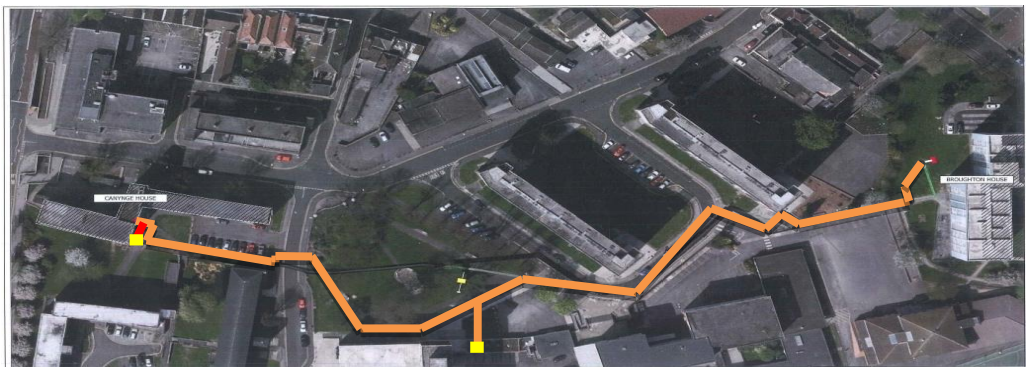
SPP REGIONS
REGIONAL NETWORKS FOR SUSTAINABLE PROCUREMENT

SPP TENDER MODEL

Energy use in buildings

Installation of a Heat Network in Bristol



Purchasing body:	Bristol City Council (BCC)
Contract:	Redcliffe and Temple District Heating Scheme Awarded: late 2015/early 2016 (phased for different elements)
Savings:	• 1863 tons of CO_2 emissions saved/yr • Primary energy savings – 0.35GWh/yr • Financial Savings - €12,255/yr

SUMMARY

- Development of a district heat network linking two small networks
- Installation of a biomass boiler and efficient gas boilers
- Heat network construction in a major city area
- Boilers and works - approx €2,160,000
- Procured using an existing framework contract
- Winning bidders: Works – Integral; boilers – Edmunsons and Jewson

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www.sppregions.eu

Procurement Approach

The Temple and Redcliffe district heat network is the largest network Bristol is currently developing and, when complete, will supply heat to businesses, a new arena and housing. It is being developed by Bristol City Council (BCC) in conjunction with several partners. The total district heat network is comprised of various phases which include replacing non-efficient boilers, linking up smaller sections of existing networks and creating new networks as further developments come on board.

Types of building which will link to overall network include:

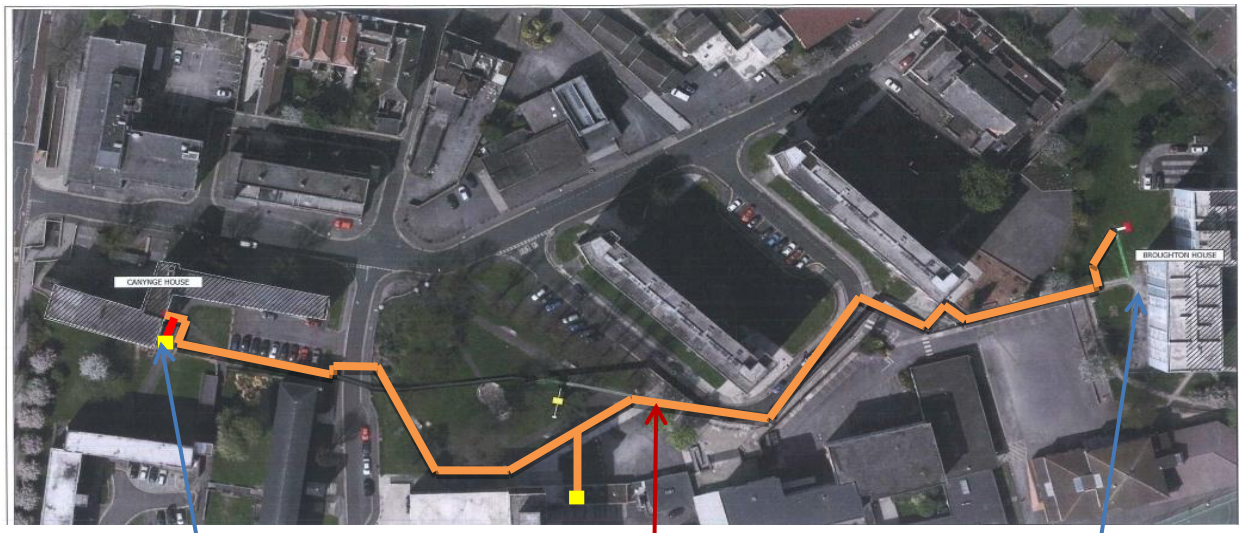
- a major development site include new office buildings and an arena (Temple Quay Enterprise Zone (TQEZ)
- existing buildings – public buildings, hotels, social housing, etc

