



Sustainability &
Construction Team



The role that commercial heating can play on the road to **Net Zero**

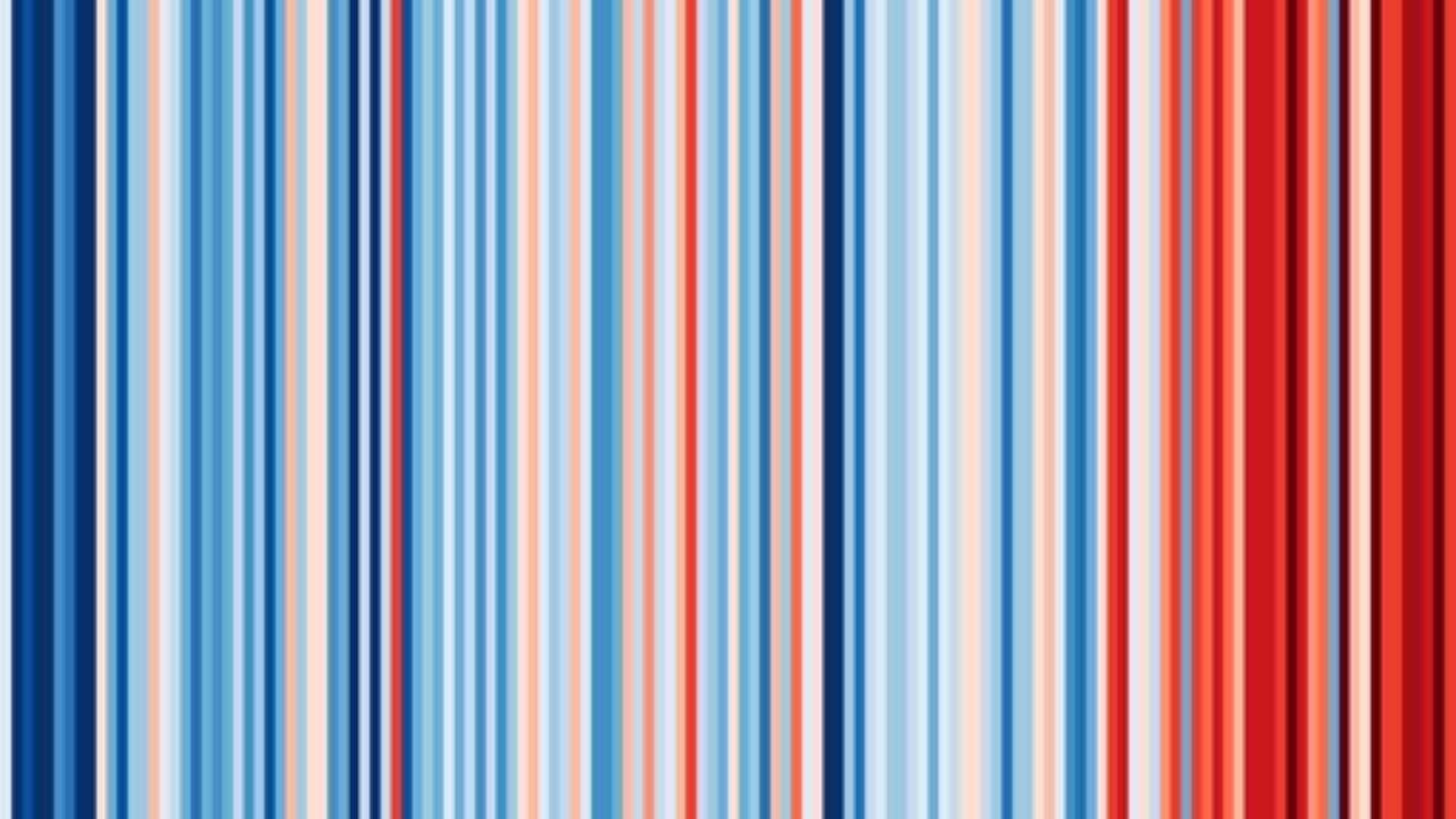
Presented By: Dan Smith & Dr. Samira Saravi



A circular portrait of Dan Smith, a man with short brown hair, smiling. He is wearing a dark blue blazer over a light blue collared shirt. The background of the portrait is a dark, textured wall.

