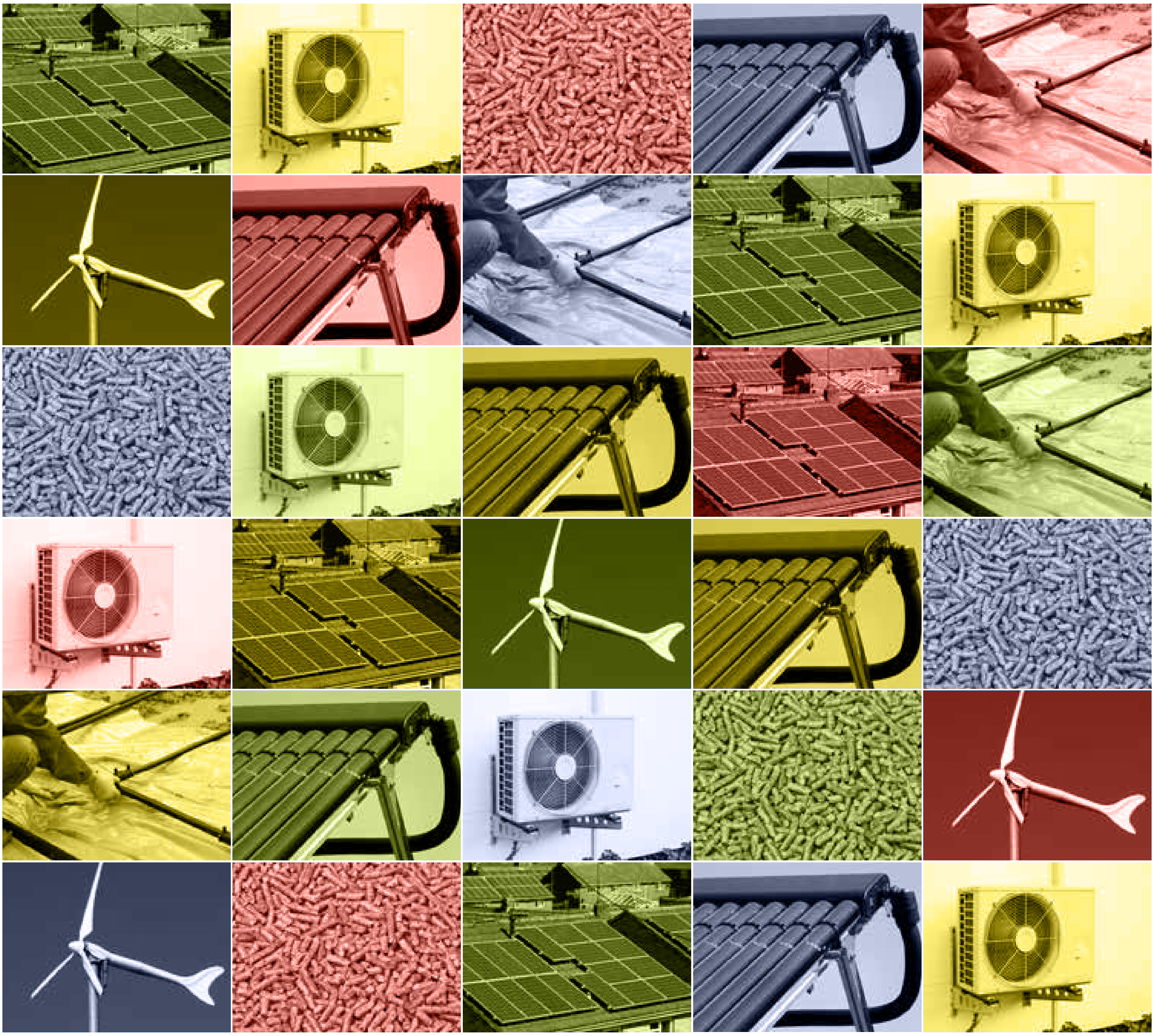
Renewables Snapshot Report
for the South Side of Glasgow

Govanhill, Crosshill, Queen's Park, Strathbungo and Pollokshields East



south seeds GROWING A GREENER GLASGOW

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South Seeds
168 Butterbiggins Road
Govanhill
Glasgow   G42 7AL
0141 636 3959
www.southseeds.org
info@southseeds.org

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Introduction

Renewables Snapshot Report by South Seeds

South Seeds is a community-led charity that is based in the south of Glasgow. We work in partnership with residents and local organisations to help improve the look and feel of the Southside of Glasgow. Our main effort goes into helping local residents tackle climate change by taking practical action such as improving home energy efficiency, cutting energy bills and tackling fuel poverty. Improving energy efficiency is the most cost-effective way of cutting energy bills. Once all opportunities for improving energy efficiency have been taken, the next step to reducing your impact on climate change from energy use in your home is to consider installing renewable energy technologies.

In 2013, South Seeds produced the award-winning Energy Snapshot report. This evaluated the housing stock in Govanhill, Crosshill, Queen's Park (postcode area G42) and Strathbungo (G41 and G42) to identify where the greatest opportunities were for improving energy efficiency and, therefore, reducing carbon emissions. This Renewables Snapshot covers these areas, but also includes Pollokshields East (G41). It looks at where the greatest opportunities are for the following renewable energy technologies:

- Solar photovoltaic (PV).
- Wind power.
- Ground source heat pumps.
- Air source heat pumps.
- Solar thermal panels.
- Biomass heating.
- District heating.

The first thing that became apparent was the lack of renewable energy capacity that had been installed in the project area. In the G42 postcode area, only 25kW[1] of solar PV panels have been installed (this is 100 panels), whereas in Bridgeton (G40 postcode) over 400kW of solar PV panels have been installed (this is 1,600 panels). This is despite the building stock in Bridgeton being similar to that in the project area.

The topography of the project area does not lend itself well to building mounted wind power. Without a water course in the South Seeds area, there is no opportunity for hydropower. However, there are opportunities for other renewable technologies to provide heat or power to domestic properties.

The report starts by mapping out where the most likely opportunities for the various renewable technologies are. This is based on a number of different technical and financial factors influenced by the different property types in the area.

Find your house on the map and see what technologies might be appropriate for you.