Phase 1 (the subject of this case study) links two areas of social housing in the Redcliffe area of Bristol. There are twelve buildings in total which are owned and managed by Bristol City Council. Two of the principal buildings have boilers (Broughton House and Canynge House). Prior to completing Phase 1, the boilers in Broughton House serviced four buildings; the boilers in Canynge House serviced eight buildings.

Initial works	***Secondary works***
The work entailed replacing old gas boilers in one building (Broughton House) with more efficient: • 1 x 1MW biomass boiler*, and • 3 x 1350kW gas boilers **=Biomass Energy Centre*	Laying pipe to link the two areas of social housing so that the most carbon and cost-effective way of supplying heat to the twelve properties could be made. Linking the Biomass Energy Centre situated at Broughton House to Canynge House to complete the heat network to service all twelve buildings.

The majority of the heat comes from the biomass boiler in Broughton House and the gas boilers (in both buildings) are back up boilers to cope with spikes in heat demand.

Feasibility and detailed design studies were commissioned at an early stage. The boilers and the mechanical and civil works (ie. constructing the works for networks) were procured using existing Housing Revenue Account (HRA) framework agreements and mini-competition. The framework agreements have multiple suppliers and are used for contracts in respect of maintaining and improving social housing stock.



Canynge House:
4 x gas boilers
Existing heat network links eight residential blocks

District heat network to link Broughton House and Canynge House local networks to provide heat from the biomass boiler installed at Broughton House (indicated by the orange line on the photo

Broughton House:
1 x biomass boiler
3 x gas boilers (auxiliary supply)
Existing heat network links four buildings

Life Cycle Costing

Life-cycle costing was taken into account in this project as in order to ascertain whether installing new boilers (including the biomass boiler) is cost effective, the costing over the proposed life needed to be considered.

Joint procurement

As phase one of the overall heat network is between two

PROCUREMENT INNOVATION

Installation of a biomass boiler in a social housing building to service not only that building but also other buildings in the same small heat network and linking it up with another cluster of social housing to develop a larger, and more efficient heat network.

clusters of BCC owned social housing buildings, joint procurement was not appropriate for this phase. However, as further phases are rolled out, both public and private sector organisations will be involved and there will be an element of joint procurement.

Tender specifications and Verification

TECHNICAL SPECIFICATIONS

- 1 x 1MW biomass boiler/3 x 1350kW gas boiler – RHI Compliant[1]
- DN150 plastic pipe and connection between two non-adjacent buildings
- all works to be carried out complying with relevant legislation (including New Roads and Street Works Act 1991 which governs how works on roads should be managed to avoid nuisance).
- all ground should be restored to how it was prior to the works including the reinstatement of grass, flower beds, etc

A regional approach to SPP

The installation of the heat network is site specific and any collaboration can only be done with partners who are in the immediate vicinity and can benefit from the scheme. The first phase (as outlined in the procurement approach) is part of a much wider heat network for Bristol which will deliver heat networks for major developments (the Temple Quarter Enterprise Zone), the new arena, private buildings (including hotels) and existing office blocks. As part of the wider heat network plans, discussions have been held with Bristol's neighbouring authority, South Gloucestershire Council (a PIPEN member), in respect of utilising heat from waste in the heat networks. Whilst the waste plant is situated at Avonmouth (part of Bristol), the route of a proposed heat network would run through land and a housing development in South Gloucestershire. Clearly, therefore, the experience of BCC in installing heat networks is crucial to South Gloucestershire council.

In addition, all learning from this project will be shared widely with the PIPEN members and the wider SPP Regions project as consideration of heat networks becomes more mainstream.

[1] RHI = *Renewable Heat Incentive*, a UK government scheme to promote the use of renewable heating. The RHI scheme certifies specific products which meet eligibility requirements for renewable heating equipment, including biomass boilers - www.ofgem.gov.uk/environmental-programmes/domestic-rhi

Results

Environmental impacts

There is an annual saving of **1,625 tons of CO_2**.

