District Energy Vanguards Newsletter

Issue 30 - November 2015

This District Energy Vanguards Network Newsletter is called November as it reports news items and emerging events announced during November 2015. Click here for latest issue.

We have three longer articles in this issue: on the surprise £300m budget announcement; on tenants' experience of district heating metering; on new research from UK Committee on Climate Change on potential for district heating; and special section on COP21 in Paris.

Opinion pieces of less than 400 words invited. Meanwhile … ***Seasons Greetings!*** David

Early Christmas?? Astonishment!!

This was the delegates' mood at the Association for Decentralised Energy's Heat Conference which took place on the day of the Chancellor's Autumn Statement. Against a backdrop of negative changes made by the new government – which have brought gloom to the sustainable energy sector, including the district energy sector (e.g. removal of Zero Carbon Homes and Allowable Solutions policies) – came some welcome news.

The Chancellor pulled a huge rabbit out of his hat for the sector with two paragraphs on p96 of the Spending Review and Autumn Statement 2015:

HM Treasury

Long-term investment

2.95 *The government's doubling of investment in DECC's innovation programme will help position the UK as an international leader in small modular nuclear reactors, and deliver commitments on seed funding for promising new renewable energy technologies and smart grids.*

2.96 *The government will provide £295 million over 5 years to improve the energy efficiency of schools, hospitals and other public sector buildings.*
Separately, over £300 million of funding for up to 200 heat networks will generate enough heat to support the equivalent of over 400,000 homes and leverage up to £2 billion of private capital investment. [our emphasis]

£300m is six times larger than last major district heating funding initiative from government launched back in 2002. The then 'Community Energy Programme' offered grants of *up to 40% of capital costs* (with an average grant given of 25%); but – critically – with a spend timeline of only three years set, it was very difficult for project proponents to scale up so quickly and consequently only £29 million was spent.

This time the government has carefully laid the foundations with the work of HNDU and the Scottish Heat Programme. The scale of the potential for new heat networks across the UK is highlighted in two new investment reports from the Scottish Government and DECC. Furthermore the term will be over the remainder of this Parliament, namely 4.5 years.

However, with only a single line on this £300m initiative, a number of questions arise.

- Will a proportion of the funding be allocated to Scotland under the Barnett Formula and if so will it be at the discretion of the Scottish Government (who experienced a 5% cut to their budget) as to what it is spent on?
- Unlike some other energy initiatives, such as the ECO, the RHI, and nuclear, the Chancellor did not actually mention this new heat network funding in his speech. These items appear in the Autumn Statement 2015 in bold letters. The passage on heat networks does not. Hence, how certain can we be that this funding is secure?
- What will be the level of funding provided per project?

The District Energy Vanguards Network looks forward to working with DECC and others in developing the answers to the above questions, and to help release the funds to support the development of networks as soon as possible, and so avoid the pitfalls experienced by previous programmes.

The Autumn Statement says that the Energy Company Obligation (ECO) would continue, "… ***replaced from April 2017 with a new cheaper domestic energy efficiency supplier obligation which will run for 5 years.***" [Para 1.139]. The ECO is set to fall to an annual spend of £640m per year. Although district energy has had a difficult time under the ECO, the consultation process for this new five-year programmes provides a further opportunity for the district heating sector to promote the benefits of its inclusion in the programme.

A further welcome – if rather confusing announcement – was that the "… *the government will increase funding for the Renewable Heat Incentive (RHI) to £1.15 billion in 2021*" – even though the Chancellor stated in his speech that RHI spend was to be cut by £700m.

Considering it was widely suggested that the RHI would be axed, this appears to be a highly positive outcome. Similar to the ECO, the scheme is to be redesigned following a forthcoming consultation on what is to be funded, and this again presents a key opportunity to ensure that RHI works closely with Government's district heating ambitions.

