumps are used in low temperature houses (houses with small difference between lowest and highest internal temperature), whereas most of the existing stock in high temperature housing; therefore before heat pumps are widely introduced the energy efficiency of the building stock has to be improved.

Overall, the discussion concluded that seawater heating system is highly replicable, as it can be used in any body of water, and it has a potential of the implementation in the UK and might be part of the solution for achieving 80% carbon reduction by 2050.
About the CLUES Project

The CLUES Project critically assesses the development of decentralised energy systems in urban areas in the light of national decarbonisation and urban sustainability goals. It examines the range and types of urban energy systems that are and might be installed. It further investigates the issues raised by the need for such initiatives to integrate with energy systems at the urban level in the UK, regional and national scales in order to effectively deliver energy and carbon reductions to 2050.

As a part of this project we are conducting a series of innovative international case studies, representing unique approaches to decentralised energy systems which could be applicable in the UK but have not yet been attempted.

In order to present each case study in the UK, we are organising a short series of focussed workshops. Our second workshop “A new way of financing PV: an example of Morris Model, New Jersey, USA” will be held on 8th of December at UCL, London. Morris Model (New jersey, USA) is a very successful public-private partnership to finance renewable energy projects through low-interest bonds, power purchase agreements (PPAs) and federal tax incentives. The aim of this workshop is to introduce a new approach to financing PV and to discuss its potential to be implemented in the UK, as well as to share the experiences of those who already worked with this innovative approach. Attendees expected at the workshop include a representative of the Morris County, USA; representatives of the UK government, academics and other interested parties.

The third workshop “Performance Contracting and Retrofit: an example of Berlin’s success” will take place at the University of Nottingham on 27th of January 2012, and will look at new ways of financing the retrofit of commercial buildings, and sharing the experience of the Berlin Energy Saving Partnership, as well as to discuss its potential to be implemented in the UK. Attendees expected at the workshop include representatives of the Berlin Energy Agency, representatives of the UK government and other UK stakeholders interested in building retrofit.

Our final workshop will be on “Body heat to warm buildings: an example of Kungbrohuset office building, Stockholm, Sweden” (location and date tbc). The aim of the workshop is to introduce an innovative heating system used in Kungbrohuset building and to discuss if this type of heating could work in the UK. Attendees expected at the workshop include representatives of Jernhusen, a

5 http://www.ucl.ac.uk/clues/  
6 http://www.ucl.ac.uk/clues/events
company in charge of the project; representatives of the UK government; professional associations; academics and other interested parties.

If you or your colleagues are interested in these workshops, please contact Dr Ksenia Chmutina on k.chmutina@lboro.ac.uk for more details.