MITSUBISHI ELECTRIC

ON THE ROAD TO NET ZERO

ON THE ROAD TO NET ZERO

Welcome

Alex Black
Branch Manager

ON THE ROAD TO NET ZERO

Your Partner On The Road To Net Zero

Phil Ord
Commercial Product
Group Director

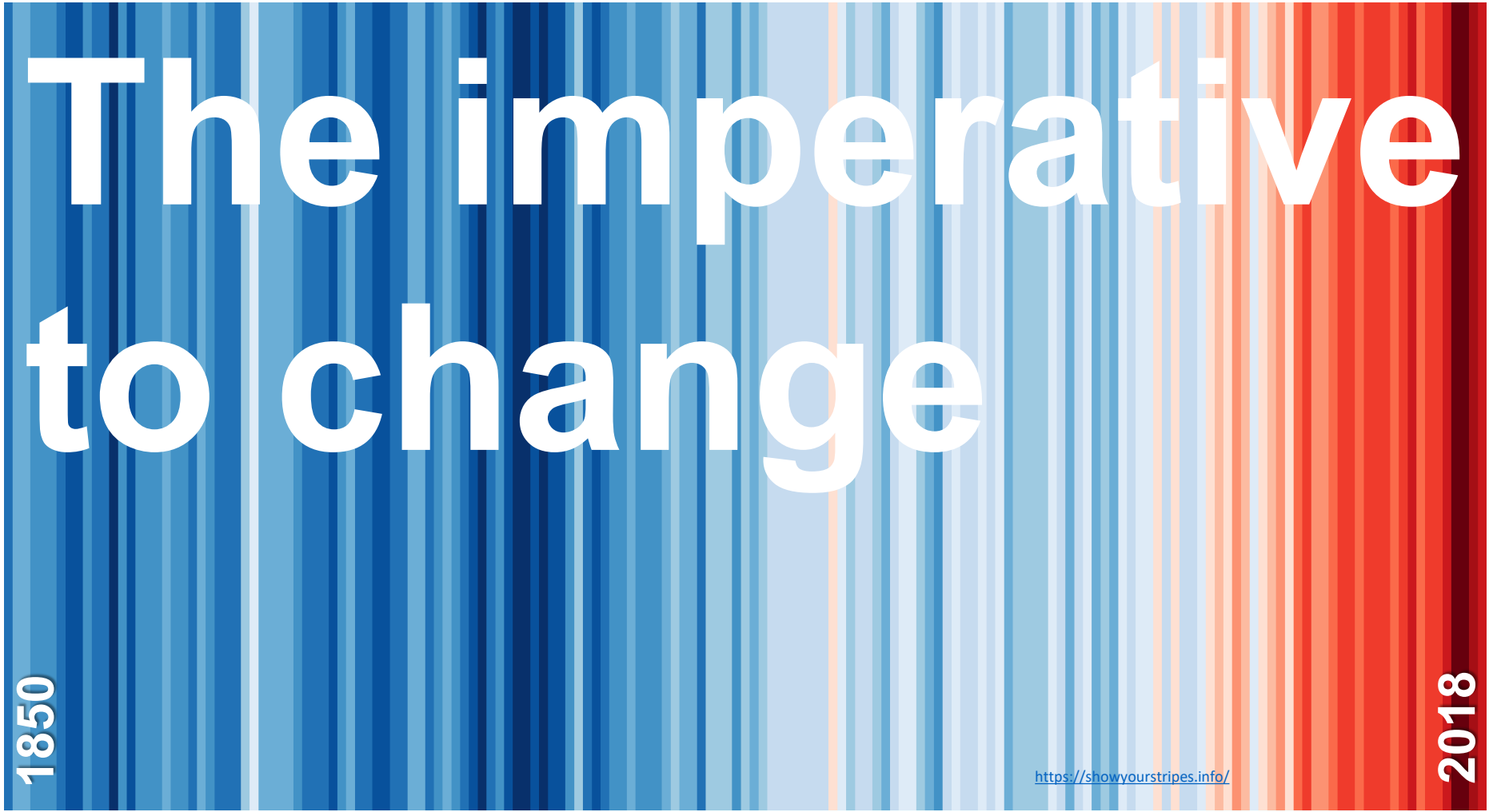
"We, the Mitsubishi Electric Group, have been engaged in manufacturing businesses since 1921. Our Purpose, and indeed our very reason to exist, has been to contribute to the realization of a vibrant and sustainable society through continuous technological innovation and ceaseless creativity."

ON THE ROAD TO NET ZERO

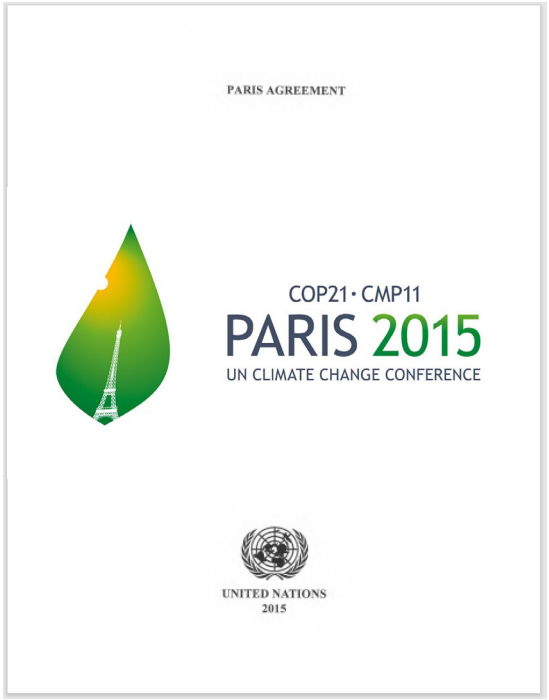
The Imperative To Change

Martin Fahey
Head of Sustainability

The imperative to change



Global



United Nations Framework Convention on Climate Change

UK

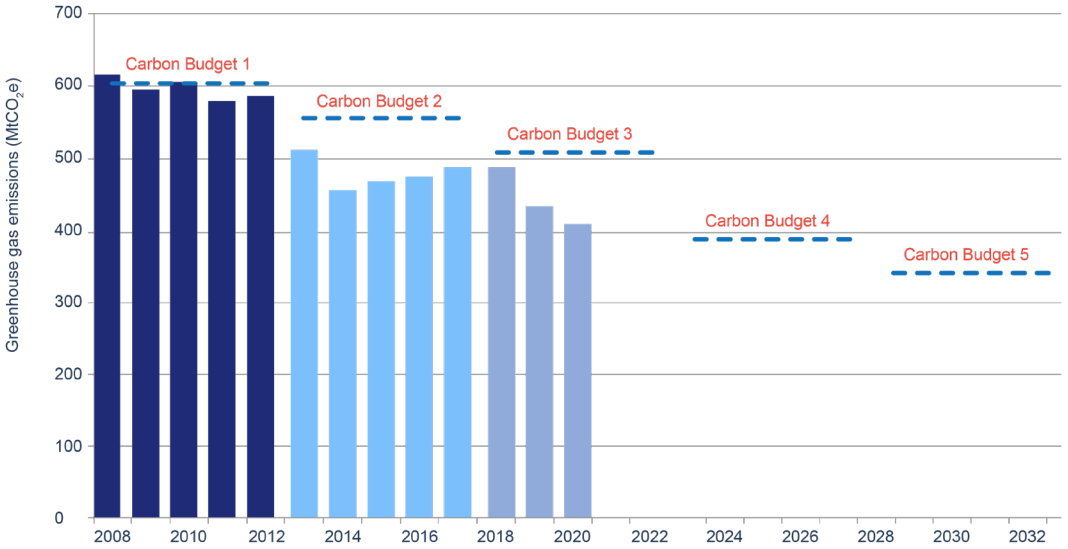
The Paris Agreement - global average temperature increase to well below 2°C, and to pursue efforts to limit the temperature increase to 1.5°C.

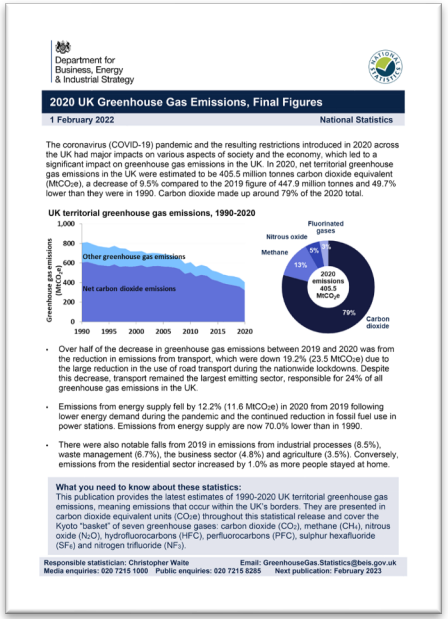
In its NDC (April 2021), the UK is committing to reduce economy-wide greenhouse gas emissions by at least 78% by 2035, compared to 1990 levels.

