MITSUBISHI ELECTRIC

ON THE ROAD TO NET ZERO

ON THE ROAD TO NET ZERO

Welcome

Stephen Reece
Branch Manager

ON THE ROAD TO NET ZERO

Your Partner On The Road To Net Zero

Phil Ord
Commercial Product
Group Director

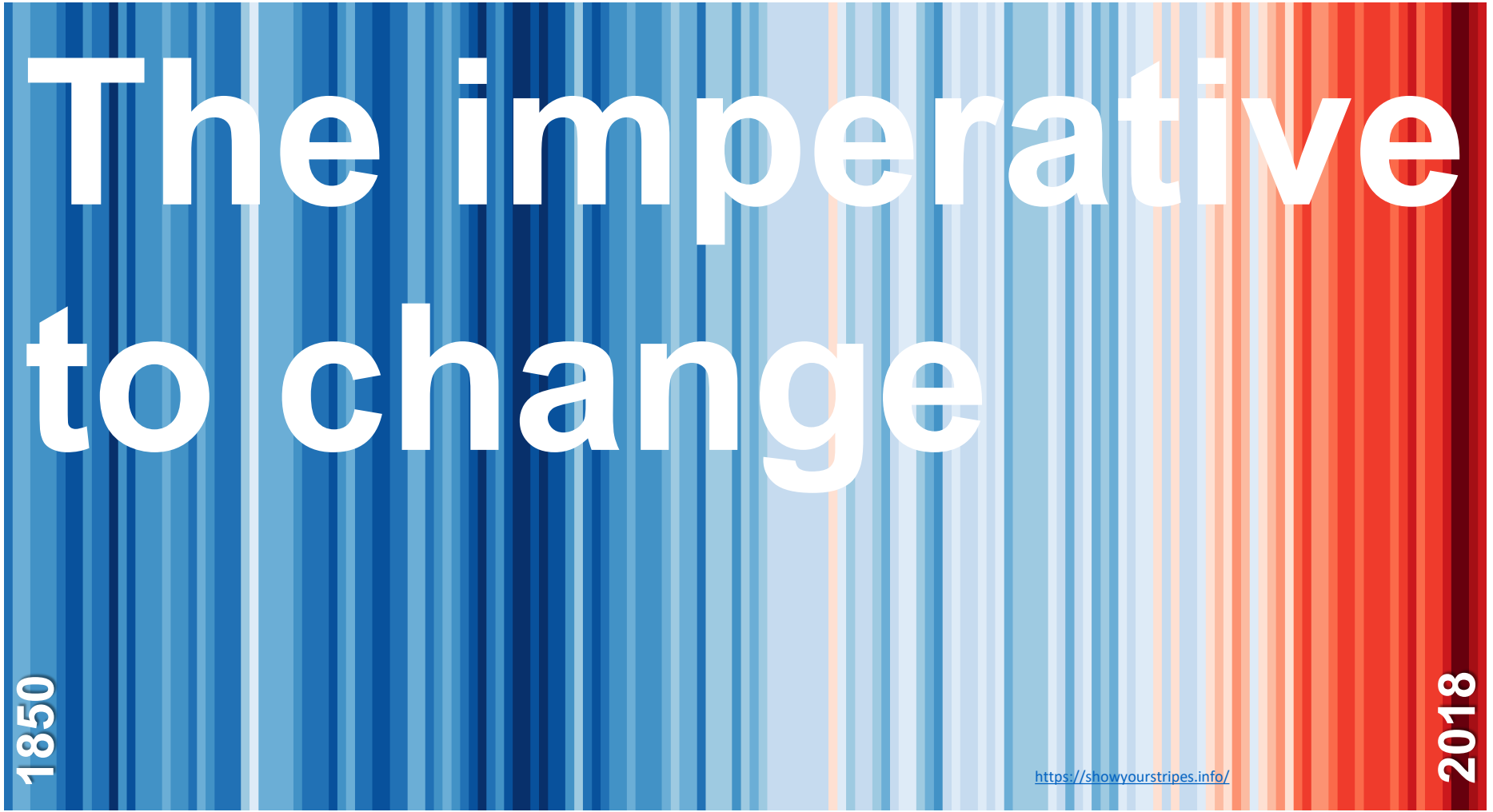
"We, the Mitsubishi Electric Group, have been engaged in manufacturing businesses since 1921. Our Purpose, and indeed our very reason to exist, has been to contribute to the realization of a vibrant and sustainable society through continuous technological innovation and ceaseless creativity."

ON THE ROAD TO NET ZERO

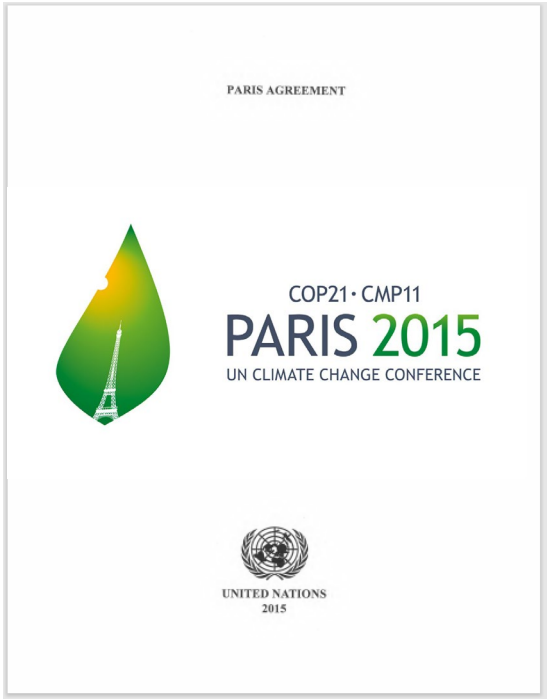
The Imperative To Change

Martin Fahey
Head of Sustainability

The imperative to change



Global



United Nations Framework Convention on Climate Change

UK

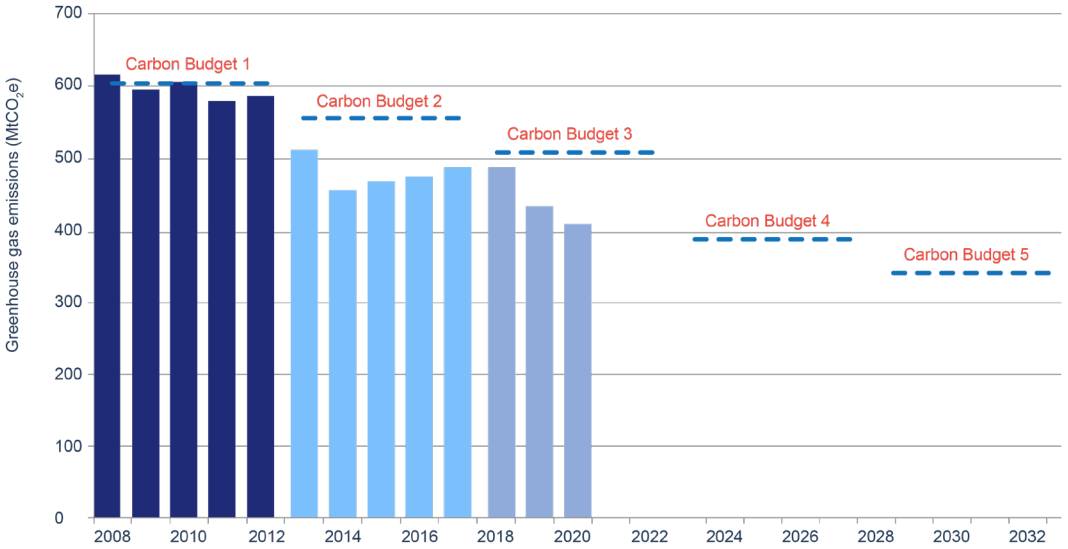
The Paris Agreement - global average temperature increase to well below 2°C, and to pursue efforts to limit the temperature increase to 1.5°C.

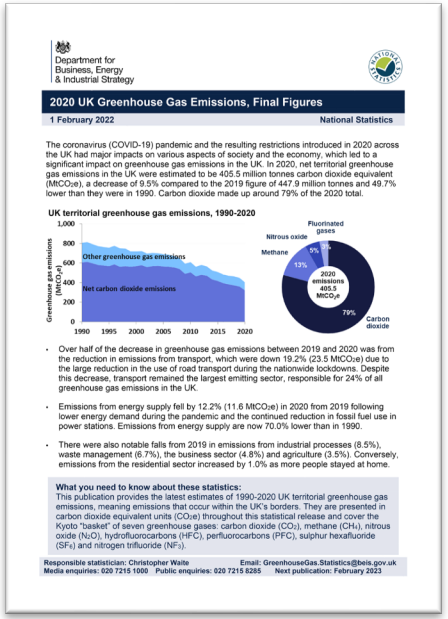
In its NDC (April 2021), the UK is committing to reduce economy-wide greenhouse gas emissions by at least 78% by 2035, compared to 1990 levels.

This includes aviation and shipping for the first time.

UK Progress

These are legally binding limits on the total amount of greenhouse gas emissions the UK can emit over 5 years. Final statement on the 3rd carbon budget will be made in May 2024.





Department for Business, Energy & Industrial Strategy

2020 UK Greenhouse Gas Emissions, Final Figures

1 February 2022 — National Statistics

The coronavirus (COVID-19) pandemic and the resulting restrictions introduced in 2020 across the UK had major impacts on various aspects of society and the economy, which led to a significant impact on greenhouse gas emissions in the UK. In 2020, net territorial greenhouse gas emissions in the UK were estimated to be 405.5 million tonnes carbon dioxide equivalent ($MtCO_2e$), a decrease of 9.5% compared to the 2019 figure of 447.9 million tonnes and 49.7% lower than they were in 1990. Carbon dioxide made up around 79% of the 2020 total.

UK territorial greenhouse gas emissions, 1990-2020

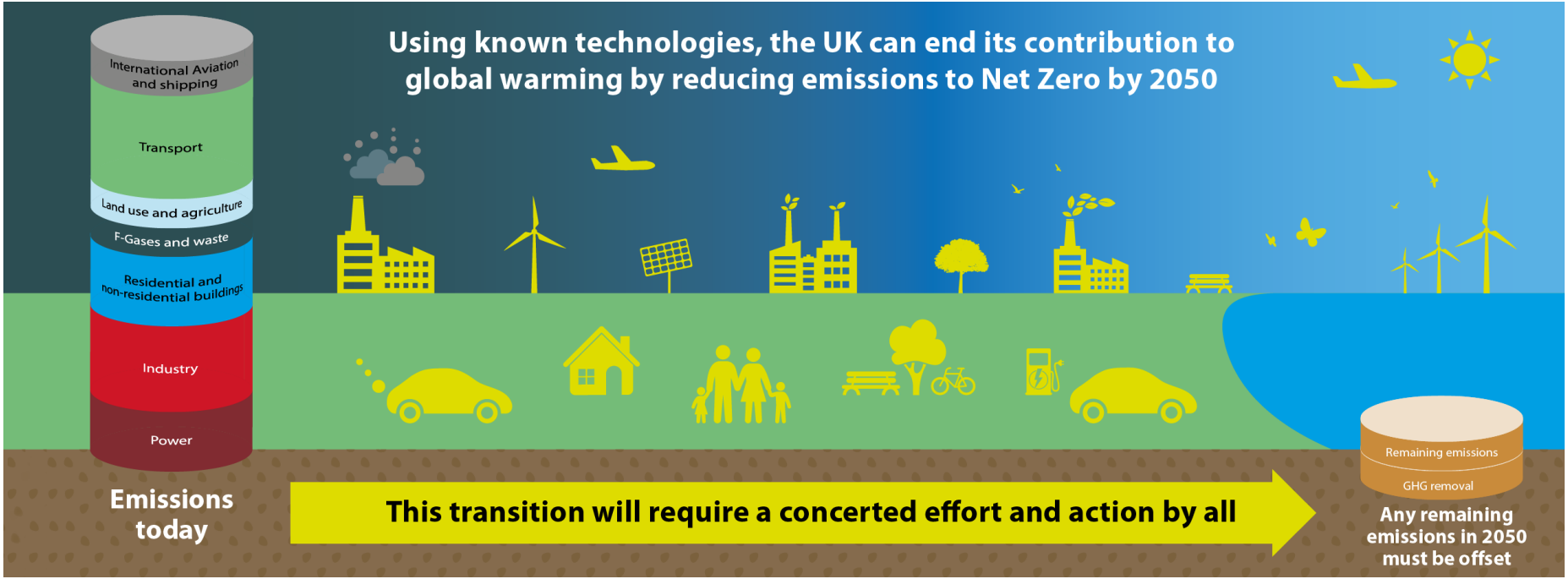
- Over half of the decrease in greenhouse gas emissions between 2019 and 2020 was from the reduction in emissions from transport, which were down 19.2% (23.5 $MtCO_2e$) due to the large reduction in the use of road transport during the nationwide lockdowns. Despite this decrease, transport remained the largest emitting sector, responsible for 24% of all greenhouse gas emissions in the UK.
- Emissions from energy supply fell by 12.2% (11.6 $MtCO_2e$) in 2020 from 2019 following lower energy demand during the pandemic and the continued reduction in fossil fuel use in power stations. Emissions from energy supply are now 70.0% lower than in 1990.
- There were also notable falls from 2019 in emissions from industrial processes (8.5%), waste management (6.7%), the business sector (4.8%) and agriculture (3.5%). Conversely, emissions from the residential sector increased by 1.0% as more people stayed at home.