Dan Smith Sustainability and Construction Manager

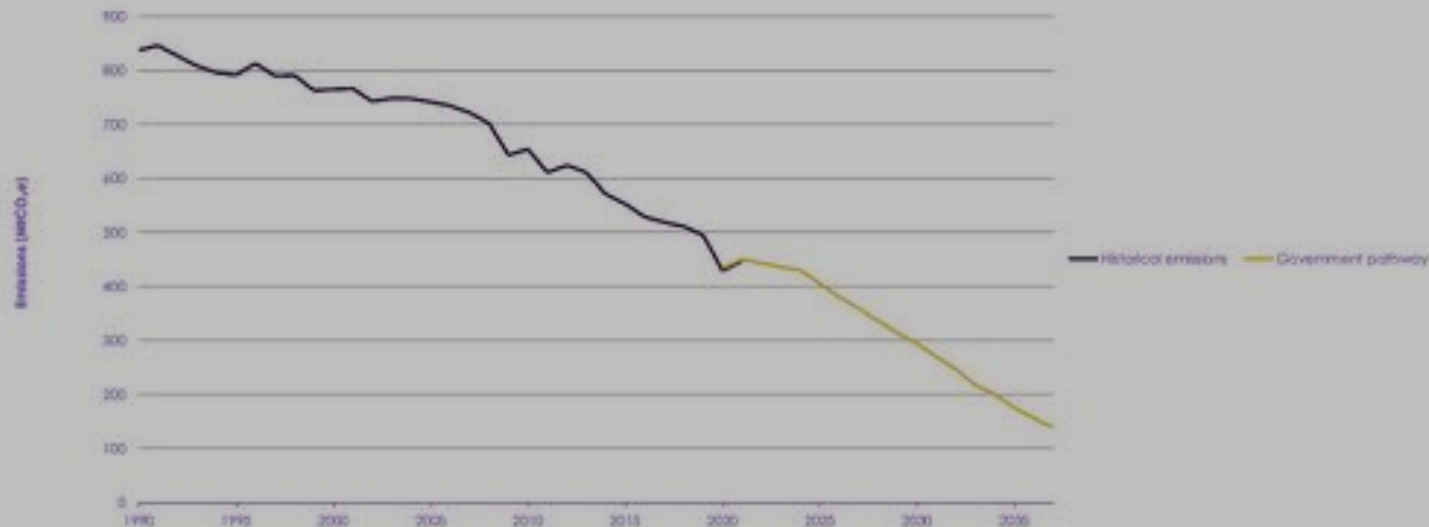




2050

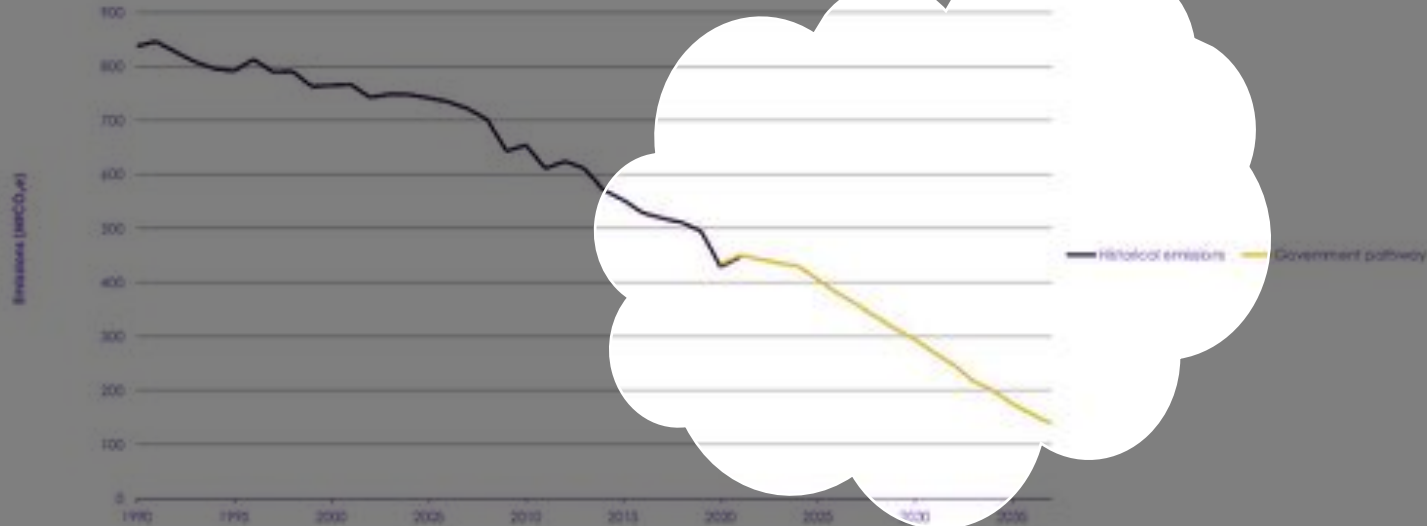
Government Net Zero Strategy

Emissions reduction needs to speed up



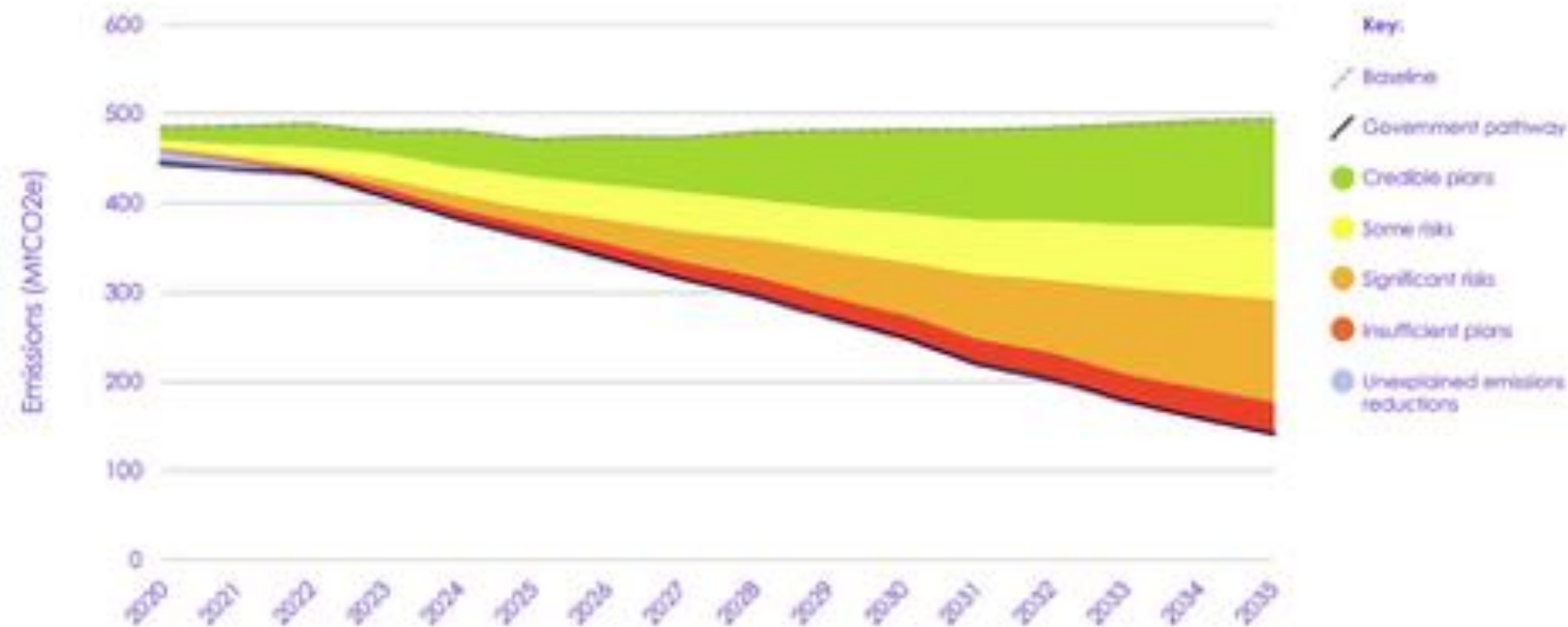
Government Net Zero Strategy

Emissions reduction needs to speed up



CCC's 2022 assessment of Government policies and plans

An improvement, but risks remain



RISK




The background features a blurred image of a risk matrix chart. The chart has a vertical axis on the left with numerical values 10, 20, 30, 40, 50, and 60. The horizontal axis at the top has labels: 'Baseline', 'Governance', 'Critical', 'Significant', and 'Insufficient'. A legend on the right side of the chart lists: 'Critical', 'Significant', 'Insufficient', 'Baseline', and 'Governance'. The chart area is filled with colored bands: green at the top, yellow in the middle, and orange at the bottom.

Local Authority Declarations

Local Authority targets for borough wide Net Zero.



A lone tree stands on a grassy hill. The ground in the foreground is cracked and dry, suggesting drought. The sky is dark and stormy, with heavy clouds. The tree has a bare, skeletal left side and a lush green right side, symbolizing the impact of climate change.

28 of 32 London
boroughs have declared
climate emergencies

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.



MISSION ZERO



"Delivering net zero is the industrial revolution of our time – and climate change the greatest threat"

"This is too important to get wrong".

