Bristol's One City Climate Strategy

What does it mean for our daily lives?

Introduction

In November 2018 Bristol City Council declared a climate emergency, and committed to achieving net zero greenhouse gas emissions by 2030.

They have now made a One City Climate Strategy to address this, and commissioned an evidence base to support this.

This document summarises some of the evidence in a way that shows how the climate emergency could affect Bristol residents.

You can read more about what the council is doing here and here.

What people can do

- Change to a 100% renewable energy supplier in your home or workplace – one that definitely acts to make a good market for renewable energy development.
- Get rid of your car – sell or scrap it, join a car club and use electric cars, walk or cycle and use public transport.
- Don’t upgrade/replace your gas boiler – be ready for a new type of heating system. Install an air source or ground source heat pump if you are replacing your boiler.
- Address underlying damp issues and other maintenance issues in your house so it is ready for energy efficiency.
- Learn more, ask questions, get reliable information about any concerns.
- Tell decision-makers that you say yes to the infrastructure changes proposed. Or tell them what you want instead.

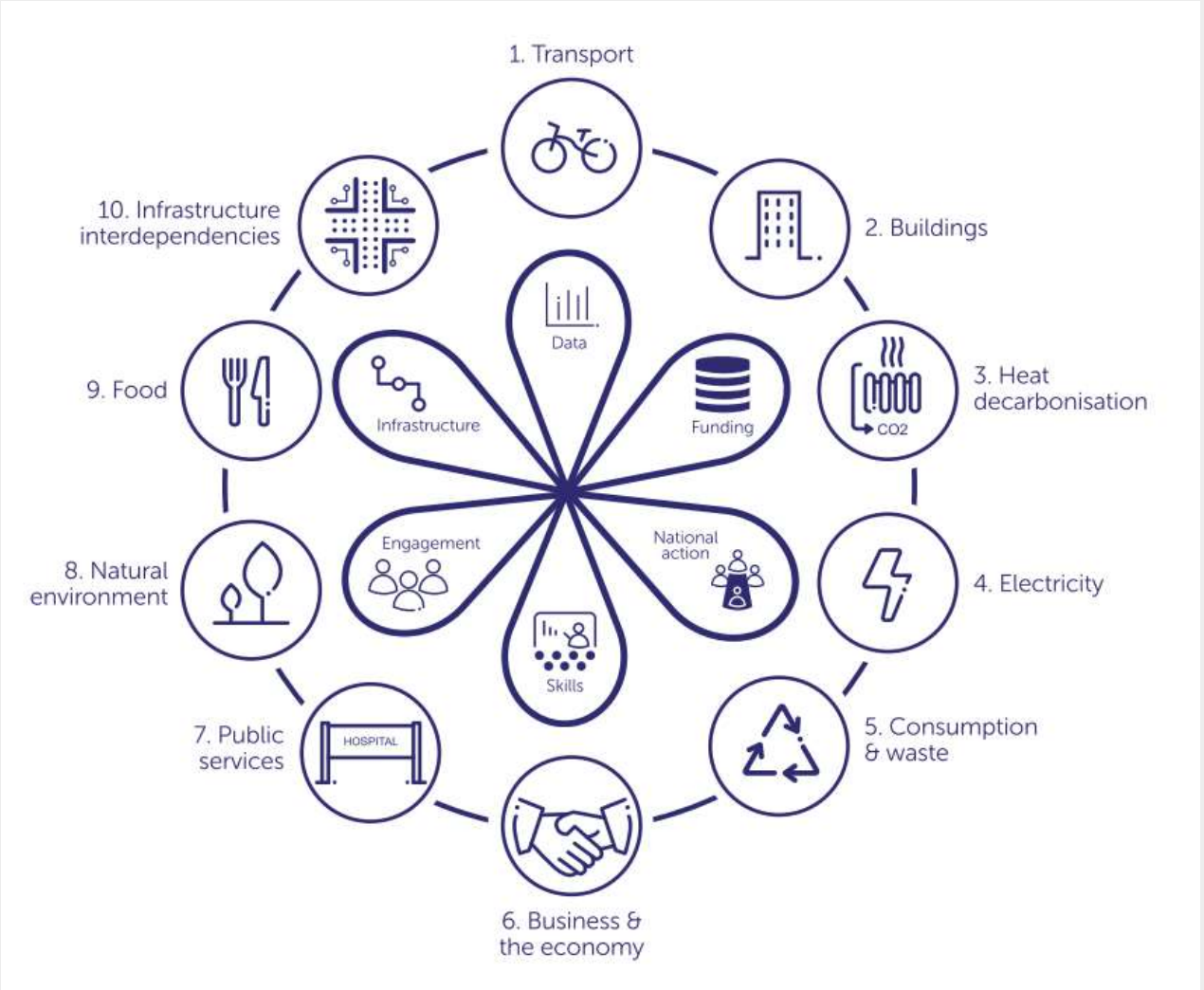
Overview of the strategy

[One City Climate Strategy]

One City Climate Strategy

The key elements of Bristol's One City Climate Strategy are shown in this diagram. It consists of:

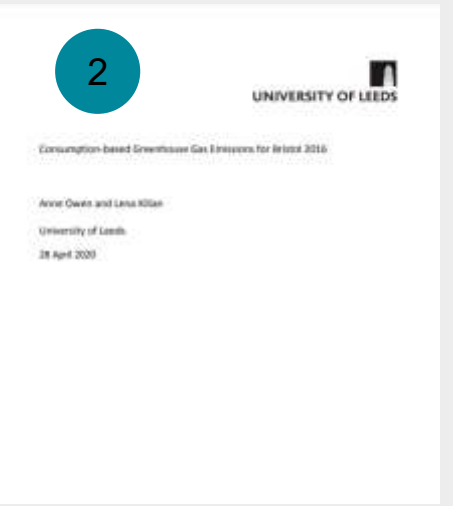
- Ten delivery themes (in the circle on the outside)
- Six enabling conditions for change (in the 'flower' on the inside)

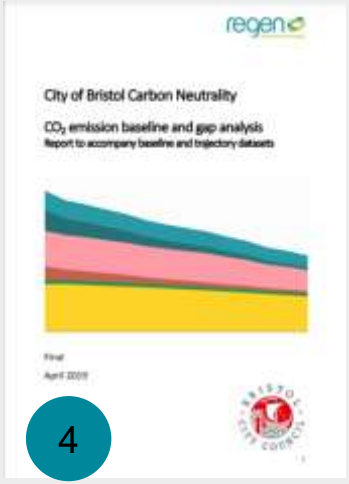


Evidence Base

To develop the strategy, Bristol City Council commissioned five studies:

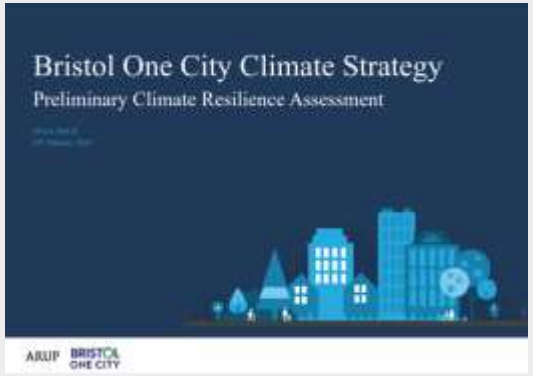
- How prepared are we for the impacts of climate change?
  1. Climate resilience study
- What are our current emissions?
  2. From households
  3. From businesses
- What future emissions do we get with different policies?
  4. Current policy, and policy gap for getting to net zero by 2050
- Policy recommendations
  5. to achieve net zero by 2030





What does the evidence mean?

The next few pages review the Resilience study by ARUP, and the pathways to net zero by 2030 study by the Centre for Sustainable Energy, to give a picture of how Bristol's residents could be affected by climate change itself, and the actions we might take to address it.



How climate change would affect Bristol

[Climate Change Resilience]

Two scenarios in the report by ARUP:

The Climate Resilience report by ARUP looked at two possible scenarios, and calculated potential impacts of climate change for Bristol if either of these happen.

The scenarios are called RCP 4.5 and RCP 8.5:

- RCP 4.5 – moderate climate change
- RCP 8.5 – really bad climate change

This section summarises information from their report, and includes images from their report. It is available to download in full from here:

https://www.bristolonecity.com/wp-content/uploads/2020/02/Preliminary-climate-resilience-assessment.pdf

Likely weather changes in both scenarios

- Hotter summers, including extreme heat – up to 9 degrees more
- Wetter winters – more rainy (yes, more rainy – up to 48% more by 2080!)
- Drier summers – less rain in summer, up to 68% less
- Sea level rise – leading to more flooding

Flooding and sea level rise and increased winter rain

There could be flooding in low-lying parts of Bristol. The left hand map shows today and the right hand map shows 2080.

	RCP4.5	RCP8.5
By 2050, winter precipitation rate in Bristol is projected to increase by up to	↑9%	↑28%
By 2080, sea level on Bristol's coastline is projected to increase by up to	↑+42cm	↑+72cm
By 2080, winter precipitation rate in Bristol is projected to increase by up to	↑17%	↑48%

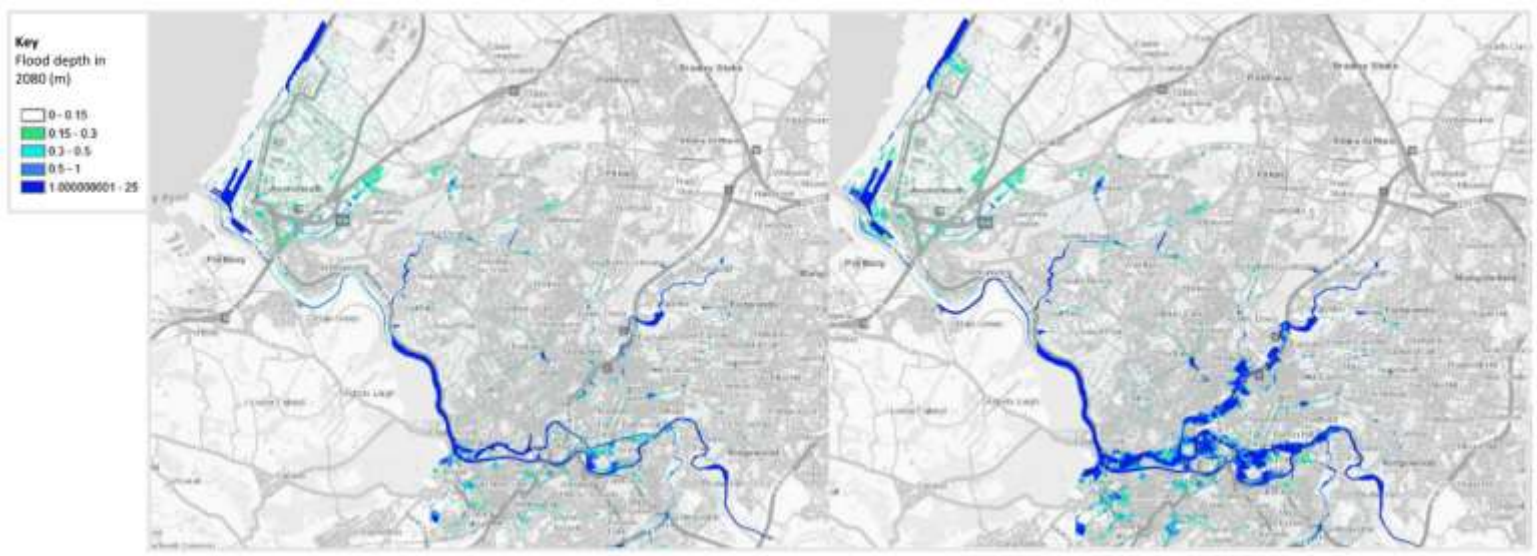
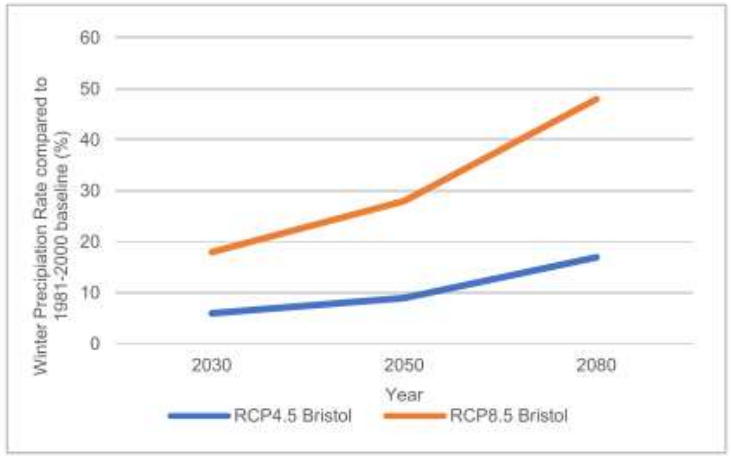


