



# **SOUTHSIDE CONNECTIONS**

Tackling energy costs and delivering carbon savings in Govanhill and Pollokshields East through district heating

A summary report for partners on the South Seeds Renewable Heat Study supported by the Local Energy Scotland's Innovation Infrastructure Fund

April 2016

**south  
seeds**  
GROWING A GREENER GLASGOW

## About this study

South Seeds is a charity working in south Glasgow to provide practical support to our local community. We work by improving the local environment and tackling energy inefficiency. A large part of our work is supporting residents who are struggling to deal with fuel poverty; providing advice, audits and energy installations to bring bills down and reduce carbon emissions in the area.

Over the last three years we have delivered a successful programme of improvements to the area. But we know that there is more that can be done to help residents reduce energy costs.

In 2013 we published our award winning [Energy Snapshot report](#). This report mapped our area street by street to show property type and tenure, and allowed us to identify which property types needed which types of installation to reduce energy use. In 2015 we followed this up with our [Renewables Snapshot report](#) which helped us to identify the best potential opportunities for renewable energy in our area. This report highlighted the strong case for renewable heat.

In 2015 we secured funding from the Scottish Government's Innovation Infrastructure Fund to look in more detail at renewable heat options and commissioned Ricardo Energy & Environment, John Gilbert Architects and the British Geological Society to conduct a detailed study of heat options. Their detailed technical report demonstrates that by thinking bigger we can tackle chronic fuel poverty by using district heating to deliver low cost, low carbon heat to low income communities in south Glasgow. This document is a summary of that [report](#).

Our study has shown that over 5,000 households in Govanhill and Pollokshields East could benefit from lower cost low carbon heat. The initial focus should be connection of 3,400 households in Govanhill using heat from the nearby Glasgow Renewables & Recycling Energy Centre (GRREC) and if this is delivered successfully the scheme can be extended to other areas as part of a local heat masterplan.

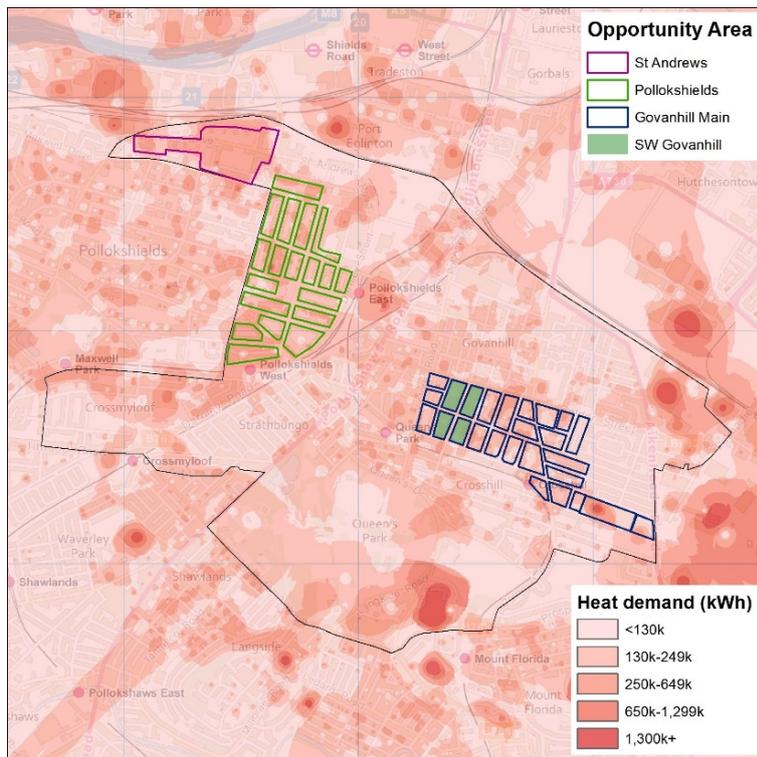
The cost of this heat could be up to 20% lower than the cost of heat from a domestic gas boiler. An initial estimate of over £800,000 per year could be reduced from heating bills in the Govanhill community. With all 5,000 properties connected, savings would increase to over £1m per year.

However, to deliver this requires the formation of a partnership linking the voluntary, public and private sectors, and pump prime funding to underpin the installation of the network and enable individual households to connect into this low cost opportunity.

Grant funding of between £4.5 million and £9 million is required to deliver a financially viable heat network, depending on the level of financial return offered to the network operator. Without grant funding a network is viable but is not able to deliver heat at as low a cost, which would mean that fewer people were removed from fuel poverty.

