Sheffield City Council

Net Zero Sheffield

Energy Generation and Storage Decarbonisation Routemap 2024-26

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Collaborative Partners

Developed by Sheffield City Council in collaboration with:

University of Sheffield
Sheffield Hallam University
South Yorkshire Mayoral Combined Authority
South Yorkshire Sustainability Centre
Upper Don Community Energy
Veolia
E.ON

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GOAL: By 2030, Sheffield will have commenced its transition to a smart, decentralised and decarbonised energy system with the capacity to meet changing

Key objectives

A Heat supplied to buildings is decarbonised.

B Small-scale renewable energy generation is increased.

C Large-scale renewable energy generation is increased.

Energy in Sheffield

The Pathways to Decarbonisation report identified that approximately 151GWh of energy is generated from the city's biomass and energy from waste district heat networks. It estimated that 21GWh of renewable electricity is generated from the domestic, industrial and commercial sectors. Combined, these meet approximately 2.5 per cent of the city's current energy needs.

This routemap sets out the short-term enabling measures that will be undertaken over the next 2-3 years.

What needs to change?

The Pathways to Decarbonisation report proposed a number of interventions to increase the amount of low carbon and renewable energy generation within Sheffield including:

- Increasing the district heat networks to decarbonise heat.
- Increasing renewable energy generation from small-scale systems, such as building mounted photovoltaics (PV's) and solar thermal panels.
- Increasing renewable energy generation from large-scale systems, such a solar PV farms and wind turbines.

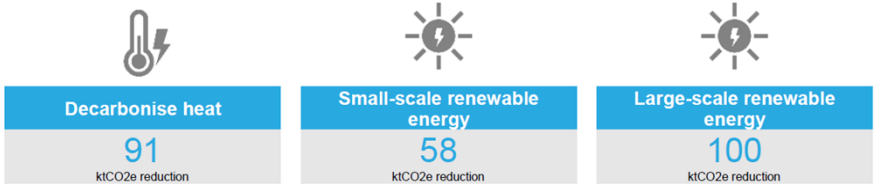
The impact of COVID

During the lockdown imposed in response to the Covid-19 pandemic, like many places, Sheffield saw a shift in energy consumption patterns. Domestic energy consumption increased as people were at home more. A reduction in non-domestic energy consumption was seen as some businesses had to close and many people started to work from home. This is also reflected in emissions data, particularly the industrial and commercial sector which reported larger energy related emissions reductions in 2020, but then increases in 2021 as the economy started to reopen and recover.

The rate of small-scale renewable energy deployment also reduced during this time, but 2022 installation levels were nearly back to pre-Covid levels.

What carbon reduction will this achieve?

The Pathways to Decarbonisation analysis shows that there is potential for a total reduction of 249kt/CO_2e through the decarbonisation of heat and increased renewable electricity generation. This would result in a nearly 10 per cent reduction of the city's baseline greenhouse gas emissions.



City-level Zero Carbon Mitigation pathway for Sheffield, 2020

In addition to the measures identified above, as a way in which to reduce emissions, the Pathways to Decarbonisation study also recognises the role that energy storage in the form of batteries for power and thermal stores for heat can play in achieving carbon reductions. Energy storage can be used to shift consumption to periods of time when the carbon intensity of energy production is lower to then be used by the end user when demand is high and the carbon intensity of energy production is higher. For example, drawing power during the day when generation from solar is high to then use at peak times in the early evening when demand is high but solar generation is lower.

It is worth noting that the Pathways to Decarbonisation study recommended immediate delivery and as such the delivery timescales and net zero trajectories are now out of date. This routemap sets out our statement of intent of the enabling measures that we need to action in the short term to deliver on our longer-term net zero objectives.

Benefits and barriers

Improvements to local energy infrastructure not only increase the scale and pace of the decarbonisation of our buildings and transport, but also bring about many other benefits such as:

- Creation of skilled green jobs and skills, leading to economic growth.
- Opportunities for income generation for both the private and public sector.
- Improved local air quality as we move away from fossil fuel heating systems to decarbonised systems.
- Reduced energy costs through on-site renewable generation.
- Localised smart and resilient energy systems that are less reliant on volatile external markets.
- Community owned infrastructure empowers local people in local decision making and increases awareness on climate and energy issues and encourages behaviour change.

