Community and locally owned energy in Scotland

2024 methodology report

14 April 2025

Report produced on behalf of the Scottish Government

Contents

Table of tables

1. Introduction

This document outlines the methodology for the review, collation and analysis of the key findings in the community and locally owned renewable energy report. It will outline the main steps taken to calculate the current capacity and installations of community and locally owned energy. It will include assumptions used to try to ensure minimal gaps in data and improve the accuracy of reporting. It will also review the limitations of the methodology and data.

Section 2 will report on the key changes made to reporting in 2024.

Section 3 will outline the definitions used to classify community and local owned categories, types of renewable energy and storage included in the report. It will also provide an explanation of shared ownership.

Section 4 will highlight the multiple sources of data used to collate the installation information of community and locally owned renewable energy. It will also provide insight to data check and quality assurance processes.

Section 5 will outline assumptions used in data analysis and reporting. This includes how capacity and output was estimated for installations with missing data. It will also provide guidance on how historic data is managed.

Section 6 will provide a summary of all know methodology limitations.

2. Changes in 2024 reporting

There were two significant changes to the reporting in 2024 compared to the 2023 report.

The first is the inclusion of Scottish Domestic Energy Performance Certificate (EPC) register[1] for social-let properties' renewable installations into this year's reporting. A Scottish Domestic EPC provides information about the energy efficiency level of a property and how it can be improved.[2] Therefore, EPCs include information about renewable technology such as heat pump, solar PV, solar thermal, biomass boiler and wind turbine. Moreover, EPCs has a field indicating the tenure type of the property, so we can separate the social-let properties from other domestic properties. However, we have used local authority and housing association surveys for social-let domestic properties in historic years, but due to their voluntary nature there is a relatively big data gap on social-let domestic renewable installations. Therefore, the inclusion of Scottish Domestic EPC register is an improvement to the data coverage and quality of the reporting. Section 4.1 explains the details of the social-let EPC analysis and data quality caveat.

The second change is that we increased the number of local authorities that we collect planning portal data from 12 to 16 this reporting year. This is a one-time off effort to minimise the data gap caused by only utilising planning portal data from two local authorities in the 2023 report. We will resume to analysing planning portal data from 12 local authorities on rotation in future reporting years.

[1] https://www.scottishepcregister.org.uk/
[2] https://www.gov.scot/publications/energy-performance-certificates-guide/

3. Definitions

3.1. Community and locally owned categories

As with previous versions of the database, the Scottish Government has requested that 'community and locally owned renewable energy' be defined as technologies producing heat and/or electricity from a renewable source,[3] where the owner of the installation is in one of the following categories:

- A community group
- A local Scottish business[4]
- A farm or estate
- A local authority
- A housing association
- A 'Public sector or charitable organisation', including:
    - Charities, including faith organisations and those found on the Scottish Charity Regulator (OSCR) website[5]
    - Public bodies or publicly owned companies
    - Further or higher education establishments such as universities and colleges

'Ownership' has not been restricted to cases where the organisation owns the entire renewable installation. It also includes cases where, for example, a community group or farmer has helped to meet part of the cost of developing and installing a renewable system in return for some benefit, such as a share in the income generated. In such cases, a percentage of the installation's capacity equal to the share owned by the community or local owner is counted towards the target.

'Ownership' does not include cases where the only benefit to the farmer or community group is a land rental payment from the owner or developer of the installation, or installations that generate community benefit payments but are owned by another organisation (for example a wind farm developer). The Scottish Government has established a register of community benefits from renewable energy installations[6] in order to help communities and renewable energy developers negotiate appropriate levels of community benefit payment.

There is naturally some overlap between the different categories of owners. For example, some community groups have charitable status, as do many housing associations; and farms and estates could also be considered local Scottish businesses. For the purposes of this report, the following definitions have been used to determine which category each installation belongs to:

- The **Community** category has been defined as communities of place, i.e. based around a sense of shared location. They often have charitable status. In some

[3] A full description of each eligible technology is given in 3.2 Renewable technology descriptions.
[4] Note this excludes Scottish businesses whose purpose is to develop renewable energy projects when the installation is at not from their own properties or where ownership and management of the installation is provided as an energy service company (ESCO).
[5] https://www.oscr.org.uk/
[6] www.localenergyscotland.org/view-the-register/

instances, the renewable technology and/or income from it may be owned by a trading subsidiary, which may be registered as a separate company; but in all such cases the installations have been treated as under community ownership.

- The **Farm and Estate** category includes organisations where the renewable technology is installed on land currently used for agricultural or other farming purposes, or on buildings that are part of a farm or estate layout; and (where the installation needs planning permission) where the person or organisation listed as the applicant in the planning application gives their address as being in Scotland. Estate ownership is often difficult to establish, but where possible publicly available information has been used to establish whether estate owners are normally resident on the estate where the installation is to be built. Estate ownership is sometimes connected to or maintained through a charitable trust or a local business, but in such cases any related renewable energy installations have been included under farm and estate ownership.
- The **Public Sector and Charity** category cover public bodies and charities. Public bodies are those listed in the National Public Bodies Directory,[7] including health bodies such as NHS health boards and public corporations such as Scottish Water. Other publicly owned organisations such as the fire and rescue services and the police forces are also included in this category, although they are not strictly public bodies. This category also includes further or higher education establishments who are members of Association of Scotland's Colleges (ASC)[8] or Universities Scotland.[9] Charities have been defined as charitable organisations found on the Scottish Charity Regulator website, which are not also a community group, housing association or estate owned charitable trust. This category has also been taken to include leisure trusts,[10] and churches building trusts and other religious organisations.
- The **Local Authority (LA)** category includes all 32 unitary local authorities of Scotland.
- The **Local Business** category are small or medium-sized enterprises (SMEs) registered with Companies House[11] at an address in Scotland. The businesses must have fewer than 250 employees and not be a subsidiary of another business which has more than 250 employees or is registered outside of Scotland as per Companies House. Businesses receiving funding through CARES or through Resource Efficient Scotland (RES) SME loans have been included. Note that this definition excludes Scottish SMEs whose purpose is to develop renewable energy installations at a location significantly removed from their registered office, and where the business does not own the land where the installation will be built.[12]
- The **Housing Association (HA)** category includes all registered providers of social housing within Scotland other than local authorities. Although some housing associations are registered charities and others are community groups, any

[7] www.scotland.gov.uk/Topics/Government/public-bodies/about/Bodies
[8] www.scotlandscolleges.ac.uk/about-us/
[9] www.universities-scotland.ac.uk/
[10] Leisure trusts supply sports facilities to local communities, often on behalf of unitary authorities.
[11] www.companieshouse.gov.uk/
[12] For example, an SME established to build and operate a renewable energy project could count as a 'local Scottish business' for the purposes of the Scottish Government's target if it was registered with Companies House at an address in Scotland, and either a) owned all the land where the installation was to be built, or b) if it did not own all the land, if its registered address indicated that it was physically located close to the address of the proposed installation.

renewable energy installations owned by a registered social landlord is recorded under the housing association ownership category.