We recommend that Glasgow City Council, Viridor, Govanhill Housing Association and the Scottish Government work together with South Seeds to form a partnership to take forward more detailed investigation. Funding may be available from the Scottish Government via the District Heating Loan Fund, future rounds of the Local Energy Challenge Fund or other sources to underpin this more detailed piece of work. South Seeds strengths are wider community engagement and promotion, as well as use of this existing research.

## The Opportunity



Our study shows that a cost effective opportunity for using the available heat from GRREC is the development of district heating in three identified local clusters of housing within Pollokshields East, SW Govanhill and central Govanhill shown in the map left.

The map shows that these three areas have the highest concentrations of heat in residential areas studied. This means that these are the areas likely to benefit most, and where schemes are most cost effective. Connection of these three areas would mean provision of lower cost low carbon heat to 6,326 properties, including 5,900 households.

Glasgow tenement flats typically have heating and hot water costs of between £900 and £1,800 per year depending on the size of flat. Of course it's worth remembering that many households in the local area do not currently use gas for heating but rely on more expensive forms such as electric heating, and we also know that some local flats have higher than average occupancy levels, meaning hot water costs could be even higher. Taking these typical costs would mean reduction in annual heating bills of between £180 and £360 per year, which equates to over £1m per year in reduced heating costs to this community.

Connecting these 6,326 domestic and non-domestic properties would also deliver over 22,000 tonnes of CO<sub>2</sub>e saved per year. That's enough CO<sub>2</sub>e to fill 10 Hampden Parks each year.

## What is District Heating?

District heating is the main type of heating in many Scandinavian towns and cities and becoming increasingly common in Scotland. The Scottish Government sees district heating as a good way to help tackle climate change and help people and businesses manage their energy costs. There are many dozens of successful district heating schemes all across Scotland from Dumfries and Galloway up to Aberdeen and Shetland, and closer to home district heating is in use in Maryhill, Shettleston and Cambuslang.

District heating means that instead of every house and business needing to maintain and operate their own boiler to provide heating and hot water, the area shares a central heating plant, and pipes are used to then move the hot water from the central plant to individual properties. Supplementary heat sources can be added to boost the system as it gets larger. Shared use of the heating plant increases the efficiency and the cost of the heat. However the big drawback of district heating is the cost and complexity of installing a pipe network to be able to do this. District heating is being used in tower blocks and in larger new build housing, as well as being "retrofitted"

into existing houses or communities. While up-front costs are high, once installed, a pipe network means that local households have continual access to this low cost and secure source of heating and can avoid the need for individual boilers and associated costs. The owner-operator of the network then has a low risk business model providing heat to local residents, attractive to low risk investors.

## What other low carbon heat options were considered?

In our study we looked in detail at Pollokshields and across Govanhill and Queen's Park. We were looking for "Opportunity Areas" with the right set of characteristics suitable to allow cost effective installation of district heating. We also considered a number of different technology solutions including biomass boilers, gas fired combined heat and power (CHP) and using trapped heat energy under the area in old mine workings. We found that the best most cost effective route comes through district heating.

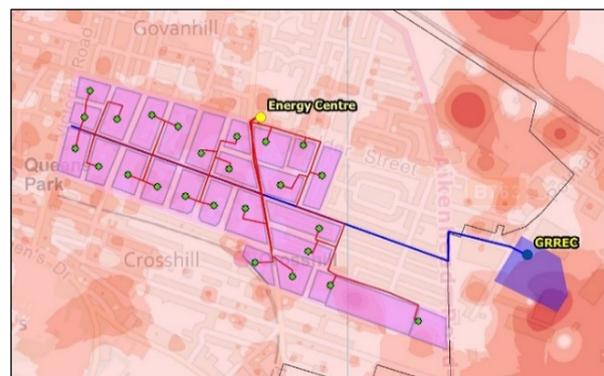
## The case for district heating in Govanhill and Pollokshields East

Three areas within the study area would be suitable for development of a district heating network. These are Govanhill (central); South-West Govanhill; and Pollokshields East.



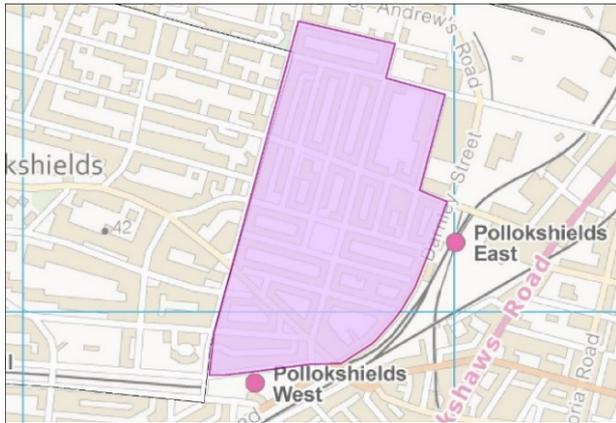
South Seeds works within an area of Glasgow with a high level of houses in poor condition, and a diverse group of residents struggling to manage energy costs.