Independent Review of Net Zero

"Half the world's leading institutions and 40% of companies have made net zero pledges"

**Securing Net
Zero**



**Powering Net
Zero**



**Net Zero &
Economy**



**Net Zero &
Community**



**Net Zero &
Individual**



**Net Zero &
Future**



Securing Net
Zero



Powering Net
Zero



Net Zero &
Economy



Net Zero &
Community



Net Zero &
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**Net Zero &
Individual**



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Net Zero &
Community



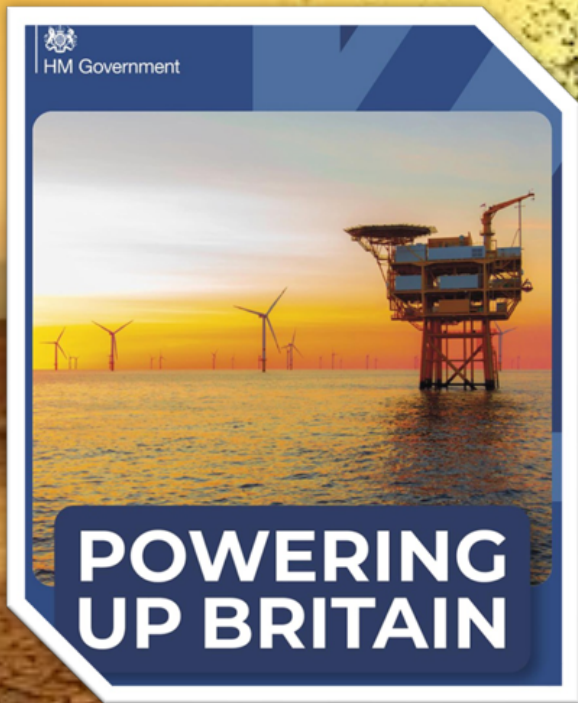
Net Zero &
Individual



Net Zero &
Future



GREEN DAY ANNOUNCEMENT







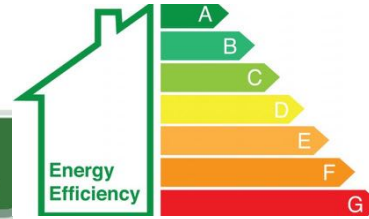
LONDON
ENERGY
TRANSFORMATION
INITIATIVE



The Building Regulations 2010

Conservation of
fuel and power

APPROVED DOCUMENT



UK Net Zero Carbon
Buildings Standard



April 1st 2020

MEES Regulations applied to all rented
residential properties.
All new or existing rentals must have
an E grade

April 2023

MEES Regulations will be extended to
include ALL COMMERCIAL leases,
including existing leases

MEES

April 2025

The UK government has declared their
intention to raise MEES standards so
the minimum will rise to a D

April 2030

In order for the UK Government
to hit their carbon target MEES
standard will rise to C

RIBA
2030
CLIMATE
CHALLENGE



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1,656,000
Non-Domestic
Buildings



634,000
0-100m²



370,000
>100-250m²



173,000
>250-500m²



94,000
>500-1000m²



96,000
>1000m²

“The highest 6% of electricity consumers are responsible for 80% of electricity consumption, while the highest 4% of gas consumers are responsible for 80% of gas consumption”



A wide-angle, high-angle photograph of the London skyline, featuring prominent skyscrapers like The Shard and the Gherkin, with a dense urban landscape in the foreground. The sky is clear and blue.

PART OF THE SOLUTION,
ELECTRIFICATION...



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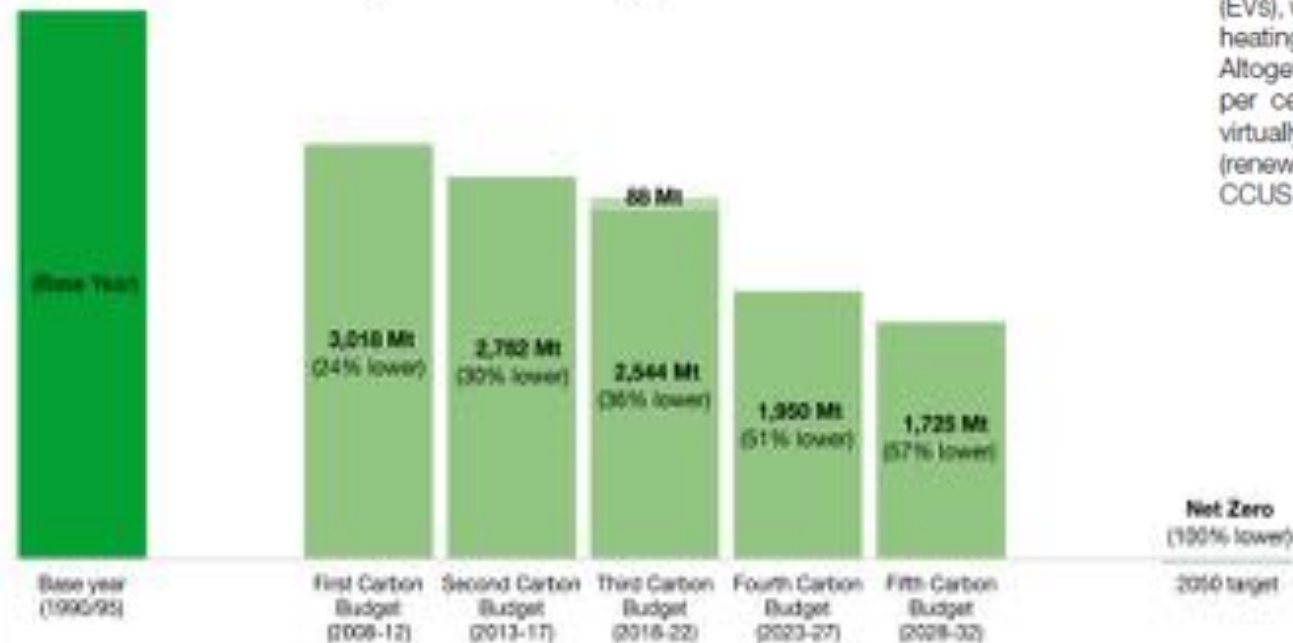
A vital **Net Zero** role for commercial heating