3.2. Renewable technology descriptions

Any source of renewable energy generation, such as electricity, heat, combined heat and power or other unspecified energy categories, i.e. energy from waste installations, or types of energy storage, such as electricity, heat and hydrogen, which fell into the ownership categories listed above were included in the database.

3.2.1. Included technologies

The following renewable technologies have been included in the database:

- **Wind**

Wind turbines have blades which are turned by the wind. When the wind blows, the blades are forced round, driving a turbine which generates electricity. They may be pole-mounted or building-mounted, and may be connected to the national electricity grid, a local distribution grid, or stand-alone.

- **Hydroelectric**

A flow of water falling from a higher altitude to a lower altitude (and not from waves or tides) is used to drive a turbine which generates electricity.

- **Wave and tidal (marine)**

The action of waves or tides is used to drive a turbine, which generates electricity.

- **Solar photovoltaics (PV)**

Panels or modules, normally fixed to the roofs of buildings, which produce electricity when exposed to light (either direct or indirect).

- **Biomass combustion**

Biomass is organic material from plants and animals. It takes carbon out of the atmosphere while it is growing and returns it as it is burned. If it is managed on a sustainable basis, biomass is harvested as part of a constantly replenished crop. This is either during woodland or arboriculture management or coppicing or as part of a continuous programme of replanting with the new growth taking up CO_2 from the atmosphere at the same time as it is released by combustion of the previous harvest.[13] The solid biomass included in this category are used directly as fuel for combustion.

    - **Biomass heat only**

      Solid biomass is burnt to directly produce heat for space or water heating, or to provide heat for an industrial process. Woodfuel is the most common type of solid biomass used to produce heat in Scotland, usually in the form of woodchip, pellets, or logs. Large biomass boilers installed for generating heat in the wood processing industries will normally be fuelled with as much on-site produced co-products as possible such as bark, offcuts and saw dust, supplemented by virgin

[13] https://www.forestresearch.gov.uk/tools-and-resources/fthr/biomass-energy-resources/general-biomass-information/

fibre or woodfuel when required. A small proportion of biomass installations may be using other solid biomass fuels instead of or in addition to woodfuel, such as straw or energy crops.

- **Biomass combined heat and power (CHP)**

Solid biomass is burnt to generate electricity. Heat is produced as a co-product, which can then be used for industrial heat, supplying space or water heating or exported to another user. Biomass CHP installations tend to be very large in capacity and will predominantly use a variety of woodfuel types including any wood co-products produced on site, recycled wood and virgin fibre.

- **Biogas combustion**

Biogas is produced by conversion of organic matter, such as food scraps, animal waste and biomass. Biomass in this case is not used directly as fuel like solid biomass rather are converted to gas form before combustion.

- **Biogas produced by anaerobic digestion (AD)**

Organic matter is broken down in the absence of oxygen to produce a mixture of combustible gases. The biogas is then burnt to produce heat or burnt in a combined heat and power unit to generate both heat and electricity. In some applications, the heat produced is used solely to maintain the anaerobic digestion process which requires some heat input. The feedstock is typically some form of waste such as food and garden waste or agricultural waste.

Biogas that is produced by AD and then processed into biomethane for injection into the gas grid is not included under biogas combustion as no fuel is consumed on site. Any renewable heat output produced in this way is found under the biomethane technology class.

- **Biogas produced by landfill**

Landfill gas (methane from rotting organic matter in landfill) is captured and burnt to produce heat or used in a combined heat and power unit.

- **Biogas produced by pyrolysis or other advanced conversion methods**

Treatment of waste or biomass at high temperatures either in the complete absence of oxygen (pyrolysis) or a limited amount of oxygen (gasification) to produce gases which can be burnt to generate heat or heat and electricity.

- **Solar thermal**

Panels normally fixed to the roofs of buildings, which produce hot water using the sun’s heat. Occasionally these systems are designed so that the hot water produced also contributes to space heating demand (solar space heating).

- **Heat pumps**

Technologies to extract low-grade heat from the external environment through a compression system. Typically used to produce heat for space heating, water heating or both and are therefore most common in domestic properties; however, specific heat pump set ups may also be capable of meeting larger scale heat demands. Although heat pumps rely on electricity to operate, their high co-efficient of performance (COP) means they extract more heat energy from the environment than they use in electricity.

Heat pumps can be used with air or water distribution systems but only heat pumps using a wet distribution system are eligible for RHI payments. For this reason, the vast majority of heat pumps installed use wet distribution systems.

'Exhaust air heat pumps' (which, in addition to extracting heat from the external air, also draw warmth from warm stale air leaving a building) have been included under the air source heat pump technology. Units which are purely exhaust air heat recovery, without also extracting heat from the air outside, have not been included as these do not include any element of renewable heating. Cooling provided by heat pumps has also not been recorded in the database.

  - **Air source heat pump (ASHP)**

    Heat from outside air is absorbed at low temperature into a fluid. This fluid passes through a compressor, increasing the temperature, and transfers that higher temperature heat to the heating circuits.

  - **Ground source heat pump (GSHP)**

    Ground source heat pumps circulate a mixture of water and antifreeze through pipework buried in the ground. Heat from the ground is absorbed into the fluid, the fluid is compressed, and then the heat passes through a heat exchanger into the heat pump. The pipework can be buried horizontally, referred to as a ground loop, or vertically in a borehole. The length of buried pipework is dependent on the amount of heat required.

  - **Water source heat pump (WSHP)**

    Water source heat pumps function the same as ground source heat pumps except the pipework is submerged in a body of water such as a river or lake, or a water filled borehole rather than the ground. Due to needing a substantial body of water available, the number of installed water source heat pumps is considerably lower than the number of installed air or ground source heat pumps.

- **Waste combustion**

Heat energy produced from burning waste not considered as solid biomass or bioliquids, such as municipal solid waste. For installations burning municipal solid waste, a proportion of the heat capacity and output is estimated to be renewable based on the biodegradable proportion of the waste burnt.[14]

3.2.2. Potential technologies

Other technologies which could have been included in the database if examples had been found are:

[14] The percentage of municipal waste assumed to be renewable is 50% in line with the latest DESNZ RESTATS methodology. https://www.gov.uk/government/collections/renewables-statistics

- **Fuel cell biomass**

Fuel cells running on biomass could be used to produce electricity and useful heat. However, none were identified in Scotland for this version of the database.

- **Deep geothermal**

Heat from deep underground is extracted by pumping water into a deep well, allowing it to heat up using the heat of the rocks, then abstracting the water via another well.

3.2.3. Not included technologies

Technologies which **have not** been included in the database, as they do not produce energy from renewable sources, are:

- **Non-biomass CHP**

CHP units fuelled by fossil fuel gas (or other fossil fuels) to produce electricity and heat. CHP (or tri-generation) units can represent an efficient use of fuel as they achieve high efficiencies. However, as the energy from such units is generated from fossil fuel sources, it has not been counted towards renewable energy targets in this report.