What you need to know about these statistics:
This publication provides the latest estimates of 1990-2020 UK territorial greenhouse gas emissions, meaning emissions that occur within the UK's borders. They are presented in carbon dioxide equivalent units (CO_2e) throughout this statistical release and cover the Kyoto "basket" of seven greenhouse gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3).

Responsible statistician: Christopher Waite — Email: GreenhouseGas.Statistics@beis.gov.uk
Media enquiries: 020 7215 1000 Public enquiries: 020 7215 5285 Next publication: February 2023

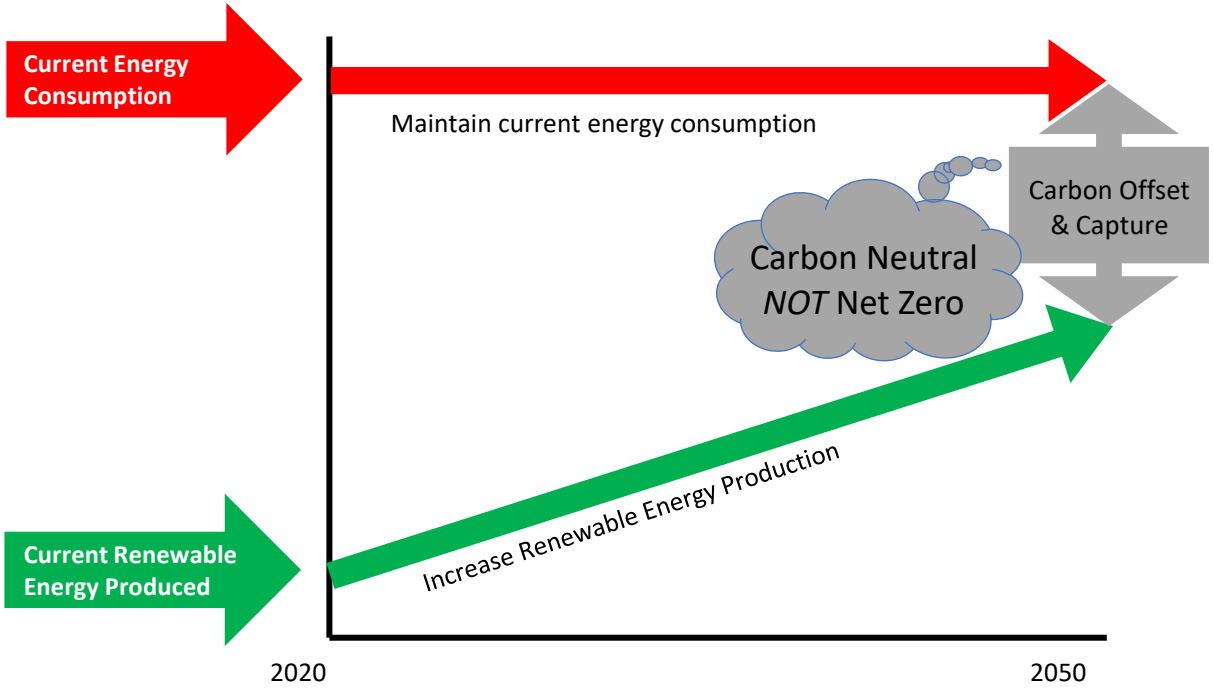
Source; 2020 UK Greenhouse Gas emissions, Final Figures - published February 2022 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachmentdata/file/1051408/2020-final-greenhouse-gas-emissions-statistical-release.pdf

What Is Net Zero?



Source – Climate Change Committee

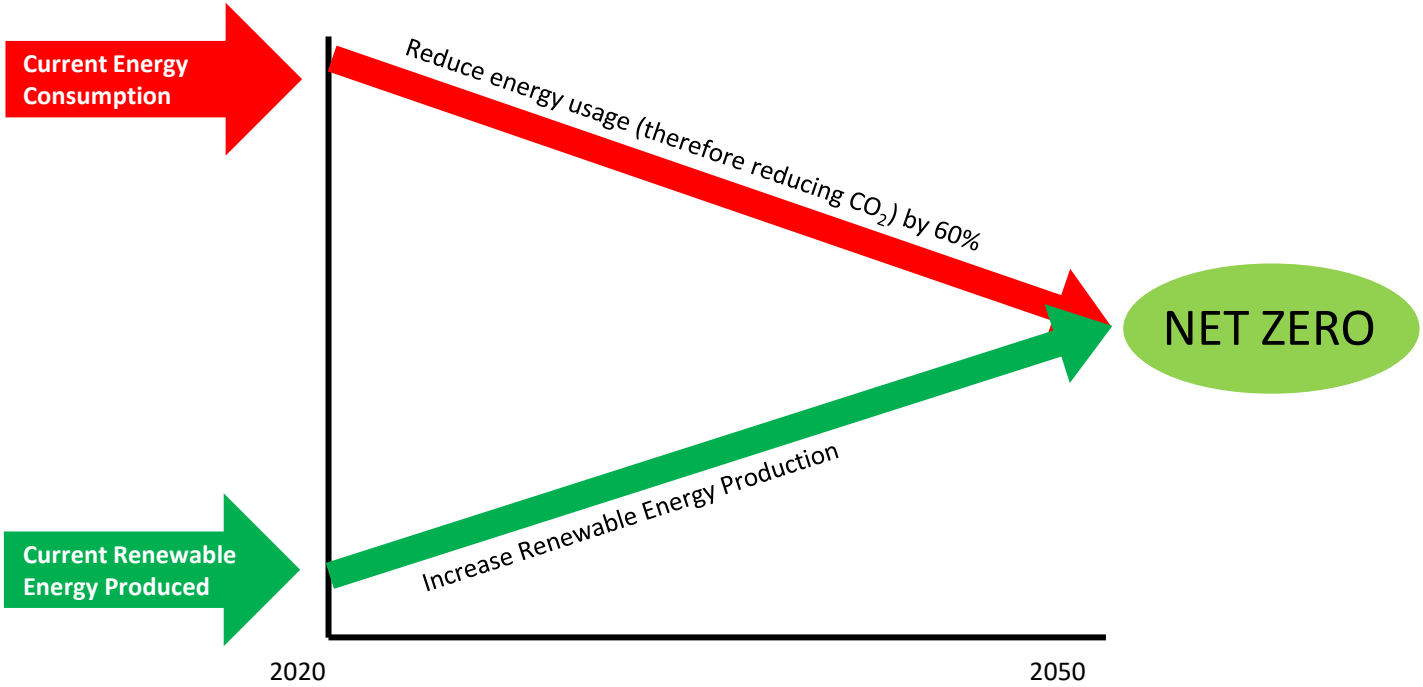
What Is Net Zero?



1 tree off-sets approx. 1 tonne of CO_2 throughout its lifespan (100 years)

We currently capture 40 Mt and need to capture 5635 Mt by 2050

What Is Net Zero?



ME Corporate Action And Direction

ON THE ROAD TO NET ZERO

Environment

- Environmental Sustainability Vision 2050
- Environmental report
- Fiscal 2021 environmental topics
- Creating a society in tune with nature
- Recycling technologies

Social

- Quality
- Human Rights
- Labor practices
- Supply chain management
- Philanthropic activities

Governance

- Corporate governance
- Compliance
- Tax policy
- Risk management
- Our approach to information security
- R&D / technology
- Intellectual property
- Communication with shareholders and investors

Environmental Sustainability Vision 2050

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Corporate Action And Direction

ON THE ROAD TO NET ZERO

Provide solutions to social challenges through our business

- Realize a sustainable global environment
- Realize a safe, secure, and comfortable society

Strengthen our business foundation to enable our sustainable growth

- Respect for all people
- Strengthen corporate governance and compliance on a sustainable basis
- Create a sustainability-oriented corporate culture

Priority SDG initiatives

- Goal 3 Good Health and Well-Being
- Goal 9 Industry, Innovation, and Infrastructure

Two new goals (SDGs) added

SDGs of particular relevance

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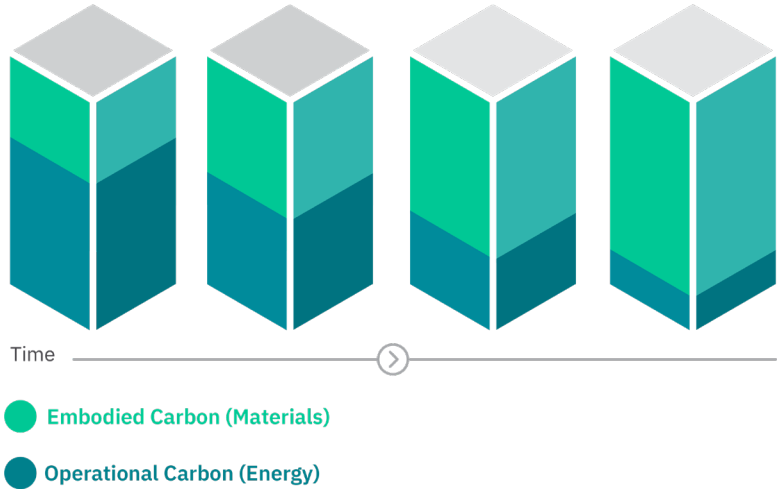
Whole Life Carbon

ON THE ROAD TO NET ZERO

Over time embodied carbon becomes a greater proportion of a building's total lifetime carbon emissions….