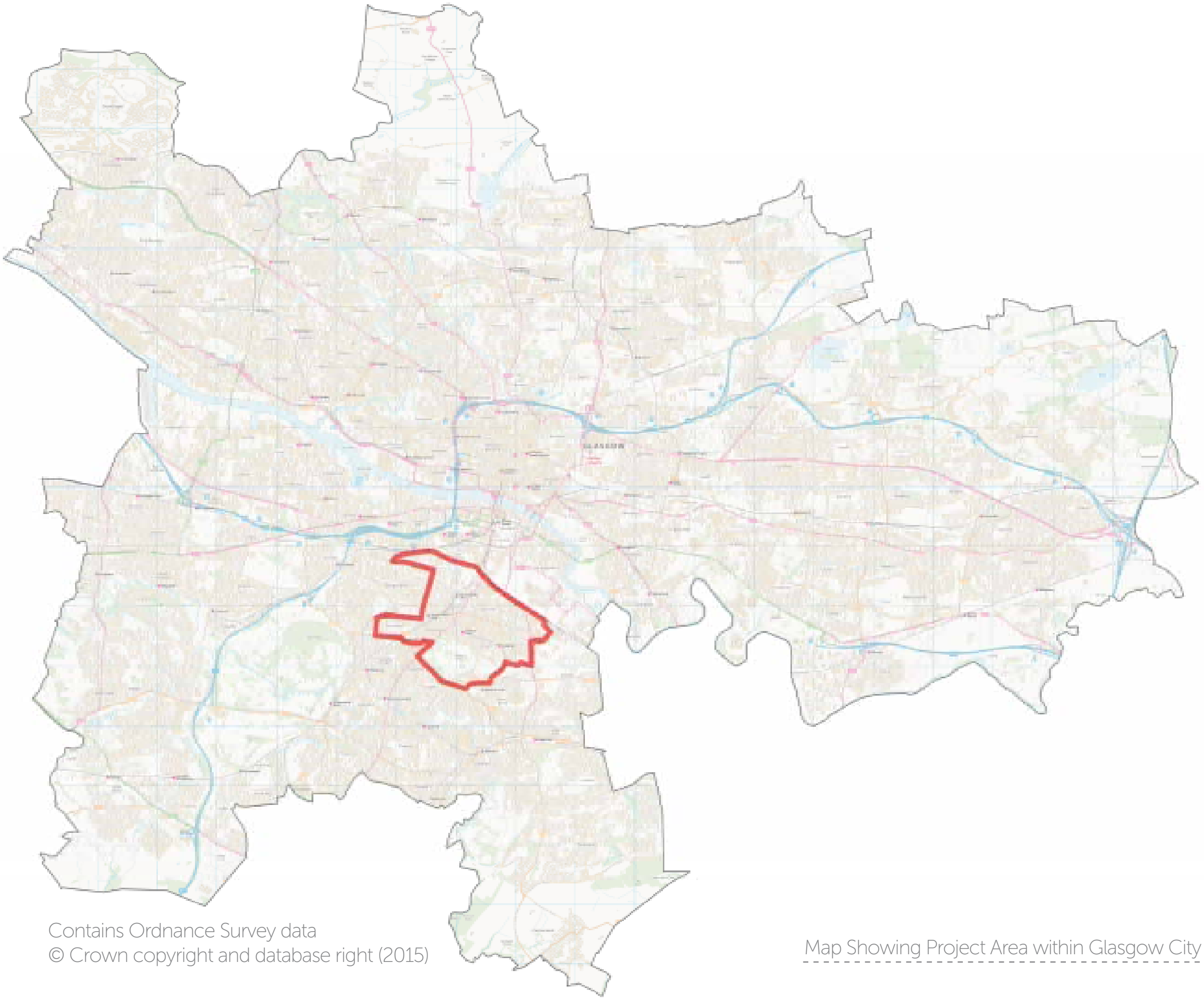
Then, in the body of the report, some of the key considerations for your property type are outlined. Installing renewable technologies in tenement properties is not without specific challenges. These are highlighted in the body of the report and can be largely overcome by people in the community doing what they do best – working together.

Every attempt has been made to ensure the report provides a realistic picture of the opportunities in the project area. There are a number of factors that influence the suitability of a renewable technology, but this can change on a regular basis. These include technology costs, installation costs and UK Government renewable energy support tariffs. This means that what might be viable at the time the report was written, may change over time. If you think a technology might be suitable for your property, then contact South Seeds and we can help you investigate this further.

[1] A kW is a measure of power equal to 1,000 watts. For comparison, a games console will be rated at approximately 200 watts (0.2kW) and a fast-boiling kettle at 3,000 watts (3kW).

South Seeds Project Area

The Project Area Within Glasgow



Contains Ordnance Survey data
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Map Showing Project Area within Glasgow City Boundary,

The project area is located between one and two miles south of Glasgow city centre. It includes Govanhill, Crosshill, Queen's Park, Strathbungo and Pollokshields East. It is bounded by the M74 extension to the north, Shields Road and St. Andrew's Drive to the west, Aikenhead Road to the east and Queen's Park to the south.

The project area has several key shopping streets running north to south – Pollokshaws Road, Victoria Road and Cathcart Road. Residents from across the five neighbourhoods are drawn to the retail opportunities offered on these streets. Govanhill, Crosshill and Queen's Park are in Glasgow City Council's Southside Central ward and Pollokshields East and Strathbungo are in Glasgow City Council's Pollokshields ward.

There are a range of different property types across the project area. Various tenement types (retail tenements, standard tenements, basement tenements, short tenements) as well as terraced houses, individual houses, 20th Century houses, These are described in detail in the South Seeds Energy Snapshot report[2]. Different property types are best suited to different renewable technologies. The opportunities for each renewable technology in the project area are presented in the following maps.

[2] http://southseeds.org/wp-content/uploads/2013/04/Energy-Snapshot-Report.pdf

Maps

Map 1: Renewable electricity opportunities (solar PV and wind)

Solar Photovoltaic

The potential for solar photovoltaic (PV) projects to succeed depends on technical, financial and regulatory factors.

Technically, a project's success depends on the amount of electricity that can be produced by the panels installed on a property. This depends on the direction the PV panels face and their angle of inclination. In Glasgow, panels facing due south at an angle of 35° from the horizontal will give the optimum performance throughout the year. The angle is also important to ensure adequate rainwater run off so preventing mould and moss growth on the panel surface.

Financially, the return on investment (ROI) is used to take account of the cost of equipment, installation and maintenance. Installation costs depend on the type of roof and the amount of scaffolding required – higher roofs require more scaffolding so cost more to install. Included in the ROI are any Feed-in Tariff (FIT) payments that may be received from the Government for generating electricity. Regulatory costs are also included (for example, some sites may require planning consent, such as those in conservation areas).

