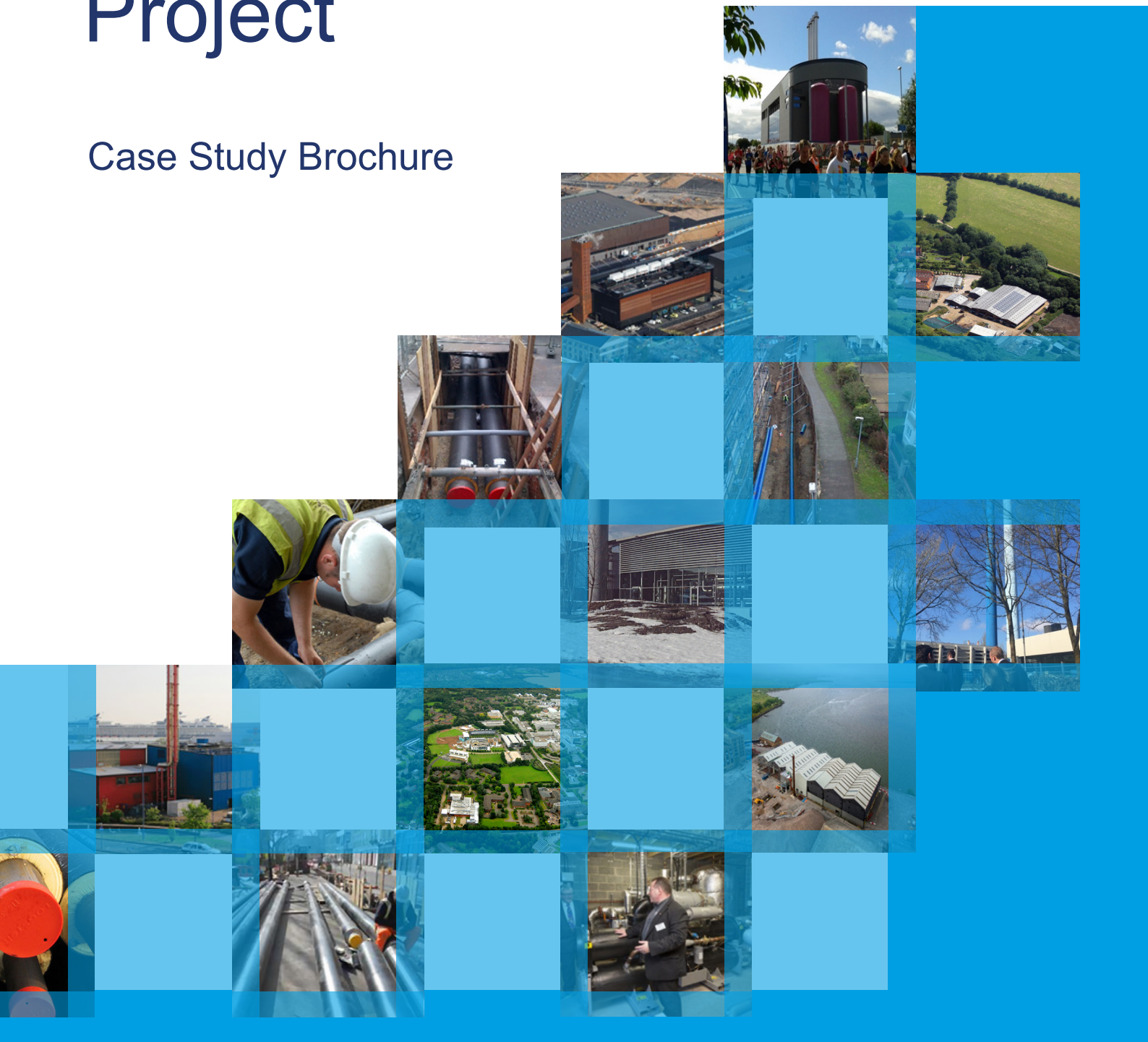
Department for
Business, Energy
& Industrial Strategy

Heat Networks Investment Project

Case Study Brochure



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1903

Copenhagen City Region, Denmark
Biomass combined heat and power, energy from waste, back up boilers

1980

Southampton, England
Geothermal, tri-generation, combined heat and power, back up boilers

