# WILL A HEAT PUMP WORK FOR ME?

ANDREW HUGHES NIND & MARC ADAMS, JUNE 2025

# AGENDA

THE ROLE OF HEAT PUMPS

MARC’S STORY

ANDREW’S STORY

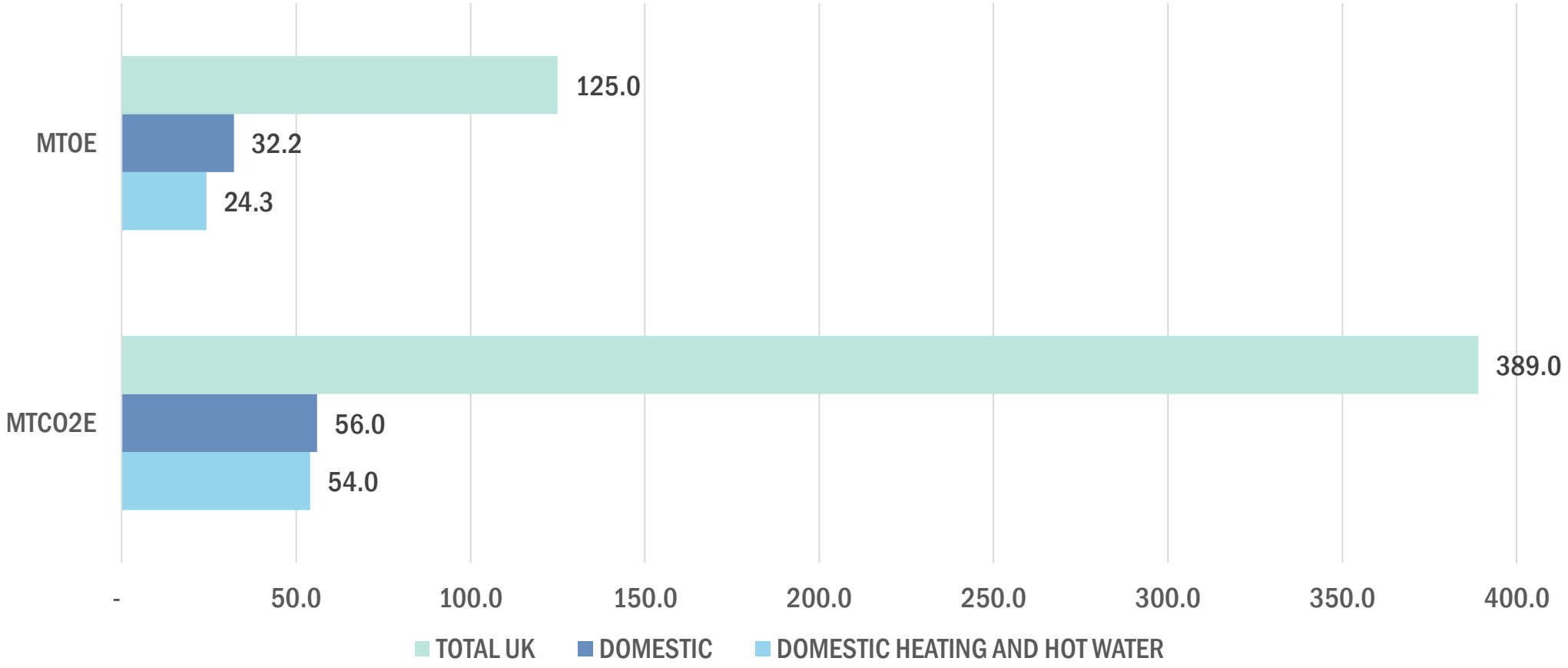
INCENTIVISING UPTAKE

Q & A

# THE ROLE OF HP

**50% of UK homes need to have heat pumps within 15 years,** and 80% by 2050 (cf 0.6% in 2023), in order to meet national decarbonisation targets – *Committee on Climate Change, 7th carbon budget, February 2025*

