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Re-Generate Newcastle

**Sustainable Innovation in Refrigeration Air
Conditioning and Heat Pumps Network
(SIRACH)**



Thursday the 1st October 2015

District Energy - Past , Present & Future

**Why District Energy in
Newcastle?**

- **The Local Vision & Experience**
- **European and National Policies**
- **Local Policies and Plans**



Vision

Re-Generate Newcastle Vision

“ To utilise the existing, planned and future development sites in Newcastle to build on the current heat infrastructure within the city to create a network that can link the east and west of the city through into the city-centre. The heat network will provide renewable & low carbon heating and cooling to public sector buildings, commercial and residential properties as set out in the Energy Masterplan.”



Zone of Planned District Energy

Existing DE schemes

A number of existing DE schemes exist throughout the city:

1. Byker Estate, 2300 connections, Gas & Oil Boilers, Gas CHP & Biomass Boilers
2. Riverside Dene, 450 connections, Gas and Biomass Boilers
3. St Anne's Close, 230 Connections, Gas Boiler
4. Queens Court, 120 connections, Gas & Biomass Boiler
5. Scotswood (currently under development) 1800 connections planned
6. Multiple Communal Schemes

Total Customers 3871 (67Gwh of heat p.a.)

Byker Estate Heat Network

- 2300 Dwellings 1979
- Byker Wall and Estate Grade 2* listed
- Main heat source was natural gas with oil as backup
- Community Trust Status in 2012
- 2012/13 Major upgrade to Energy Centre and Network
- CESP £2.5M Npower Biomass Boiler and CHP in 2012. Saving £156K pa and 64k Tonnes of Co2 over project lifetime
- NCC Own and Operate network currently. Investing £7M in network upgrades, BMS and controls 2015/16
- Two additional biomass boilers planned for 2016



Riverside Dene

- Originally 10 blocks “Cruddas Park” 1960’s “City in the sky”
- 5 Blocks Regenerated & completed in 2011 £35m investment 450 dwellings to Decent Homes Standard.
- Originally electrically heated with a high level of voids and fuel poverty
- EWI & Biomass Boiler with Nat Gas backup DH to all 5 Blocks
- £1.7m Funding for DECC Low Carbon Infrastructure Fund
- 1000T Co2 Savings per year
- Looking to expand DH system to shopping centre and further regeneration 2015/16



Scotswood

- £265M redevelopment of Scotswood
- NCC Joint Venture with two house builders
- 62 Hectare site
- 1800 Houses over 15 years
- Code Level 4
- Mixed tenure, Affordable, Social, Shared Ownership
- 40 year Contract with Eon for DH with new Energy Centre
- First phase 377 Homes
- Nat Gas for first 600 units then CHP/Biomass
- 35% Reduction in Co2 emissions, heating and hot water costs -10%. Social tariffs being offered



European and National Policies

National Heat Policy

Heat responsible for half national energy use

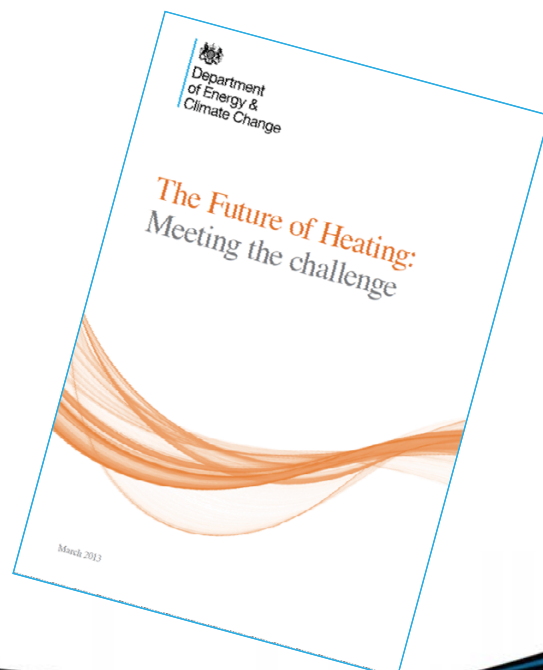
80% carbon reduction by 2050

- **Implies decarbonised grid**

DH is solution for urban areas

- **Range of heat sources**
- **Thermal storage potential**
- **Best retrofit option**

DH could be 20% of national domestic demand by 2030



Local Policy and Plans

- EU Covenant of Mayors 2010
- Climate Change Strategy & Action Plan 2010
- Sustainable Energy Action Plan 2010
- UK's Most sustainable city 2009/10
- Changes in Planning Policy 2015

Energy Masterplan 2012

Next Steps:

- Reduce building energy demand & improve energy efficiency (Warm up North)
- Large scale deployment of market ready renewable energy sources (PV roll out)
- **Develop large scale heating & cooling networks (Re-Generate Newcastle)**
- Assist the delivery of regeneration & economic growth



Newcastle a “Low Carbon Pioneer City”

In 2012 NCC signed a “City Deal” with government that covers four growth sites in NewcastleGateshead.