1987

Sheffield City, England
Energy from waste

1989

Nottingham City, England
Energy from waste

2001

Warwick University, England
Combined heat and power, thermal store

2009

Islington, England
Combined heat and power, thermal store, heat from the London Underground

Drammen, Norway
Biomass boilers, water source heat pump

2010

Olympic Park, England
Combined heat and power, biomass boilers, tri-generation, thermal store

2011

Gateshead, England
Combined heat and power, thermal store

2013

Kingston Heights, England
Water source heat pump, thermal store

2014

Bore Place, England
Biomass boiler

2015

University of St Andrews, Scotland
Biomass boiler

Borders College, Scotland
Heat from sewage, heat pumps

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INTRODUCTION

Policy background to heat networks

The Clean Growth Strategy[1] (CGS), published in October 2017, sets out the policies and proposals that will allow the UK to meet its Fourth and Fifth Carbon Budgets. The Fifth Carbon Budget (2028-32)[2] was passed into law in 2016, setting a 57% reduction in greenhouse gas emissions compared to 1990, in line with the Committee on Climate Change's recommendation. The Clean Growth Strategy makes clear that heat networks will play a vital role in the long-term decarbonisation of heating.

What are heat networks?

Heat networks are a distribution system of insulated pipes that take heat from a central source and deliver it to a variety of different customers such as: public sector buildings, shops and offices, sport facilities, universities and homes. Heat networks provide a unique opportunity to exploit larger scale, and often lower-cost renewable and recovered heat sources that otherwise cannot be used. In the indicative scenarios set out in the CGS, heat networks are projected to meet 17% of heat demand in homes and up to 24% of heat demand in industrial and public-sector buildings in order to cost effectively meet 2050 decarbonisation targets. Heat networks currently supply around 1% of buildings heat demand.

Heat Networks Investment Project (HNIP)

To help deliver the required growth, in 2015, the Government allocated £320million in funding out to 2021 to grow the UK heat networks market through the Heat Networks Investment Project (HNIP). This support will help create the conditions necessary for a sustainable heat network market to emerge during the 2020s. HNIP will enable the market to grow from approximately 2% annual growth up to 10% per year, drive up standards and deliver substantial carbon savings. This funding is expected to lever in around £1billion of private and local investment by 2020/21. BEIS is aiming to launch the main HNIP scheme in autumn 2018.

This brochure is intended to provide an overview of a range of heat networks across various applications, technologies and scales. The case studies described here have been selected to showcase projects across in the UK and further afield in Norway and Denmark, where heat networks are well developed.

Heat network infrastructure is technology-neutral and can generally accommodate a range of fuels depending on the heating requirements of buildings connected including:

- CHP (combined heat and power)
- Deep geothermal
- Water sources e.g. for heat pumps
- Industrial waste heat
- Energy from waste
- Renewable heat
- Urban recovered heat – such as from the London Underground

Heat Networks can also be future-proofed for transition to other fuels.

[1] https://www.gov.uk/government/publications/clean-growth-strategy
[2] https://www.gov.uk/guidance/carbon-budgets

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All scheme information provided in the case studies, including carbon savings, was supplied by the network operators. Methodologies used to calculate figures may differ between projects and may not be directly comparable with published HMG analysis of energy and climate policies.

Case studies have been grouped by heat capacity and technology to help navigation.

Large (>50MW)	Medium (10-25MW)	Small (<10MW)
Copenhagen City Region p. 6	Southampton p. 7	Islington p. 11
Sheffield City p. 8	Warwick University p. 10	Kingston Heights p. 15
Nottingham City p. 9	Drammen p. 12	Bore Place p. 16
Olympic Park p. 13	Gateshead p. 14	University of St Andrews p. 17
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Biomass	Heat Pump	Combined Heat and Power (CHP)
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COPENHAGEN CITY REGION

Biomass combined heat and power, energy from waste, back up boilers	
Partnership:	Metropolitan Copenhagen Heating Transmission (CTR) and VEKS with the local municipal companies
Capacity:	882MW (822MJ/s)
Timescale:	Local district heating schemes started in 1903, CTR set up 1984 – ongoing
Carbon savings:	665,000 tonnes CO_2 saved per year

