GREENING WADSWORTH

WEDNESDAY 14th Jan 7pm

ALL WELCOME!

GREENING WADSWORTH

At the Wadsworth Community Centre

Smart home?

by Dr Christopher Lyon Anderson

A look at energy and money saving devices, from easy motion sensing lights to app controlled heating.

New grants - Heat Batteries and Air Con

by John Butterworth What the heck is a heat battery and do I want one?

GREENING WADSWORTH

Greening Presentation

Latest Stuff about Grants
Reasons to be cheerful

John Butterworth. 2025

MATT

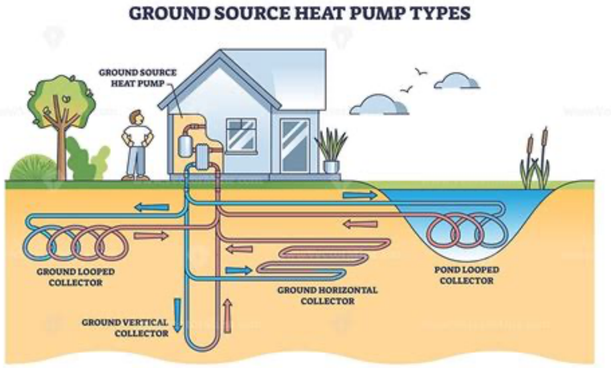
'I have a Chinese-made car.
I park it a few streets away
because I don't want it
to know where I live'

The CURRENT SCHEME…

What you can get https://www.gov.uk/apply-boiler-upgrade-scheme

You can get one grant per property. Current grants are available for:

- £7,500 towards an **air source heat pump**
- £7,500 towards a **ground source heat pump** (including water source heat pumps and those on shared ground loops)



- £5,000 towards a **biomass boiler**

*You cannot get a grant for a **hybrid** heat pump system (for example a combination of gas boiler and air source heat pump).*

The CURRENT SCHEME…. SMALL PRINT!

You’re eligible for a grant if both of the following are true. You must:

- **own the property** you’re applying for (including if it’s a business, a second home, or a property you rent out to tenants)
- be **replacing** fossil fuel heating systems - such as oil, gas, electric or LPG (liquefied petroleu gas)

You’re still eligible if you’ve already had funding to make your property more energy efficient, for example by insulating it.

Your installer must commission and install the heat pump within 120 days of applying for the grant or it will not be eligible.

(Your house needs an EPC).

GOVERNMENT Press release. November 2025

Discounts for families to keep warm in winter and cool in summer

Boiler Upgrade Scheme has been expanded to include air-to-air heat pumps and heat batteries giving families more choice in how they upgrade their home.

From:
Department for Energy Security and Net Zero and Martin McCluskey MP
Published
18 November 2025

‘Now the scheme has been expanded to offer a £2,500 discount off the cost of installing an **air-to-air heat pump**, which can offer the best of both worlds, providing heat in winter and keeping you cool in summer’. *Can’t see an exclusion for a hybrid system - keep your boiler for heating the water??*

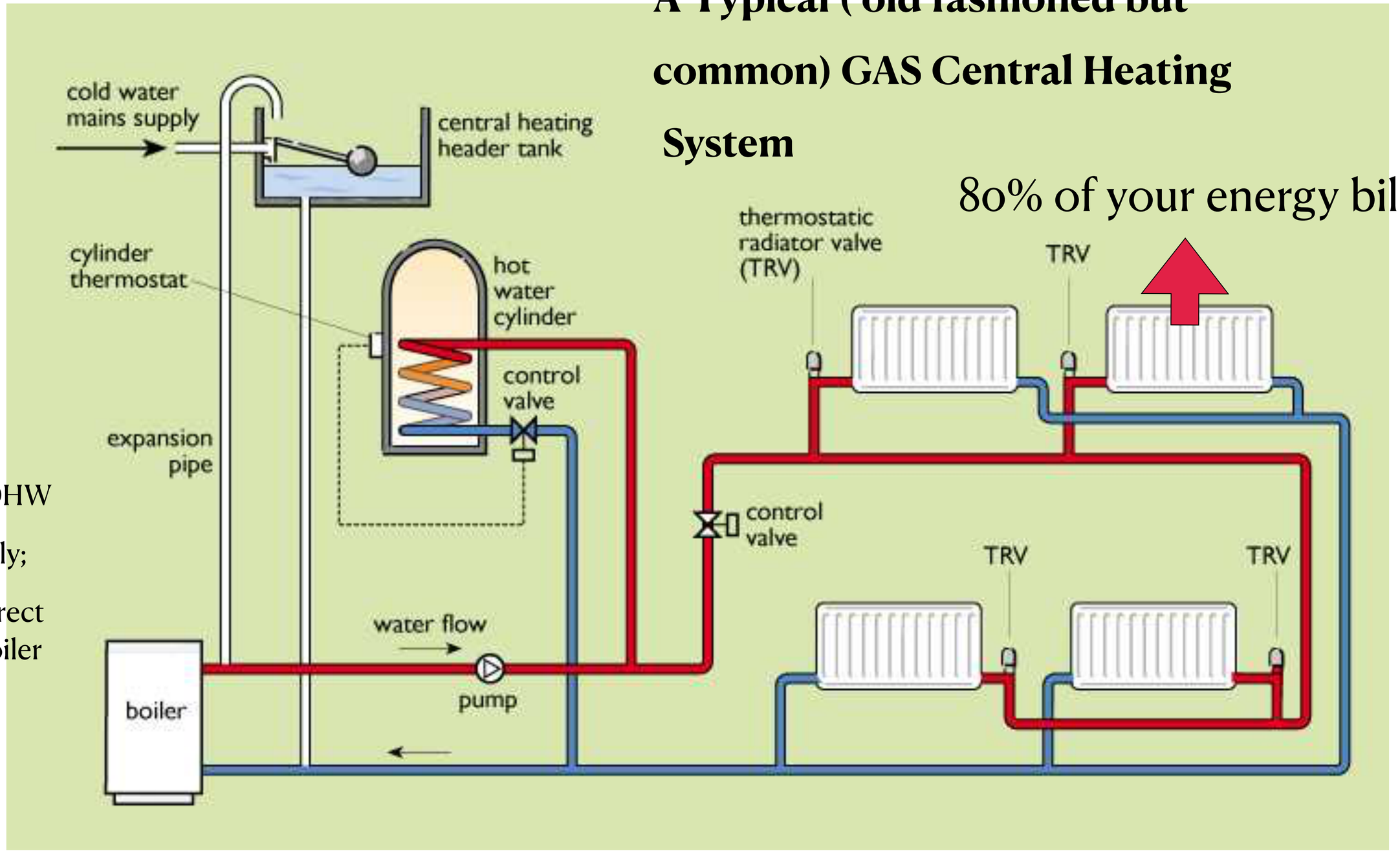
‘This is the first time air-conditioning units have been eligible for government funding, meaning residents will benefit from cool homes during a long, hot summer, without burning harmful fossil fuels’.

They’ve included **HEAT BATTERIES** too, a £2500 grant.

Why have they done this?

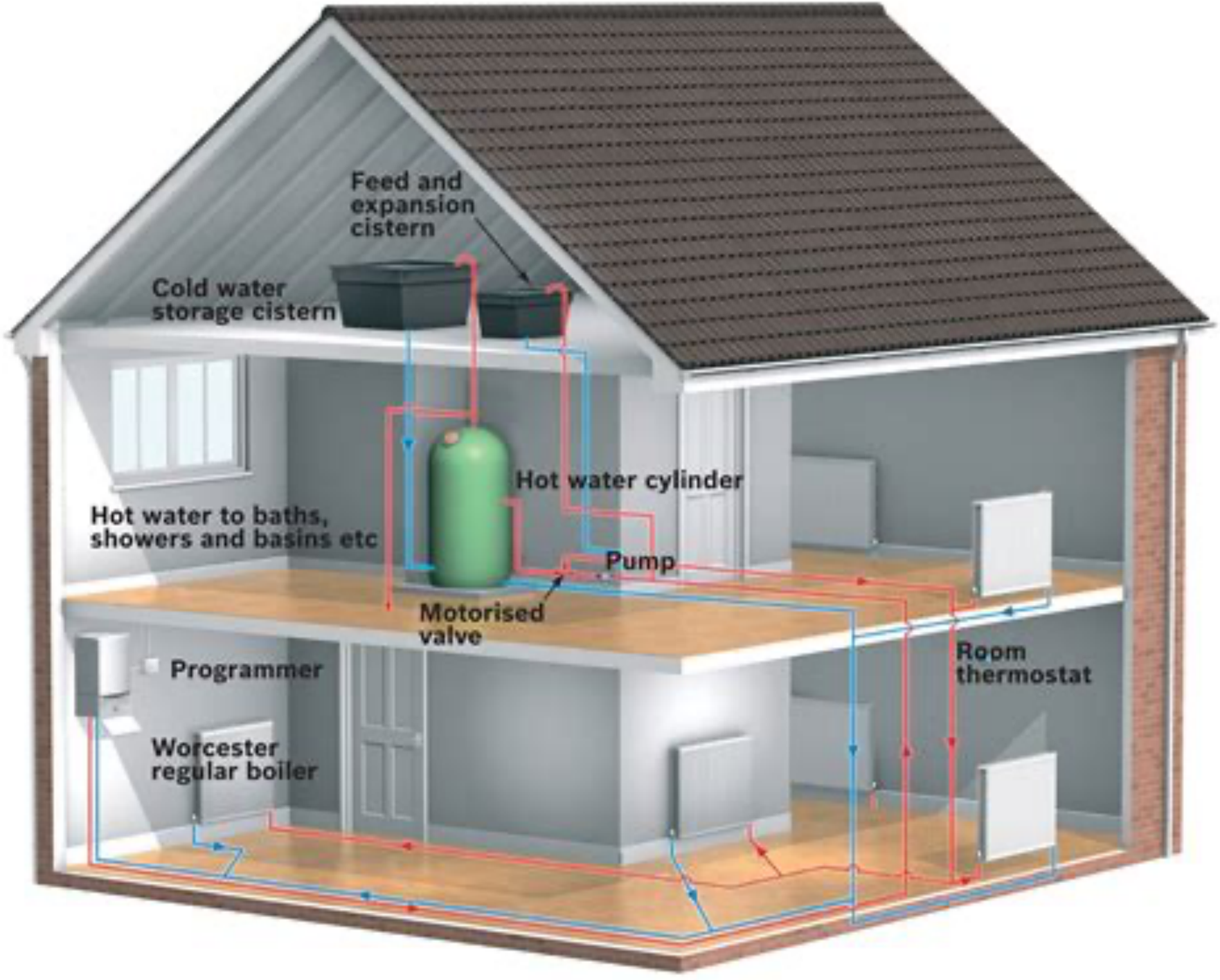
A Typical (old fashioned but common) GAS Central Heating System

80% of your energy bill



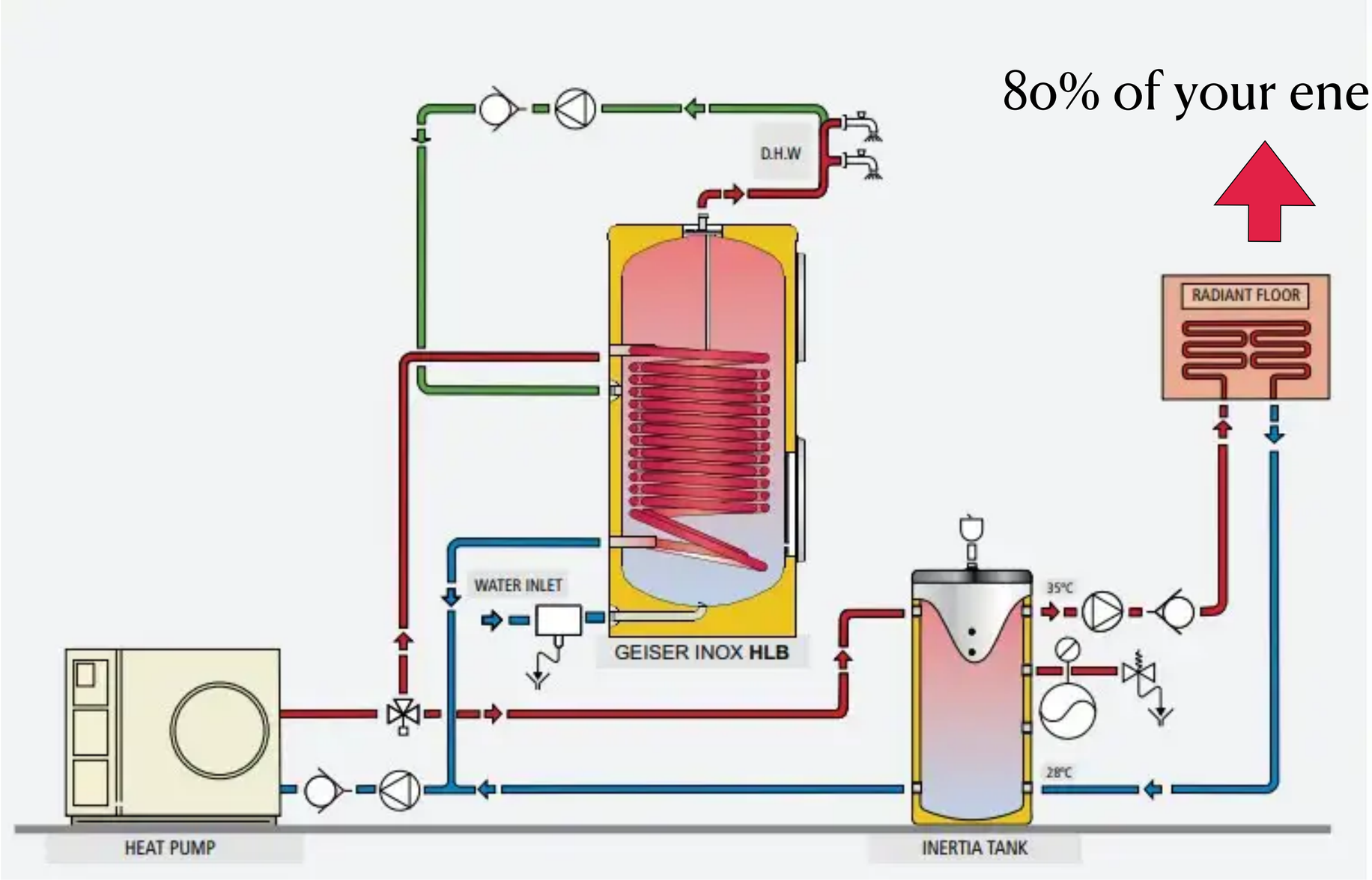
Heats DHW indirectly;

Rads direct from boiler


Feed and expansion cistern
Cold water storage cistern
Hot water cylinder
Hot water to baths, showers and basins etc
Pump
Motorised valve
Programmer
Room thermostat
Worcester regular boiler

A Typical AIR SOURCE HEATING System also needs water tank(s)...