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

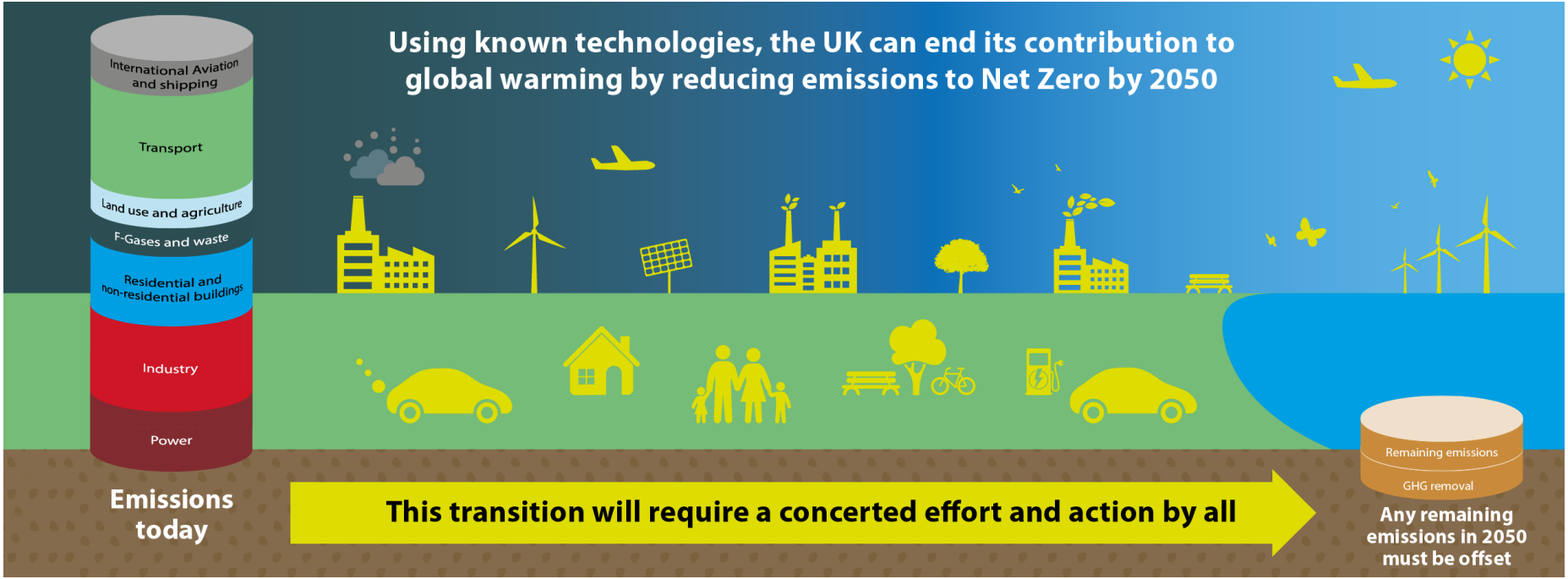
- Over half of the decrease in greenhouse gas emissions between 2019 and 2020 was from the reduction in emissions from transport, which were down 19.2% (23.5 $MtCO_2e$) due to the large reduction in the use of road transport during the nationwide lockdowns. Despite this decrease, transport remained the 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

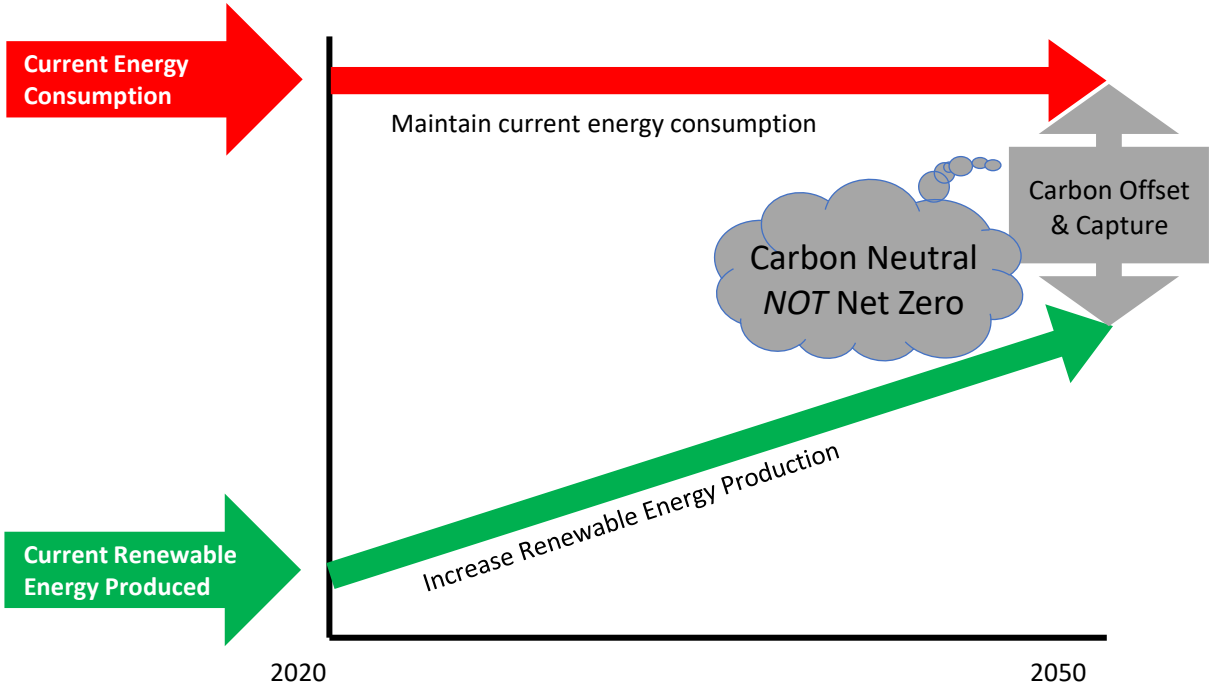
Source; 2020 UK Greenhouse Gas emissions, Final Figures - published February 2022 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachmentdata/file/1051408/2020-final-greenhouse-gas-emissions-statistical-release.pdf

What Is Net Zero?



Source – Climate Change Committee

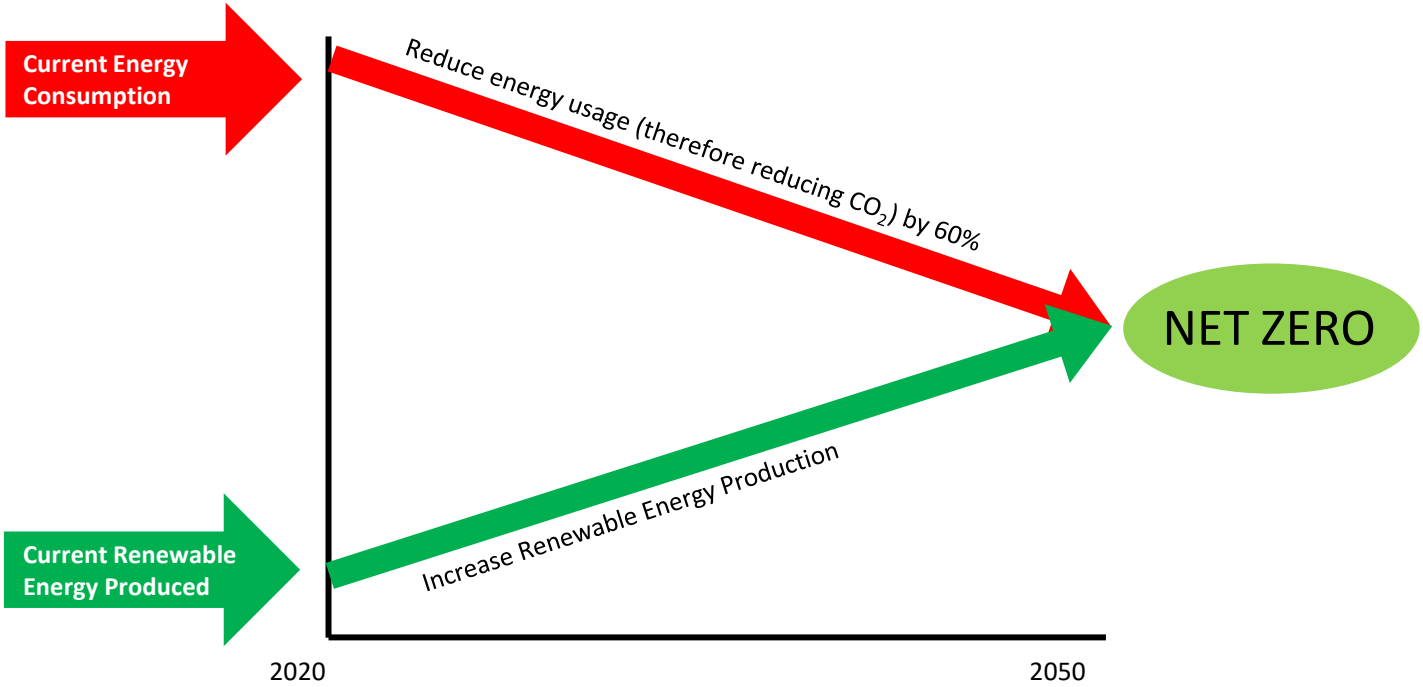
What Is Net Zero?



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

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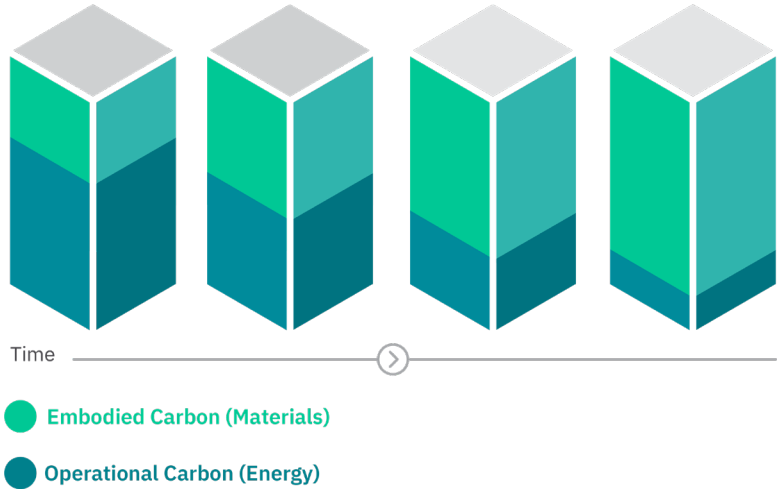
Over time embodied carbon becomes a greater proportion of a building's total lifetime carbon emissions….