However, there are a number of social, political, financial and technological barriers that need to be overcome:

- Current electricity grid constraints expand project delivery time for the deployment of new renewable generation.
- Significant investment is required for large infrastructure projects, with limited revenue funding available to develop the feasibility and commercialisation of some projects.
- Global influences have escalated costs and impacted supply chain availability, increasing delivery costs and timescales of project delivery.

- Political appetite to level of risk in developing and delivering large infrastructure projects.
- Insufficient number of skilled workforce required to deliver infrastructure projects.

Opportunities for growth and investment

Sheffield's energy transition presents many opportunities for growth and investment in the city. Sheffield's draft Local Plan sets the spatial strategy for the approach to urban renewal, prioritising development within the central city area with 20,000 new homes proposed. The draft Local Plan provides a sustainable planning framework that recognises and supports economic drivers, including job creation, in the city and identifies the investment in transport and infrastructure requirements. The Plan strengthens Sheffield's climate and net zero objectives with policies in place to support sustainability, Biodiversity Net Gain, blue and green infrastructure and a cut off for planning applications that are not net zero by 2030.

The council is currently developing its guiding principles for its Growth Plan, which will aim to achieve prosperity for all. The transition to decarbonised energy will adhere to the principles of the Growth Plan and support growth and investment in the city.

Local Area Energy Plan

The development of a Local Area Energy Plan (LAEP) is a data driven process to undertake spatial and collaborative planning of local energy systems. The process involves the mapping of existing energy systems and scenario modelling for future heat, power and transport needs, which together with stakeholder engagement identifies the least cost pathway to the energy transition needed to achieve net zero targets.

The council secured funding from the South Yorkshire Mayoral Combined Authority's (SYMCA) Project Feasibility Fund to commission a LAEP in 2024, this place-based approach will provide the detailed evidence base delivery plan for decarbonising Sheffield's energy, including future infrastructure needs and the move to smart local energy systems. The LAEP will provide a costed, spatial plan identifying the change needed to the local energy systems and built environment detailing what will be carried out and where along with timescales and allocating responsibilities to those responsible for delivery. It will be ensured that the LAEP adheres to and supports the growth principles of the city.

Through the process, we'll be engaging with stakeholders including utilities and infrastructure providers such as Northern Powergrid and Cadent, businesses, citizens and community groups.

Working together

The transition to a local, decarbonised energy supply cannot be achieved by the council in isolation due to the limits of our control and influence. However, we'll work in partnership with private,

public and the voluntary and community sector stakeholders to realise the level of ambition needed to achieve our net zero targets. As previously set out in the 10 Point Plan for climate action, we will need to work with our local Distribution Network Operator, Northern Powergrid, to ensure the electricity grid infrastructure is fit for the future and can support our net zero goals.

In November 2022, a city-wide climate event was held with a range of organisations. The event aimed to map out what action was already taking part and plan how we can work together to decarbonise the city and address the climate emergency. Participants identified the city's strong starting position with existing local businesses and organisations with expertise in renewable and low carbon energy, such as ITM Power, Magnomatics, Sheffield's District Energy Network operated by Veolia and E.ON's biomass Combined Heat and Power (CHP) plant. Working in partnership with the city's businesses and private sector partners will be crucial to achieve net zero and in ensuring we have the local skills and supply chain to enable the transition.

The voluntary and community sector also has a vital role to play. Sheffield and the wider South Yorkshire region has the lowest uptake of community owned renewables across the country. The council's 10 Point Plan for climate action set an objective to increase the amount of community owned renewables in the city to maximise the wider socio-economic opportunities community energy brings to an area.

Sheffield has a strong research and development base with both the University of Sheffield and Sheffield Hallam University in the city. Through its Energy Institute, the University of Sheffield is undertaking world leading research into sustainable aviation fuels, green energy solutions and electrical storage solutions and its recently opened Energy Innovation Centre provides industry partners access to world leading research facilities. Sheffield Hallam University's Centre for Regional Economic and Social Research undertakes much needed research to understand the socio-economic impacts of net zero transitions, which will enable us to ensure we decarbonise in a just and fair way.

During 2022, the universities in partnership with the South Yorkshire Mayoral Combined Authority (SYMCA), the four South Yorkshire local authorities and a range of private and voluntary sector organisations, created the South Yorkshire Sustainability Centre (SYSC). The SYSC connects innovative research with regional partners to develop and implement plans to reduce greenhouse gas emissions, whilst addressing inequalities and providing economic growth opportunities.

Whilst there has been a lot of good partnership working over the years, we recognise the need to formalise this and ensure there is robust city wide climate governance and oversight. We will explore with partners how we can approach this and recommend that we work to set up an external group that can carry out this function.

