

Switching the UK on to heat pumps



**green
alliance...**

Why we
need heat
pumps

We need to tackle heat

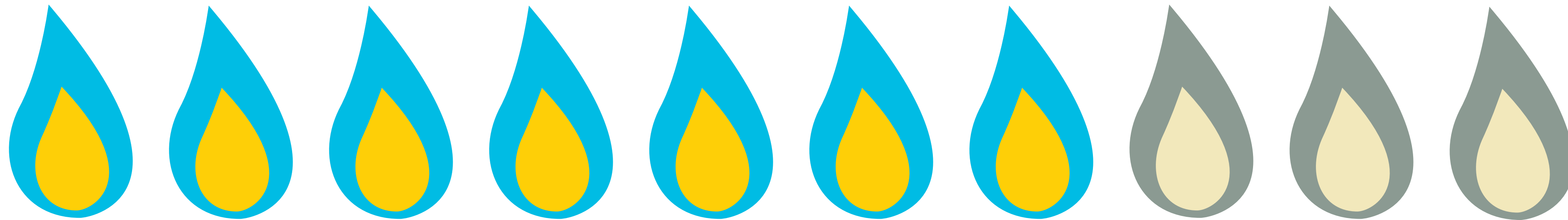
Nearly half the energy we use in the UK is used for heating



“green alliance...”

We need to tackle heat

70% of all heat currently comes from burning natural gas



We need to tackle heat

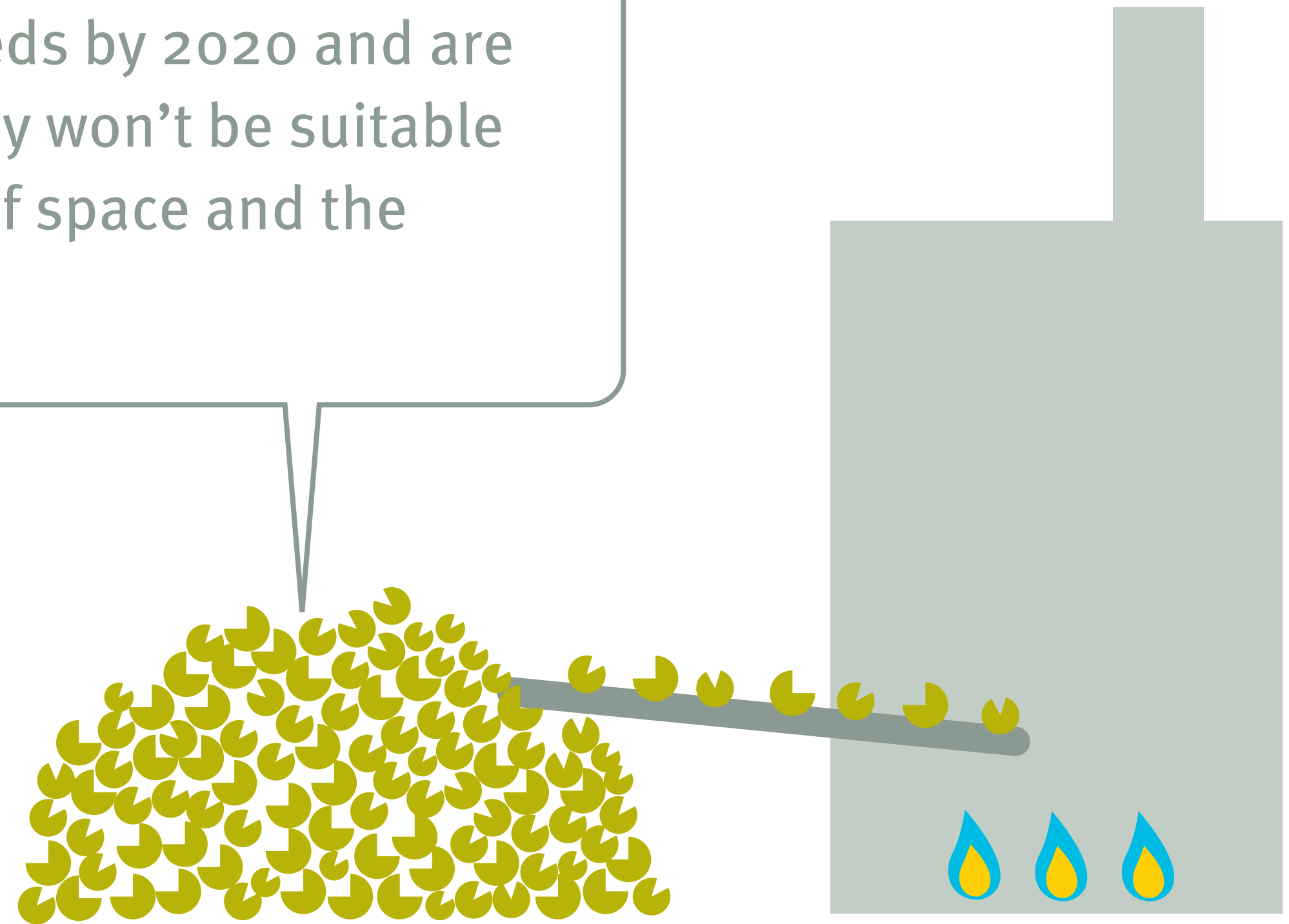
Heat is responsible for a third of the UK's
CO₂ emissions



What are the low carbon heating options?

1. Biomass

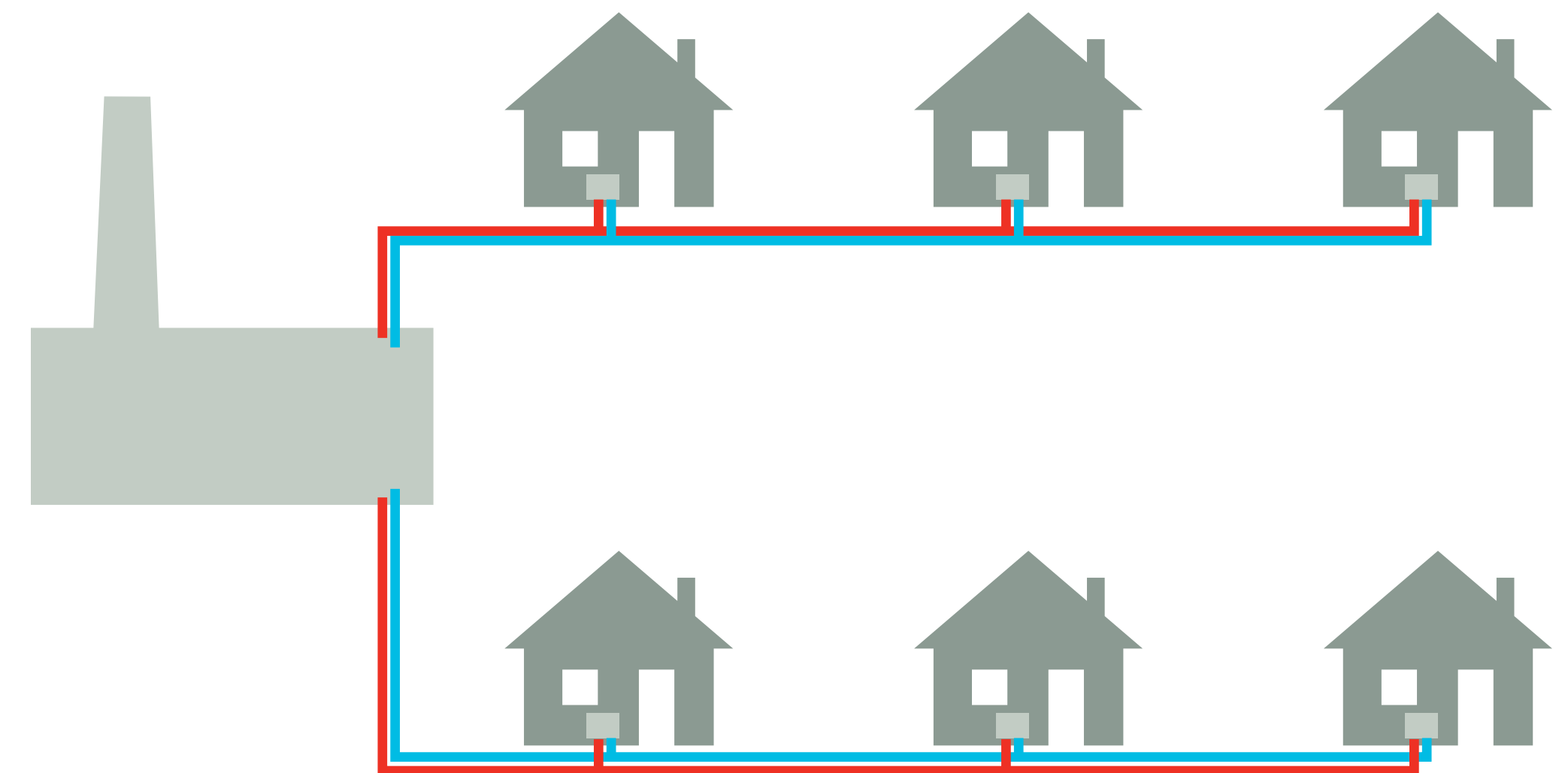
Biomass heating systems could contribute 6% of heating needs by 2020 and are a good way to heat large, off gas grid buildings. However, they won't be suitable for many properties: biomass heating systems take up a lot of space and the need for fuel delivery may put people off.



What are the low carbon heating options?

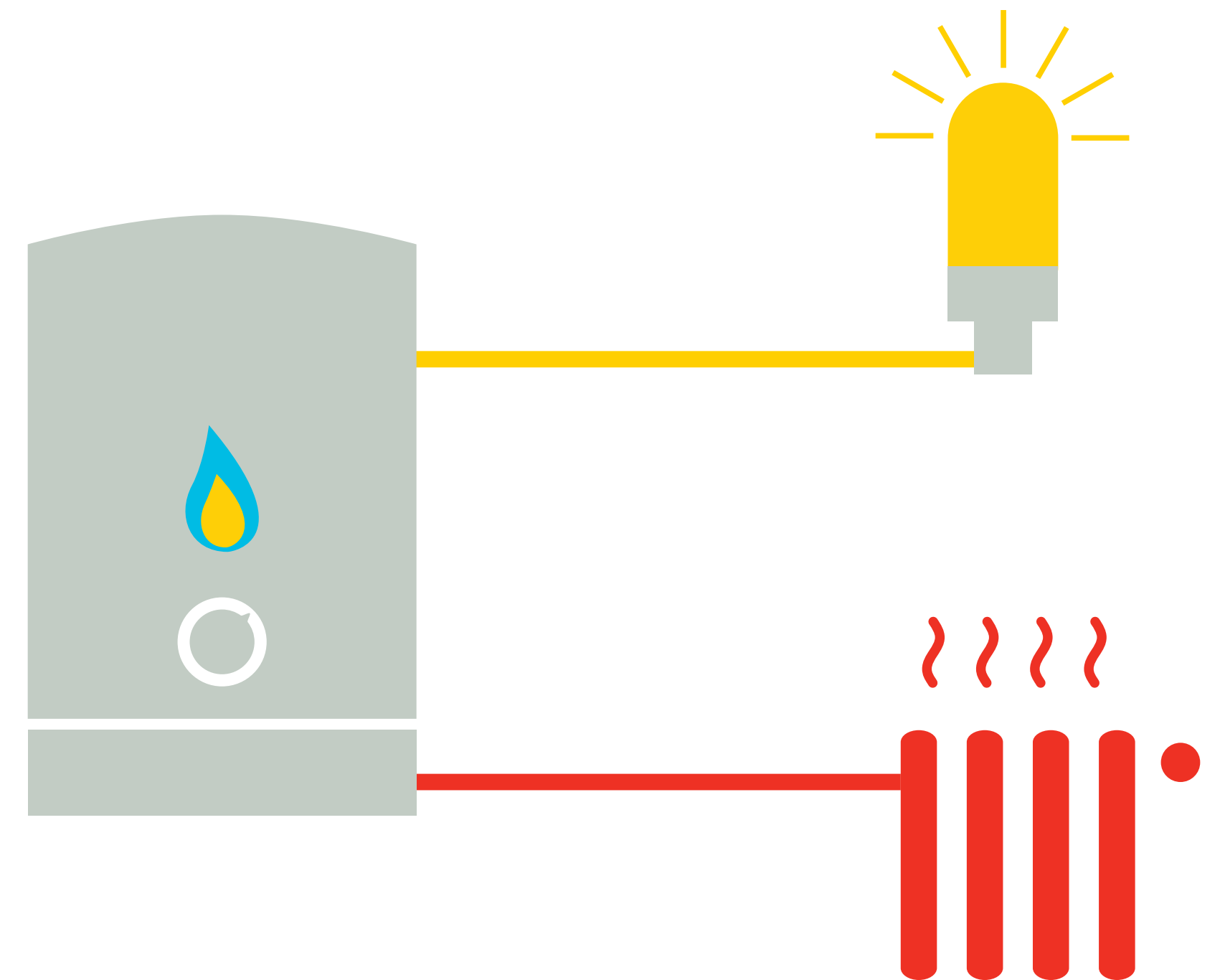
2. Low carbon heat network

Heat networks can be powered by efficient gas systems in the short term and large biomass or heat pump systems in the future. But they are unsuitable for less dense suburban and rural areas. Installation also requires significant upfront investment and is disruptive.



What are the low carbon heating options?