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



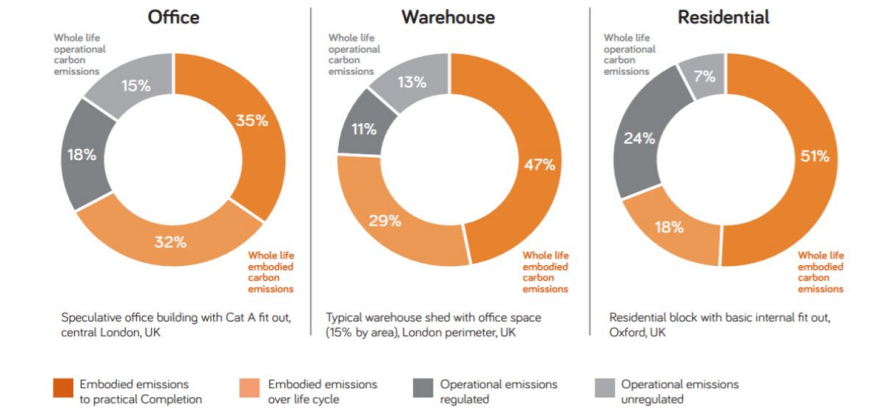


Image credit: from RIBA's *Embodied and whole life carbon assessment for architects*

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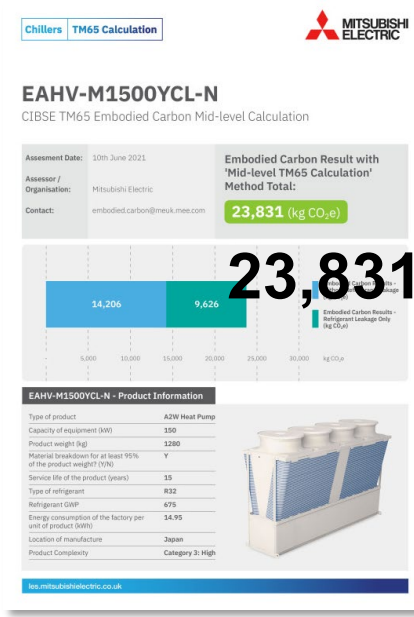
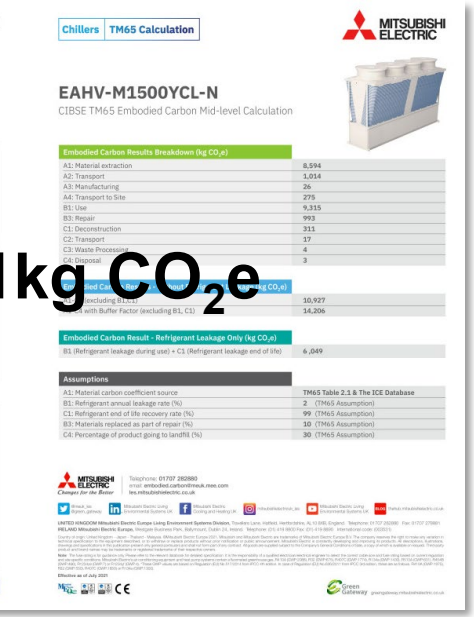
Whole Life Carbon

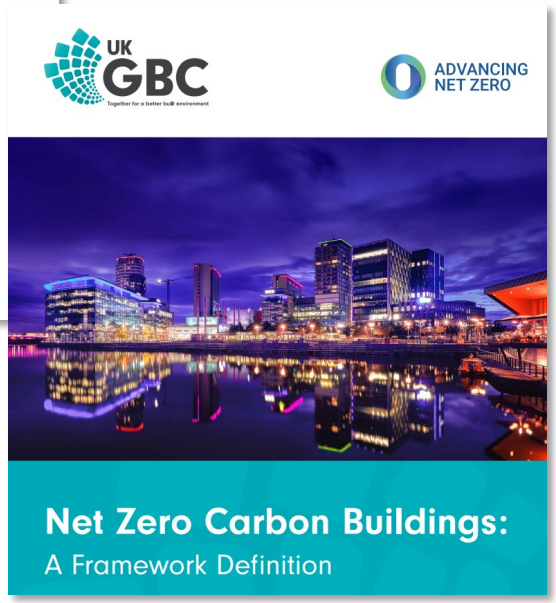
435kg CO_2e

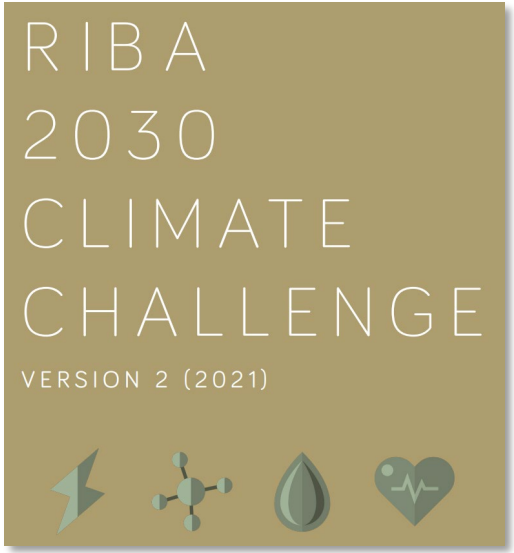


23,831kg CO_2e



Lots Of Guidance





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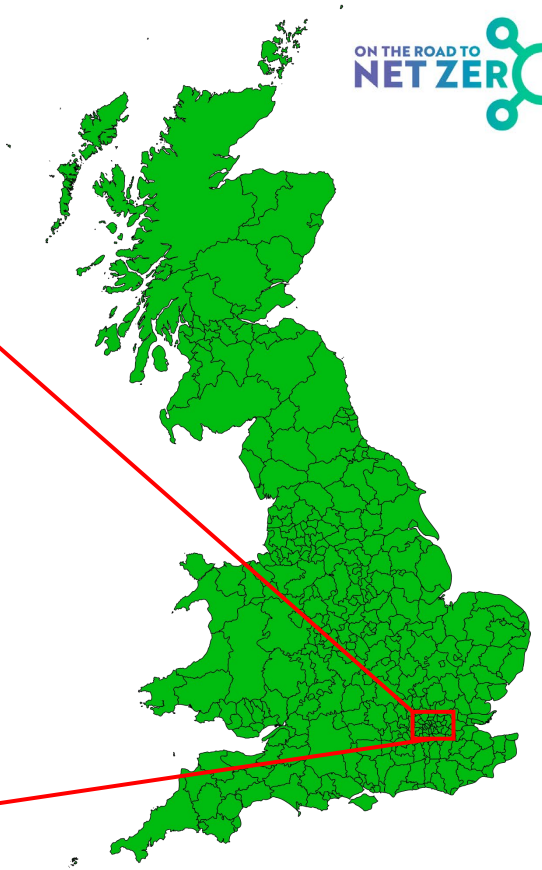
What Does This Mean In Our Region?

Chris Newman
Net Zero Design Manager

Greater London



Local Authority Declarations

Local Authority targets for carbon emission reductions within their own buildings and operations.

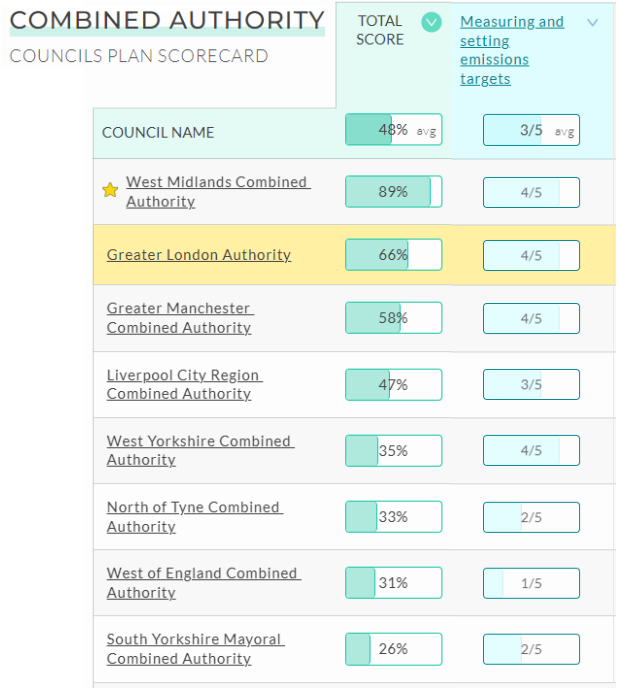
Local Authority Declarations

Local Authority targets for borough wide Net Zero.

Key: net zero or carbon neutral by:

2030
2040
2041
2050
No data

Local Authority Declarations



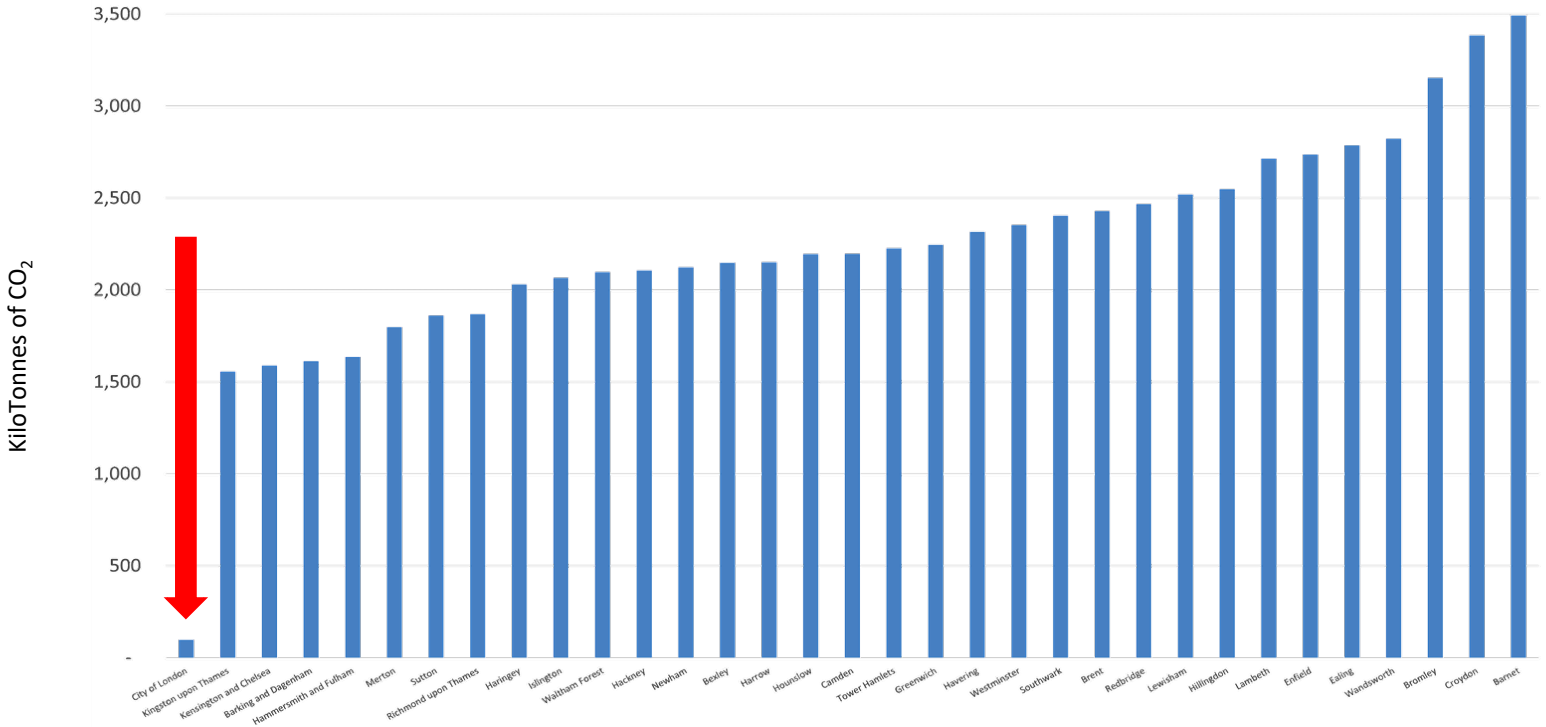
28 of 32 London boroughs have declared Climate emergencies

CLIMATE EMERGENCY UK

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

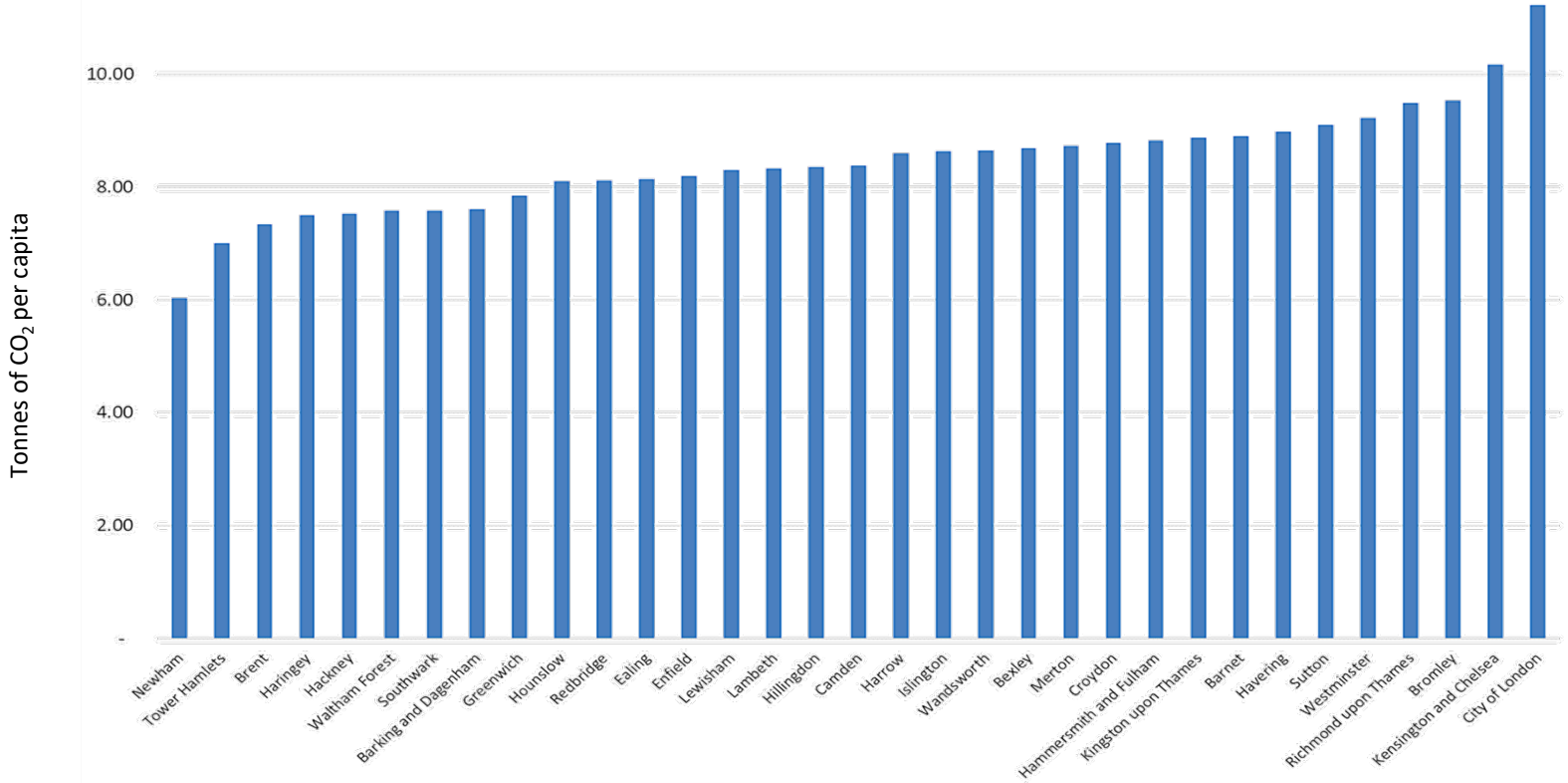
Rank	Name of local authority	Type of local authority	Score
1	Somerset West and Taunton Council	Non-metropolitan district	0.91
2	West Midlands Combined Authority	Combined authority	0.89
3	Manchester City Council	Metropolitan district	0.87
4	Staffordshire Moorlands District Council	Non-metropolitan district	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
12	London Borough of Southwark	London borough	0.79
15	London Borough of Lewisham	London borough	0.78
16	London Borough of Richmond upon Thames	London borough	0.78
23	London Borough of Brent	London borough	0.74
24	London Borough of Ealing	London borough	0.73
38	London Borough of Haringey	London borough	0.69
47	London Borough of Hounslow	London borough	0.65
60	Royal Borough of Greenwich	London borough	0.63
66	London Borough of Camden	London borough	0.62
67	London Borough of Harrow	London borough	0.62
68	London Borough of Islington	London borough	0.62
74	London Borough of Croydon	London borough	0.61
75	Royal Borough of Kensington and Chelsea	London borough	0.61
84	London Borough of Wandsworth	London borough	0.59
98	City of Westminster	London borough	0.57
110	London Borough of Bromley	London borough	0.55
115	Royal Borough of Kingston upon Thames	London borough	0.54
122	London Borough of Merton	London borough	0.53
123	London Borough of Redbridge	London borough	0.53
136	London Borough of Newham	London borough	0.51
159	London Borough of Sutton	London borough	0.47
167	London Borough of Enfield	London borough	0.46
188	London Borough of Hillingdon	London borough	0.42
223	London Borough of Lambeth	London borough	0.36
226	City of London Corporation	City corporation	0.35
234	London Borough of Barking and Dagenham	London borough	0.34
235	London Borough of Tower Hamlets	London borough	0.34
368	London Borough of Barnet	London borough	0
369	London Borough of Bexley	London borough	0
370	London Borough of Hackney	London borough	0
371	London Borough of Havering	London borough	0
372	London Borough of Waltham Forest	London borough	0

Emissions Data (Total)



Data from University of Leeds

Emissions Data (per Capita)



Climate Action Plans (CAP)

As of January 2022, 27 boroughs and the City of London have published **Climate Action Plans**.

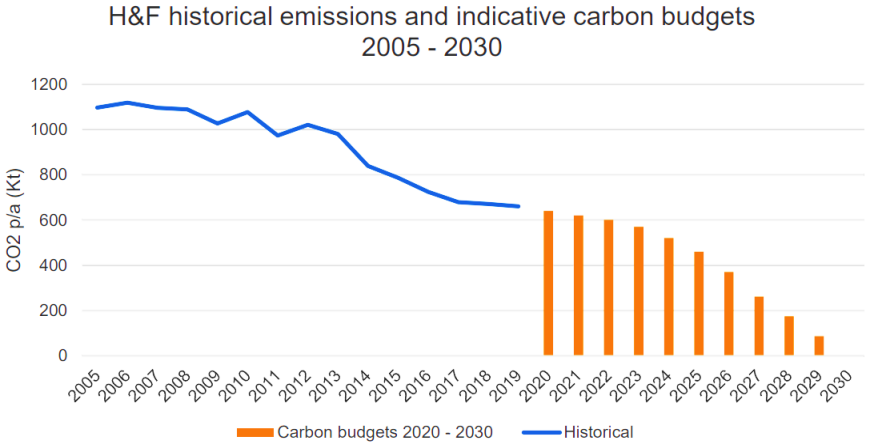
22 boroughs have fully published Climate Action Plans and 6 boroughs have published drafts (5 boroughs have Plans in development).