80% of your energy bill



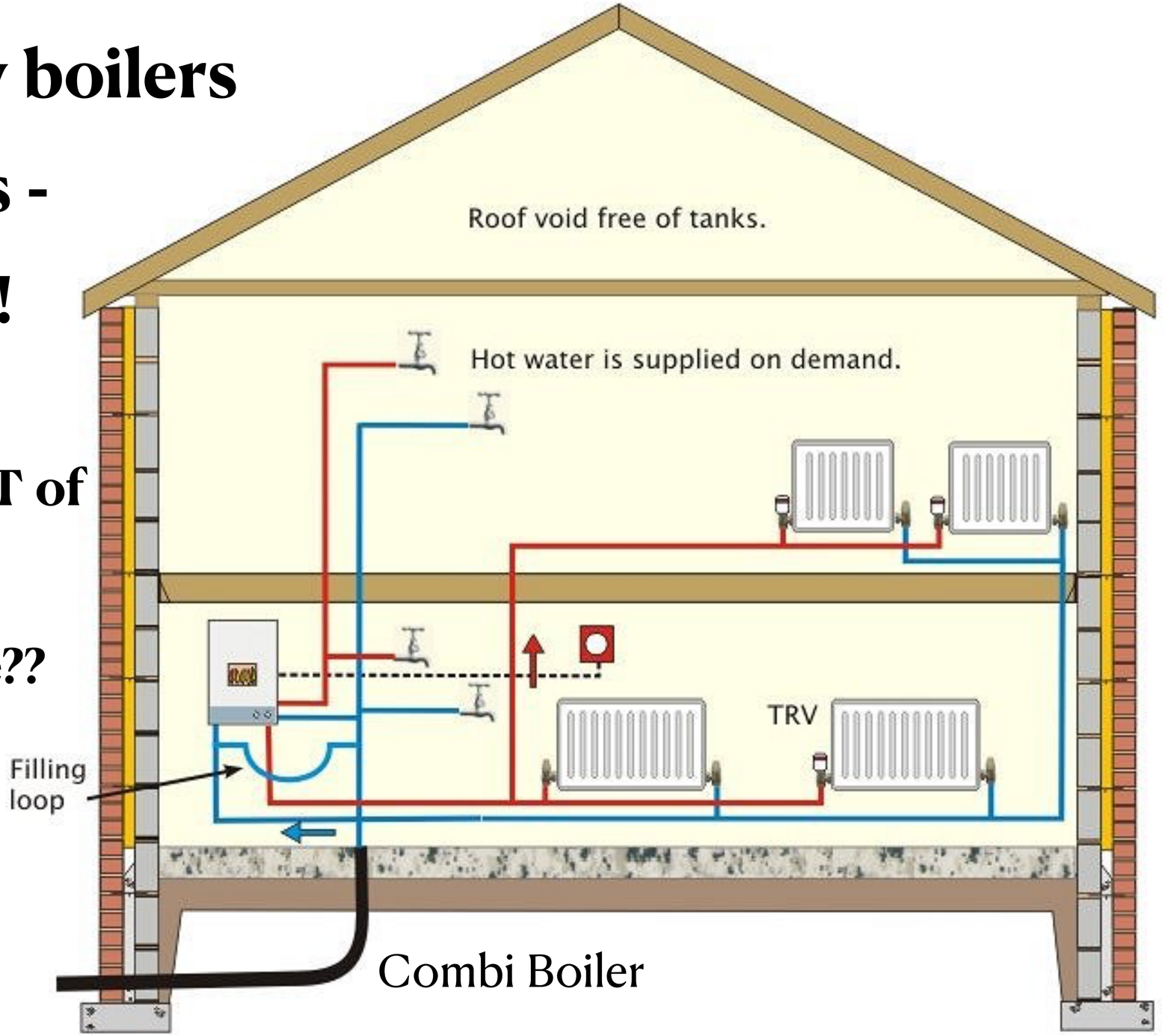
Typical AIR-SOURCE Outside and Inside

Here's the internal tank(s) of one that Duncan Installed earlier...

BUT 80% of new boilers are COMBI Boilers - NO big water tank!

SO - Apart from the COST of AIR SOURCE System,

Have you got room inside??



45,076 Govt-supported heat pump installations in the last 12 months

c. a million gas boilers

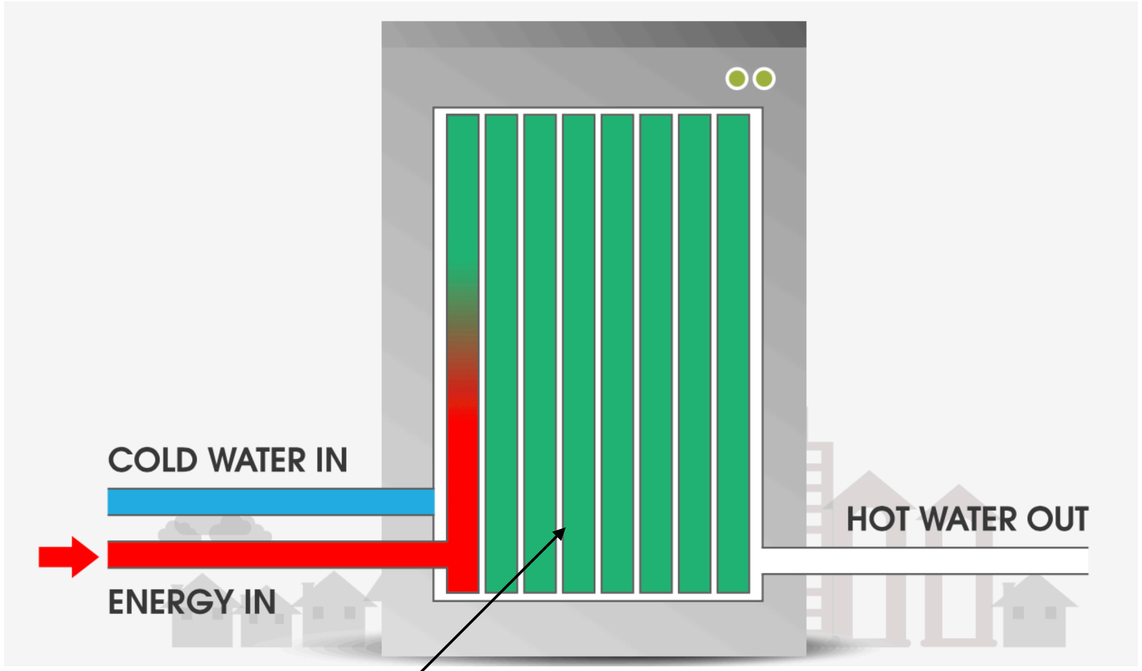
Super-compact thermal batteries for hot water

BRING ON THE HEAT BATTERY!


uniQ
Sunamp

What the heck *is* a ‘HEAT BATTERY’?

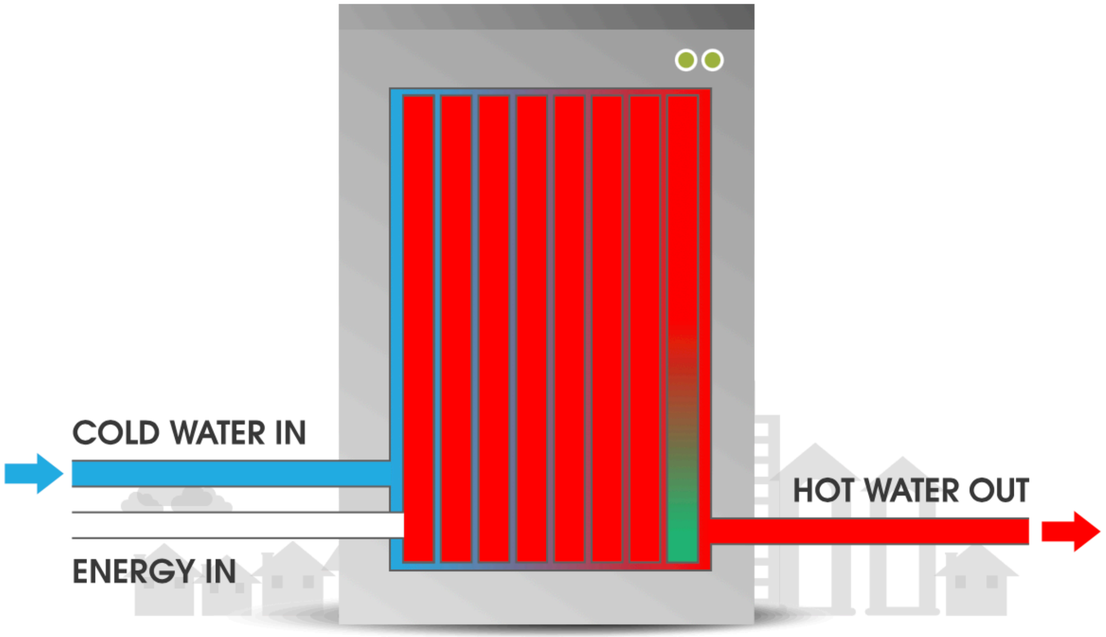
Charging it



Sodium Acetate Tri-Hydrate

(Similar to Salt and Vinegar!) GEL

Dis- charging it



(BIG) SNAG - AIR SOURCE DOESN'T RUN HOT ENOUGH TO MELT THE HEAT BATTERY GEL. HAVE TO ADD MAINS!

OK in SUMMER

COP =1

Optimum - 30-40°C

for COP of 4

(Seasonal is 3.1)

63°C min

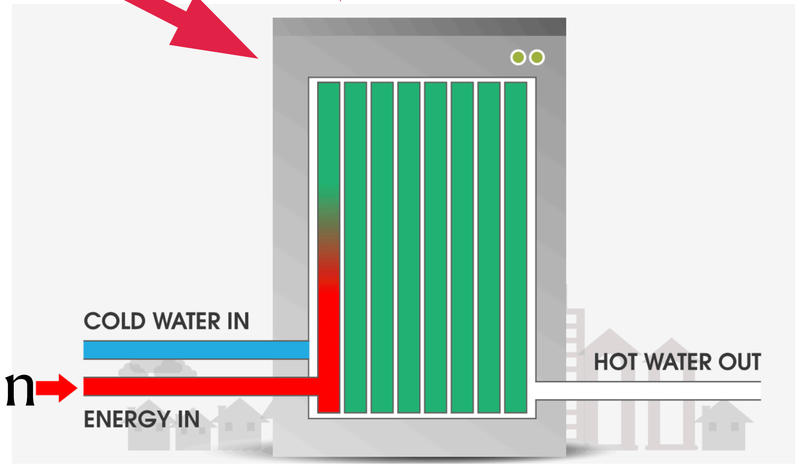


Table 1 - Thermino xPlus technical specifications

Maximum Heat source flow temperature[9]	°C	80
Minimum Heat source return temperature[10]	°C	63
Maximum ambient temperature	°C	40

SO - DOES A HEAT BATTERY SOLVE THE AIR SOURCE SPACE PROBLEM *EFFICIENTLY*?

- Not really - main advantage is it's smallness
- It will probable need direct mains electricity to heat your domestic hot water
- Then again, so does Air Source with water tanks!
- **Air-air** - 'Air-con' About time!

LINKS

https://www.gov.uk/government/news/discounts-for-families-to-keep-warm-in-winter-and-coo
in-summer

https://www.gov.uk/apply-boiler-upgrade-scheme

https://www.sun-lite.co.uk/boiler-upgrade-scheme-changes-2026/

https://www.warmzilla.co.uk/blog/air-conditioning-government-grant-funding-2025

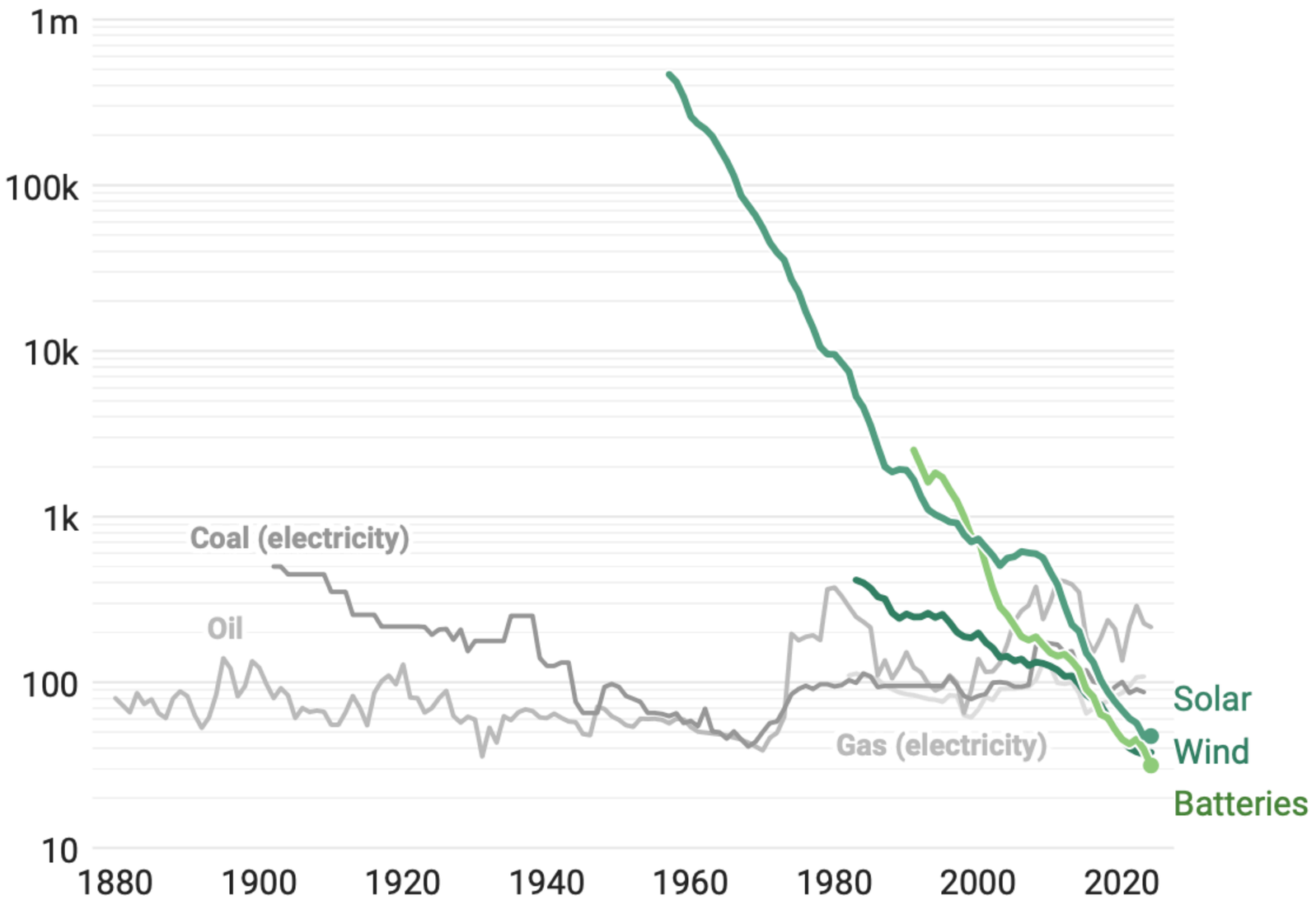
https://energysavingtrust.org.uk/grants-and-loans/boiler-upgrade-scheme