Potential breakdown between embodied and operational carbon for new buildings over time:



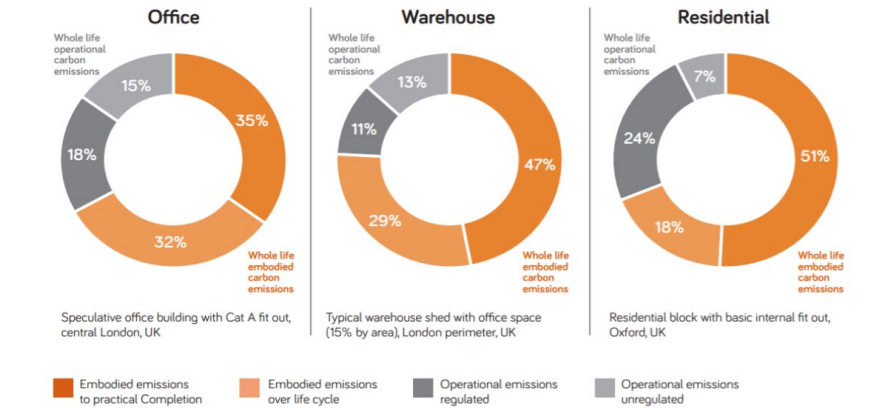


Image credit: from RIBA's *Embodied and whole life carbon assessment for architects*

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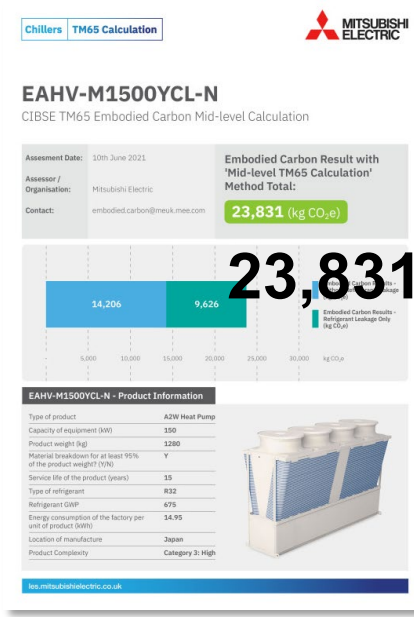
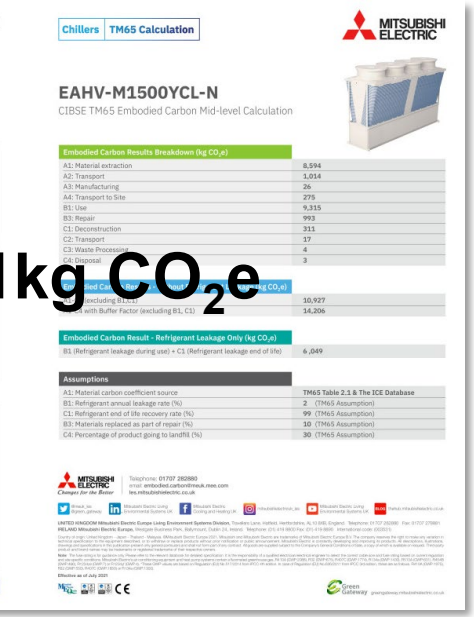
Whole Life Carbon

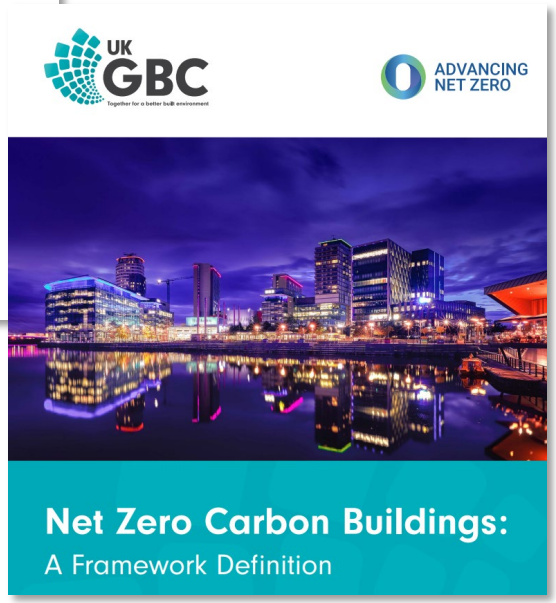
435kg CO_2e

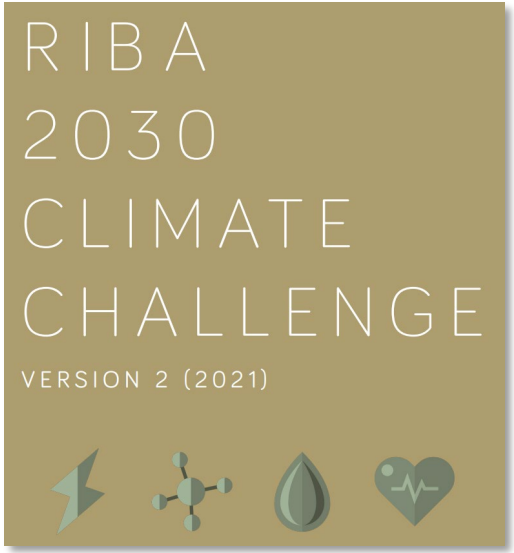


23,831kg CO_2e



Lots Of Guidance





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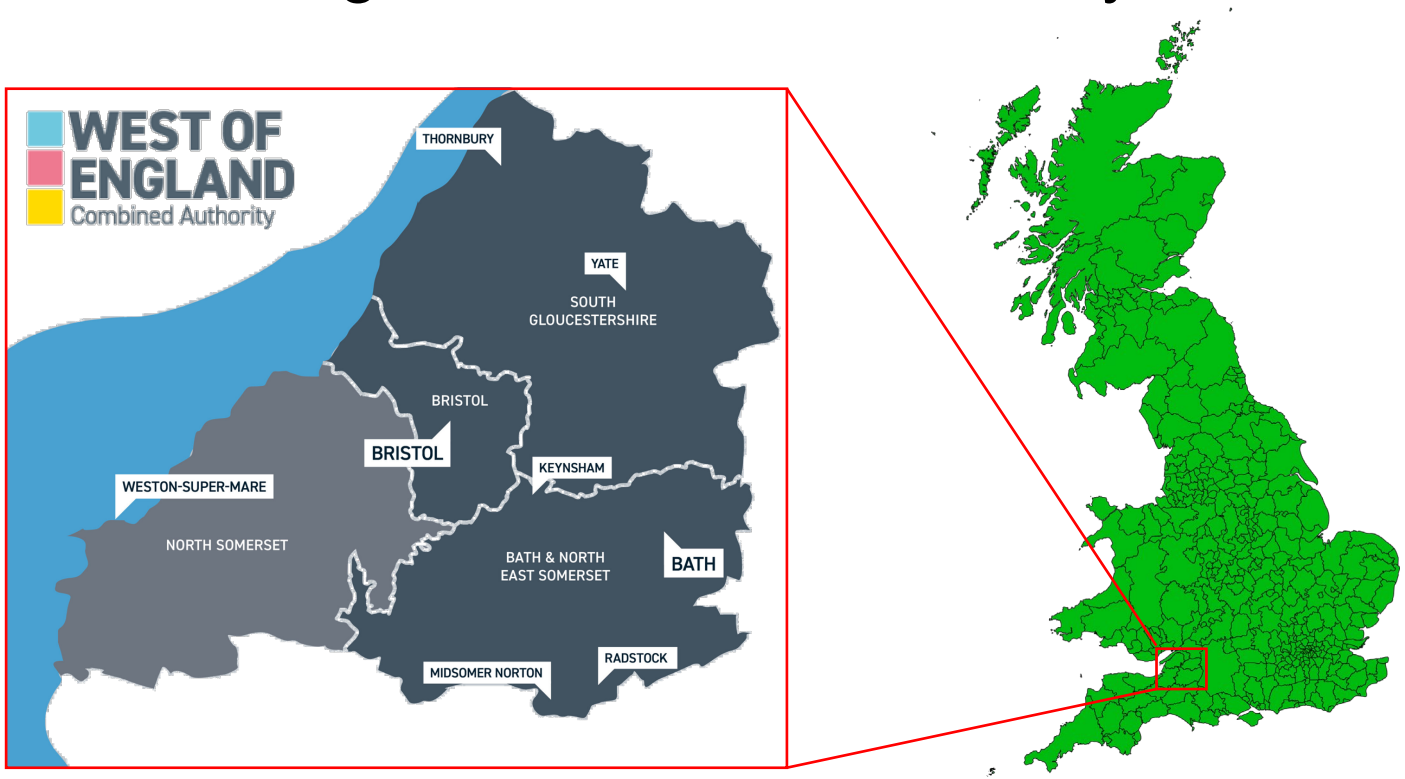
What Does This Mean In Our Region?

Chris Newman
Net Zero Design Manager

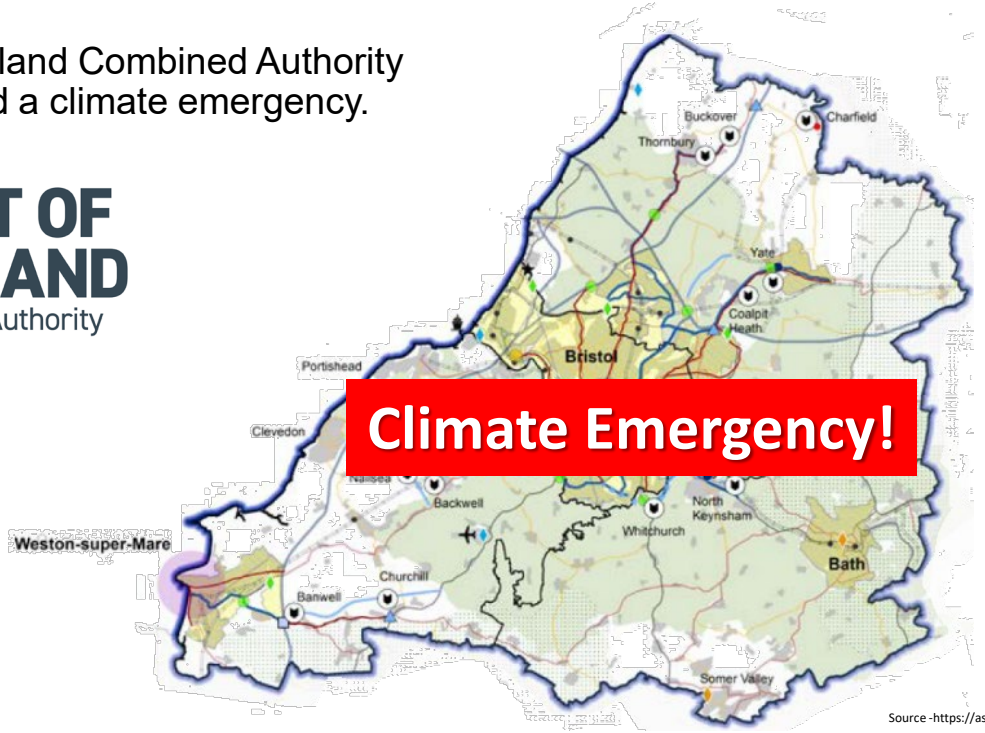
West of England Combined Authority



WECA Declarations

West of England Combined Authority has declared a climate emergency.