As part of this the Department of Energy and Climate change were asked to work with NCC as part of the Low Carbon Pioneer Cities Programme. (Also Nottingham, Manchester, Leeds and Sheffield)

A number of projects were established - some funding and support was provided to assist in the development of;

- Heat Networks
- Warm up North
- Behavioural Insights (Heating Controls Trial)
- Fuel Poverty
- Data sharing

Feasibility Stages

Technical and financial feasibility (Oct 2013)

Citywide heat mapping and clustering of heat loads

Identification of prioritised pipeline of most viable projects

Stakeholder engagement

Detailed appraisal of two most financially viable schemes

Financial appraisal to investment grade proposal

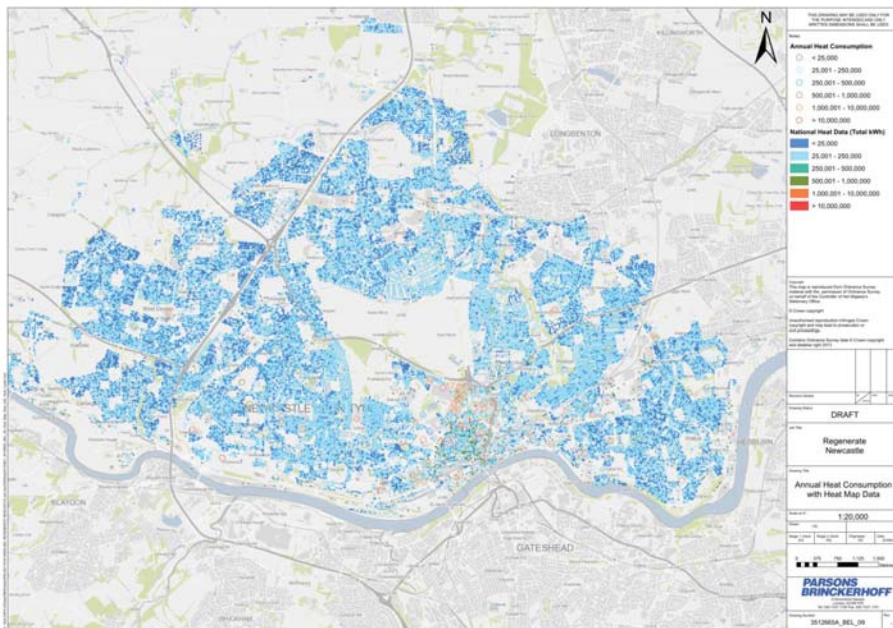
Develop business & delivery model leading to procurement in 2014/15



