



WWF

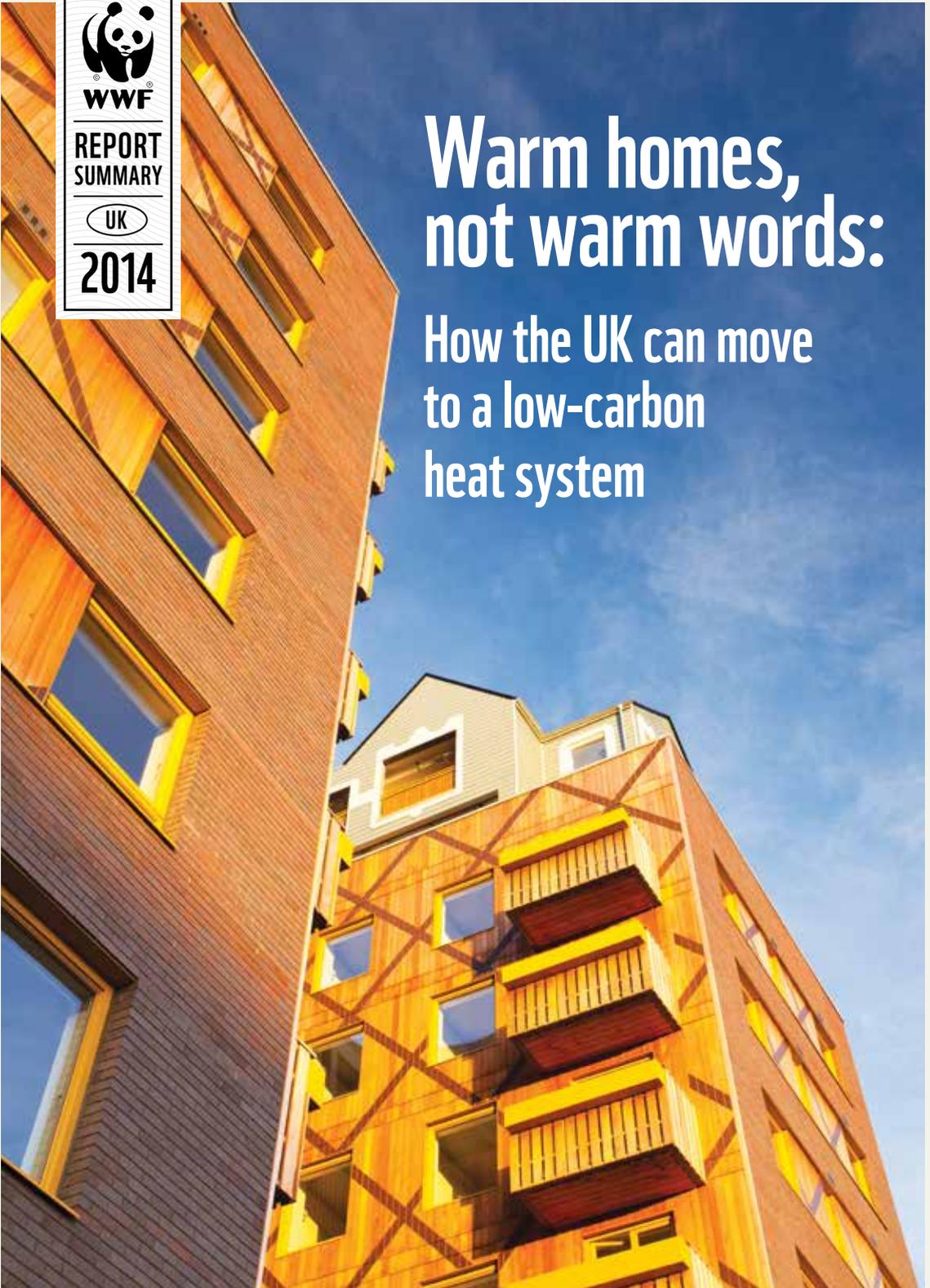
REPORT  
SUMMARY

UK

2014

# Warm homes, not warm words:

How the UK can move  
to a low-carbon  
heat system





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# THE HEATING CHALLENGE

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Heat is part of all our lives – from the way we keep warm in our homes and offices, to the production of many items we use every day. Most of this heat is produced through the burning

of fossil fuels. Because of this, it's responsible for around a third of the UK's greenhouse-gas emissions. To protect our environment from severe climate change impacts, we must reduce our emissions by at least 80% by 2050 – so decarbonising our heat system will be critical.