WEST OF ENGLAND
Combined Authority

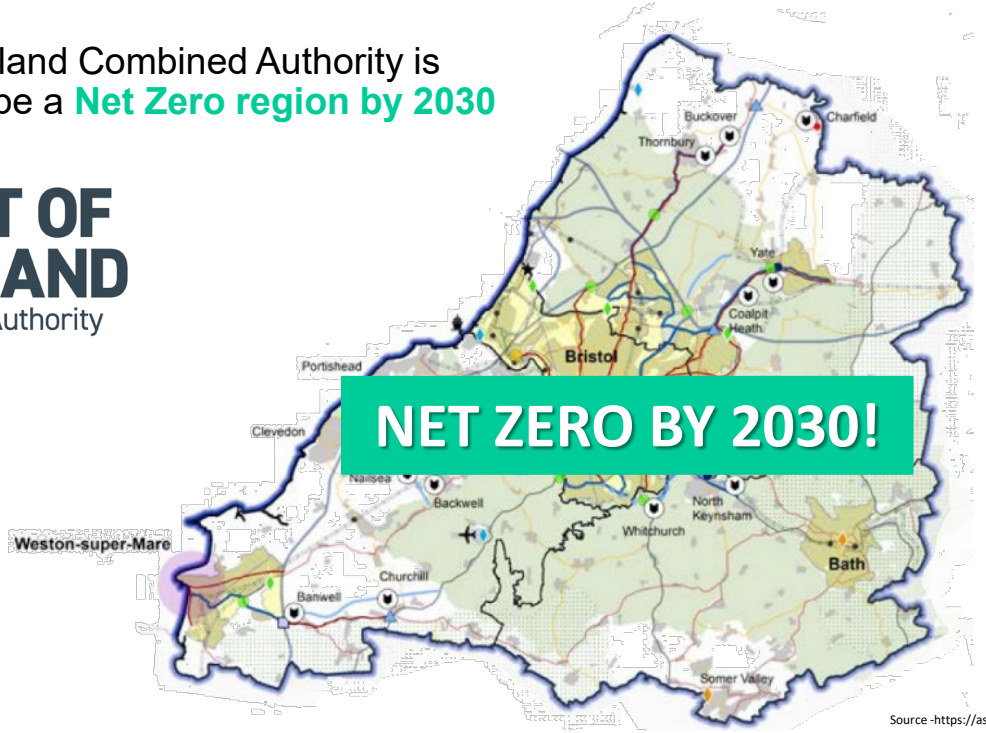


Source -https://assets.publishing.service.gov.uk/government/uploads/system/uploads/image_data/file/90101/figure-6.png

WECA Declarations

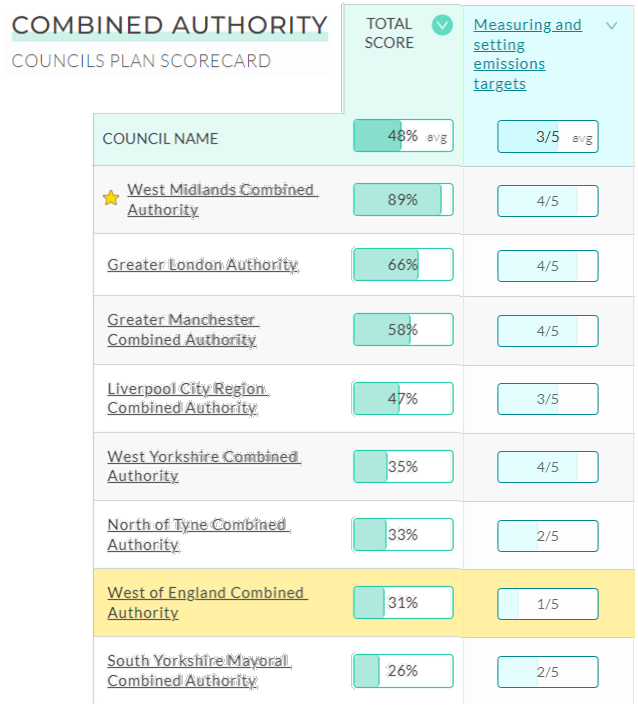
West of England Combined Authority is targeting to be a **Net Zero region by 2030**

WEST OF ENGLAND
Combined Authority



Source -https://assets.publishing.service.gov.uk/government/uploads/system/uploads/image_data/file/90101/figure-6.png

Local Authority Declarations



COMBINED AUTHORITY
COUNCILS PLAN SCORECARD

COUNCIL NAME	TOTAL SCORE	Measuring and setting emissions targets
	48% avg	3/5 avg
★ West Midlands Combined Authority	89%	4/5
Greater London Authority	66%	4/5
Greater Manchester Combined Authority	58%	4/5
Liverpool City Region Combined Authority	47%	3/5
West Yorkshire Combined Authority	35%	4/5
North of Tyne Combined Authority	33%	2/5
West of England Combined Authority	31%	1/5
South Yorkshire Mayoral Combined Authority	26%	2/5

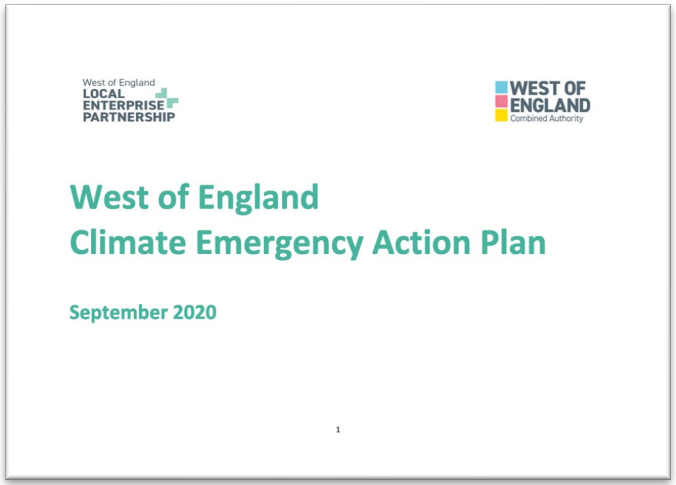
All 4 Local Authorities have declared Climate Emergencies

CLIMATE EMERGENCY UK

Rank	Name of local authority	Type of local authority	Score
1	Somerset West and Taunton Council	Non-metropolitan district	0.91
2	West Midlands Combined Authority	Combined authority	0.89
3	Manchester City Council	Metropolitan district	0.87
4	Staffordshire Moorlands District Council	Non-metropolitan district	0.87
5	Solihull Metropolitan Borough Council	Metropolitan district	0.85
6	City of Edinburgh Council	Scottish unitary authority	0.83
7	Newcastle City Council	Metropolitan district	0.82
8	London Borough of Hammersmith & Fulham	London borough	0.81
9	Wiltshire Council	Unitary authority	0.81
10	South Gloucestershire Council	Unitary authority	0.8
48	West Suffolk Council	Non-metropolitan district	0.65
49	Bristol City Council	Unitary authority	0.64
50	Cambridge City Council	Non-metropolitan district	0.64
148	Bath and North East Somerset Council	Unitary authority	0.48
149	Bournemouth, Christchurch and Poole Cour	Unitary authority	0.48
236	North Somerset Council	Unitary authority	0.34
247	West of England Combined Authority	Combined authority	0.32
248	Ards and North Down Borough Council	NI district	0.31
249	Broxbourne Borough Council	Non-metropolitan district	0.31
250	Caerphilly County Borough Council	Welsh unitary authority	0.31

Source; climate emergency UK https://councilclimatescorecards.uk/scoring/combined/

WECA Climate Emergency Action Plan


West of England
LOCAL ENTERPRISE PARTNERSHIP

WEST OF ENGLAND
Combined Authority

West of England
Climate Emergency Action Plan

September 2020

1

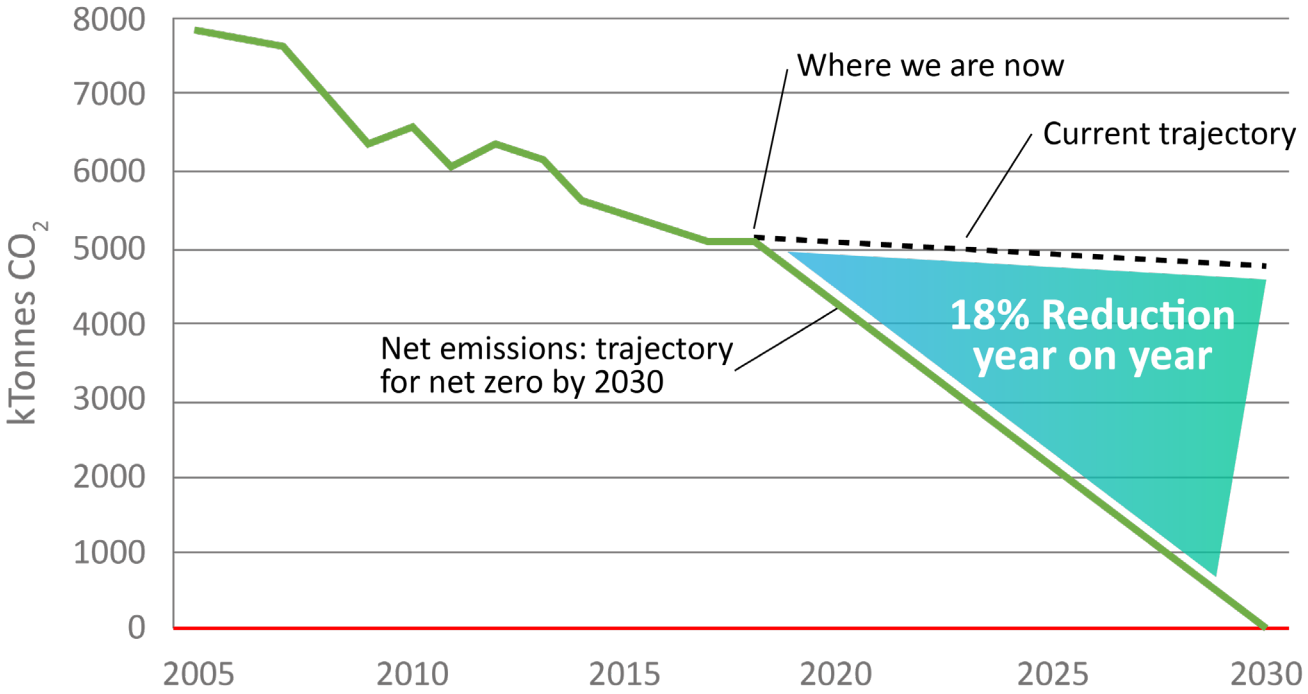
The West of England has set an ambitious goal for tackling climate change

‘In 2030, the West of England is net zero carbon’

5 Challenge Areas to be tackled over this 5 year plan

- Low carbon transport system
- Low carbon business
- Renewable energy
- Low carbon buildings and places
- The green environment

WECA Climate Emergency Action Plan



Approx 90% of all emissions come from fossil fuels!

29% Business
27% Domestic
44% Transport

Approx 4.5 tonnes of CO_2 per capita vs 5.2t UK average

WECA Climate Emergency Action Plan

Low carbon buildings and places

Increase the energy performance of buildings and develop low carbon standards in new developments

GREEN BUSINESS GRANTS

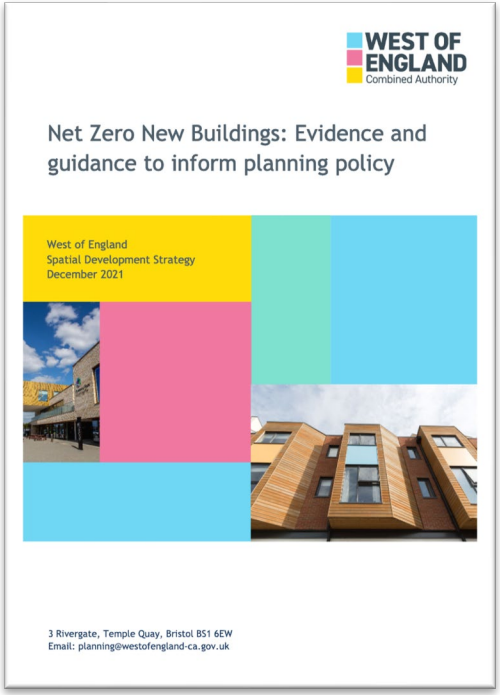
Closes 30th June 2022

Free Carbon survey and Decarbonisation report

The grants of up to **£15,000** pay for 50%-80% of eligible capital costs

Action/Opportunity	Description
Extend and enhance the Green Business Grants [part of the Low Carbon Challenge Fund] to increase the energy efficiency of business units and operations	Green Business Grants help businesses to lower their emissions through investing in new equipment or improving the efficiency of their buildings. It is funded by ERDF until 2022, so a business case will need to be developed to extend and expand this programme.