This study has demonstrated that a combination of factors make south Glasgow viable for district heating, with a scheme able to deliver energy at 20% lower cost to residents than use of gas condensing boilers.



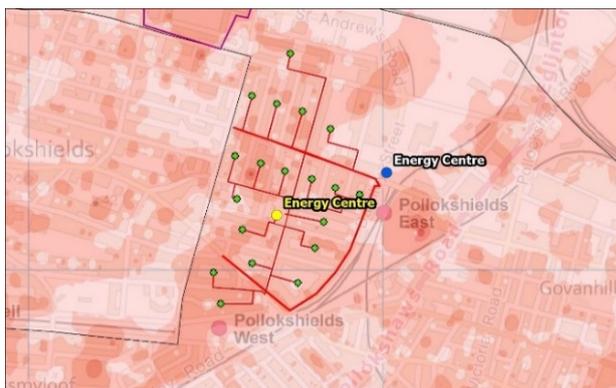
These areas could be connected as part of an area wide masterplan. Phase One would be construction of a heat network in Govanhill using heat from the new GRREC Polmadie plant as shown to the left. Phase Two would be construction of a separate district heating network in Pollokshields East around a separate energy centre as shown on the following page. Phase Three would be the growth out from these first phases: connecting them up to form one single stronger network.

Total heat demand in the area is estimated to be in excess of 980,000MWh. Domestic heat consumption dominates in the South Seeds project area. In Pollokshields, approximately 95% of all heat is for domestic use, and in Govanhill this figure is approximately 85%.



While most district heating schemes require anchor loads such as large public buildings or commercial heat users to ensure a constant heat demand, the concentration of housing and the diversity of energy demands in the identified opportunity areas, mean that the many clusters of tenement properties can be treated as anchor loads.

Our study has shown that our local area has a number of characteristics which make district heating well suited. These are:



- Local availability of a heat source at the Glasgow Renewables and Recycling Energy Centre (GRREC) in Polmadie;
- High density housing meaning a high heat load;
- Low levels of housing investment, meaning that local households often have poor or old heating installed, meaning that any upgrade will deliver high benefits and high cost savings;
- Options to use tenements to advantage by fitting pipe heating in a way that minimises laying pipes under roadways, which reduces cost and complexity;
- An ongoing program of coordination to deliver energy efficiency, regeneration and housing improvement.

**Heat network Interlinking**

 A schematic diagram showing two clusters of buildings represented by blue circles. Each cluster has a central red square representing an energy centre. Green lines represent the heat network pipes connecting these centres and branching out to individual buildings. A central horizontal line connects the two clusters, representing interconnectors.
 

Interconnectors installed to share excess heat capacity between clusters in Pollokshields East and Govanhill Main. Interconnector routes selected to permit further connection with economic demands situated between clusters such as St Bride's Primary School.

In addition, the Scottish Government is proposing changes to housing regulations which would make it easier to coordinate installation of district heating in tenements meaning that many bureaucratic hurdles will soon be removed.