- **Exhaust air heat recovery (EAHR) only**

Systems which recover the heat from warm stale air leaving a building and use it to warm incoming air. This can help to reduce space heating requirements. However, because the heat being recovered for the building will normally have been generated by fossil fuels in the first instance, these systems do not provide renewable heat. Some heat pumps have been included which are classed as 'exhaust air heat recovery', but only where it was possible to ascertain that they also provided heat taken from the air outside the building (which is renewable heat) via a heat pump component.

- **Passive renewable heating or cooling**

The building design is used to ensure heating or cooling without relying on mechanical means, for example through features such as solar gain through large areas of south-facing glazing, or 'natural ventilation'. Such design features can successfully help a building meet its heat demand; however they have not been included in this report or in the database as the heat resource is very difficult to estimate.

3.2.4. Storage technologies included

The following energy storage solutions have been included in the database are;

- **Electricity battery storage**

Deep-cycle batteries that store electricity when it is generated and provide power when it is needed. The most common types of battery storage are lead acid batteries and lithium-ion batteries. Batteries can be charged from a range of technologies including wind turbines, solar PV panels, hydroelectric systems and diesel generators.

- **Heat batteries**

Heat batteries take generated electricity or heat and use phase change materials (PCMs) to store this energy. This energy can later be used to heat water on demand.

- **Hydrogen storage**

Hydrogen can be stored as either a gas (at a high pressure) or a liquid (at a low temperature) before being used as a fuel.

- **Pumped Hydroelectric storage**

Water can be pumped up to a higher elevation and then allowed to flow downwards at times of high electrical demand. The water is used to drive a turbine which generates electricity as per other hydroelectric installations which do not have pumped storage capabilities.

3.3. Shared ownership

As noted earlier, the definition of 'ownership' used in this analysis was not restricted to cases where the community group owns the entire renewable installation. It also included cases where, for example, a community group helped to meet part of the cost of developing and installing a renewable energy system in return for some benefit, such as a share in the income generated. In such cases, a percentage of the installation's capacity equal to the share owned by the community or local owner is counted towards the target.

Such instances are normally wind energy developments, where perhaps the best-known example is the wind turbine 'owned' by Fintry Renewable Energy Enterprise, the trading subsidiary of Fintry Development Trust,[15] which is part of the larger Earlsburn Wind Farm. In this case, the turbine owned by Fintry has a capacity of 2.5 MW, so Fintry Development Trust's entry in the community and locally owned database lists one turbine of 2.5 MW, although the full capacity of Earlsburn wind farm is much larger (around 35 MW).

Energy4All wind farms were a special case for consideration. Energy4All works to help establish wind energy co-operatives in the UK, and this work has included the establishment of operational wind farm co-operatives in Scotland.[16] Members of the local community can buy shares in the developments. In these cases, information on the percentage of community ownership was received from Energy4All, and the percentage applied to the total installed capacity of the site to estimate the MW in community and local ownership.

As shared ownership agreements are finalised, those installations currently classed as under discussion will move into the other stages of development. Where any such agreements do not come to fruition, the installations will be removed from the database. Note that the 'under discussion' status also includes a small number of sites which are already operational but where the owners are looking to refinance to include a component of shared ownership. We will continue to work closely with all groups involved to monitor the active shared ownership pipeline and the progress will be reported here annually.

In 2023, we stopped using "projects" to describe shared ownership activity in favour of "installations". As the definition of a "project" can be subjective, it can impart the consistency and clarity of the report.

[15] fintrydt.org.uk/about/
[16] energy4all.co.uk/

3.4. Units and measurements

When referring to renewable energy installations *"capacity"* refers to the maximum instantaneous power output of the system, in either electricity or heat. The capacity of technologies is usually measured in kilowatts-thermal (kW) or megawatts-thermal (MW), depending on the size of the installation. For ease of reading, the capacity totals presented in this report are all given in megawatts (MW), except when we were referring to the 2 GW target at the beginning of the report. One gigawatt is equal to one thousand megawatts.

Combined heat and power units have figures for electrical capacity and heat capacity. Where such installations are recorded in the database, the total installed capacity in MW is recorded. However, the supporting database attempts to also record both figures (electrical capacity and heat capacity).

"Energy output" is total energy of any type (electricity, heat or both) produced during a particular time. In the database, energy output is estimated for each technology on an annual basis. Energy is recorded in the database in megawatt-hours (MWh) and given in the report as gigawatt-hours (GWh). One gigawatt-hour is equal to one thousand megawatt-hours.

When referring to energy storage systems *"capacity"* refers to the maximum amount of energy that the system can store at one time and is measured in megawatt hours (MWh).

4. Data collection

The approach taken to collect data from each source is broadly in line with that taken to produce the previous versions of the database and accompanying report and is outlined below.

The data collection period was from January 2024 to December 2024. The figures reported in this publication are correct as of 31 December 2024.

A significant amount of time has been spent reviewing records for which detailed information has been previously hard to find and checks have been undertaken to assure quality and accuracy of data. To further improve quality, the final dataset used to compile the figures detailed in this report have been through an internal quality check. There are still uncertainties associated with the methodology used to compile the data despite the measures taken to ensure the accuracy of the data. These are discussed later in this section.

4.1. Data sources

Due to the large number of different organisations and different technologies covered by the Scottish Government's definition of 'community and locally owned renewable energy', information is sought from a variety of sources. This includes organisations administering Scottish Government or other public funding streams, local authorities and planning authorities, public bodies (e.g. NHS and Highlands and Islands Enterprise) and other groups of organisations which we believe are likely to be renewable energy owners themselves. In some cases, organisations were able to provide information about installations in more than one ownership category. These installations will be allocated to each of their ownership categories separately without duplication. For each ownership category there were a number of different data sources used, please refer to Table 2 for the ownership categories that each dataset contributes.

During the 2024 reporting cycle, we have reviewed and updated or added data from these sources:

- **Data from funding and delivery organisations**

There have been a variety of funding sources available in recent years to promote the uptake of renewable energy generation among different groups, such as communities and farms. Therefore, an important source of information for this database was information on the organisations who have received such funding, which was provided either by the funding organisation themselves (e.g. Scottish Government) or delivery and administration organisations (e.g. Local Energy Scotland, Energy Saving Trust and Ofgem).

- **Data from local authorities**

A survey was sent by email to all 32 Scottish local authorities enquiring about renewable energy and energy storage technologies fully or partly owned by local authorities. This year we have received survey responses from 17 local authorities. Since 2011, we have received information from all 32 local authorities, however, as Table 1 shows some local authorities have not been updated recently.