By working together, and by designing change around the system's most important component – the people and businesses that use it, we can transition to a zero-carbon energy system and realise the wide-reaching benefits for the people of Sheffield.

Community energy

Acting to ensure a fair and just transition.

The move to a local, clean and smart energy system needs to be fair and affordable. We will do everything we can to ensure that future policy and programme development considers inequalities and have a positive impact on those already disadvantaged so that no one is left behind as we transition to a decarbonised energy system.

The energy transition needed to achieve net zero provides opportunities for local manufacturing of energy infrastructure, retraining of skilled workers as well as local training and skills development for the additional green infrastructure jobs.

This commitment is further supported by the recently adopted City Goals;

Goal 4: We adapt our economy and city to a changing climate, retore our relationship with nature and safeguard it for future generations, while ensuring a just transition for people of all abilities.

Goal 5: We foster and grow businesses, organisations and local initiatives that look after people, place and planet, and lead the way on decarbonisation, re-use and the rewilding of nature.

Goal 6: We invest in our wellbeing and mental health, and work with nature to create better, more resilient places and communities that can better understand and act on the challenges they face.

Community energy is the term used to define energy efficiency, renewable energy and energy supply projects that are delivered through a community-led model. Whilst these projects may be wholly owned and operated by communities, community energy schemes may also be delivered in partnership with the public and private sector. Community energy schemes that empower communities to have shared responsibility for and collective ownership of energy generation enable the just transition as the focus is on the local energy needs and the communities directly benefit, in terms of reduced cost and income from their schemes.

Within their Energy Strategy, SYMCA have committed to enabling community energy schemes by working with community groups to develop and support community schemes across South Yorkshire. Through the South Yorkshire Sustainability Centre, the University of Sheffield, Sheffield Hallam University and SYMCA are collaborating on research to inform regional energy policy making that SYMCA can implement to achieve this, with the aim to install 100kW per year of community energy by 2030 and double the number of community energy organisations across South Yorkshire by 2040.

Community Energy England is headquartered in Sheffield and there are some notable community energy organisations delivering community energy projects across the city. Sheffield Renewables is a community benefit society that is run by volunteers and owned by members. They fund, develop, own and operate renewable energy schemes financed through investment from members of the community. Any surplus profit is either reinvested in future projects or benefit people through their Community Benefit Fund.

The Upper Don Valley Community Energy group was formed in 2012 to look at renewable energy potential. More recently this group has been raising awareness and knowledge of domestic energy efficiency measures through open homes visits and events. They're conducting domestic surveys, including the use of a thermal imaging camera to identify heat loss. They're currently running a community warming project that gives households in fuel poverty

free access to insulation materials and LED lightbulbs. They're looking at the development of local community share energy generation projects with local businesses and community buildings.

Sheffield Community Energy has recently been established, a group of like-minded individuals representing various groups including, Sheffield Renewables, Green New Deal UK and the South Yorkshire Climate Alliance. Sheffield Community Energy aim to build knowledge and work with partners to stimulate the development of community owned energy in and around Sheffield.

OBJECTIVE A: Heat supplied to buildings is decarbonised.

OUTCOMES

1. Heat Network Zoning opportunities are maximised.
2. Existing heat networks in Sheffield are expanded and densified.
3. The needs of people and businesses are supported.
4. Sheffield has the skills and supply chain needed to deliver Heat Network Zones.
5. Innovative finance and ownership models increase the pace and scale of delivery.
6. A Local Area Energy Plan is adopted.

Why do we need to decarbonise heat supply?

The Pathways to Decarbonisation evidenced that approximately 6,300 GWh of energy used for heating buildings in Sheffield is supplied by fossil fuels (gas, coal and oil), approximately 74 per cent of total energy use. To achieve net zero as well as improve air quality, we need to move away from fossil fuels and increase the amount of heat from low carbon sources such as heat networks and heat pumps. Heat decarbonisation is lagging behind the progress of electricity decarbonisation and will impact the deliverability of net zero if concentrated effort is not made.

What does the future look like?

Our vision for the future is that Sheffield's homes and businesses have a secure, affordable and low carbon source of heat. Through building fabric improvements, buildings have reduced their heat demand in the first instance. Heat networks served by low carbon and waste heat sources are a primary source of heat in the city with buildings connected to them where viable to do so. The Pathways to Decarbonisation study indicated that an additional 15,000 domestic properties and 8,000 industrial and commercial buildings could be connected to the existing heat networks, saving 91kt/CO_2e. Heat pumps are deployed at scale for those buildings unable to connect to low carbon heat networks and where electricity grid infrastructure allows.