**44%**

**HEAT IS THE MAIN ENERGY DEMAND IN THE UK, ACCOUNTING FOR 44% OF ALL END-USE ENERGY CONSUMPTION**

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The Committee on Climate Change (CCC) has suggested that by 2030 renewable heat sources could cost-effectively provide a quarter of the heating needed for our homes and almost two-thirds (63%) of the heating needed for commercial buildings. This could be achieved by improving the energy efficiency of buildings and installing low-carbon heat technologies.

The government's 2013 low-carbon heat strategy acknowledges the need to reduce emissions from heat and suggests a general direction for 2030. However, it does not set any clear targets for the deployment of technologies or supporting policies that could drive action on low-carbon heat. Without these, we risk missing out on one of the most important – and readily achievable – things we can do to limit climate change and improve our energy security.

# DECARBONISING HEAT

## WHY LOW CARBON HEAT IS URGENT

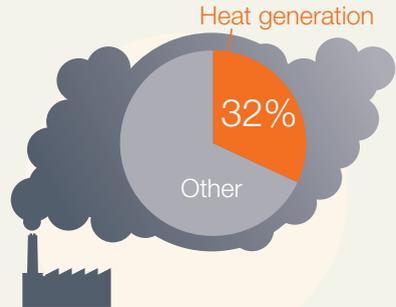
### CLIMATE CHANGE ACT

80%



The climate change act requires UK to reduce greenhouse gas emissions by at least **80%** by **2050** (from a 1990 base)

### EMISSIONS



**32%** of UK greenhouse emissions come from heating

### OVER RELIANCE ON GAS

70%



UK has an over reliance on gas for heating. Gas is **70%** of fuel used for heat and a major driver of energy bill increases

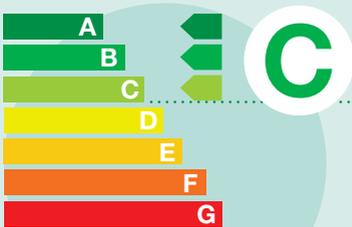
### ENERGY SECURITY



Diminishing North Sea reserves and domination of global oil and gas reserves in just a few countries means increasing energy security issues

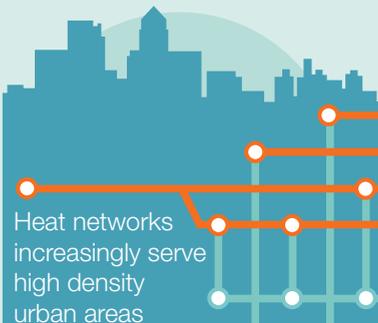
## WHERE WE NEED TO BE BY 2030

### ENERGY EFFICIENCY

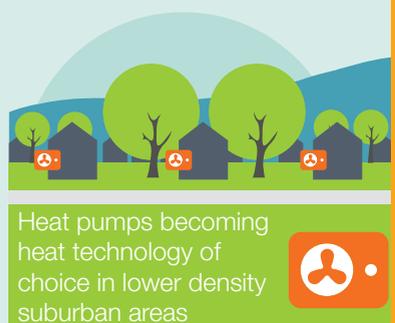


Retrofitted buildings have improved energy performance

### HEAT NETWORKS



### HEAT PUMPS



# WHAT NEEDS TO BE DONE



Energy efficiency is critical to heat affordability for UK homes

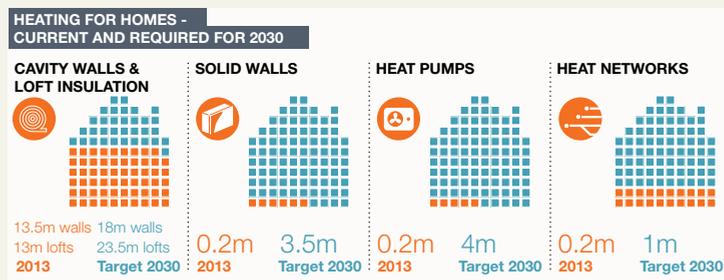
## High levels of energy efficiency

As a rule, the buildings we are paying to heat in the UK are very inefficient. Because so much heat is lost, we need a large amount of energy just to provide an adequate temperature. This means that families and businesses are wasting huge amounts of energy, and money.

Big improvements to the energy efficiency of the UK building stock are a prerequisite to delivering sustainable and affordable low-carbon heat. Currently, the average home in the UK has an energy performance rating in band D (on a scale of A to G, with A being the most efficient). Raising this to band B would substantially reduce the heat demand of a home. This would have the additional benefit of protecting present, and future, occupants from fuel poverty.