Table 1. The last year that we received data from local authorities

Local Authority	Last year that we received data
Aberdeen City	2022
Aberdeenshire	2021
Angus	2022
Argyll & Bute	2023
City of Edinburgh	2024
Clackmannanshire	2024
Dumfries & Galloway	2024
Dundee City	2024
East Ayrshire	2024
East Dunbartonshire	2024
East Lothian	2023
East Renfrewshire	2024
Falkirk	2024
Fife	2024
Glasgow City	2024
Highland	2018
Inverclyde	2024
Midlothian	2013
Moray	2022
Na h-Eileanan Siar	2024
North Ayrshire	2024
North Lanarkshire	2021

Orkney Islands	2022
Perth & Kinross	2024
Renfrewshire	2024
Scottish Borders	2017
Shetland Islands	2014
South Ayrshire	2016
South Lanarkshire	2024
Stirling	2021
West Dunbartonshire	2023
West Lothian	2024

- **Data from Scottish Energy Performance Certificate (EPC) Register**

We have used local authority and housing association surveys for social-let domestic properties in historic years, but due to their voluntary nature there is a relatively big data gap on social-let domestic renewable installations. The Scottish Energy Performance Certificate (EPC) Register is administrated by Energy Saving Trust on behalf of the Scottish Government. The Scottish EPC register contains a list of all the domestic properties in Scotland, along with their energy ratings, existing renewable technology installations. Moreover, this dataset contains tenure and technology information, therefore we can extract the number of social-let installations by technology, tenure type and local authority area for year 2023 and 2024. This number of installations would be a very high-quality figure in data coverage. However, the existing database also have information on social-let installations from years of surveys.

To avoid double counting, we counted the existing number of social-let installations in the database owned by Local Authority and Housing Association. The number of installations from both existing database and the EPC register are broken down by technology, ownership category and local authority area. Then we calculated the differences between the number from the existing database and EPC register, used as the number of installations to be added to the database.

It is important to note that the EPC register does not include information on installation size, so we assigned assumed capacity based on the existing installation in the database that are from social-let properties. The assumed capacity for each technology type from domestic installations from Local Authority and Housing Association is found in Table 4.

There is a significant reason that we did not use EPC analysis results to replace the social-let installations from the database completely. That is there are accurate capacity information in the existing database, whereas EPC analysis results would have to use assumed capacity.

- **Data from the Non-domestic Renewable Heat Incentive (RHI)**

On behalf of the UK Department for Energy Security and Net Zero (DESNZ), Ofgem administered the non-domestic RHI scheme. As part of this administration, Ofgem collects data on the owner, capacity and heat subsidised (taken as a proxy for output) for each installation. The dataset contains the accredited renewable heat installations from micro installations (<45kW) to large installations (>1MW). We manually checked 35% of the total capacity of installations from non-domestic RHI so far. We will continue seeking to check the rest of the dataset in future reporting years.

- **Data from the UK Renewable Energy Planning Database**

The UK Department for Energy Security and Net Zero (DESNZ) publishes the Renewable Energy Planning Database (REPD),[17] which is maintained on their behalf by Eunomia. The REPD tracks the progress through the UK planning system of all renewable electricity-generating technologies with an electrical generation capacity of 0.15 MWe (150 kWe) and greater, and of some heat-generating installations. However, it does not record details of ownership. Please note that the minimum capacity recorded in REPD has changed over the years, before Oct 2014, it was 0.01 MWe (10 kWe). Between October 2014 and 2021, the minimum capacity is 1 MWe. After 2021, the minimum capacity recorded was lowered to 0.15 MWe (150 kWe). This has made the tracking of smaller installations between 2014 and 2021 more challenging and means the number of smaller installations in operation and in various stages of development may now be further underestimated.

- **Data from planning authorities**

As part of this year's data collection, information was collected from two of the 32 Scottish local authority planning portals for any planning application which involved a renewable technology being installed after the date that these two local authorities were last checked. We then checked whether the applicant/owner is an eligible community or locally owned ownership category. We increased the number of local authorities that we collect planning portal data from 12 to 16 this reporting year. This is a one-time off effort to minimise the data gap caused by only utilising planning portal data from two local authorities in the 2023 report. We will resume to analysing planning portal data from 12 local authorities on rotation in future reporting years. We aim to check 12 local authorities every year and we should be able to cover 32 local authorities every three years. Please note that there would still be a time difference between the 32 local authorities as they are not all updated at the same time.

- **Data from Scottish Water**

Data on any Scottish Water owned renewable energy installations are provided directly to us by Scottish Water each year. The dataset includes information on the location, capacity and output of each installation. As Scottish Water are a publicly owned company, this dataset solely contributes to the public sector and other charitable organisation totals of the community and locally owned renewable energy database.

- **Investigative sources outside of Scottish Government**

We have received information about ownership change for some records, which we reviewed and rectified in the according years that they are no longer community or locally owned.

[17] www.gov.uk/government/publications/renewable-energy-planning-database-monthly-extract

Further information sources included:

- Information from individual installation owners, where necessary to confirm details such as capacity or ownership in response to telephone or e-mail contact
- Information available on Community Energy Scotland's website[18] and in its newsletters
- Individual community group, charity or housing association websites

Wherever possible, the information sought included:

- Name of the project
- Ownership (organisation and type of organisation)
- Where appropriate, the name of the subsidiary trading company owning the renewable technology on behalf of the community group or charity
- Location, including local authority area, address, and a postcode and/or grid reference
- Technology type
- Number and installed capacity of the technologies installed
- Operational status as at 31 December 2024 (operating / under construction / consented not built / in planning / in scoping / shared ownership under discussion / non-operational / decommissioned / cancelled), including, where possible, the date on which generation commenced for operational installations
- Percentage ownership by the community or local organisation in cases where the organisation did not have full ownership of the installation
- Where appropriate, the building type associated with the renewable energy or storage installation, to aid cross-checking with other sources and to better estimate yearly energy output
- Whether public grant or loan funding was received, to aid cross-checking with information received from bodies administering those funds

[18] www.communityenergyscotland.org.uk/

Table 2 lists the main data sources used in this update of the community and locally owned renewable energy database, by ownership category and data provider. We have also included the year of the last update for each data source. For the data sources that we did not received update in 2024, they are still included with historic value assuming to be still correct for this reporting cycle: Details of the data sources used for previous versions of the database can be found in the relevant reports.