Courtesy of Danish Embassy Trade Council

References

C40 cities http://www.c40.org/case_studies/98-of-copenhagen-city-heating-supplied-by-waste-heat

Ramboll http://www.ramboll.co.uk/projects/group/district-heating-system-in-the-copenhagen-region

State of Green https://stateofgreen.com/en/infocus/publications/district-energy

CTR Centralkommunernes Transmissionsselskab I/S http://www.ctr.dk/en/about-ctr/technical-facts.aspx

- One of the world's largest network
- Supplies 98% of the city region with clean, reliable and affordable heating
- Cost-effective low carbon heat supply to one million residents in 22 municipalities
- District cooling is also being expanded

Project details

District heating started in Copenhagen with one small local system in 1903. Now 98% of the city's buildings are supplied by 21 municipal and community owned local networks, making it one of the largest and most successfully integrated groupings of heat networks in the world. Recently, several natural gas networks in the city have been replaced by district heating and the heat networks are expanding to supply the new urban areas being developed in and around the city.

In 1984, a partnership was formed by the capital's borough councils to set up a common supply of lowest cost heat across the Copenhagen region. The 160km long CTR pipe network, costing €379million, captures heat from across the city-region from a combination of biomass CHP plants (70% of heat supplied), energy from waste plants (25%) and back-up boilers (5%). It is linked to the local municipal networks via heat exchangers.

The total heated floor area which is supplied from the interconnected heat networks is 75million square metres. The annual heat sale is 30,000TJ (~8,500GWh). Average emissions are 100kgCO_2/MWh and households paying for their heat reduce their energy bills by about 50% compared to using the default fuel source in Denmark (oil heating).

District cooling in central Copenhagen has been supplied by the HOFOR company since 2010 and helps reduce CO_2 emissions by up to 30,000 tonnes each year against conventional single buildings based systems. The pipe system is being doubled in size to supply more customers and to make a significant contribution to Copenhagen's target to become CO_2-neutral in 2025.

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SOUTHAMPTON

Geothermal, tri-generation, CHP boilers, backup boilers	
Partnership:	Joint Cooperation Agreement between Southampton city council and ENGIE UK
Capacity:	26MW heat; 9MW of cooling; 7MW of electricity
Timescale:	District heating scheme started in 1980
Carbon savings:	12,000 tonnes of CO_2 saved per year

Courtesy of ENGIE

- One of the UK's oldest district heating schemes
- A pioneering example of UK geothermal heat potential
- The network has expanded considerably over the last 30 years to incorporate a great diversity of public and private customers

Project details

Southampton's district energy system emerged from the city's desire to become energy self-sufficient during the 1980s. In 1986, Southampton began pumping heat from a geothermal borehole and since then, the project has steadily expanded to include new CHP plants alongside absorption chillers and backup vapour compression machines to provide heat and cooling across the city. There are also future ambitions to pursue new technologies including energy from waste, anaerobic digestion and heat pumps.

Southampton's main energy centre lies in the heart of its retail quarter. A 14km pipe network across the city connects houses and buildings to the district heating network. The scheme has expanded to encompass over 45 energy users including over a thousand residential properties, several large office buildings, the Council Civic Centre, Royal South Hampshire Hospital, Southampton Solent University, an Olympic size swimming and diving complex, West Quay shopping centre, IKEA, a health clinic, Grand Harbour Hotel, police headquarters and BBC television studios, among others. In 2014, capital costs amounted to £13million. The network is currently providing over 40,000MWh of heat, 26,000MWh of electricity and 7,000MWh of chilled water per year whilst saving 12,000 tonnes of CO_2 emissions each year. Consumers also benefit from a £0.6million cost saving per year.

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SHEFFIELD CITY

Energy from waste	
Partnership:	Sheffield City Council / Vital Energi
Capacity:	60MW of heat; 19MW of electricity
Timescale:	1987 – Present
Carbon savings:	21,000 tonnes of CO_2 saved each year

Courtesy of Vital Energi

References

Vital Energi https://www.vitalenergi.co.uk/casestudies/sheffield-city-district-heating/

- Provides the city with a low carbon energy source generated from Sheffield's non-recyclable waste
- Supplies heat to over 140 buildings in the city
- One of the UK's oldest district heating networks

Project details

Established in 1987, Sheffield has one of the oldest district heating networks in the UK and over the years, the network has expanded considerably. The initial project was a joint venture between Sheffield City Council and Sheffield Heat and Power Ltd. Since then, the company has changed ownership and is now a wholly owned subsidiary of Veolia.