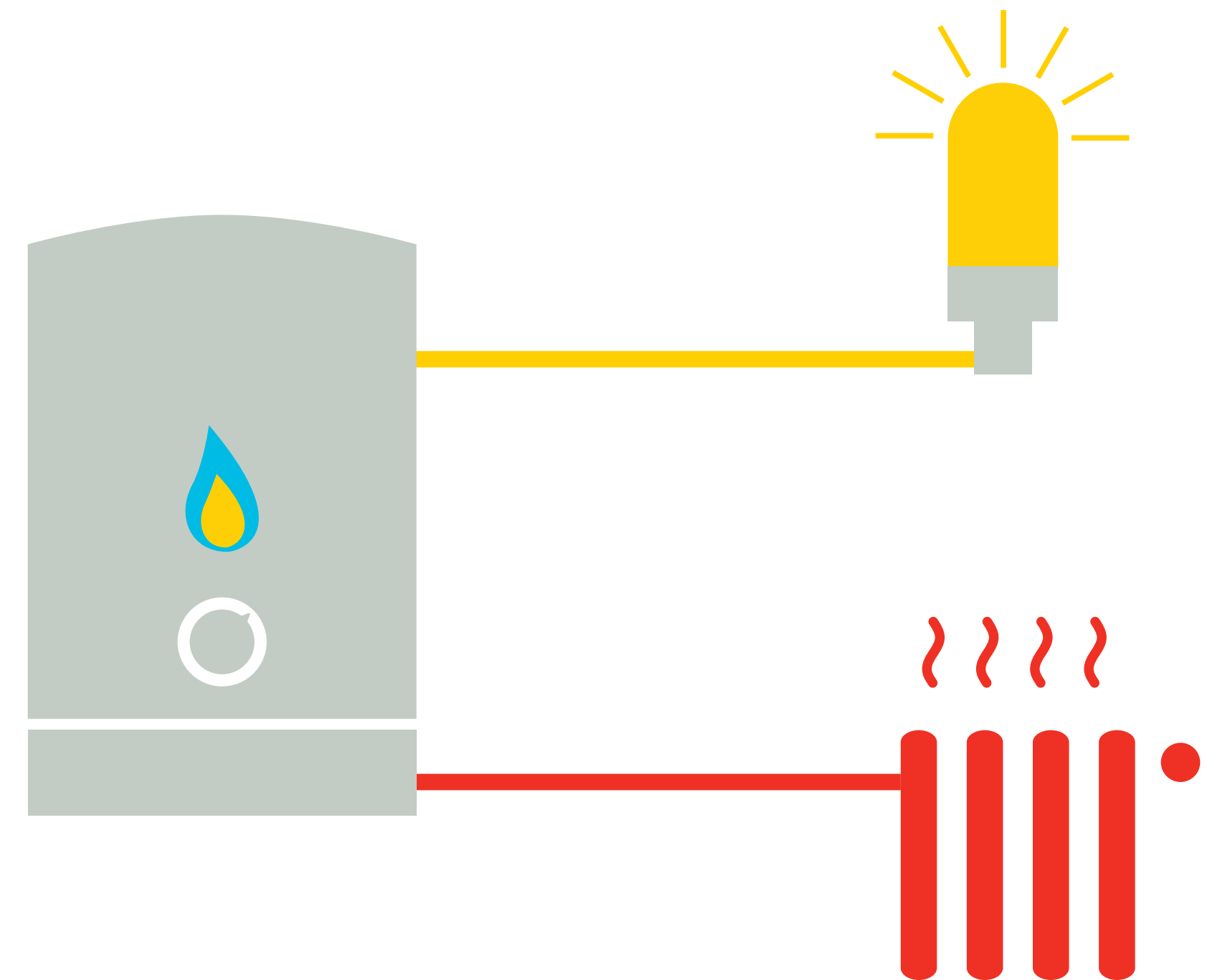
3. Ultra efficient gas based technologies



What are the low carbon heating options?

3. Ultra efficient gas based technologies

Technologies such as combined heat and power (CHP) using natural gas can play an important role but still emit CO₂. They can run on increasing amounts of biogas but they will remain largely fossil fuel-based as supply of biogas is limited (likely to be only 4% of total gas demand in 2050).

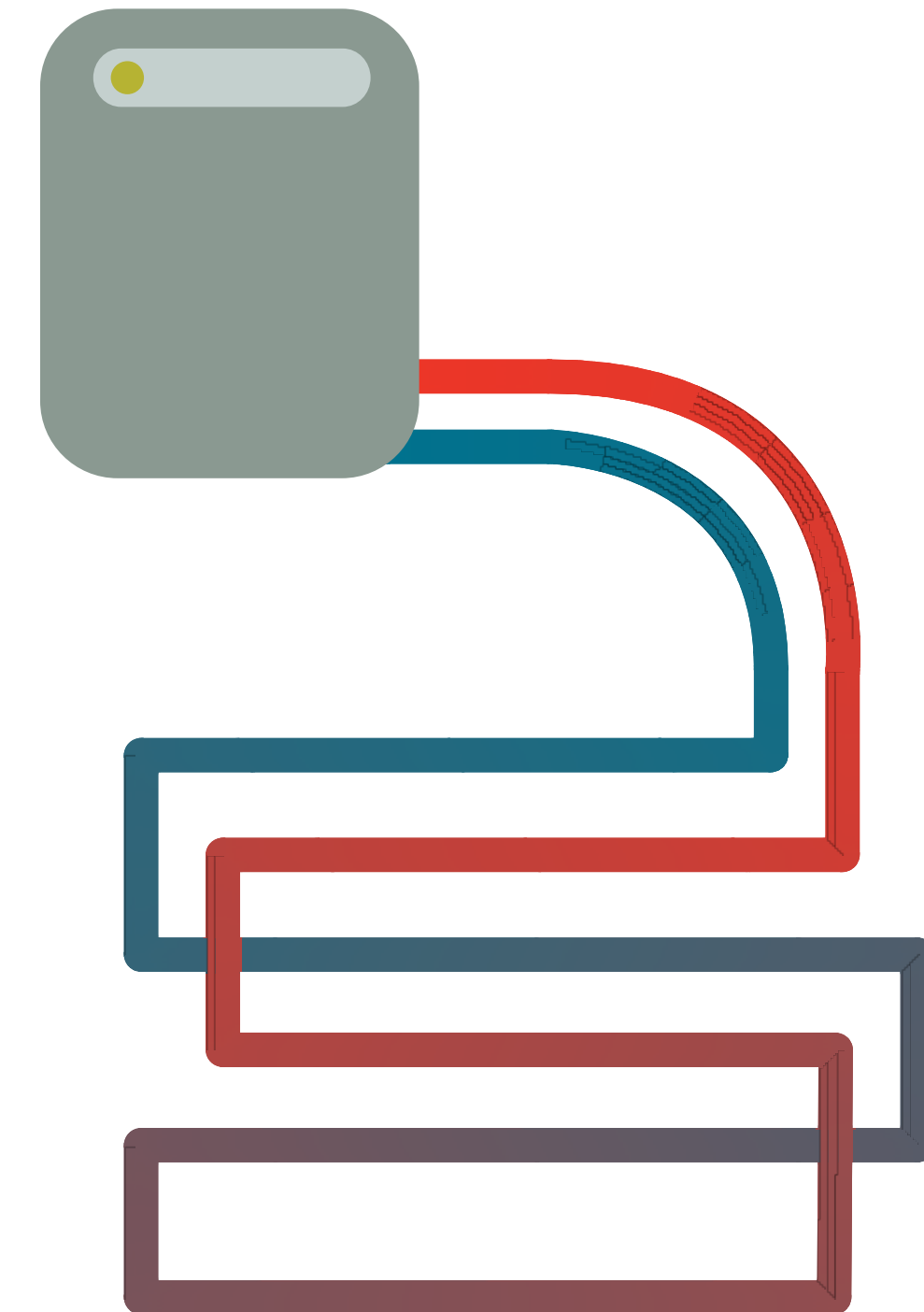


What are the low carbon heating options?

4. Heat pumps

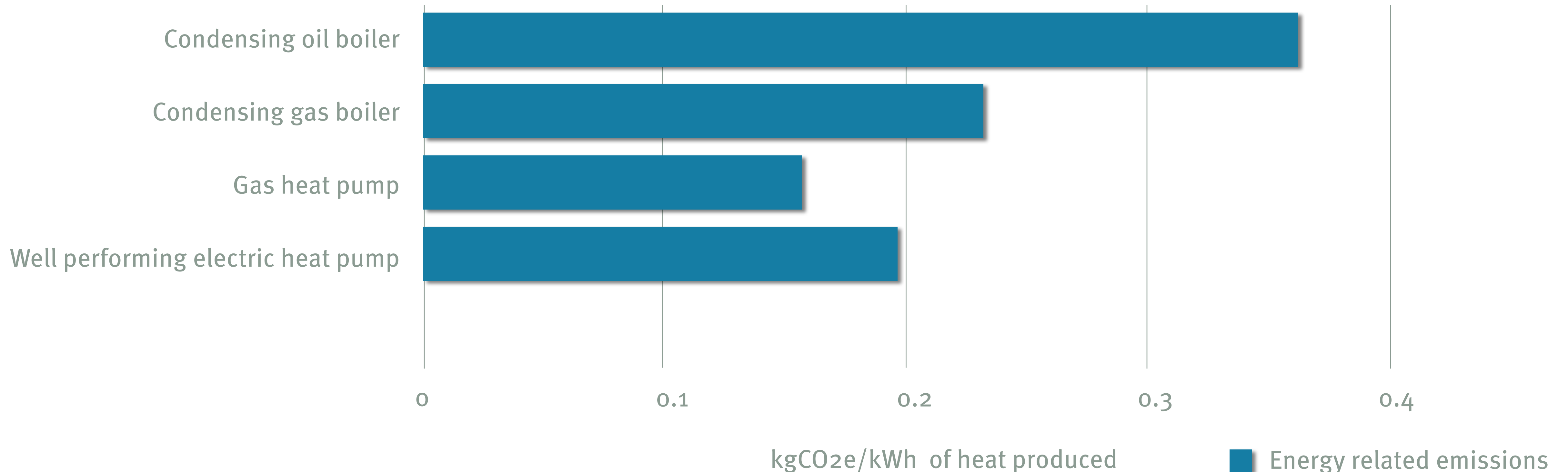
Heat pumps are suitable for most buildings. Ground source pumps are the most efficient, although they often require deep, vertical boreholes in densely populated areas. Air source pumps can be fitted to most buildings. Hybrid heat pumps, that burn gas to meet peak heat demand and minimise the use of electricity, may be a good option in large buildings.

Heat pumps are the best and lowest carbon option where other low carbon options aren't technically possible or are limited in scale.



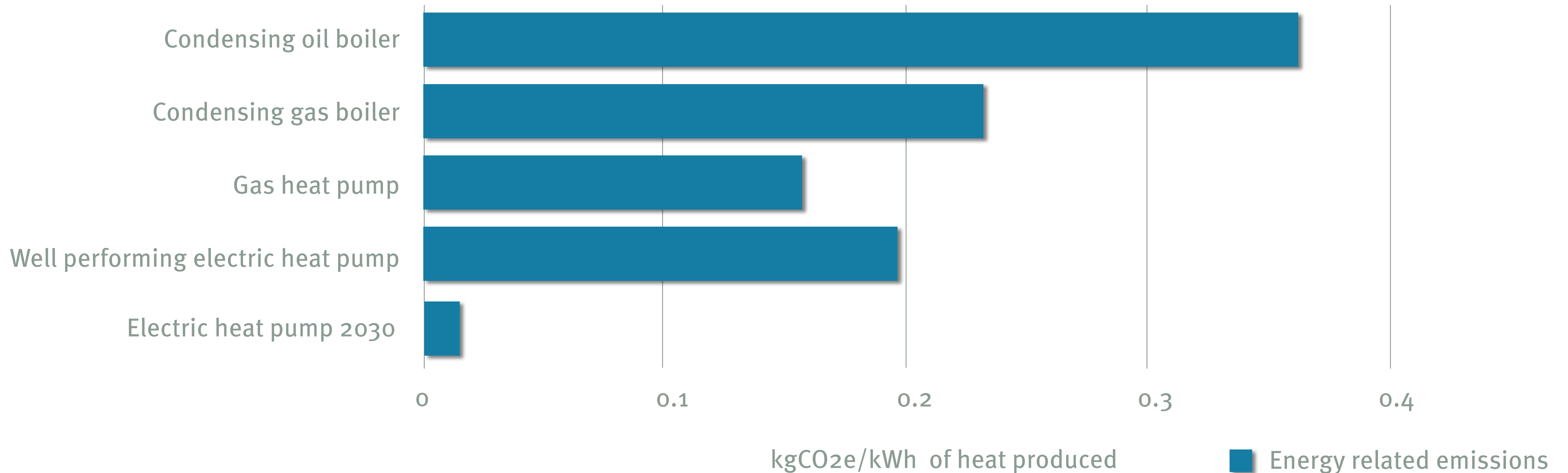
Heat pumps are needed for decarbonisation

A well performing ground source heat pump produces lower carbon heat than a gas boiler (energy related emissions)



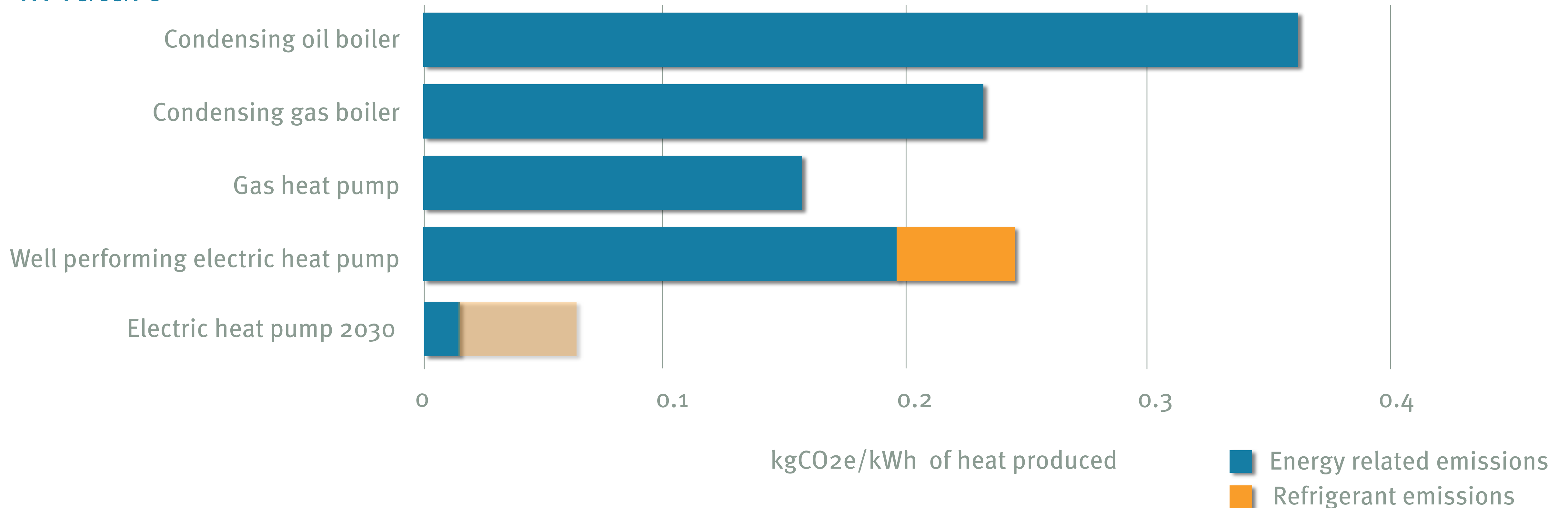
Heat pumps are needed for decarbonisation