Dr. Samira Saravi



The race to Net Zero

Figure 1: UK carbon budgets and 2050 target



Electricity pathway: Under this pathway, electricity is the main source of energy in 2050. There are many more electric vehicles (EVs), we replace our gas boilers with electric heating and industry moves to cleaner fuels. Altogether this means we use around 80 per cent more electricity than today, and virtually all of it comes from clean sources (renewables and nuclear). In this pathway, CCUS is not used in the UK by 2050.



UK Electricity Grid

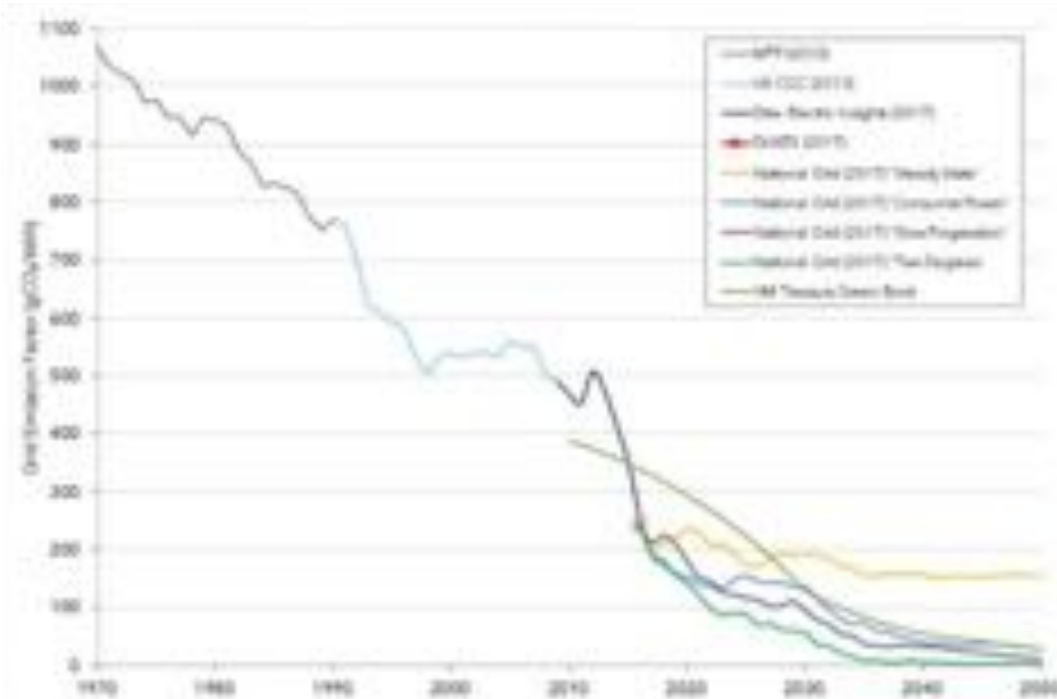


Figure 1.01 – Historic and projected carbon content of electricity



L1(b), L2 ONLINE VERSION

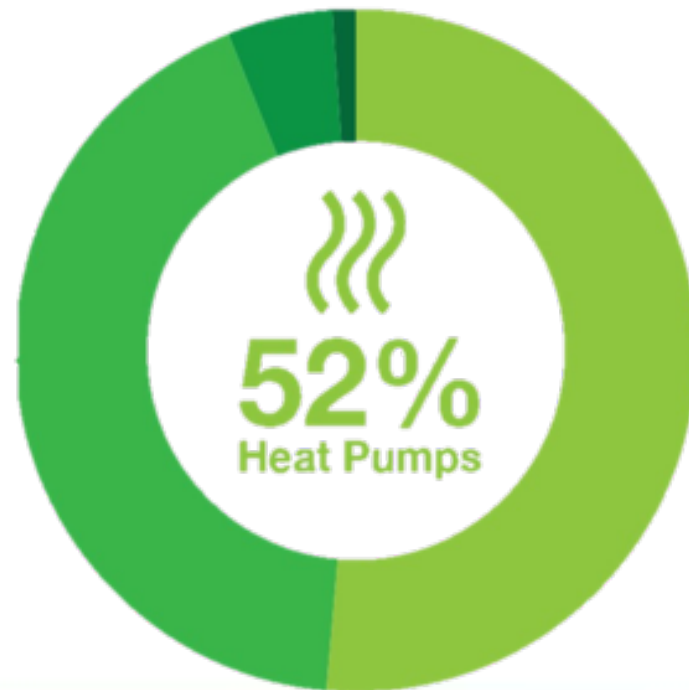
NOTE: For grid-supplied electricity, a CO₂ emission factor of 0.136kgCO₂/kWh and primary energy factor of 1.501kWh_{pr}/kWh should be used. All other CO₂ emission factors and primary energy factors should be taken from Table 29 (or Table 32 for district heat networks) of the *National Calculation Methodology Modelling Guide*.

0.136 KgCO₂/kWh



The Future of Heat

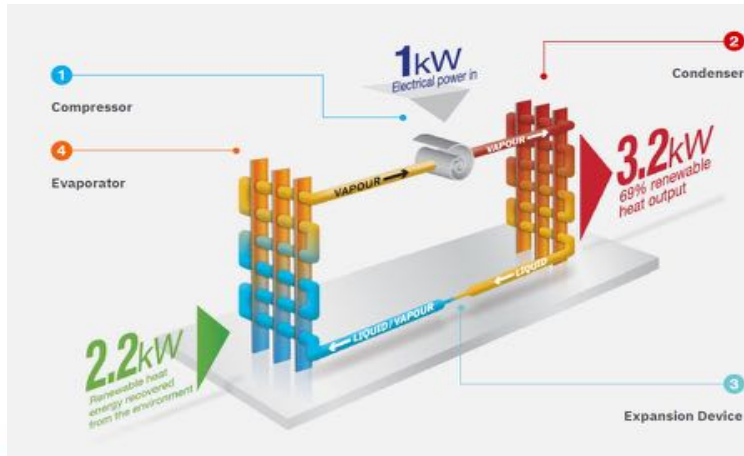
- There is no single solution to the low-carbon heat challenge.
- By 2050, the CCC believes that all UK heat demand should be met by low-carbon sources.