The main fuel source for the network is an energy from waste incinerator. This burns 12,000 tonnes of municipal waste each year, diverting non-recyclable waste away from entering landfills. The plant produces 60MW thermal energy and up to 19MW of electrical energy while reducing 21,000 tonnes of CO_2 from being emitted into the atmosphere per year. Contracted at a value of £16million, the scheme now serves a diverse mixture of 2,800 homes and 140 public and private buildings through a network of 44km pipework installed by Vital Energi's engineering team. Buildings served on the network include the Lyceum Theatre, Millennium Galleries, Crucible, Weston Park Hospital, Sheffield City Hall and several university buildings.

The Sheffield district heating scheme won the first CHPA Community Heating Award for its innovative, city-centre community heating scheme.

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NOTTINGHAM CITY

Energy from waste	
Partnership:	Nottingham City Council / Enviroenergy / Vital Energi
Capacity:	80MW of heat; 14.4MW of electricity
Timescale:	1989 - Present
Carbon savings:	27,000 tonnes of CO_2 savings per year

Courtesy of Vital Energi

References

Vital Energi

https://www.vitalenergi.co.uk/casestudies/nottingham-city/

Enviroenergy https://enviroenergy.co.uk/about-us/

UK District Energy Association http://www.ukdea.org.uk/en/our-members/full-members/52.html

Public Sector Energy http://www.publicsectorenergy.co.uk/project-showcase/150-articles/project-showcase/465-project-showcase-nottingham-city-council

- 85km pipework
- 5,000 domestic customers and 100 commercial customers
- Specialist Pipework

Project details

The Nottingham District Heating scheme was originally managed by British Coal. Today it is managed by an independent energy services company, an ESCO, Enviroenergy Limited which is wholly owned by Nottingham City Council.

Domestic and commercial waste is collected in Nottingham and burnt at the Eastcroft Energy from Waste facility which generates up to 52 tonnes per hour of steam at 23.5barg 371°C. The steam produced at Eastcroft is piped 1.5km to Enviroenergy London Road Energy Centre (ELREC) where it is converted to a medium temperature hot water system. It is then passed through a condensing extraction steam turbine to generate electricity and provide heat to the district heating network. Hot water is distributed to customers over an extensive pipe network that covers a large area of the city centre.

Enviroenergy has supplied electricity, hot water and steam to properties across the city centre for almost 20 years. Customers include the National Ice Arena, the Broadmarsh and Victoria shopping centres, the Nottingham Town Hall, Capital One's UK headquarters and Nottingham Trent University as well as approximately 5,000 domestic consumers. Around 60,000MWh of electricity and 150,000MWh of heat are sold annually.

Nottingham's heating network has been a constantly evolving project which has involved Vital Energi connecting many estates and buildings throughout the city, each with its unique challenges. The network consists of circa 85km of pipe in and around Nottingham City Centre

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WARWICK UNIVERSITY

Combined heat and power, thermal store	
Partnership:	Warwick University / Veolia / Edina
Capacity:	25.4MW of heat; 8.6MW of electricity
Timescale:	First CHP unit was installed in 2001, with additional energy centre added in 2014
Carbon savings:	Saves in excess of 5,000 tonnes of CO_2 per year

Courtesy of University of Warwick

- Successful university campus scheme
- Winner of the 2014 COGEN Europe Recognition Award for Technology/Innovation
- Aids long term energy security for the entire University campus

Project details

The University of Warwick has invested more than £14million in the development of their campus heat networks. Powered by a gas CHP plant, the original heat network's initial investment cost was estimated to be approximately £4million. It was installed in 2001 and extended over a 16km network. In 2014, an additional energy centre and heat network extension was added, costing £10million, increasing the network range to 19km.

The University generates over 60% of its electricity and hot water for space heating and absorption cooling requirements. The network also has thermal storage facilities which helps to meet heat demand, at peak times. The system generates 37GWh of low carbon electricity and 52GWh of heat per year.