Table 2. Main datasets used (*Fund, scheme or programme is closed)

Organisation(s) contacted/providing data	Dataset	Ownership category	Last update time
Local Energy Scotland, on behalf of the Scottish Government	Community and Renewable Energy Scheme (CARES)	Community; farm and estate; local business[19]	2024
	Local Energy Challenge Fund (LECF)	Community; farm and estate; local business	2017*
Energy Saving Trust, on behalf of the Scottish Government	District Heating Loan Fund (DHLF)	Local authority; housing association; community;[20] farm and estate; local business	2023*
	Green network for business	Local business	2016
Business Energy Scotland, on behalf of the Scottish Government	Business Energy Scotland Small and Medium-sized enterprise loan	Local business	2024
Scottish Forestry (previously Forestry Commission Scotland)	Wind and hydroelectric schemes on the National Forest Estate (publicly available information)	Community; public sector and other charity; farm and estate; local business	2024
	Scottish Biomass Heat Scheme (SBHS)	Public sector and other charity; farm and estate; local business	2011*
NHS National Services Scotland	Operational renewable energy installations on the NHS Scotland estate	Public sector and other charity	2019
Individual local authorities via survey	Responses to an Energy Saving Trust email survey	Local authority	2024
Biomass sites via survey	Responses to an Energy Saving Trust email Wood fuel survey	Local business; farm and estate; public sector and other charity	2023
Individual housing associations via SFHA	Responses to an SFHA email survey	Housing association	2023

[19] Local businesses must also be rural businesses to be eligible for CARES funding.
[20] Communities must be legally constituted community groups to apply for the district heating loan fund.

Eunomia, on behalf of DESNZ	Extract from the Renewable Energy Planning Database (REPD)	Local authority; housing association; community; public sector and other charity; local business; farm and estate	2024
Ofgem	Renewables and CHP register (publicly available)	Public sector and charity; community; local business; farm and estate	2019
Scottish Enterprise, on behalf of the Scottish Government	Energy Investment Fund (EIF) and Renewable Energy Investment Fund (REIF)	Community	2018
Community Energy England, Community Energy Scotland and Community Energy Wales	Community Energy: State of the Sector report	Community	2021
Scottish Government	Low Carbon Infrastructure Transition Programme (LCITP)	Public sector and charity; local authority; local business; community	2019*
Scottish Water	Renewable installations owned by Scottish Water	Public sector and other charity	2024
Scottish Natural Heritage	Renewable installations owned by Scottish Natural Heritage	Public sector and other charity	2015
	Scottish Rural development programme (SRDP)	Farm and estate; local business; community	2017*
Local authorities, collected by Energy Saving Trust	Planning applications on local authority planning portals which include renewables	Local authority; housing association; farm and estate; local business; public sector and other charity; community	2024
Ofgem, on behalf of DESNZ	Non-domestic Renewable Heat Incentive Scheme	Local authority; housing association; farm and estate; local business; public sector and other charity; community	2023*
Energy Saving Trust, on behalf of the Scottish Government	Scottish Domestic Energy Performance Certificate (EPC) register	Local authority; housing association	2024

The information sources listed below were investigated for the first version of the database and report, but the publicly available information on these was found to contain either information captured elsewhere, insufficient detail for this project or were unavailable for access.

- Carbon Reduction Commitment (CRC) Energy Efficiency Scheme (administered in Scotland by the Scottish Environmental Protection Agency (SEPA) on behalf of DESNZ)
- The Feed-in Tariff (FIT) scheme (administered by Ofgem on behalf of DESNZ)
- Installations registered for the Climate Change Levy, and Renewable Energy Guarantees of Origin (administered by Ofgem on behalf of DESNZ)
- Scotland's Climate Change Declaration

4.2. Data quality

Not all the required information was available from all sources. Given the large number of installations covered by the community and locally owned renewable energy database, it was not possible to contact each project individually, or to track down all missing details from other sources. Priority was given to ensuring the database contained the correct information with regards to technology type; operational status; installed capacity; and percentage community or local ownership share. The status of installations that were under development as of 31 December 2023 has remained the same if no evidence has been found that the project has progressed as of 31 December 2024.

The quality of data provided varied considerably. In particular, installed capacity was often not provided, and operational status was sometimes unclear.[21] Technology type was sometimes also unclear (for example 'solar', which does not indicate whether the installation is a solar PV panel generating electricity, or a solar thermal panel generating hot water). In these cases, we have recorded as much information as has been provided by the data source but have not made assumptions on the technology or size of system. In some cases, a known capacity has been recorded, but the technology type is unknown. As the annual output assumptions used are dependent on technology type, the annual output for these systems cannot be estimated.

Data received from DESNZ's REPD provided very good location data and operational status, but did not contain information on ownership, which had to be sought from other sources (mostly the planning authorities).

Location data was often missing or incomplete. In the case of installations still in scoping, location had not always been decided at the time of data collection.

4.3. Data assurance process

When adding new records to the database, not all required information was available from the sources consulted and some data gaps remain. When adding new data, priority is

[21] For example, grant and loan schemes frequently record the stage of the application for funding (loan offered or paid), but not the stage of the renewable technology itself e.g. under construction or operational.

given to ensuring the database contains the correct information with regards to technology type; operational status; installed capacity; and percentage community or local owned as these affect the reported results. Where capacity values are missing, they are assumed using values set out in 5.1 Capacity assumptions. Historical data gaps are often filled as new or improved data sources become available.

Although the sources used to populate the database frequently give an owner of the installation, it can be difficult to ascertain whether this owner is eligible to be considered community or local. Further research is often required to establish whether an owner is community or local, including through review of Companies House, planning application documents and, where applicable, other company literature such as their own website or related news articles.

Checks of Companies House include confirming that the address of the business is registered in Scotland, that the persons with significant control (i.e. the owners) also reside in Scotland, and that any parent companies, including parents of the parent company, also meet the same criteria. Where ownership of a single organisation is split between an eligible and ineligible individual or entity, the split is recorded and factored into the analysis. For example, a 1 MW installation which is only 50% community or local would only contribute 0.5 MW to the reported totals.

Once any new data has been through the previous checking steps, there is the last step. The cross-checking with all existing data in the database to exclude any potential double counting. We perform this check using in-house developed R script to ensure the efficiency and accuracy of this check. We compare owner information, installation name, address, operating date, capacity in this last step using Jaccard distance to produce a matching score. For those records that fall into the fuzzy score zone, we would perform manual checks to make sure that we do not double counting in any case.

Installations can change over time, most notably they may become decommissioned or change ownership and so what was accurate when an installation was first recorded may no longer be the case. Due to the large number of records held within the database it is not possible to proactively review the owner or status of every installation recorded. Instead, the accuracy of any database record is reviewed, and rectified when appropriate, in response to new information from newly accessible or improved datasets or feedback from other researchers of community and locally owned energy.

As only a selection of records are reviewed internally each year or are publicly accessible to be reviewed externally, it is likely some out of date or inaccurate information remains held within the database and reported on. Internal discussions are ongoing on how to best improve and mitigate any review practices, which will continue to be important as records held within the database further age.

Wherever possible, the information collected for each installation includes:

- Name of the project
- The owning organisation (including the category of community or local ownership as per the list set out in Appendix B1)
- Where appropriate, the name of the subsidiary trading company owning the renewable technology on behalf of the community group or charity.