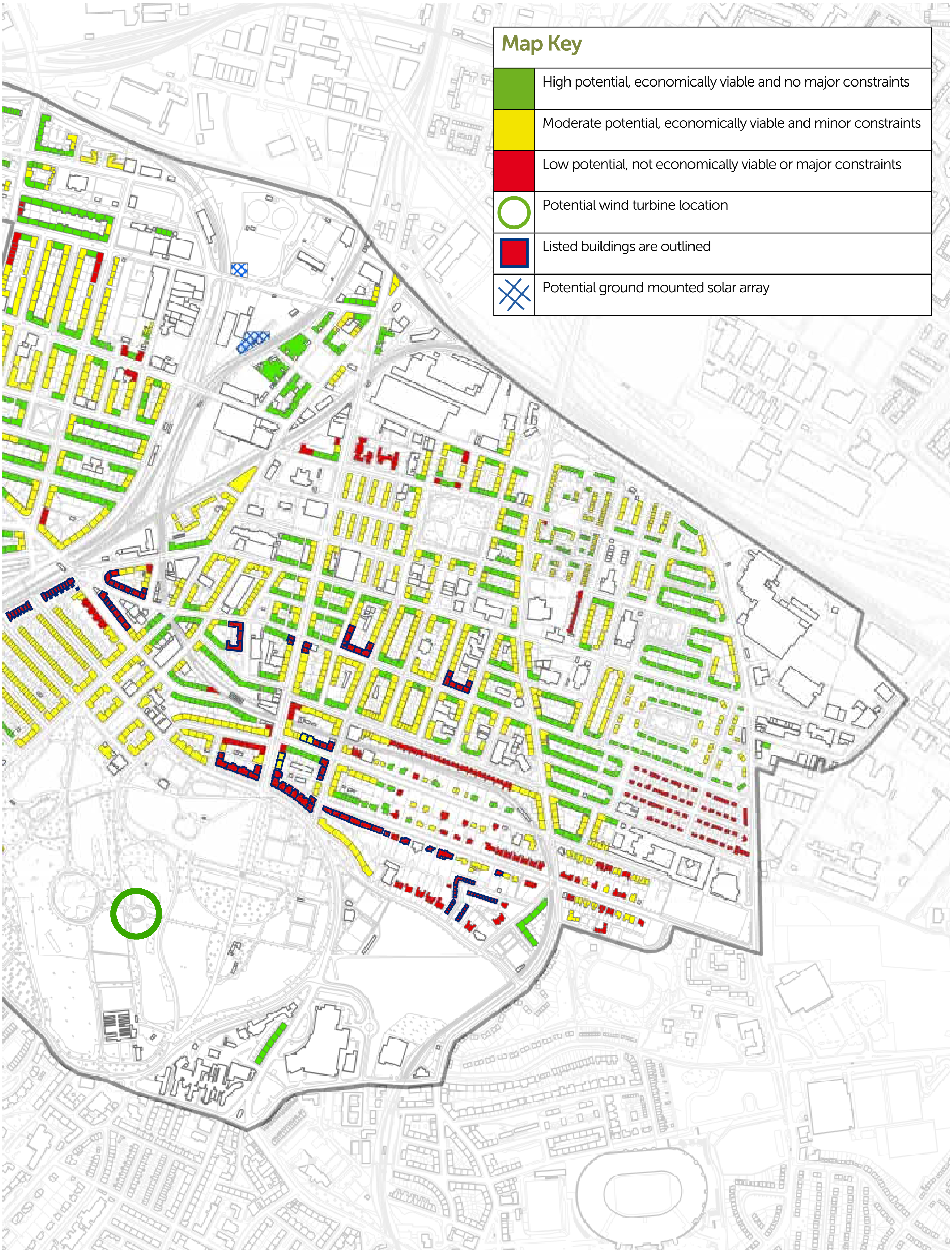
Taking all of these factors into account, the potential for a solar PV project on every home across the project area has been rated. This rating provides a preliminary indication of the potential for installing PV, but does not confirm that it is possible to install a system.

If the roof space is shared, then an agreement must be drawn up by those sharing ownership of the roof and will need to be for the lifetime of the panels. As the panels will be connected to the electricity grid, this will likely be through a separate, metered connection to the grid.

Areas for potential ground mounted solar systems are also highlighted.

Wind power

Free standing small scale wind turbines must be a minimum of 100m from a residential property and wind speeds at 45m above ground level must be at least 5m/s. Only one place in the project area was identified as being suitable for a wind turbine. As shown on the map, this is near the top of the hill in Queen's Park.


Map Key
High potential, economically viable and no major constraints
Moderate potential, economically viable and minor constraints
Low potential, not economically viable or major constraints
Potential wind turbine location
Listed buildings are outlined
Potential ground mounted solar array

Map 2: Renewable heat opportunities (air source heat pump and solar thermal)

Air source heat pump

Air source heat pumps (ASHP) have the widest potential for renewable heat generation in the project area. This potential is shown on the map.

The technical factors influencing the suitability of a property for an ASHP include how well insulated the property is or can be. Those with loft and wall insulation, and double glazing are best suited. The cost to reach insulation standards in listed buildings is likely to be prohibitive however in conservation areas secondary glazing could be a substitute for double glazing. Outside the property, adequate space, with unrestricted airflow, is required. A route for pipework from the ASHP into the property is also required.

The ROI calculations include the cost of equipment, installation, operation and maintenance. To produce heat, ASHPs use electricity rather than gas. Therefore, the cost for both fuels has to be taken into account, as has subsidy payments from the Domestic Renewable Heat Incentive (RHI).

ASHPs are likely to require planning consent in Victorian sandstone tenement properties. Consent is more likely to be granted if it can be demonstrated that steps will be taken to minimise noise from the ASHP. While individual houses are unlikely to require planning consent, it is likely that consent for listed buildings will be required.

Solar thermal

Compared with solar PV panels, solar thermal panels are lighter. However, space is required inside the building for an insulated water tank to store the heated water.