CLIMATE CHANGE

Reasons to be cheerful

Historical cost of energy sources

Technologies have reduced in price compared with **commodities**



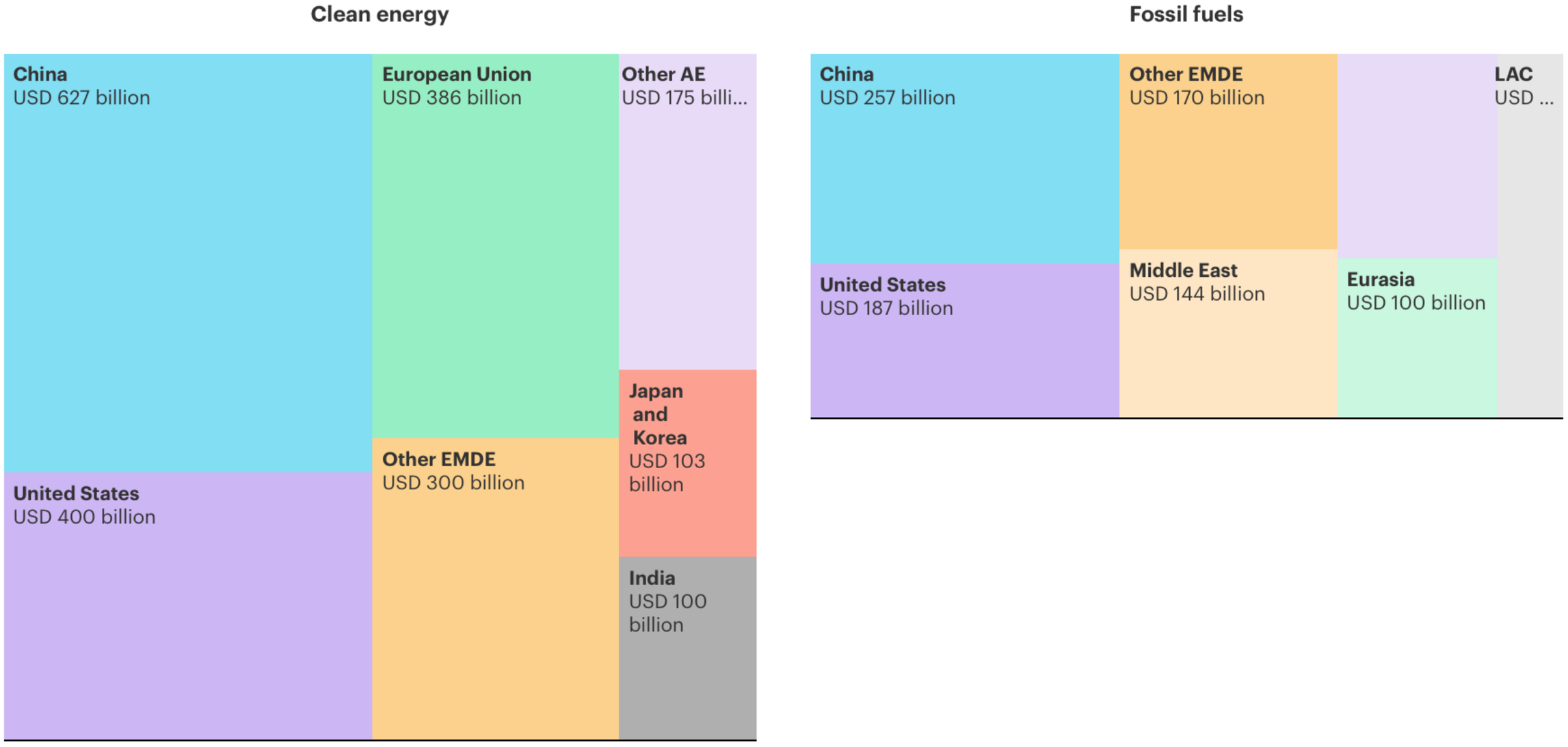
Unit is $ per MWh useful energy

Chart: The Times and The Sunday Times • Source: Ember

Last year, the International Renewable Energy Agency said that 91 percent of new renewable energy projects delivered power for **less money** than the cheapest fossil-fuelled alternative.

Clean energy investment and fossil fuel investment by region, 2025

billion USD (MER, 2024)



What do ‘Heat Batteries’ cost?

The smallest, (uniq6) which is equivalent to a 150L cylinder costs £3218.16 (including delivery, standard install* & fitting)

The most popular(uniq9) which is equivalent to a 210L cylinder costs £3843.12 (including delivery, standard install* & fitting)

The largest, (uniq12) which is equivalent to a 280L cylinder costs £4937.16 (including delivery, standard install* & fitting)

*Any extra work required is quoted separately.

https://commonsenseenergy.co.uk/heat-batteries/

https://www.youtube.com/watch?v=IJHvUgLr6bw

https://www.youtube.com/watch?v=t1x4J2c7v9I

Performance comparison (realistic, not brochure)

2️⃣ Temperature compatibility

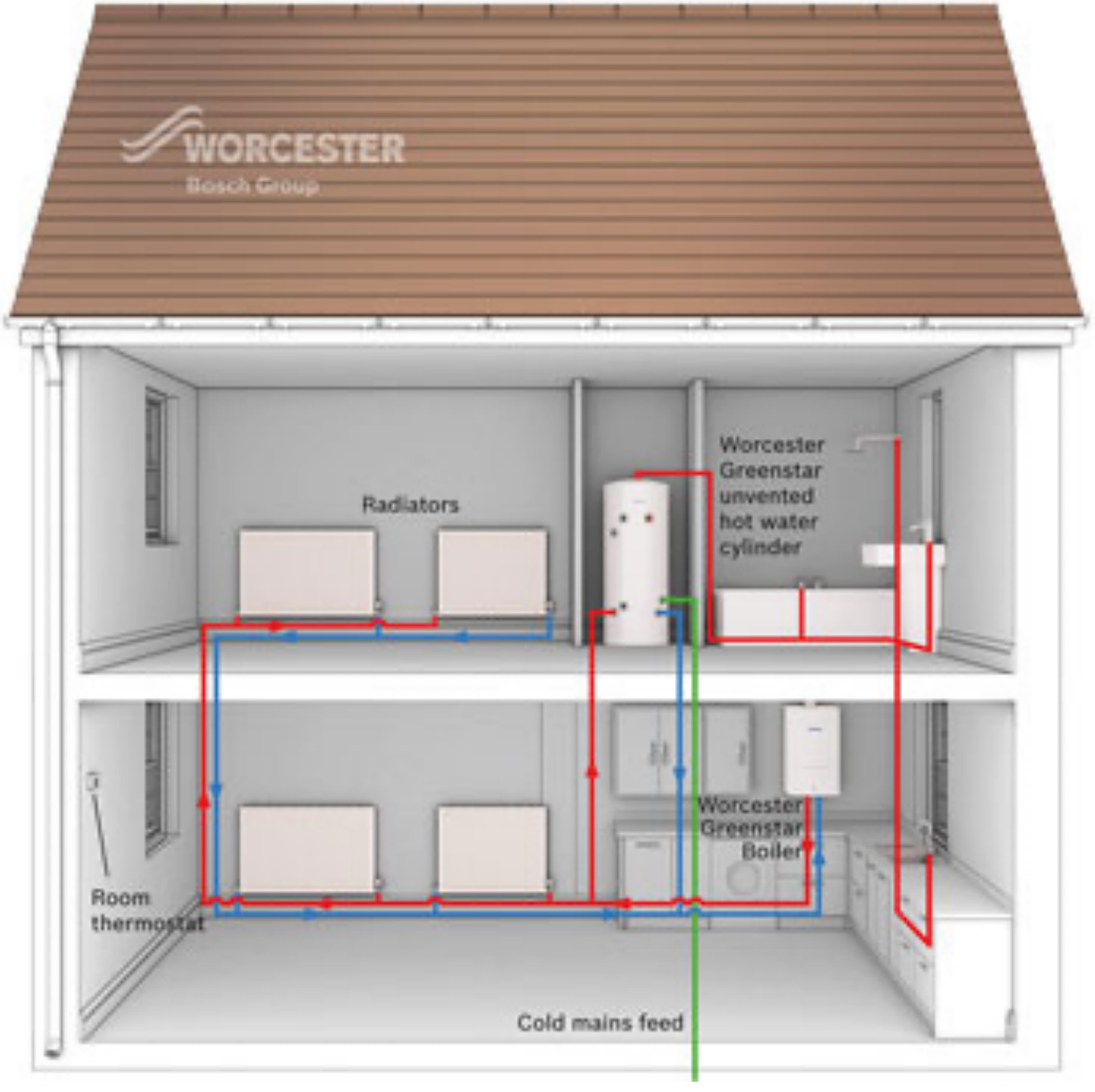
Heat batteries are usually **temperature-threshold devices**; cylinders are not.

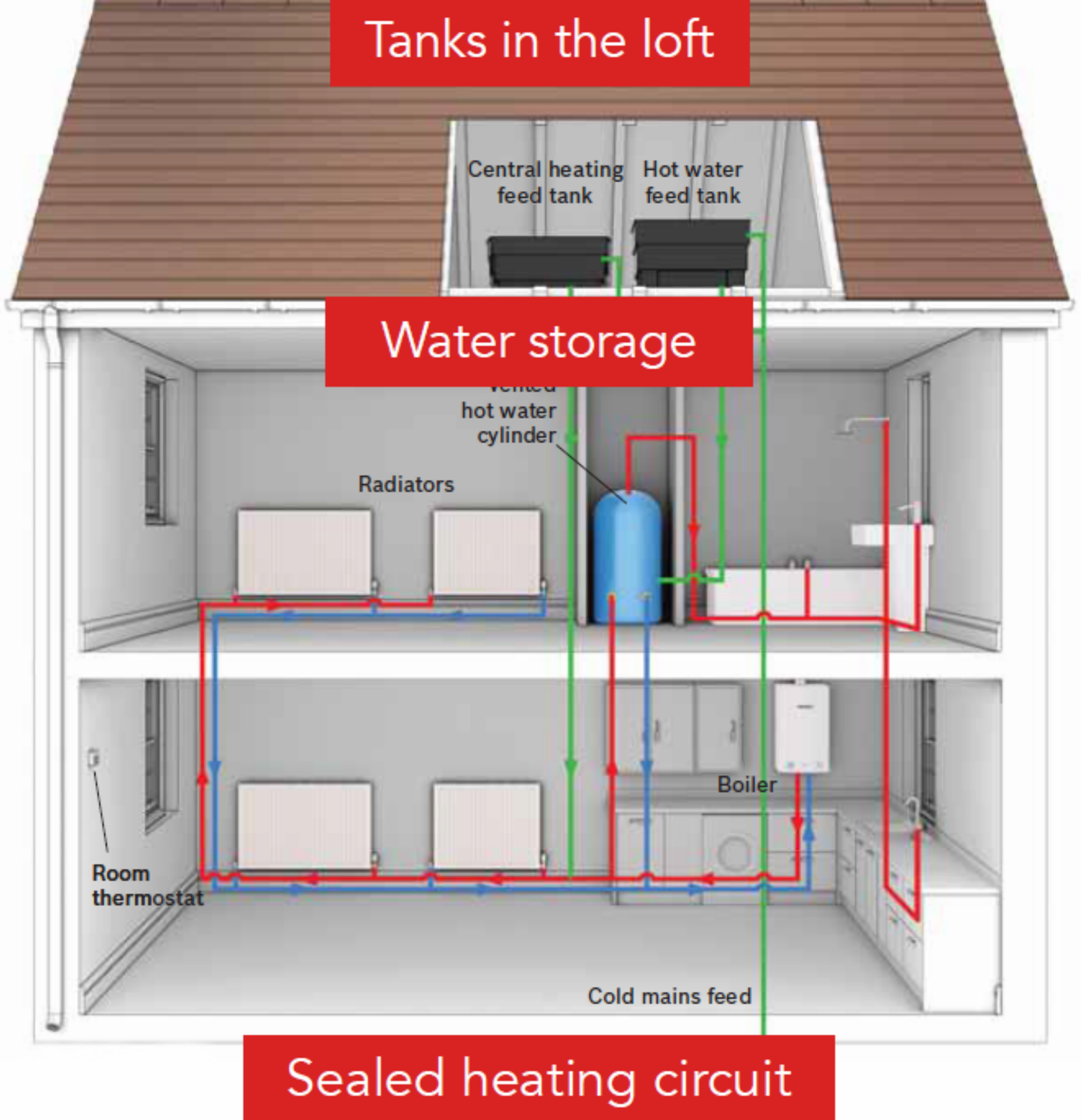
Issue	Cylinder	Heat battery
Works well at 45 °C	✅ Yes	❌ Often no
Accepts partial charging	✅ Yes	⚠️ Limited
Low-temperature charging	✅ Efficient	❌ Inefficient

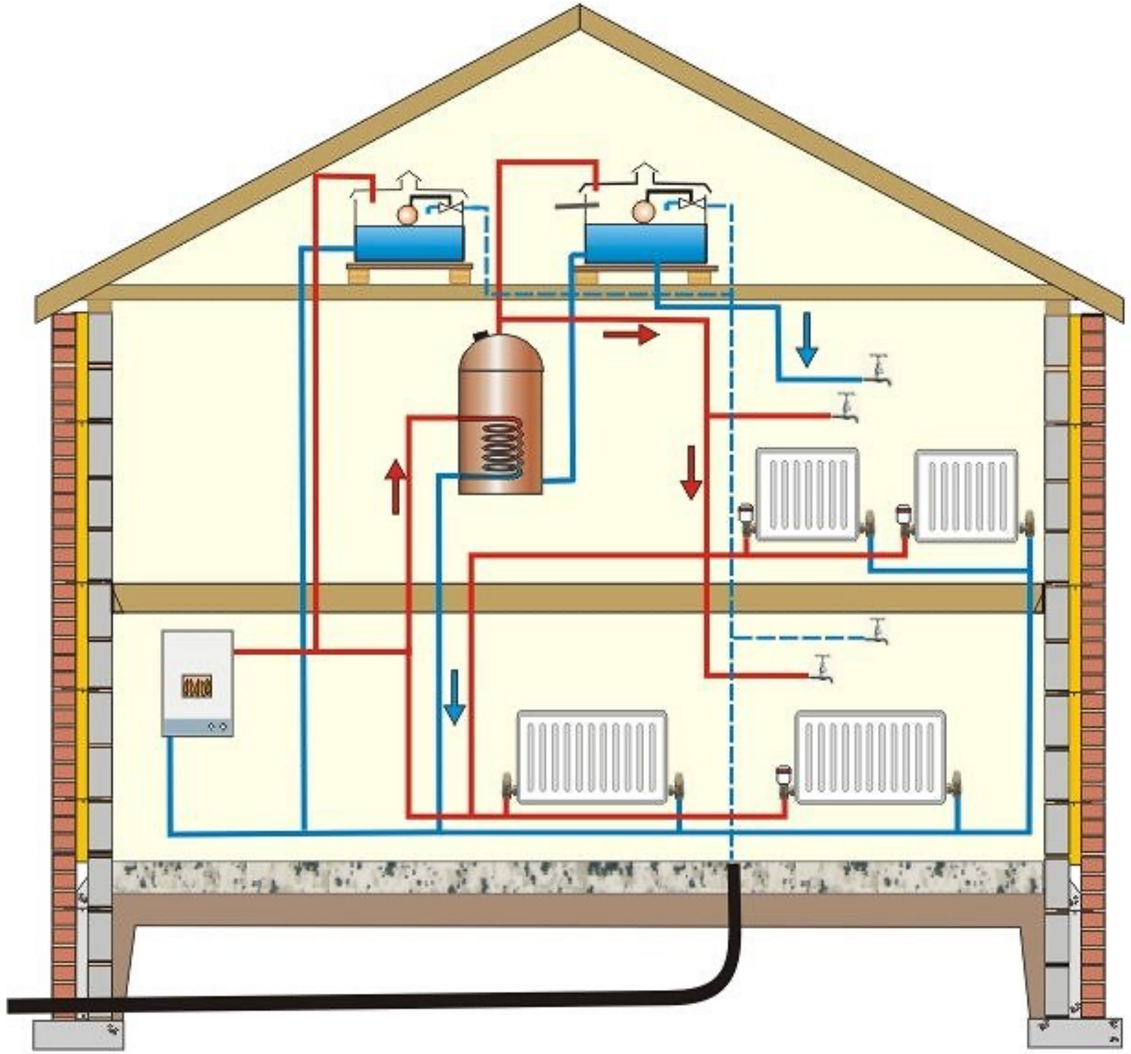
An ASHP can typically gain 4 kWh thermal energy from 1 kWh electric energy. They are optimized for flow temperatures between 30 and 40 °C (86 and 104 °F), suitable for buildings with heat emitters sized for low flow temperatures.