Figure 11a. Present day flood extent map (BCC 2020)

Figure 11b. Flood extent map for Bristol by 2080 when today's school children retire (BCC,2020)

Hazard	Likelihood in 2050	Confidence
Flood	H	Very certain



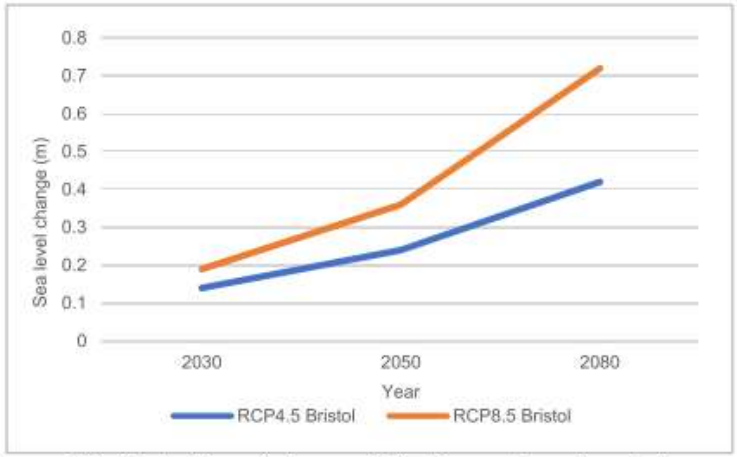


***Figure 10**. Illustrative winter precipitation and sea level change predictions for Bristol*

Extreme heat

Extreme heat – 2 or more days in a row of max temperature above 30 degrees.

Expected to go from once every 4 years (1981-2000) to 4x a year by 2070

	RCP4.5	RCP8.5
By 2050, summer maximum temperature is projected to increase by over	+2.2°C	+4.9°C
By 2080, summer maximum temperature is projected to increase by over	+3.5°C	+9.2°C

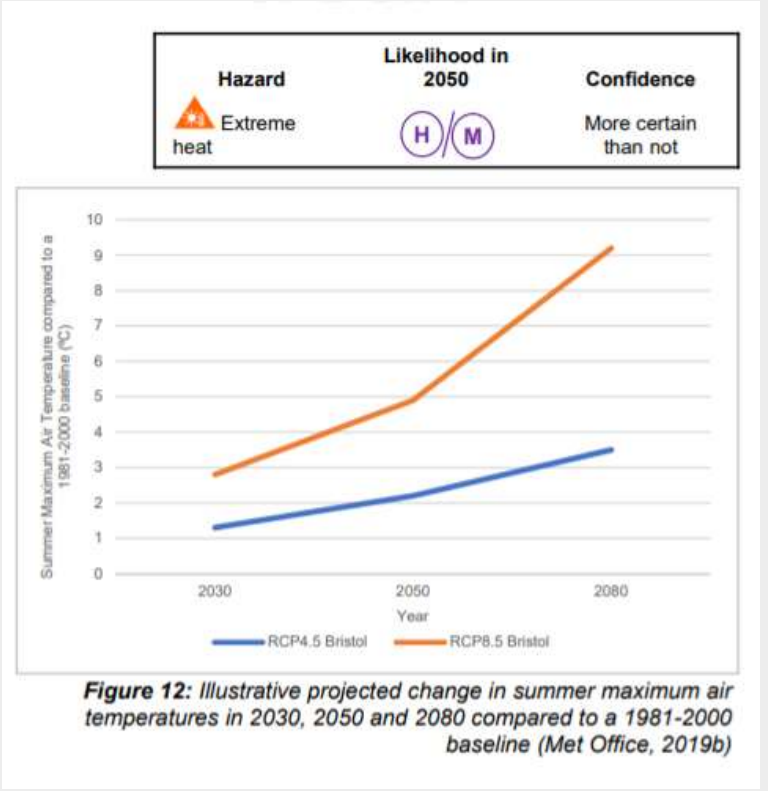


Figure 12: *Illustrative projected change in summer maximum air temperatures in 2030, 2050 and 2080 compared to a 1981-2000 baseline (Met Office, 2019b)*

Drought

All the climate change scenarios show less rainfall in summer. That may seem pleasant, but water is necessary for life – for people, other animals, growing food, trees, parks and more.

	RCP4.5	RCP8.5
By 2050, summer precipitation rate in Bristol is projected to decrease by up to	↓ 18%	↓ 45%
By 2080, summer precipitation rate in Bristol is projected to decrease by up to	↓ 26%	↓ 68%

Hazard	Likelihood in 2050	Confidence
Drought	H / M	More certain than not

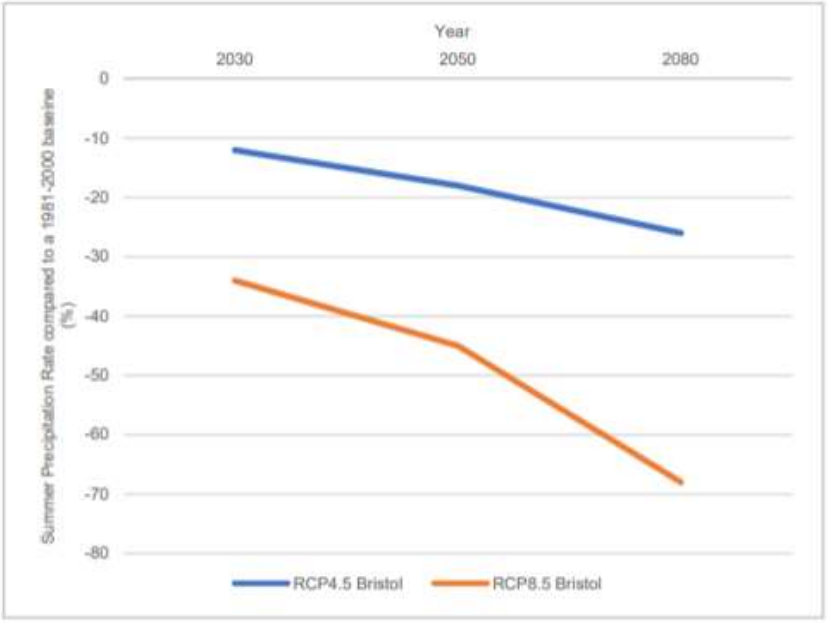


Figure 13: *Illustrative projected change in summer precipitation in 2030, 2050 and 2080 compared to a 1981-2000 baseline (Met Office 2019b)*

Winter temperatures

Extreme cold is likely to decrease, as winters are expected to be warmer.