The Chancellor's announcements were somewhat overshadowed by Secretary of State for Energy and Climate Change, Amber Rudd's 'Reset Speech' the week before – where she said: "*In the next 10 years it's imperative that we get new gas-fired power stations built."*

As my colleague Syed Ahmed tweeted after news of the Chancellor's Statement appeared – '*if we have to have new gas generation, let's make it CHP, providing low carbon heat to these 200 new heat networks'.* A point well made.

Lastly, the Committee of Climate Change (CCC) has published new research on the potential for district heating as part of its work feeding into its advice to government for the 5th Carbon Budget. This is described in an article by CCC Senior Analyst Jenny Hill.

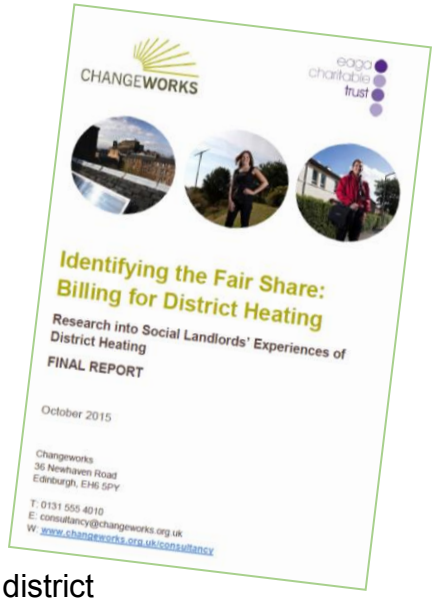
A second separate article by Tessa Clark of Changeworks reports on their research on the experience of district heating by housing associations and their residents.

Both are worthy of comment. But I shall leave that to these two researchers.

Overall it has been a helluva month!! Let's hope the coming festive month provides yet more welcome announcements for the district energy sector!

Michael King, Editor

Metering and billing of social housing district heating



Recent research published by environmental charity Changeworks investigates the experiences of social landlords and residents with district heating, specifically around metering and billing. "Identifying the fair share: billing for district heating", funded by eaga Charitable Trust and the City of Edinburgh Council, provides useful learnings for current and future schemes.

The research found that social landlords had mixed experiences of district heating and that managing schemes was often challenging due to their complexity. Problems were common, sometimes with significant consequences.

For example, faults with heat meters could cause billing errors which could then lead to tenant complaints. However, landlords generally felt such challenges could be overcome and district heating was successful in providing affordable heating.

Different approaches had been taken to billing including fixed fee approaches, typically 'heat with rent', or variable rate billing where residents pay the amount of heat consumed. Fixed fee approaches were preferred by some landlords to prevent under-heating and minimise tenants' worry about heating bills.

In contrast, variable rate billing was considered to be fairer by some landlords as it incentivises energy saving behaviours. Success and challenges were experienced with both approaches. Common issues included difficulty setting prices, managing debt and disconnection, and high administration costs.

Landlords also faced issues with heat meters including transmission difficulties, residents tampering with them and high installation or maintenance costs. Such findings are pertinent for heat scheme owners given new metering requirements, set out by the Heat Network (Metering and Billing) Regulations 2014.

Most residents were satisfied with district heating, with 75% of those surveyed saying they preferred it to their old heating system. A likely contributing factor is residents' dissatisfaction with other heating systems, such as electric storage heaters.

Residents' preferences for billing and payment options varied. For example, prepayment meters recorded the highest levels of dissatisfaction but this was partly attributed to limited top-up facilities, and other residents favoured prepayment as it enabled them to budget.

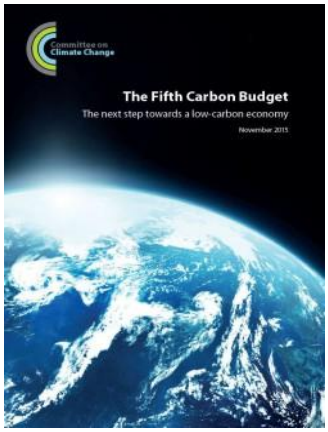
Overall, the research highlighted that an effective billing system is integral to the success of district heating schemes. Recommendations are provided to support social landlords implement schemes more successfully. These include:

- offering residents multiple payment options,
- consulting with residents during the planning phase and
- providing easy-to-understand information to residents about how their billing works.