WECA Climate Emergency Action Plan



Policy Considerations

Modelling	Major developments to go beyond Building Regs compliance modelling
Operational Energy	4 principle approach; No fossil fuels / Heating EUI target / Overall EUI target / Renewable generation
District Heating	Achieve Net Zero EUI before connection to DHN – no exemption due to DHN
Embodied carbon	Embodied Carbon assessment and set target for embodied emissions
Existing Buildings	Set consequential improvements requirements at local level
Offsetting	Reduce emissions before off-setting – Do not use to avoid EUI targets!
Monitoring	Avoid policies that cannot be measured in the real world or rely on new policy

WECA Climate Emergency Action Plan

Table 8 Example summary reporting: non-residential buildings

Operational Carbon assessment		Building Regulations assessment	Operational Energy assessment	Justification where targets is not met
Modelling software			*see accredited list*	
Floor area (GIA m^2)				
Space heating (kWh/m^2)			*should target 15-20 and not exceed 30 kWh/m^2 heating*	*n/a if mandatory*
Space cooling (kWh/m^2)				*n/a if mandatory*
Total energy use (kWh/m^2)			*targets by archetype*	*n/a if mandatory*
Predicted DEC rating				
CO^2 savings	Demand reduction	*Part L linked targets where relevant*		*n/a if mandatory*
	Total			*n/a if mandatory*

Embodied carbon assessment	Upfront carbon [A1-5]	Embodied carbon [A1-5, B1-5, C1-4]	Justification where targets is not met
Emissions ($kgCO^2{}_e/m^2$)	*RICS recognised assessment tool*	*RICS recognised assessment tool*	*n/a if mandatory*
LETI Rating (A++ to G)	*LETI template*	*LETI template*	*n/a if mandatory*

Bristol Climate Strategy

Under a high emissions scenario, by 2080, Bristol could expect to see:

Sea level on Bristol's coastline is projected to increase by up to **+72cm**

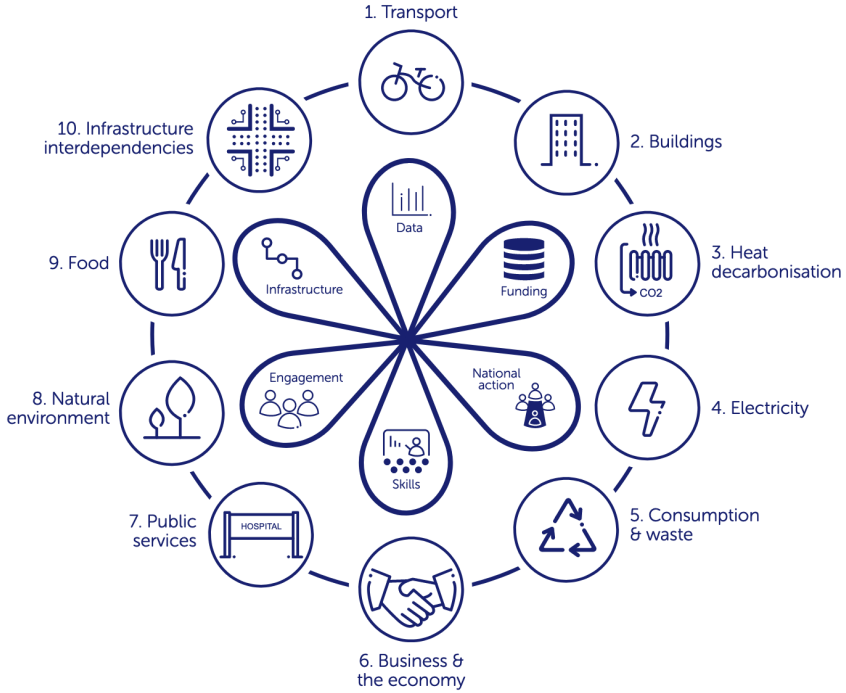
Summer maximum temperature is projected to increase by over **+9°C**

By 2080, summer precipitation rate in Bristol is projected to decrease by up to **68%**

Winter precipitation rate is projected to increase by up to **48%**

Bristol Climate Strategy - NET ZERO BY 2030

This strategy is a call to action.
We call on you, as people who live, work, visit and invest in Bristol, to join with us on this exciting decade of transformation.



Bristol Climate Strategy

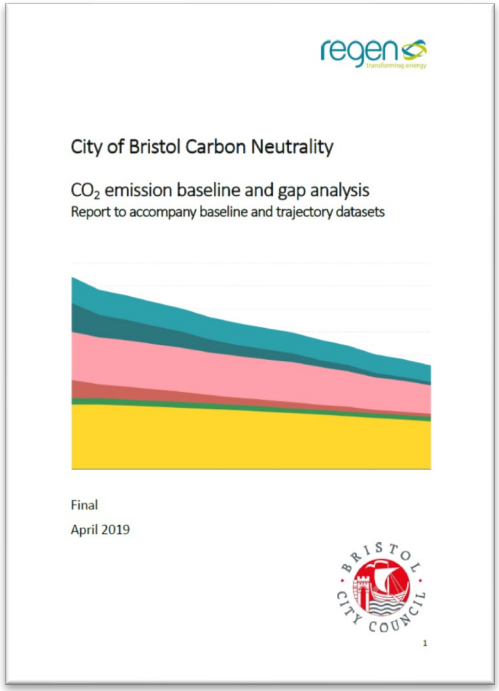
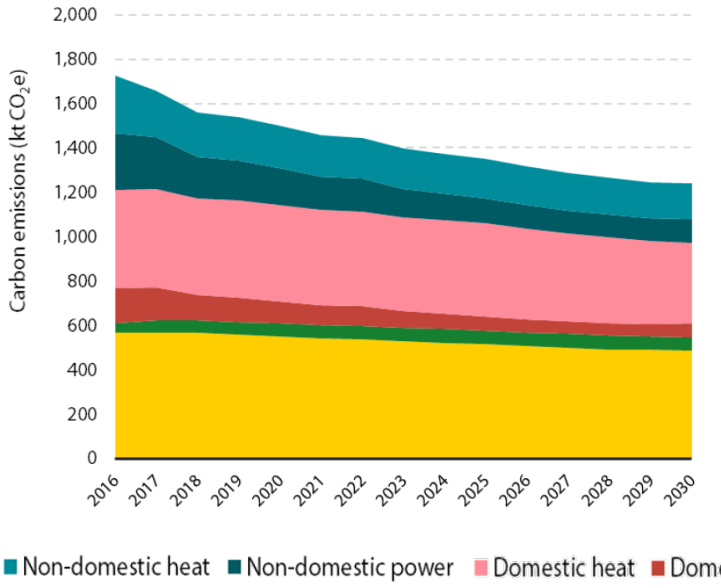


Table 2-1: Summary results and reductions by sector

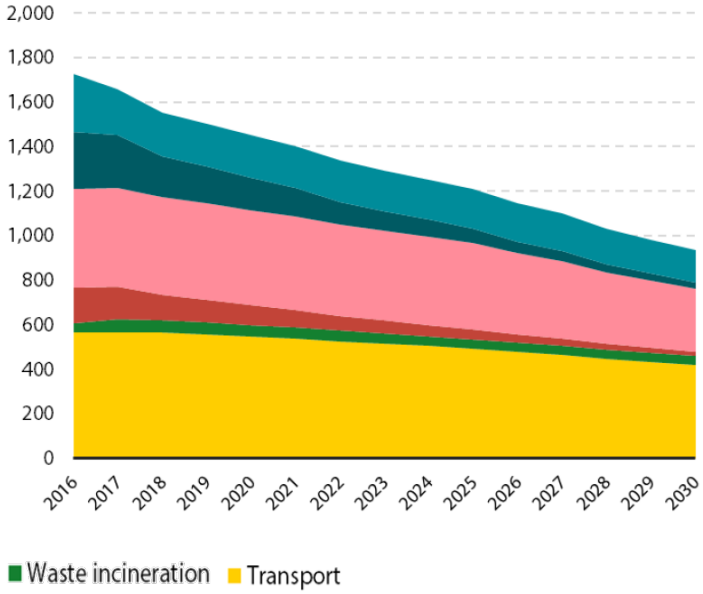
	2016	2030	Reduction	% Reduction
	'Committed' scenario emissions (kt CO_2e)			
Domestic (Total)	603	423	180	30%
Heat	*444*	*362*	*81*	*18%*
Power	*160*	*61*	*98*	*62%*
Non-domestic (Total)	512	270	242	47%
Heat	*259*	*161*	98	38%
Power	*253*	*109*	144	57%
Waste incineration	43	61	- 18	-42%
Transport	566	486	80	14%
Total	1,724	1,241	483	28%
	2016	2030	Reduction	% Reduction
	'Target 2050' scenario emissions (kt CO_2e)			
Domestic (Total)	603	304	299	50%
Heat	*444*	*283*	*161*	*36%*
Power	*160*	*22*	*138*	*86%*
Non-domestic (Total)	512	172	340	66%
Heat	*259*	*147*	*111*	*43%*
Power	*253*	*25*	*229*	*90%*
Waste incineration	43	40	3	6%
Transport	566	419	147	26%
Total	1,724	936	788	46%

Bristol Emissions Pathways

Currently Committed

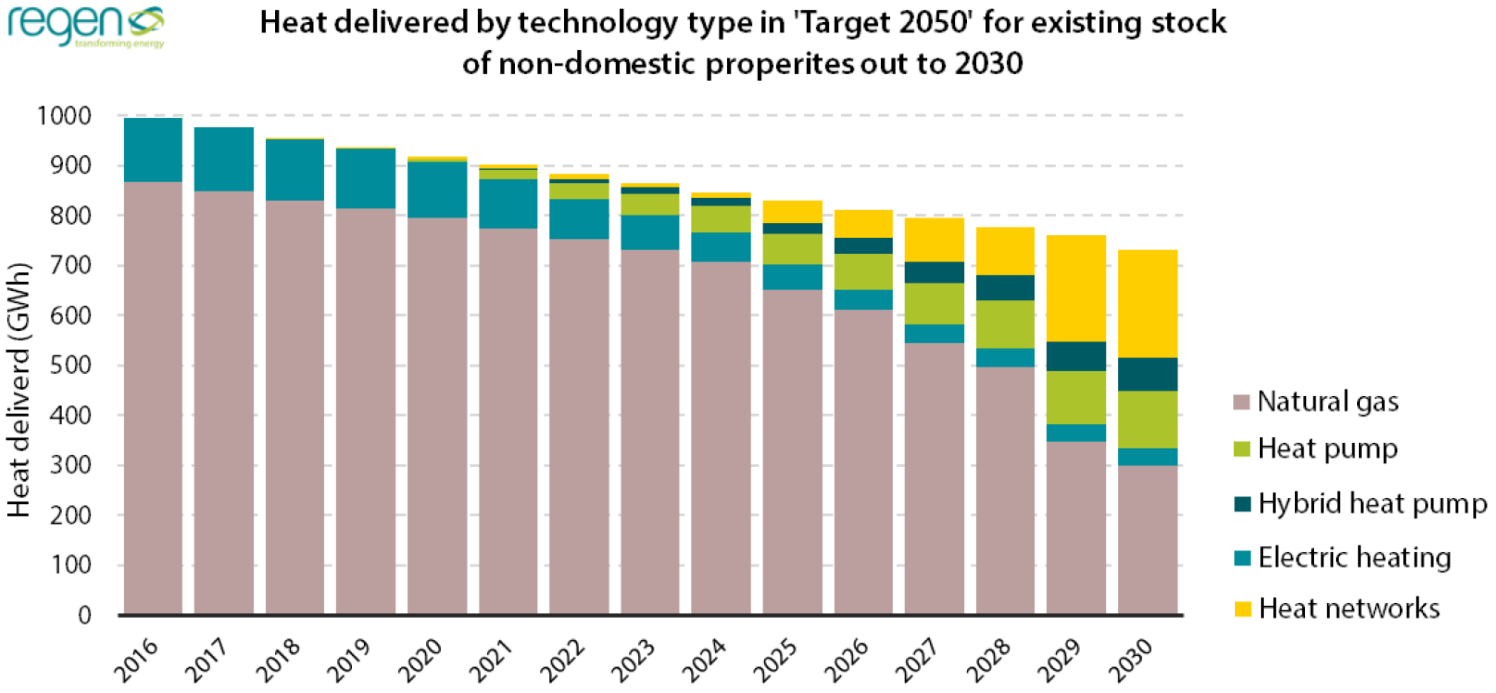


‘Target 2050’ Pathway



Non-domestic heat | Non-domestic power | Domestic heat | Domestic power | Waste incineration | Transport