Table 1: Environmental savings – green tender compared to current solution

Tender	Fuel consumption (kWh/year)	CO_2 emissions (tCO_2/year)	Primary Energy consumption (GWh/year)	RES triggered (GWh/yr)
Benchmark (Gas boiler being replaced)	9,481,349 (935 kNm^3)	2,340	10.43	0
Green tender (Biomass boiler)	9,161,711 (2,101 tons)	477	10.08	10.08
Savings		**1,863**	**0.35**	**10.08**

CALCULATION BASIS

- Calculation based on assumption of 100% switch to wood pellets for the heating of the 12 buildings covered
- CO_2 emission factors include the direct and indirect emissions: 2.503 $kgCO_2/m^3$ for natural gas and 0.227 $kgCO_2$/kg for wood pellets.
- For primary energy consumption PEF (Primary Energy Factor) of 1.1 is used for both fuels.
- Calculation made using the tool developed within the GPP 2020 project (*www.gpp2020.eu*), and refined within the SPP Regions project. Available on the SPP Regions website.
- (More detailed calculation tables are included in the Annex below)

Financial and social impacts

Fuel poverty can be a significant issue for tenants of social housing. All the buildings benefitting from this heat network are social housing properties owned and managed by BCC with meters installed in them. By installing the cost efficient biomass and gas boilers in one building and developing the

network to service the other eleven buildings, BCC can assure tenants in these buildings that they will be receiving a competitive price for their fuel. This removes the uncertainty of the price of fuel as and when gas prices fluctuate. Consultation was carried out with residents to mitigate disruption and nuisance.

Lessons learned and future challenges

The experience from phase one is being fed into the subsequent phases of the heat network. It is useful for there to be follow-on phases in which to refine an approach. Future challenges will be where the network needs to cross different terrain (eg. using bridges as part of the network infrastructure) and working with other public and private partners.

Installing this heat network will encourage new developments to connect onto the network, particularly when heat networks are still a new technology in the UK. Phase one of the heat network will be used as an example for other new developments and to incorporate them at the building planning stage.

A further heat network is being is in the pipeline with BCC, University of Bristol and UBHT (United Bristol Health Trust) all of which are PIPEN members and close collaboration is currently being under to develop this heat network. The learning from phase one is directly informing the development of this network.

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Annex 1 - Calculation of environmental savings

SAVINGS			
	Savings (Baseline / Green tender)		
Expected results	Per year	Per lifetime	Percentage
Primary energy savings, (GWh)	0,35	3,5	3,37%
Reduction of CO_2 emissions, (t CO_2)	1 863,4	18 634,2	79,62%

INPUT DATA					TOTAL EMISSIONS AND CONSUMPTION							
	Baseline		Green tender		Baseline				Green tender			
					Per year		Per lifetime		Per year		Per lifetime	
Energy source	Current annual energy consumption		Expected annual energy consumption		Primary energy consumption (GWh/year)	CO_2-emissions (t CO_2/ year)	Primary energy consumption (GWh)	CO_2-emissions (t CO_2)	Primary energy consumption (GWh/year)	CO_2-emissions (t CO_2/ year)	Primary energy consumption (GWh)	CO_2-emissions (t CO_2)
Electricity, conventional		kWh		kWh	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Electricity, green		kWh		kWh	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Heating oil		l		l	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Natural Gas	935 044	m^3		m^3	10,4	2 340,4	104,3	23 404,2	0,0	0,0	0,0	0,0
Wood pellets		kg	2 101 310	kg	0,0	0,0	0,0	0,0	10,1	477,0	100,8	4 770,0
Wood		kg		kg	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
District heating		kWh		kWh	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Coal Briquette		kg		kg	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Lignite high quality		kg		kg	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Lignite low quality		kg		kg	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Coke/Anthracite		kg		kg	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
				TOTAL	10,43	2 340,4	104,3	23 404,2	10,08	477,0	100,8	4 770,0

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About SPP Regions

SPP Regions is promoting the creation and expansion of 7 European regional networks of municipalities working together on sustainable public procurement (SPP) and public procurement of innovation (PPI).

The regional networks are collaborating directly on tendering for eco-innovative solutions, whilst building capacities and transferring skills and knowledge through their SPP and PPI activities. The 42 tenders within the project will achieve 54.3 GWH/year primary energy savings and trigger 45 GWh/year renewable energy.

SPP REGIONS PARTNERS

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