The research report, summary and appendices are available on the Changeworks website.

For enquiries please contact **Tessa Clark, Senior Consultant at Changeworks, Edinburgh**.

Strengthened role for heat networks to 2030



The UK Committee on Climate Change (CCC) has delivered its advice to Parliament on the level of the Fifth Carbon Budget (2028-2032).

It recommends an average of 57% reduction on 1990 levels. This is the next step from a 52% reduction required under the existing fourth carbon budget, which ends in 2027.

The advice draws on research by Element Energy and Frontier Economics on the role for low-carbon heat networks in decarbonising heating.

The advice presents a new set of heat de-carbonisation scenarios with four separate technology mixes: heat networks; heat pumps, biomass and hydrogen. Each scenario achieves 12 Mt CO_2 of direct abatement in buildings to 2030, compared to emissions of 84 Mt CO2 in 2014. This is combined with measures to reduce demand, such as heating controls and insulation, which contribute a further 11 Mt CO2 abatement. This represents an appropriate, cost-effective, contribution from buildings to the economy-wide reduction in emissions.

Low-carbon heat networks feature strongly in each of the alternative mixes, and deliver over half the abatement in the main central scenario from low-carbon heat. This is a step up from previous scenarios in CCC advice and analysis for earlier carbon budgets.

The Element Energy study assesses the social cost-effectiveness best role of for low-carbon heat networks, based on new detailed spatial analysis to 2050 of 1 sq.km zones. The modeling matched up zones with high heat density to sources of low-carbon supply, including waste heat, water- and sewage-source heat pumps. It also considered interactions with the rollout of efficiency measures across the building stock and the transition over time to low-temperature networks.

The analysis suggests that low-carbon heat networks could account for nearly 10% of heating supply in 2030, with the right policy framework in place. The study also reviews evidence on district cooling and the role of thermal storage.

A separate report by Frontier Economics considered what policies are needed to achieve this level of roll-out and address current barriers to uptake, building on previous work by Poyry (2009) and BRE, University of Edinburgh and CSE (2013). The assessment underscores the need for a mechanism to address the lack of carbon pricing, along with a supportive planning framework and oversight of competition.

Some important results from the work include the greater share of take-up in non-residential buildings (around two-thirds of the total) reflecting the importance of 'anchor' loads and lower costs of connection. The analysis also shows the impact on cost-effectiveness of the proportion of buildings connecting in a given area, with a range of 50-100% assumed connection fraction tested as part of the work.

This suggests a role for heat zoning, along with policies such as encouraging public buildings to connect to schemes where cost-effective. Water-source heat pumps play a prominent role in the future scenarios, building on water-source heat map work developed by DECC and the Environment Agency.

The CCC advice is at https://www.theccc.org.uk/publication/the-fifth-carbon-budget-the-next-step-towards-a-low-carbon-economy/. The detailed buildings scenarios are presented in the Technical report, with links to the Element Energy and Frontier Economics studies.

Jenny Hill, Senior Analyst, Committee on Climate Change

UK policy, regulation, consultations, guidance, funding

The two reports for the UK Committee on Climate Change (CCC) are:

1. Research on District Heating and local approaches to heat decarbonisation
A Central scenario leads to 42 TWh/yr of DH in 2030 and 81 TWh/yr in 2050. Heat is supplied by many highly localised sources, including waste heat from industry and power stations, water sources and sewage, as well as energy-from-waste and biomass. Displacement of gas-based heating by these low carbon sources leads to a carbon emissions abatement of more than 15 MtCO2/yr in 2050, at an average cost of £108/tCO_2.
2. Overcoming Barriers to District Heating – report suggests policy intervention required.

UK Trade and Investment and DECC have published Investing in the UK's heat infrastructure: Heat Networks and a table of E&W pipeline projects – needs filling in!