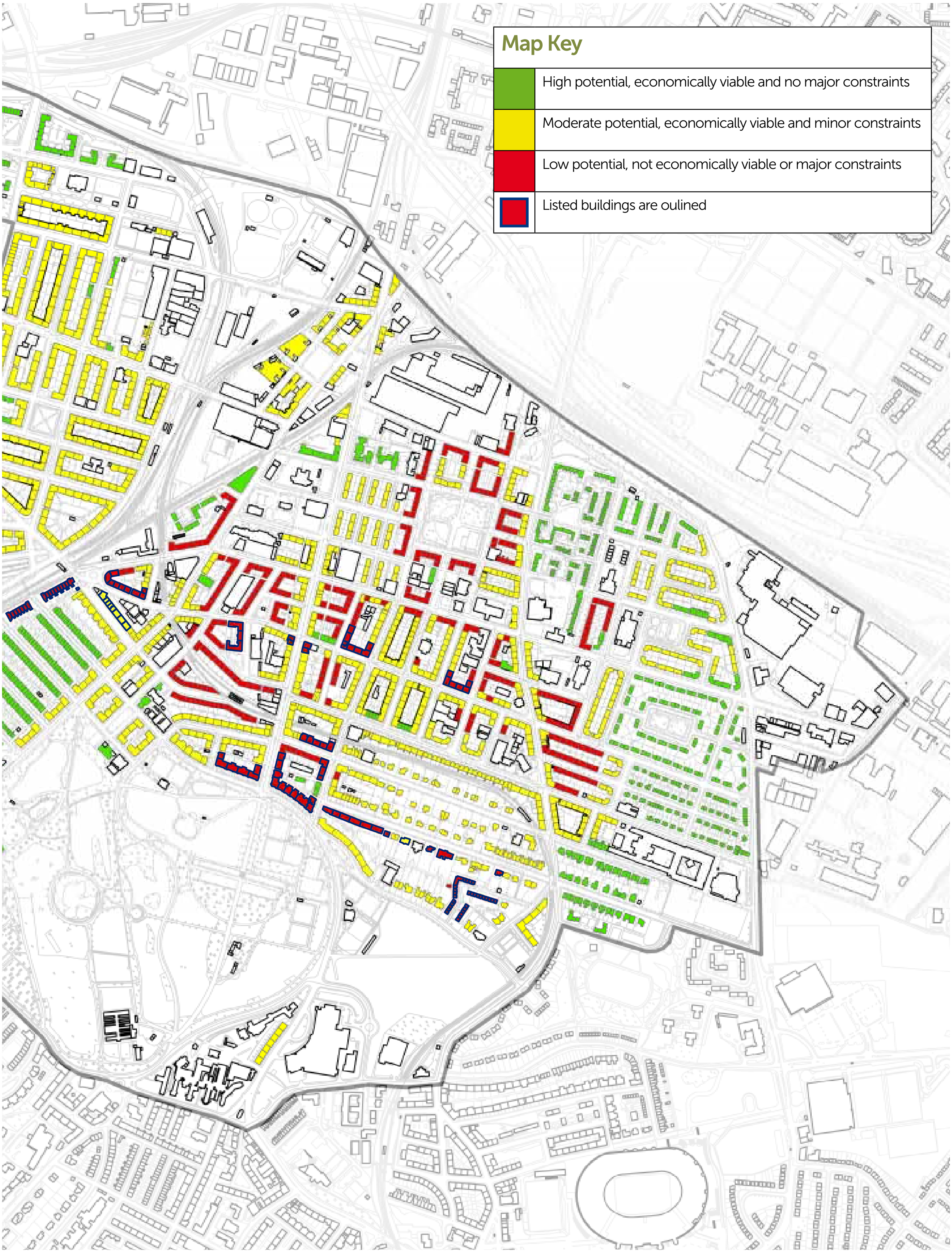
The planning requirements for solar thermal panels are similar to those for solar PV, so properties in conservation areas will need to obtain consent.

Solar thermal panels are unlikely to be cost-effective for properties that are on mains gas, even with the additional Domestic RHI payments that they attract.

However, for those properties that have an electric immersion heater to provide hot water it may be cost-effective to install solar thermal panels to reduce the amount of electricity used to heat the water.

It has not been possible to map these properties as this information is not publicly available. If your property has an electric immersion heater, then turn to page 16 of the renewables snapshot report for further information on solar thermal installations.

Solar thermal technology is most suited to new-build properties or properties where a new roof is being installed.


Map Key
High potential, economically viable and no major constraints
Moderate potential, economically viable and minor constraints
Low potential, not economically viable or major constraints
Listed buildings are oulined

Map 3: Renewable heat opportunities (ground source heat pump, biomass and district heating)

Ground source heat pumps

Ground source heat pumps (GSHPs) have very specific installation requirements to enable heat to be extracted from the ground and used to heat a property. There must be enough space around the property to enable a network of pipes to be installed under the ground or sufficient space between pipes that are drilled deeper into the ground. This means GSHPs are less suited to shared tenement properties. As with ASHPs, properties must be well insulated and listed buildings are not suitable.

Installation costs can be high for GSHPs. However, they are a very efficient technology, so the financial savings from running a GSHP can be positive when replacing a gas or electric heating system. These savings were included in the assessment of the potential for GSHPs in the project area.

Biomass

Biomass heating systems do not need the high level of building insulation that is required for ASHPs and GSHPs, although it is recommended that this is installed. Biomass systems can be connected to an already installed hot water system. However, they do require suitable space for fuel delivery and storage – this excludes a large number of properties in the project area. A flue is required for the biomass boiler, so planning consent may be required.

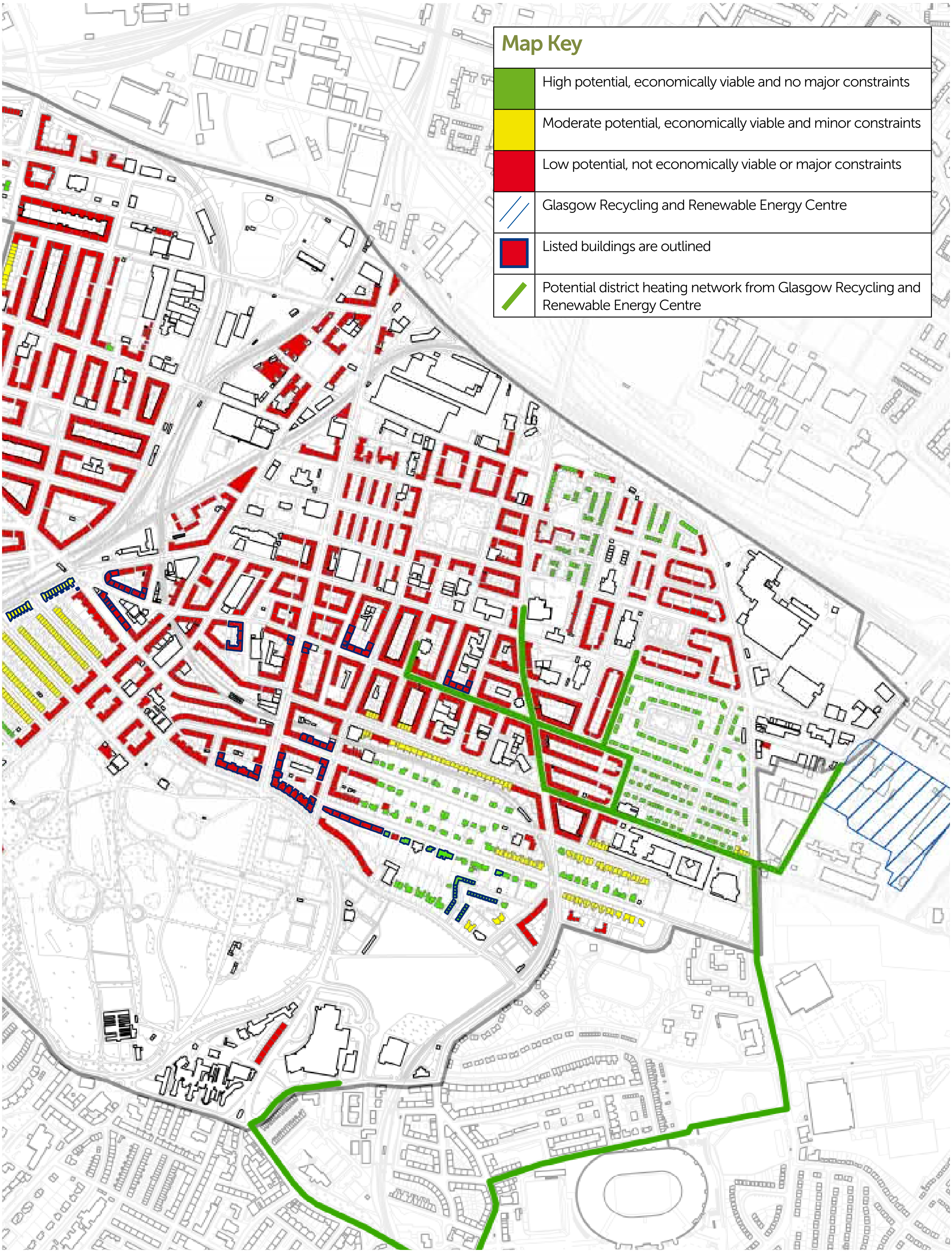
When Domestic RHI payments are taken into consideration, small biomass boilers may be financially viable when replacing a gas or electric heating system.