And other low carbon options won't be low carbon enough in the longer term



Heat pumps are needed for decarbonisation

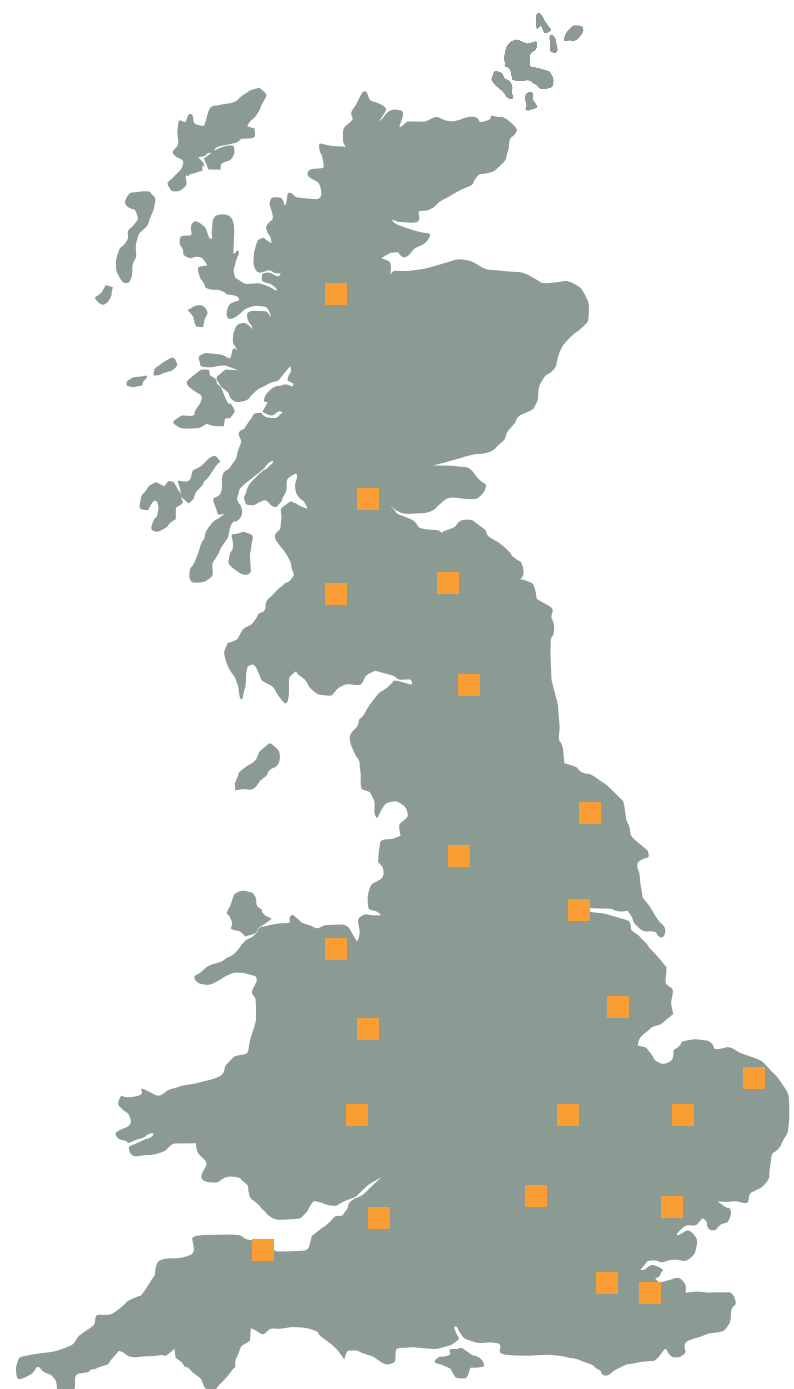
Although **refrigerant emissions** are fairly high – new heat pumps that use CO₂ or other refrigerants with a low Global Warming Potential could be used in future



All future low carbon scenarios require lots of heat pumps

2012

53,000 estimated (based on Heating and Hot Water Task Force; EST and Open University)

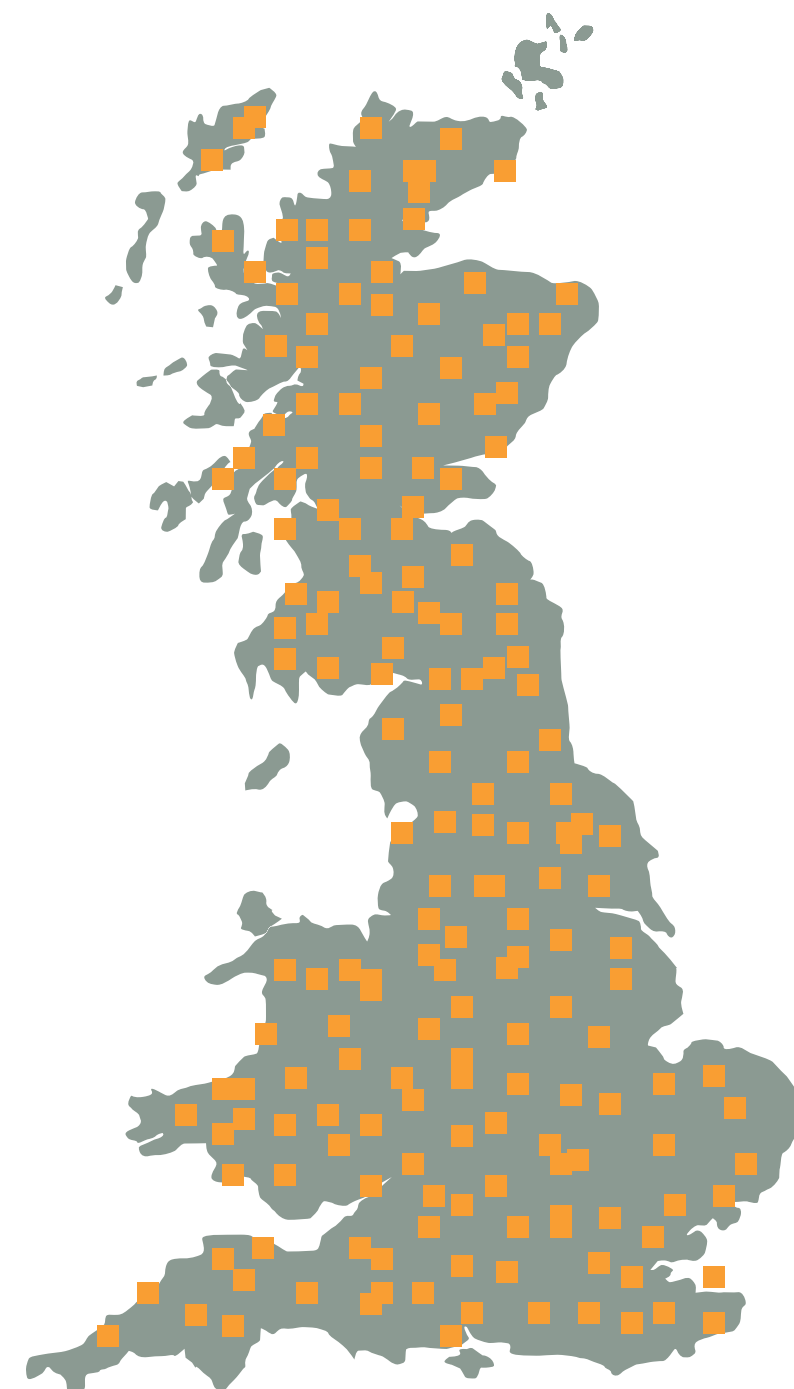


2020s

600,000 (2020) Committee on Climate Change

Around 1.5m (2020) National Grid Gone Green scenario

4.7 million (2025) Delta-ee Balanced Transition scenario

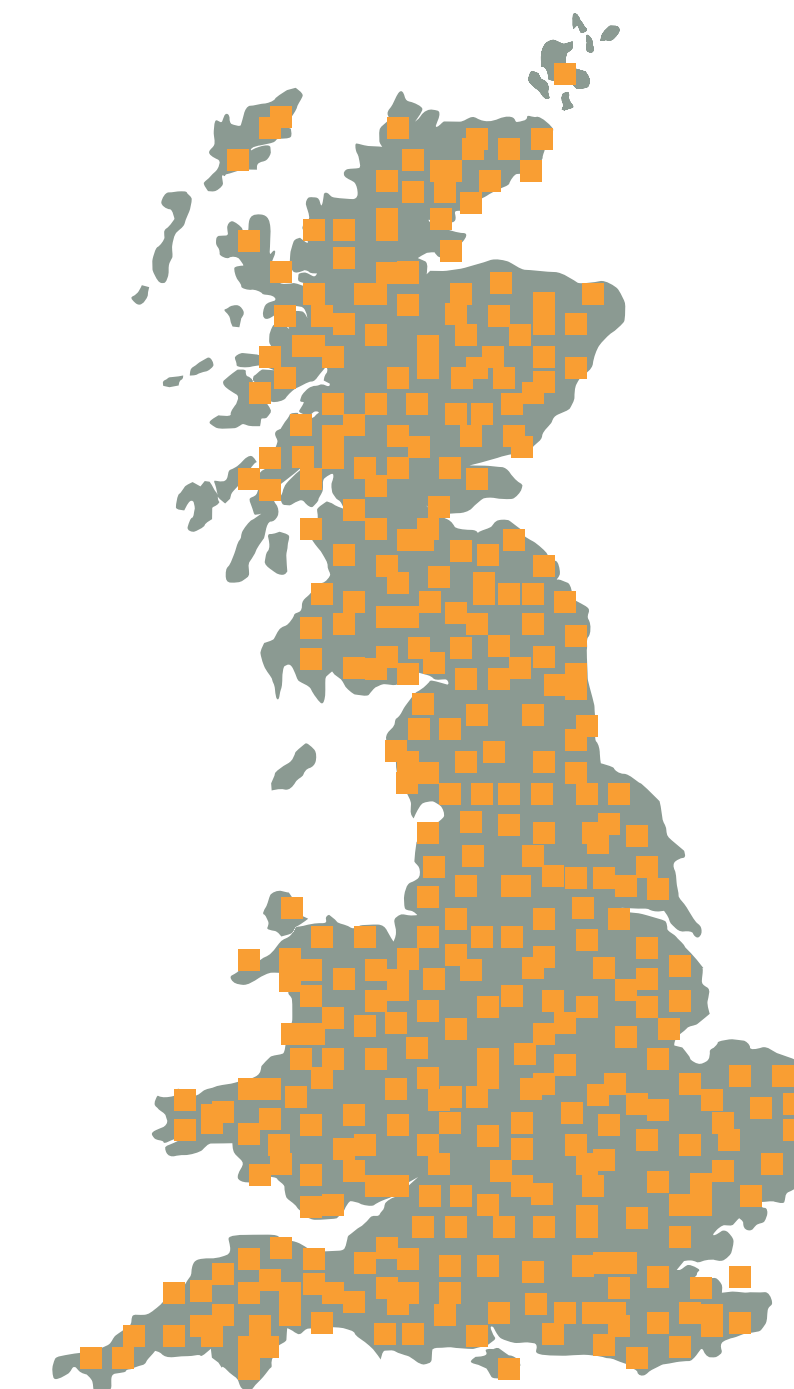


2030s

6.8 million (2030) Committee on Climate Change

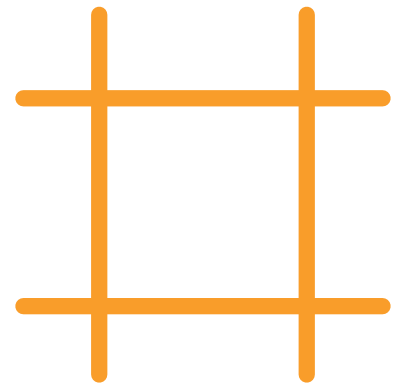
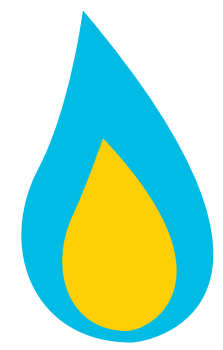
Around 9m (2030) National Grid Gone Green scenario

9.2 million (2035) Delta-ee Balanced Transition scenario



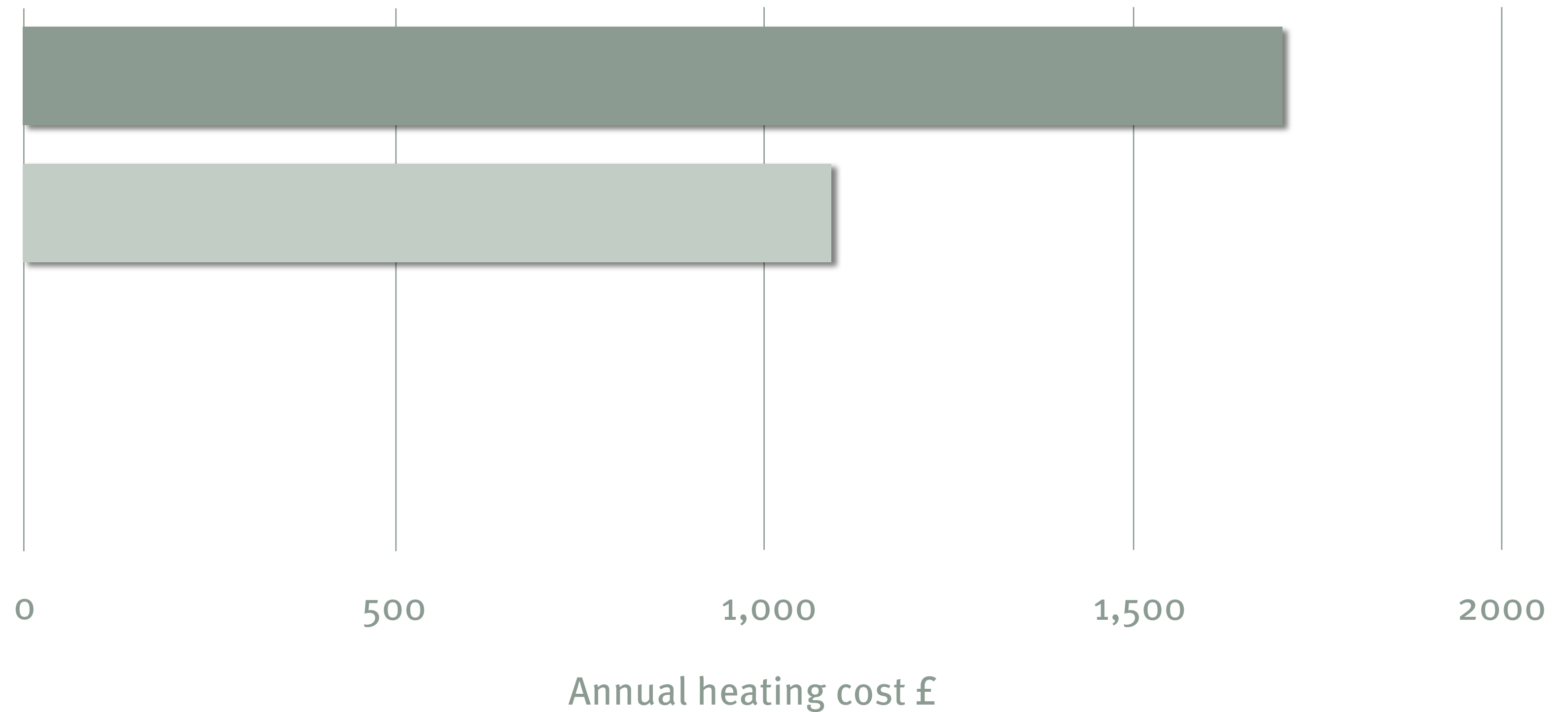
Heat pumps can reduce heating bills

Significant savings can be made for a typical property off the gas grid, if switching from an oil boiler to a well performing heat pump