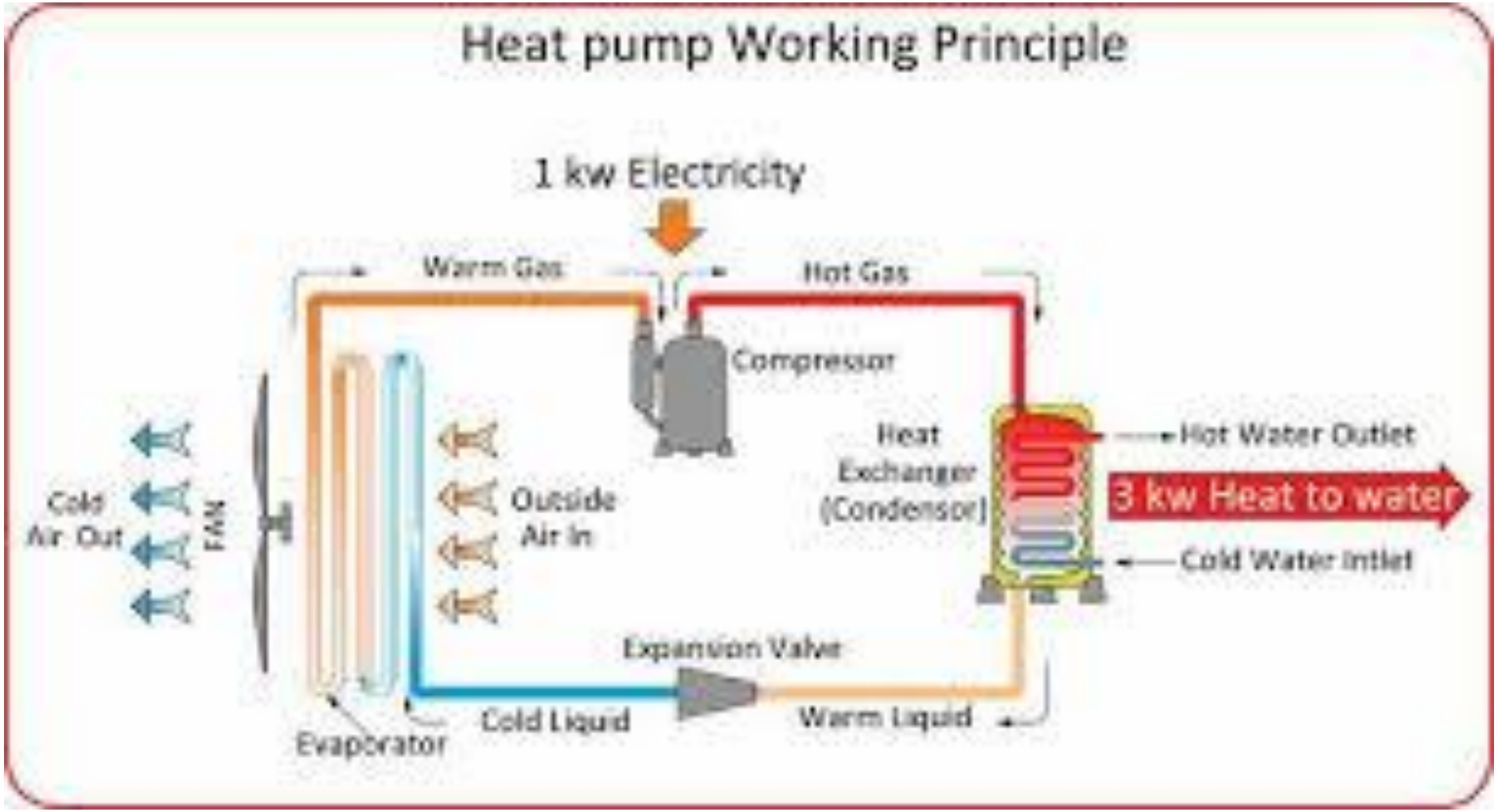
# END-USE ENERGY AND GHG





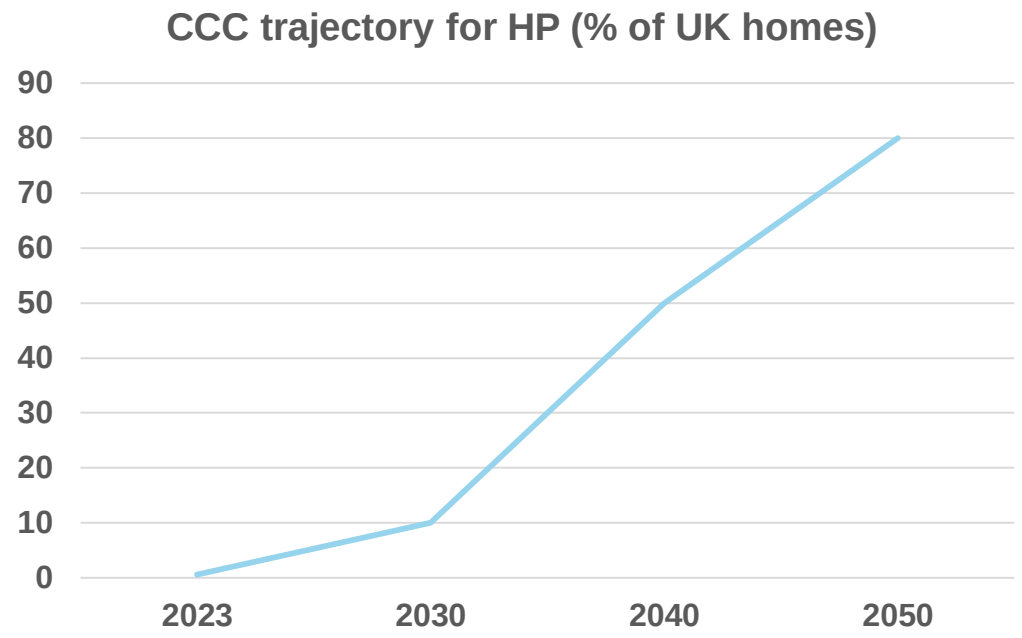

Source: Digest of UK Energy Statistics 2024, emissions are as produced (scope 1)

# HOW A HEAT PUMP WORKS



# THE ROLE OF HEAT PUMPS

- If all houses converted to ASHP, UK GHG emissions (in total) would fall – even if all the extra electricity was natural gas-fired
- Total annual electricity consumption – for UK as a whole, all uses - would rise circa 25%, but the impact on the grid would depend on patterns of usage
  - Calculation based on DUKES figure for domestic gas use divided by 3 to estimate additional electricity consumption, taking account of transmission and distribution losses
- Energy security would benefit from reduced gas consumption overall (less reliance on other countries)