The Pathways to Decarbonisation study estimated that 10 per cent of houses in the city will be suitable for the installation of solar thermal, with the potential to save a further 4 kt/CO_2e. These domestic opportunities are explored further in the Our Council routemap and will be considered in the emerging housing decarbonisation routemap.

The future role of hydrogen in heat decarbonisation is still unclear, with the Government recently terminating its hydrogen village pilots in the North East and North West of England due to local opposition and lack of local hydrogen supply. They are still assessing evidence from trials in Scotland and across Europe ahead of making a decision on hydrogen for heating in 2026. As such, the role of

hydrogen in heating isn't a feature of this routemap but we will keep up to date with learnings from trials elsewhere and Government policy as it develops.

However, the production of hydrogen for transport and processing is an area of development within Sheffield. The city has been home to ITM Power, a developer and manufacturer of electrolysers, since 2001. The University of Sheffield have installed an electrolyser to produce hydrogen for its research into sustainable aviation fuels and EON are in receipt of Industrial Hydrogen Accelerator (IHA) funding from DESNZ to support the demonstration of end-to-end industrial fuel switching to hydrogen within the local steel industry. If deemed to be viable, EON will install an electrolyser at its Blackburn Meadows site in Sheffield, generating green hydrogen from its biomass CHP plant, which will be transported to local manufacturers for use in their industrial processes.

Heat networks

Sheffield is fortunate to have two existing heat networks in the city. The Veolia District Energy Network is powered from Sheffield's Energy Recovery Facility. The network has been in existence since the 1970's, serving the Park Hill apartments at the time. The network, as it is today, was conceived in the 1980's and has continually expanded since, coupled with the development of a state-of-the-art Energy Recovery Facility (ERF) which also generates electricity for the national grid. In 2006, a new ERF was opened to meet the waste needs of the city and to comply with stricter environmental legislation regarding emissions.

Veolia Energy Recovery Facility; Bernard Road, Sheffield.

The Veolia network is one of the UK's largest with over 45km of pipework serving around 130 buildings in and around the city centre. The ERF is able to produce over 20MW of electrical energy and has a peak capacity of 60MW available for the district heating network. Additional capacity is available via a number of auxiliary boiler houses, serving the 130 connected buildings. Annually, an average of 25 per cent of its 60MW capacity is currently supplied.

EON own and operate a biomass Combined Heat and Power (CHP) plant at Blackburn Meadows that has been operational since 2015. The CHP uses waste wood to generate 30MW of electricity and up to 25MW of thermal energy of which it currently supplies about 20 per cent of this capacity through its 8km of district heating network serving commercial connections in the Lower Don Valley area of Sheffield.

EON, Blackburn Meadows biomass CHP

Heat Network Zoning

Since the production of the Pathways to Decarbonisation study, the Government in their 2020 Energy White Paper set out its ambitions to introduce Heat Network Zoning legislation by 2025. Heat networks currently provide about 3 per cent of heat in the UK and to meet the UK's legally binding target to achieve net zero by 2050, the Climate Change Committee have said that this needs to increase to 20 per cent. Heat Network Zones are defined as geographical locations within which heat networks can provide the lowest cost solution to heat decarbonisation, and within which certain buildings will be mandated to connect to new or existing heat networks within a certain timeframe.

The Energy Act which received Royal Assent in October 2023 sets outs the primary legislation for this and the development of secondary legislation will be consulted on throughout 2024. It is currently anticipated that buildings that will be required to connect will be new buildings that receive planning permission following the designation of a zone; existing communally heated buildings, including residential; multi-unit residential homes undergoing refurbishment; existing non-domestic buildings that meet a heat demand threshold (proposed >1000MWh per annum).