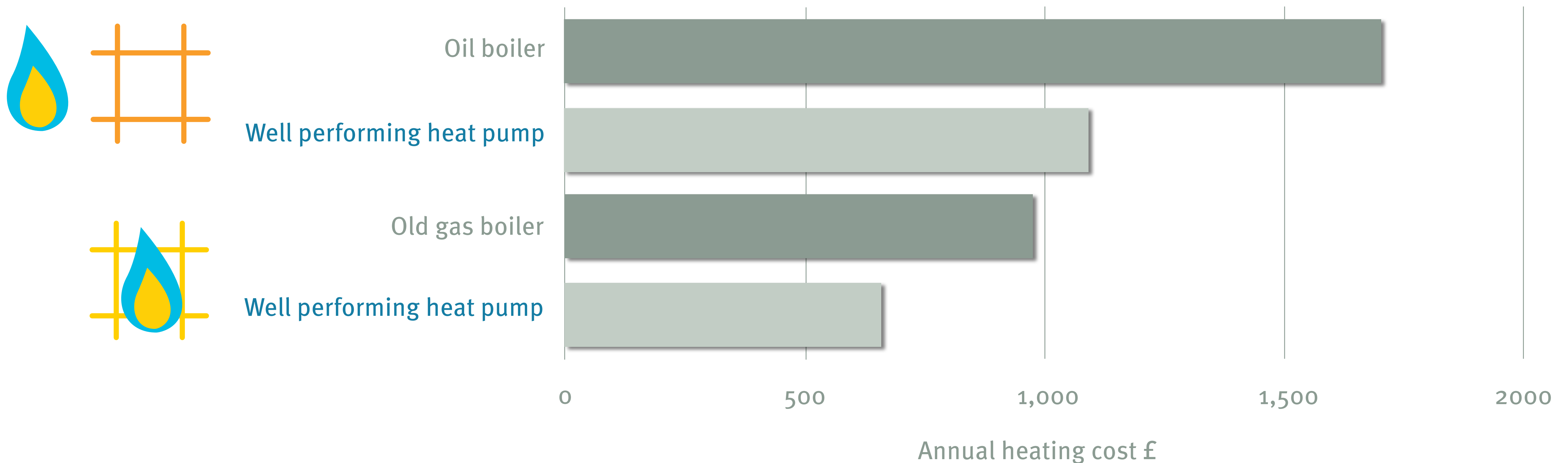
Well performing heat pump

Oil boiler



Heat pumps can reduce heating bills

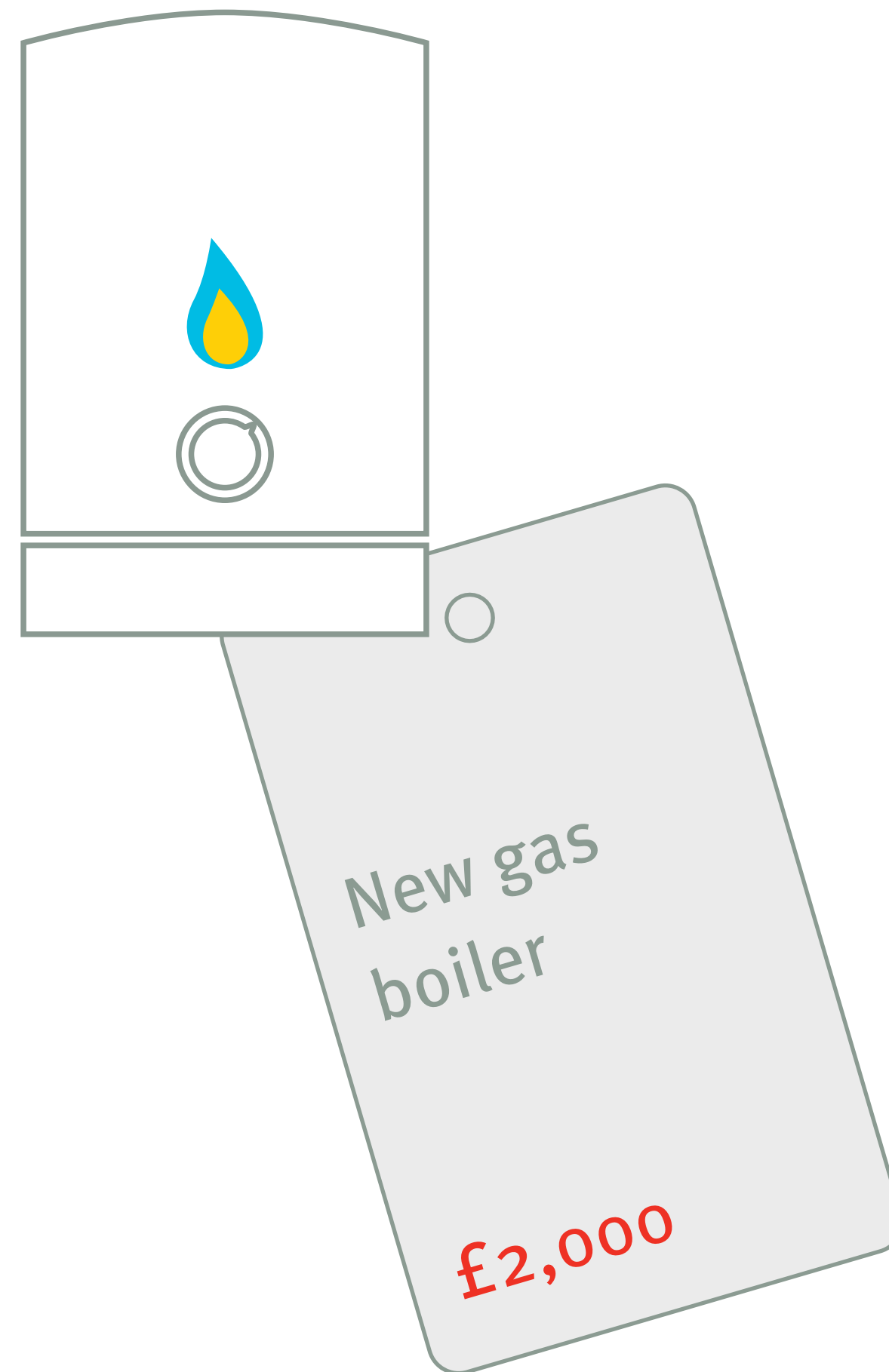
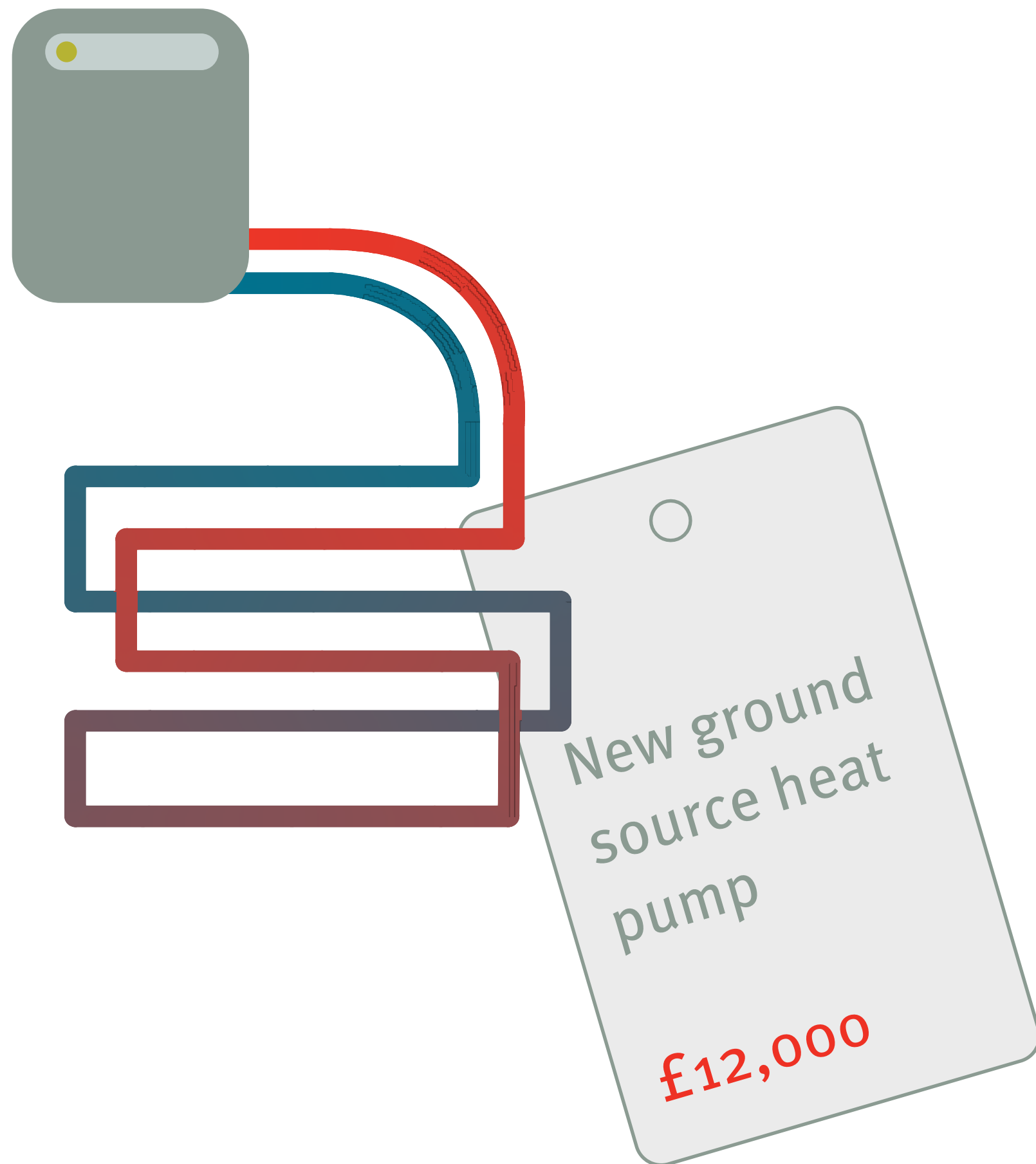
Typical properties on the gas grid can save too, if they switch from an old non-condensing gas boiler to a heat pump



Why aren't
people installing
heat pumps?

Heat pumps have high upfront cost

Example costs of system and installation



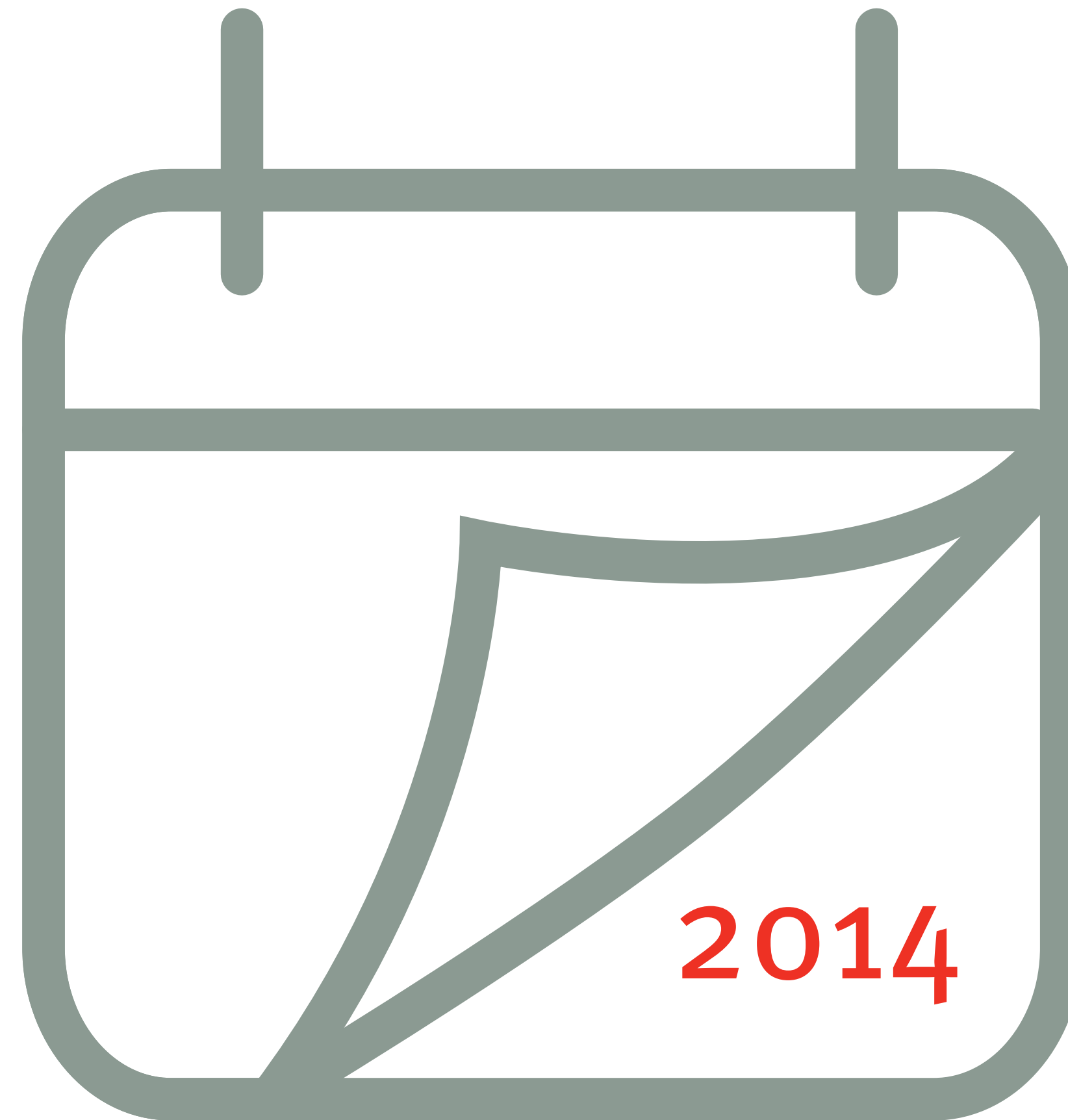
The government is trying to help

But only **47** heat pumps have been installed under the current non-domestic government support scheme so far