With losses in efficiency, an ASHP can even provide full central heating with a flow temperature up to 80 °C (176 °F).[2]

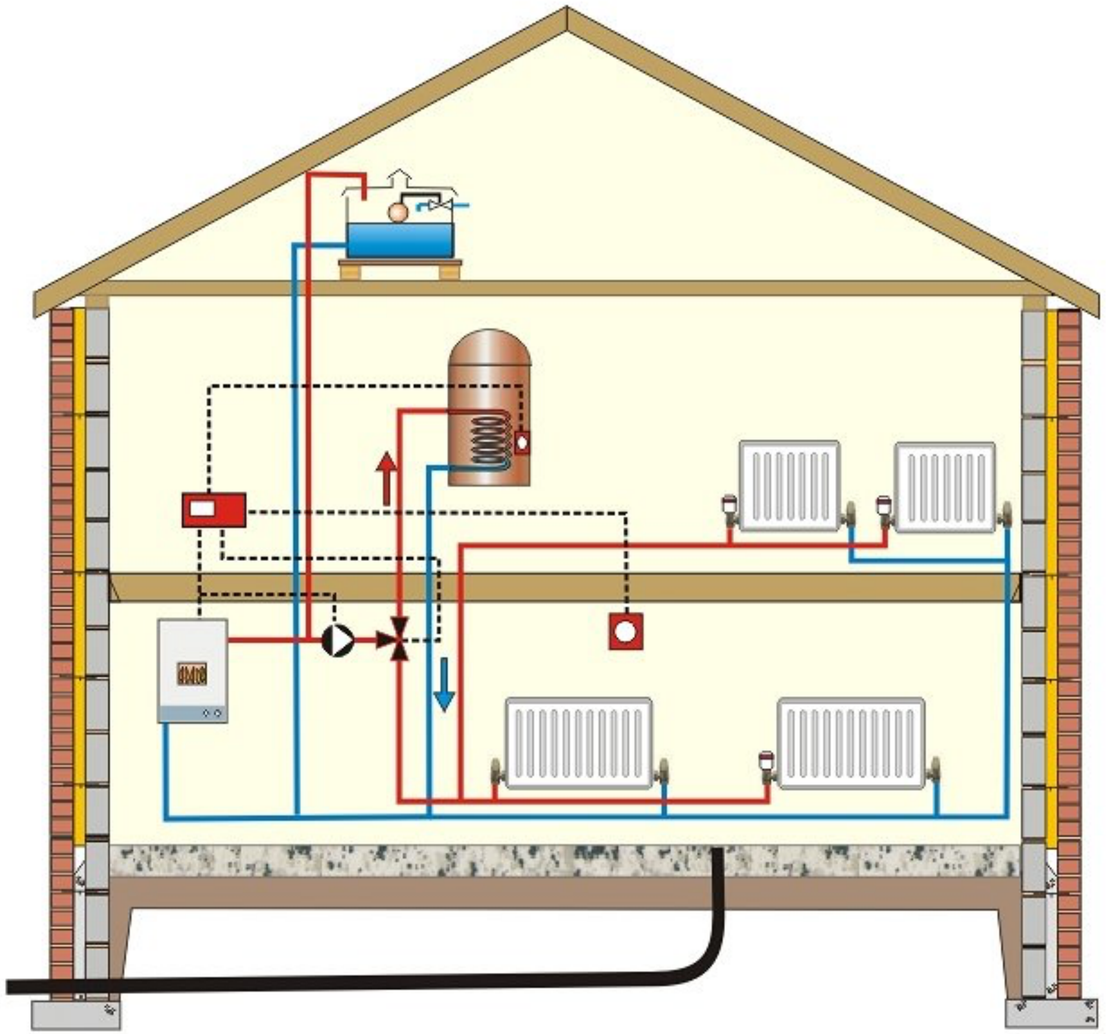
Wikipedia Heat Pumps


WORCESTER
Bosch Group
Radiators
Worcester
Greenstar
unvented
hot water
cylinder
Worcester
Greenstar
Boiler
Room
thermostat
Cold mains feed


Tanks in the loft
Central heating feed tank
Hot water feed tank
Water storage
hot water cylinder
Radiators
Boiler
Room thermostat
Cold mains feed
Sealed heating circuit

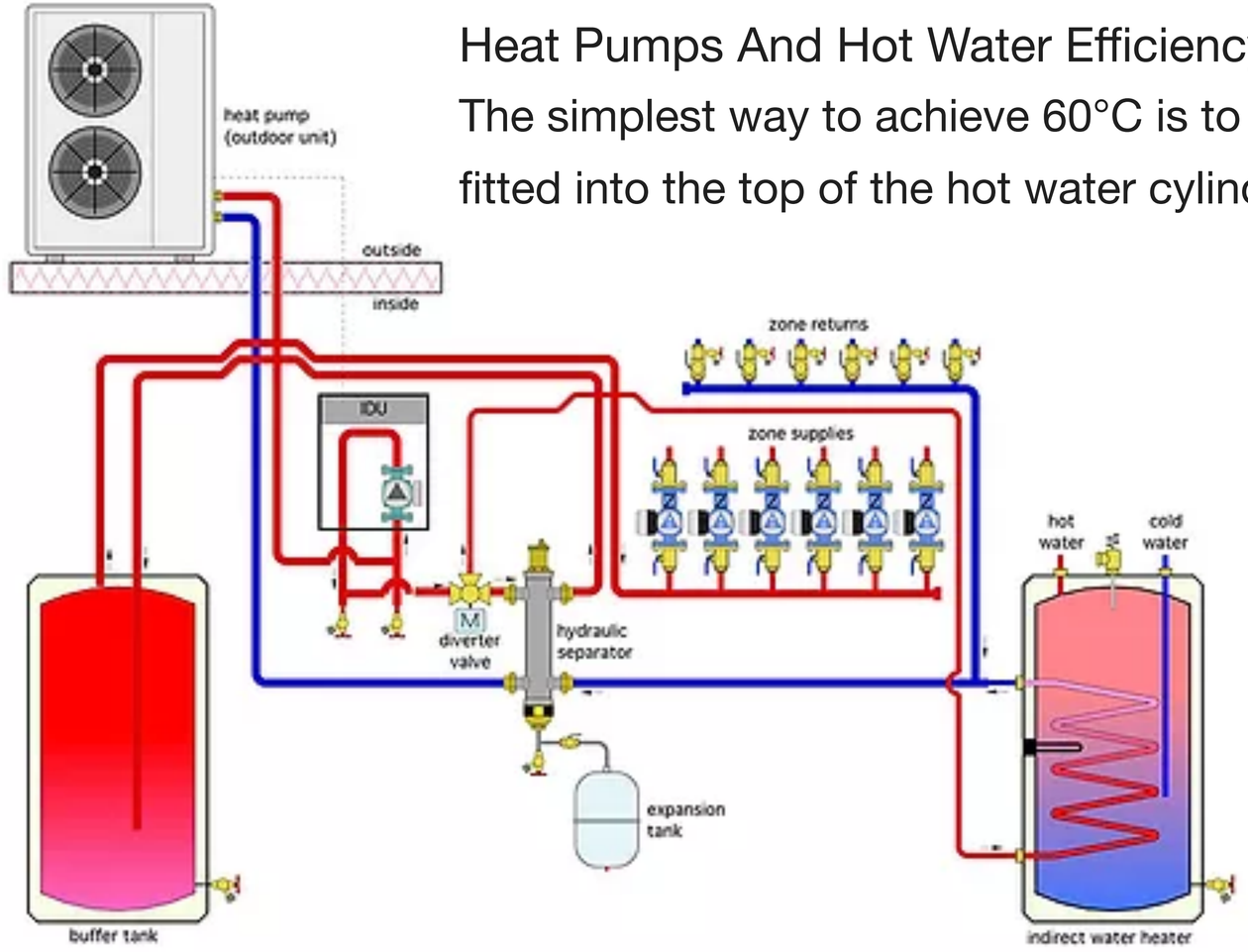


Typical vented central heating system



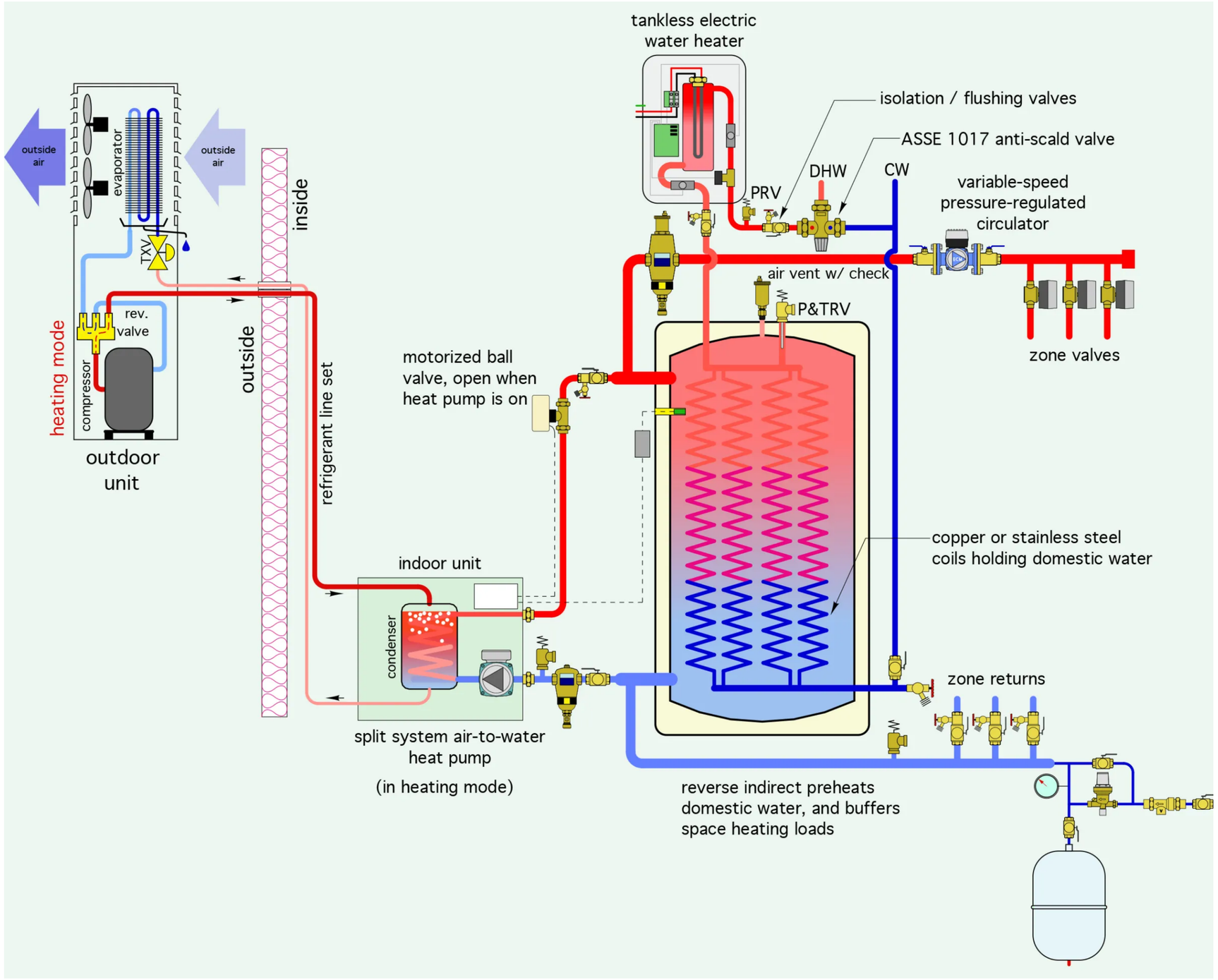
Where the valves / sets are located

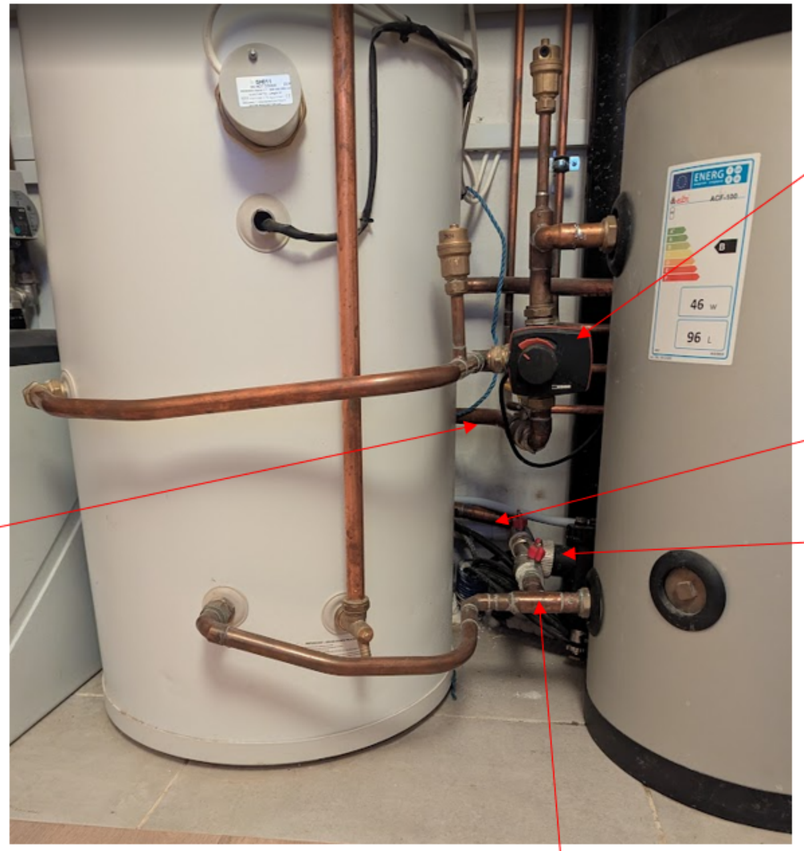
In air-source heat-pump systems, domestic hot water is usually heated in a **separate indirect cylinder**, using the heat pump at moderate temperatures and an **electric immersion heater for hygiene and peak demand**. This separation allows space heating to remain low-temperature and efficient while meeting the stricter temperature and safety requirements of hot water.



