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Introduction

• Context
• Market Summary
• Policy
• Innovation
• Research and Development
Context – UK Primary Energy Consumption

1990:
- Oil: 36%
- Gas: 24%
- Coal: 32%
- Primary electricity: 8%
- Bioenergy & waste: 0%

2020:
- Oil: 32%
- Gas: 43%
- Coal: 3%
- Primary electricity: 11%
- Bioenergy & waste: 11%

Context – UK Sector Energy Consumption

2018 Consumption by Sector
Context – UK Electricity Generation

Electricity Generated by Fuel Type

[Graph showing electricity generation by fuel type from 2000 to 2019]

Coal
Oil & other fuels
Gas
Nuclear
Hydro
Wind & solar
Other renewables

Context – Heating Systems

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Number of Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains gas</td>
<td>22 million</td>
</tr>
<tr>
<td>Electricity</td>
<td>2.2 million</td>
</tr>
<tr>
<td>Heating oil</td>
<td>1.1 million</td>
</tr>
<tr>
<td>District heating</td>
<td>420 thousand</td>
</tr>
<tr>
<td>Solid fuel</td>
<td>200 thousand</td>
</tr>
<tr>
<td>LPG</td>
<td>193 thousand</td>
</tr>
<tr>
<td>Other</td>
<td>4 thousand</td>
</tr>
<tr>
<td><strong>Total Households</strong></td>
<td><strong>26.2 million</strong></td>
</tr>
</tbody>
</table>

~4 million GB homes are off the gas grid

~1.3 million GB homes use oil/LPG for heating

Typical house gas consumption
13,000 kWh/y

www.heatpumpingtechnologies.org
Market – Domestic Heat Pumps

• Domestic heat pump sales remained relatively constant despite the introduction of the Renewable Heat Incentive in 2014.

• Sales have begun to increase as new policy certainty emerges and consumer awareness increases.

• The majority of growth is in air-water monobloc units which offer lower upfront cost and lower barriers for installation.

• Approximately 400k heat pumps are installed in homes today.

• Gas boiler sales are ~1.6 million units per year.
Market – Non-domestic

Air - Air & VRF Systems 2019 (Capacity)

- 46% < 5 kW
- 43% 5.01-7.0 kW
- 11% > 7.01 kW

Many large systems not captured in market data

Air- Air & VRF Systems Annual Sales

- Single splits
- Multi splits
- VRF

www.heatpumpingtechnologies.org
Policy - Strategy

Heat and Buildings Strategy 2021

- To meet Net Zero virtually all heat in buildings will need to be decarbonised.
- No new fossil fuel heating in new homes by 2025.
- Phase out fossil fuel heating in off-gas grid buildings by 2026.
- Ambition to phase out the installation of new natural gas boilers from 2035.
- Take major strategic decisions on the role of hydrogen for heat by 2026.
- Aim to grow the heat pump market to deploy 600,000 heat pumps per year by 2028.
- Boiler Upgrade Scheme – Heat pump grants for homes (£5,000 for ASHPs, £6,000 for GSHPs)
- Introduce a market-based mechanism to grow the heat pump market and supply chain.
- Rebalance costs of electricity and gas

Figure 1 provides an illustrative diagram of the breadth of activities planned to be undertaken over the next decade according to BEIS’ current thinking.
Government is committed to delivering 300,000 new homes each year from the mid-2020s. New homes have low heat demand and no expensive retrofit costs, so are well suited for heat pumps.

There are over 5m homes and businesses off the gas grid which use oil, LPG or resistive electric heating. UK Government has already announced plans to phase out high carbon fossil fuel heating in 1.3m buildings off the gas grid in the 2020s. For these buildings, heat pumps are typically the most cost effective low-carbon heating solution.

The optimal solution for the 24.5m homes and businesses on the gas grid is uncertain and may vary locally. Options include heat networks, efficient electric heating solutions, like heat pumps, or replacing gas with low-carbon alternatives: hydrogen or biogas.
Policy – Heating Systems

• Renewable Heat Incentive (RHI)
  – Introduced for non-domestic in 2011 and domestic 2014
  – The first “feed-in tariff” for renewable heat.
  – Receive a price/kwh of renewable heat produced and paid over the lifetime of the installation
  – For heat pumps, biomass boilers, solar thermal, biomethane/biogas, deep geothermal.
  – Closed in March 2022

• Boiler Upgrade Scheme
  – Provide upfront grants for heat pumps and biomass boilers
  – £5,000 for ASHP or biomass boiler, £6,000 for GSHPs
Innovation

BEIS Energy Innovation Programme
(£505m 2015 – 2021)

~£90m for project on the built environment
• Electrification of Heat Demonstrator – installing 750 heat pumps in homes, monitoring their use and aiming to demonstrate cost reductions
• Challenge funds for low carbon heating – to support a variety of innovative projects

BEIS Net Zero Innovation Portfolio
(£1bn 2021 – 2025)

10 Priority Areas
• future offshore wind
• nuclear advanced modular reactors
• energy storage and flexibility
• bioenergy
• hydrogen
• homes
• direct air capture and greenhouse gas removal (GGR)
• advanced carbon capture, usage and storage (CCUS)
• industrial fuel switching
• disruptive technologies

https://www.gov.uk/guidance/energy-innovation

www.heatpumpingtechnologies.org
Innovation

BEIS Heat Pump Ready Programme (£60m 2022 - 2025)

• Stream 1: solutions for high-density heat pump deployment. Challenge funds for low carbon heating – to support a variety of innovative projects.

• Stream 2: developing tools and technology. Up to £25 million of grant funding for projects to overcome barriers to heat pump deployment.

• Stream 3: trial support and learning. Up to £5 million contract from spring 2022.

https://www.gov.uk/guidance/energy-innovation
Research

• Large thematic area of end-use energy demand
• Research tends to focus on heat pumps in systems rather than component level
• Specific expertise on gas sorption heat pumps, energy storage, whole energy system modelling, building simulation modelling

https://www.gov.uk/government/collections/heat-pump-research
Summary

• Heat pumps in the UK are currently a niche market in homes but widely used in commercial buildings.
• The market is growing steadily but new policy developments are expected to increase this in specific areas e.g. new build, off-grid buildings.
• Ambition for high levels of heat pump deployment with key decisions around the role for hydrogen in heating needed in the next decade.
• Significant barriers remain around suitability of the building stock, consumer awareness, gas/electricity price ratio and upfront cost of systems.
• Current energy price crisis raising the profile of heat pumps as an option.