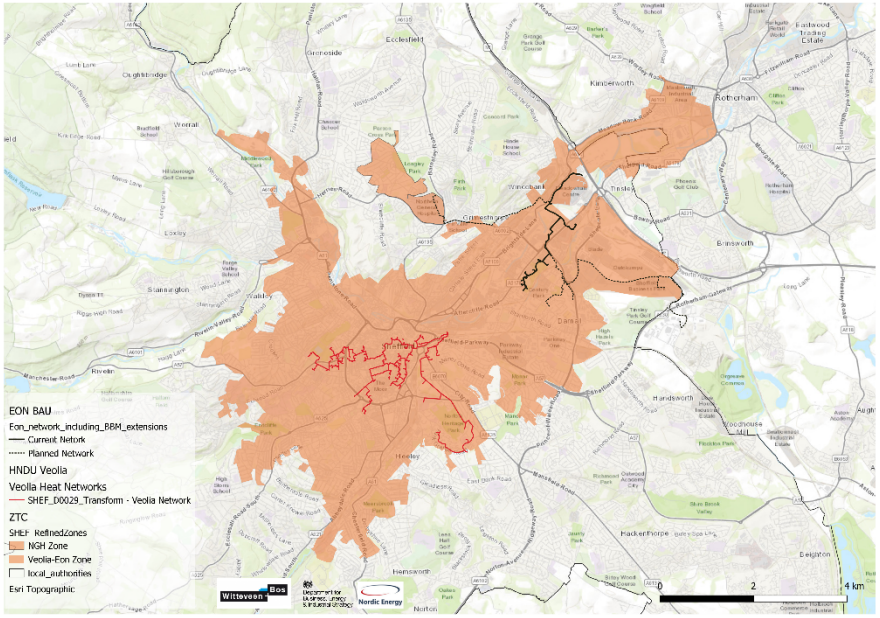
Sheffield was invited to participate in the Department for Energy and Net Zero's (DESNZ) Heat Network Zoning Pilot Programme during 2022 – 2023 along with 27 other towns and cities. This programme sought to develop and test the methodology to identify and designate Heat Network Zones. Subsequently, Sheffield was selected to be part of DESNZ's Advanced Zoning Programme (AZP), which aims to support the construction of new zonal scale heat networks as quickly as possible following the introduction of heat network zoning to accelerate the implementation of the legislation. In addition, the AZP aims to establish best practice in zone delivery and operation, offer project development support and promote market transformation to prepare the market and supply chain for the scale and pace of delivery ahead required when national heat network zoning policy comes into force in 2025.

In addition to the above mentioned DESNZ programme, the council, alongside EON and Veolia, secured revenue funding from DESNZ's Heat Network Delivery Unit (HNDU) to undertake techno-economic feasibility studies to assess early opportunities for heat network expansion as well as the integration of waste heat sources.

Advanced Zoning Programme

The zonal scale opportunity selected by DESNZ for the AZP encompasses the proposed zone around the existing networks of

Veolia (serving the city centre) and EON (serving the Lower Don Valley and including a zone around the Northern General Hospital).



N.b. the outputs from the Heat Network Zoning Pilot Programme and Advanced Zoning Programme are still subject to change awaiting secondary legislation.

A detailed assessment of heat demand and potential heat sources has been undertaken. There are a total of 90,168 buildings within this area with a total heat demand of 1,930GWh. Under current proposed secondary legislation, only 2 per cent of those buildings will be required to connect to a heat network, but they make up nearly 60 per cent of the total heat demand in the proposed zone as seen in the following table:

	All buildings			Mandatable buildings		
	No. of buildings	**Total demand (GWh/yr)**	**Average per connection (MWh/yr)**	**No. of buildings**	**Total demand (GWh/yr)**	**Average per connection (MWh/yr)**
Veolia network area	71,900	1,206	19	1,160	640	493
EON network area	18,268	724	60	712	502	1,507
TOTAL	**90,168**	**1,930**	**26**	**1,872**	**1,142**	**667**

The transition to a lower carbon source of heat from gas of this scale could saving in the region of 230kt/CO_2. The existing heat sources of the ERF serving the Veolia network area and the biomass CHP serving the EON network area will not provide sufficient heat for the scale of the proposed heat network zone. Under the proposed Heat Network Zoning legislation, heat sources will also be mandated to connect into new and existing heat networks, and this will be needed to meet increased future demands as well as contributing to heat decarbonisation. Through the AZP and HNDU studies, a number of waste heat sources, from manufacturing, data centres and waste wastewater treatment plants have been identified along with opportunities for thermal storage potential, providing a further 204MW capacity.