On the other hand, high winds and storms are expected to increase.

	RCP4.5	RCP8.5
By 2080, minimum winter temperatures are projected to increase by	↑1.9°C	↑5.2°C

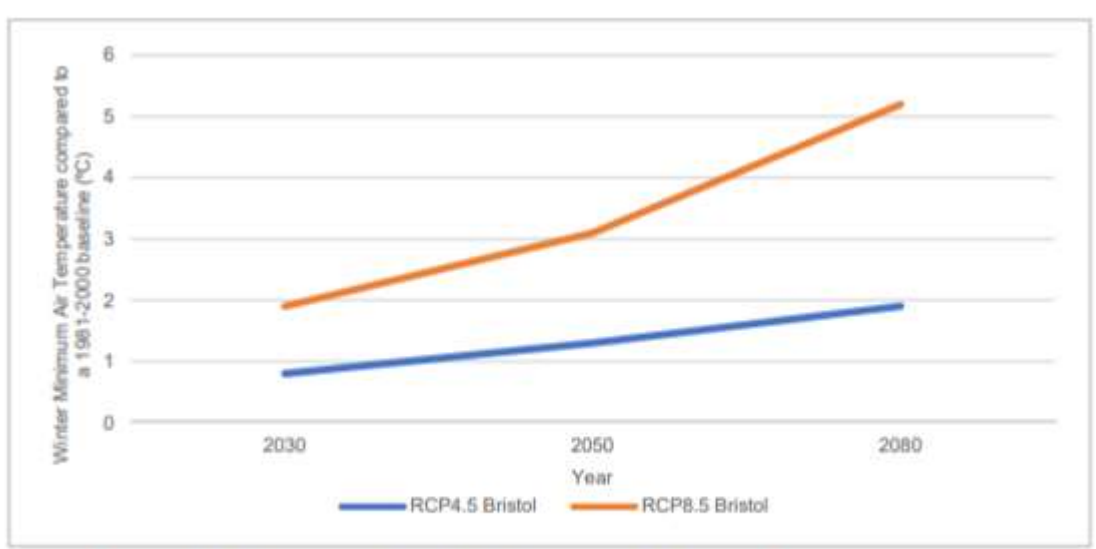


Figure 14: *Illustrative projected change in winter minimum air temperature in 2030, 2050 and 2080 compared to a 1981-2000 baseline (Met Office 2019b)*

How could these changes affect Bristolians' daily lives?

Possible disruption to transport infrastructure could affect your ability to travel

- Rail:
  - Temple Mead station could be affected by flooding
  - Railway tracks could buckle in the summer heat
  - Heat can affect safety of passengers in trains and busses, and function of the vehicles.
- Roads
  - Risk of flooding to major roads: Cumberland Road; Victoria Street, Portway, Hotwells, Baldwin Street, Prince's street
  - Tarmac can soften and damage road surfaces.
- Foundations of roads and rail lines could be affected drought, excess rain, freeze-thaw cycles. Risks of landslip or subsidence for example.
- Drought could reduce water depth in rivers and canals, affecting boats.

Possible disruption to energy infrastructure

- Some electricity substations on Feeder Road could be impacted by flooding, affecting emergency services, residents and businesses.
- Power lines could sag in extreme heat.
- The energy system could be at risk if demand for air conditioning and refrigeration goes up a lot in high temperatures.
- Underground pipes and cables could be affected by drought, flood or increased rainfall, and foundations of pylons.
- Drought could affect electricity generation nationally, as water is needed for steam powered turbines.

Possible disruption to water system

- Flooding could overload stormwater pipes and storage
- High temperature can increase level of water treatment needed as more pollutants get into water from soil.
- When it’s hot, people use more water, putting stress on the water system
- Drought can reduce water availability, and also increase concentration of pollutants in water
- Hot weather and drought can also affect the earthworks around pipes etc.

Waste

- Some waste management sites are inside of flood risk zone, particularly around Avonmouth. Also waste depots in St Philips and broadmead, and four recycling banks could be impacted by flooding.
- Waste could become more smelly and need more frequent collection in very hot weather.
- Waste systems rely on transport systems for collection, and could be impacted by any affects on transport and other infrastructure.

Buildings

- The City Centre has high flood risk, affecting businesses, public buildings and homes in places including Broadmead, Redcliffe, Canon's Marsh, Hotwells, Wapping Warf, Spike Island.
- Many buildings are at risk of overheating in summer, particularly in very hot temperatures. Even now 20% of homes in England overheat.
- Drought and flooding could affect foundations.

Telecoms

- Flooding could cut off homes and businesses from the internet.
- High temperatures can affect data centres needed for internet function.

Parks and green space

- Trees could be affected by extreme heat and by drought. On the other hand, trees help cool the city down, and we can sit in their shade.

Health and emergency services

- Hospitals could be affected if staff can't travel to work due to flooding. Transport links to major hospitals could be affected.
- Flooding, heat and drought would directly affect people's health.
- Emergency services likely to be overstretched in hot weather and drought: suicide rates are higher in very hot weather; more people swimming in rivers increases risk of drowning; and dehydration risk is higher in hot weather and drought.
- Temple fire station, Bridewell Police Station, and a number of GP surgeries are in flood risk areas.

Picture by carnagenyc

Schools and business

- Some schools around the city centre could be affected by flooding. Schooling would generally be affected by any flooding that disrupts life for people more generally.
- Schools may have to close during hot weather if the buildings overheat.
- Flood risk is increased in Avonmouth and Severnside, and in the Temple Quarter area near temple meads. Flood impacts on transport infrastructure would affect businesses.
- Overheating of buildings would affect people's ability to concentrate at work, or be in their workplaces.
- Climate change may also affect global supply chains which Bristol businesses rely on.