Since Warwick University is the only customer of the network, all new buildings built on campus are required to connect to the heat network, ensuring a long term sustainable commitment to the scheme. Power and hot water produced from the CHP plant is distributed to teaching and lecture facilities, as well as 6,400 bedrooms across the campus.

In 2013, the University also upgraded the original 1960s boiler house with new, high efficiency boilers with heat recovery. Together with the new 4MWe energy centre, this helps save in excess of 5,000 tonnes of CO_2 per year. Cost savings of £300,000 per year have been realised and primary energy consumption has fallen by 13%.

References

DECC 'The Future of Heating: Meeting the challenge' https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/190149/16_04-DECC-The_Future_of_Heating_Accessible-10.pdf

Veolia http://www.veolia.co.uk/media/media/chp-warwick-university

Warwick University https://warwick.ac.uk/services/accommodation/studentaccommodation/

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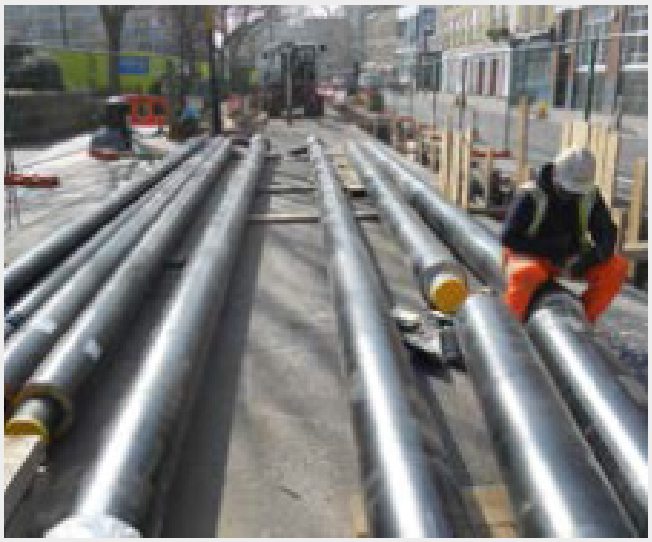
ISLINGTON

Combined heat and power, thermal store, heat from London Underground	
Partnership:	London Borough of Islington and the European Union CELSIUS project
Capacity:	Bunhill 2.27MWth of heat and 1.95MWe of electricity; Expansion 1.55MW of heat
Timescale:	Bunhill project 2009-2012; Heat from the tube project 2013-2018
Carbon savings:	Bunhill heat network saves 1,800 tonnes CO_2 per year; Heat from the tube project will save 500 tonnes per year



Courtesy of Islington Council

References

UNEP http://www.districtenergyinitiative.org/

Energy for London http://www.energyforlondon.org/islingtons-new-energy-centre-brings-power-to-the-people/

Islington Council https://www.islington.gov.uk/energy-and-pollution/energy/bunhill-heat-network

Greater London Authority https://www.london.gov.uk/press-releases-5910

- Bunhill Energy Centre provides cheaper, greener heat for hundreds of residents
- The heat from the tube project is a pioneering part of the EU CELSIUS projects
- Network constantly seeking expansion opportunities and new heat sources

Project details

Islington Council have developed an innovative district heating scheme in an inner-city environment. Funded by £3.8million in grants from the London Development Agency and the Homes and Community Agency, the Bunhill Energy Centre houses a 2MWe gas CHP engine and a 115m^3 thermal storage system. This delivers hot water to more than 800 local homes, the Ironmonger Row Baths, Finsbury Leisure Centre and four office buildings on Old Street. The installation has reduced the area's carbon footprint by saving 1,800 tonnes of CO_2 per year.

The Bunhill heat network is currently in a stage of expansion as the Council seeks to connect more customers and grow the low carbon heat network in the area, with a new project seeking to utilise heat from a London Underground ventilation shaft on the Northern Line. Heat will be captured using a heat exchanger and a heat pump system to help heat a further 500 homes added to the network.

This project is the first of its kind in Europe and is part of the EU CELSIUS project, a partnership of five cities that aims to demonstrate innovative district heating systems. Funded with £6million from Islington Council and £1.4million from the EU, the project is anticipated to produce approximately 1.55MW of thermal energy whilst reducing CO_2 emissions by 500 tonnes per year.