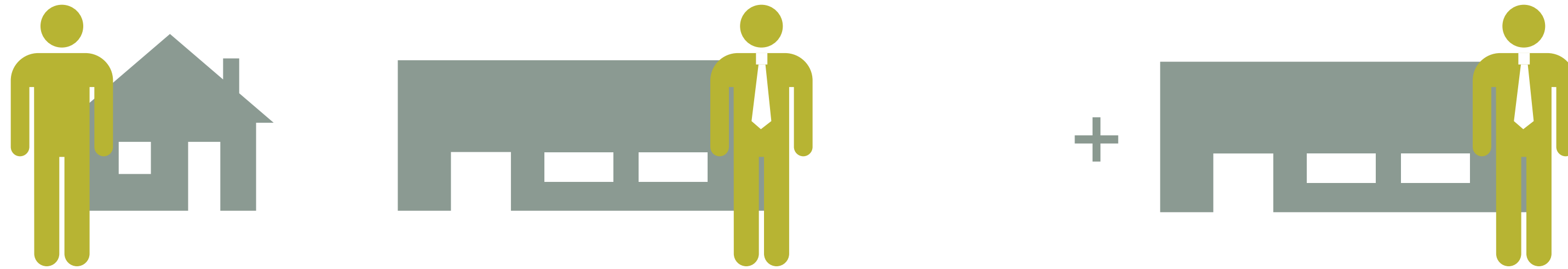


The government is trying to help

And domestic incentive payments
have been delayed until spring 2014



Financial incentives aren't enough



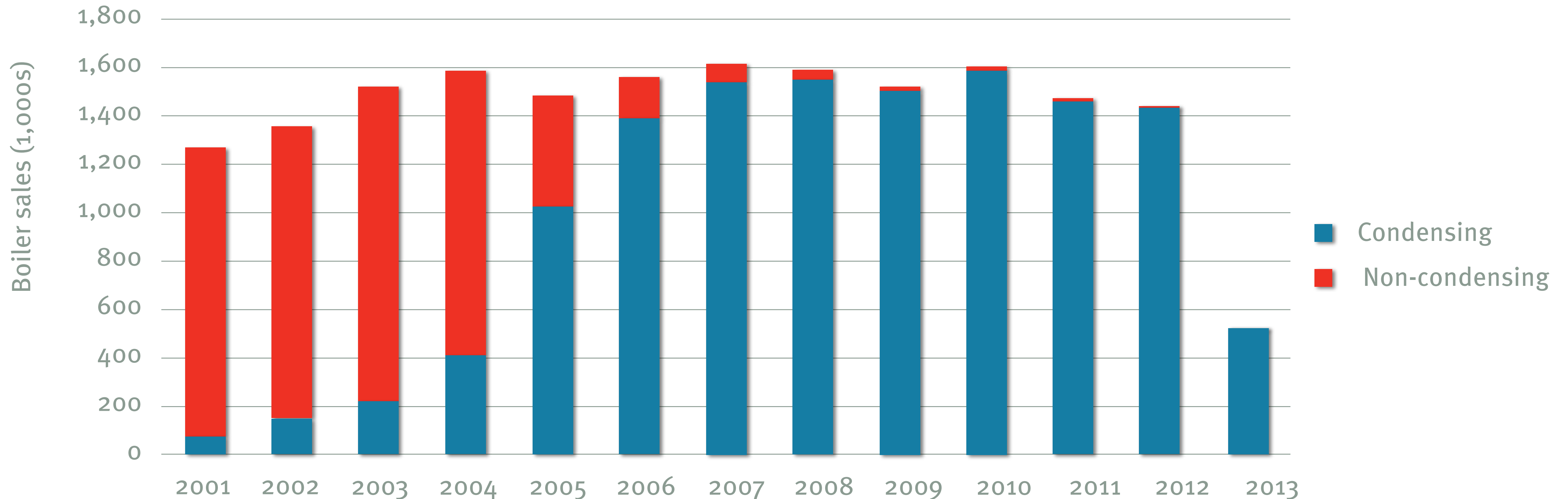
- People are wary of new systems
- Most installers aren't skilled to specify or fit heat pumps
- Installation of a heat pump and system can be disruptive
- People like the convenience of gas heating systems
- Boilers are often a 'distress purchase'
- Tenants have no control over their heating systems

- Payback timescales for heat pumps are too long for many businesses
- Business qualification for government support is uncertain and complex

Transforming
the heat pump
market

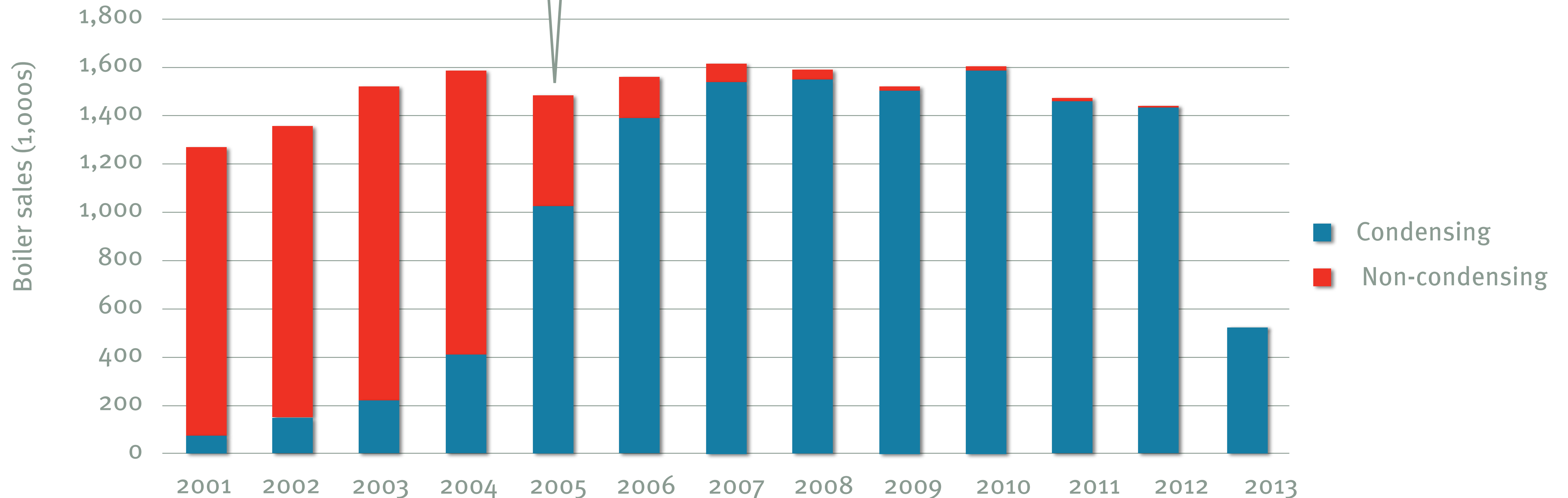
The need to regulate

Significant changes to heating systems have only happened as a result of regulation, eg the switch to energy efficient condensing boilers



The need to regulate

In 2005 the government banned inefficient boilers. Now only condensing boilers that are 88% efficient or more can be installed.



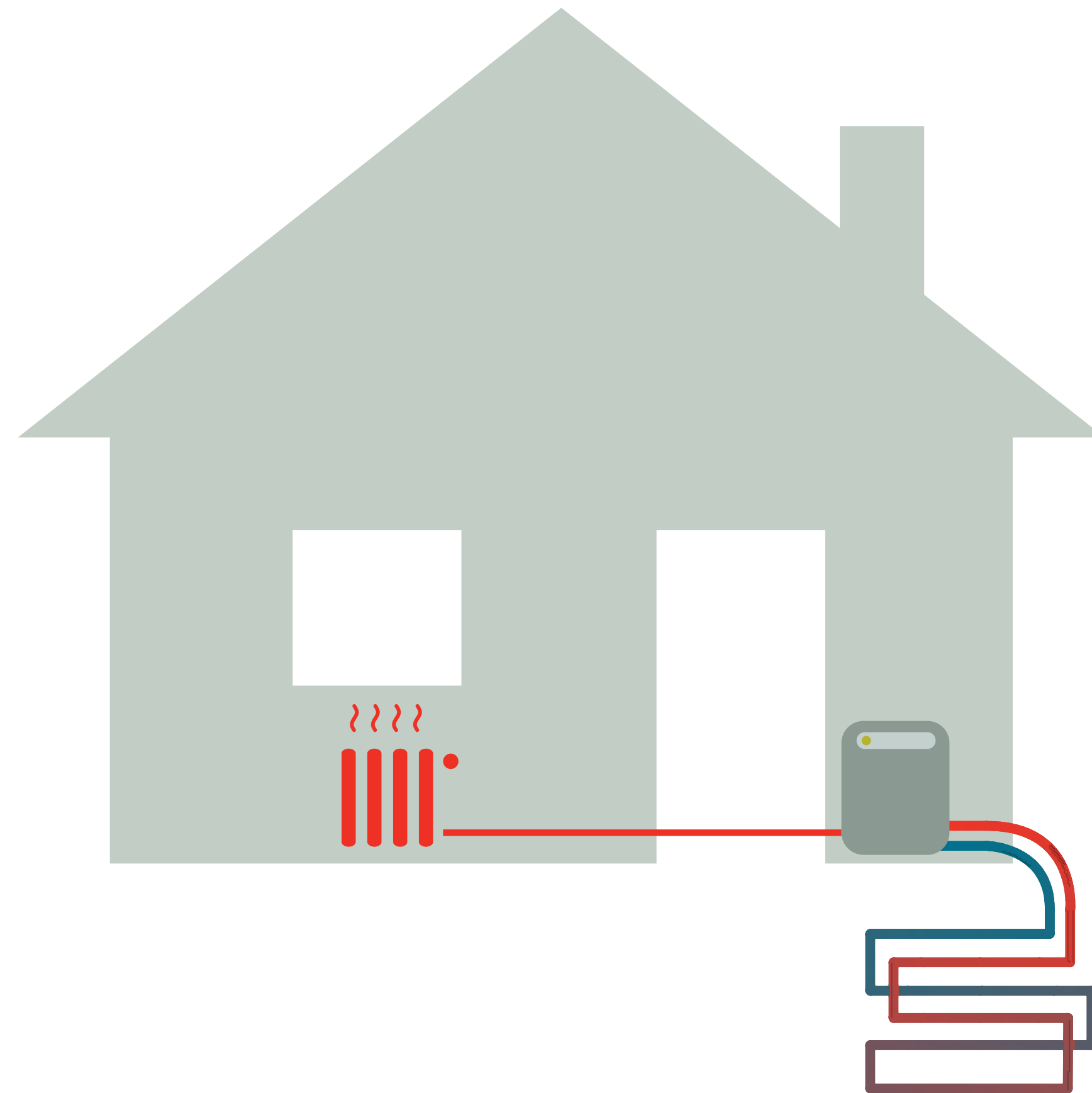
Regulate new build for lowest carbon heating

New buildings should be built to passive house standards so they don't need heating systems



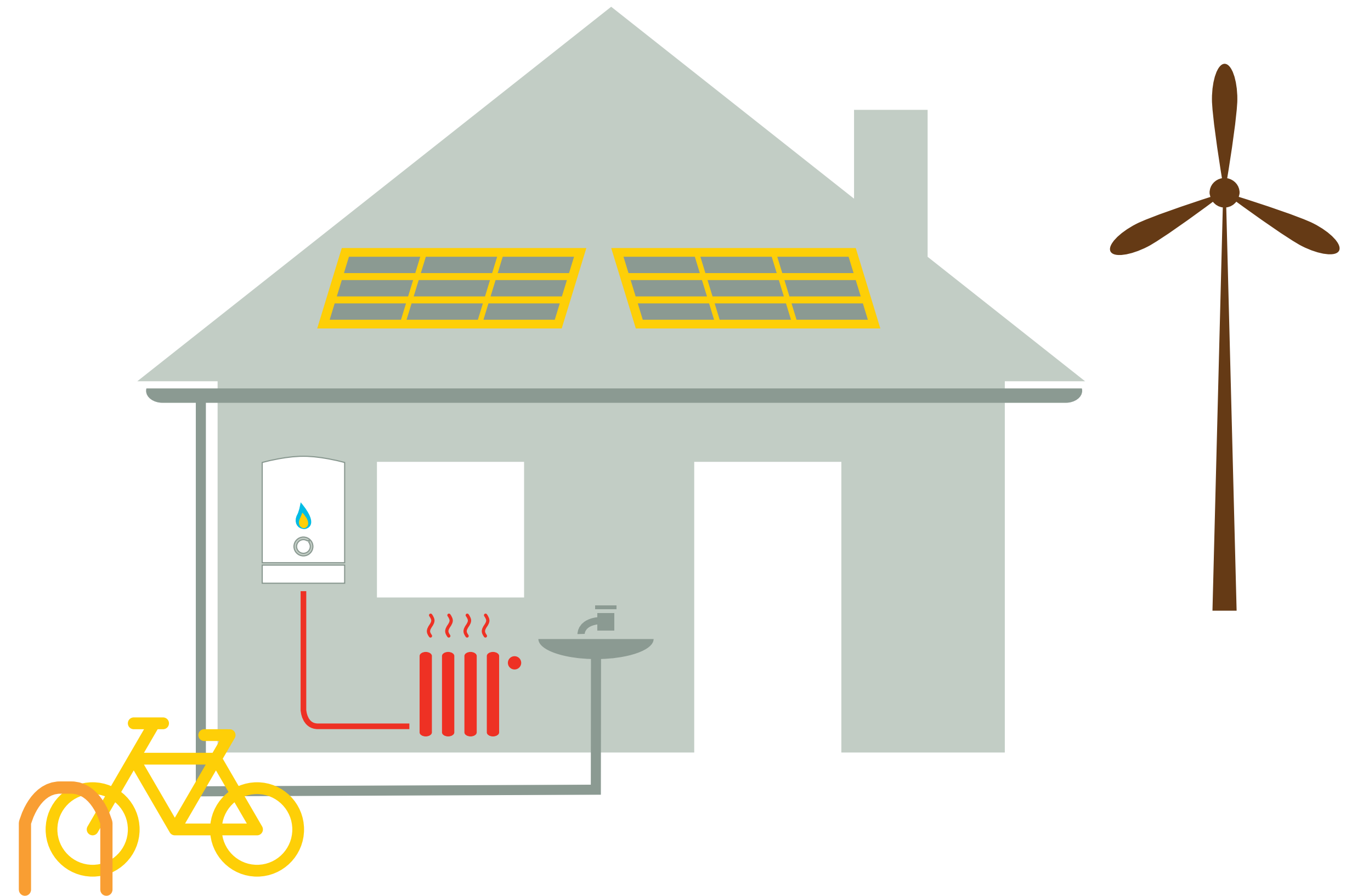
Regulate new build for lowest carbon heating

If they have to have heating, it should be with a heat pump and not a gas boiler



Regulate new build for lowest carbon heating

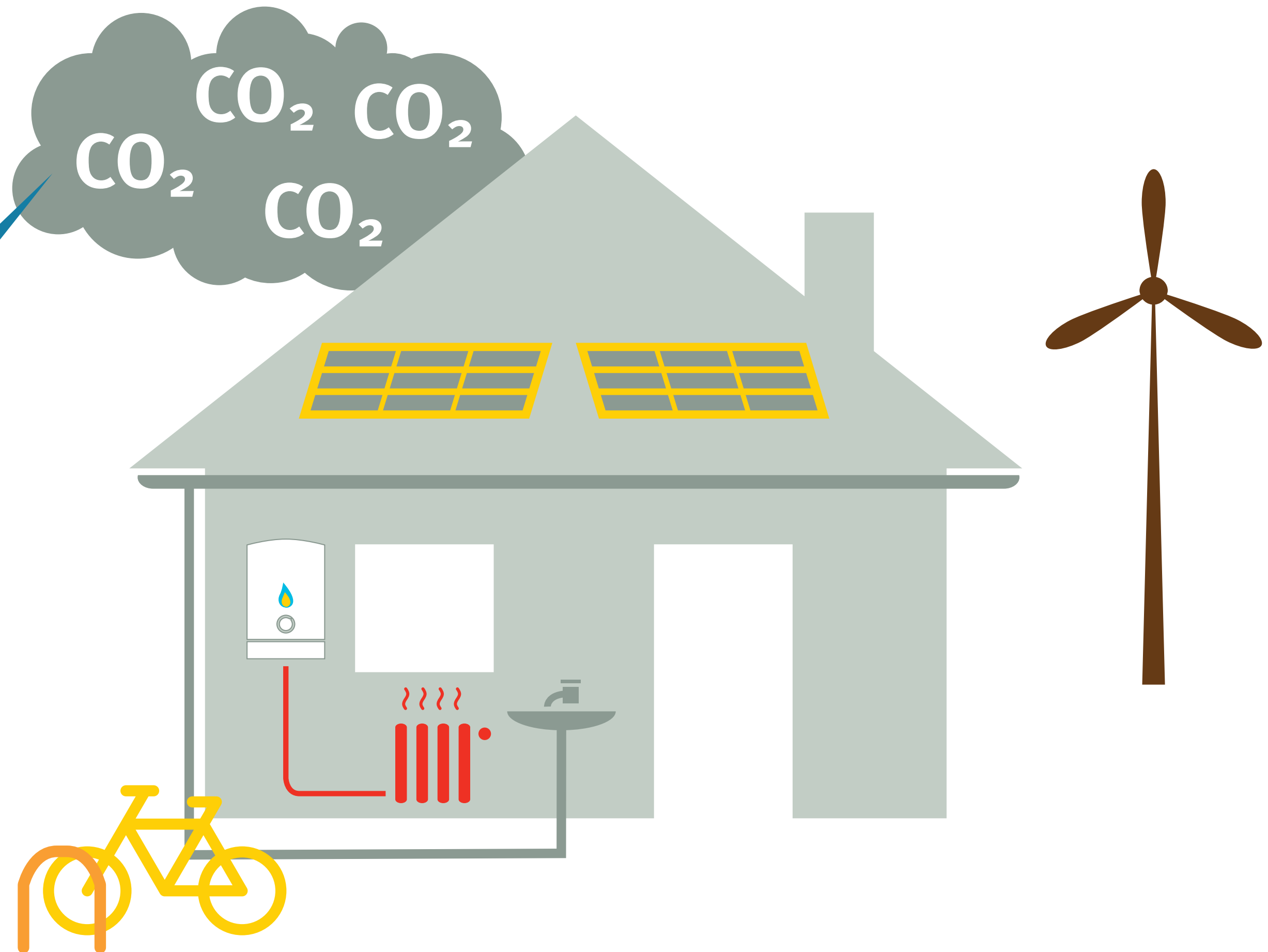
But, current and proposed building regulations won't necessarily drive low carbon heating in new buildings