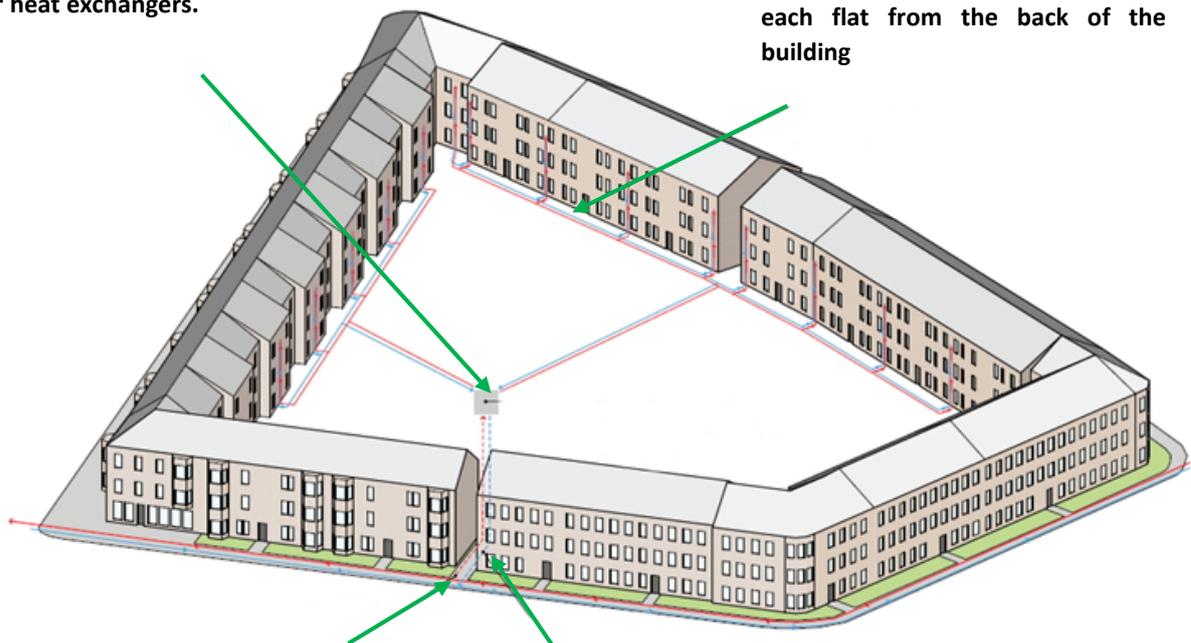
## What would the district heating network look like?

The easiest way to think about the opportunity is to go up in the air and look at the district as a whole. First, think of a typical street in Govanhill, the community where we have identified the greatest scope for district heating. It will have Victorian tenement properties along it. Depending on the street length there will be between 10 to 20 front doors with tenement closes behind them and between 6 to 10 flats in each close.

From above, look behind this row of tenements at the back court gardens surrounded on four sides by tenements. Looking east from here you might be able to see the GRREC plant taking shape at Polmadie. The Govanhill tenement blocks are less than a mile from GRREC, meaning the cost of connection via a pipe under one of the main roads can be kept to a minimum. From this 3.6km of distribution pipework, we can add branches off this to serve groups of tenements connecting over 3,000 residential properties. Underground distribution nodes set up in the back closes connect heat pipes to individual stairwells which can be buried beneath the garden (minimising the cost and disruption of roads being dug up), and then travel to each connected flat up external walls or close walls in the way that gas pipes and water pipes currently go up and down and connect each flat.

**1. Incoming and return pipes travel through central nodes, manifold or heat exchangers.**

**3. Incoming and return pipes enter each flat from the back of the building**



**2. Hot flow pipes enter into back court from district heating network**

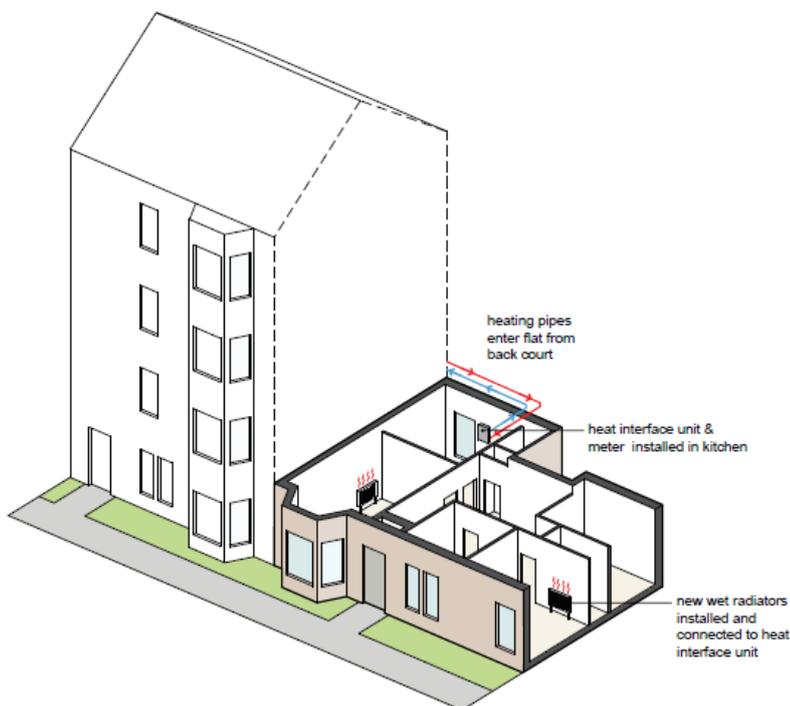
**4. Return pipes exit from back court and feed back into the return network**

Once this “Govanhill Main” opportunity area is connected, there would be an opportunity to extend out across Govanhill and over time to look at building a Pollokshields East scheme around its own energy centre. Over time as more tenements are connected, this network could be connected back into the Govanhill network and GRREC.