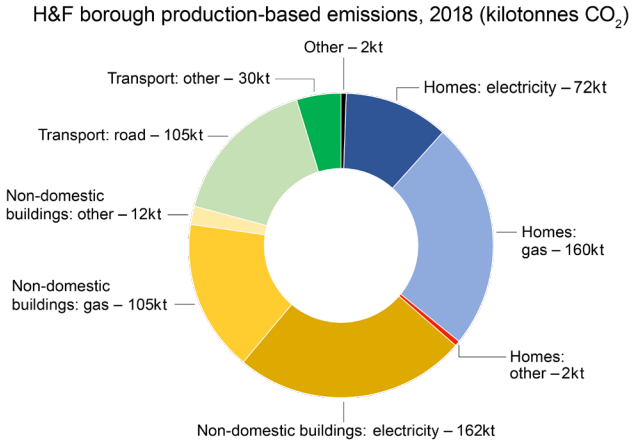
Meaning that all boroughs have already published or intend to publish a Plan.

Hammersmith & Fulham CAP

The borough's non-domestic buildings include 12,000 businesses, 60 schools, 2 main hospitals, 3 football stadiums, 1 prison and a large variety of retail, leisure and entertainment venues.

Together, these account for 43% of the borough's emissions





36% Homes
43% Buildings
21% Transport

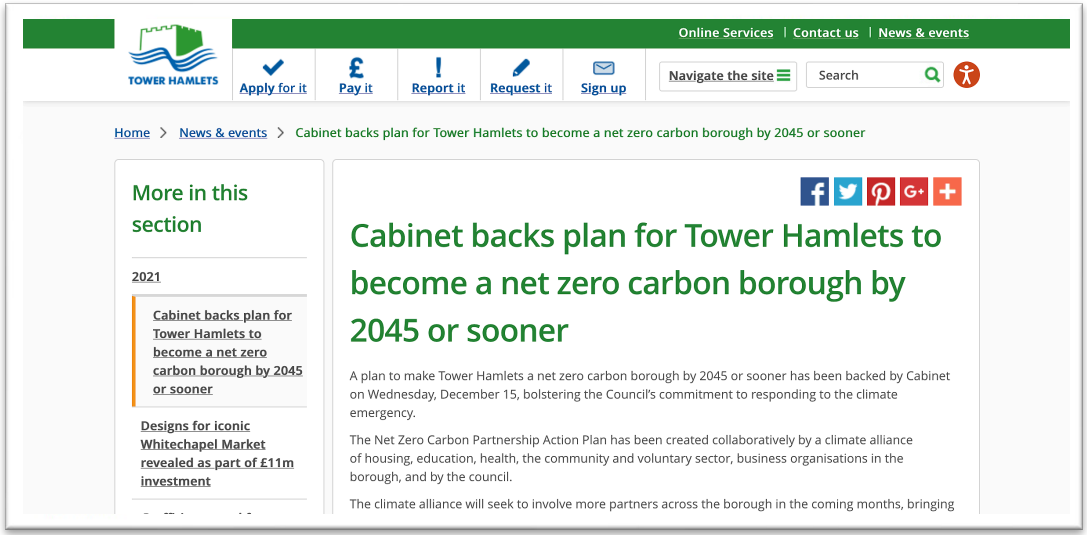
Hammersmith & Fulham CAP

Homes, buildings and energy: **2030 Vision**	
All residents in the borough live in comfortable, affordably heated and well-adapted homes that are cost efficient and have zero carbon impact. All business and organisational buildings are powered sustainably, cost efficient and have zero carbon impact. Our heat and power is supplied by renewable energy and, where possible, by local sources that efficiently meet demand.	
Theme	**Objectives**
Homes	Council housing: Put in place and implement whole house retrofit plans for all council homes to achieve net zero, that include adaptation measures.
	Private housing: Promote and support all owner-occupiers, landlords and renters to retrofit their homes to net zero
Organisations	Council assets: Put in place and implement retrofit plans to achieve net zero, that include adaptation measures for all council buildings
	Existing private buildings: Promote and support commercial landlords, tenants and third sector organisations to increase the energy efficiency of their buildings and install low carbon heating
Planning	Planning: Adopt the highest possible climate standards, and integrate these into planning frameworks, to achieve net-zero developments that secure necessary infrastructure, are well-adapted for a changing climate, and result in a net increase in biodiversity.
Energy	Energy management: Reduce total and peak energy demand in the borough
	Energy supply: Increase the borough's renewable energy use and generation

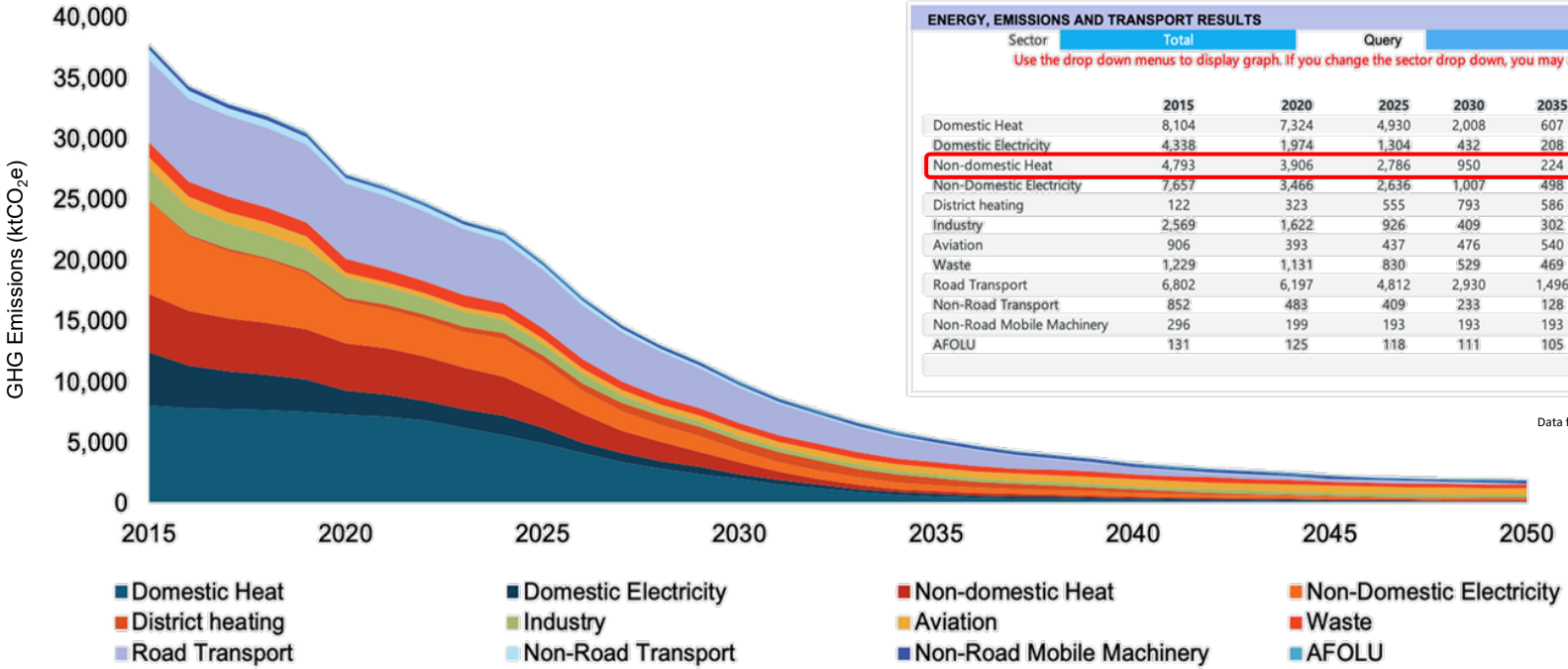
- Decarbonising the borough is projected to require investment in excess of **£2 billion**
- The net cost to the council to decarbonise the organisation is estimated to be **£248m**
- New building in the borough should be to a **zero-carbon standard**, with embedded emissions from their materials and construction minimised and energy use minimised

Tower Hamlets CAP?

“The council has also committed to becoming a net zero carbon council by 2025, which means doing everything we can to improve energy efficiency of buildings, ensuring the council is powered by 100 per cent renewable energy, converting street lighting to efficient LED lights, planting more trees in our streets and in our beautiful parks.”



Emissions Pathway



ENERGY, EMISSIONS AND TRANSPORT RESULTS

Sector: Total | Query: Carbon Emissions

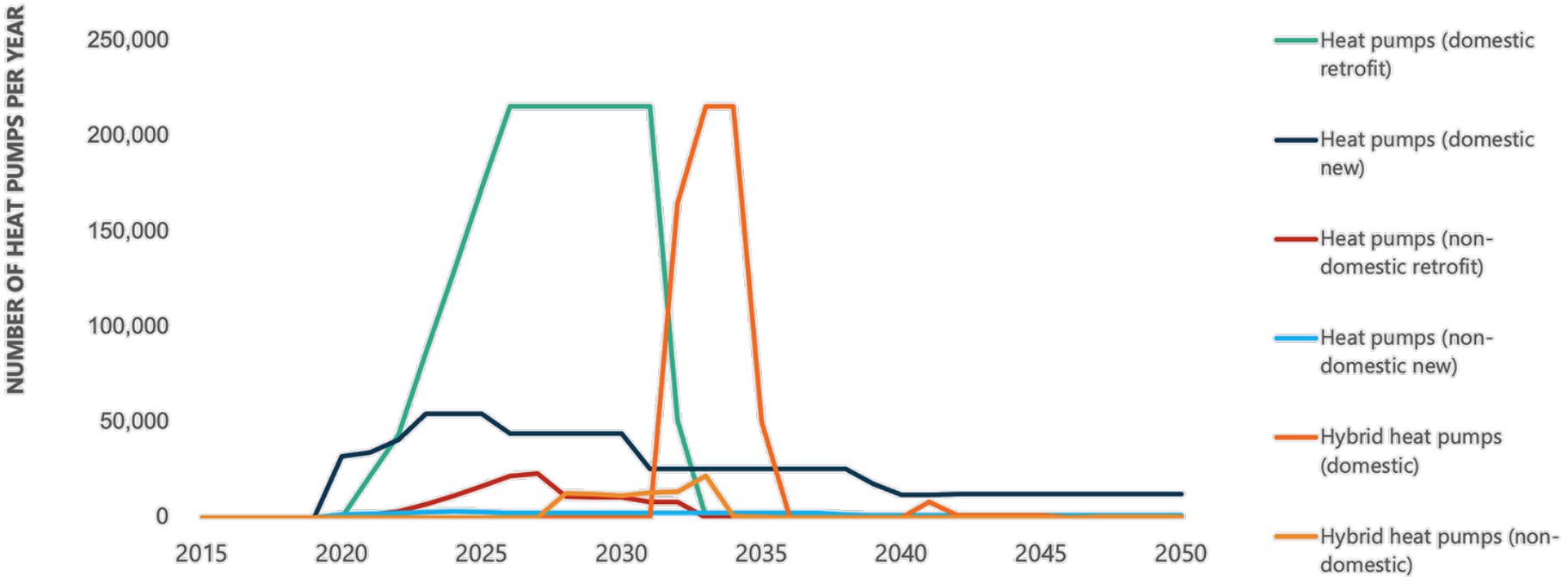
Use the drop down menus to display graph. If you change the sector drop down, you may also need to change the query.