Regulate new build for lowest carbon heating

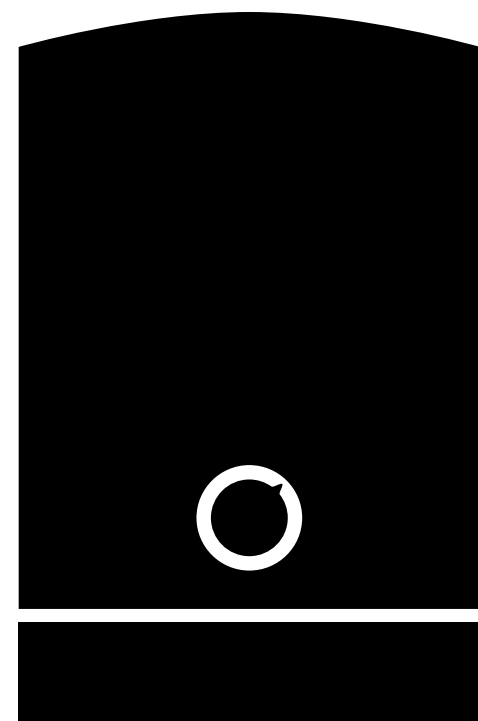
But, current and proposed building regulations won't necessarily drive low carbon heating in new buildings

Zero carbon standards aren't ambitious enough: good ratings can still be achieved under the Code for Sustainable Homes and BREEAM if gas heating is used combined with other green measures. The government should adopt a stricter zero carbon definition to eliminate the need for heating or, at minimum, ensure lowest carbon and renewable heating, which will reduce the burden on government support funding (the Renewable Heat Incentive).

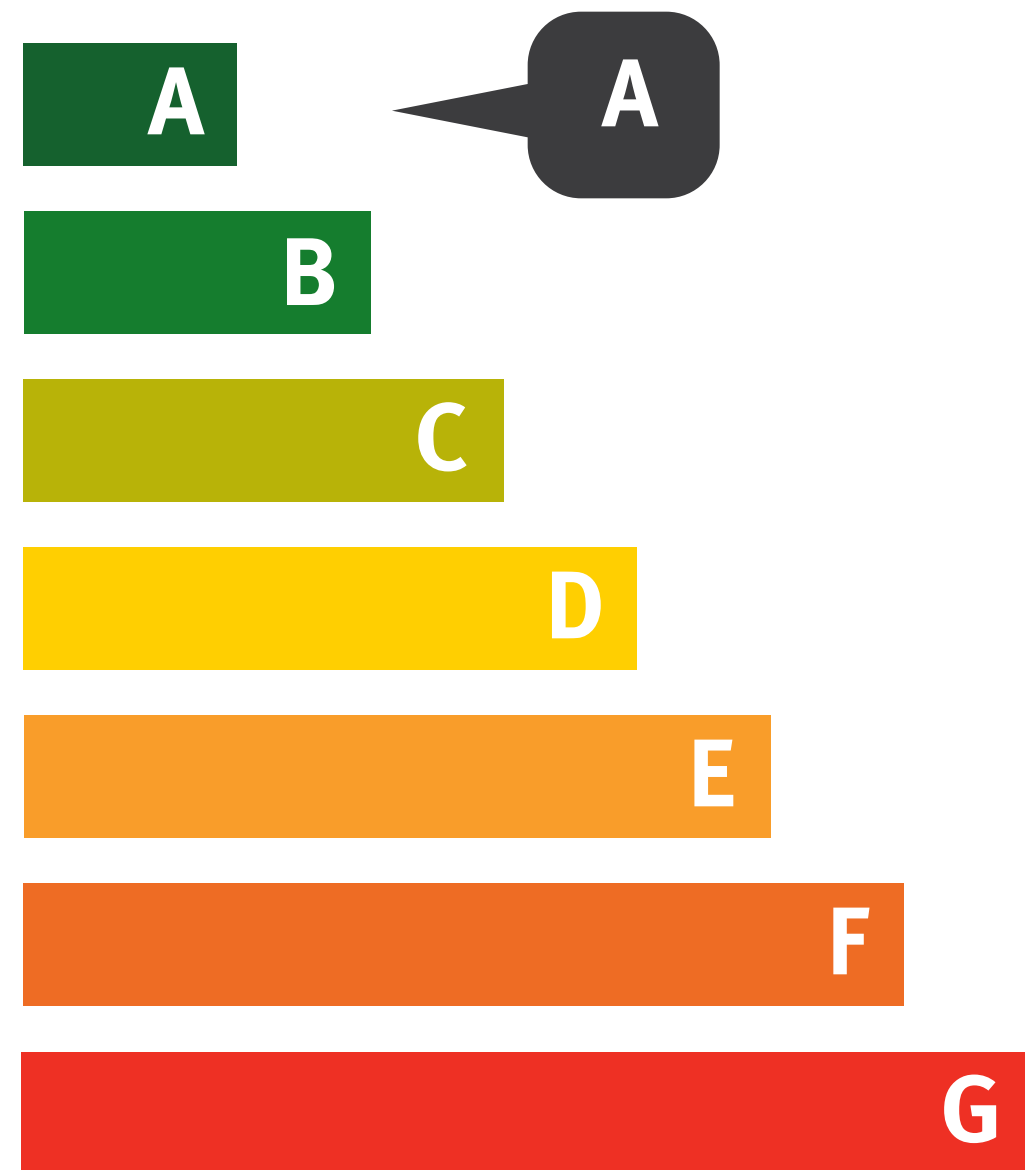


Target boiler replacement

Energy efficiency standards mean an 88% efficient oil boiler can be fitted
But this still has relatively high carbon emissions