Bristol Heat Delivery Technologies



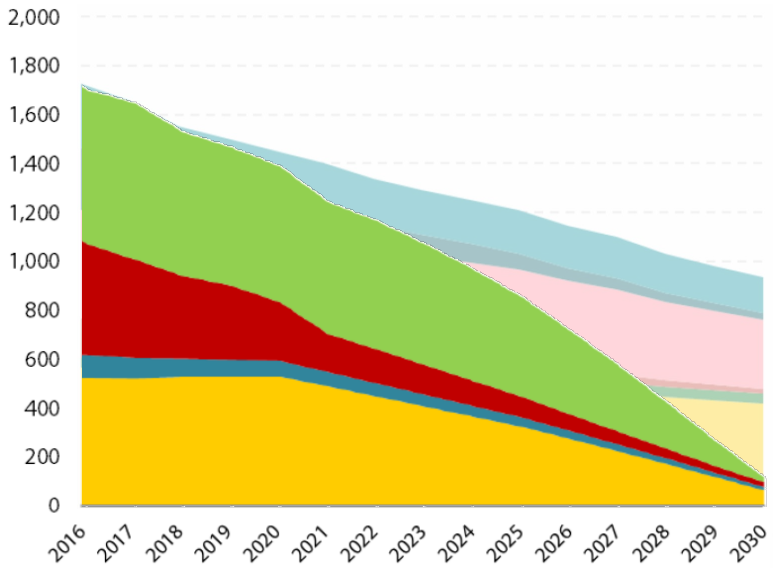
Bristol Emissions Pathways

To achieve net zero carbon by 2030 will require doubling of the already challenging 'Target 2050' outcomes

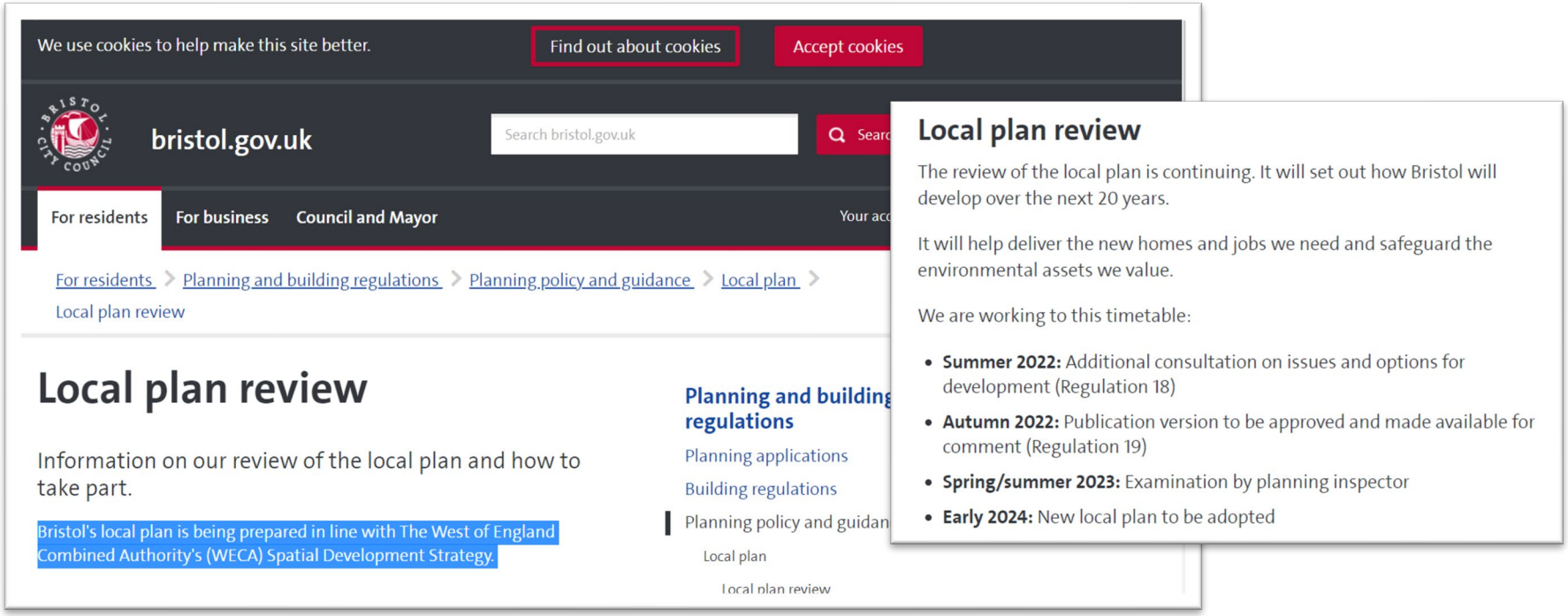
2018-2030 (-93%, -1,400 ktCO$_2$)

- Heat -97%
- Power (not incl EVs or heat) -94%
- Waste -83%
- Transport -88%

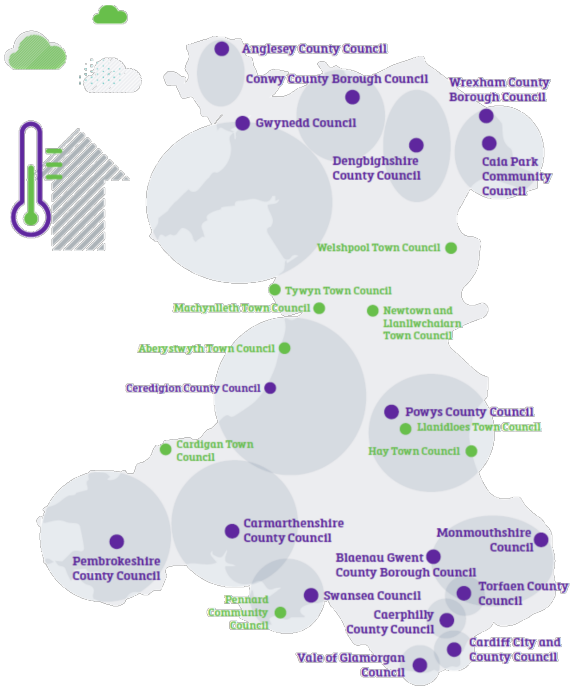
Net Zero Carbon by 2030



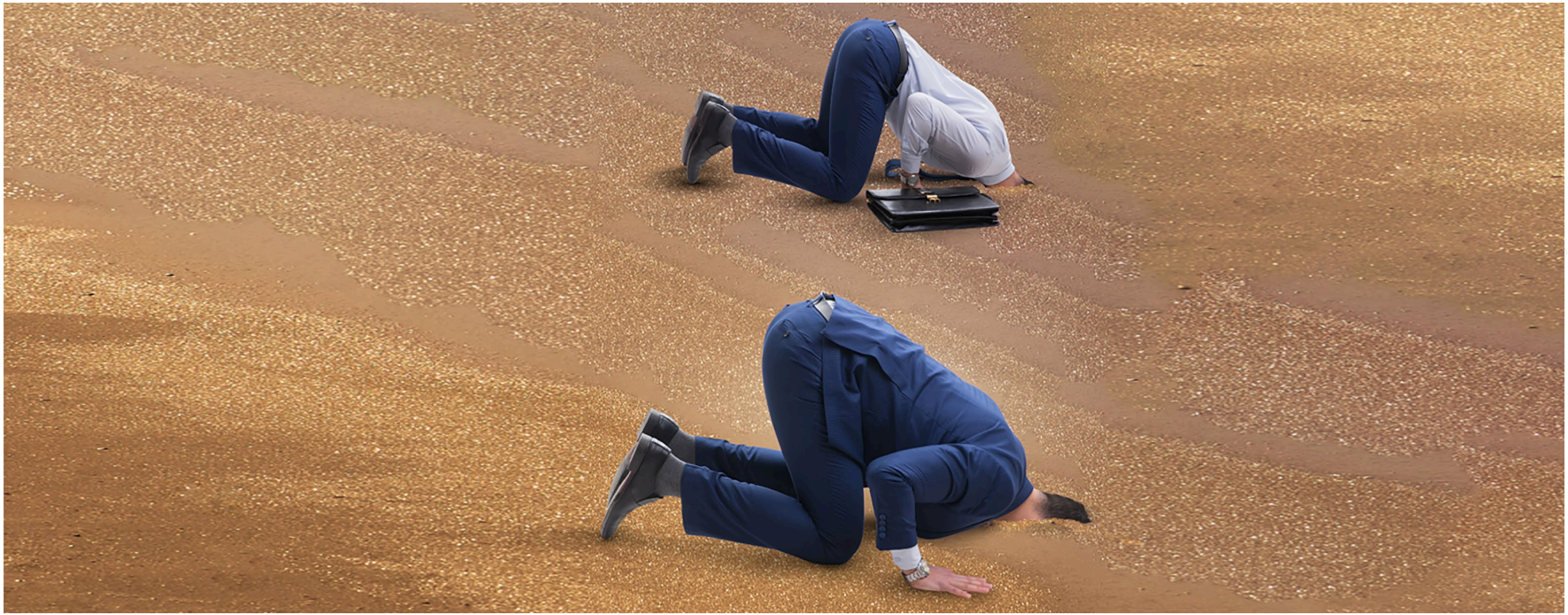
Bristol Local Plan Review



Wales Net Zero



Nowhere to hide!



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Decarbonising Heat

James Chaplen
Senior Product Manager

ON THE ROAD TO NET ZERO

What Could Net Zero Mean For Commercial Heating?