OBJECTIVE A: Heat supplied to buildings is decarbonised.
Biodiversity

Social Health Economic

Outcome	Action	Who	When	Co-benefits
Heat Network Zoning opportunities are maximised.	We will actively participate in forthcoming DESNZ consultations on Heat Network Zoning legislation and encourage our businesses to do so.	SCC / Others	March 2025	
	We will continue to keep updated on forthcoming legislation to understand and be prepared for legislation coming into effect and be in a position to act in the role of Zoning Coordinator should that fall to Local Authorities to deliver.	SCC	Dec 2025	
	We will continue to participate in the DESNZ Heat Network Zoning Pilot Programme to understand the likely zones to be designated Heat Network Zones under new legislation.	DESNZ / SCC / Veolia / EON	March 2024	
	We will continue to participate in the DESNZ Advanced Zoning Programme to enable the build out of a Heat Network Zone in 2025.	DESNZ / SCC / Veolia / EON	March 2026	
Existing heat networks in Sheffield are expanded and densified.	We will complete and publish the Heat Network Delivery Unit (HNDU) funded techno-economic feasibility studies of both existing network areas and ascertain next steps and proceed to Detailed Project Development where applicable. This will include assessment of new connections, heat sources that will further decarbonise the heat supply, and thermal storage opportunities.	SCC / Veolia / EON	March 2025	
	We will deliver a first phase of our planned network expansion, part funded by the Green Heat Network Fund.	EON	March 2026	
	We will continue to work with stakeholders to connect additional buildings onto the District Energy Network.	Veolia	March 2026	
	We will continue to trial and implement innovative solutions to further decarbonise our Energy Recovery Facility and District Energy Network, including our worlds-first trial of algae based carbon capture from an ERF and implementation of the first Artificial Intelligence (AI) district energy control system.	Veolia	March 2026	
	We will continue to seek opportunities, develop business cases, and secure funding to connect our buildings (domestic and non-domestic) on to heat networks.	SCC	March 2026	
	We will work collaboratively with other public sector bodies to explore opportunities to connect our estate to heat networks.	SCC	December 2025	
The needs of people and businesses are supported.	We will engage with citizens and businesses on infrastructure schemes and develop a consultation and engagement programme once more detail on Heat Network Zoning legislation is known.	SCC / Veolia / EON	March 2026	
	We will work to increase the amount of community energy projects in Sheffield and surrounding areas, which we'll kick start with a community energy engagement event.	Sheffield Community Energy	March 2024	
Sheffield has the skills and supply chain needed to deliver Heat Network Zones.	We will work with partners and training providers to ensure the rights skills are in place for the delivery of Heat Network Zones.	SCC	March 2026	
	We will identify and support local supply chain opportunities that support the delivery of heat network infrastructure.	SCC	March 2026	
	We will participate in a 12-month mentoring programme delivered by DESNZ and the Danish Embassy to build heat network knowledge and capacity in Local Authorities.	SCC	September 2025	

Innovative finance and ownership models increase the pace and scale of delivery.	We will develop business cases to assess financial and ownership models to include public, private and community ownership models for future heat decarbonisation schemes.	SCC	March 2026	
A Local Area Energy Plan is adopted.	We will commission a Local Area Energy Plan (LAEP) that will assess the future electrification of heat requirements and inform a delivery plan across the city.	SCC	March 2026	
	We will engage with people and businesses to ensure the energy transition is fit for purpose and meets local needs.	SCC	March 2026	

OBJECTIVE B: Small-scale renewable energy generation and storage is increased.

OUTCOMES

1. Innovative finance and ownership models increase the pace and scale of delivery.
2. A Local Area Energy Plan is adopted.
3. Planning policy supports net zero transition.

Why do we need to increase the amount of small-scale renewable energy generation?

Whilst energy efficiency improvements have been made over recent years in lighting and appliances, efforts to decarbonise heat and transport through electrification will lead to increased electrical demand in the future. Not only will that put further constraints on the electricity grid, we also won't achieve net zero if the amount of renewable energy generation doesn't increase. Generating on-site renewable energy generation and storage potential will also ensure a secure, affordable supply of power to the building user.

According to the Department for Energy Security and Net Zero's renewable energy statistics, the installed capacity of solar PV in Sheffield has increased by 10 per cent between 2017 and 2022, compared to a national increase in the same period of 33 per cent.

What does the future look like?

The Pathways to Decarbonisation study identified that there is potential to generate up to 518GWh of electricity by the installation of solar PV across 53,000 buildings in Sheffield by 2030. This would save in the region of 54ktCO_2e.

This would require rapid deployment of solar PV as figures at the end of 2022 indicate that there are currently 7,300 buildings in Sheffield with solar PV installed, generating 26 GWh of electricity. To enable this, small-scale renewable generation is delivered through various public, private and community funded models. Actions relating to the council's domestic and non-domestic estate and skills are included in the Our Council routemap.