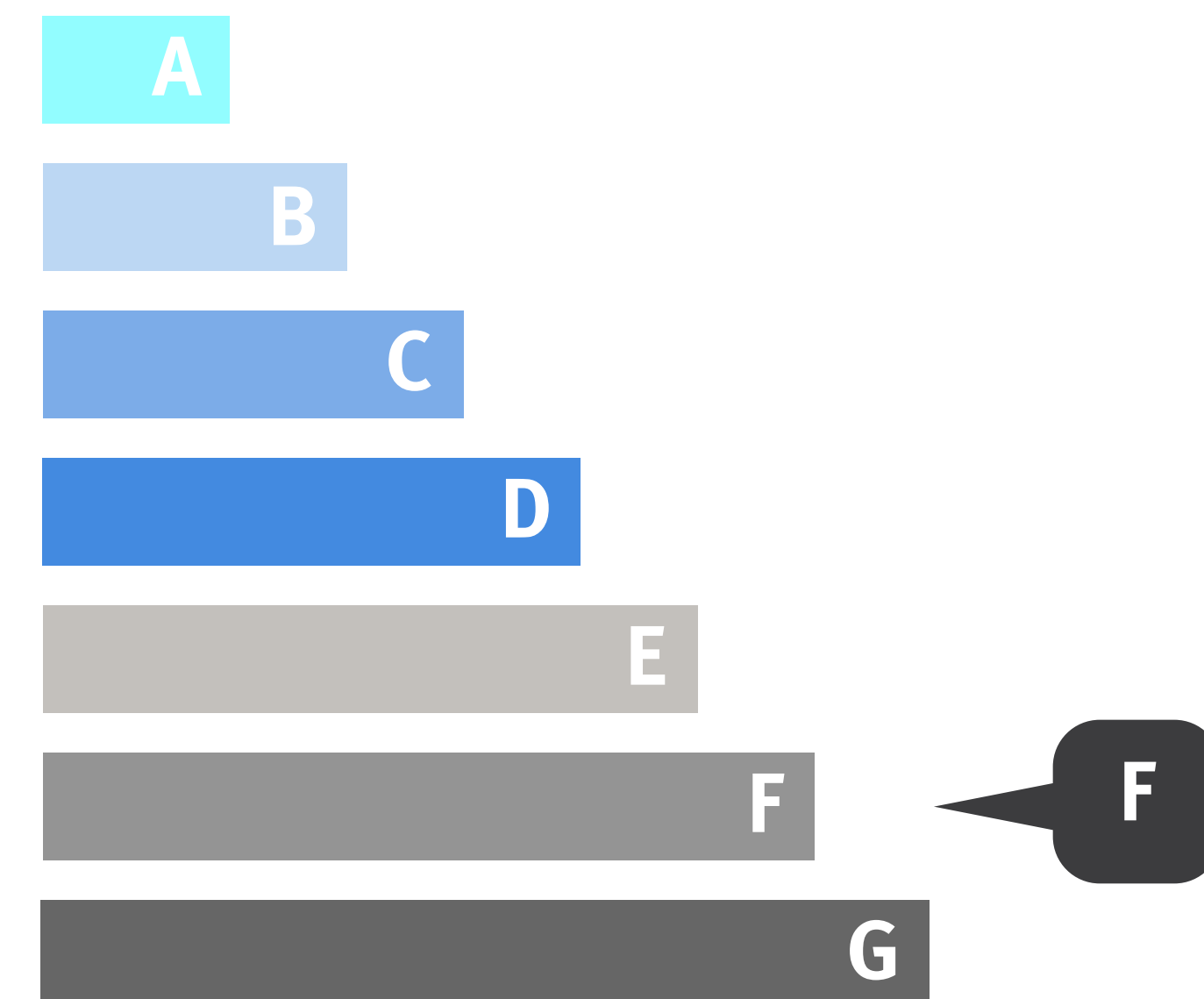


Energy efficiency rating
More efficient



Less efficient

CO₂ rating
Lower CO₂ emissions

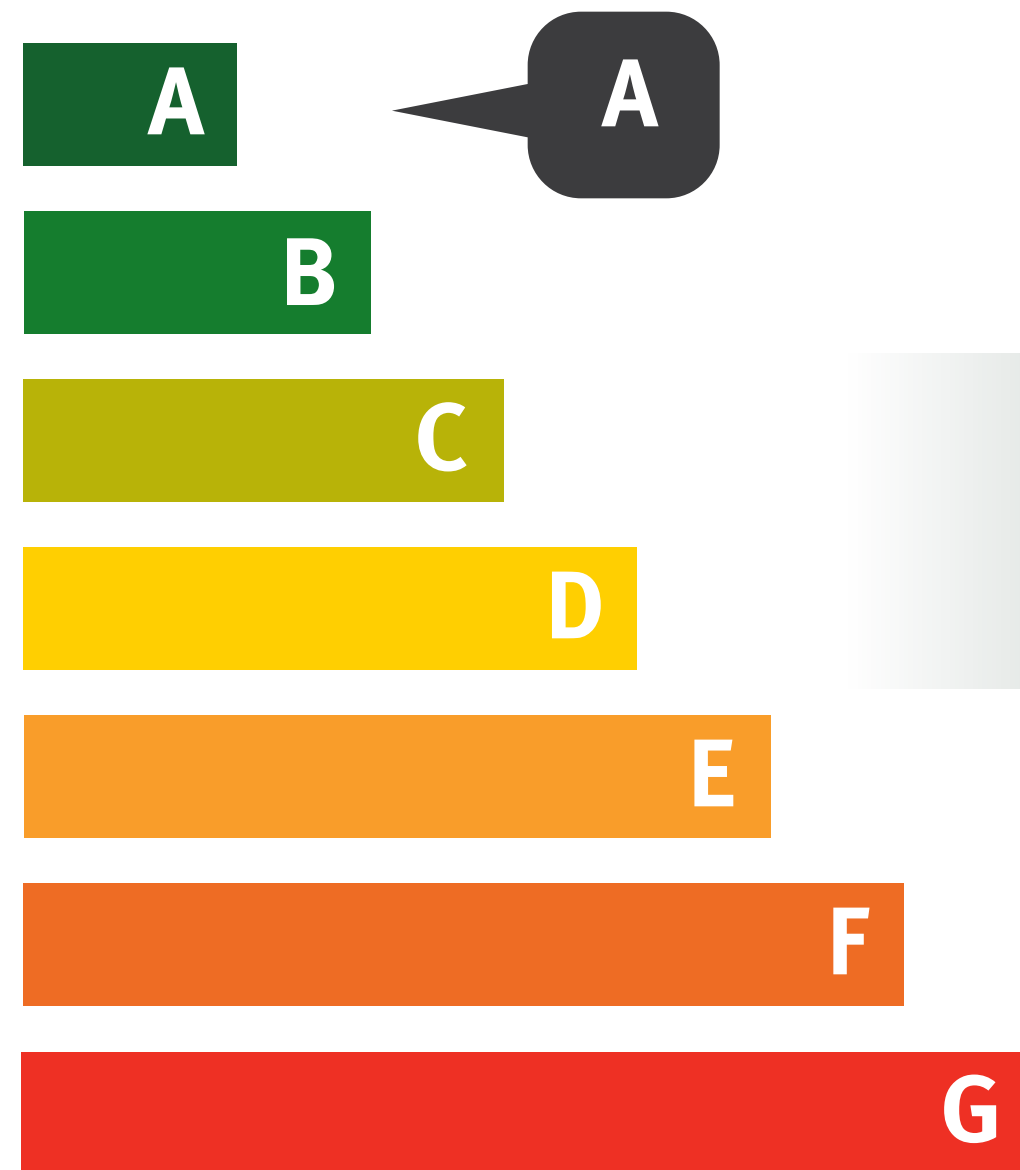


Higher CO₂ emissions

Target boiler replacement

Boiler standards need to change from energy efficiency to carbon emissions

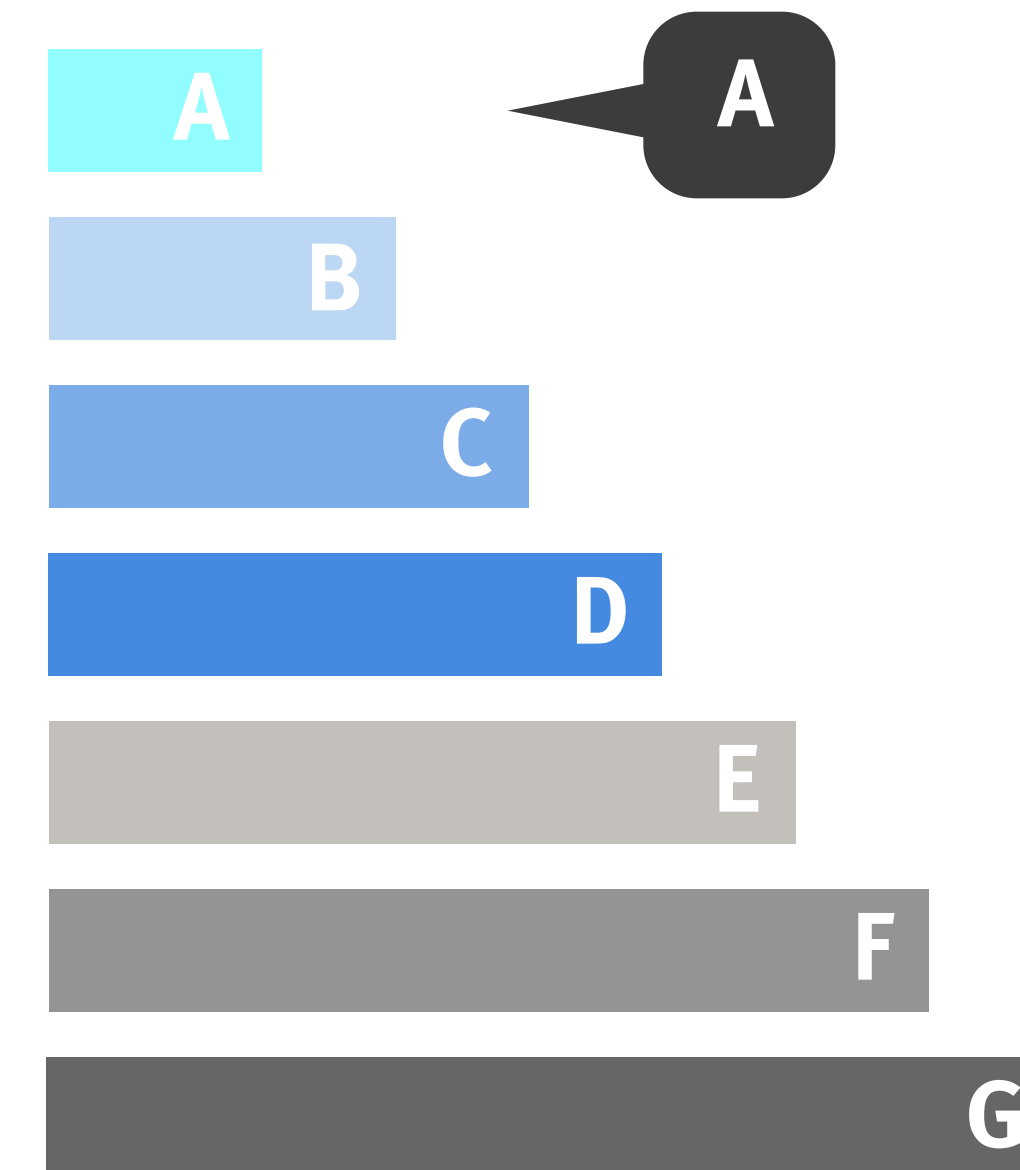
Energy efficiency rating
More efficient



Less efficient



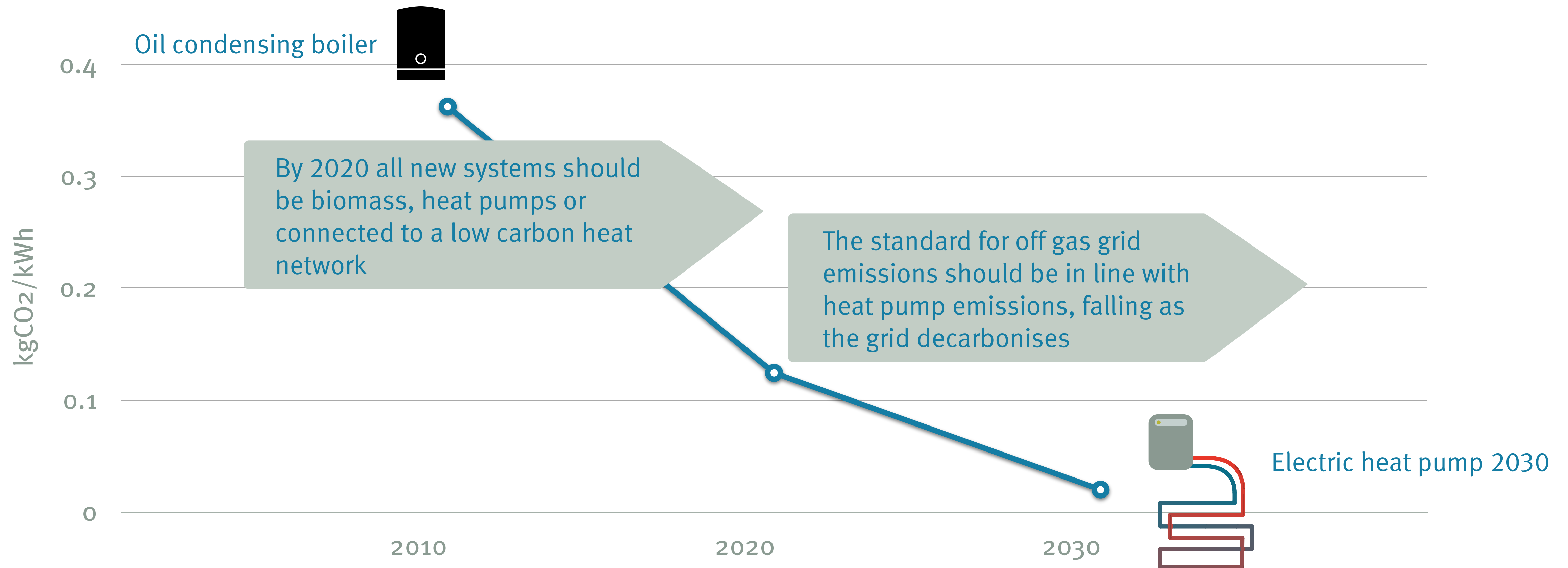
CO₂ rating
Lower CO₂ emissions



Higher CO₂ emissions

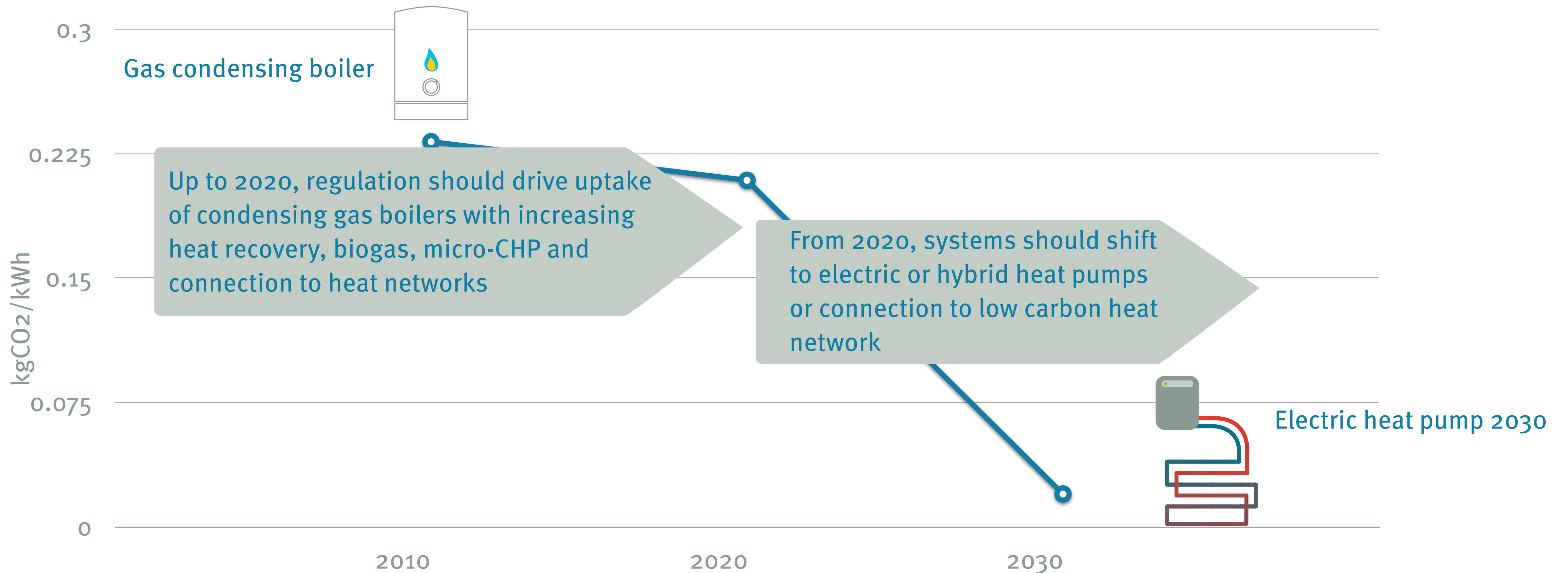
Target new systems off the gas grid first