Although different technical, economic and regulatory factors influence the opportunities for GSHPs or biomass systems, the properties the technologies are most suited to in the project area are the same, except for listed buildings.

The map shows the opportunities for both biomass heating and GSHP systems across all domestic properties, except listed properties. All listed buildings have low potential for GSHP, so the opportunities for biomass are shown in these buildings.

District heating systems

The green pipeline shows a potential route for a district heating network that is heated by the Glasgow Recycling and Renewable Energy Centre (GRREC) at Polmadie. This route runs to key anchor loads in the project area – New Victoria Hospital, schools and a gym. Properties along this route could potentially be connected to the network. Glasgow City Council will be looking at this in more detail over the next two years.


Map Key
High potential, economically viable and no major constraints
Moderate potential, economically viable and minor constraints
Low potential, not economically viable or major constraints
Glasgow Recycling and Renewable Energy Centre
Listed buildings are outlined
Potential district heating network from Glasgow Recycling and Renewable Energy Centre

Solar PV

Solar PV technology uses solar cells to convert light into direct current (DC) electricity. The solar cells are grouped together in panels, which can be interconnected to create PV arrays.

PV panels are usually roof mounted, with weatherproof membranes used to seal areas between the roof/tiles and the mounting kit.

As solar PV generation relies on light, electricity is only produced during daylight hours and the maximum output is achieved on summer days. To maximise a system's efficiency, the panels should be mounted on south facing elevations with a 35°pitch angle.

Another component of a PV system is an inverter, a small box installed inside the property. This converts DC electricity from the PV arrays into alternating current (AC), which can be used in the house or exported to the electricity grid. Inverters may need replaced every 7 to 10 years.

A meter is often connected to the PV system to measure the amount of electricity generated. This is necessary if you want to receive payments from the Government through the FIT scheme. FIT payments are made to the owner of the PV system based on the amount of electricity generated. FIT rates vary depending on the size of the installed solar PV system. The smaller the installed system the higher FIT rate.

A 4kW PV system is the most popular size in the UK as it is the largest which qualifies for the higher FIT rates. Such a system comprises 16 panels and requires an area of 28 square metres or a little over 5 metres (m) by 5m. Where communal roof space is being considered, residents may choose to cover the available roof area with one large PV system or several separate systems , one for each property. Separate systems will be more costly.

Key points:

» Solar PV work best facing in a southerly direction (any orientation between south east and south west).

» To benefit from FIT payments, PV systems must include a meter that measures the amount of electricity generated.

» Panels require little maintenance.

» An inverter, usually installed in the loft, is needed to convert DC electricity into AC.

Things to avoid:

» Roofs that are shaded by trees or other buildings.

» Areas of the roof that are shaded by chimneys or other pipework.

» Roofs that are in need of maintenance.

The solar PV map on Page 6 also shows areas that have the potential for ground mounted arrays to be installed.

Solar PV panels being installed (4kWp system)

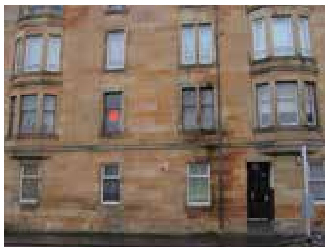
Short tenement on Dixon Avenue. Potential for 4kWp system.

Detached property. Potential for 4kWp system

Solar PV panels on pitched roof (~4kWp) in Strathbungo

Some of the streets that are an opportunity for solar PV installation.

Allison Street



Calder Street

Regent Park Square

Waverley Gardens

Wind power

The power of the wind makes the blades of a wind turbine rotate. The blades are connected to a shaft which drives an electrical generator. The electricity generated by a turbine can supply power to a building directly, can heat it (when connected to electrical heaters), or can be exported to electricity grid.

There are two types of wind turbine. Horizontal axis turbines, that rotate in the same way as a fan and vertical axis turbines, which have blades that are parallel to the turbine tower.

Small, horizontal-axis turbines have generators with a capacity up to 50kW and are installed on towers between 10m and 20m in height. Medium-scale turbines, 50kW to 500kW have larger blades between 9m and 26m long and sit on towers up to 80m high. Vertical-axis wind turbines are mounted on towers of similar heights.

The majority of turbines are designed to be free-standing structures. However, there are some micro-sized building-mounted wind turbines available (typically 1kW to 6kW). Wind turbines work best when installed in areas where the wind can blow freely without any turbulence caused by trees or buildings, so building mounted turbines are not suited to urban areas.

Most wind turbine installations are eligible for additional financial support through the FIT scheme. There are no wind turbine installations in Glasgow receiving FIT payments.

Wind turbines create noise due to parts moving in the wind. Hence, there are strict planning rules that govern how close to a residential property wind turbines can be installed. The required minimum distance between the turbine and nearest residential property is 100m for turbines up to 100kW and 400m for turbines up to 500kW.

There are no locations in the project area that are 400m from a residential property. However, the top of the hill in Queen's Park is more than 100m from a residential property. Typically, wind turbines are located where the average wind speed is at least 5m/s at 45m above ground level. This is the case at the top of the hill in Queen's Park.