Heat Pumps And Hot Water Efficiency. (National Energy Foundation)

The simplest way to achieve 60°C is to use an electric immersion heater, fitted into the top of the hot water cylinder.


tankless electric
water heater
isolation / flushing valves
ASSE 1017 anti-scald valve
DHW
CW
PRV
variable-speed
pressure-regulated
circulator
air vent w/ check
P&TRV
zone valves
outside
air
outside
air
evaporator
TXV
inside
heating mode
rev.
valve
compressor
outside
refrigerant line set
outdoor
unit
motorized ball
valve, open when
heat pump is on
indoor unit
condenser
copper or stainless steel
coils holding domestic water
zone returns
split system air-to-water
heat pump
(in heating mode)
reverse indirect preheats
domestic water, and buffers
space heating loads


Valve on incoming pipework (says EBSE on it)
Connection to buried duct to ASHP
I believe is a filter
Connection to buried duct to ASHP
Outgoing flow from both tanks

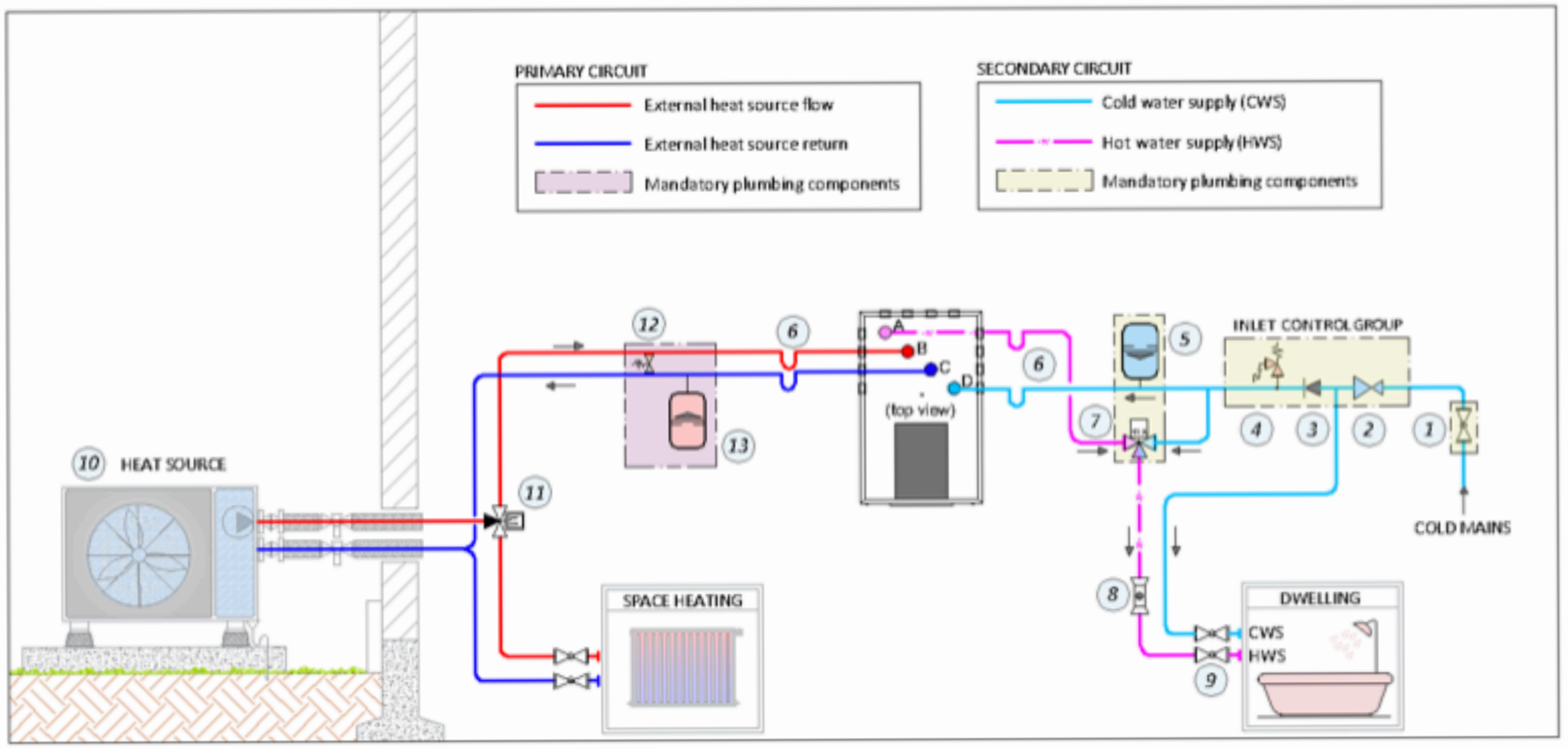
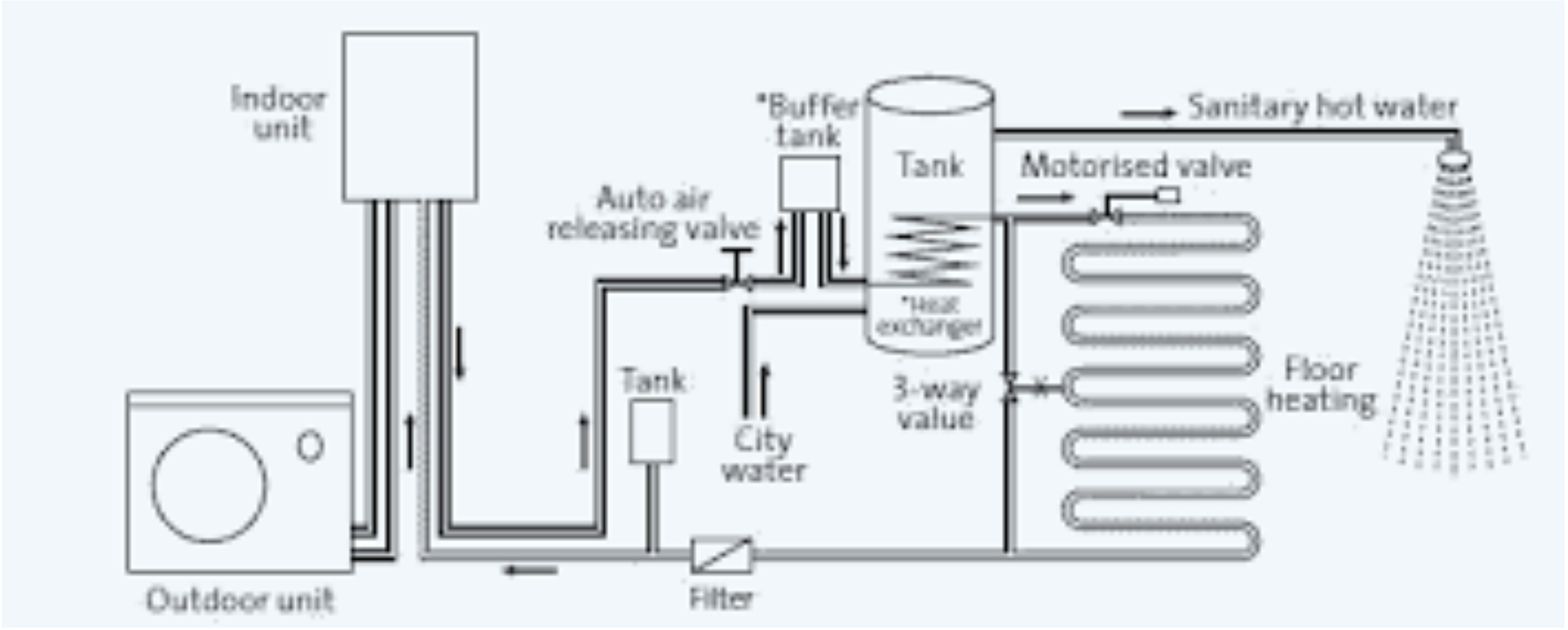
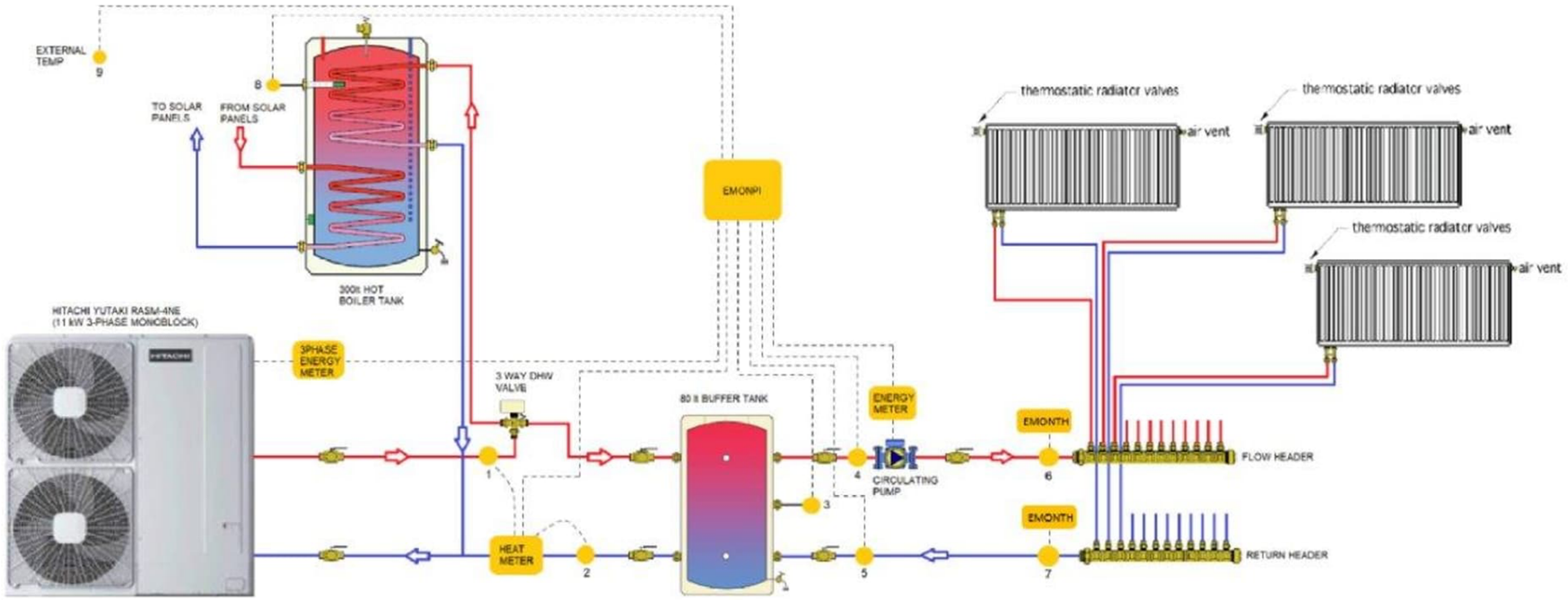
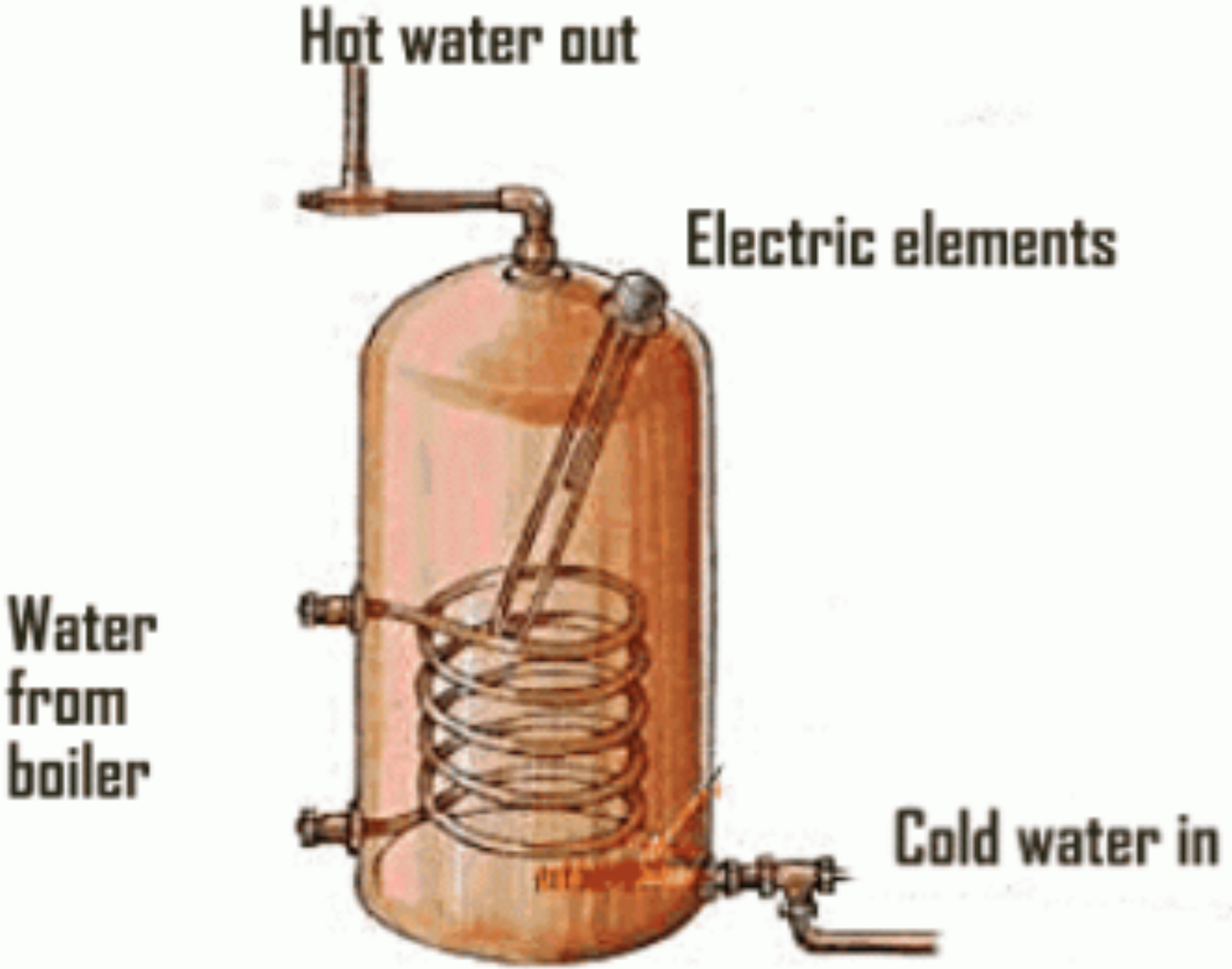