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DRAMMEN

Biomass boilers, water source heat pump	
Partnership:	Drammen Fjernvarme + Star refrigeration
Capacity:	13.2MW of heat
Timescale:	Heat pump commissioned in 2010
Carbon savings:	15,000 tonnes of CO_2 saved per year

Courtesy of Star Refrigeration

- City powered by heat retained in local fjord
- Meets the heating needs of Drammen's 63,000 residents and businesses

Project details

Drammen, in Norway, is home to over 63,000 inhabitants whose original district heating system was supplied by biomass and gas. As plans to increase the system were developed, a heat pump was desired for base load with 2-off dual fuel (oil and gas) boilers for back up. The water source heat pump utilises the 8°C fjord water as the heat source (return at 4°C) which is used to boost the district heating water up from 60°C to 90°C through 3-off, two-stage compression systems, providing reliable heat for the network. This system was chosen to overcome some of the pressure issues that a single stage solution could not address. It is a natural refrigerant-based heat pump utilising ammonia (Global Warming Potential = 0) and operates at an average Seasonal Coefficient of Performance (SCOP) of 3.05 after seven years of operation.

The annual cost savings are £2million compared to using gas fired boilers. Meanwhile, 105,000 tonnes of CO_2 have been saved over its seven years of operation, thus helping to reduce the carbon footprint of the city. There are now plans to utilise the 4°C fjord water discharged from the heat pump in a new hospital being constructed beside the energy centre to meet its air conditioning requirements. This new step shows the true potential of a water source heat pump where 1 unit of electricity can generate 3 units of heat and 2 units of cooling. In less demanding operating conditions, this Combined Coefficient of Performance (COP) could go up to 7 or 8.

References

DECC 'The future of heating: meeting the challenge' https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/190149/16_04-DECC-The_Future_of_Heating_Accessible-10.pdf

EHPA http://www.ehpa.org/technology/best-practices/large-heat-pumps/drammen-district-heating-norway/

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OLYMPIC PARK

Combined heat and power, biomass boilers, tri-generation, thermal store	
Partnership:	The London Legacy Development Corporation (LLDC) + Stratford City Development (SCD) + ENGIE
Capacity:	92MW of heat; 57MW of cooling; 10MW of electricity (initial phase)
Timescale:	Project opened in 2010
Carbon savings:	Achieves 12,000 tonnes of CO_2 emissions savings per year

Courtesy of ENGIE

- Designed to provide the London 2012 Olympic and Paralympic games with low carbon heating and cooling
- District heating system estimated to reduce CO_2 emissions by 60% over conventional heating systems
- One of the largest combined cooling, heating and power facilities in the UK

Project details

The Queen Elizabeth Olympic Park District Energy Scheme is one of the largest combined cooling, heating and power facilities in the UK. The Kings Yard energy centre is located at the western edge of the Olympic Park, with a large biomass boiler housed in an adjacent retained industrial building. A second energy centre in Stratford City feeds the network from the east.

Altogether, the scheme initially comprised 18km of distribution pipe work (16km heating and 2km cooling) and has now grown well beyond 20km of pipe work, with the aim to heat around 10,000 domestic homes in the long run. The two energy centres generate heat with a 3.5MW woodchip biomass boiler, three 3.3MWe gas-engines and 80MW of back-up hot water boilers. The cooling is generated by seven ammonia electric chillers (totalling 49MW) plus two 4MW absorption chillers. The base-load demand for heat is met from the biomass boiler, using locally sourced, grade A sustainable woodchips for fuel. The utilisation of low carbon heat is maximised with intelligent use of thermal storage.

The two energy centres are designed to eventually provide 200MW heat, 64MW of cooling and 30MW of low-carbon electricity, with significant space provision for future plant and an ongoing research programme into the options for deployment of future low carbon technologies.

