Title	Energy race for the Finnish
Author(s)	Klobut, Krzysztof
Citation	International Innovation. Research Media (2013) No: June, Pages 34 - 35
Date	2013
URL	http://www.research-europe.com/magazine/REGIONAL/EX10/index.html
Rights	This article may be downloaded for personal use only.

Energy race for the **Finnish**

A team from the **VTT Technical Research Centre of Finland** is working to establish a pragmatic and effective way to improve energy efficiency in Finnish homes. The group's efforts – focused on district heating solutions towards zero-energy households – are essential to achieving ambitious emissions targets set by Finnish and EU legislators

TO DEAL WITH the evermore ominous threat of global warming, measures are being considered at both national and international levels to reign in anthropogenic greenhouse emissions and deal with unpredictable patterns of change. One of the EU's core objectives is to realise a future in which all newly constructed homes are nearly zero energy by 2021. How this is being attempted throughout Europe varies between Member States, but one country is leading the way – Finland.

The Finnish Government intends to go beyond the EU objectives by setting their own target of achieving an 80 per cent reduction in greenhouse emissions by 2050 in comparison to those in 1990. This ambitious goal will require changes in both industry practice and wider Finnish society. There is little doubt that it can only be achieved with dramatic improvements in household energy consumption and construction design.

District heating has existed in Finland for many years and its contribution to the housing stock is growing. Furthermore, standards of insulation are extremely high – perhaps an obvious necessity due to the Nordic climate.

FOUNDATION FOR INNOVATION

The building stock in Finland accounts for 40 per cent of the nation's total energy consumption and subsequent greenhouse emissions. As such, it is unsurprising that household energy use and new constructions are a key focus for reduction initiatives.

Reducing these consumption levels is the challenge which has been taken up by the Technical Research Centre of Finland (VTT) in collaboration with policy makers and industry. The project – Future district heating solutions for residential districts – is headed by VTT Senior Scientist Krzysztof Klobut, and looks to find innovative ways to achieve greater efficiency by pooling knowledge and expertise from academia and the energy industry. Holistic in its approach and concerned with the practical application of technology in a cost-effective way, the initiative's main objective is to assess the feasibility and cost of a number of district heating and energy solutions for future zero-energy buildings in Finland. Therefore, any measures that can be realised to reduce

energy use or produce energy as a by-product are on the agenda.

All technology being evaluated within the project is considered in a holistic start-to-finish process known as a life-cycle analysis. The Finnish researchers therefore consider the minutiae of how that heat is produced, transported and finally used within a district heating scheme: "We investigate the potential utilisation of municipal and construction waste," highlights Klobut.

What is district heating?

District heating schemes supply heat from a central source directly to homes and businesses through a network of pipes carrying hot water. This means that individual buildings do not need to generate their own heat on-site.

FUTURE DISTRICT HEATING SOLUTIONS FOR RESIDENTIAL DISTRICTS

OBJECTIVES

- To develop adequate district heating solutions for residential low energy districts
- To compare alternative solutions by life-cycle assessment (cost and emissions)
- To evaluate the potential of utilising municipal and construction waste for district heating energy generation
- To investigate how nearly zero-energy buildings (in terms of the Energy Performance of Buildings Directive) affect the dynamics of local district heating network operation

KEY COLLABORATORS

Jyri Nieminen, Key Account Manager, VTT

Matti Laukkanen, CEO, Hyvinkään Lämpövoima Oy

FUNDING

Finnish Funding Agency for Technology and Innovation (Tekes) • Finnish Energy Industries • Ekokem Oy Ab • Hyvinkään Lämpövoima Oy • Jyväskylän Energia • Helsingin Energia • City of Hyvinkää • Porvoon Energia Oy • Riihimäen Kaukolämpö Oy • VTT Technical Research Centre of Finland

CONTACT

Krzysztof Klobut
Senior Scientist

VTT Technical Research Centre of Finland
P O Box 1000
FI-02044 VTT
Espoo, Finland

T +358 20 722 4647
E krzysztof.klobut@vtt.fi

www.vtt.fi

KRZYSZTOF KLOBUT (LicTech, MScTech) has been Senior Scientist with VTT since 1994. He has 30 years of scientific experience in the field of heating systems, energy consumption in buildings, renewable energy sources, district heating and residential applications of fuel cells. Klobut has been involved in a number of projects co-funded by the EU Fifth Framework Programme (FP5) and FP6, the SAVE-programme and the International Energy Agency. Recently he has been engaged in now completed EC-funded projects – IDEAL EPBD (IEE), IntUBE (FP7) and AmI_MoSES (FP7) – and ongoing FP7 projects – eHUB, IDEAS and AMBASSADOR. Klobut has authored and co-authored more than 70 publications.

PAYING FOR PROGRESS

The project has several overlapping research directions. Most simply, the coordinators are assessing the value of district heating for single family homes. To further enhance the value of district heating, they are also looking into areas where heat could replace electricity in household activities, eg. washing clothes and heating saunas. This would improve household electricity use and increase the relative importance of district heating technology. Critically, the VTT team is also discussing the need for new business and service models to provide technological solutions in a mutualistic and cost-effective manner. This work is essential for any pragmatic solution which can be rolled out in the near future: "Tariffs must be created according to the business model that assures added value to the consumer at an affordable price and yet cover the investment and running costs of the service provider," explains Klobut.

In the application of technological solutions, cost is always an important consideration. For this reason, cost-effectiveness analysis is a central part of VTT's project. Zero-energy buildings on the whole add relatively little to the cost of construction: "Our first net zero-energy buildings have extra costs of approximately 15 per cent compared to typical new buildings," project member Jyri Nieminen reveals. However, with the introduction of new concepts and models such as those assessed in the district heating project, the group estimates that cost increases will be further reduced to 10 per cent. This reasonable increase will be offset by the benefits enjoyed by builders and building owners, who can expect low energy bills.

While the science and the finances stack up in favour of rolling out zero-energy construction, new projects are being prevented by market appeal and legal issues. One of the main challenges is making zero-energy construction projects desirable for investors and low energy building companies.

DIVERSIFICATION AND FEEDBACK

In addition to the centralised district heating solution, the Finnish investigators are also assessing the potential of on-site energy production to contribute to household portfolios. One example of this technology is solar thermal – which utilises the Sun's energy to produce heat. This combination of energy provision is seen as key in order to diversify the technology utilised in the reduction of energy use.

In order to enrich their own research and recommendations, the team is also measuring energy use and power peaks in district heating systems. Crucially, the data collected will be used not only to inform technical progress but will also aid in the creation of the next wave of national codes: "We have been one of the contributors to the development of energy requirements for both new and existing buildings," expands Klobut.

The district heating project is at the heart of Finland's energy and environmental objectives for the forthcoming years. In combination, the aims and practices within the project produce an impressively comprehensive and pragmatic step towards environmental sustainability in Finland. However, while progress is being made in the housing sector, the project coordinators are well aware of the challenges for wider society: "Finland needs a climate act that drives the development of energy efficiency in all sectors in society; not just in buildings and transportation, but also in the production of goods and services," highlights Nieminen. In this context, confronting the challenge of greenhouse emissions will require efforts across all industrial sectors.

Despite the scale and magnitude of this challenge, Finland is making impressive progress, as evidenced by the work being conducted by the VTT team. If such success can be achieved in the harsh Nordic climate, there is no reason that similar zero-energy technology could not be implemented in wider Europe and beyond: "In countries with milder climates, considerable advancement could be achieved with less technological effort," Klobut concludes.