Figure 8 - Thermino xPlus plumbing diagram

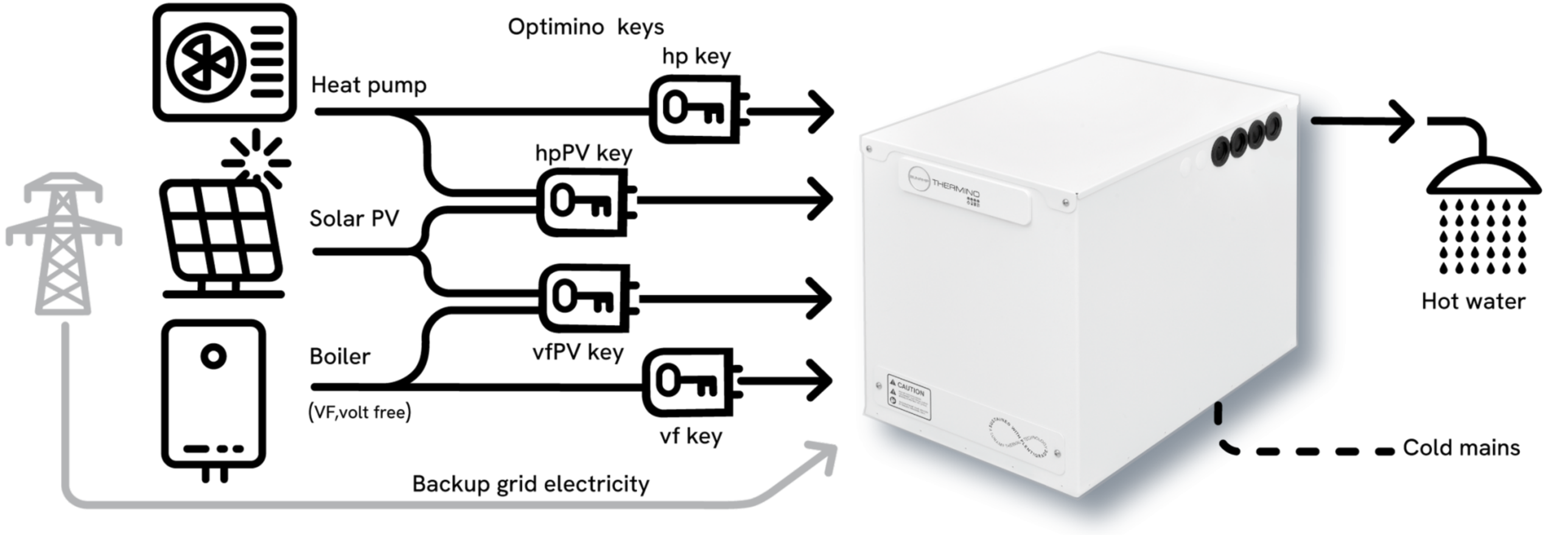

Indoor unit
*Buffer tank
Tank
Sanitary hot water
Motorised valve
Auto air releasing valve
*Heat exchanger
Tank
3-way value
Floor heating
City water
Outdoor unit
Filter

YOU NEED A BUFFER TANK!

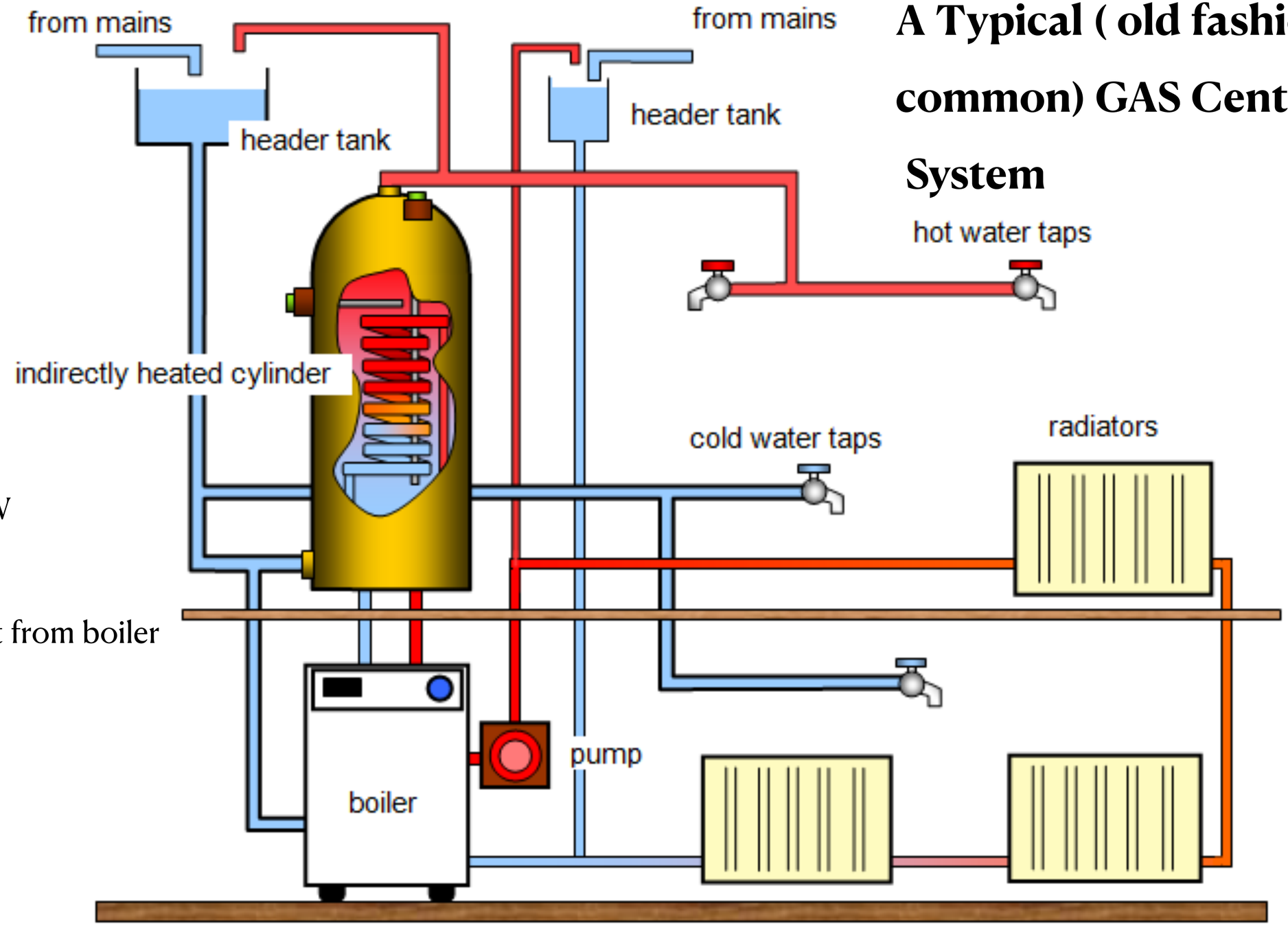



Hot water out
Electric elements
Water from boiler
Cold water in

Tao (°C) DB/WB	Leaving internal exchanger water temperature (°C)															
	30			35			45			55			60			
°C	kWt	kWe_ tot	COP	kWt	kWe_ tot	COP	kWt	kWe_ tot	COP	kWt	kWe_ tot	COP	kWt	kWe_ tot	COP	
-25	4,60	1,44	3,19	4,47	1,92	2,33	-	-	-	-	-	-	-	-	-	
-20/-20,1	5,86	1,50	3,92	5,70	2,02	2,82	-	-	-	-	-	-	-	-	-	
-15/-15,3	7,11	1,58	4,51	6,92	2,12	3,27	6,52	3,20	2,04	-	-	-	-	-	-	
-10/-11	8,37	1,68	4,98	8,14	2,22	3,67	7,68	3,29	2,33	7,21	4,37	1,65	6,98	4,91	1,42	
-7/-8	9,13	1,76	5,20	8,87	2,28	3,90	8,37	3,32	2,52	7,86	4,37	1,80	7,61	4,89	1,56	
-2/-3	10,39	1,90	5,47	10,10	2,38	4,25	9,52	3,34	2,85	8,95	4,30	2,08	8,66	4,78	1,81	
0/-1	10,89	1,96	5,55	10,59	2,42	4,38	9,98	3,33	3,00	9,38	4,24	2,21	9,08	4,70	1,93	
2/1	11,39	2,03	5,61	11,08	2,46	4,51	10,97	3,48	3,15	9,82	4,17	2,36	9,50	4,60	2,07	
7/6	12,65	2,22	5,71	12,30	2,56	4,81	12,80	3,51	3,53	10,90	3,73	2,92	10,55	4,26	2,48	
15/12	13,72	1,87	7,32	13,34	2,16	6,17	12,58	2,74	4,59	11,82	3,32	3,57	11,44	3,60	3,18	
20/15	13,86	1,64	8,20	13,08	1,89	6,91	12,34	2,40	5,14	11,59	2,90	3,99	11,22	3,36	3,56	
25/18	12,47	1,39	8,95	12,12	1,61	7,54	11,43	2,04	5,62	10,74	2,46	4,36	10,40	2,68	3,88	
30/22	10,76	1,13	9,53	10,46	1,30	8,03	9,87	1,65	5,98	9,27	2,00	4,64	8,98	2,17	4,13	
35/24	8,34	0,85	9,80	8,10	0,98	8,26	7,64	1,24	6,15	7,18	1,51	4,77	-	-	-	


Optimino keys
hp key
Heat pump
hpPV key
Solar PV
vfPV key
Boiler
(VF,volt free)
vf key
Backup grid electricity
THERMINO
CAUTION
Hot water
Cold mains

A Typical (old fashioned but common) GAS Central Heating System



Heats DHW

indirectly;

Rads direct from boiler

From the Government Website 18th Nov 2025

Boiler Upgrade Scheme has been expanded to include air-to-air heat pumps and heat batteries giving families more choice in how they upgrade their home.

Boiler Upgrade Scheme. This currently offers grants of £7,500 off the cost of installing an air source or ground source heat pump

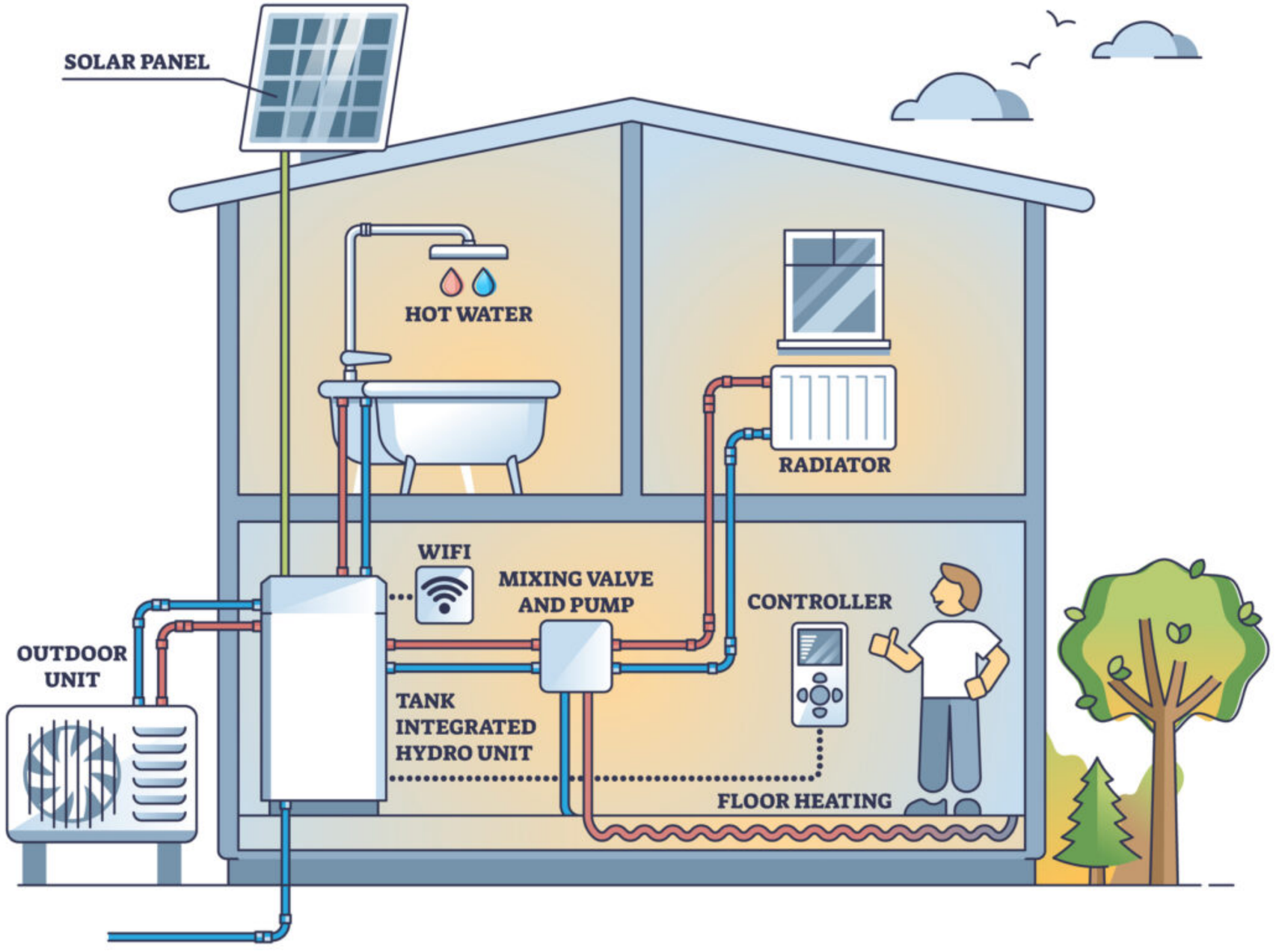
Now the scheme has been expanded to offer a £2,500 discount off the cost of installing an air-to-air heat pump.

£2,500 off the price of heat batteries, which can store heat overnight for use during the day.

The grants are available to all households.

https://www.gov.uk/government/news/discounts-for-families-to-keep-warm-in-winter-and-cool-in-summer

HEAT PUMP


SOLAR PANEL
HOT WATER
RADIATOR
WIFI
MIXING VALVE
AND PUMP
CONTROLLER
OUTDOOR
UNIT
TANK
INTEGRATED
HYDRO UNIT
FLOOR HEATING

What the heck is a ‘HEAT BATTERY’?

The concept of a heat battery is simple: it stores heat during times when excess energy is produced and releases it when there is a shortage of energy. This is similar to the way a traditional battery stores and releases electrical energy.