- Location, including the local authority area, address, postcode and national grid coordinates
- Technology type as per the list set out in Section 3.2
- The number of installations and the installed operational capacity
- The operational status as at the end of December 2023, selected from:
    - Operating
    - Under construction
    - Consented, not built
    - In planning
    - In scoping
    - Shared ownership under discussion[22]
    - Completed but non-operational[23]
    - Decommissioned[24]
    - Cancelled[25]
- The date on which generation commenced (for operational installations)
- The data on which the installation started to become community and locally owned
- The data on which the installation seized to become community and locally owned
- The percentage of ownership by the community or local group in cases where ownership of the installations is shared with another organisation
- Where appropriate, the building type associated with the renewable energy installations
- Where public grant or loan funding was received to support the installation

4.4. Data removal

After the data assurance process is complete, any installation that is categorised as cancelled, decommissioned, the owner is no longer in an eligible ownership category or removed due to data management will go through the data removal process.

During the data removal process, there may be installation removal that has an impact on the operating figures for the year. There may also be installation removal that does not have an impact on the operating figures for this reporting year.

[22] Note that the majority of projects which are included in the 'under discussion' status are in various stages of development, including a small proportion which are already operational. Once an element of shared ownership has been agreed, installations will move from the shared ownership under discussion status into the true development status of the project.
[23] These statuses are not reported on as the installations are no longer operational and are therefore excluded from our operational or in-development metrics.
[24] These installations are only included in the reporting year that they are operating as community and locally owned renewable energy and removed from the decommissioning reporting year onwards.
[25] These statuses are not reported on as the installations are cancelled during in-development stages and are therefore excluded from our in-development metrics.

Type of removal that impacts the operating figures:

- For decommissioned installations, the operating status would change from operating to decommissioned. The decommission date and decommission date type would be added accordingly. If the decommission date is exact and provided by the data provider, the decommission type would be labelled as “exact”. If the decommission date was not provided specifically, we would put the last day of the reporting year as the decommission date and “approximate” as the decommission date type. This type of removal will only remove the capacity from the year of decommission, therefore would be present in historic years when timeseries is presented.
- For no-longer eligible installations, the operating status would remain the same, but we will put the original operating date as the start date and the provided or approximated end date as the end date. The start date type and end date type would be added accordingly in similar manner as decommissioned installations. This type of removal will only remove the capacity from the year of no-longer community or locally owned, therefore would be present in historic years when timeseries is presented.
- Under data management removal category, when the removal reason was that new information has come to light that the installation was never community or locally owned or it was a duplicate of another installation, the capacity would be removed from all historic years and will not be present in the time series. This is the occasions when human errors happen over a very long period of time since 2011 despite the rigorous data assurance process.

Type of removal that does not impact the operating figures:

- For cancelled installations, the operating status would change from any of the in-development operating status to cancelled. The cancellation date and cancellation date type would be added accordingly. If the cancellation date is exact and provided by the data provider, the cancellation type would be put as “exact”. If the cancellation date was not provided specifically, we would put the last day of the reporting year as the cancellation date and “approximate” as the cancellation date type. As this is the removal of in-development installations, the operating figures will not be impacted.
- Under data management removal category, when the removal reason was that the data provider has decided to provide a better set of information on the installations. For example, the original entry could be a single entry of 30 heat pumps that was under one project, there would not be accurate address information. Then the data provider specifies address information for each heat pump. In this case, we would remove the old entry and add these new entries. There would be no net impact on the operating figures or timeseries.

5. Data analysis and reporting

5.1. Capacity assumptions

As previously noted, not all required information was available for all renewable energy installations. In some cases, the installed capacity was one of the figures that were unavailable.

Every effort was made to confirm capacity with the owners of installations. However, because of the large number of installations covered in this work it was not always possible to obtain this information for all installations within available resources.

For installations where a value for capacity was not provided, an estimate was made for likely installed capacity based on technology type, ownership category and building type (where appropriate). These were derived from similar installations where capacity was known, or by using other assumptions as given below.

Information on solar thermal panels and solar PV panels was sometimes provided in area (m^2) of panel. In such cases, the conversion factors used to estimate capacity are given in Table 3.

Table 3. Assumptions used to estimate capacity of solar thermal and solar PV panels from array size

Technology	Value used	Unit	Information source
Solar PV	0.14	kWp/m^2	Solar Trade Association
Solar thermal	0.7	$kWth/m^2$	Energy Saving Trust Solar Energy Calculator tool assumptions[26]

Table 4 shows the assumed capacities that were used in the community and locally owned renewable energy database where information on capacity was not available. All assumption calculations are based on data held in the database as of December 2023.

[26] Scottish average calculated using data from: www.pvfitcalculator.energysavingtrust.org.uk/

Table 4. Assumptions for capacity by technology and building type

Ownership category	Building type	Technology	Assumed capacity (kW)	Source
Community	Non-domestic	ASHP	19	Average of known community air source heat pump capacities
	Non-domestic	Hydroelectricity	395	Average of known community hydroelectric capacities
	Non-domestic	Biomass	105	Average of known community biomass primary combustion installations
	Non-domestic	GSHP	28	Average of known community ground source heat pump installations
	Non-domestic	Solar PV	48	Average of known community solar PV capacities
	Non-domestic	Solar thermal	7	Average of known community solar thermal capacities
	Non-domestic	Wind	895	Average of known community wind capacities[27]
	Non-domestic	Energy storage	25	Average of known community energy storage(electricity) capacities
Farm and estate	Non-domestic	ASHP	16	Average of known farm and estate air source heat pump capacities
	Non-domestic	Biogas (AD)	1,680	Average of known farm and estate anaerobic digestion and biogas combustion capacities
	Non-domestic	Biogas	134	Average of known farm and estate biomass gasification and combustion capacities
	Non-domestic	Biomass	249	Average of known farm and estate biomass primary combustion capacities
	Non-domestic	GSHP	64	Average of known farm and estate ground source heat pump capacities
	Non-domestic	Solar PV	57	Average of known farm and estate solar PV capacities
	Non-domestic	WSHP	60	Average of known farm and estate air source heat pump capacities
	Non-domestic	Wind	193	Average of known farm and estate wind capacities
Local authority	Non-domestic	ASHP	16	Average of known LA air source heat pump capacities
	Non-domestic	Biomass	15	Average of known LA biomass primary combustion capacities
	Non-domestic	GSHP	28	Average of known LA ground source heat pump capacities
	Non-domestic	Solar PV	10	Average of known LA solar PV capacities
	Non-domestic	Solar thermal	4	Average of known LA solar thermal capacities
	Non-domestic	WSHP	40	Average of known local authority water source heat pump capacities

[27] This average excludes large-scale wind developments. Assumed capacity was used for installations under SCHRI or CARES grant schemes and for community hall or small building installations. We have endeavoured to determine the exact size of each installation for non-grant funded community wind projects given the likelihood of a larger capacity.