September 2013



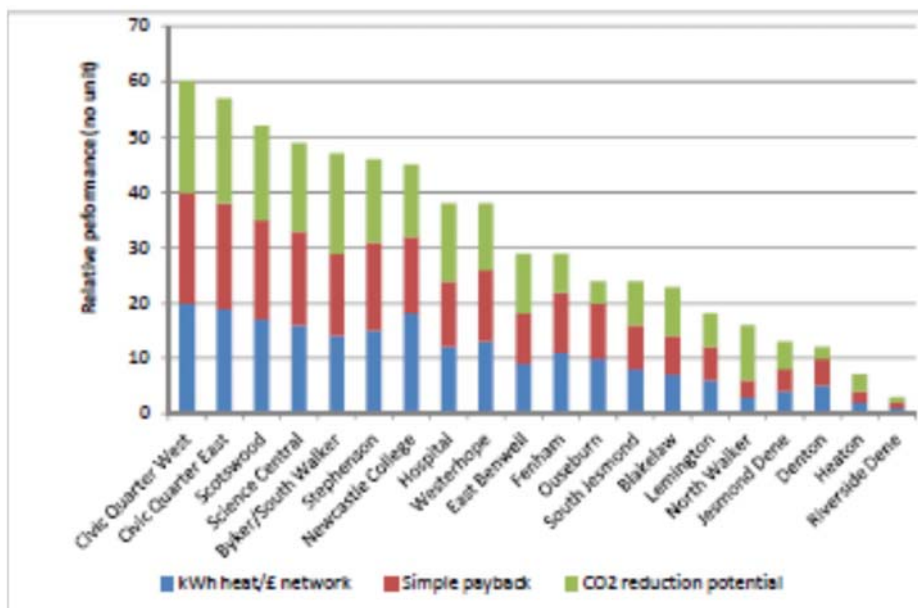
Newcastle Heat Map



Heat Loads- Pipeline of Potential Projects

Scheme reference	District heating cluster	Annual heat load (kWh)
1	Blakelaw	3,818,803
2	Denton	1,146,617
3	East Benwell	4,378,859
4	Ferham	2,562,838
5	Heaton	1,586,862
6	General Hospital	6,804,129
7	Jesmond Dene	2,313,780
8	Lemington	2,410,086
9	North Walker	3,794,498
10	Newcastle College	6,512,004
11	Ouseburn	2,195,468
12	Riverside Dene	10,530,144
13	Science Central	11,209,830
14	Scotswood	16,140,353
15	South Jesmond	3,486,179
16	Stephenson	10,415,677
17	Civic Quarter East	34,033,874
18	Civic Quarter West	102,864,499
19	Westerhope	5,986,548
20	Byker/South Walker	18,047,330
	TOTALS	249,799,448

Comparative appraisal of schemes



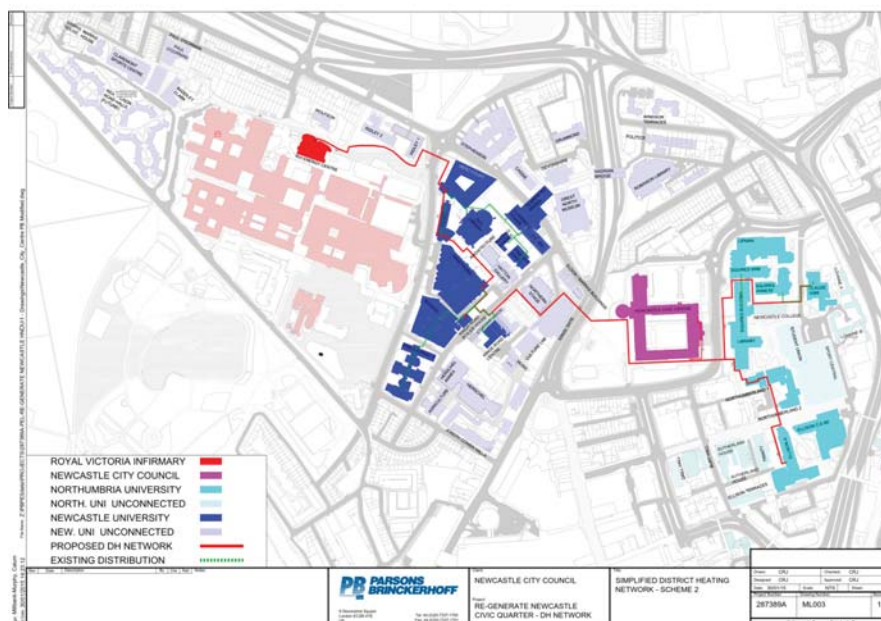
Range of Options Appraisals



Full city-wide scheme comprising:

- Newcastle University
 - Northumbria University
 - Newcastle College
 - Eldon Square Shopping Centre
 - Civic Centre
 - Royal Victoria Infirmary (RVI)
 - Science Central
- **Total heat demand:**
 - 147TWh/year
 - **Indicative CHP capacity:**
 - 17MWe Energy Centre Clarendon Rd
- Initial Focus on Civic Quarter and Science Central in parallel