References

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UNEP http://www.districtenergyinitiative.org/

BEIS 'Heat Network Detailed Project Development Resource: Guidance on Strategic and Commercial Case' https://www.arup.com/-/media/arup/files/publications/h/strategic_comm_hn_guide_issue_1_22072016.pdf

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GATESHEAD

Combined heat and power, thermal store	
Capacity:	21MW of heat; 4MW of electricity
Timescale:	2011-2016
Carbon savings:	Initial CO_2 savings will be 3,000 tonnes per year; on expansion this could reach 15,000 tonnes

Courtesy of Gateshead Council

- The Gateshead District Energy Scheme is the first of its kind and scale in the North East
- Providing heat and power for homes and businesses
- Buildings served by the new network are expected to save significantly on energy bills compared to their current suppliers

Project details

Since 2011, Gateshead Council together with Parsons Brinckerhoff have developed a new district energy scheme to provide heat and power for central Gateshead and Gateshead Quayside. The energy centre is an £18.5million scheme fully financed by Gateshead Council providing low-carbon energy to two commercial customers, three public buildings, two social housing blocks (with 190 residents) and the City's civic centre. Housed in the Baltic Business Quarter, the energy centre contains 2MW gas CHP engines and will generate both heat and power for sale directly to customers, via 3km underground heat and private wire networks.

The initial scheme will supply 16GWh of heat per year but is capable of expanding to 35GWh per year. Gateshead Council is in discussion with several other commercial hotels and offices interested in the scheme and future plans seek to include developments in Gateshead Quays, Baltic Business Quarter and the Exemplar Neighbourhood (which includes development of 1,000 new homes, delivered by the Gateshead Regeneration Partnership). Once the project becomes fully functional, it anticipates heating and power cost reductions for building occupants of around 5% per year against prevailing market rate heat and power costs.

References

DECC publication: 'Investing in the UK's heat infrastructure: Heat Networks' https://www.gov.uk/government/publications/investing-in-the-uks-heat-infrastructure-heat-networks

Gateshead Council http://www.gateshead.gov.uk/Building%20and%20Development/Regeneration/Gateshead Centre/Gateshead-Town-Centre-District-Energy-Scheme/Gateshead-Town-centre-District-Energy-Scheme.aspx

Gateshead Quays https://www.investgateshead.com/article/2364/Gateshead-district-energy-project-earns-1-million-boost

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KINGSTON HEIGHTS

Water source heat pump, thermal store	
Partnership:	NHP Leisure Developments Ltd and Christopher White Associates
Capacity:	2.3MW of heat
Timescale:	Oct 2013
Carbon savings:	Estimated to save over 500 tonnes CO_2 per year

Courtesy of Mitsubishi Electric

- Revolutionary project using abundant solar energy stored in the river Thames
- Project demonstrates potential for water source heat pumps to become commercially viable on a large scale

Project details

NHP Leisure Developments have pioneered a new eco-friendly residential development in Kingston-upon-Thames using water source heat pumps. This system recovers solar energy naturally stored in river water. Water passes through a two-stage filtration process and is then passed through high-efficiency heat exchangers. Once the low-grade heat has been harvested, the water is immediately fed back to the river untreated in any way. It may have a slight temperature change +/- 3°C but the water becomes instantly assimilated into the main body of water and returns to the ambient temperature immediately. The heat exchangers transfer this low-grade heat from the river to an internal 'closed' loop water system. This is then carried 200 metres to a plant room in the apartment building where heat pump technology boosts the low-grade heat to the temperature required for the hot water.

Installed at a cost of £2.5million, the system currently serves 137 domestic flats and a 142-bedroom hotel, saving over 500 tonnes of CO_2 emissions per year by using water source heat pumps instead of burning biomass in a CHP plant. Kingston Heights shows the great potential of renewable energy that could be replicated in other towns and cities across the UK.

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ICAX http://www.icax.co.uk/Kingston_Heights.html

Mitsubishi Electric http://heating.mitsubishielectric.co.uk/KnowledgeBase/Public/kingston_case_study.pdf

Energy loop animation https://www.youtube.com/watch?v=8rMNC_

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BORE PLACE

Biomass boiler	
Partnership:	Bore Place
Capacity:	300kW of heat
Timescale:	Feasibility study commissioned 2014, scheme built and commissioned by end 2015
Carbon savings:	104 tonnes of CO_2; the scheme displaced three stand-alone biomass boilers which were re-installed elsewhere contributing savings of another 55 tonnes

Courtesy of Bore Place

References

Bore Place https://www.boreplace.org/

- Community group project which received grant support for feasibility studies from the Government's Rural Community Energy Fund
- Uses locally sourced biomass feedstock

Project details

Bore Place is a 500-acre estate in Kent encompassing an organic dairy farm, organic market gardens, a conference centre and an environmental education centre. It applied for a Rural Community Energy Fund grant of £10,156 in February 2014. The feasibility report was signed off in March 2015.