Culture and leisure and community spaces

- Event venues and tourist attractions may have to close during flooding.
- Public buildings may be a refuge for people to keep cool when it’s very hot outside.
- Some community buildings in centre are in flood risk areas, also food banks, ‘community places of safety’ may be flooded.
- Volunteers may not be able to make their usual contribution if it’s very hot.

Food supply

- Food supply chains are global, and climate change around the world is likely to lead to crop failures resulting in global food shortages.
- Local food businesses don't store large amounts of food, but use 'just in time' systems. That means that if transport infrastructure is disrupted, it affects food availability in a very short timeframe.
- Agriculture in the UK, including in and near Bristol, is affected by flooding, heat and drought. UK agriculture doesn't have irrigation systems in place, and might need it in future.

What solutions to climate change mean for the city

[Pathway to net zero by 2030]

Pathways to net zero evidence base

The Centre for Sustainable Energy reported on how the city can achieve net zero greenhouse gas emissions by 2030. These are recommendations which have not yet been made into policy.

The recommendations are based on modelling scenarios that would achieve net zero by 2030. In practice, we are not on track to achieve these scenarios.

This section explains what implementing the net zero scenarios could mean for ordinary people in Bristol, if we were to actually implement them.

You can read the full study here:

https://www.bristolonecity.com/wp-content/uploads/2020/02/Bristol-net-zero-for-direct-emissions.pdf

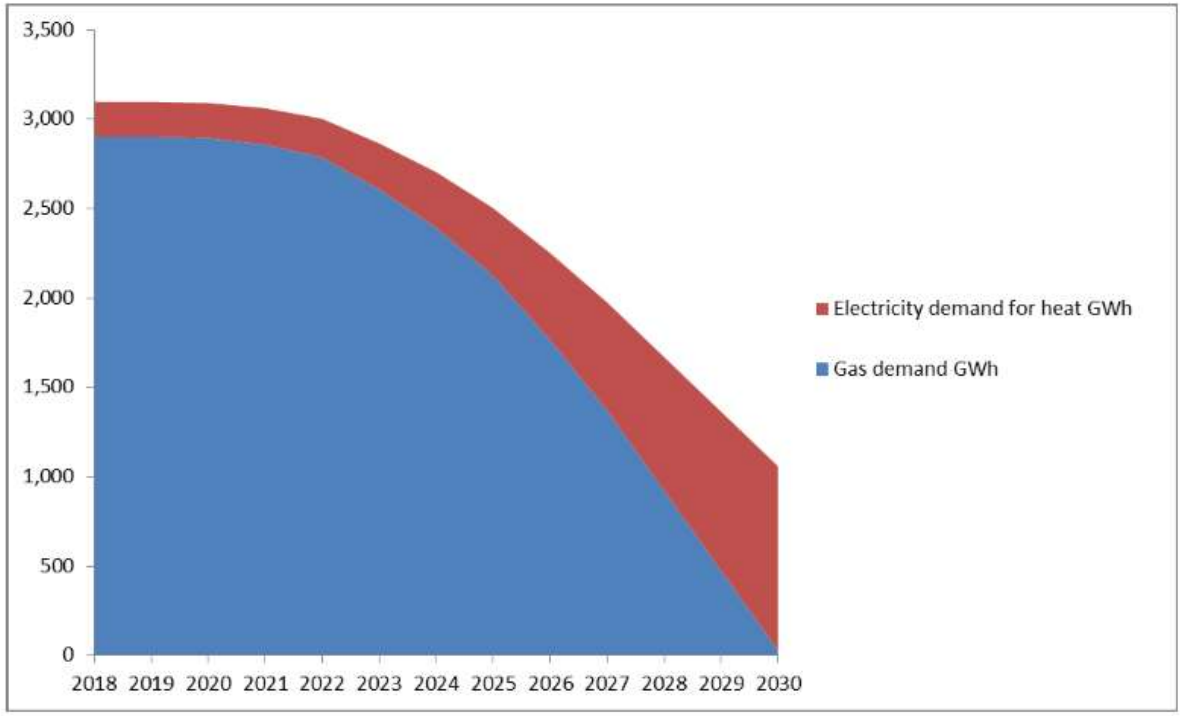
Energy for heat moves from gas to electricity

We stop using gas for heat altogether as it is a fossil fuel and inherently has greenhouse gas emissions.

The amount of heat energy needed is significantly reduced because our homes are better insulated.

The heat we need is powered by electricity instead of gas. The electricity all comes from zero carbon sources.

Figure 6: Gas and electricity demand for heat production in selected scenario



New heating technology

- District heating (also called ‘heat networks’) – hot water pipes in the ground, with a community scale zero carbon boiler.
- Air Source Heat Pump, taking heat from the air, powered by electricity.