An 85kW wind turbine installed at this location could generate up to 245,000kWh per year, enough to power 52 homes in the area.

Small scale horizontal axis wind turbine

Small scale vertical axis wind turbine

Potential opportunity for a wind turbine in Queens Park

Key points:

» Typically, wind turbines are installed at locations where the average wind speed is 4.5m/s at 10m above the ground and 5m/s at 45m above the ground.

» Wind turbines will require an electricity grid connection.

» Planning permission will be required.

» A radar study will be required if close to an airport flight path.

Things to avoid:

» Choosing a site too close to a residential property.

» Choosing a site with turbulent wind flow.

» Choosing a site in a conservation area.

Heat pumps

Heat pumps extract heat from the ground or outside air and "pump" it into a property. They work in a similar way to a freezer. In a freezer, heat is extracted from inside the freezer and pumped out into the room. In a heat pump, heat is extracted from the air or ground and pumped into the property.

In a domestic heat pump system, this sealed gas is heated by the ground or air to ambient temperature. When the gas is circulated through the pump, it is compressed, increasing its' temperature enough to heat the property. Repeating this process pumps heat from the ground or air to the heating system in the house. The higher the pressure the gas is compressed to, the higher the temperature the heat pump can provide to the property and the more electricity required to run the compressor.

Heat pumps are most efficient when the source of heat (air or ground) is as warm as possible and the radiators connected to the heat pump, heat the house using water at as low a temperature as possible. Heat pump water temperature is typically 45°C, compared to 70°C for use with a conventional gas boiler. Typical household comfort levels range from 18°C to 24°C. Hence radiators used with heat pumps are larger than those used with gas boilers and more radiators may be required. Correctly sized radiators can save up to 16% on the running costs alone.

A well-designed heat pump system is very efficient supplying three or four units of heat for every unit of electricity used. Since electricity prices are greater than mains gas prices, heat pumps are made financially attractive with a financial subsidy via the Domestic RHI, which is a payment to owners of renewable heat sources for every unit of heat they generate. Hence, they provide low cost heating.

Air source heat pumps

ASHPs are simple to operate and are able to provide enough heat to keep a house or flat warm all year round. An ASHP pumps air from outside to extract heat from it. Using a hot water storage tank can reduce the energy used during the operation of an ASHP, although it is not essential.

ASHPs generate some noise and must be located where they will not be a nuisance. Ways to reduce the noise include installing fencing around the ASHP or fitting it in a noise reducing enclosure. For this reason, it is sometimes necessary to obtain planning permission before an ASHP is installed.

ASHPs should be installed outside a property where air can move freely, such as on an external wall in a similar way to an air-conditioning unit.

Ground source heat pump

GSHPs work on the same principle as ASHPs, except that they extract heat from the ground instead of the air.

There are two types of GSHP:

» Horizontal trenches – these are ground loops of pipe that extract heat from the soil at around 1.5m deep.

» Vertical boreholes – these are drilled to a depth of approximately 100m and pipework is installed to extract heat from the bedrock.

Horizontal trenches tend to be cheaper to install, but require a large area of ground – up to three times the area of the property being heated – that cannot include tarmac or paving. Vertical boreholes need be around 7m apart. A typical house would require two to four vertical boreholes. These require a smaller area than horizontal trenches, but cost more to install. The land where the trenches or boreholes are to be installed must be owned by the householder unless permission can be obtained with a long-term agreement with the landowners.

If the trenches do not cover a sufficient area or there are too few boreholes, then the ground will get colder every year and eventually the system will stop working.

GSHPs are more expensive to install than ASHPs, but are cheaper to operate as they are more efficient and the Domestic RHI payments are higher.

Key points:

Before installing a heat pump, you should ensure that:

» Your property is well insulated.

» The hot water cylinder used is designed for use with a heat pump.

» Your electricity connection is capable of supplying a heat pump.

» The size of the GSHP ground loops are appropriate for your property and location.

» Your chosen installer is registered with the Microgeneration Certification Scheme.

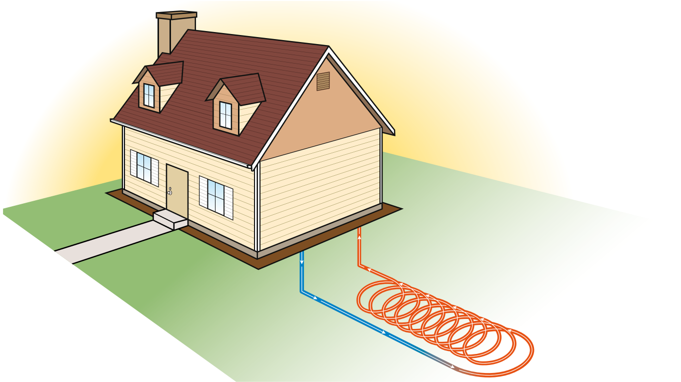
Things to avoid:

» Using undersized radiators, such as those designed for a gas central heating system.

» Installing a heat pump that is too large or too small.

» Locating ASHPs where air flow is limited, such as in an outdoor stairwell or a light well.

GSHP ground loop being installed



A horizontal trench GSHP system

ASHP installed outside a flat

Suitable tenement flats in Govanhill for ASHPs to be installed on the outside wall

Some of the streets that are an opportunity for ASHP installation

Bennan Square

Moray Place

Allison Street

Myrtle Park

Some of the streets that are an opportunity for GSHP installation

Albert Road

Bennan Square

Allison Street

Preston Place

Solar thermal heating

Solar thermal panels work using a metal plate, called an absorber that has a dark coating and heats up in the sun. Solar thermal panels come in two types:

» Flat plates – where the absorber size is typically 2m x 1m and has a sheet of plastic or glass in front of it.

» Evacuated tubes – a number of small absorbers, each placed in a clear glass tube containing a vacuum. This prevents heat escaping in the same way as a vacuum flask does.

Flat plates and evacuated tubes look very different, but work in the same way. Evacuated tubes are more efficient, but more expensive to install.

Solar thermal panels can provide all of a building's hot water needs in the summer and are eligible for Domestic RHI payments for this. Under the Domestic RHI scheme, they are not eligible for providing space heating.

Most solar thermal systems are sealed, pressurised systems. A water and antifreeze mixture is pumped through the panels. It is heated by the sun and then passes through a coil in a hot water tank where the heat is transferred to the water. The cooled water and antifreeze mixture returns to the solar panels where it is heated and the process begins again.

In most cases a solar hot water tank has two sections. The bottom section is heated by the solar panels and the top is heated by a gas boiler or electric heater in the usual way. In houses or flats with a combination boiler, a solar hot water cylinder pre-heats water before it goes through the boiler. The boiler then tops up the temperature if it is required reducing the amount of gas used.