Two 150kW Gilles woodchip boilers were installed in a separate energy centre. Two existing oil-fired boilers serving the conference centre were retained as back-up. The milking parlour, conference centre, education centre and three other buildings were connected to the heat network displacing oil, biomass and electric heating. The opportunity was taken to improve the internal heat distribution systems of two of the buildings to improve comfort.

Wood chip was chosen on economic, educational and practical grounds. Approximately 50% of the wood is supplied from the site's own coppiced woodland keeping this in management with associated employment, education and biodiversity benefits. Incremental CO_2 savings were estimated at 104 tonnes, but the displaced biomass boilers were re-sited so will have contributed to an additional saving of 55 tonnes.

Economically, the project was only possible with the support of the Renewable Heat Incentive.

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UNIVERSITY OF ST ANDREWS

Biomass boiler	
Partnership:	University of St Andrews / Vital Energi
Capacity:	6.5MW of heat
Timescale:	Sept 2015 – Jan 2017
Carbon savings:	6,000 tonnes of CO_2 reduction each year

Courtesy of Vital Energi

- Improved district heating design bringing lower heat loss and increased savings
- Allows use as an educational resource
- Additional future proofing for ease of modification/expansion

Project details

The University of St Andrews harbours ambitions to become the UK's first energy carbon neutral university. In 2010 acquired the disused Guardbridge Paper Mill and developed plans to turn it into the Guardbridge Energy Centre. The £25million project was seen not only as a way of lowering carbon emissions, but also of revitalising the Guardbridge area, creating jobs and ensuring much of the investment was spent locally and regionally to benefit the community.

The project is one of the largest biomass and district heating schemes in Scotland and the project involved converting the former 19th century Guardbridge Paper Mill into a 21st century energy centre capable of pumping the hot water through a 10.6km district heating network where it would serve 37 buildings on its North Haugh Campus.

In addition, the University was keen for the energy centre to be used as an education facility, so the designers created a solution which allows easy access for groups ranging from primary school children to energy experts.

The project identified future proofing opportunities at an early stage, including additional acoustic enhancements, due to the potential to create further buildings on the site. The early identification means that alterations can be included into the original design, making them not only more affordable, but also better integrated.

References

Vital Energi

https://www.vitalenergi.co.uk/casestudies/st-andrews-biomass-district-heating-project/

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BORDERS COLLEGE

Heat from sewage, heat pumps	
Partnership:	Borders College, Scottish Water, SHARC Energy Systems
Capacity:	800kW of heat
Timescale:	Launched in 2015
Carbon savings:	170 tonnes of CO_2 per year

Courtesy of Borders College

- UK's first heat from sewage scheme
- Provides 95% heat needed by the Galashiels Campus
- Does not impact on local waste water network

Project details

In June 2015, SHARC Energy Systems secured a £4million investment from Equitix and the UK Green Investment Bank plc (GIB) to finance the installation of the SHARC sewage heat recovery system. From this, Borders College have installed the UK's first heat from sewage scheme which intercepts heat from a waste water sewer close to the local treatment works. The local treatment works are operated by Scottish Water with SHARC Energy Systems as the main partner in the project, specialising in sewage heat recovery technology.

The system uses heat pumps to amplify the natural warmth of the waste water and the heat is then sold to Borders Campus in Galashiels, under a 20-year purchase agreement. Providing around 95% of the heat needed by the Galashiels Campus, the scheme does not impact on the normal operation of the local waste water network but delivers long term renewable heat to the campus. This innovative technology aims to deliver a substantial reduction in CO_2 emissions. There are plans to deliver similar systems across Scotland.

References

Borders college

http://www.borderscollege.ac.uk/news-and-events/uks-first-heat-from-sewage-scheme-launched/

Department for
Business, Energy
& Industrial Strategy

For further information on any of the heat networks featured, please contact:
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If you would like to find out more about the Heat Networks Investment Project, please visit:
https://www.gov.uk/government/publications/heat-networks-investment-project-hnip

Prepared by Ecuity Consulting LLP 2018