 - Heat pumps 52%
 - District heating 42%
 - Hydrogen boilers 5%
 - New direct electric heating 1%



Heat Pump Technology



- Flow Temp >
- Efficiency >
- Capex >
- Noise Levels >
- Refrigerant >
- Footprint >



A heat pump for every application



- The widest range available in the UK
- Heat pumps available from 5kW to +1,000kW
- Deliver water up to 90°C
- Effective operation down to outdoor temperatures of -20°C



Ecodan PUZ
[5°C - 90°C] - 5kW - 85kW
All houses/ Apartments/
Light commercial

Ecodan GAFF-R
[24°C - 70°C] - 40kW - 840kW
Apartment blocks/
Commercial offices/Leisure/
Health/Education/Industrial

Ecodan GAW
[5°C - 90°C] - 40kW - 640kW
Apartment blocks/
Commercial offices/Leisure/
Health/Education/Industrial

MEHP-IS-S07
[24°C - 65°C] - 50kW - 880kW
Commercial offices/Leisure/
Health/Education

e-Series EAW
[5°C - 55°C] - 150kW - 1350kW
Commercial offices/Leisure/
Health/Education

Climaveneta
[HX2/LFX/EN-RT/FOCS-R]
[24°C - 65°C] - 38kW - 1112kW
Commercial offices/Leisure/
Health/Education/Industrial



Embodied Carbon example - CAHV-R



For building and construction projects to achieve true Net Zero carbon levels, the embodied carbon footprint needs to be included in the calculation or we are at risk of neglecting a large amount of upfront carbon emissions.