LA & HA	Domestic	ASHP	7	Average of known LA & HA domestic ASHP
	Domestic	Biomass	32	Average of known LA & HA domestic biomass primary capacities
	Domestic	GSHP	7	Average of known LA & HA domestic GSHP capacities
	Domestic	Solar PV	2	Average of known LA & HA domestic solar PV capacities
	Domestic	Solar thermal	3	Average of known LA & HA domestic solar thermal capacities
	Domestic	WSHP	2	Average of known LA & HA water source heat pump capacities
	Domestic	Wind	2	Average of known LA & HA wind capacities
Local business	Non-domestic	ASHP	16	Average of known local business ASHP capacities
	Non-domestic	GSHP	50	Average of known local business GSHP capacities
	Non-domestic	Biomass	220	Average of known local business biomass primary combustion capacities
	Non-domestic	Heat pump	12	Average of known local business heat pump (unknown source) capacities
	Non-domestic	Hydroelectricity	80	Average of known local business hydroelectricity capacities
	Non-domestic	WSHP	150	Average of known local business water source heat pump capacities
	Non-domestic	Solar PV	33	Average of known local business solar PV capacities
Public & charity	Non-domestic	ASHP	15	Average of known public sector & charity ASHP capacities
	Non-domestic	Biomass	345	Average of known public sector & charity biomass primary capacities
	Non-domestic	GSHP	42	Average of known public sector & charity GSHP capacities
	Non-domestic	Heat pump	12	Average of known public sector & charity heat pump (unknown) capacities
	Non-domestic	Solar thermal	53	Average of known public sector & charity solar thermal capacities
	Non-domestic	WSHP	65	Average of known public sector & charity WSHP capacities
	Hospital (Large)	Biomass	1,100	Average of known medium and large hospital/health centres biomass primary capacities
	Hospital (Small)	Biomass	134	Average of known micro and small hospital/health centres biomass primary capacities
All categories	School	ASHP	35	Average of all school ASHP capacities
	School	Biomass	249	Average of all school biomass primary combustion capacities
	School	GSHP	66	Average of all school GSHP capacities
	School	Solar PV	36	Average of all school solar PV capacities
	School	Solar thermal	12	Average of all school solar thermal capacities

5.2. Annual energy output assumptions

The assumptions used to estimate yearly output in MWh of energy from community and locally owned renewable energy sources, where the output was is unknown, are given in Table 5.

For solar thermal panels and solar PV panels, annual energy output was estimated using the following method:

*Total installed capacity (kW) * estimate of output per kW of capacity (kWh/kW/yr) = annual energy output (kWh)*

For all other renewable technologies, the following formula used was:

*Total installed capacity (kW) * estimate of peak load hours per year (h) = annual energy output (kWh)*

Table 5. Assumptions used to estimate annual energy output

Technology	Assumption	Value used	Units	Information source
Solar PV	Annual energy output per kW	807	kWh/kW/year	Derived from MCS calculations recreated using Energy Saving Trust standard assumptions for occupancy and panel size
Solar thermal	Annual energy output per kW	630	kWh/kW/year	Energy Saving Trust Solar Energy Calculator tool assumptions[28]
Wind (<10 kWe)	Annual peak load for small wind turbines	1,664	Hours/year	Energy Saving Trust field trial of domestic small-scale wind turbines
Wind (>=10 kWe)	Annual peak load for large wind turbines	2,365	Hours/year	Scottish Renewables
Hydroelectric	Annual peak load	3,500	Hours/year	Various[29]
Biomass	Annual peak load	Not disclosed[30]	Hours/year	Analysis of unpublished non-domestic RHI data
Heat pumps	Annual peak load	Not disclosed[30]	Hours/year	Analysis of unpublished non-domestic RHI data
Solar thermal	Annual peak load	Not disclosed[30]	Hours/year	Analysis of unpublished non-domestic RHI data
Biogas	Annual peak load	Not disclosed[30]	Hours/year	Analysis of unpublished non-domestic RHI data
CHP (All technology)	Annual peak load	3,902	Hours/year	Digest of UK Energy Statistics (DUKES) CHP chapter
Tidal	Annual peak load	3,066	Hours/year	Scottish Renewables

[28] Scottish average calculated using data from: www.pvfitcalculator.energysavingtrust.org.uk/

[29] The following sources were used, which indicated that a reasonable assumption to use would be 3,500 peak hours per year, equivalent to a 40% load factor.

- Garrad Hassan report on renewable energy potential for Scottish Renewables
- The British Hydropower Association's mini hydro guide (V3), www.british-hydro.org/wp-content/uploads/2018/03/A-Guide-to-UK-mini-hydro-development-v3.pdf
- Scottish Hydropower Resource Study for FREDS, Aug 2008, www2.gov.scot/Resource/Doc/917/0064958.pdf

However, estimates of output from hydroelectric installations should be treated with caution because it is highly site specific.

[30] We have not disclosed the running hours assumptions for these technologies because they have been calculated from unpublished non-domestic RHI data provided by DESNZ for the Renewable Heat in Scotland Report https://energysavingtrust.org.uk/report/renewable-heat-in-scotland-2020/

5.3. Energy equivalent assumptions

In the main report we have included some real-life equivalencies to illustrate the impact of the energy output. Here are the assumptions we have used to calculate these equivalents.

"These installations could produce an estimated 1,963GWh of renewable energy annually, out of which 961GWh is electricity and 803GWh is heat. That is the same as:

> *•Providing electricity for all households in Glasgow City and East Dunbartonshire for one year*
>
> *•and, providing heating for all households using natural gas boiler in North Ayrshire for more than one year."*

"961GWh of electricity is the same as providing electricity for 343,000 homes for a year, which is close to the number of households in Glasgow City and East Dunbartonshire. Moreover, 803GWh of heat energy equates to heating 66,000 homes using natural gas boilers for a year, which is close to the number of households in North Ayrshire."

We used the median electricity consumption per household of 2,800 kWh/yr[31] and median gas consumption per household of 12,400 kWh/yr.[32] The results are rounded to the nearest 1,000 for ease of reading. The number of households in 2023 in Glasgow City (297,386) and East Dunbartonshire (46,610) is 343,996.[33] The number of households in 2023 in North Ayrshire is 64,633.[33]

5.4. Timeseries and historic data

The 2024 report was the fourth year that we provided a fully revised time series for this iteration of the report. We make changes to the time series as part of our continual improvement of the data and from access to updated or improved datasets that we may not have had access to at the time of previous reporting.

Some of the key changes to the revised time series concern our review of installation operating dates, where more precise operating dates become known to us for particular installations, or where operating dates are found for several installations where they were previously unknown to us.

The revised time series can be considerably different to the figures published in previous editions of the report. This is because the historical reports before 2021 in the series talk about the growth in capacity between publications. Such an approach is limited because some of the growth seen between reports was historical and should not be confused with the growth seen within the present reporting year. Commenting on the difference in capacity and number of installations between two years using the revised time series allows us to better report on the growth seen in any particular reporting year. It is important to note that it can be years before the total growth for a particular reporting year can be confirmed because it can take a considerable amount of time for some installations to become known to us either through survey or other data collection. Any comments on the trends in community or locally owned renewable energy within the last one or two reporting years may therefore be limited to an extent.