	2015	2020	2025	2030	2035	2040	2045	2050
Domestic Heat	8,104	7,324	4,930	2,008	607	335	213	187
Domestic Electricity	4,338	1,974	1,304	432	208	125	74	52
Non-domestic Heat	4,793	3,906	2,786	950	224	155	80	74
Non-Domestic Electricity	7,657	3,466	2,636	1,007	498	314	197	146
District heating	122	323	555	793	586	265	70	38
Industry	2,569	1,622	926	409	302	261	251	247
Aviation	906	393	437	476	540	588	600	546
Waste	1,229	1,131	830	529	469	410	351	292
Road Transport	6,802	6,197	4,812	2,930	1,496	562	183	75
Non-Road Transport	852	483	409	233	128	59	37	25
Non-Road Mobile Machinery	296	199	193	193	193	193	193	193
AFOLU	131	125	118	111	105	100	96	91

Data from London Zero Carbon Pathways Tool

Heat Pump Installations

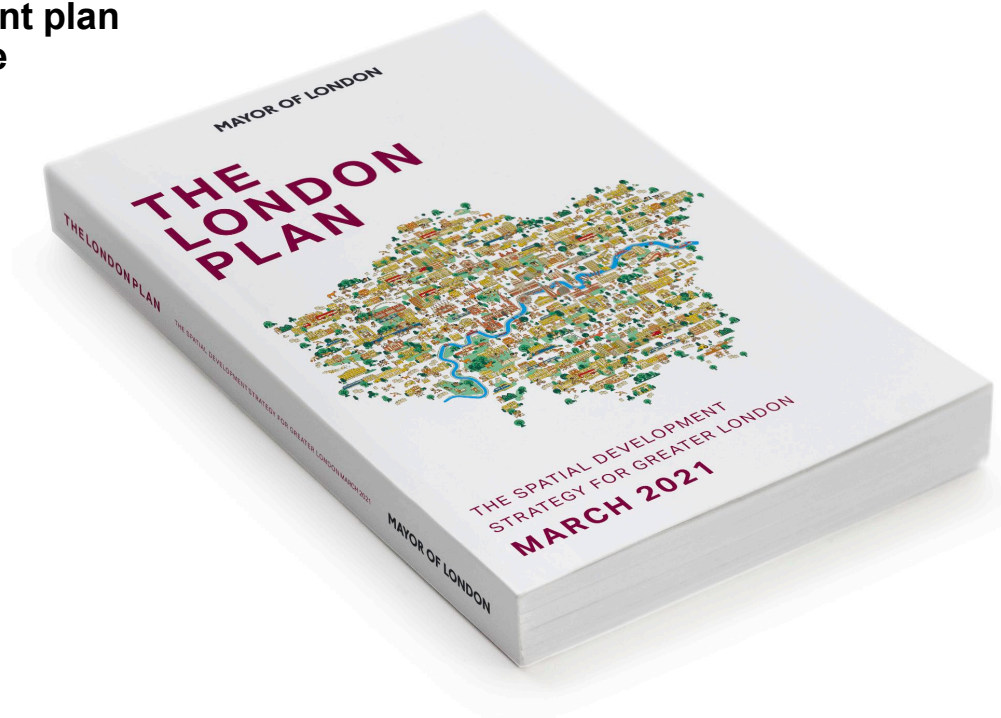
Data from London Zero Carbon Pathways Tool



The London Plan

The Plan is part of the statutory development plan for London, meaning that the policies in the Plan should inform decisions on planning applications across the capital.

Borough's Local Plans must be in 'general conformity' with the London Plan, ensuring that the planning system for London operates in a joined-up way and reflects the overall strategy for how London can develop sustainably, which the London Plan sets out.



Net Zero - Major Developments

Policy SI 2 Minimising greenhouse gas emissions

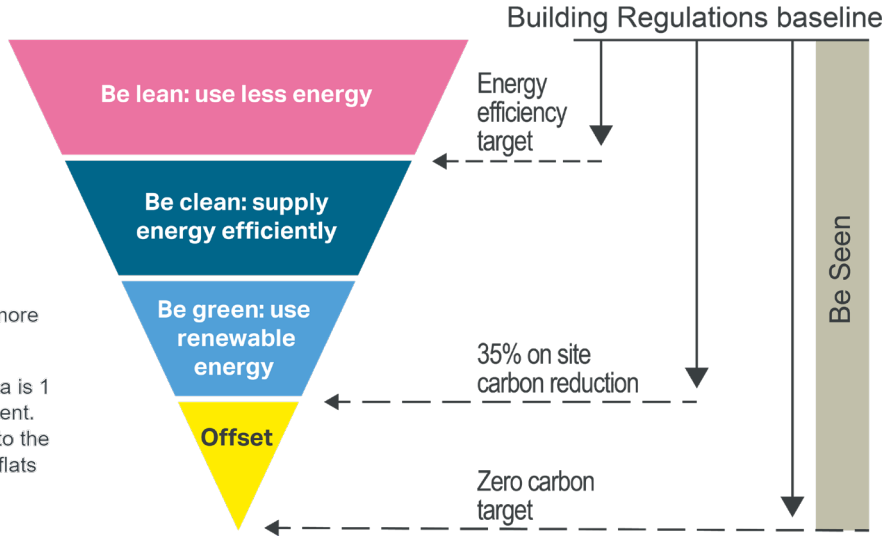
Major development should be net zero-carbon. This means reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand in accordance with the following energy hierarchy:

Major development (applications decided by the London Boroughs)

Major Developments are defined as these:

- For dwellings: where 10 or more are to be constructed (or if number not given, area is more than 0.5 hectares).
- For all other uses: where the floor space will be 1000 sq metres or more (or the site area is 1 hectare or more). The site area is that directly involved in some aspect of the development. Floor space is defined as the sum of floor area within the building measured externally to the external wall faces at each level. Basement car parks, rooftop plant rooms, caretakers' flats etc. should be included in the floor space figure.

Figure 9.2 - The energy hierarchy and associated targets



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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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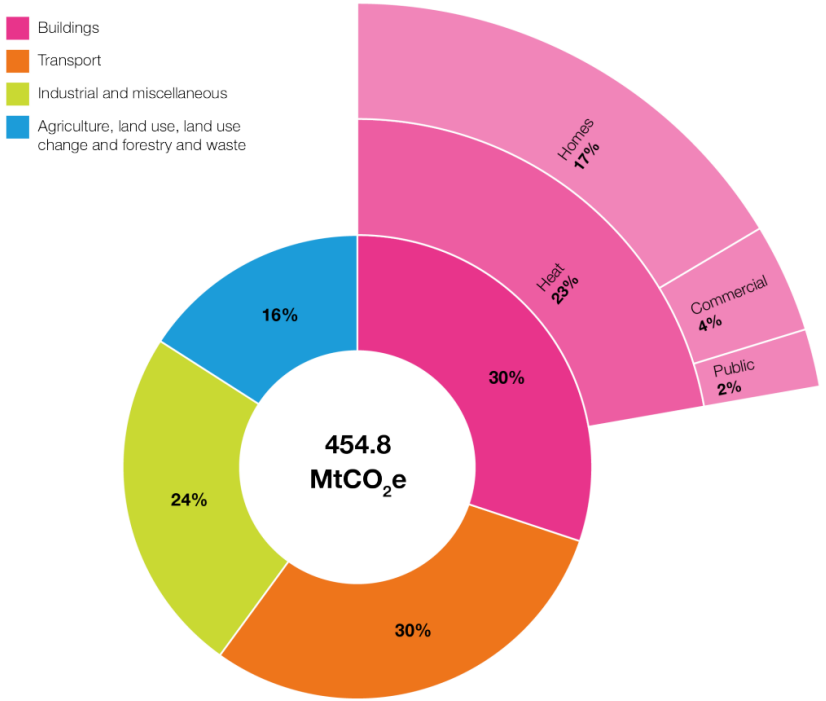
A Significant CO_2 Contributor

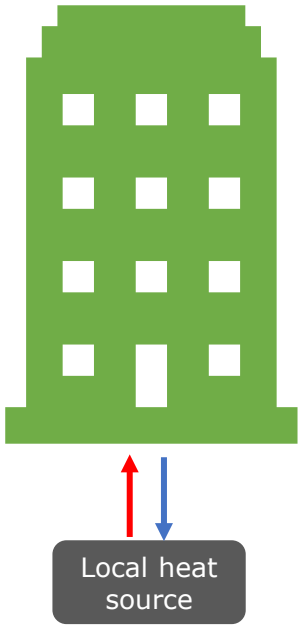
Heating our buildings account for **23%** of all UK emissions.

Significant potential savings can be made with low carbon technologies.