The scale of work involved

Figure 5: Projected installation rates for heat decarbonisation solutions

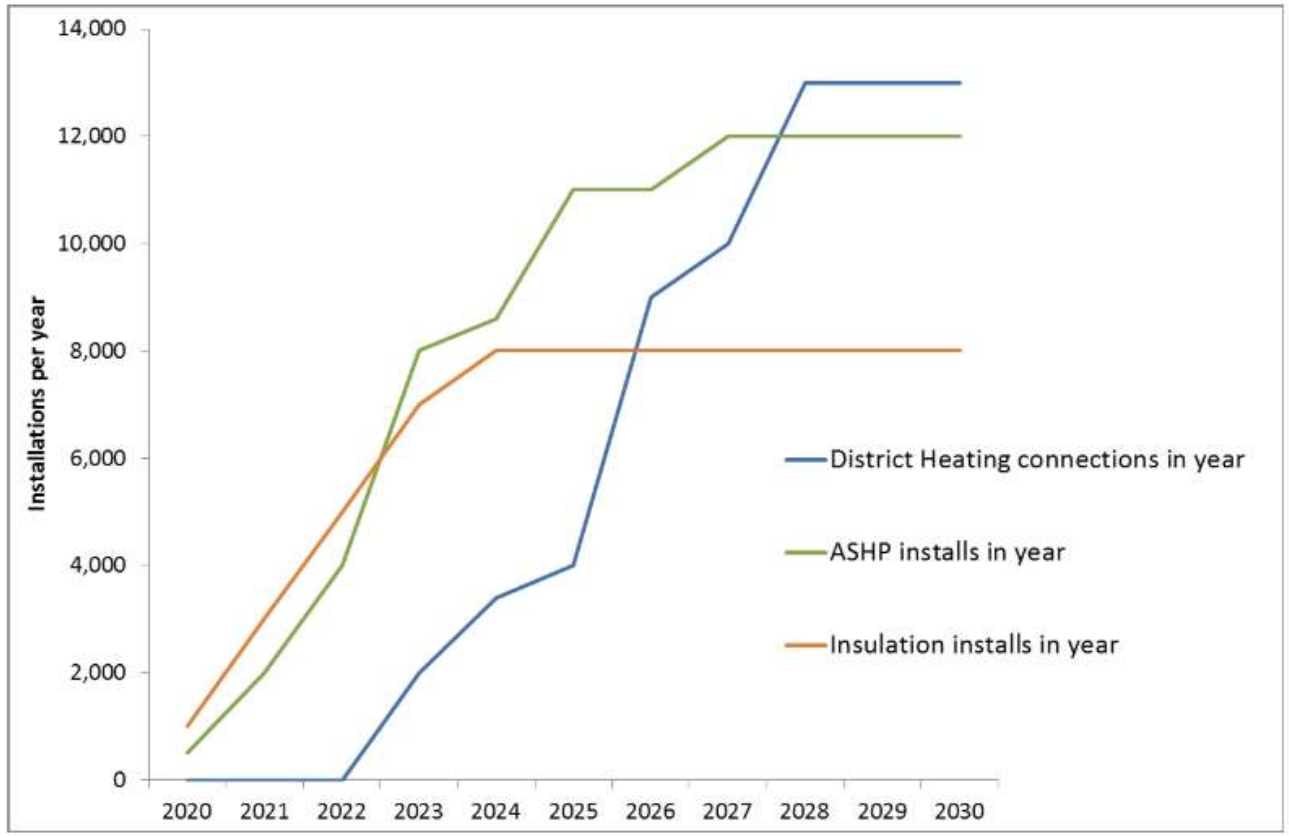
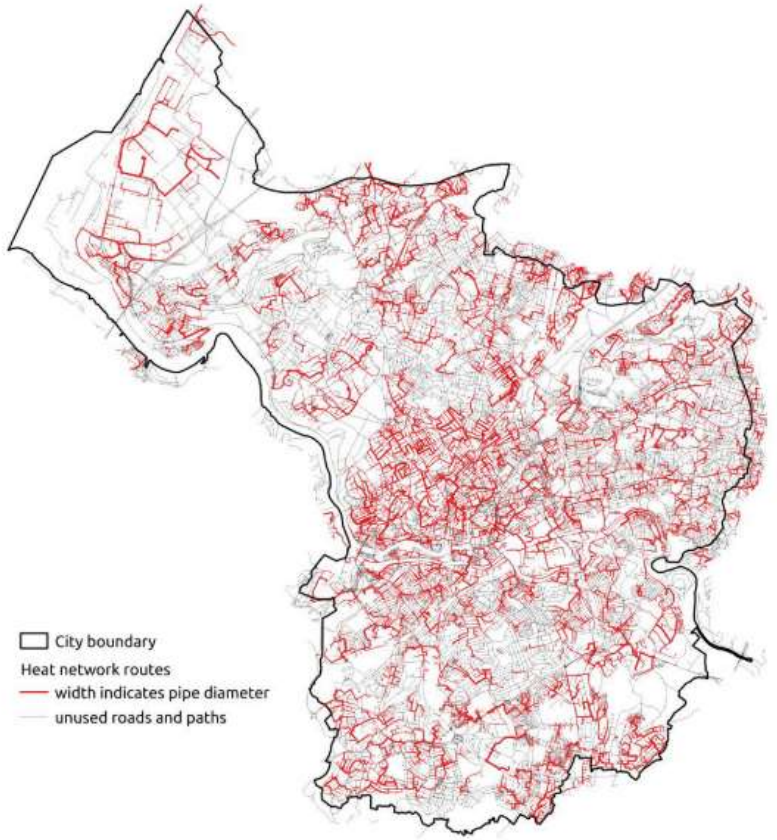


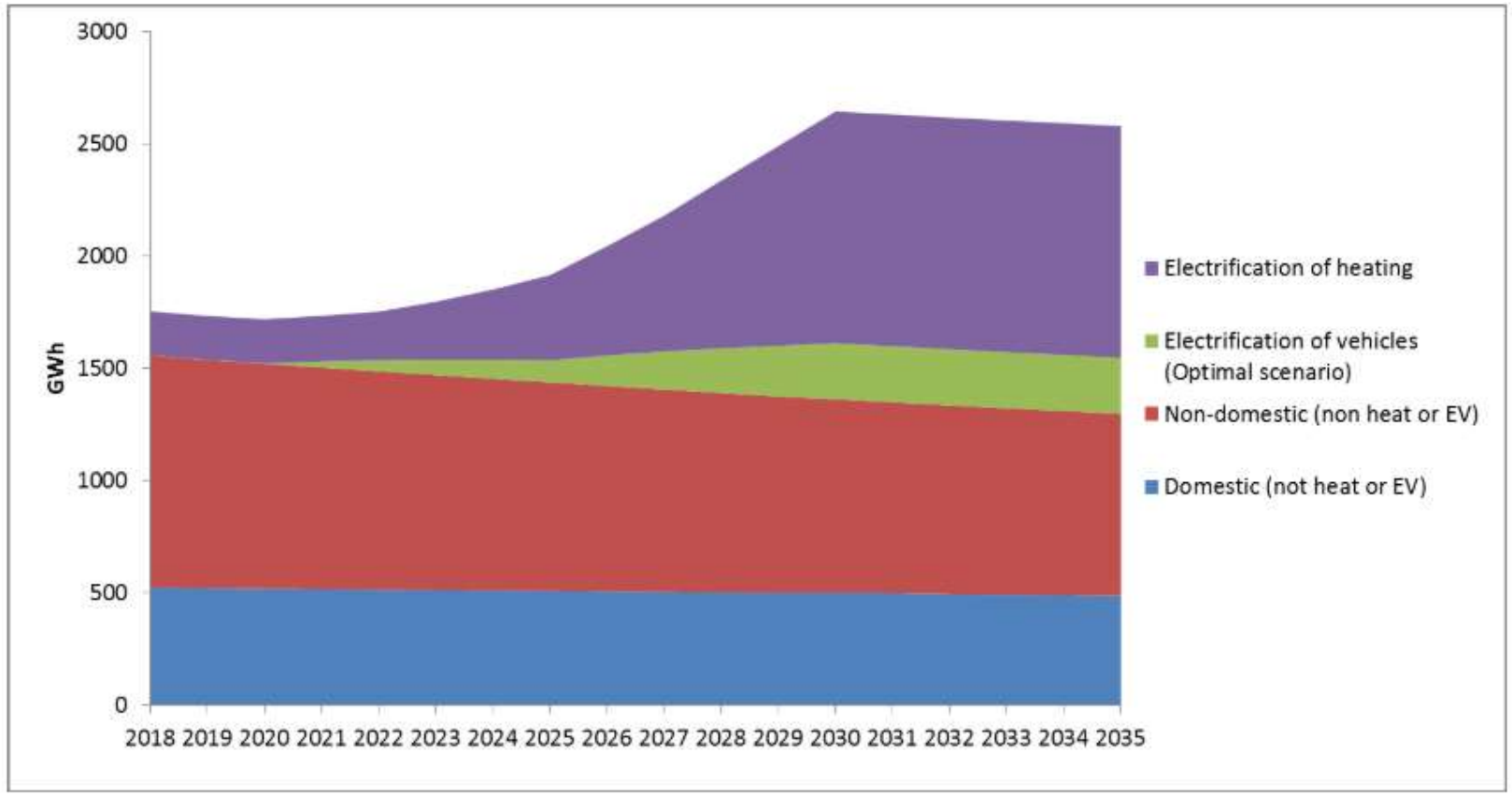
Figure 4: Roads and paths with (in red) and without (in grey) heat networks in selected least-lifetime-cost heat decarbonisation scenario