As shown in the diagram below, there is still huge potential to improve the energy efficiency of UK homes. Up to 4.5 million cavity walls and 10.3 million lofts still need to be insulated. Less than 3% of the UK's 7.5 million solid-wall homes have been insulated.

The latest analysis of actual installed energy-efficiency measures highlights that we are falling far short of what is needed to meet the targets of the Climate Change Act.<sup>1</sup>



## Low-carbon heating systems

The table below outlines the low-carbon technologies that need to be installed in homes and commercial buildings by 2030, according to CCC figures.

	NO. OF DOMESTIC BUILDINGS WITH LOW-CARBON HEAT IN 2030	NO. OF NON-DOMESTIC BUILDINGS WITH LOW-CARBON HEAT IN 2030
<b>HEAT PUMPS (including storage)</b>	4,078,000	621,000
<b>BIOMASS BOILERS</b>	300,000	124,000
<b>SOLAR THERMAL</b>	910,000	11,000
<b>BIOGAS</b>	866,000	58,000
<b>LOW-CARBON HEAT NETWORKS</b>	1,000,000	321,000

Currently, there are 406,000 heat pumps installed in buildings in the UK with around 20,000 new ones installed every year. This compares with 1.6 million gas boilers fitted each year. In addition, in the last 13 years around 25,000 homes have been connected to heat networks.

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<sup>1</sup> ACE (2014) ECO and Green Deal Briefing <http://www.energybillrevolution.org/wp-content/uploads/2014/07/ACE-and-EBR-fact-file-2014-06-ECO-and-the-Green-Deal.pdf>

# WHAT IS LOW CARBON HEAT?

A broad range of low-carbon heat solutions already exists. These span primary energy sources such as biomass, generation technologies such as solar water heating, and delivery infrastructure such as heat networks.

The main short- and medium-term solutions for low-carbon heat provision in buildings include:



## **Solar water heating**

Provides supplementary hot water to homes or commercial buildings and can typically provide 50-60% of annual hot water demand.



## **Air-source heat pumps**

Provide heat by absorbing heat energy from the air outside. Run on electricity, but for every unit of electricity put in they deliver 2-3 times more heat.



## **Ground-source heat pumps**

Supply heat to buildings by absorbing heat energy from the ground below. Typically more efficient than air-source heat pumps.



## **Hybrid heat pumps**

A hybrid system integrates an air-source heat pump with another non-renewable source such as a condensing boiler, enabling installation in a wider range of circumstances.



## **Gas absorption heat pumps**

These are essentially air-source heat pumps but driven by gas rather than electricity.



### **Biomass boilers**

These burn wood pellets, chips or logs to heat a single room, or as a central boiler for heating and hot water.



### **Heat networks (or district heating)**

Heat generated at a central source is supplied directly to buildings through a network of pipes that carry hot water. More efficient than individual boilers, they can run off the excess heat produced by power plants or factories, for example.



### **Biogas**

Gases generated from organic matter or waste such as manure, sewage, food waste and plant material.



### **Waste-to-energy (or energy-from-waste) plants**

Heat generated from municipal waste by combustion or an advanced conversion process that produces gas/biogas.

To maximise affordability and effectiveness, these systems should only be installed in buildings that are energy efficient. Heat systems need to be supported by a range of other measures and infrastructure. These include smart systems, which ensure heating is only used when and where it's needed, and storage solutions that mean heat can be stored and used later. Reducing waste and optimising energy use in this way benefits both the energy network and the user.

### **Policy interventions**

Achieving the necessary number of low-carbon heat installations by 2030 will require a range of policy interventions to provide incentives, regulations and awareness-raising to drive action.



# WHAT IS STOPPING US?

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WWF engaged a group of 12 stakeholders in the heat sector in two roundtables to see what can be done to accelerate the transition to a low-carbon heat system.

They identified three main barriers to progress:



**The government has failed to put in place policies that will drive the deployment of low-carbon heat at the necessary scale.** Historically, energy policy has focused on the electricity sector rather than the heat sector. Aside from building regulation requirements, there have been relatively few policies and regulations that directly target the environmental performance of heating technologies. The importance of a transition to an energy-efficient and low-carbon heating system must be recognised and become a key government priority.



**There is insufficient consumer demand for low-carbon heat technologies.** Both consumers and installers are unfamiliar with low-carbon heat technologies, and there is little awareness and incentive to install them. Consumers often lack confidence in new and unfamiliar technologies, and the lack of advice available exacerbates this.