Solar thermal systems can be installed on any property with a roof that gets direct sunlight for at least part of the day and where a hot water cylinder can be installed.

Planning permission would only be required in conservation areas and on listed buildings.

Key points:

» Solar panels must be in direct sunlight for at least part of the day.

» Allow a large enough hot water tank to store heat from the panels.

» Check pressure gauge frequently.

» Arrange for antifreeze to be checked annually.

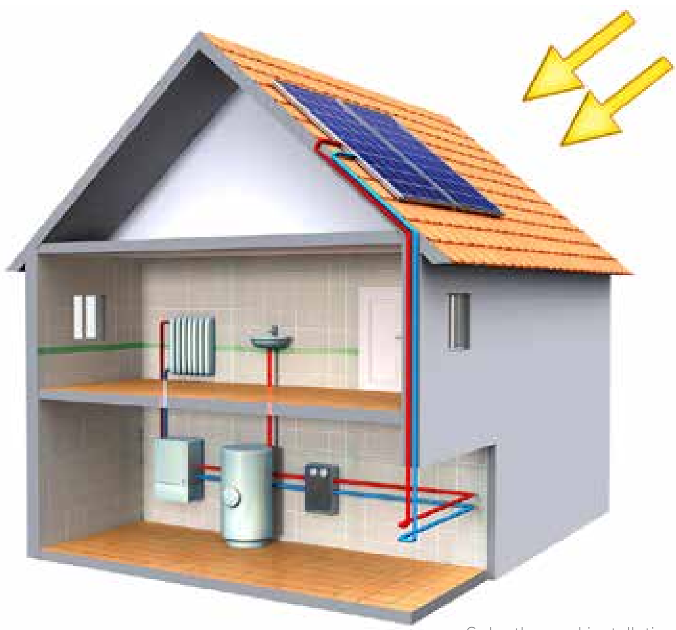
Things to avoid:

» A water tank which is too small.

» Long distances between panels and water tank.

» Allowing panels to overheat regularly.

» Shade on the panels for a lot of the day.



Solar thermal installation

Solar thermal evacuated tubes

Solar thermal flat plates

Suitable solar thermal roof space in Govanhill if away from the shading of the chimney

Biomass heating

A biomass boiler is low carbon since it burns wood-based fuel. Unlike fossil fuels, carbon dioxide (CO_2) from the atmosphere was absorbed by plants used to fuel the boiler, so no extra CO_2 is added to the atmosphere when the fuel is burned. Biomass boilers provide all the heating and hot water requirements for a house or flat, while biomass stoves often only heat a single room. Some stoves can provide backup hot water.

Fuel that can be used in a biomass system are wood chips, logs and wood pellets. Wood chips and wood logs are unsuitable for households in urban environments because they require a large storage area. Therefore, wood pellets are the best source of fuel as they have a higher energy content than logs or chips, so a smaller quantity of fuel is required to provide the same amount of heat.

A pellet boiler, providing heating and hot water, will use approximately 10kg of fuel a day in a typical property. Pellets are available in 10kg bags or deliveries of several tonnes can be made by a lorry if there is suitable access and storage. Moving the fuel into the property requires a lot of manual handling.

In larger houses, it may be beneficial to install a pellet store, so pellets can be purchased in bulk and automatically fed to the boiler. This will reduce the cost of fuel. The cost of building a fuel store needs to be included when obtaining a quotation for a biomass system. In most cases, biomass boilers are larger than oil or gas boilers.

The South Seeds project area is in an air quality management area. This means that planning permission will be required for a biomass flue as the fuel releases a higher level of small particulates into the air compared with that for natural gas. A flue running through an already installed chimney is possible.

Domestic RHI payments are available to support biomass systems as the cost of wood pellets is higher than the cost of mains gas and biomass boilers are more expensive than gas boilers.

Large individual properties or large terraced houses provide the best opportunity for biomass systems in the South Seeds area, provided planning permission can be granted.

Key points:

» Ensure there is enough space for the boiler and fuel storage.

» Wood pellets are the best fuel supply for domestic properties.

» Biomass boilers require a hot water tank, stoves do not always.

» Ensure regular boiler maintenance and cleaning.

Things to avoid:

» Storing fuel in humid unventilated rooms.

» Installing a biomass flue that is too small.

» Oversizing the boiler as it will not run efficiently.

» Burning wet or damaged wood pellets.

Wood pellet fuel store with approximately 2 months fuel supply.

Wood pellets

Biomass boiler and hot water tank

Biomass stove for heating a room only

Some of the streets that are an opportunity for biomass installation

Albert Road

Allison Street

Preston Place

Bennan Square

District heating

A district heating scheme has many properties connected by heating pipework to a single source of heat. There are a number of opportunities for this in the South Seeds project area.

A successful district heating system usually consists of a mixture of building types, which need heat at different times of day and times of year. Sites that need a lot of heat such as schools, leisure centres or hospitals are anchor loads and are connected to form the basis of the network.

This allows a heat source to be used that is only viable at a larger scale such as geothermal heating, an industrial biomass boiler or waste heat from an industrial process.

District heating schemes also reduce the cost of heat by maximising the hours that a single heat source is operating. Schools, hospitals and houses often require heat at different times of the day. Smaller district heating schemes can be connected to form larger, city-wide networks.

Mine water heating

There is a coal seam under the South Seeds project area which contains a large number of mine workings. These mine workings are now flooded. The deeper these mines, the higher the temperature of the water in them. Small to medium-sized heat pumps could use heat from the mines to heat well-insulated properties. A large heat pump system (over 10MW) could provide high temperature heat (90°C) to hundreds of properties in a large district heating system.

This provides a very efficient and low carbon option for heating a large number of properties from one heating system.

The Scottish Government has completed a study on the use of mine waters for heating homes across the country[3]. Theoretically, mine waters could provide the equivalent of approximately one third of Scotland's heat demand, although in reality this will be less as heat can only be used close to the mines, not all mines are suitable and not all homes are suitable for mine water heating.

Case study

A mine water heat pump system was installed in a new housing development in Glenalmond Street, Shettleston in 1999[4](see picture opposite). This provides low-cost heating to 16 houses using the heat from mine water. Water in the mines at 12°C is pumped up from 100m below ground and passed through a heat pump. This produces water heated to 55°C which is stored in a thermal store (a large water tank). This provides central heating and hot water for all houses. All homes were well insulated and it is suggested that Glenalmond Street residents served by the system have heating bills of around £160 per year, as compared to £660 for an average Scottish family.

[3] www.gov.scot/Resource/0043/00437977.pdf
[4] www.sust.org/pdf/glenalmond.pdf
[5] Based on 5kW peak load per house

South Seeds will be further investigating the suitability of the mine workings to heat properties in the area.