The total amount of electricity needed goes up

Our need for electricity goes up even though we use it more efficiently, because we use it for heating and transport, instead of gas, diesel and petrol.

Figure 10: Forecast of electricity demand for Bristol including post 2030



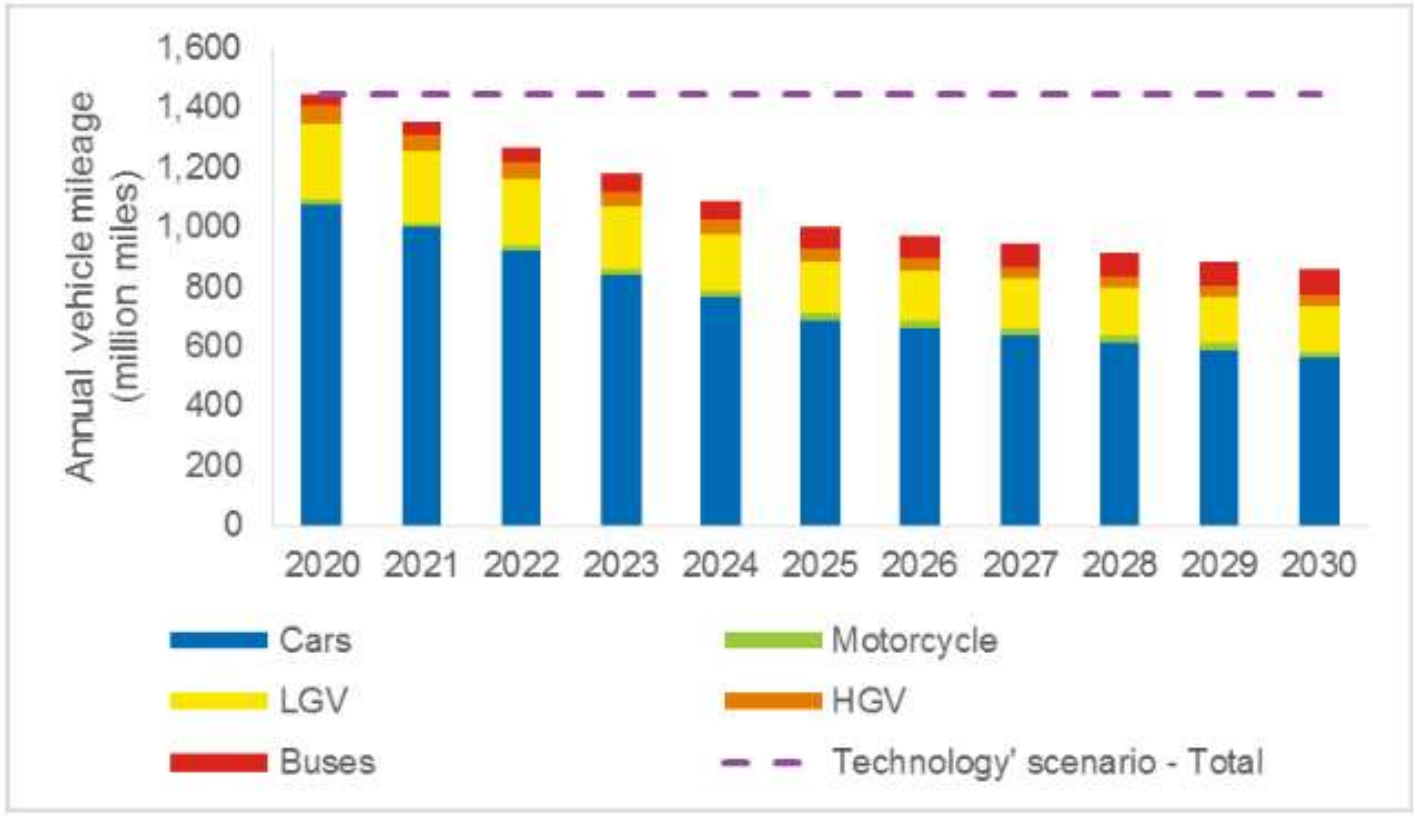
The amount of miles travelled by car reduces

Two transport scenarios were presented – one based only on technology change, and one ‘balanced’ with technology and behaviour change.

In the balanced scenario, the amount of car travel reduces by 48% by 2030.

Car ownership goes down and more people use car clubs or shared cars.

