A Tasting Menu of LZC Technology

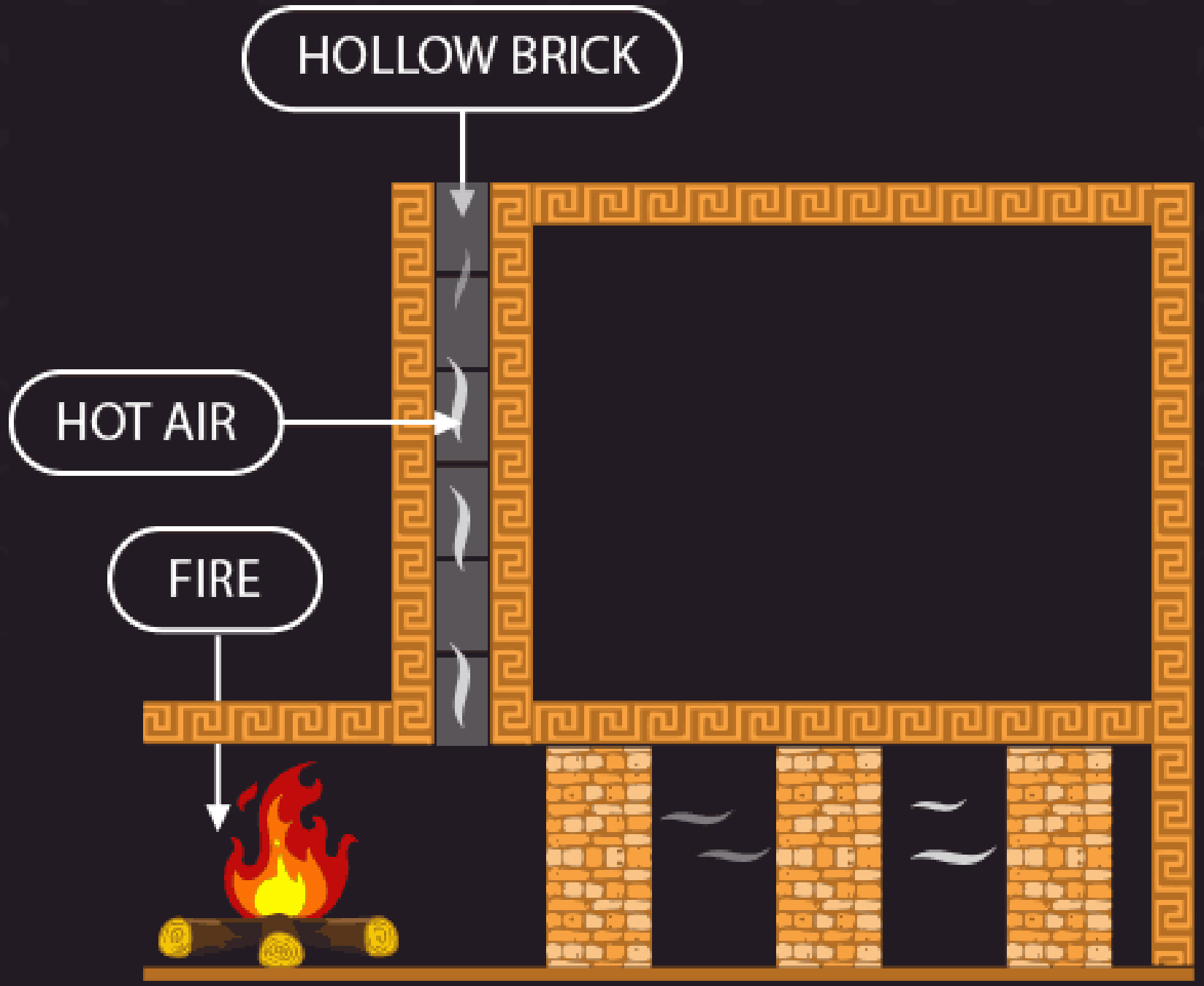