Assessment Date: 11th October 2022

Assessor /
Organisation:

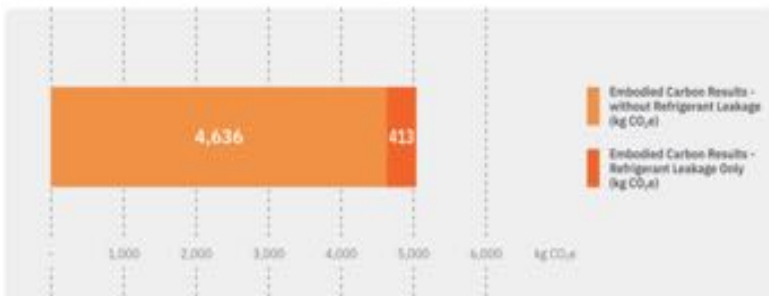
Mitsubishi Electric

Contact:

embodied.carbon@meuk.mee.com

Embodied Carbon Result with
'Mid-level TM65 Calculation'
Method Total:

5,049 (kg CO₂e)



CAHV-R450YA-HPB - Product Information

Type of product	W2W Heat Pump
Capacity of equipment (kW)	40
Product weight (kg)	359
Material breakdown for at least 95% of the product weight? (Y/N)	Y
Service life of the product (years)	15
Type of refrigerant	R454C
Refrigerant GWP*	148
Energy consumption of the factory per unit of product (kWh)	15.26
Location of manufacture	Japan
Product Complexity	Category 3: High

*GWP 100



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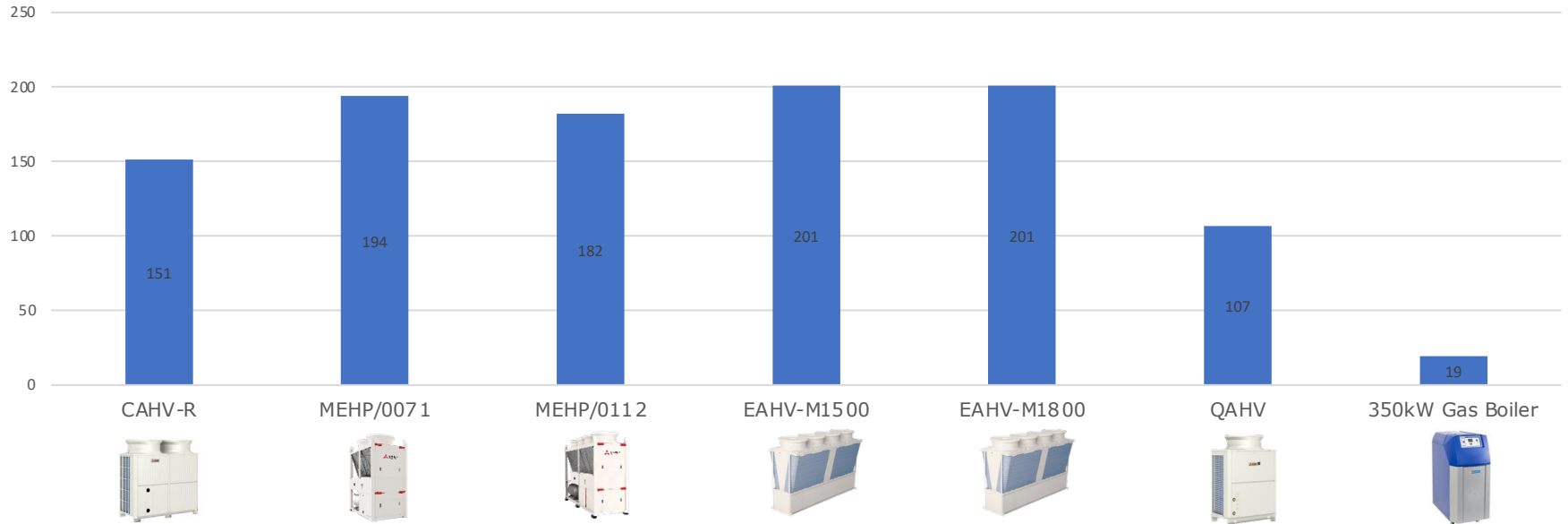


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Embodied Carbon per kW



Embodied Carbon per kW = (CIBSE TM65 Mid-Level calculation) / (Capacity at A-5W55)



■ Embodied Carbon per kW (kgCO2e/kW)