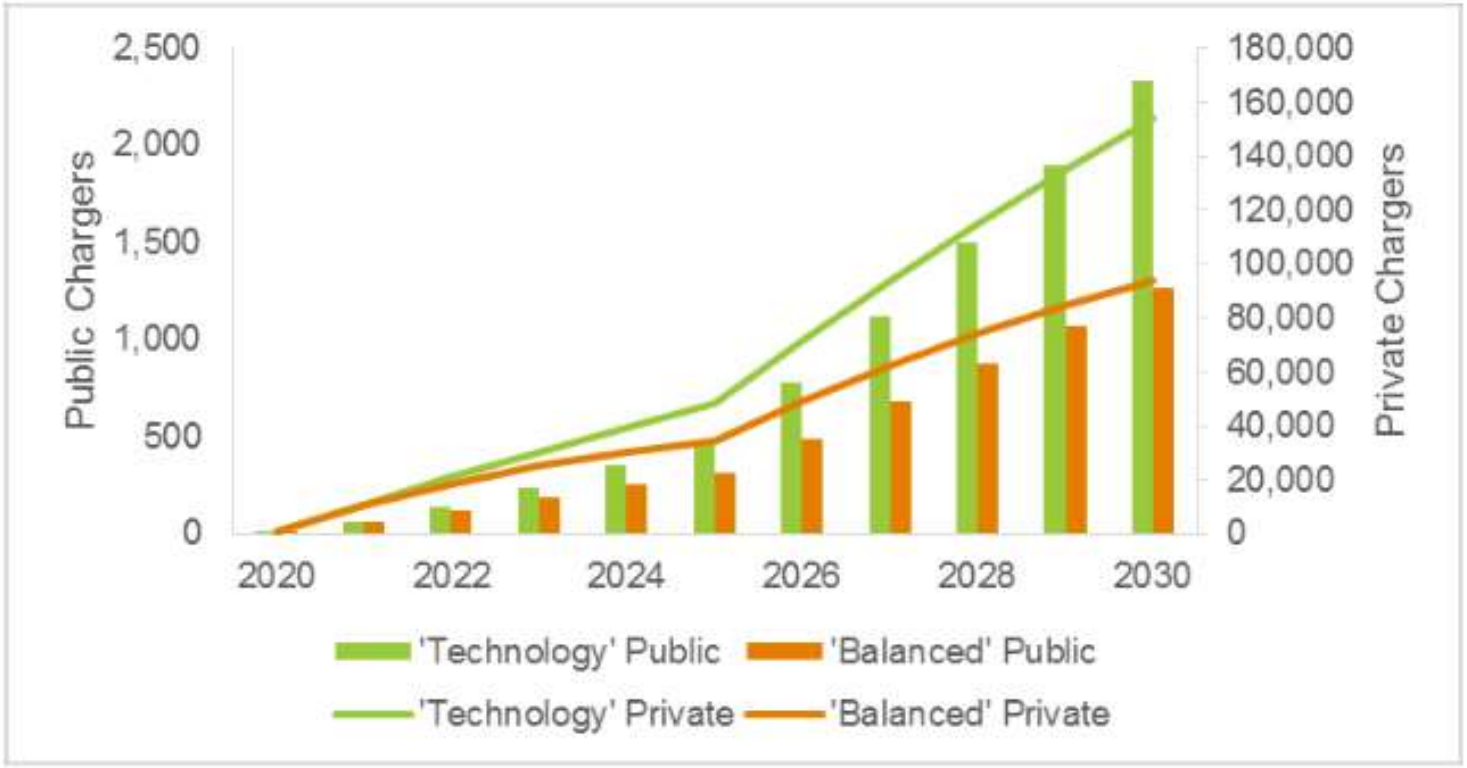
Figure 16. Annual vehicle mileage in ‘Balanced’ scenario (million miles)



Electric car chargers are built

In both of the transport scenarios, the vast majority of all vehicles are ultra low emission – mostly electric. That means we have to build a lot of electric car charging points.

Figure 18. Private and public charger requirements in each scenario



Solar panels are installed on all roofs that can take them

The yellow and orange colours on this map show the buildings which have the most potential for solar panels to generate electricity on the roofs.

Figure 11: Solar PV potential and projected IRR for Cotham area of Bristol

What does it feel like?

- Air quality is better, and less people suffer from air quality related illness.
- You can use a smart integrated ticketing system for all forms of public transport, which is cheaper than now and free for a lot of people.
- Getting into town by bus is the quickest mode of transport because traffic has been reduced, and prioritisation has been improved.
- Your house is warmer and cosier as it has been well insulated.
- The city is quieter, and you can hear more birdsong and less car engine noise, it is safer and more pleasant to walk and cycle, and road space has been given to walking and cycling.
- Electric cars are much cheaper than they are currently, busses are less noisy and less polluting, as they are now electric or biogas powered.
- You wear clothes that last, and buy new clothes less often.
- You use a lot less plastic packaging for food etc.


HOVIS

What it’s like for household and daily life?

- You don’t drive into the centre of town, and when you do drive you use an electric car club car rather than owning your own. Public transport is faster, simpler to use with tickets you can use across all busses and trains. It’s cheaper and free for many people.
- Your house is better insulated, you probably have solar panels on the roof. Your heating system changes from a gas boiler to getting heat from the city’s hot water pipes or from an air source heat pump. You have a smart energy meter and control systems. You put a hot water tank back into your house to store heat.
- You cook on electricity – probably a modern induction hob – rather than gas.

Job opportunities and changes

- Gas heating engineers are retrained to fit in home heat exchangers connecting to the city hot water pipes, and air source heat pumps, and the controls for these.
- Gas network staff retrain to maintain electricity and hot water infrastructure instead
- Builders learn new skills to insulate homes and ensure good indoor air quality and ventilation
- Chefs cook on electric induction cookers rather than gas or wood
- New work opportunities e.g. providing advice for households and building owners, quality assurance of insulation work, installation of new infrastructure, installation of solar panels and electric vehicle charge points

What the disruption is like for infrastructure building works

- The roads are dug up to put in citywide hot water pipes to change our heating system over from gas. Roads are also dug up to upgrade the electricity cables, so that we can heat homes electrically and charge electric cars.
- Electric vehicle charging points are installed throughout the city.
- Road space is reallocated from private cars to public transport – busses and taxis, walking and cycling.
- There is a lot of scaffolding on people's houses as insulation is installed.

What people can do to help progress it

- Change to a 100% renewable energy supplier in your home or workplace – one that definitely acts to make a good market for renewable energy development.
- Get rid of your car – sell or scrap it, join a car club and use electric cars, walk or cycle and use public transport.
- Don’t upgrade/replace your gas boiler – be ready for a new type of heating system. Install an air source or ground source heat pump if you are replacing your boiler.
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