- Energy prices would probably be more stable given less fossil fuel demand in winter

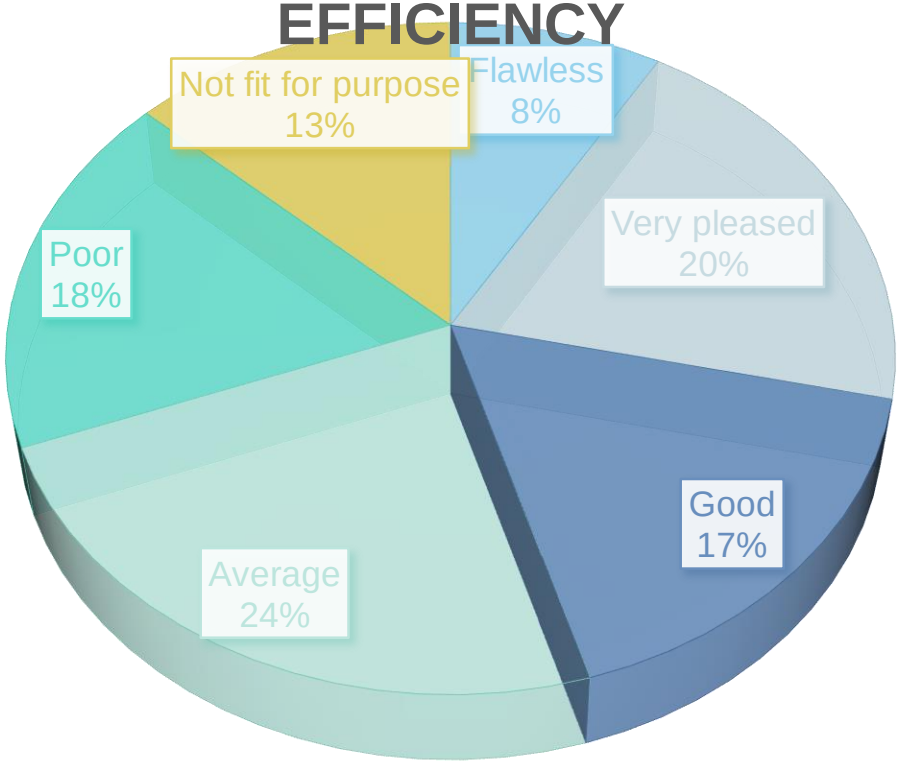



Source: Committee on Climate Change, February 2025

# MARC'S STORY

- Our House
  - Detached with 4 bedrooms, 1700 sq feet
  - Built 1965 by Laing
  - Cavity wall insulation
  - Baxi 15 KW system boiler with hot water cylinder
  - Nest heating controller
- Improvements
  - 2.9 Kw Solar PV system + Solar iBoost
  - Thermal building survey to identify areas of high heat loss
  - Loft insulation increased to c. 300mm
  - Cold flat roof over hall/ garage replaced with warm roof
  - Gaskets replaced on double glazed windows & doors
  - Energy Performance Certificate: B after improvements