However, instead of using chemicals to store energy, a heat battery uses a phase change material (PCM) such as sodium acetate or paraffin wax.

Comparison to water tanks

Sunamp

Standard Water Tank

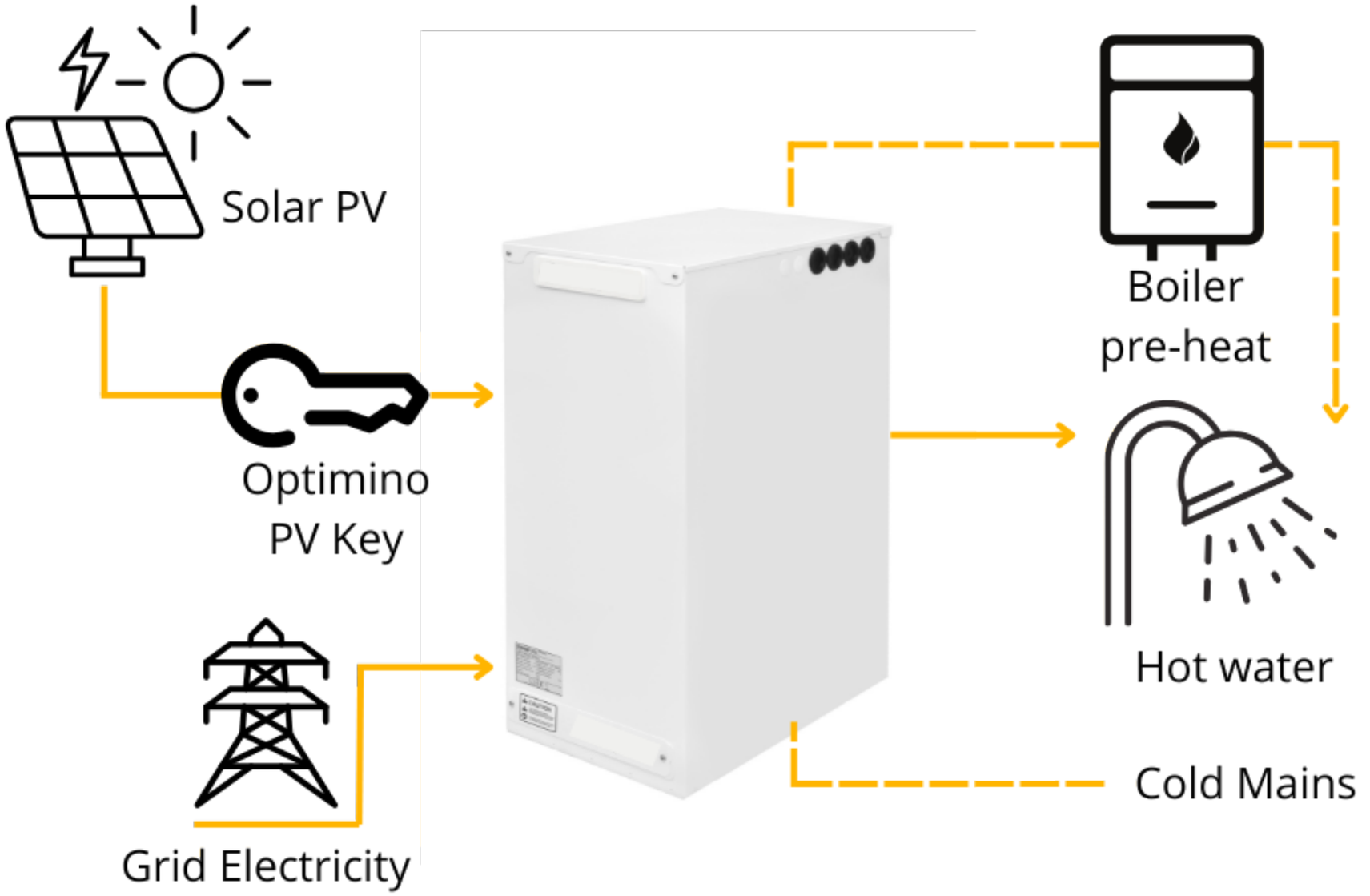
UniQ eHW 9 Heat Battery

Diameter:.....579mm
Height:.....1,486mm
Volume:.....391dm³

Heat loss:.....1.57kWh/day
ErP rate:.....B
(it becomes C for larger models)

Width:.....365mm
Depth:.....575mm
Height:.....860mm
Volume:.....180.5dm³

Heat loss:.....0.74kWh/day
ErP rate:.....A+
(over the whole range)


Solar PV
Optimino
PV Key
Grid Electricity
Boiler
pre-heat
Hot water
Cold Mains

Downsides!

You need a high temperature to charge a heat battery efficiently

Most Air Source Heat pumps have a LOW flow temperature

1. Limited charging of the heat battery

Problem:
Many heat batteries are designed to charge efficiently at **higher temperatures** (often 55–70 °C).

Why low flow temps cause issues:

- Heat transfer into the storage medium (PCM, phase-change salts, or water) slows at lower temperatures
- Some PCMs simply **don't melt fully** at ASHP flow temperatures

Result:

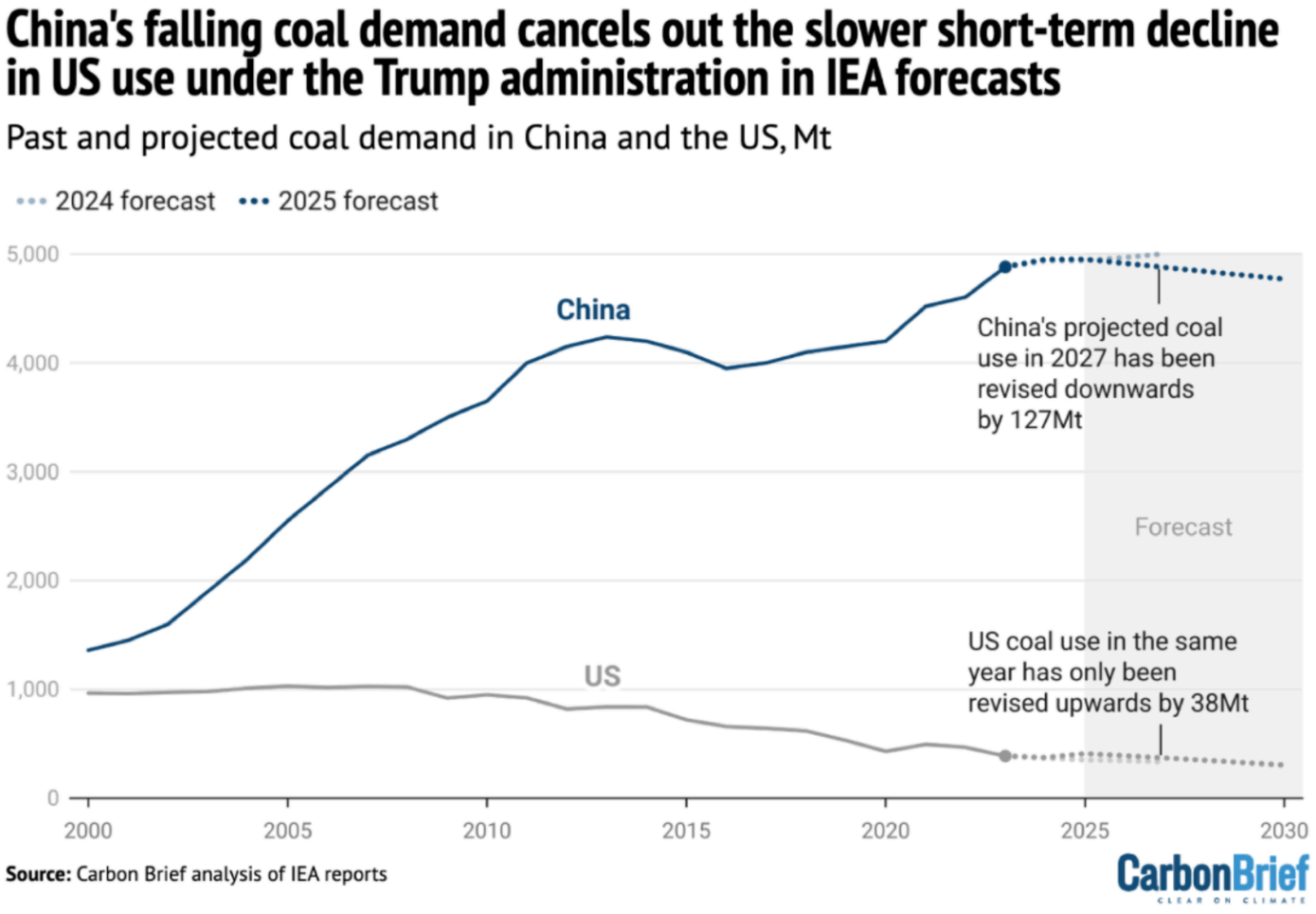
- Reduced usable storage capacity
- Longer charging times
- Heat battery may never reach its rated energy content
-

Bottom line

Low flow temperatures are excellent for **heat pump efficiency**, but they are often **fundamentally mismatched** with many heat battery designs—especially those expected to deliver high-temperature DHW.

Table 1

Last	year,	the	International	Renewable	Energy Agency	said	that	91	per
cent	of new	ren	ewable energy	projects	delivered power	for	less		
money	than	the	cheapest fossi	l-fuelled	alternative.				

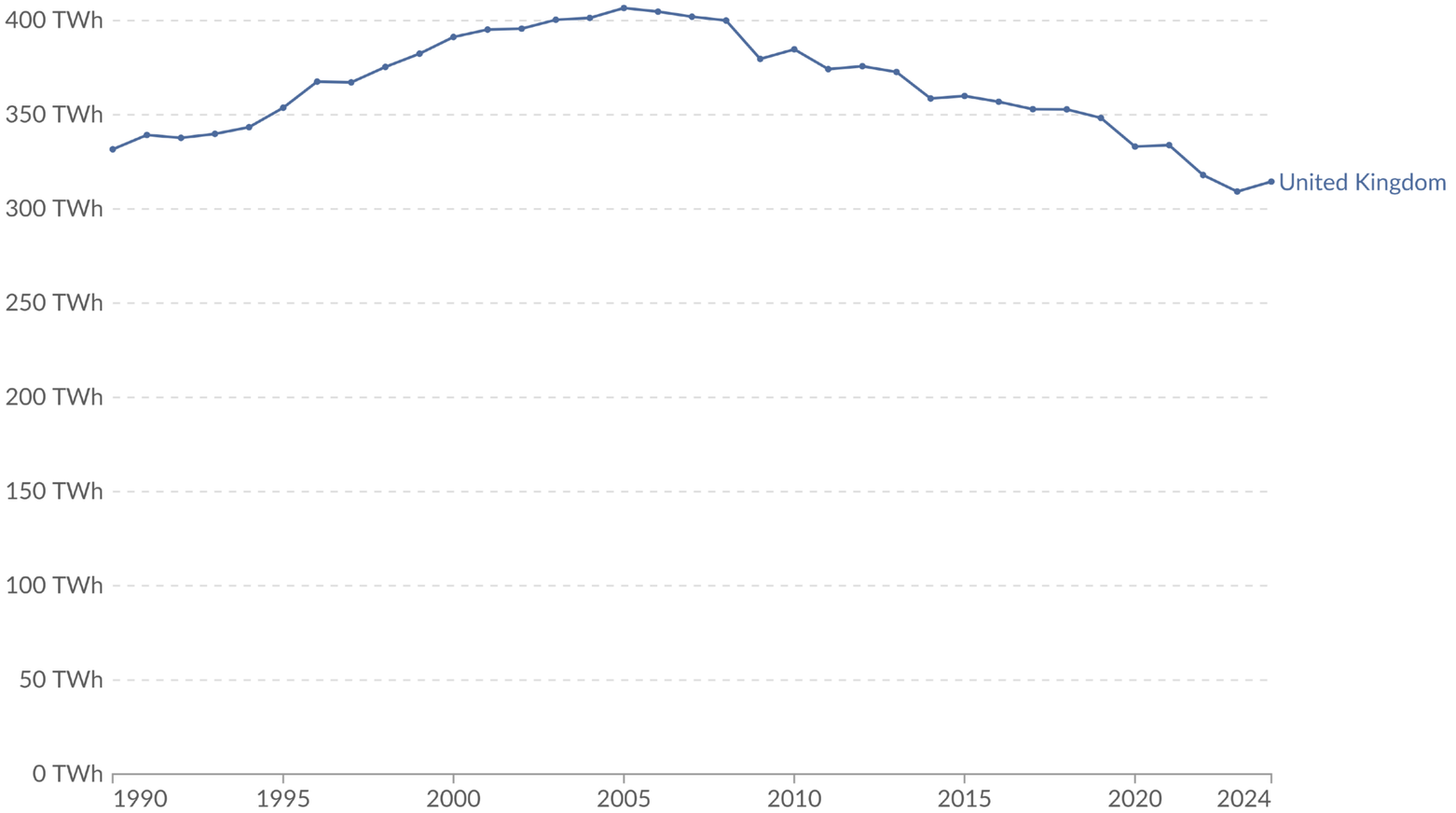


The latest coal market report from the International Energy Agency said that global coal use will reach record levels in 2025, but will decline by the end of the decade. Carbon Brief analysis of the report found that projected coal use in China for 2027 has been revised downwards by 127m tonnes, compared to the projection from the 2024 report – "more than cancelling out the effects of the Trump administration's coal-friendly policies in the US".

Electricity demand, 1990 to 2024

Our World in Data

Electricity demand is measured in terawatt-hours[1], as total electricity generation, adjusted for electricity imports and exports.



