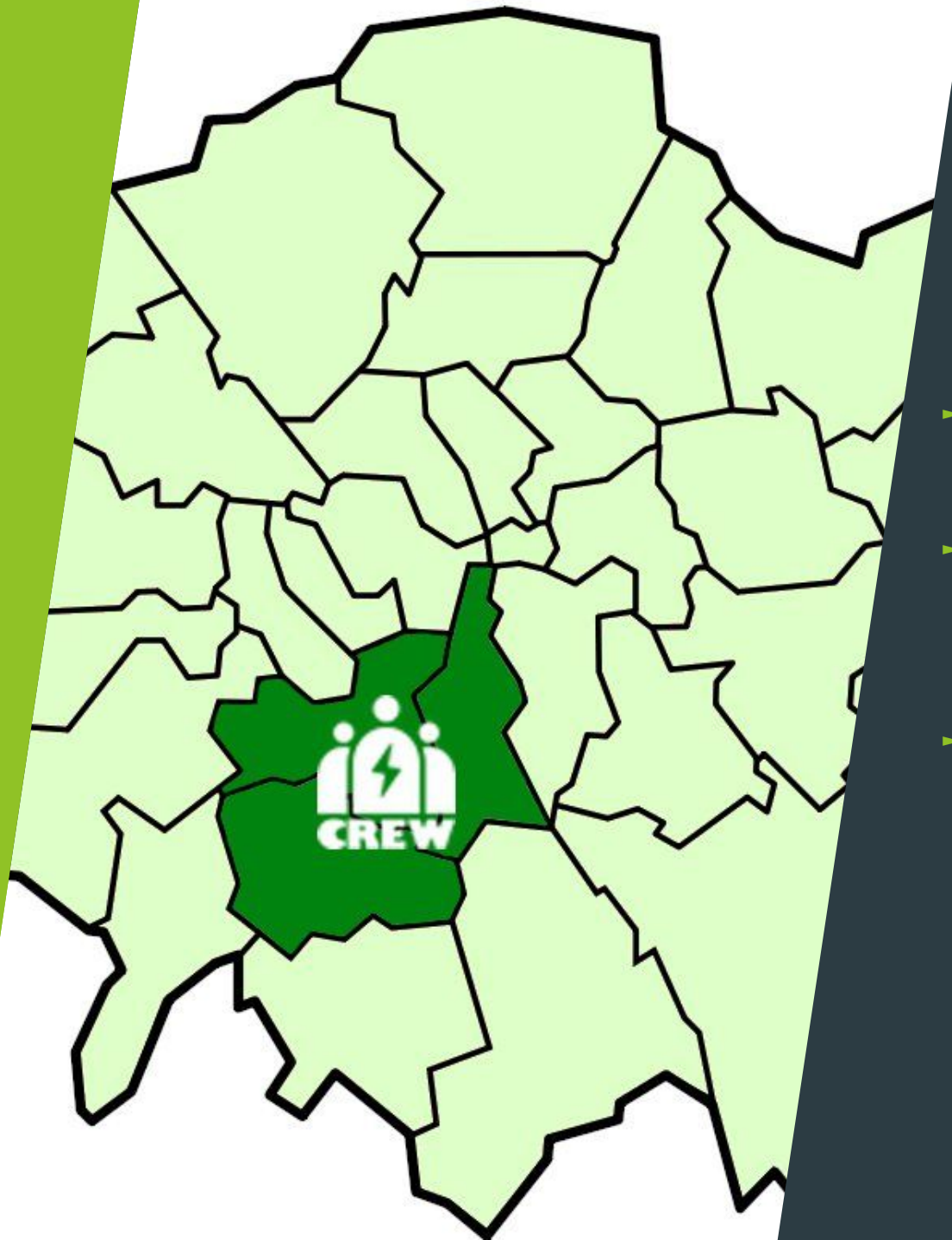
CREW Energy

An introduction to heat pumps

By Toby Costin



CREW Energy

- CREW is a SW not for profit community group. We completed or first project in 2017.
- Our primary focus to date has been working with charities and schools to install energy efficiency measures (LEDs, BMS, heat transfer solutions), solar PV and heat pumps
- We also have an outreach focus on climate action and fuel poverty alleviation.

Why renewable heat?

- IEA declared that gas boilers should no longer be sold from 2025 to aid the fight against climate change
- UK Gov has stated that no new build gas connections from 2025 and no retrofit from 2033.
- UK Gov sets a target to install 600 000 heat pumps a year by 2028
- Carbon emissions
  - Typical GCH system will emit 2.8 tonnes of CO2e
  - The equivalent heat pump will emit just 0.95 tonnes and close to zero if you are on green tariff.
- Air quality
  - Emissions include particulate matter, carbon monoxide and nitrous oxides
  - 12 % of London's NOX emissions come from domestic gas boilers and further 8% from non-domestic gas boilers.