# CHOOSING AN INSTALLER




Air Source HP Forum Poll n=130 (2025) https://renewableheatinghub.co.uk

# FINDING A REPUTABLE INSTALLER

- Microgeneration Certification Scheme (MCS) membership is essential…
- But MCS membership does not guarantee a competent installer!
- TrustMark accreditation provides some additional assurance
- Personal experiences and recommendations
- Request initial ballpark quotes and views on the design e.g. HP location
- Visit examples of installers' previous work - https://www.nesta.org.uk/project/visit-a-heat-pump/
- Consult public forums e.g. https://renewableheatinghub.co.uk for recommendations

# OUR DESIGN

Installer (‘Heat Geek’) carried out a design consultation (£375) covering:

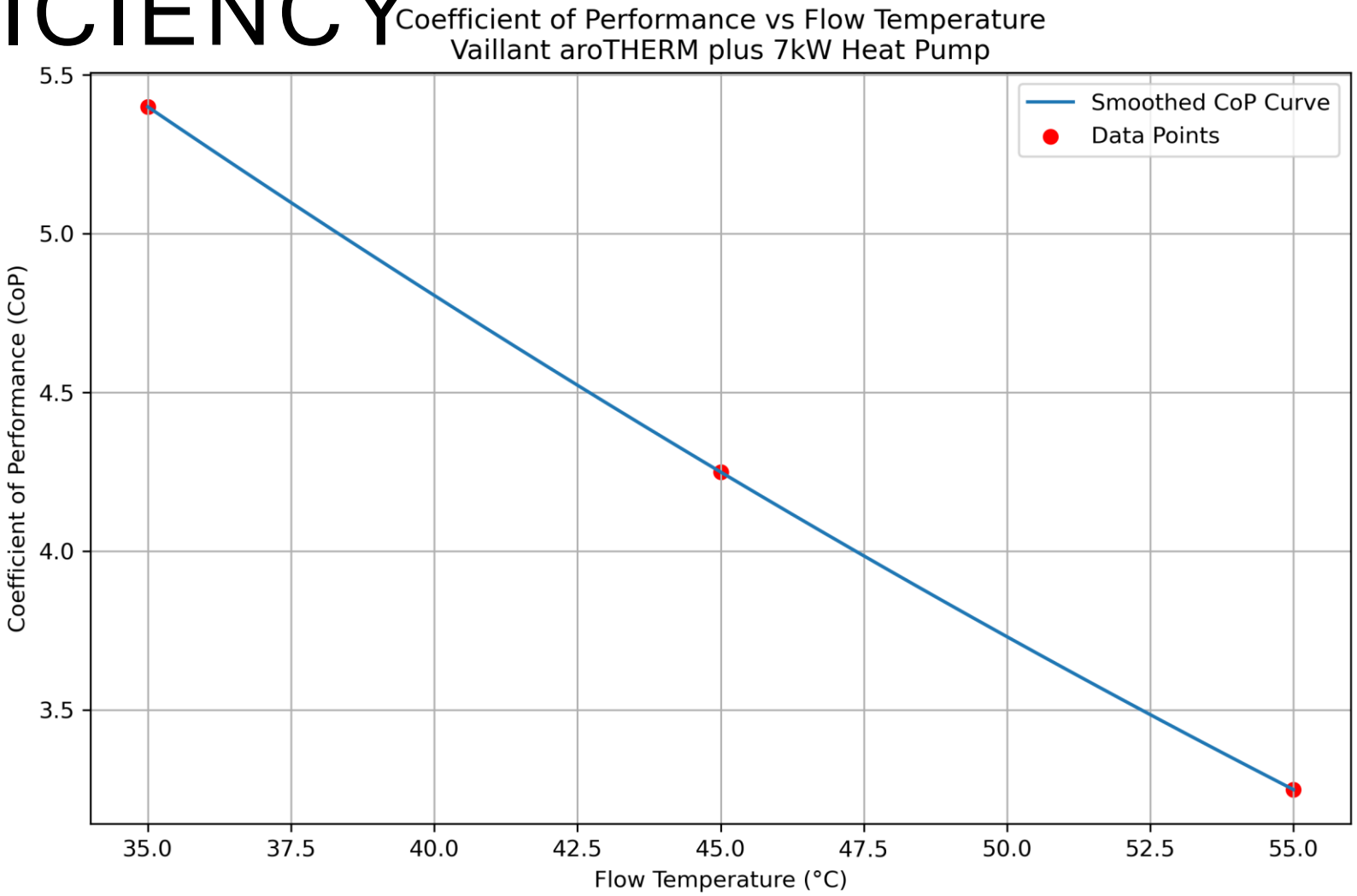
- Heat loss survey - how much heat our home needs to maintain 21 Celsius at -2 Celsius outside, room by room and overall;
- External HP location and noise check; internal cylinder and controls location