OBJECTIVE B: Small-scale renewable energy generation and storage is increased.
Biodiversity

Social Health Economic

Outcome	Action	Who	When	Co-benefits
Innovative finance and ownership models increase the pace and scale of delivery.	We will explore the options for procuring and promoting a collective purchasing offer for citizens and businesses to procure small-scale renewable energy for their homes and businesses.	SCC	March 2026	
	We will identify and promote opportunities for increased community owned energy in the city.	SCC	March 2026	
	We will work to increase the amount of community energy projects in Sheffield and surrounding areas, which we'll kick start with a community energy engagement event.	Sheffield Community Energy	March 2024	
A Local Area Energy Plan is adopted.	We will commission a Local Area Energy Plan (LAEP) that will assess small-scale renewable energy generation capacity across the city.	SCC	March 2026	
	We will engage with people and businesses to ensure the energy transition is fit for purpose and meets local needs.	SCC	March 2026	
Planning policy supports net zero transition.	We will have an adopted Local Plan and will develop Supplementary Planning Guidance following its adoption.	SCC	2025	

OBJECTIVE C: Large-scale renewable energy generation and storage is increased.

OUTCOMES

1. Innovative finance and ownership models increase the pace and scale of delivery.
2. Council land is used to generate local renewable energy.
3. A Local Area Energy Plan is adopted.
4. Planning policy supports net zero transition.
5. Sheffield has the skills and supply chain needed to deliver large-scale renewable energy.

Why do we need to increase the installed capacity of large-scale renewables?

The electricity grid needs to decarbonise in order to meet net zero targets and to increase capacity for future increases in demand from the electrification of transport and heat. The majority of large-scale renewable energy generation will be fed directly into the grid and therefore won't directly contribute to the city's net zero target trajectory as grid decarbonisation has already been factored into the setting of the 2030 net zero target. However, all areas must play their part in creating opportunities for increased renewable energy generation.

What does the future look like?

The Pathways to Decarbonisation study highlighted that there is 31km^2 of land in Sheffield that may be suitable for ground mounted solar PV arrays, which could generate in the region of 750GWh of electricity annually, avoiding 98ktCO_2. In addition, the study highlighted that there may be the potential for wind generation of up to 16 GWh annually, saving 2ktCO_2.

There are currently no large-scale wind or ground mounted solar projects in Sheffield. As with small-scale renewable energy deployment, this will need to take place using a range of public, private and community finance models.

Where feasible, opportunities to private wire renewable generation to nearby buildings will be explored to ensure as much locally produced energy is used locally where possible. Failing that, alternative ways to supply generated energy through for example, Power Purchase Agreements will be explored.

Energy storage opportunities are maximised as a way in which to use renewable generated power at a time when it is most needed.

Large scale renewable energy projects are designed and delivered to protect sensitive sites and vulnerable species and to maximise biodiversity net gain opportunities.

OBJECTIVE C: Large-scale renewable energy generation and storage is increased.

Social Health Economic Biodiversity

Outcome	Action	Who	When	Co-benefits
Innovative finance and ownership models increase the pace and scale of delivery.	We will identify and promote opportunities for increased community owned energy in the city.	SCC	March 2026	
	We will work to increase the amount of community energy projects in Sheffield and surrounding areas, which we'll kick start with a community energy engagement event.	Sheffield Community Energy	March 2024	
Council land is used to generate local renewable energy.	We will commission a renewable energy and electrical storage scoping study to identify opportunities on council owned land for large scale energy projects. (Our Council decarbonisation routemap).	SCC	June 2024	
	We will undertake business cases to assess finance and operating models, including the identification and promotion of opportunities for community owned energy.	SCC	March 2026	
A Local Area Energy Plan is adopted.	We will commission a Local Area Energy Plan (LAEP) that will assess large-scale renewable energy generation capacity and electrical storage opportunities across the city.	SCC	March 2026	
	We will engage with people and businesses to ensure the energy transition is fit for purpose and meets local needs.	SCC	March 2026	
Planning policy supports net zero transition.	We will have an adopted Local Plan.	SCC	2025	
Sheffield has the skills and supply chain needed to deliver large-scale renewable energy.	We will work with partners and training providers to ensure the rights skills are in place for the delivery of large-scale renewable energy.	SCC	March 2026	
	We will identify and support local supply chain opportunities that support the delivery of large-scale renewable energy.	SCC	March 2026	