Regulate new off gas grid heating systems



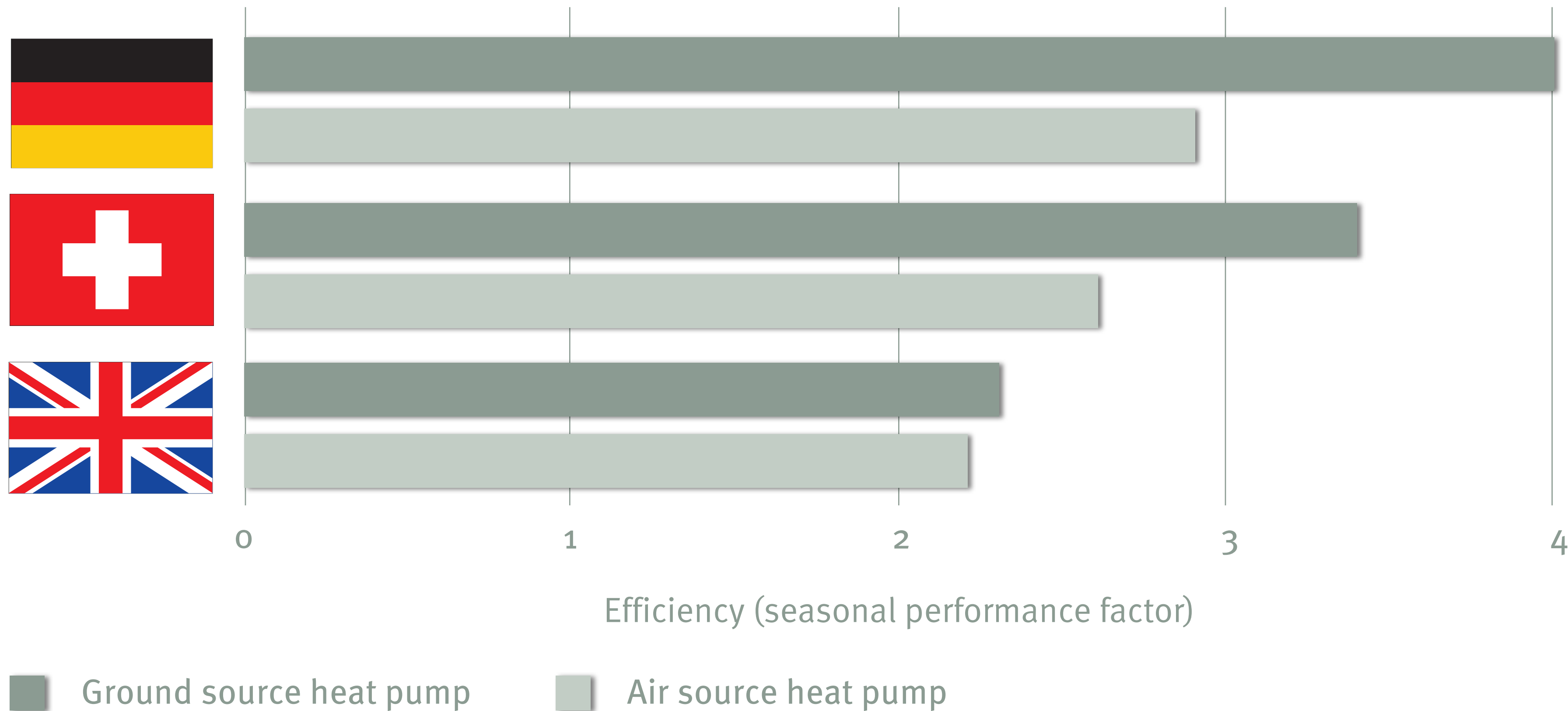
Then target gas grid properties

Regulate new on gas grid heating systems



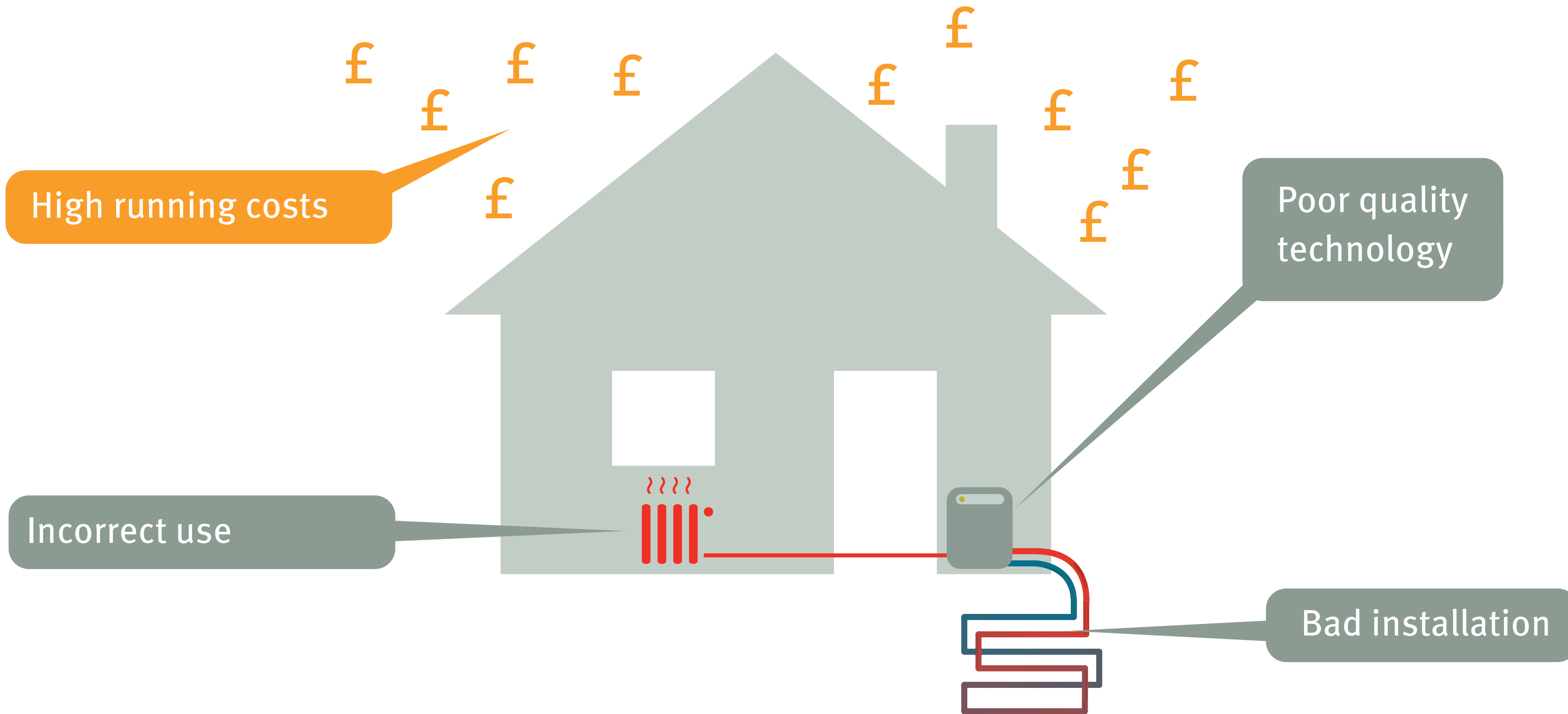
Improve the reputation of heat pumps

Heat pumps have performed badly in the UK



Improve the reputation of heat pumps

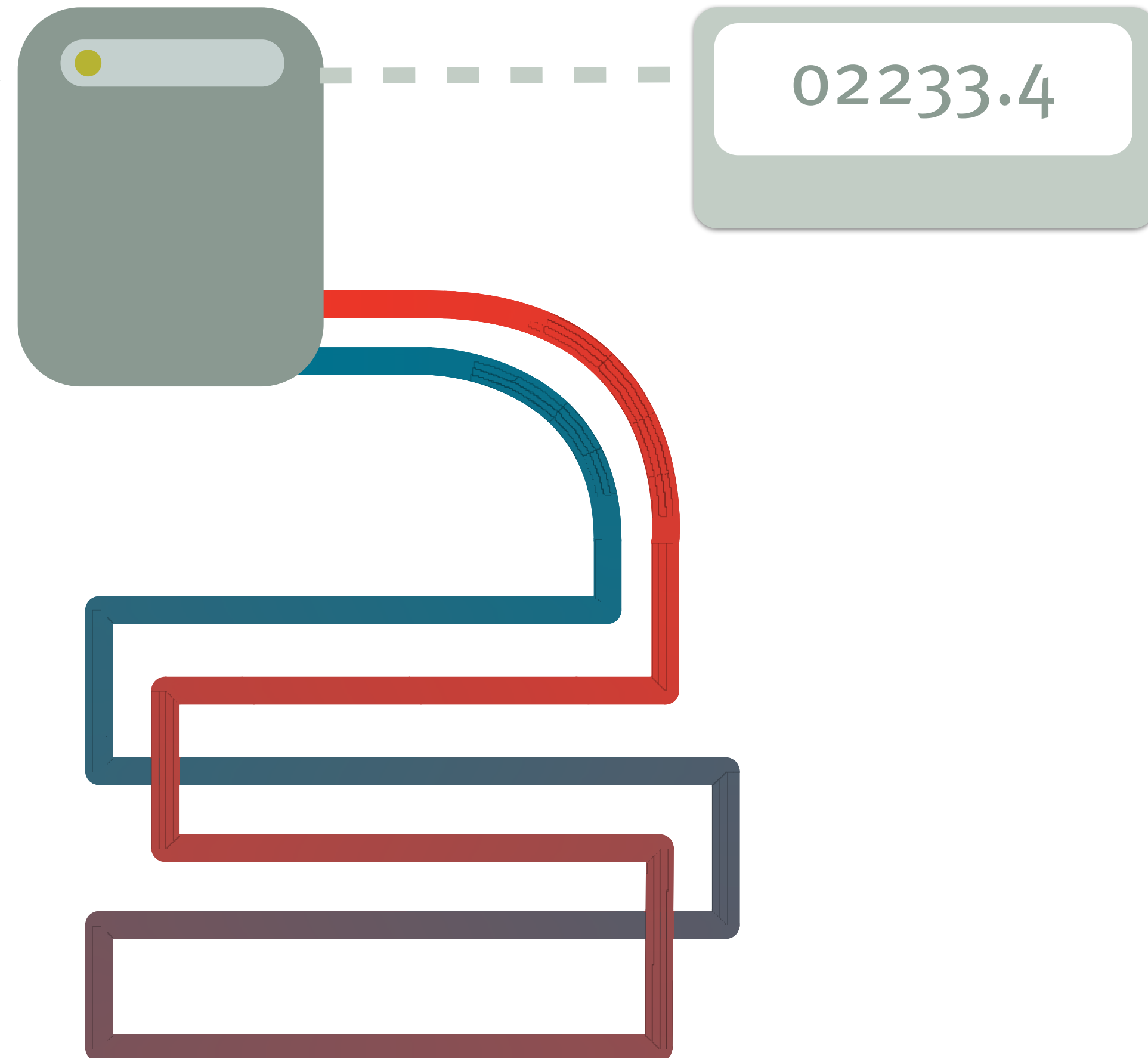
UK heat pumps have suffered from...



Improve the reputation of heat pumps

Their performance should be monitored

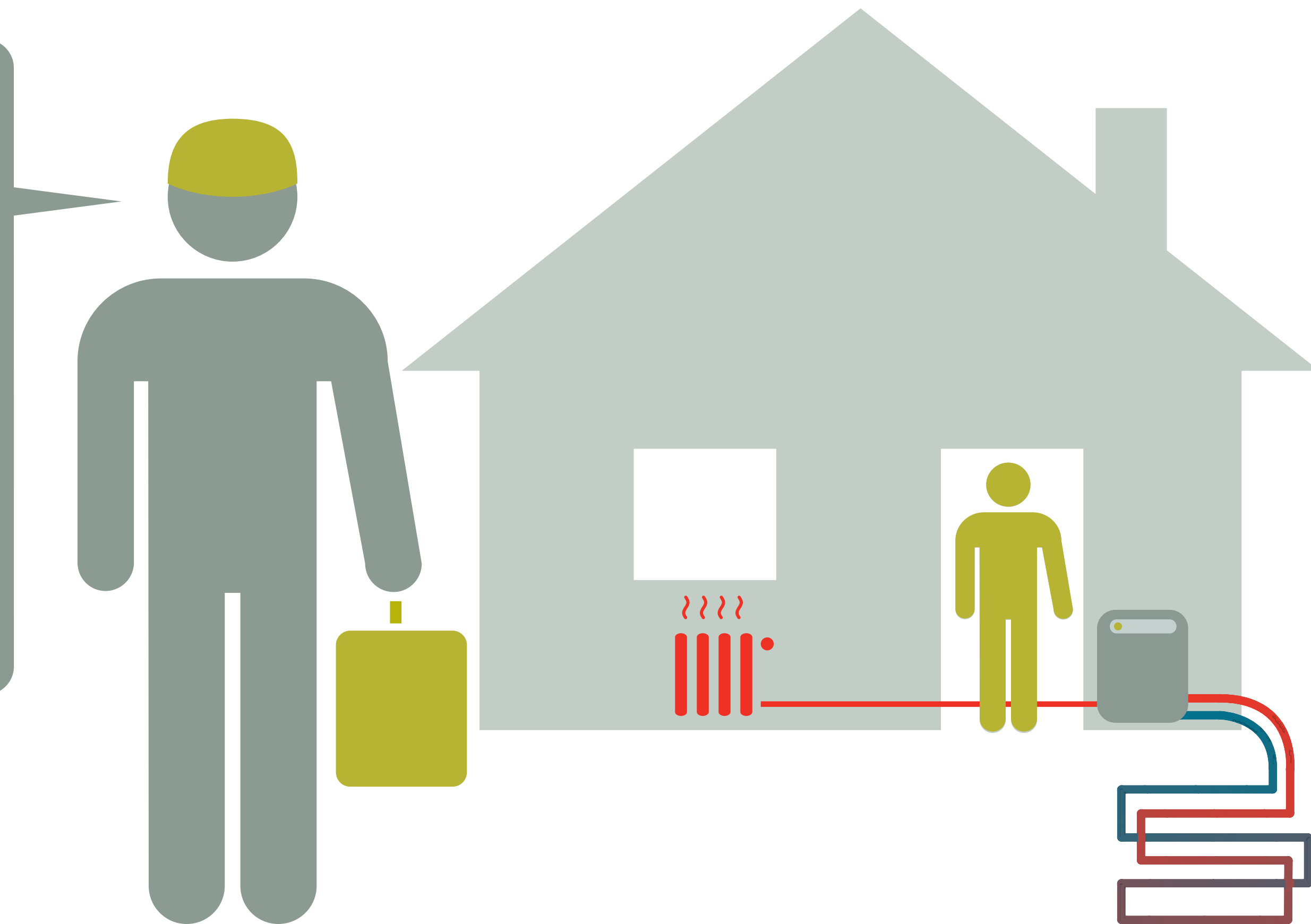
Better metering of electricity use and heat provided is needed. Subsidies should be based on how well the heat pump performs. The government should mandate the fitting of smart meters with all new domestic heat pumps.



Improve the reputation of heat pumps

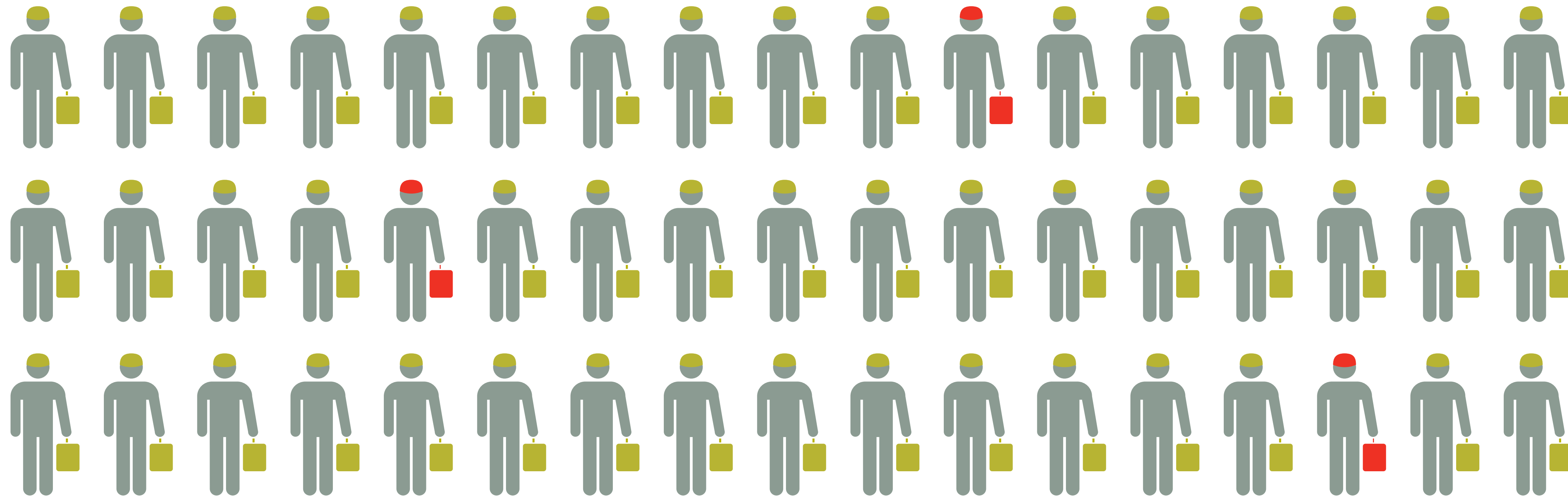
Installers should educate users

Installers are not currently required to show householders how to use heat pumps. They are more efficient if operated properly. The Microgeneration Certification Scheme should be strengthened to make sure installers train users and to check the system is working properly.



Improve the reputation of heat pumps

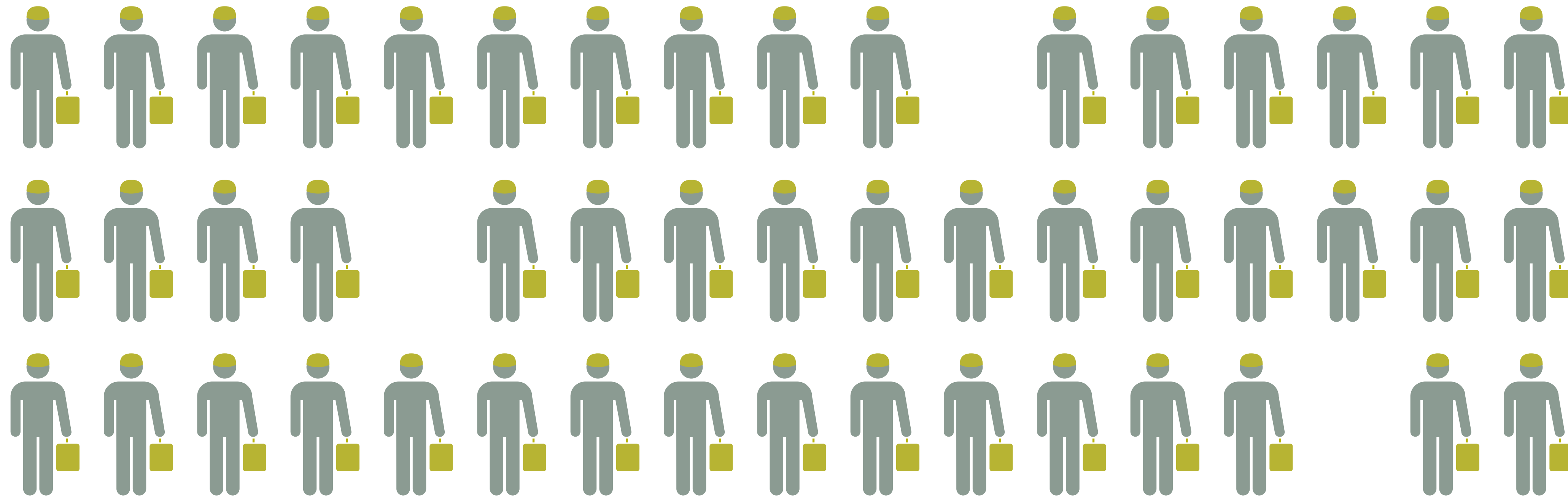
Installer certification should be tightened and enforced



Improve the reputation of heat pumps

Installer certification should be tightened and enforced

Despite poor installations, heat pump installers aren't being struck off for malpractice



So, how should the government switch the UK on to heat pumps?

1 Regulate to stimulate the market

- Adopt tighter building regulations for new buildings on low carbon heating
- Switch new boiler standards from efficiency to CO₂ emissions

2 Improve the reputation of heat pumps

- Monitor heat pumps and base government subsidies on performance
- Tighten installer standards so installers have to train heat pump users
- Ensure bad installers are struck off the register

References (by slide number)

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This work is part of Green Alliance's Low Carbon Energy theme

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