Proposed Design:

- Vaillant aroTHERM plus 7kW monobloc air source heat pump
- Five new radiators, two reused in different rooms
- Vaillant heating controls & new hot water cylinder
- Additional work including water softener, water pressure pump, replacement of two power showers
- Target radiator flow temperature of 45 Celsius
- Guaranteed minimum system efficiency of 380%

**TOTAL £11,716** (£21,216 - £7,500 BUS Grant - £2,000 Barclays Greener Homes Grant)

# FLOW TEMPERATURES & EFFICIENCY



# INSTALLATION PROCESS

Preparatory Tasks

- Submission of application to the Distribution Network Operator (DNO) for pump connection (10-day processing period)
- Construction of the heat pump base and soakaway
- External electrical connection installation

Main Installation – over five days

- Installation of heat pump, cylinder, radiators, and controls
- System commissioning



- Installation of induction hob at an extra expense


Vaillant
aroTHERM plus


Cyclone

# LIVING WITH A HEAT PUMP

## OLD GAS BOILER

Preset radiator flow temperature – c. 60 Celsius

Scheduled bursts of heating in morning and evening

Morning and evening target temperatures 18.5 Celsius, otherwise 16 Celsius

Occasionally used electric radiators during daytime

Heating off when house unoccupied

Issues with damp in bathroom and bedroom

Single storey extension cold during winter (c. 15 Celsius)

Rugs and jumpers helpful on cold days!

Estimated annual gas usage = 9,893 kWh (bill) producing 8310 kWh of heat (84% efficiency)

Note: UK average gas usage in detached 4 bed - 17,000 (ofgem)

## NEW HEAT PUMP

Weather compensation determines radiator flow temp

Heat Pump runs constantly during heating season – ‘low and slow’ to achieve high efficiency