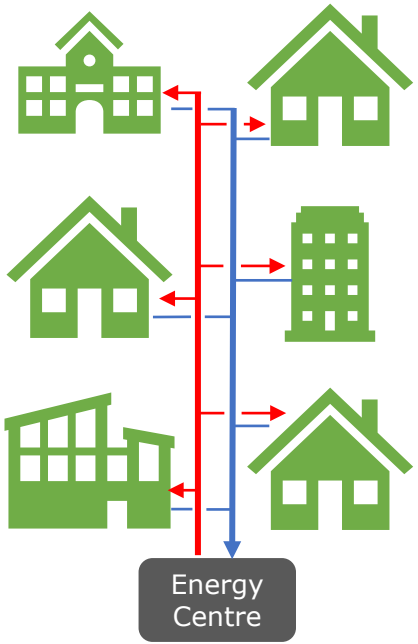
Application Types

Local delivery



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

Heat Networks

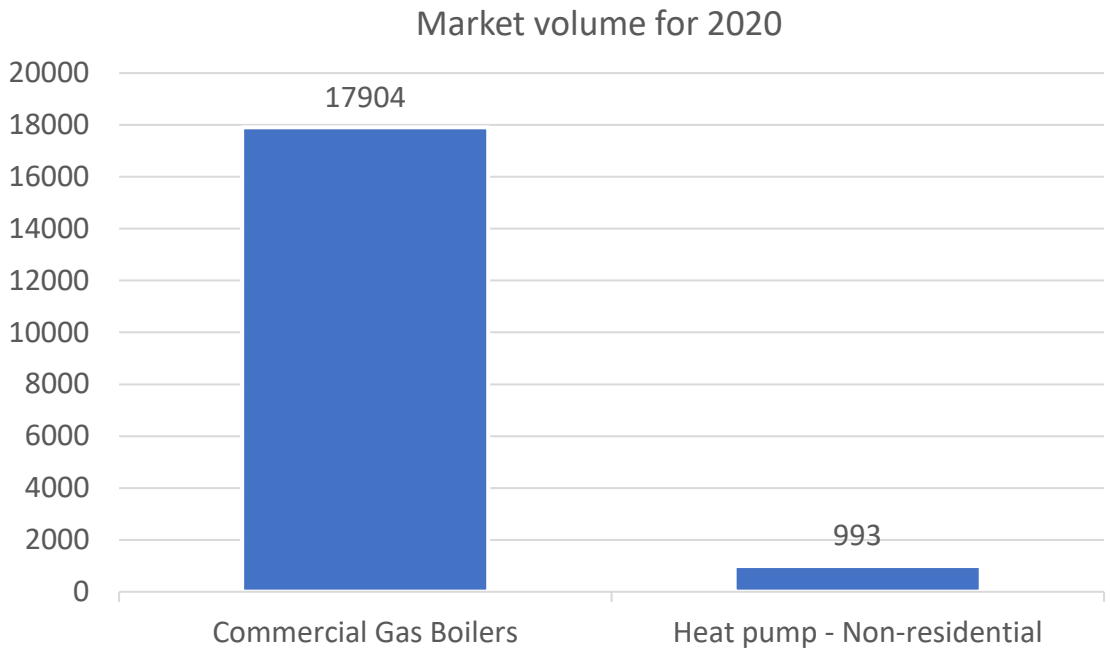


- Heat is delivered to multiple buildings from a single centre.
- Various types and designs depending on temperatures.
- Currently a small part of the market but set to grow.

The Big Drivers Now

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

Market Volumes

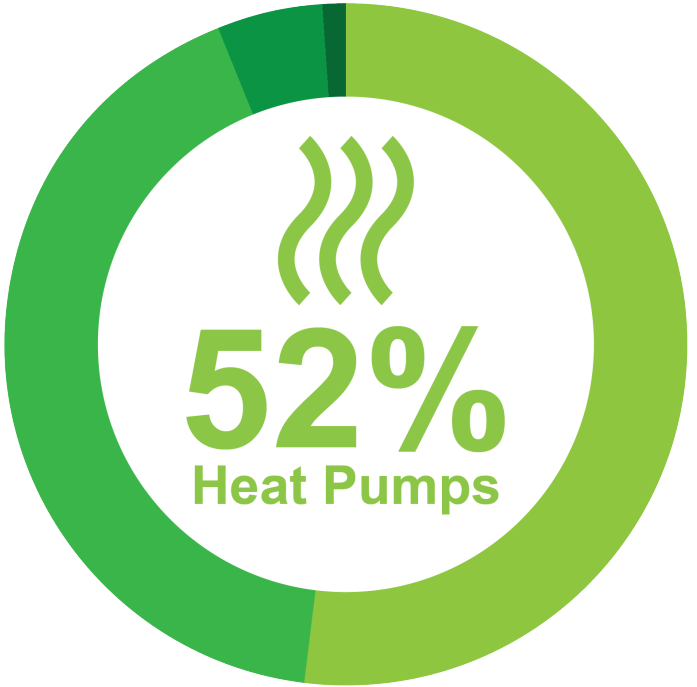


- From 2020 to 21 commercial heat pumps saw a 75% increase to 1747 units.
- Huge change needed to move this market to low carbon technologies.

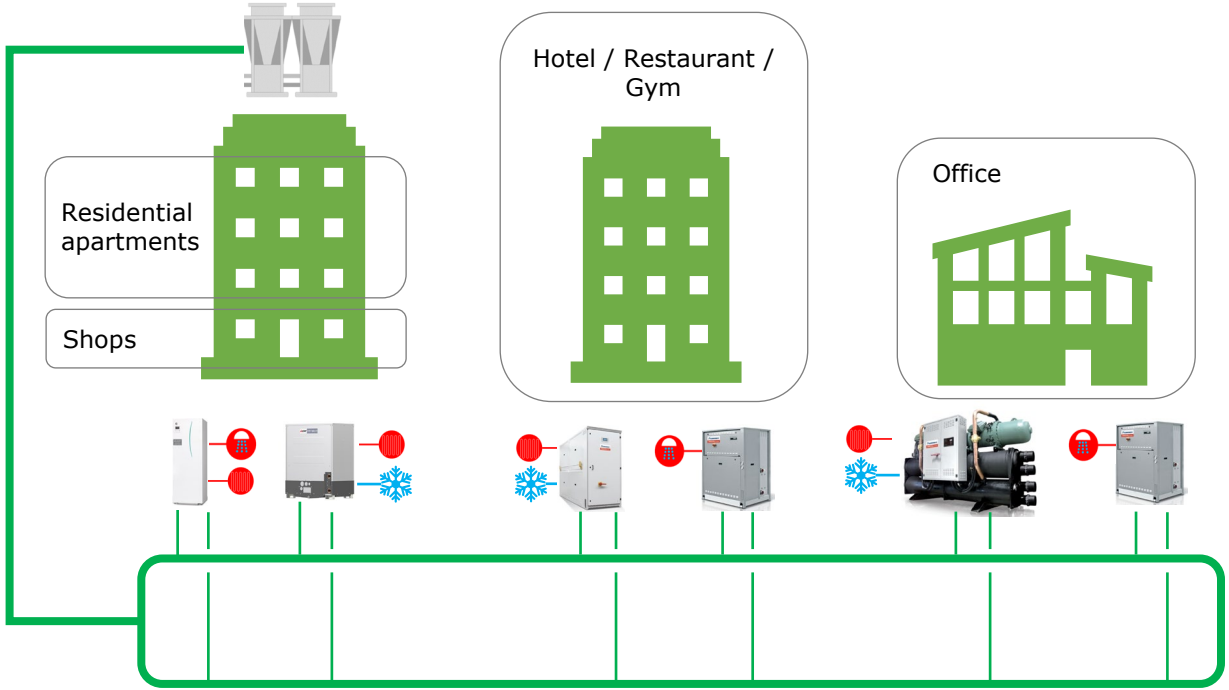
What Could This Market Look Like?

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



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The Future Of Offices

Mel Threader
Product Marketing Manager

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

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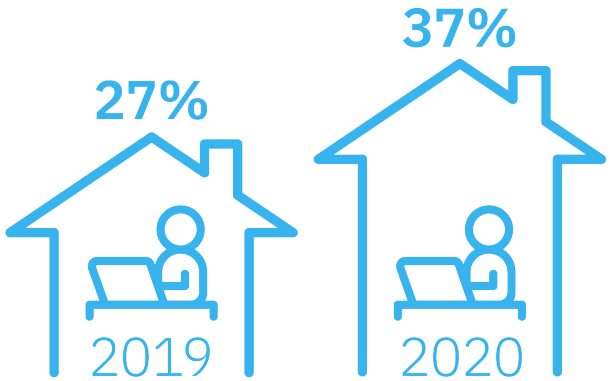

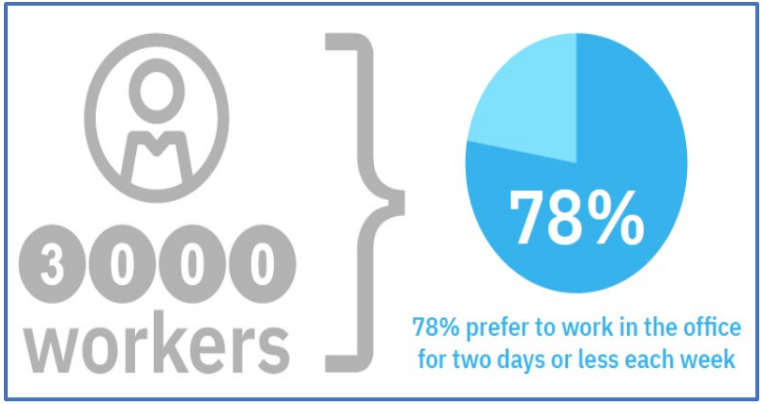

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- **Hybrid** working
- “Hub and Spoke”
- Downsizing
- Net Zero challenges