Renewable Energy Association joined with seven renewables bodies to effectively lobby Amber Rudd / HMG to focus on renewable heat as part of the UK heat delivery strategy.

Energy Technologies Institute's Smart Systems and Heat: Consumer challenges for low carbon heat report outlines the real challenge in weaning UK public off gas heating.

Good to see positive report in Housing Association Magazine of a launch seminar for residential social landlords of the CIBSE / ADE Heat Networks Code of Practice for UK.

Seven of UK's largest district heat network operators signed up to share performance data to improve the efficiency of heat networks. Seven other projects also funded.

UK conferences, workshops and awards

Low Carbon Project Development in Scotland: Delivering energy efficient investment – Wed 9th Dec, Edinburgh, set to explore Grangemouth, Clyde Gateway etc opportunities.

International 2016 Low Carbon Heat and Water Conference & Showcase – 23 Feb, 2016: low carbon heat & cooling and water & wastewater sectors. Free. Glasgow.

Heat Networks Code of Practice Certification: CIBSE is offering two-day courses with the opportunity to take an exam leading to entry on the Heat Networks Consultant register. They're intensive / require a high level of knowledge / two years' experience - so check on: Competencies / Self-assessment questions / List of required reading and preparation.

Dates offered: Manchester 1-2 March 2016 / London 9-10 March 2016 / London 18-19 May 2016 / Leeds 8-9 June 2016 / London 6-7 July 2016 + one in Edinburgh tbc.

UK general news

The Eden Project and EGS Energy have planning permission for a 3-4MW geothermal project taking 180degC heat from 4km down to heat and power the site. Funding sought.

Caithness General Hospital, Wick to be heated by Ignis Biomass "phoenix" energy centre at Old Poultney Distillery on north coast – local woodchip boiler with co-produced power.

The Association for Decentralised Energy (ADE) strong case for continued investment and policy paper were clearly recognised by the Chancellor in his Autumn Statement.

HEAT TRUST, GB-wide independent heat customer protection scheme launched, 15,000 heat customers get complaint resolution and improved customer service standards.

Steelwork is now up at Gateshead District Energy Centre, a £14m project set to serve Baltic Business Quarter and adjacent residences - initially from a 2MWe gas-fired CHP.

Aberdeen Heat & Power has won a 2015 VIBES Award (Vision in Business for the Environment in Scotland) in the category of 'Environmental Product or Service'.

Cheshire East Council seeks to develop district heating with opportunities for geothermal and renewable energy – see also 2013 Atkins Deep Geothermal Review Study for DECC.

Scarborough Hospital installed a 776kWe CHP engine to deliver £500,000 energy savings and cut CO_2 by 2,100 tonnes / year. Vital Energi, who designed and installed the system, have won a 15 year energy performance contract with the Trust. ADE Awards finalists.

UN Conference of the Parties (COP21) Paris

Low-carbon electricity: energy for life, energy for the Earth with Ségolène Royal: French Minister of Ecology, SD and Energy, 11:30-13:00 Tues 1 Dec, Observer Rm 3, Le Bourget.

Phase out of fossil fuel subsidies and a Paris Climate deal, Climate Action Network & Oil Change International, 15:00-16:30 Friday, 4 Dec, Observer Rm 1, Le Bourget.

District Energy and Buildings Efficiency - Cities enabling countries to meet their climate objectives / highlighting energy efficiency in the heating, cooling and building sectors in the urban context.. 13:15 - 14:45, Sat 5 Dec, OECD Pavilion (Blue zone).

SE4All`s focus is on Lima-Paris Action Agenda and Energy Access and Energy Efficiency for the Energy Day 10:00- 18:30 on 7 December, Observer Room 10, Le Bourget.

Global Geothermal Alliance (GGA) is to be launched on 7 Dec at Energy Day for COP21.

The Overseas Development Institute (ODI) - a leading independent UK think tank - report: Empty promises: G20 subsidies to oil, gas and coal production - $452 bn/yr in subsidies.