Target temperature a constant 20 Celsius – always warm

Heating remains on even when house is unoccupied during the day/ weekends

Condensation and damp issues eliminated

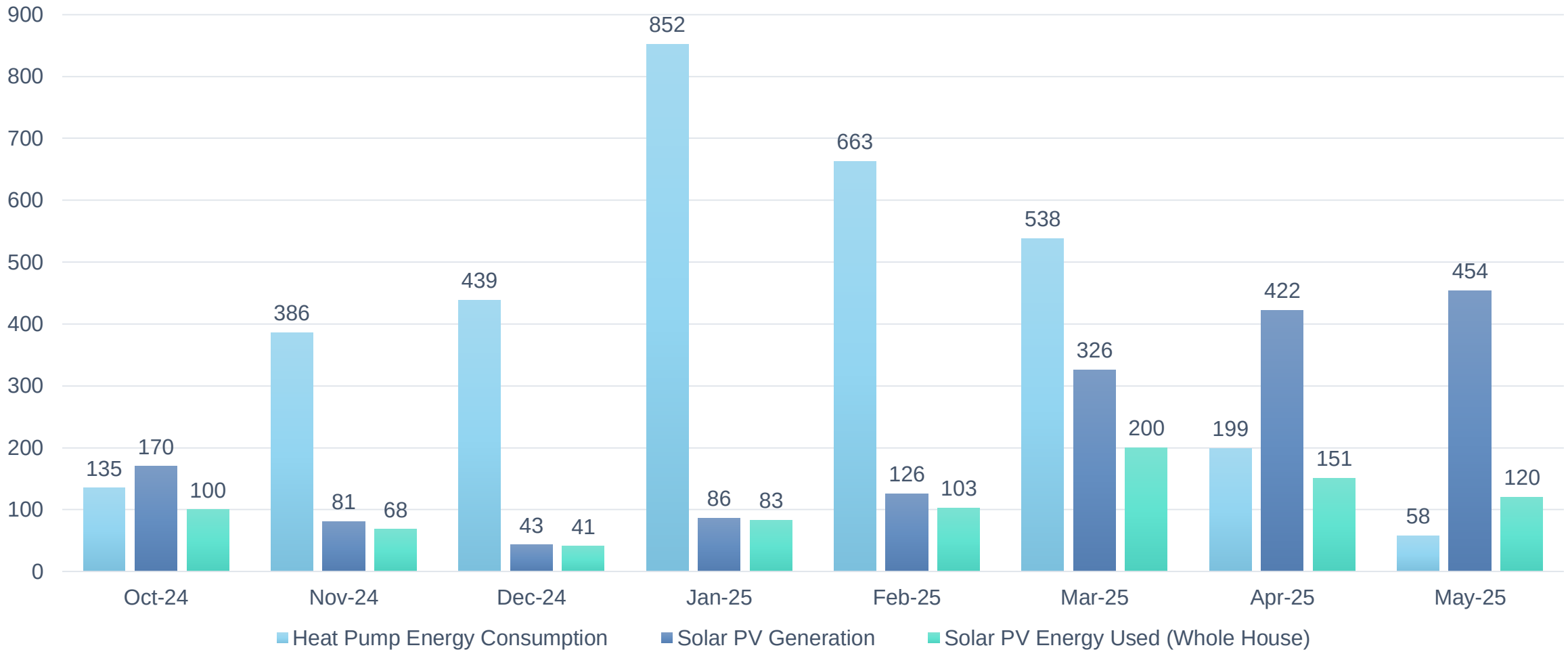
Single storey extension now warm during winter (new radiator)

Heat Pump usually very quiet

Performed well over winter: house temperature dropped to 19.1 on coldest day (external average -4.6 Celsius)

Estimated annual HP electricity usage = 3,649 kWh producing 15,325 kWh of heat (420% efficiency)

# HEAT PUMP ENERGY USE AND SOLAR PVS



# ANNUAL ENERGY COSTS

## BAXI GAS BOILER

Estimated annual gas usage = 9,893 kWh (bill)

Octopus Fixed 12 Months gas tariff = 5.87p per kWh

Annual heating cost 9,983 kWh x 5.87p = £586 per annum

## VAILLANT HEAT PUMP

Predicted annual electricity usage for Heat Pump = 3,649 kWh

Octopus Fixed 12 Months electricity tariff = 24.91p per kWh

Annual heating cost 3,649 kWh x 24.91 = £908 per annum

Approximately 15% of our solar PV output is going to the HP 450kWh x 24.91p per kWh = less £112

Removal of gas meter standing charge = less £84

Actual annual running cost estimated at £712

Switching to a heat pump specific tariff e.g. Ovo Heat Pump Plus @ 15p per kWh would lower our annual cost to £480

# CO2 SAVINGS OVER 15 YEARS

## BAXI GAS BOILER

202g CO2 per kWh of gas burned

Annual gas usage of 9,893 kWh (bill) x 202g CO2 = 2.0 tonnes CO2 per annum

Lifetime emissions over 15 years = **30 tonnes CO2**

## VAILLANT HEAT PUMP

207g CO2 per kWh of grid electricity used

Estimated 50g CO2 per kWh of solar PV electricity generated (emissions from manufacturing)