Data source: Ember (2025)

OurWorldinData.org/energy | CC BY

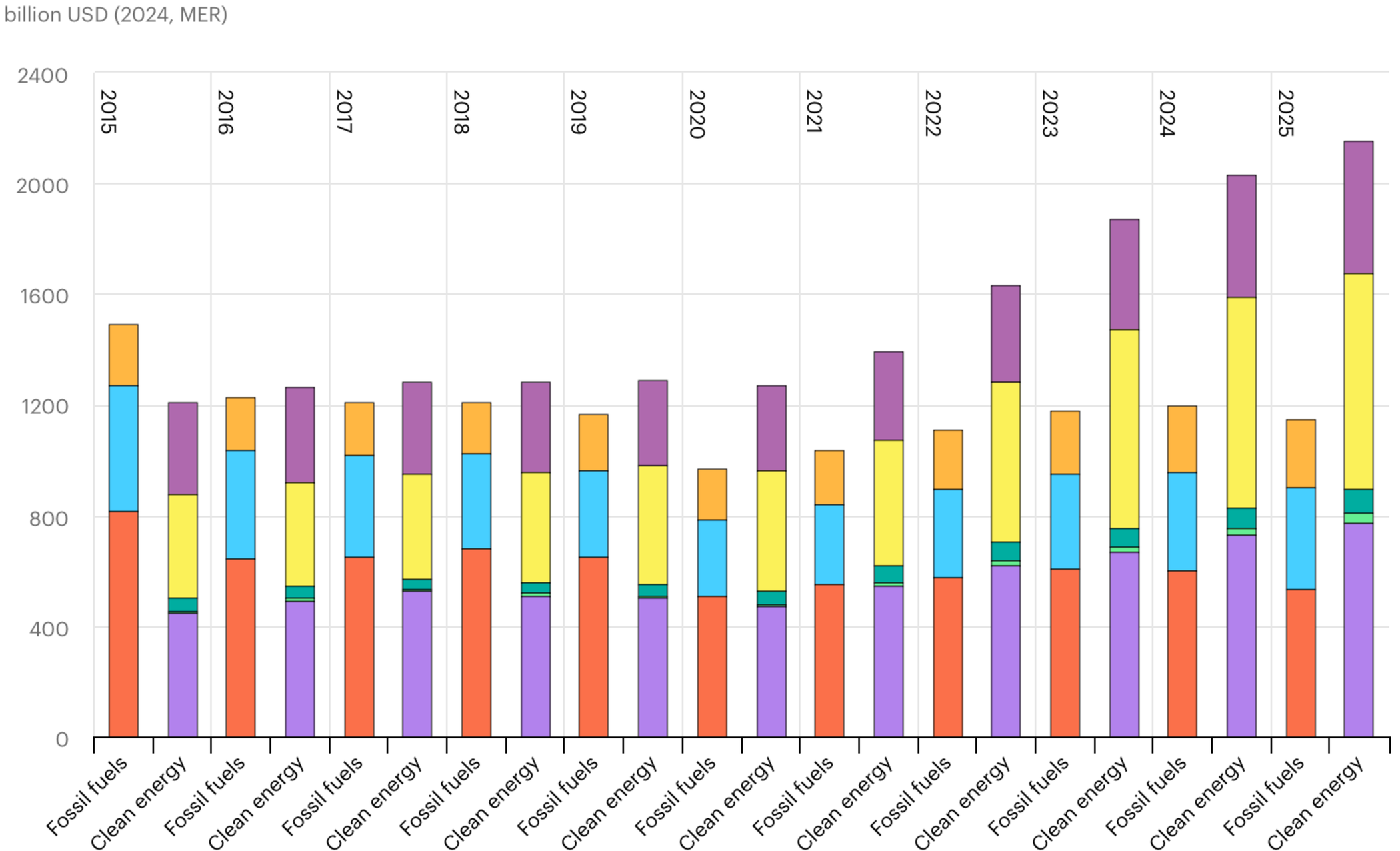
1. Watt-hour A watt-hour is the energy one watt of power delivers for one hour. Since one watt equals one joule per second, a watt-hour equals 3600 joules of energy.
Metric prefixes are used for multiples of the unit, usually:
- kilowatt-hours (kWh), or a thousand watt-hours;
- Megawatt-hours (MWh), or a million watt-hours;
- Gigawatt-hours (GWh), or a billion watt-hours;
- Terawatt-hours (TWh), or a trillion watt-hours.

Last year, the International Renewable Energy Agency said that 91 percent of new renewable energy projects delivered power for less money than the cheapest fossil-fuelled alternative.“This is about as obvious a technology shift as I have seen in my career,” said Kingsmill Bond.

Bond’s team has forecast that if renewables, batteries and electric cars keep growing at their current pace, they will push fossil fuel demand into decline by 2030. It would drop by more than half by 2050, with coal falling fastest, then oil, then gas.

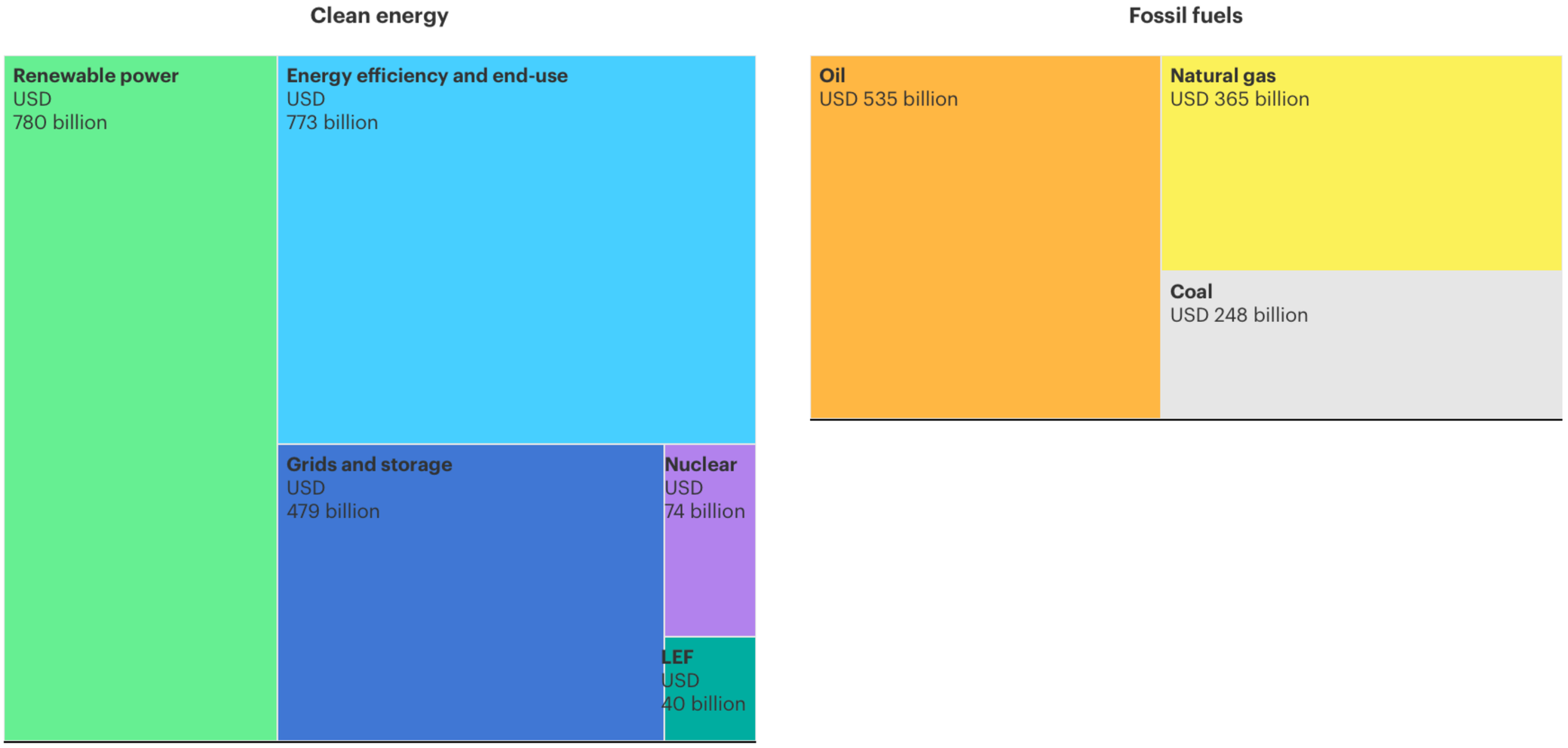
The world recently passed a massive milestone: renewables have finally overtaken coal to become the world's leading source of electricity. The Conversation 7 Jan 2026

Global investment in clean energy and fossil fuels, 2015-2025



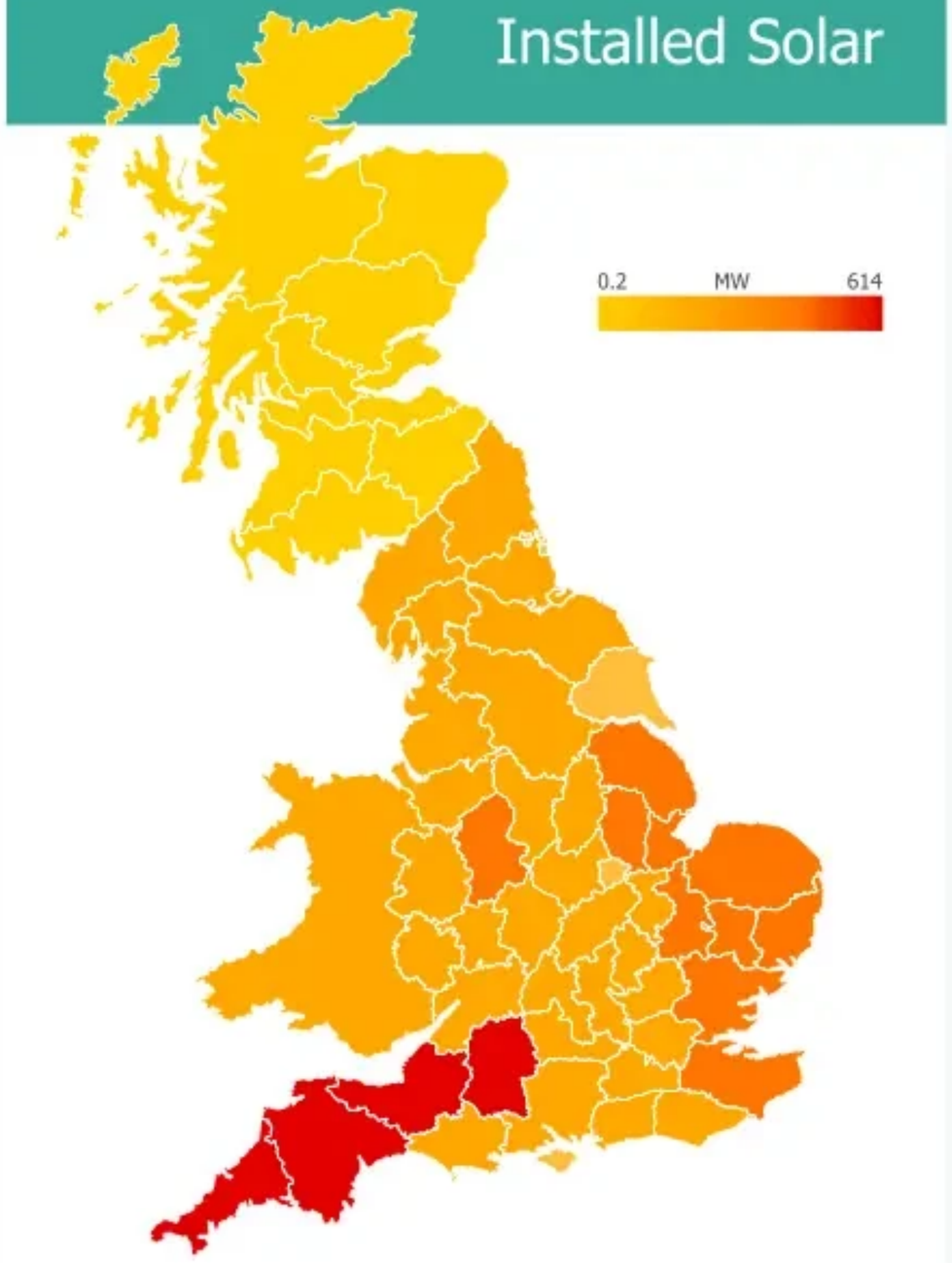
Breakdown of clean energy and fossil fuel investment by sub-sector, 2025

billion USD (MER, 2024)

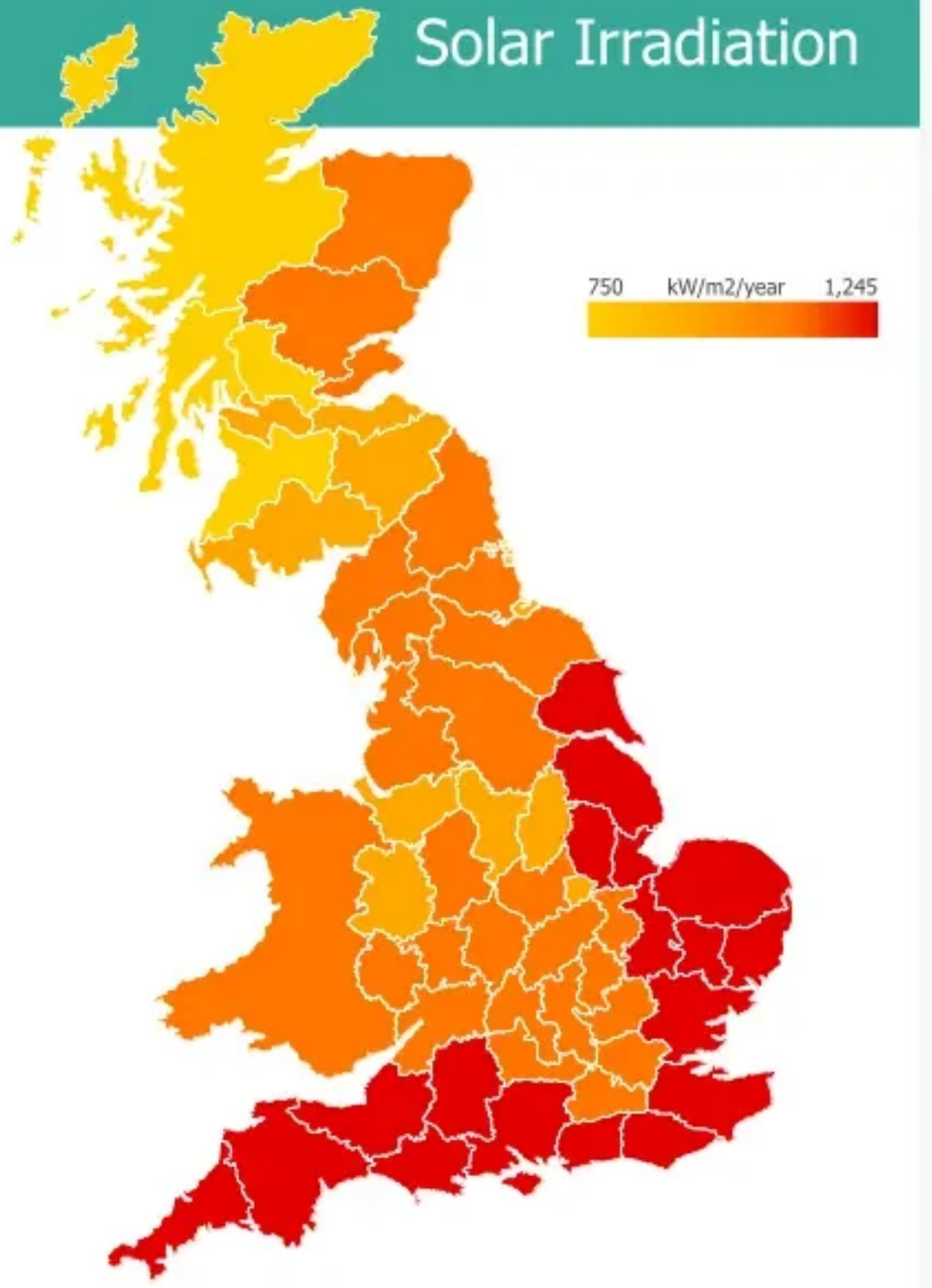


Oil Gas Coal Energy efficiency and end use Low-emissions fuels Nuclear and other clean power Renewable power Grids and storage

Installed Solar



Solar Irradiation



Example variance in daily south-facing system output