Global developments [via IDEA & Cogeneration & On-Site Power Production etc]

FLEXe consortium in Finland aims to achieve a forecasting energy system to grid balance CHP and renewables outputs – funded by Finnish Funding Agency for Innovation TEKES.

The Swedish town of Växjö wins legal case requiring connection to the CHP/DH network powered by local waste wood biomass. The "the greenest municipality in the world" – of 80,000 between Copenhagen and Stockholm – is aiming to cut 70% CO_2/person by 2025.

Heat Roadmap Europe: Identifying strategic heat synergy regions – according to Swedish researchers who studied district level heat opportunities in 834 regions across 27 member states – could deliver EU 2020 energy efficiency goals / the Roadmap for Energy Union.

EU on course to miss primary energy savings goal for 2020, latest Commission statistics show – but CHP/DH could enhance use of primary fuels to help achieve targets.

Cogen Europe have published a briefing Competitive heat can fire up EU industry growth.

International Energy Agency (IEA) Energy Conservation through Energy Storage (ECES) project nearing completion – report: Latent Heat Storage has Huge Potential in Long Run

Cleaner, Cheaper, Stronger: Industrial Efficiency in the Changing Utility Landscape explores how US utilities face major opportunities in delivering EPA's Clean Power Plan.

An 800kWe MWM 16-cylinder reciprocating gas CHP engine, +2 new boilers, for 1,700 homes, 2 day-care centres, in Berlin, Germany – replaces 6 old boilers saving 600tCO_2/yr.

Link to the glossary of terms and acronyms

This newsletter is prepared in Edinburgh with support of correspondents who alert me of useful content. All contributions welcomed – email to David.Somervell@ed.ac.uk.

This is a legacy service of the Heat and the City project led by the team at the University of Edinburgh which continues to bring together leading practitioners promoting District Energy in the UK. www.heatandthecity.org.uk/

Heat and the City has been supported by:

Research Councils UK Energy For a Low Carbon Future

Research Highlights return … [thanks to Mike Martin]

The increased utilisation of geothermal energy in a DH network with heat storage – algorithms for the sizing and operation of plant were developed for this study to model geothermal DH systems with thermal storage leading to results which indicate lower pipeline heat losses as well as cheaper and more environmentally friendly solutions. (UK, Glasgow) (Applied Thermal Engineering).

Using data centres for combined heating and cooling: an investigation for London – this study explores the use of waste heat from data centres in DH systems using heat pumps to upgrade the heat where necessary.
(London South Bank University) (Applied Thermal Engineering).

A cost-effective evaluation of biomass DH in rural communities – this study found that eight of ten rural villages could cost-effectively be heated via biomass DH compared with heating oil, and that viability was dependent on erratic fuel oil prices and the presence of large heat demands. (State University of New York, USA) (Applied Energy)

The cost of using power plant reject heat in low-temperature DH&C networks – this study examined the costs of DH&C schemes with different weather conditions, found that their implementation greatly reduce CO_2 emissions and would lead to significant cost and net primary energy savings even where the heat was transported over long distances.
(Madrid City University, Spain), (Applied Energy)

Optimal design and operation of CCHP-DNC systems in a residential complex – an MILP model for the optimization of complex distributed energy systems was used to identify the opportunities for the integration of photovoltaic and DH&C systems.
(Shahid Beheshti University, Tehran, Iran) (Energy and Buildings)

An applied methodology for assessment of the sustainability of biomass DH systems - this study describes a methodology and associated software as applied to the design of biomass fueled DH systems, taking into account the types of building structures and urban settlement layout around the plant.
(Agricultural University of Athens) (International Journal of Sustainable Energy)

Heat demand profiles of ECMs in buildings and their impact on a DH system - this study highlights the emerging problem of diminishing environmental benefits from heat demand reducing energy conservation measures (ECMs) of buildings serviced by DH systems (DHS), as the supply side is becoming “greener” and more primary energy efficient
(Mälardalens University, Västerås, Sweden) (Applied Energy)