

COLERAINE PROJECT

COLERAINE MICROGRID PROJECT

PROJECT DETAILS

Cluster: Energy Systems

Knowledge provider: Ulster University - Centre for Sustainable Technologies (PI Professor Patrick Keatley)

Industrial Partners: Bg Energy, Kerry Group, WD Meats with Causeway Coast and Glens Borough Council and Northern Health and Social Care Trust.

Total project costs: £48,736 over 6 months from April 2016 to September 2016.



PROJECT BACKGROUND

This project examined the feasibility of developing a hybrid 'power to heat' energy system for industrial heat consumers in Coleraine based on a large-scale water source heat pump (WSHP) and electrode boilers. More specifically the project sought to quantify the capability of large-scale advanced water source heat pumps, combined with megawatt-scale electrode boilers, to provide grid services (frequency regulation, reserve, load on demand) in a system with a high penetration of variable renewable energy (VRE).

Some years ago the Council recognised the potential to draw data centres to the area as it is the first landfall in Europe of the Kelvin Link fibre optic link with North America. In response, the Council established an Enterprise Zone to the north of the town, offering tax and planning incentives to companies located there. In order to provide enough power for energy intensive data centres, the Council commissioned a 33 kV power connection from the Loguestown substation to the Enterprise Zone and construction has now begun on a data centre in the Coleraine Enterprise Zone.

However, energy supply and the problems associated with it - high energy prices and expensive grid connections - is still an issue. To address this, Causeway Coast and Glens District Council developed a Smart Energy Programme, investigating a microgrid concept in which business consumers generate and trade energy downstream of the Loguestown 110 kV substation. The Smart Energy Programme led to this a feasibility study, funded by Invest NI and carried out by Ulster University, into the potential for a heat network in Coleraine.

PROJECT OUTPUTS

The study confirmed a significant and concentrated demand for heat within a relatively small area of the town which would lend itself to a smart district heat network. The chart below shows demand from industrial partners through the year.



CASE is an Invest Northern Ireland funded competence centre with grant funding of £5 million. The centre has successfully funded 18 research projects in renewable energy across biogas, marine renewables and energy systems sectors.