**There is insufficient governance and planning support for the deployment of low-carbon heat networks.** The construction of heat networks at the scale needed is a long-term infrastructure project requiring a strong governance system. Heat networks require upfront investment and an adequate customer base to underwrite the investment and overcome competition from existing gas and electricity networks.

# RECOMMENDATIONS FOR THE NEXT GOVERNMENT

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Our stakeholders identified three key areas for transforming the UK's heating system. To deliver sustainable and affordable low-carbon heat, WWF-UK calls upon the government to undertake the following actions:



## **Improve understanding of the low-carbon heat transition**

UK consumers and businesses need to embrace the transition to a system of low-carbon heating – and there are compelling economic, social and environmental reasons for them to do so. It's critical to unite around a common goal, by making the business case for low-carbon heat and creating an aspirational vision of a low-carbon future.

Government should take the lead in highlighting the long-term economic, energy-security and environmental benefits of low-carbon heat and develop a vision for low-carbon heat in the UK with a clear timeline for action for all stakeholders. Engaging people in the process of developing the vision will help to create a sense of shared ownership for the goals.

Industry and government need to work together to showcase low-carbon heat technologies, engaging with consumers to make the technologies desirable to people.

Industry should work to improve knowledge of technologies among national and local installers so they feel confident in recommending them to customers and have the appropriate skills to install them.



## **Drive action on low-carbon heat**

In the early stages of any transition there is a need to overcome inertia to drive the necessary take-up of new technologies. In the case of moving to a system of low-carbon heat, it is equally important that energy-efficiency policies integrate with heat policies to ensure measures are effective and overall costs for households are kept down. Consumers are a diverse group and a variety of policies is needed to increase demand for both energy efficiency and low-carbon heating.

Government should work with stakeholders to develop a comprehensive policy framework that both requires, and encourages, the uptake of low-carbon heat technologies through a package of incentives, regulations and awareness-raising. This should include legislation that sets a timeline for regulating improvements in energy efficiency and low-carbon heating.

Specific sectors, such as social housing, should act as early movers in retrofitting buildings with energy-efficiency measures and low-carbon heating technologies. This will help to inspire people by demonstrating what is possible and to kick-start the low-carbon heating industry.



### **Elevate the roll-out of low-carbon heat networks to a national infrastructure priority**

Heat networks are already being rolled out in urban areas with strong local leadership and vision. However, we need to connect many more homes and businesses to heat networks over the next 15 years. To enable this to happen, we need to support more areas to develop the necessary infrastructure.

Government needs to demonstrate strong leadership and commitment, with a coherent national plan for heat networks. It is making progress in this area with the Heat Network Delivery Unit, which should continue and expand over the next 10 years.

Government, local government institutions and industry should work together to develop ownership and governance structures that will ensure rapid delivery of quality networks at scale. Mechanisms are also needed to ensure building owners connect to heat networks.

To tackle the issue of upfront investment, low-cost finance should be made available to leverage equity and debt funding from public and private sources including the European Investment Bank, Green Investment Bank, funds and private investors.

# CASE STUDY: DENMARK, AN EXAMPLE OF LOW-CARBON HEAT LEADERSHIP

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When the oil crisis struck in the 1970s, Denmark and the UK reacted very differently. While the UK focused on North Sea oil and privatisation, the Danish government set out to reduce heat consumption and increase efficiency.

The Danish model is a decentralised combined heat and power (CHP) system. Nationwide, heat networks provide 60% of Denmark's space and water heating, rising to 98% in Copenhagen. This requires around 30% less fuel than using separate heat and power plants.

The Danish government made a long-term policy commitment with a consistent, coordinated strategy to support its transition to a low-carbon heat system. Policy instruments included regional heat plans, local powers requiring households to connect to heat networks, higher taxes for fossil fuels and a ban on electrical heating in buildings.





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**Further information:**

A pdf version of this report is available online at [wwf.org.uk/warmhomes](http://wwf.org.uk/warmhomes)

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# Heat in numbers

100%  
RECYCLED



1/3

Heat is responsible for around a third of the UK's greenhouse-gas emissions

3.6 MILLION

The UK needs to install at least 3.6 million new domestic heat pumps to meet our climate targets



50-60%

Solar water heaters typically provide 50-60% of annual hot water demand

98%

Heat networks provide 98% of space and water heating in Copenhagen



#### Why we are here

To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

[wwf.org.uk](http://wwf.org.uk)