Large-scale biomass

A large-scale biomass boiler can provide enough heat for a number of different properties. If a suitable anchor load is identified, a large heat user, during the day, most of the heat from the biomass boiler would be used by the anchor load, whilst at night the heat from the boiler could be used in domestic properties.

For example, a biomass district heating scheme could serve St Bride's RC Primary School and the surrounding tenement properties on Allison Street, Victoria Road and Prince Edward Street. The school is currently heated by an oil boiler and consumes around 80,000 litres of fuel per year. During the day, most of the heat from the biomass boiler could go to the school. During the night, most of the heat from the biomass boiler could go to the surrounding tenements.

The surrounding tenements consist of approximately 108 flats in adjacent blocks, each requiring approximately 8,000kWh of heat per year. Installing a 200kW biomass boiler could provide heat to the school and the surrounding properties. To make the system financially viable and ensure all properties received low-cost heat, the cost of the connecting heat network would need to be funded separately, potentially through a grant.

Glasgow Recycling and Renewable and Energy Centre

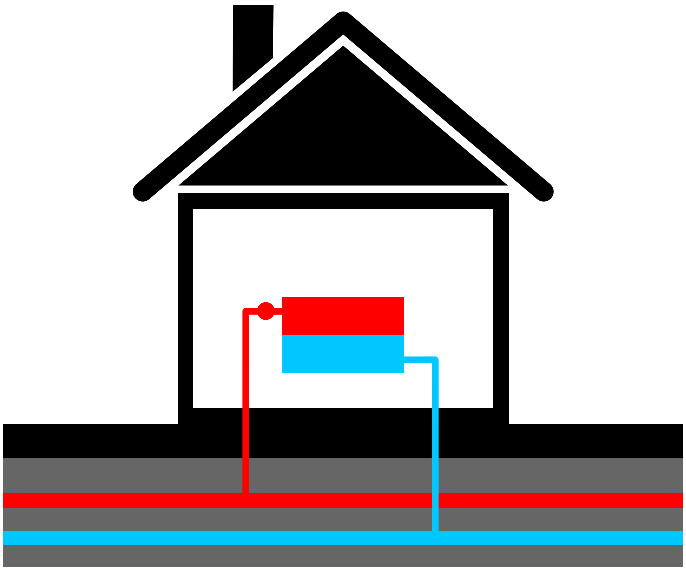
The GRREC will be operated by Viridor and will generate 38MW of waste heat, enough to heat more than 7,000 houses [5].

Therefore, it would be possible to use this to heat a significant number of properties in the study area. These properties would need to be connected to the GRREC using insulated pipework which would be installed under existing roads and pavements. This will be economically viable only by charging users for the heat, which would be cheaper than gas heating. It is essential that a number of anchor loads are connected to any pipe run as these provide certainty of there always being demand for the heat.

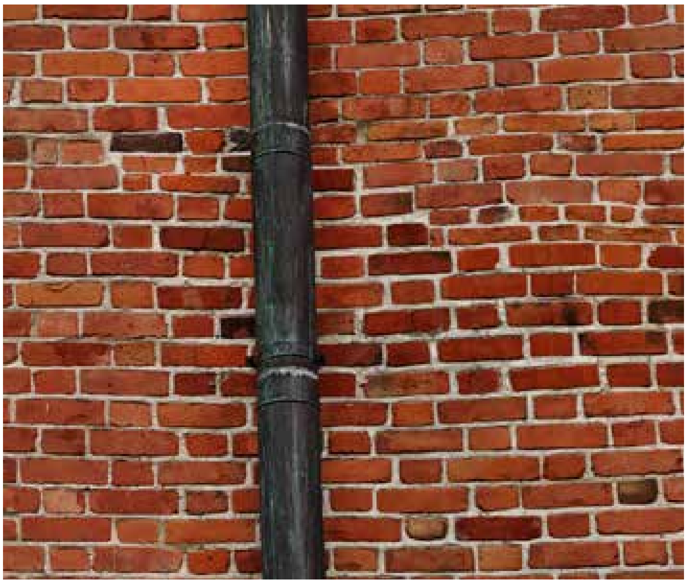
Map 3 on page 10 shows one possible route for this pipework. It would connect the GRREC to heat loads at Hampden, the New Victoria Hospital, Holyrood Secondary School, Holy Cross Primary School and Govanhill Housing Association properties.

Further work could identify additional anchor loads to determine possible routes for pipework. This would allow a greater number of domestic properties in the South Seeds area to benefit from low-cost heat from the GRREC. Glasgow City Council is currently looking into options for such a district heating network.

Heating pipework would run from the main heat source eg GRREC



How a district heating scheme works



External district heating pipes running to each house

Heating pipework would run from the street up the outside of the flats

Example biomass boiler house that could be connected to St Bride's

District heating system in Shettleston heated with heat from mine water.

South Seeds

What We Can Do For You

» Through our home energy auditing programme, we offer residents home visits. During these visits we identify where householders can make savings on their electricity and/or gas use by implementing energy efficiency measures, changing their behaviour and/or installing renewable energy technologies.

» We offer advice on the most appropriate renewables for your property and can signpost you to available sources of support to help you with installing renewables.

» We support residents in making achievable changes to their energy use. We advise on energy saving behaviour, giving practical tips based on the types of properties found in south Glasgow. We also lend out electricity monitors, so residents can understand in pounds and pence their energy usage. We do this because it puts residents in better control of their energy use and they are able to understand what changes in behaviour will make the most difference.

» Through our handyman service, we support residents to start saving energy as soon as possible by installing energy saving measures that are suitable for properties in the south of Glasgow such as draughtproofing, underfloor insulation and radiator panels.

» We support tenants to engage with their social or private landlord to make improvements so they can save energy and reduce their bills during their tenancy.

» We work with local agencies to make it easier to implement energy efficiency measures or install renewable energy technologies in the south of Glasgow.

» We work alongside local residents to put derelict land to use as greenspace and food growing areas, and support residents in making use of backcourts and other greenspaces. We do this not only for the carbon savings, but also because such action can help bring individuals together, which can be a starting point for a discussion about energy use in the home.

» We build compost bins, which are designed for a group to share (such as in a tenement close). We can support the group to get started and provide on-going support.

» We support volunteers to assist us to provide community gardening opportunities, learn more about energy awareness in the home and support South Seeds achieve positive outcomes for the community.

To get in contact with South Seeds call 0141 636 3959 or drop in to the office at 168 Butterbiggins Road, Govanhill. Visit www.southseeds.org for more information.

South Seeds
168 Butterbiggins Road
Govanhill
Glasgow G42 7AL
0141 636 3959
www.southseeds.org
info@southseeds.org