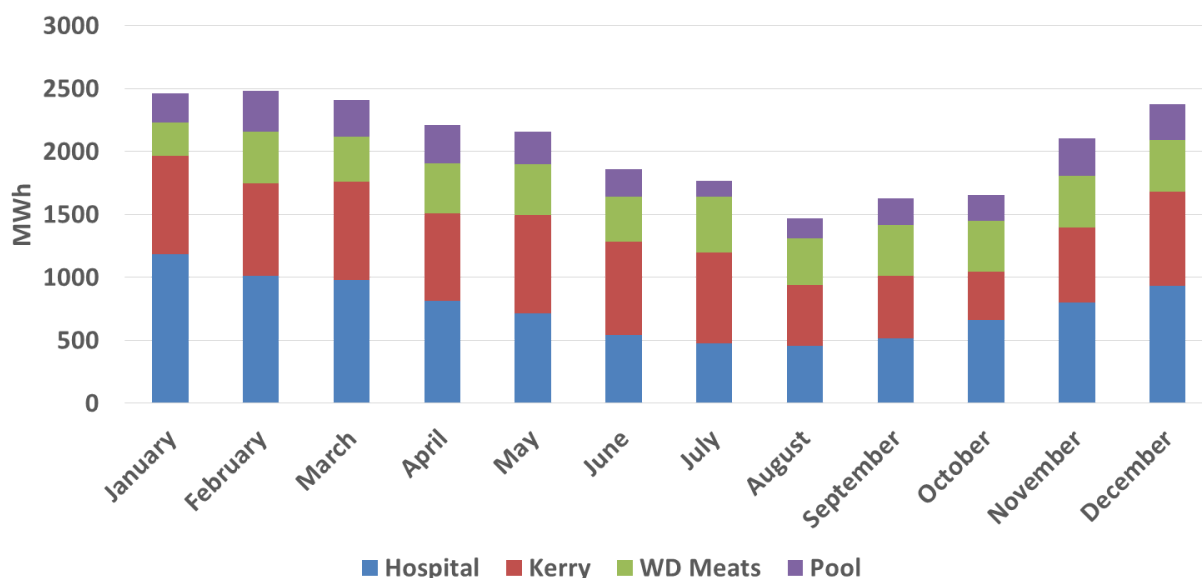
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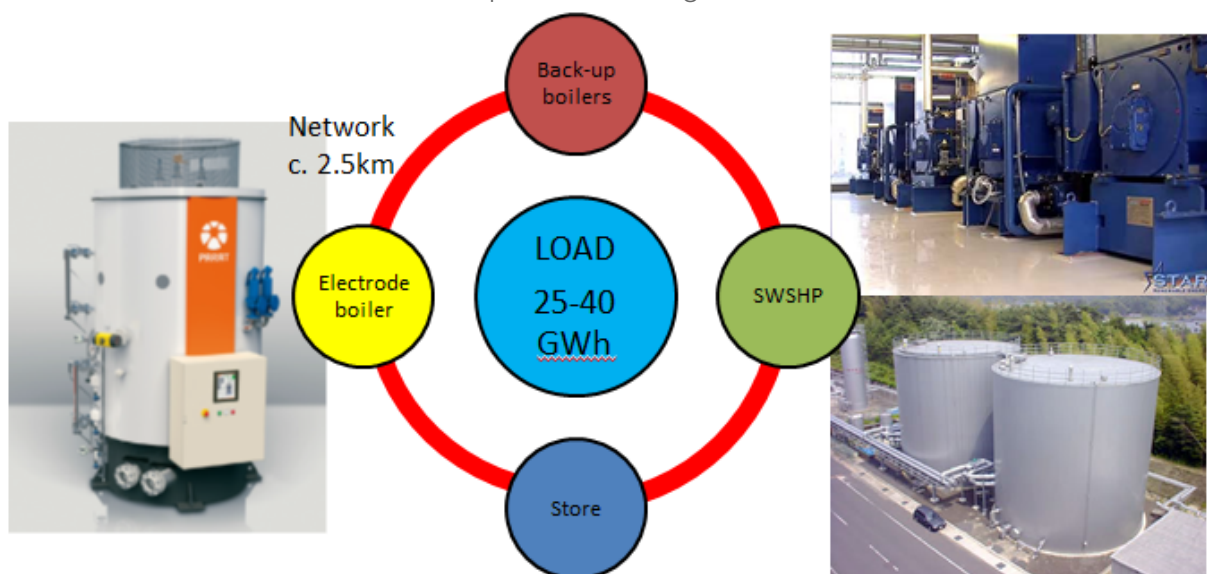
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PROJECT OUTPUTS

The study also found that the expansion of the network to include domestic loads would add significantly to its economic viability. Industrial heat loads in Coleraine are also associated with very large (by NI standards) electricity loads, particularly those of AVX .



Given the feasibility work already undertaken and the confluence of energy challenges in the area, Coleraine has been identified as an ideal location for the development NI's first smart district energy scheme, to include integrated power, heat and transport. The technical concept is illustrated in the diagram below. The core energy supply is a surface water source heat pump (SWSHP below and picture top right) that extracts heat from the River Bann. Electrode boilers are used to produce heat efficiently from electricity. Energy storage units such as compressed air stores are also in the network (picture lower right).



The feasibility study found that heat demand (for industrial consumers) in Coleraine town centre is larger and more concentrated than many schemes currently being funded in Great Britain, however, following the collapse of RHI there is no explicit support mechanism for district heating in Northern Ireland.

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IMPACT OF CASE FUNDING

ICASE funding enabled the formation of the consortium, following early activity by the local authority on the idea. This is best seen as overcoming market failure since whilst individual actors could benefit by the existence of the network, none is motivated to make the investment by itself.

BENEFITS FOR CASE MEMBERS

Industrial members that are technology companies benefitted from the development of a model for the network in which their products and services could be specified and shown to be of value in achieving the objectives of the network. It was already recognised that networks of this kind would have to be customised for each location and the study provided a concrete illustration of how this could be done in Coleraine.

Members that were energy consumers (Kerry Foods, WD Meats and the hospital) benefitted in understanding technical issues in using a network system of this kind. The technical departments concerned possessed the skills and knowledge to make use of project outputs in relation to their own energy planning (e.g. the need for back-up electricity generation in a scenario of this kind).



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