[31] https://www.gov.uk/government/statistics/national-energy-efficiency-data-framework-need-consumption-data-tables-2023
[32] https://ukrlg.ciht.org.uk/media/12713/sotn-report.pdf
[33] https://www.nrscotland.gov.uk/publications/households-and-dwellings-in-scotland-2023

Table 6 shows the non-cumulative capacity (MW) in each reporting year for both the 2023 and 2024 time series and their difference.

Table 7 shows the cumulative capacity (MW) in each reporting year for both the 2023 and 2043 time series and their difference.

Table 6. Non-cumulative capacity (MW) in each reporting year for different time series

Report Year	Pre-2010	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2023 time series (MW)	161	39	62	64	106	99	87	93	88	48	99	31	23	24	5	NA
2024 time series (MW)	158	39	52	64	106	100	88	94	89	49	100	31	24	23	74	19
Difference (MW)	-3	0	-10	0	0	1	1	0	1	1	1	0	1	-1	69	NA

Table 7. Cumulative capacity (MW) in each reporting year for different time series

Report Year	Pre-2010	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2023 time series (MW)	161	200	262	326	432	531	618	712	799	847	946	977	1,000	1,024	1,028	NA
2024 time series (MW)	158	197	249	313	419	519	607	701	789	838	938	969	993	1016	1090	1,109
Difference (MW)	-3	-3	-13	-13	-13	-12	-12	-11	-10	-9	-8	-8	-6	-8	66	NA

6. Methodological limitations

In order to present the figures of this report in the best context, we have included some information on the key limitations of the methodology used to produce them.

A significant issue with reporting on community and locally owned renewable energy is that owners, installers, certifiers and many funders of these renewable energy systems report community or local ownership figures on a voluntary basis. As such, much of the data we report on is voluntarily provided or is sourced from public datasets that do not include all of the data we require. This means that the local authority surveys and housing association surveys about non-domestic installations are potentially impacting the results, in particular local authority analysis, towards the local authorities that have provided a survey response. We are also aware that there are some potentially very useful datasets, such as the FiTs register, that we do not have access to.

Although we have built the time series to better reflect the growth in each reporting year and trends of the sector, it can however take years before the total growth for a particular reporting year can be confirmed. This is because of the amount of time for some installations to become known to us through surveys or other data collection avenues like local authority planning portal checks. Any comments on the trends in community or locally owned renewable energy within the last one or two reporting years may therefore be more limited.

We strongly believe that the data we have collected does not form a fully complete picture of renewable energy in community and local ownership because there are very likely to be gaps in the information. These are gaps both spatially, due to the voluntary nature of some of the data reported to us, as well as temporally, due to the delay of an operational installation becoming known to us. Regular reviews are carried out to improve the amount or quality of data received. We pursue access to new datasets and review and, where necessary, revise the assumptions we use to fill in some of the data gaps. Despite our best efforts, it remains possible that the interpretations made using our results may be biased towards the trends in the data collected rather than trends in the installation of renewable energy in community or local ownership. However, due to the extensive data collection that we do carry out, the depth of data collected and from Energy Saving Trust's experience in the sector and from over a decade of data collection, analysis and reporting on the Scottish Government's target, we consider the results presented here to be the best available on community and locally owned renewable energy in Scotland to date. We endeavour to continually improve the methodology and access to data sources.

In any analysis of this kind where data is gathered from a variety of different sources, total data coverage may be incomplete. This is for a number of reasons, for example:

- Incomplete information may be received on some installations
- The number of sectors and technologies that the database covers means there is a chance that some installations may have been missed altogether

Large capacity renewable energy installations are typically higher profile installations, and more likely to require planning consent (and planning records are a very good source of reliable information). Issues with data collection are therefore more likely for smaller capacity installations such as heat pump, solar thermal and solar PV installations.

The double-counting of installations is also a potential issue, although efforts have been made to avoid this. Due to the large number of data sources and the varying level of detail provided by different organisations there remains a risk that some double-counting of installations or their capacity may have occurred. Again, as large capacity renewable energy installations are typically higher profile installations, and more likely to require planning permission, double-counting is most likely to occur for smaller capacity installations such as heat pump, solar thermal and solar PV installations, and are therefore less likely to significantly affect the overall figures.

Some points for particular consideration in relation to data coverage and data quality are:

- **Information received from local authorities**

Due to the large numbers of different building types for which councils have responsibility (for example: social housing, council offices, schools, waste collection facilities) and the large number of different council departments which are involved in maintaining these, we could not always guarantee that the response received provided a full picture of all council-owned stock. As renewable capacity reported for local authority stock varied greatly, no attempt was made to scale up known capacity to account for non-respondents, meaning that the local authority capacity totals presented in this report are likely to be underestimates.

- **Information received from housing associations**

The SFHA sent an email survey on behalf of Energy Saving Trust and the Scottish Government to all members of the SFHA. Again, given the range of reported installed capacity per housing association, no attempt was made to scale up known capacity to account for non-respondents.

- **Installations in the scoping phase of development**

It is difficult to gain information on installations which are still in the early development stages, particularly if the applicants are not eligible for financial support from the funding organisations we contacted while compiling the database. This will be particularly true of farms and estates intending to install wind turbines or biomass systems, which typically have large capacities, as we would not be aware of these installations until they enter the planning process. Therefore, the figures presented here for installations in scoping are highly likely to be an underestimate.

- **Installations in the planning phase of development**

In compiling the database, the majority of in planning information comes from DESNZ's REPD as well as our own checks of local authority planning portals. However, the REPD is now only updated with installations greater than 1 MW of capacity. For our own checks, only a sample of local authority planning portals can be checked each year in time due to resource constraints., Therefore, the figures presented here for installations in planning are likely to be an underestimate.

- **Installations in all stages of development**

Best efforts are made to identify the development status of the project upon initial entry into the database and this is often possible using the sources and methodology described above. However, after entry into the database there is no guarantee that there will be a subsequent update on the status of the project through any of the sources used. As a result, some installations can remain in an in-development stage and recorded as in

scoping, in planning, consented not built or under construction for a considerable, and perhaps unrealistic, amount of time. As such, we may be over-estimating the amount of renewable energy capacity in the various stages of development to some extent, although, this may be negated by the fact that some installations in development are likely to be missing from the database altogether due to not being found in the sources used.

- **Energy storage installations**

When compiling the database, it was difficult to collect data on energy storage systems because very few data sources that hold this information were found. The majority of the energy storage data has been sourced from surveys completed by local authorities and housing associations and from the Global Energy Storage Database[34] which tends to hold information on larger scale energy storage systems. It is therefore highly likely that the energy storage figures presented in this report are underestimates. In particular, small scale energy storage installations not in local authority or housing association ownership are much less likely to have been captured in the data collection process.

[34] www.energystorageexchange.org/