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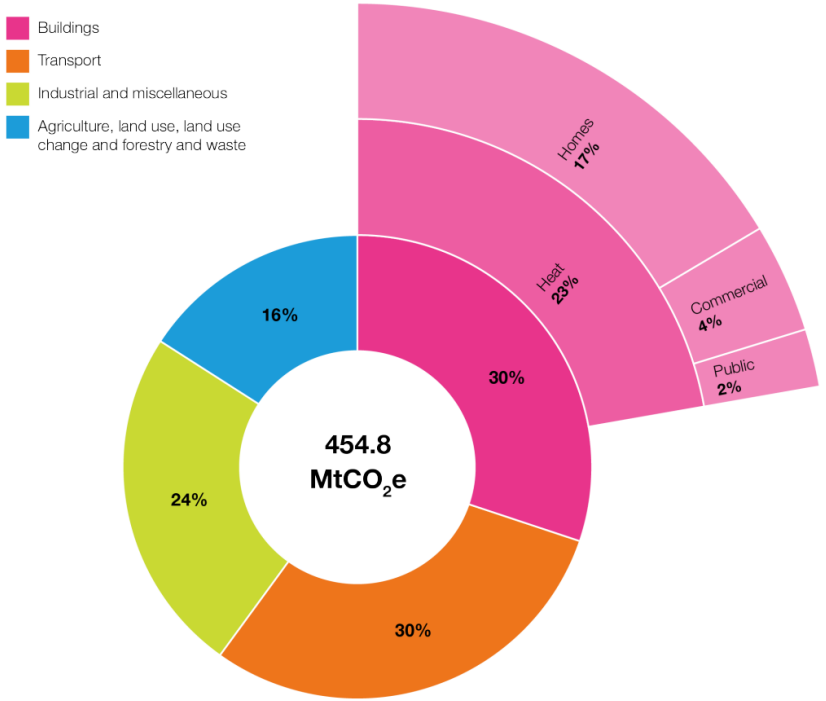
A Significant CO_2 Contributor

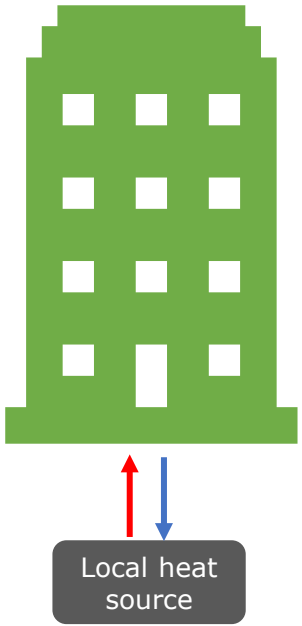
Heating our buildings account for **23%** of all UK emissions.

Significant potential savings can be made with low carbon technologies.



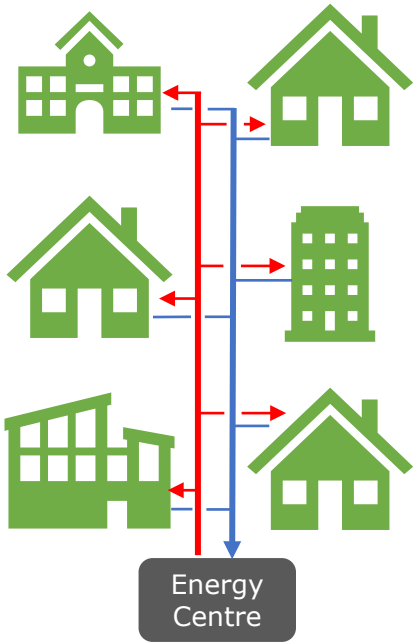
Application Types

Local delivery



- Heat is delivered to a single building using local sources.
- Various types of technologies.

Heat Networks

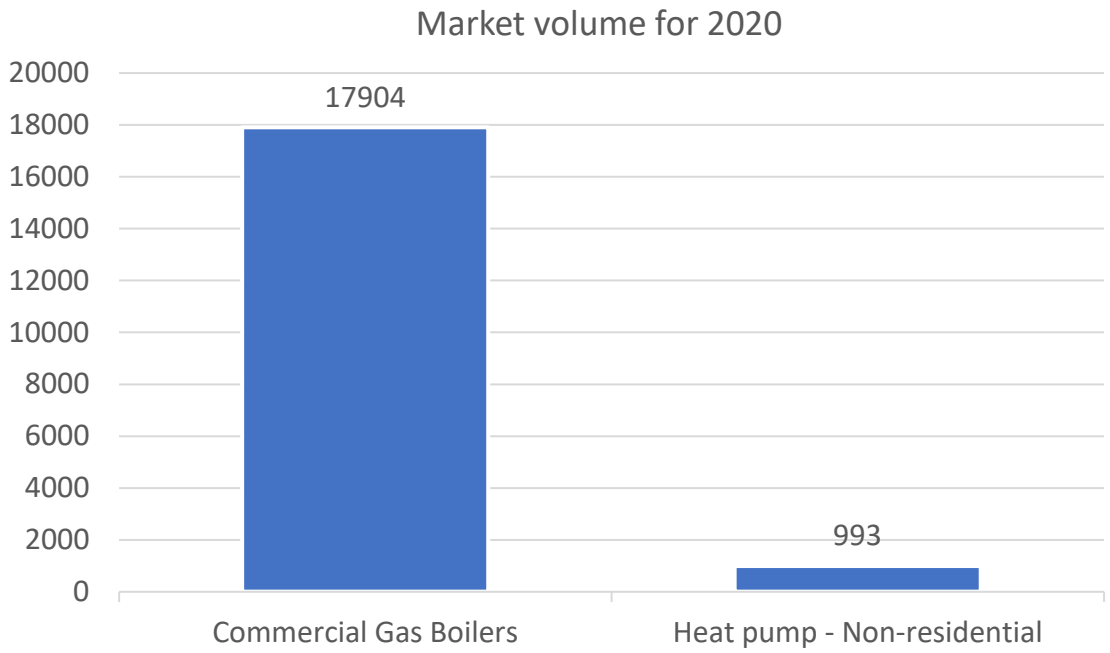


- Heat is delivered to multiple buildings from a single centre.
- Various types and designs depending on temperatures.
- Currently a small part of the market but set to grow.

The Big Drivers Now

- Interim changes to building regs
- Changes to SAP
- Public decarbonisation fund
- Heat network investment fund
- Mounting client awareness

Market Volumes

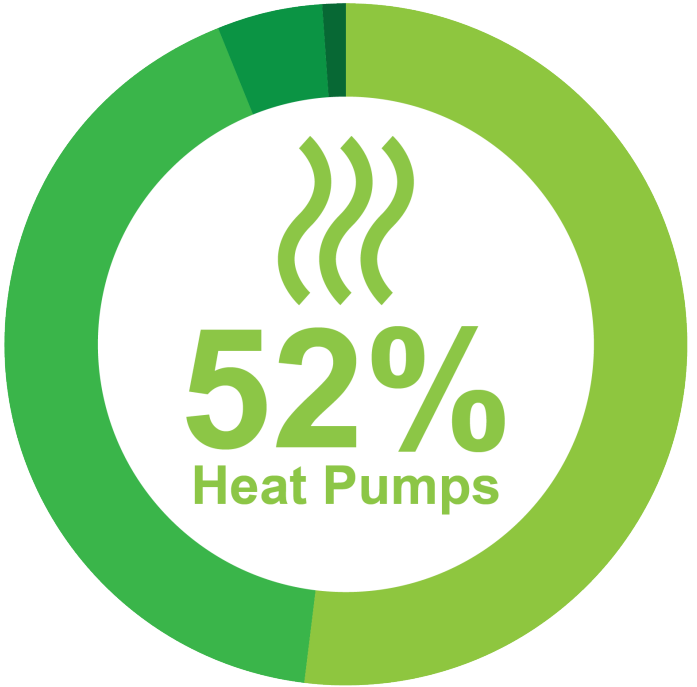


- From 2020 to 21 commercial heat pumps saw a 75% increase to 1747 units.
- Huge change needed to move this market to low carbon technologies.

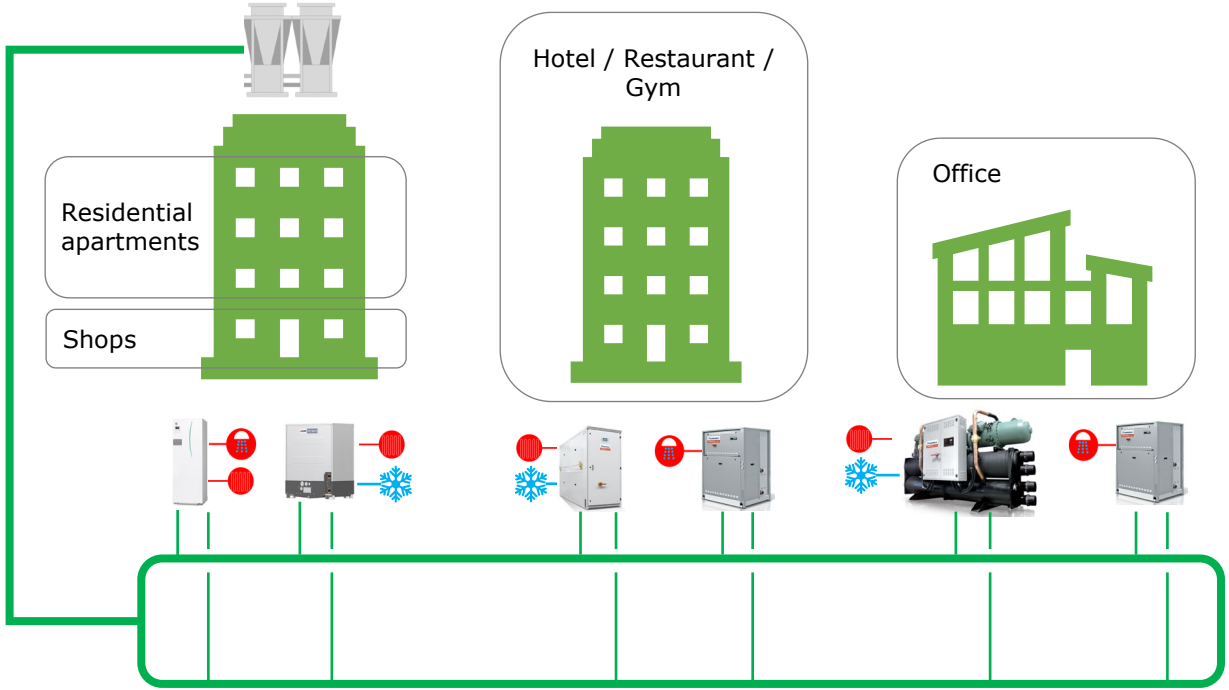
What Could This Market Look Like?

By 2050, the CCC believes that all UK heat demand should be met by low-carbon sources.

- **Heat pumps 52%**
- **District heating 42%**
- **Hydrogen boilers 5%**
- **New direct electric heating 1%**



A Vision For The Future



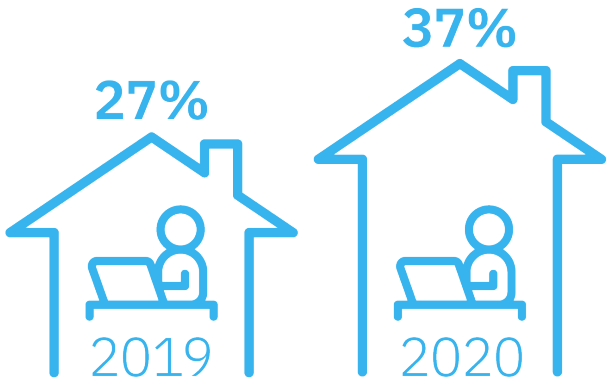
ON THE ROAD TO NET ZERO

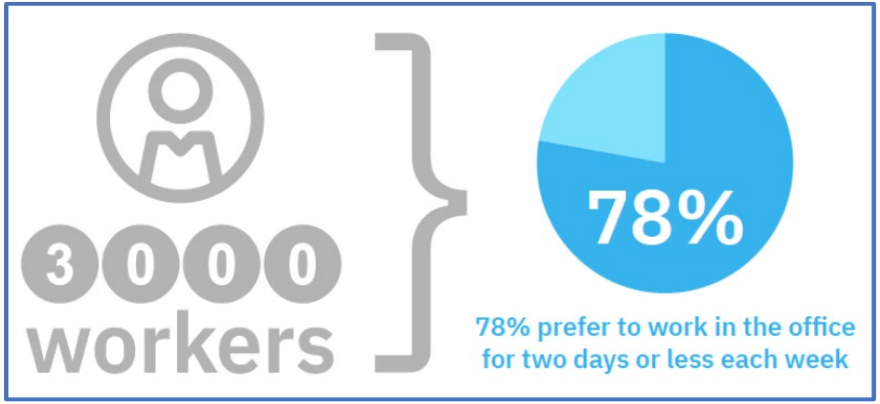
The Future Of Offices

Mark Grayston
Product Strategy
& Delivery Manager

- Work patterns
- Office space
- Building services
- Net Zero Carbon

ON THE ROAD TO NET ZERO





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- **Hybrid** working
- “Hub and Spoke”
- Downsizing
- Net Zero challenges