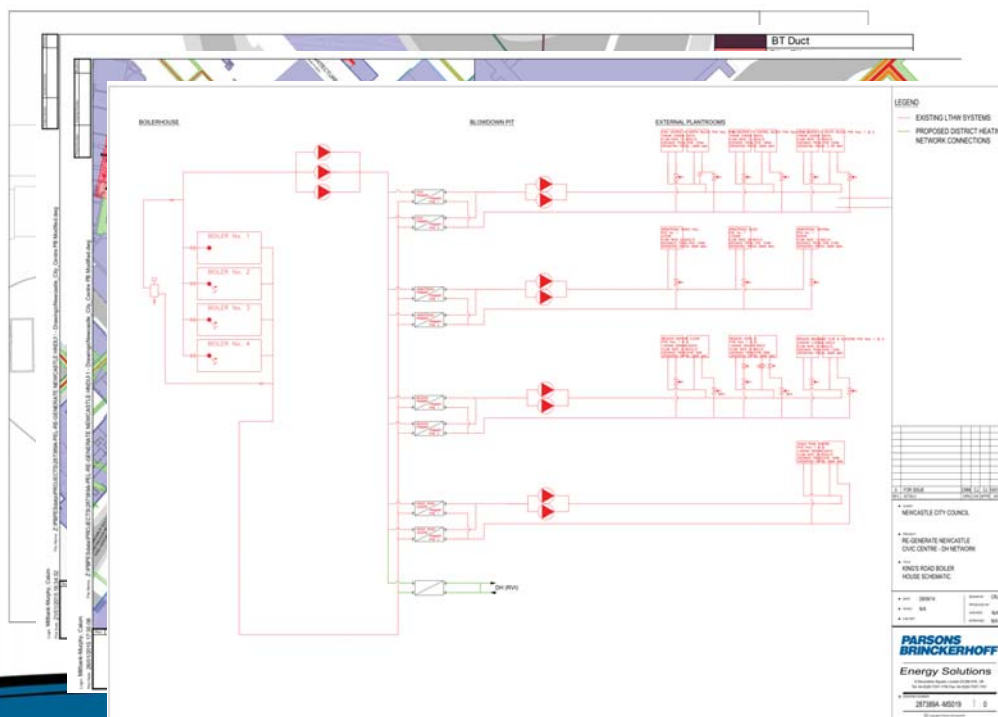
Initial Scheme – The Civic Quarter



Initial Focus - Civic Quarter District Energy Scheme

- Based upon Hospital Trust (RVI) and their Energy Services Contractor upgrading the current on site generation capacity
- Heat Network fed with surplus heat from increased generation and connected to Newcastle/Northumbria Universities and the Civic Centre
- A number of significant technical and commercial risks identified by all stakeholders that required further work.
- Work completed in 2014 & funded by DECC-HNDU
- Work with Science Central to develop financially viable standalone on site solution that could link to Civic Quarter

Potential future DE projects – Civic Quarter



Civic Quarter

Commercial overview

- Development of the scheme is dependent on upgrade of existing infrastructure at the Royal Victoria Infirmary resulting in a thermal capacity of 8,276kW and a electrical capacity of 8,802kW.
- Initial CBA indicates this could be undertaken with no net cost to Newcastle Hospitals NHS Foundation Trust while providing affordable heat to the heat network. Discussion with the Trust are ongoing.
- The project is predicated on providing heat to Newcastle University, Northumbria University and the Civic Centre at no greater cost than current levels based current heat loads.

Science Central Scheme

- Science Central Site- One of four key development sites in Newcastle
- Part of City Deal with Accelerated Development Zone status
- Joint venture with Newcastle University
- Energy centre and district energy network in plans
- £2.8M funding form North East Local Enterprise Partnership
- Detailed Technical and Commercial feasibility report November 2014
- Geothermal Energy Potential Explored



The Future - The Opportunity Being Tendered

- 40 year partnering agreement to jointly develop district energy projects in Newcastle with the Council
- Exclusive opportunity for the successful bidder
- Two projects at an advanced stage of development
- Future potential public-sector led projects for inclusion in the partnership
- Vehicle will also have opportunity to bid for future private-sector led developments
- North East Local Enterprise Partnership funding (Local Growth Fund)



Decentralised Energy in Newcastle

The outputs of the various feasibility studies studies have allowed the council to classify the opportunities made available through the procurement as follows:

1. The **Project** – a decentralised energy scheme, with attached LEP funding, has been identified for the Science Central development
2. **Potential future** DE opportunities identified at specific locations within the city including Key Development sites and expansion (E.g. Civic Quarter District Energy Scheme)
3. **Existing** district and communal heating schemes operating throughout the city

The Project: Science Central

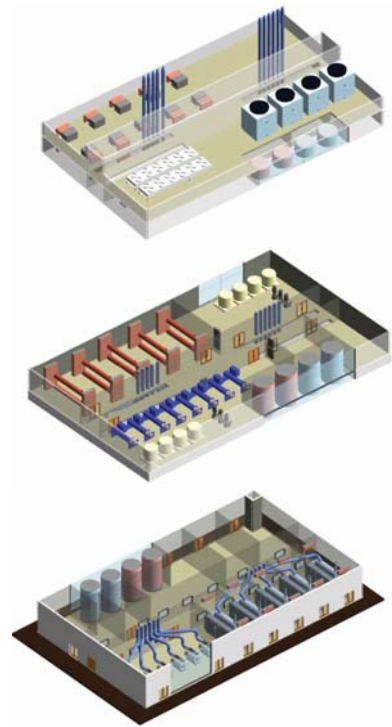


The Project: Science Central

Technical overview

- New Mixed use development to be supplied with heating and cooling using mixture of technologies that could include gas engine CHP and heat pumps in a central energy centre
- Buildings that have either already been constructed or are in planning have been future proofed for connection to the system
- Potential for using innovative heating & cooling technology – 4th generation district energy system
- Potential for private wire and interface with on-site smart grid demonstrator project
- Construction of the network is proposed over a 6 year period to align with the masterplan for the Science Central site commencing in 2016