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Glossary

Advanced Zoning Programme (AZP)	Department for Energy Security and Net Zero programme to accelerate heat network zoning and help transform the market ready for legislation coming into effect.
Building fabric	The structural and material elements that make up a building, including the walls, roof, floors, window and doors. Improvements to building fabric can include double and triple glazing, loft, wall (external, interior and cavity) and floor insulation.
Co-benefits	Wider benefits that will be realised from an action as well as it mitigating against climate, for example wellbeing, health or economic benefits.
Combined Heat and Power CHP)	The use of a heat engine or power station to generate electricity and useful heat at the same time.
Community energy	Energy reduction and generation projects that are managed, delivered and owned by the community, with the benefits of these projects going back to the community.
Decarbonised/decarbonising	The reduction of carbon dioxide and greenhouse gases from processes and operations. For example, decarbonising the electricity grid through the generation of more renewable energy and reduction in fossil fuel based power generation.
DESNZ	The UK Department for Energy Security and Net Zero.
Distribution Network Operator (DNO)	Licensed companies that own and operate the electricity distribution network.
Electrolyser	A device that uses electricity to split water molecules into hydrogen and oxygen.
Energy hierarchy	A process for prioritising policies and actions to ensure energy demand is reduced in the first instance through energy conservation, then energy efficiency measures, prior to investing in renewable energy generation.
Energy Recovery Facility (ERF)	The generation of energy in the form of electricity, heat or both from the burning of residual waste.
Fossil fuels	Materials that contain hydrocarbons formed from decayed plants and animals such as coal, oil, natural gas. When burned for energy generation, they produce CO_2.
Green and blue infrastructure	Green infrastructure relates to green landscapes such as woodlands, grasslands and hedgerows. Blue infrastructure relates to water infrastructure such as ponds, lakes and rivers.
Green Heat Network Fund	Capital grant for the development of new and existing low and zero carbon heat networks.
Grid/grid decarbonisation	The reduction of fossil fuel based power generation and increase in renewable energy generated power in the national electricity grid will result in a lower carbon intensity of the grid.
GWh	Gigawatt hour – a unit of energy equal to one million kilowatt hours.
H2	Hydrogen.
Heat network	Also referred to as a district heating network, this is the supply of heat (and cooling) from a central source to consumers via a network of underground pipes.
Heat Network Zoning legislation	Legislation set in the Energy Act 2023 that will mandate certain buildings to connect to new and existing heat networks and mandate heat suppliers to connect into heat networks. Secondary legislation is due to be in place by 2025.

Heat Network Delivery Unit (HNDU)	The Government's Heat Network Decarbonisation Unit established to provide the public sector with capacity to develop heat networks.
Local Area Energy Plan (LAEP)	A data drive, place-based approach to identify the lowest cost route to decarbonisation.
Local Plan	A statutory spatial vision and framework for future development prepared by the local planning authority in consultation with its community.
MWh	Megawatt hour – a unit of energy equal to one thousand kilowatt hours.
Net zero	The reduction of greenhouse gases to as close to zero as possible with any remaining emissions sequestered from the atmosphere. Sheffield has taken net zero to mean a 95% reduction in emissions.
Offset/offsetting	Where net zero emissions cannot be achieved by energy reductions and efficiencies, residual emissions will look to be compensated by investing in other projects that sequester carbon or are projects that reduce carbon outside of the city boundary.
Pathways to Decarbonisation reports	Reports commissioned by the Council and undertaken by ARUP and Ricardo during 2019/20. They set out the baseline position of the city and Council's emissions and identify actions required to meet net zero by 2030.
Photovoltaic (PV)	A solar cell that converts sunlight into electricity.
Power Purchase Agreement (PPA)	A long-term agreement between an energy generator and customer for the purchase of energy.
Private wiring	Localised electricity grid that distributes from the generation source direct to an end-user.
PV	Photovoltaic – solar panels that convert sunlight into electricity.
Smart Local Energy Systems	Place based energy assets working together through smart metering and monitoring to distribute energy (physically or virtually) from generation to point of use.
SYMCA	South Yorkshire Mayoral Combined Authority – led by the South Yorkshire Mayor and brings together the local authority areas of Barnsley, Doncaster, Rotherham and Sheffield.
SYSC	South Yorkshire Sustainability Centre – led by the University of Sheffield through a partnership that includes the South Yorkshire Mayoral Combined Authority, the four local authorities and Sheffield Hallam University.

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