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

Achieving Net Zero In The Office

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

ON THE ROAD TO NET ZERO

HVAC & Connectivity

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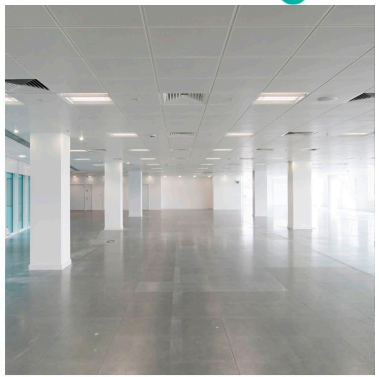
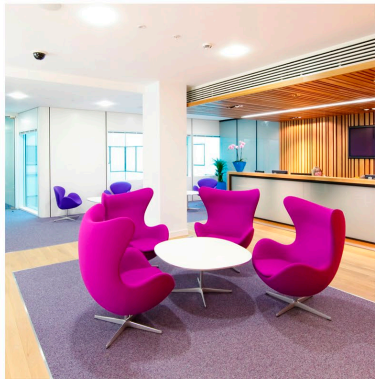
Air Conditioning

- 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**

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Digital Future Of HVAC

Manny Lal
Product Manager,
Controls & Innovations

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Visibility And Awareness

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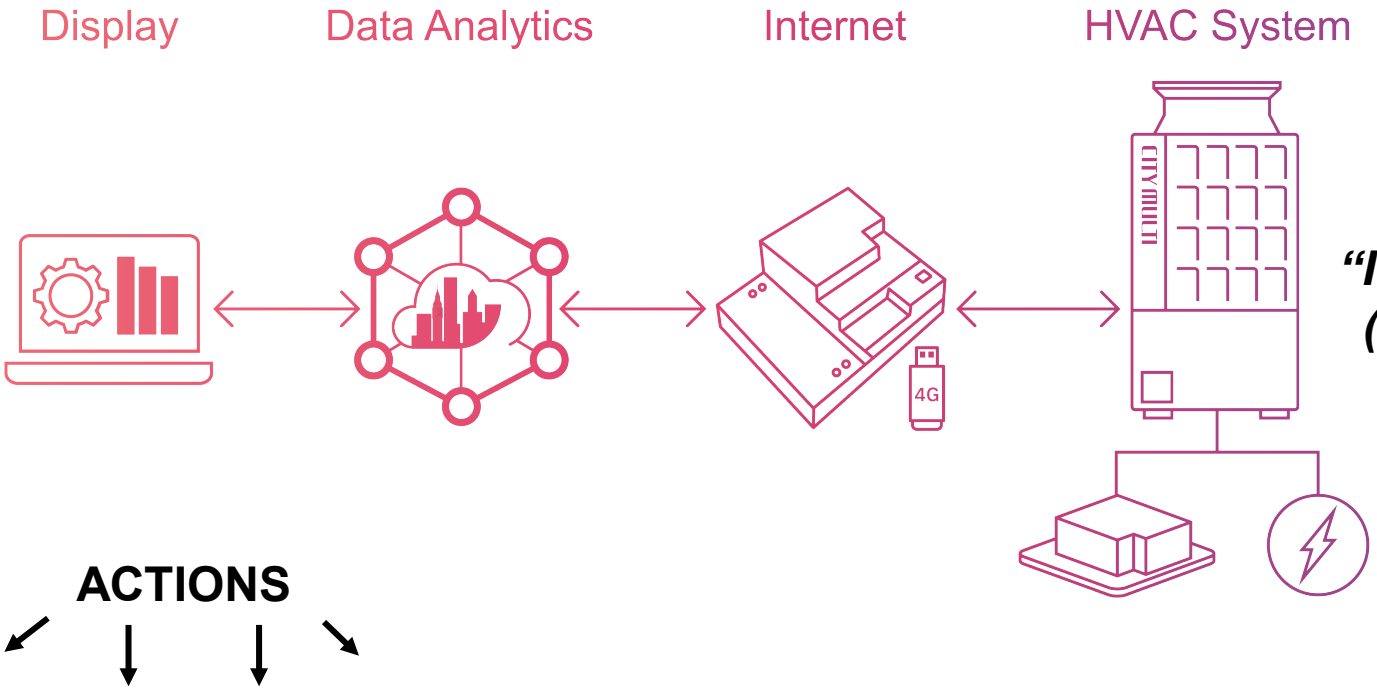
Digital HVAC - What Is It?



"Internet of Things (IoT) movement"

Insight And Knowledge

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Control + Monitor + Energy + Engineering Assistance*

Analytics + Automated Health Check + Engineering Assistance*

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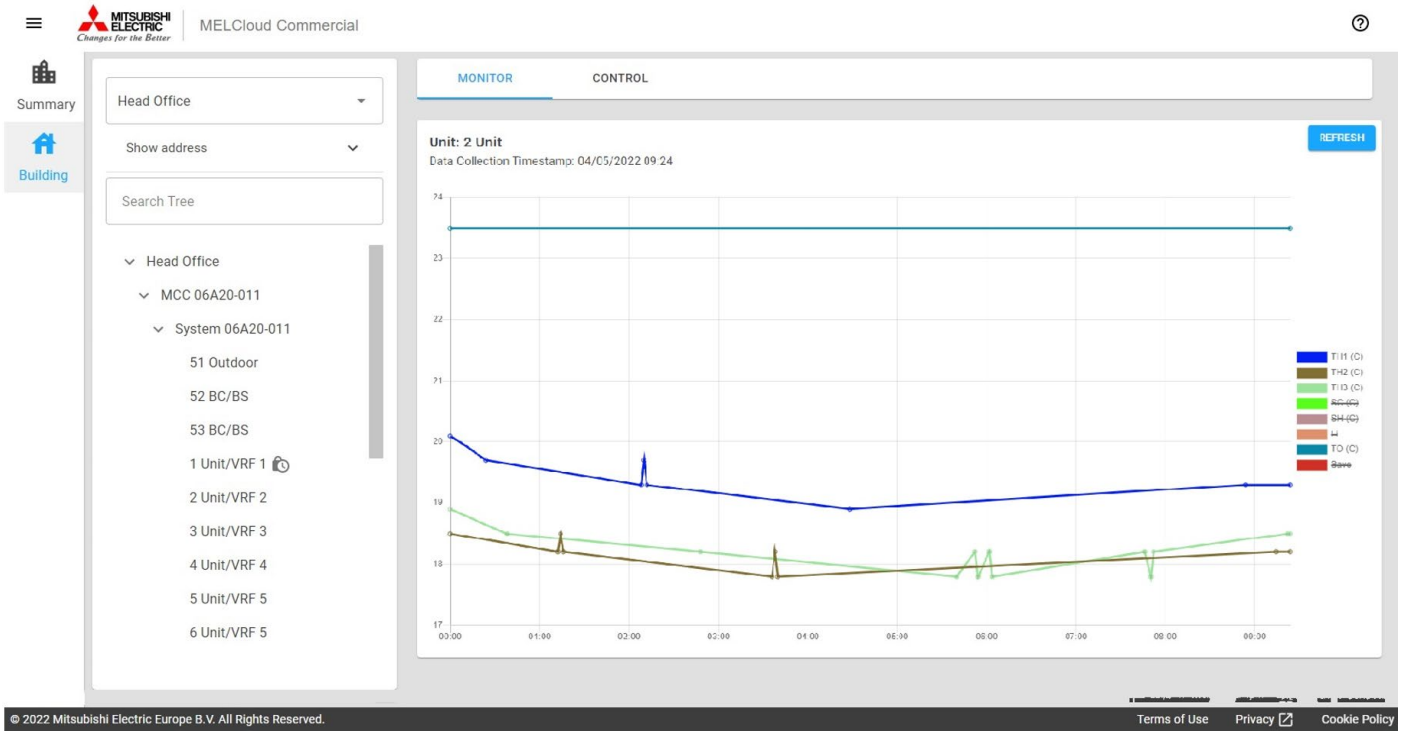
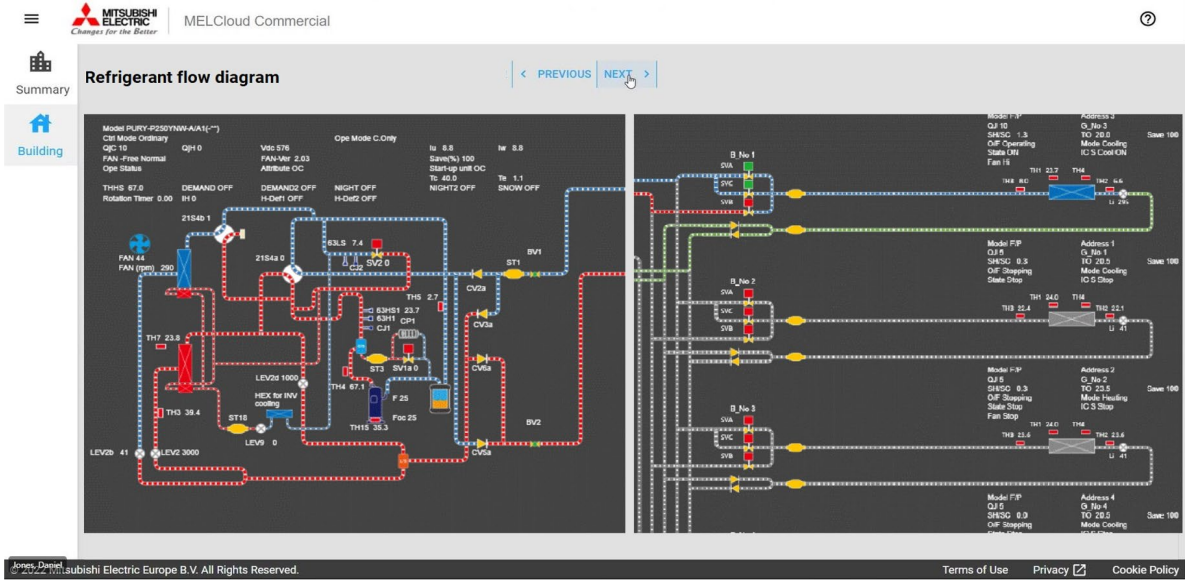
Insight And Knowledge

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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