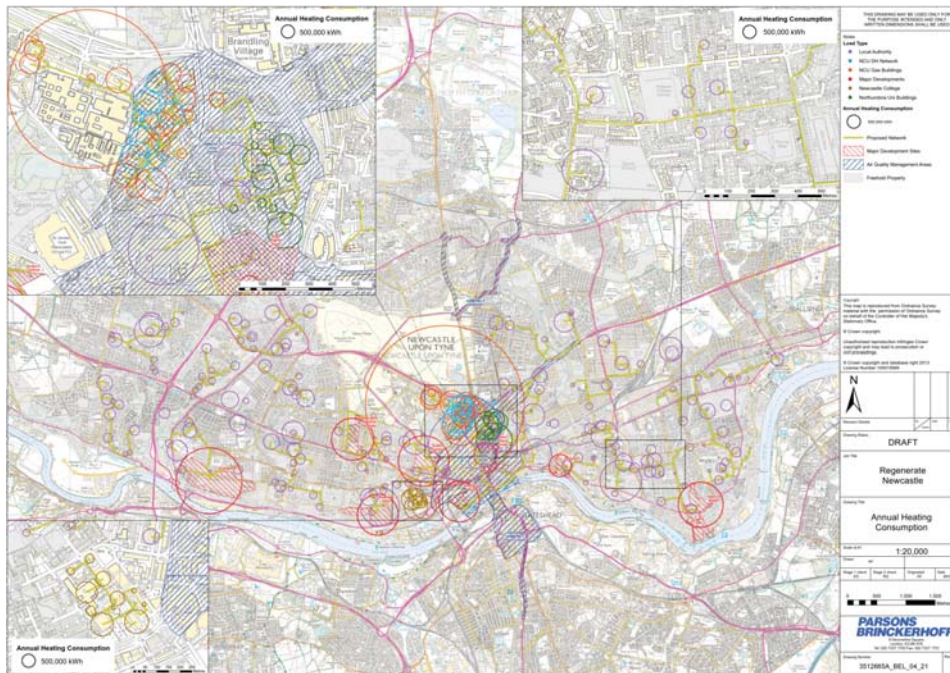
The Project: Science Central



The Project: Science Central



Potential future DE projects



Potential future DE projects

The following opportunities for implementing DE projects in Newcastle were identified as part of an energy masterplanning process:

1. Civic Quarter: Surplus heat from the existing Royal Victoria will supply major heat loads owned by the University of Newcastle, the University of Northumbria and the Civic Centre.
 - Stakeholder engagement undertaken and draft HoT produced
 - Detailed techno-economic appraisal undertaken
 - Stage C scheme design
2. East Pilgrim St.
3. Byker /Walker Expansion
4. Stephenson Quarter
5. Newcastle College Cluster
6. Housing Sites in new LDF (Newburn/Forth Yards etc...)

Partnership Structure

- 40 year innovative partnering agreement to jointly develop district energy projects in Newcastle with the Council
- Exclusive opportunity for the successful bidder
- Contract documentation for Science Central
- Future potential public-sector led projects for inclusion in the partnership including Civic Quarter
- Vehicle will also have opportunity to bid for future private-sector led developments



Partnership Structure

Long term partnering arrangement

- Commitment to bring forward opportunities for network extension, and to jointly develop viable projects, through Partnering Agreement
- Criteria for viability of future projects to be assessed in the context of the initial schemes
- Mechanisms to ensure that the partner and the Council benefit from the portfolio effect of various schemes, to maximise delivery of district energy in Newcastle

Partnership Structure

Individual project arrangements – outline

- Scope for Council funding alongside partner funding
- Separation of asset ownership from asset operation
- Council role as long term strategic partner in all aspects of the network – i.e. Council to have interest in both ownership and operation of assets
- Allocation of risk and return in ownership and operation elements of the structure through ownership and contracting structure
- 'Upside' above agreed level of return to be retained for development of future schemes
- Council to have role overseeing protection of consumers – particularly vulnerable consumers – ensuring that the partnership is a good deal for local residents

Any questions?

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