## Residential property changes

Let's look at these blocks of tenements again. Using the back courts and the back tenement walls cuts costs and makes connection easier. Connecting these groups of tenements by branch connection to a main pipe minimises the length of under street pipes, so to connect tenement buildings we don't need to dig up every street but can connect up properties block by block.

Within each individual tenement flat pipes connect up the back wall from each back court. A heat exchanger can be fitted in place of any existing boiler, along with a heat meter. This single measure would be enough to change the energy efficiency rating of an example flat from G to D helping housing associations meet the requirements set out in the Energy Efficiency Standards for Social Housing.



### Case Study 2: 3 Bedroom Maindoor Tenement

- Single glazed windows
- Electric storage heaters with electric immersion cylinder
- Assumed total energy demand: 24,450 kWh/year
- Current Energy Efficiency Rating: 17 G

### After Installation of CHP District Heating

- Heat interface unit (HIU) and meter in kitchen
- New radiators connected to new HIU
- Domestic hot water supplied through district heating
- Energy Efficiency Rating: 64 D

GRREC is currently being built by Viridor at Polmadie, and will be used to process green waste from bins. The site will remove any recyclable waste to boost recycling and organic waste treated in an Anaerobic Digestion (AD) process to generate biogas. This biogas will supply CHP engines which will supply electricity to the National Grid and will recover heat that can be delivered into a heat network. Waste that cannot be recycled will be passed to an advanced conversion facility to generate electricity and heat. The GRREC Pollution Prevention and Control permit means that heat generated on site must be put to eligible use, so a viable use for heat from the plant must be identified.

Our study has clearly shown that each block of tenements offers a very good opportunity to connect and grow out a district heating network. The clustered nature of properties means that installation costs can be minimised by avoiding long road connections (see above), using back court areas, and running pipework up rear walls along existing draining pipes. And the low levels of investment in this area (for example there is a high level of electric heating present) means that district heating offers a cost effective route to tackling fuel poverty and reducing carbon emissions from the heat produced.

Our study has not identified any insurmountable constraints in the area that would prevent a district heating scheme from being deployed. Constraints that there are in the area such as the layout of other utilities (electricity, gas, broadband) can be managed, but may add additional cost. This would become apparent with a more detailed feasibility study.

Critical to the success of any local heat network would be recovering the capital cost of installing such a network through charges for the heat being provided to heat users, which will mean having a sufficient number of households and other heat users signing up to purchase heat. This will require coordination and would require widespread engagement within the community in addition to signing up owners of multiple properties in the area, such as housing associations and private landlords.

## Next Steps

Our study has demonstrated that the Govanhill and Pollokshields East areas of Glasgow contain two good opportunity areas which would benefit from district heating. However, district heating requires coordination and effort from a number of partners, and a long term vision.

South Seeds has deep experience of working in these areas, and an understanding that more ambition is required if fuel poverty is to be reduced, building condition improved and emissions reduced. While there are many challenges facing the area, a carefully planned and delivered district heating scheme could underpin wider regeneration efforts *and* deliver significant local benefits.

To do this however, a wider partnership needs to look at the recommendations within this report and consider what a more detailed study would uncover. We think there is value in Glasgow City Council, Viridor, Govanhill Housing Association and the Scottish Government getting together to look at the findings of this study and options of forming a partnership to take forwards more detailed investigation. Funding may be available via the Scottish Government to underpin this more detailed piece of work. As part of this partnership, South Seeds would be ready to support wider community engagement and promotion, and would make available relevant materials and research commissioned so far.

The Scottish Government has a target of 40,000 homes to be connected to district heating schemes by 2020, with 11% of all heat to come from renewables, so district heating in the project area will go a long way to support these goals. Our proposed approach – working to grow out a district heating scheme from GRREC – offers a cost effective route to achieving this, growing a network out over time. This pragmatic approach helps minimise cost and risk. However, we are not without ambition: there are over 30 tenement blocks within our three Opportunity Areas. Each of these has between 100 to 200 properties within them, meaning that successful connection of each of these properties would deliver 10% of the Government target from an area no larger than a square mile. This one simple fact shows the opportunity present, that a successful partnership can be built to deliver.

## Further information

[South Seeds Renewable Heat Study](#) - the 44 page technical report

Contact South Seeds through [www.southseeds.org](http://www.southseeds.org) or [@SouthSeeds](#)

South Seeds is a Scottish charitable incorporated organisation, registered in Scotland (number: SC042244).