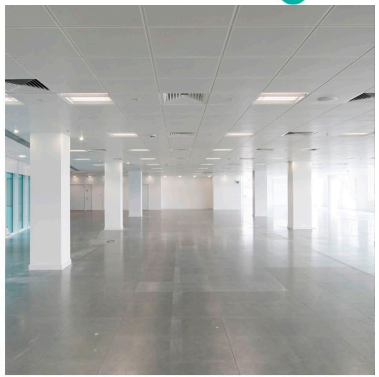
- **Flexible** office space
- Access to **technology**
- Health and wellbeing

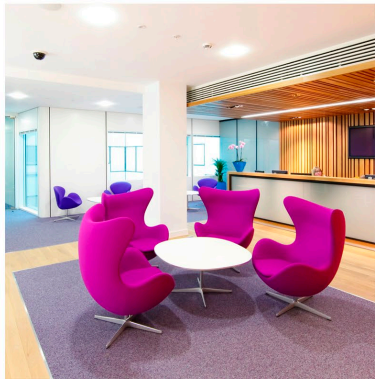
Achieving Net Zero In The Office

- Energy efficiency
- Renewables
- Low carbon
- IES & NABERS

Air Conditioning

- Flexibility
- Future-proof
- Lower GWP refrigerant
- *Hybrid VRF*





Indoor Air Quality

- Ventilation
- Filtration
- Monitoring

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Hot Water

- R744 Heat Pump

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IT Cooling

- More technology
- Business critical

- R32 Close Control

Maximise performance

Remote monitoring

Energy apportioning

Energy usage patterns

- RC with PIR

Residential Solutions

- Energy Efficiency
- Increased Costs

- Air / Water Source HP
- M Series
- MVHR & Filtration

- Achievable **now**
- Future proof
- Challenges
- **Collaboration**

ON THE ROAD TO NET ZERO

Digital Future Of HVAC

Manny Lal
Product Manager,
Controls & Innovations

ON THE ROAD TO NET ZERO

Visibility And Awareness

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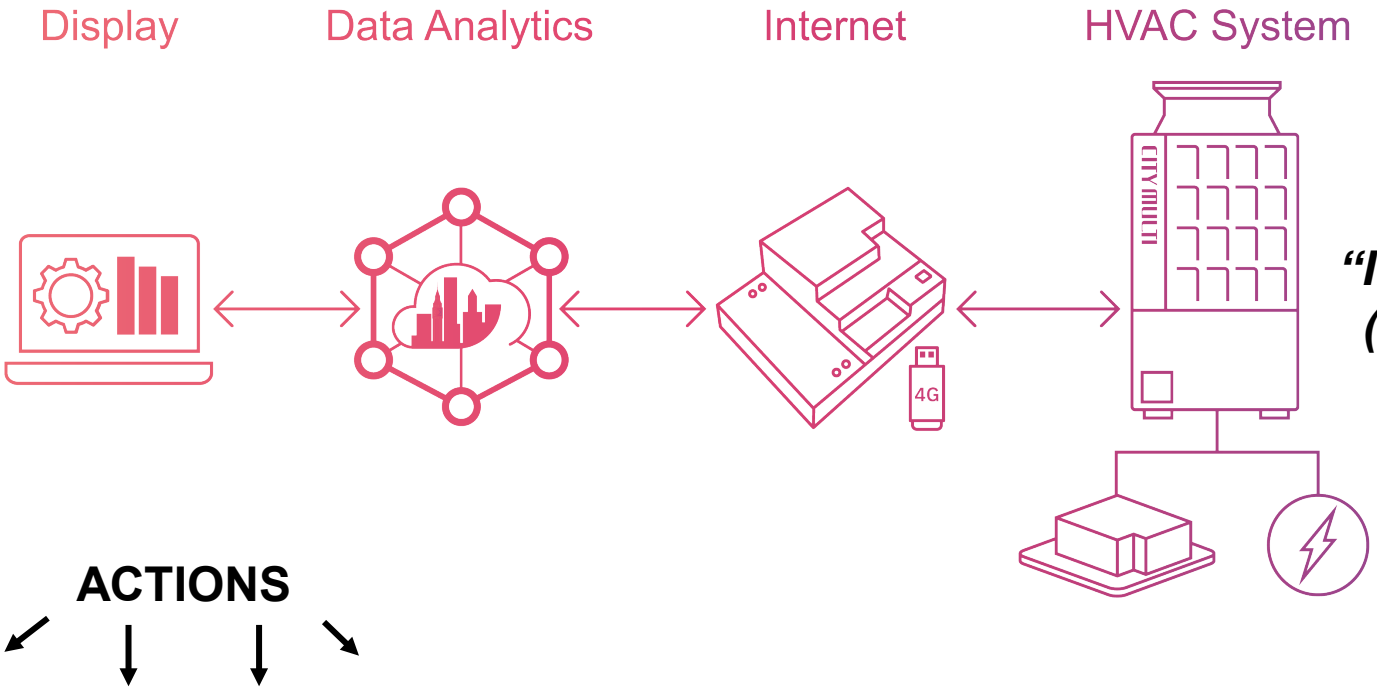
Digital HVAC - What Is It?



"Internet of Things (IoT) movement"

Insight And Knowledge

ON THE ROAD TO NET ZERO

Control + Monitor + Energy + Engineering Assistance*

Analytics + Automated Health Check + Engineering Assistance*

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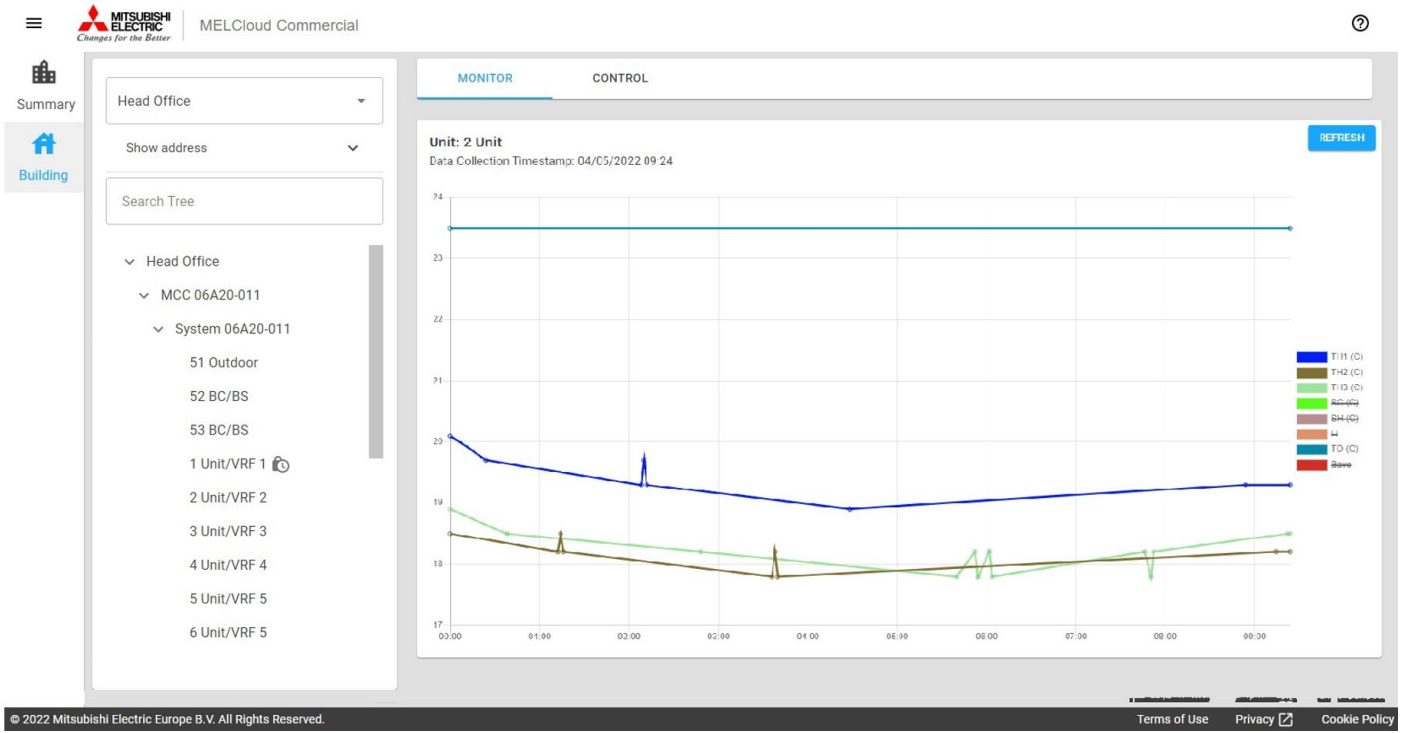
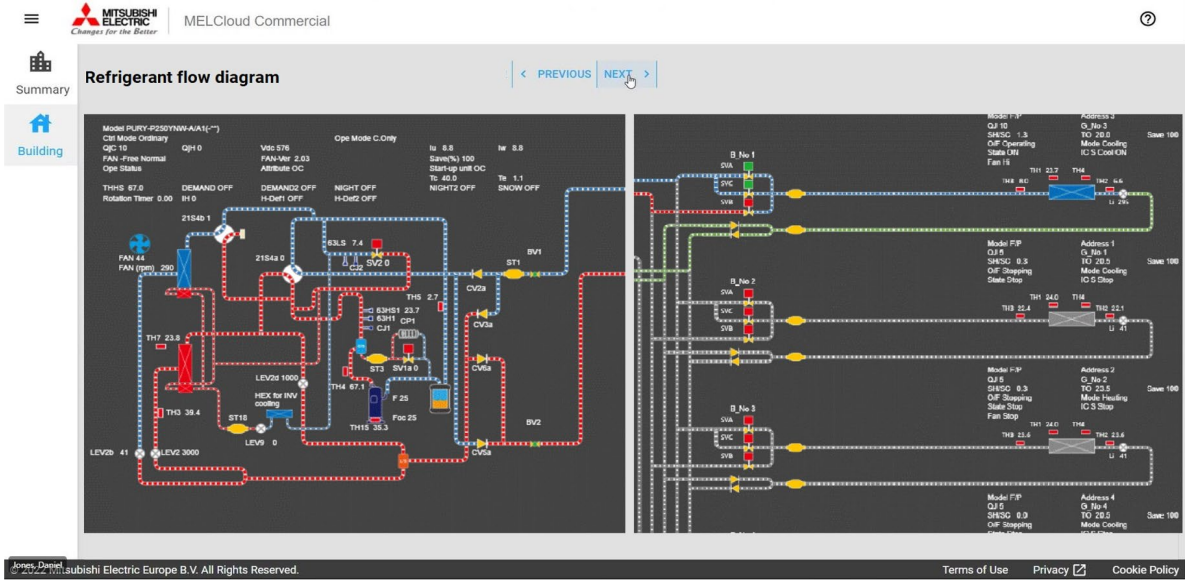
Insight And Knowledge

MELCloud COMMERCIAL

Monitor & Analyse System & Building Data



Avoiding Wasted Energy Through Faults



Improved Service

Engineers can carry out their work more efficiently, accurately and to higher standards

Service history

Overview of operation of a unit and its application within a wider system

Access product information, for parts ordering and replacement

Smart Buildings. Smart Cities.

ON THE ROAD TO NET ZERO

Smarter, Together.

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