Myth busting

- Won't we just switch to Hydrogen?
  - Beware of shades of hydrogen (grey, blue and green)
  - Electrolysers are only ~70% efficient. So we would need more 5.7 times the electricity generation we have today.
  - Wood Mack forecasts that Hydrogen will reach gas prices only by 2040
- Heat pumps are Expensive (£10k)
  - RHI which runs until March 2022 will cover the cost over 7 years.
  - Octopus energy forecast prices will begin to fall over the next 18 months
    (https://inews.co.uk/inews-lifestyle/money/ethical-money/fearmongering-on-low-carbon-heat-is-hot-air-103740)
- Are heat pumps more expensive to run than GCH.
  - We will demonstrate that is not really the case and can be much cheaper
- Heat pumps are new technology
  - They have been around for decades and work exactly like you fridge

Myth busting

- Heat pumps are big ugly grey boxes

Myth busting

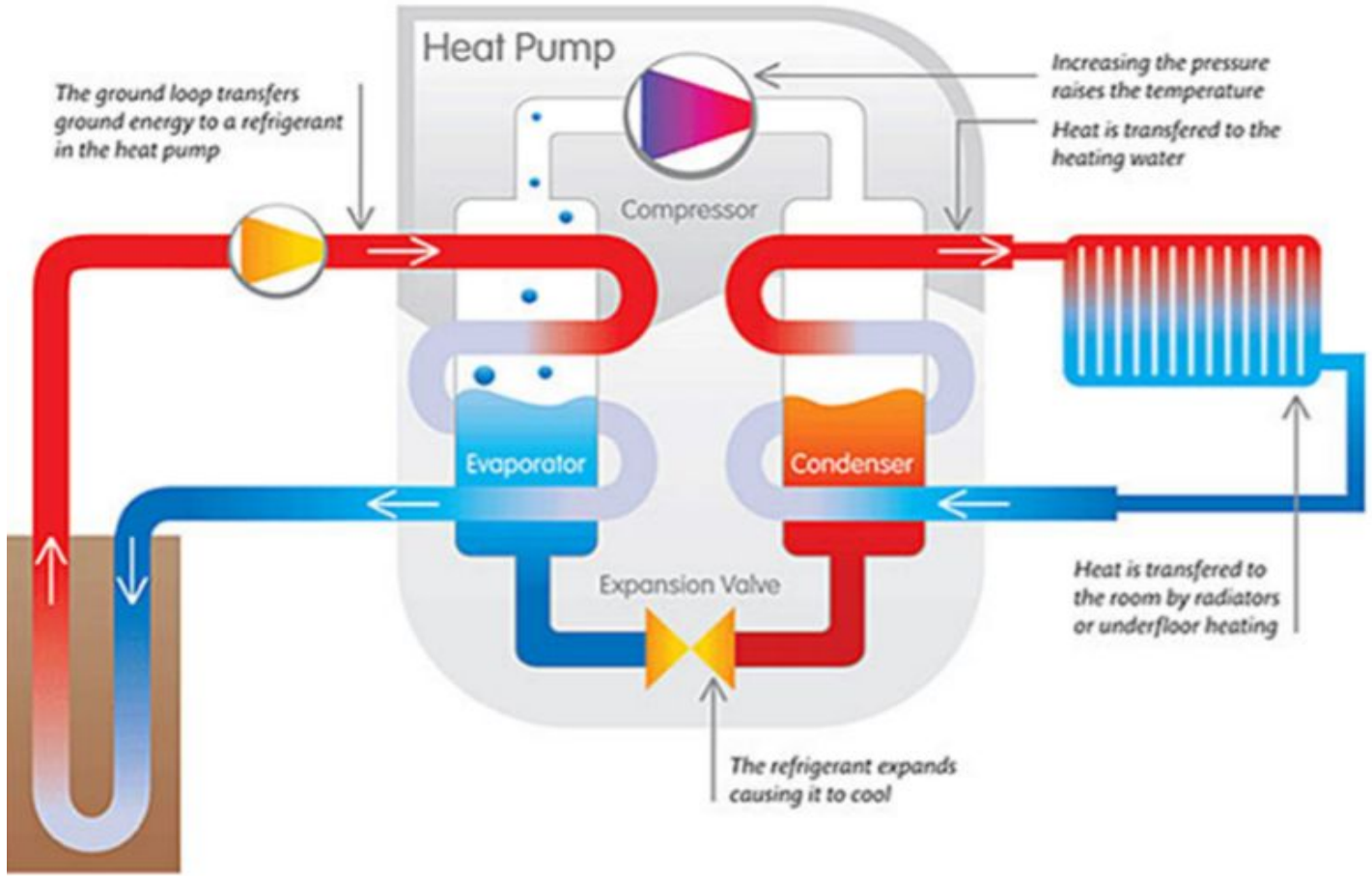
- Heat pumps are noisy
  - London background is 41dB(A)
  - Whisper quiet is 31 bB(A)

Heat Pump	6 kWh dB(A)	8 kWh dB(A)	12 kWh dB(A)
Sound level	50	54	57
2 M away	36	40	43
6 m away	26.5	30.5	33.5

What has held back deployment of heat pumps

- Lack of cohesive Gov Strategy
- Power of the Gas lobby
- Flux in renewable heat subsidies
- Lack industry skills and knowledge and led to a lack of consumer awareness
- EPC regulations lagging other policies.