Annual HP electricity consumption 3,649 kWh

HP energy from solar PVs 450kWh x 50g CO2 = 0.02 tonnes

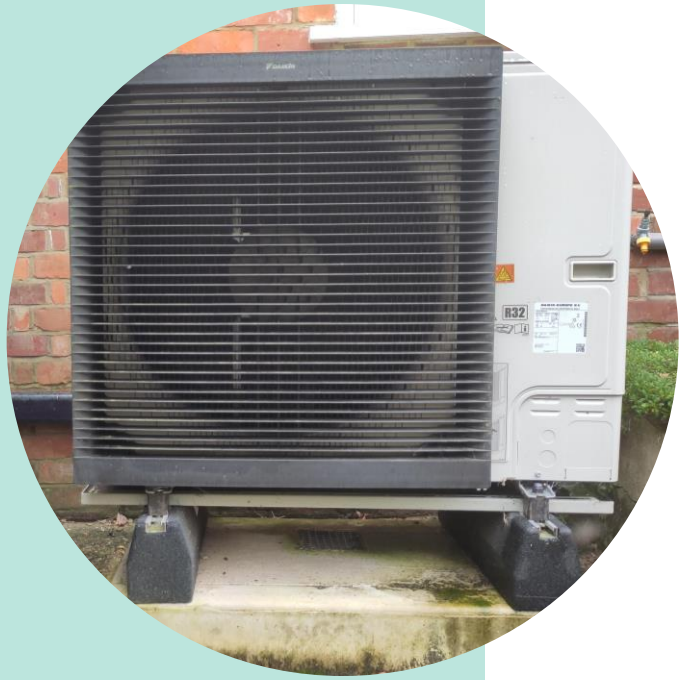
HP energy from grid 3,199 x 207g CO2 = 0.66 tonnes

Annual electricity CO2 emissions = 0.68 tonnes

Lifetime emissions over 15 years = **10.2 tonnes CO2**

# SUMMARY

- Heat pumps are viable for 1960s houses without major improvements
- Take care when choosing your installer
- Installation costs are high compared to gas boiler replacement
- Heating is more comfortable with a heat pump – house always warm
- Heat pump worked well through the coldest winter days
- Significant carbon reduction compared to gas boiler
- Solar PVs help to lower energy costs but minimal impact during winter
- Specialist heat pump electricity tariffs can enable lower operating costs




# ANDREW'S STORY

My personal experience shows that an ASHP can work well in a large 1920s semi

# ANDREW'S STORY

- Some installation points:
  - 1920s semi with 5 bedrooms and 3 floors (including loft conversion)
  - Energy Performance Certificate: C
    - After home improvements, before Heat Pump put in
  - 100 amp fuse verified (some older properties just have a 60 amp fuse, which would not have been sufficient for the extra load)
  - 4-day installation (April 2023)
  - Outdoor unit – cubic metre of space required, including separation from external wall
    - 7 kW unit (32 amp) – maximum power draw
    - On patio outside kitchen window
  - Indoor unit – size of fridge freezer
    - Large airing cupboard
  - No radiators replaced
    - Comfort of home actually improved
    - No need for back-up heating

# ANDREW'S STORY

- Operation, cost and environmental impact:
  - Circa £6k more expensive than new gas boiler (net of grant, which was £5k in 2023)

    £300 each year over 20 years
  - Operating costs similar to gas heating
    - Circa £1000 based on last 12 months for space/water heating
    - Room temperature set to 16 degrees overnight and 18-19 during the day
    - Temperature in hot water tank (and radiators on cold days) just under 50 degrees
  - Frost forms on cold damp nights (temperature circa 5 degrees)
  - Noise broadly similar to large refrigerator
    - HP unlikely to be operating when we are outside
    - Don't notice in kitchen with door closed
  - Carbon savings circa 1-1.5 tonnes CO2 each year
    - Depends on how extra electricity is generated, i.e. what fuel source
    - Embodied emissions mean 'payback' at least 1 year (more for ground source heat pump)

# INCREASING UPTAKE

The annual installation rate of HP in the UK is around **20 times lower** than in the Netherlands, a country with historically high gas penetration – *Committee on Climate Change, Progress Report 2024*

# INCREASING UPTAKE

- Installation rates in the UK are significantly lower than in the EU – largely explained by (unnecessary) practical obstacles, lack of trained installers, and cost impediments
- Requirement that HP must be located at least one metre from the property boundary has just been scrapped (new planning rules from 29th May 2025, Government Warm Homes Plan)
- Installation costs are significant cf gas boiler – more generous grants would help
- Nearly half of the average electricity bill is made up of network charges, environmental support and capacity mechanism costs
  - Government is investigating redistribution of cost elements, as recommended by Committee on Climate Change (CCC)
- Electricity to gas price ratios (domestic consumers) from CCC's 7th carbon budget, February 2025:

  1.5 to 2.5 in Netherlands, France, Ireland

  2.5 to 3.5 in Germany

  > 3.5 in UK

# Q & A

READING FRIENDS OF THE EARTH

Website: www.readingfoe.co.uk

e-mail address;  info@readingfoe.co.uk

Facebook page:
https://www.facebook.com/groups/510395548980140