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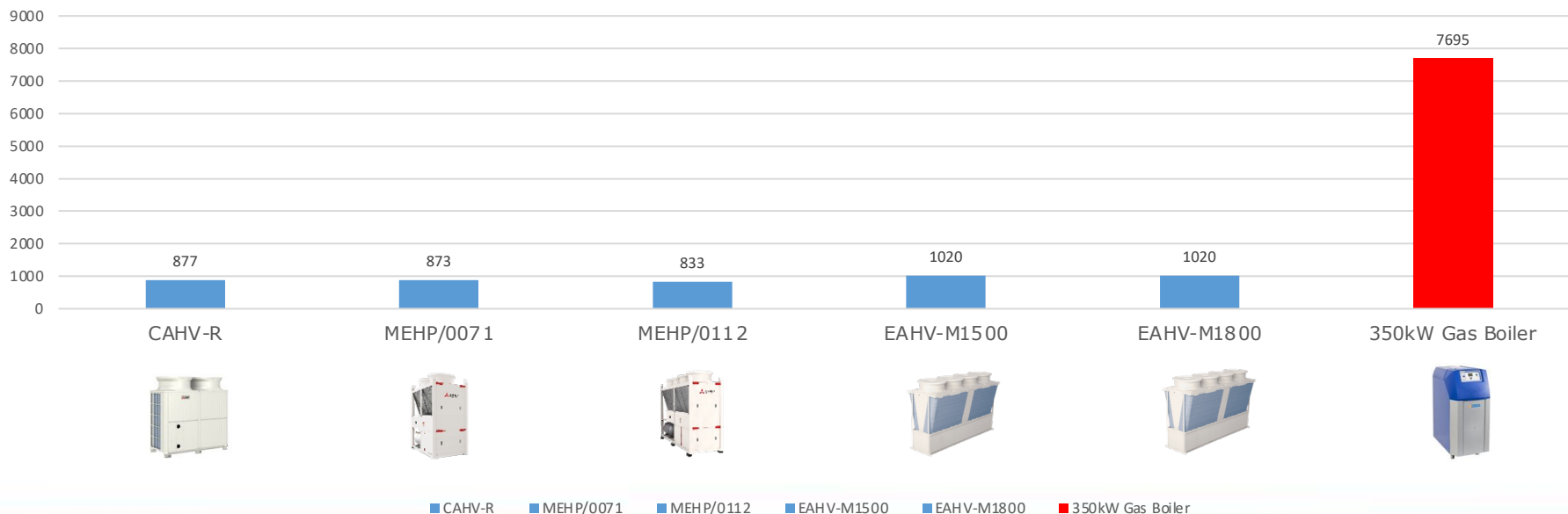
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Whole Life Carbon per kW



WLC per kW = (Embodied Carbon per kW) + (Operational Carbon / P_{rated} Capacity)

Unit	Prated Capacity	Annual Energy Consumption
CAHV-R	27 kW	17161 kWh
MEHP/0071	48 kW	29687 kWh
MEHP/0112	82 kW	49600 kWh
EAHV-M1500	130 kW	93223 kWh
EAHV-M1800	130 kW	93223 kWh

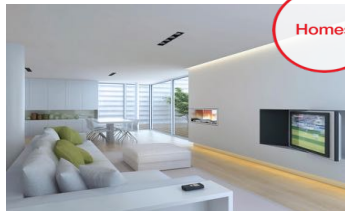


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Application



Homes



Hotels



Gyms



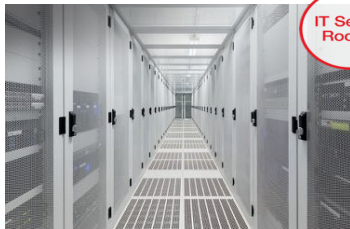
Offices



Retail



Hospitals



IT Server
Rooms



Manufacturing



Pharmaceutical



Community Heating



- Leaf Street, Manchester (105 new-build homes) – 8 x Ecodan CAHV ASHPs
- Social Housing, Essex (160 new-build apartments) – 10 x Ecodan CAHV ASHPs
- Social Housing tower block, Scotland (150 apartments in refurbished tower block) – 10 x Ecodan CAHV ASHPs



Education



- University of Salford
 - 4 x AW-HT heat pump chillers
& 1 x i-BX chiller
- St Andrew's Primary School,
Chedworth, Gloucestershire –
SALIX Funding for 4 x Ecodan
PUZ ASHPs
- Arley Primary School,
Warwickshire – 3 x Ecodan CAHV
ASHPs



Health



- 265-bedded Northern Hospital
 - 2 x i-FXQ heat pump chillers
 - & 1 x 1,400kW i-FOCS heat pump chiller (replaces 1980's boiler and steam distribution system)
- Local Health Centre, South London – 3 x Ecodan CAHV ASHPs (replaces gas boilers)



Leisure

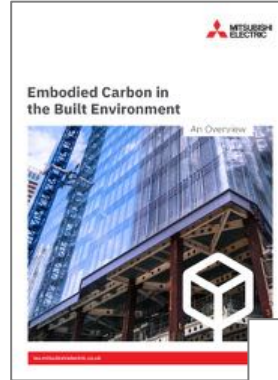
- St Sidwells Leisure Centre, Exeter – 1 x Integra EW-HT heat pump chiller & 1 x Integra NX-Q chiller
- The Wave, surfing school, Bristol – 6 x Ecodan CAHV ASHPs
- Football Sports Centre, Yorkshire – 2 x QAHV CO₂ ASHPs



Further Assistance



- White papers
- Technical Guides
- CPD Guides



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Any Questions?

Dan Smith & Dr. Samira Saravi