How a heat pump works



Ground Source Air Source

Ground Source

- Bore holes give a more consistent temperature (8-12°) which can improve efficiency.
- More expensive (£20k+) but better supported through the current subsidy scheme (RHI)
- Space and access are likely to be the limiting factors for Londoners
- Requires more space in the home for the heat pump, buffer and hot water tank.

ASHP

- Less upheaval but placement is a consideration
- Lower costs (£10K) and well supported by subsidy.
- Energy derived from local air temperature.
- Monobloc or split system

Monobloc (Fan and compressor outside)	Split HP (fan outside, compressor inside)
Lowest cost option	Expensive
54 dB(A)	32 dB (A)
Ok looking	Aesthetically pleasing
Inside: Water tank , buffer	Inside: water, buffer and heat pump inside

Monoblock v Split

Heat pump efficiency

Coefficient of Performance (COP) measures the efficiency of a heat pump at a set ambient temperature and set flow temperature

Season Performance Factor (SPF) is the average COP over a heating season

These factors are impacted by three variants:

1. The quality of the heat pump
2. The outside temperature (the higher the better)
3. The flow temperate (the lower the better)

Ochsner 717 split

Flow Temp	COP
35°	4.4
40°	4.23
45°	4.06
50°	3.83
55°	3.6

Estimated energy use and potential savings

Estimated yearly energy cost for this property	£929
Potential saving	£230

The estimated cost shows how much the average household would spend in this property for heating, lighting and hot water. It is not based on how energy is used by the people living at the property.

The estimated saving is based on making all of the recommendations in how to improve this property's energy performance.

For advice on how to reduce your energy bills visit Simple Energy Advice.

Heating use in this property

Heating a property usually makes up the majority of energy costs.

Estimated energy used to heat this property

Space heating	11245 kWh per year
Water heating	2305 kWh per year

Funding your heat pump

- The Renewable Heat Incentive (RHI) is a 7 year subsidy paid quarterly based on your deemed demand.
- Your demand demand can be found on your EPC
- You will receive 10.92 per kWh for your combined hot water and space heating demand. Max of around £12 000.
- The efficiency of your heat pump will also play a factor in the amount you receive.
- The payment is index-linked to inflation
- RHI ends in March 2022

Post RHI economics

- Government is proposing a flat-rate up-front grant of up to £4,000 called the Clean Heat Grant
  - Encourages air-source over ground-source. This perhaps makes sense as efficiency gap closes and Britain warms.
  - The system will only support installs up to 45 kW, so not subsidy for larger scale projects.
- The drive for additional income is afoot
  - CREW modelling heat shifting with ToU tariffs to reduce running costs
  - Demand-side response services could bring in additional income
- Include avoided gas costs in your models
  - No gas standing charge saves £90 p.a.
  - No gas safety checks and reduce maintenance cost could save £100-150 p.a.

Running Costs

- Assumed 15 000 heat demand required
- Heat pump efficiency of 350 % &325%
- Gas Price 3.8p & electricity price of 14.37 (source: ukpower.co.uk)

Gas running cost	ASHP running cost
85 % efficient	350% efficient /325% efficient
Energy Required: 17 647 kWh	Energy Required: 4285 kWh/ 4615 kWh
Running cost	Running cost
£670	£615 / £663

Planning

- Domestic heat pumps are considered permitted development
  - The must be 1m away from the curtilage
  - In conservation areas they can’t be seen from the road side.
  - If you live in a listed building you may require planning permission.

- Commercial heat pump typically require planning permission
  - LBW charged us £490 for our application
  - Considerations are noise and sightline from local domestic properties.

Placement of your heat pump

- The nearer it is to your existing boiler the easier the install
- Remember it needs to be 1 m away from your curtilage, difficult in a terraced house.
- Flat roof extension are option and vibration noise can be limited by rubber chocks.
- Back of the garden is an option but a trench to the house will cause upheaval and additional cost.

Hydromx

Hydromx is a nanotechnology heat solution which is used to improve the heat transfer within a closed-loop heating system such as a boiler and radiators.

This is achieved by:

- Taking more heat from the boiler/ heat pump
- Delivering more heat to each room
- Returning at lower temperature improving boiler efficiency

The benefits of Hydromx:

- Reduces heating demand by 20-35% with commensurate carbon savings
- Cuts gas flue emissions, improving air quality
- Warms home quicker
- Installation is quick with minimum disruption.
- Extends main appliance life
- 22% saving on recent Samsung ASHP trial
- 20-year warranty.

Up and coming events

June 29th:
How green is your home and lifestyle- The launch of CREW's Home Carbon Audit with optional EPC and heat loss calcs.

June 30th:
Community Energy's role in renewable heat

July 14th:
Heating Controls for Schools and Commercial buildings

Email Toby@crewenergy.london

Web www.crewenergy.london

Social Media @crewenergyldn