22nd October 2021

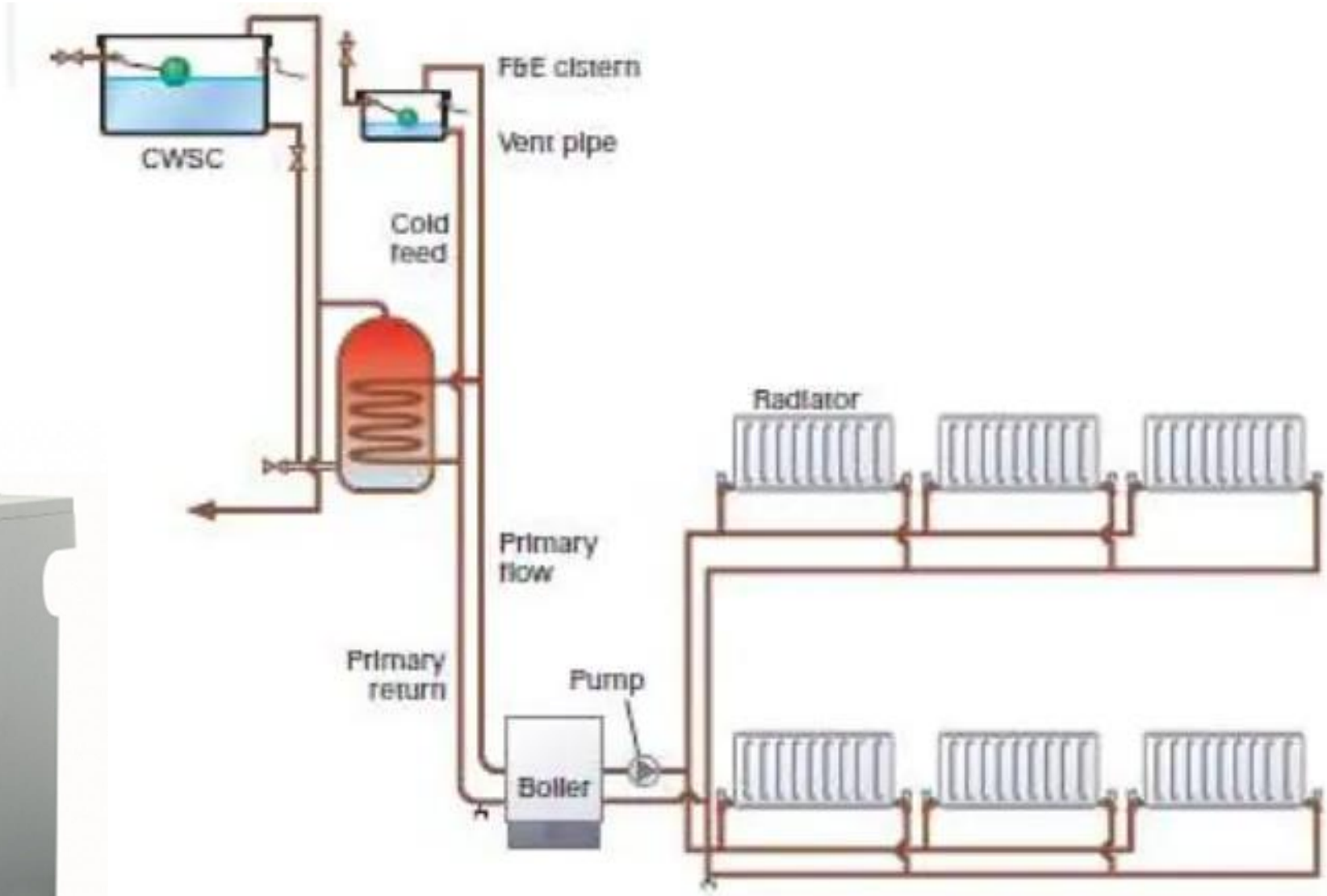
Steve Hunt

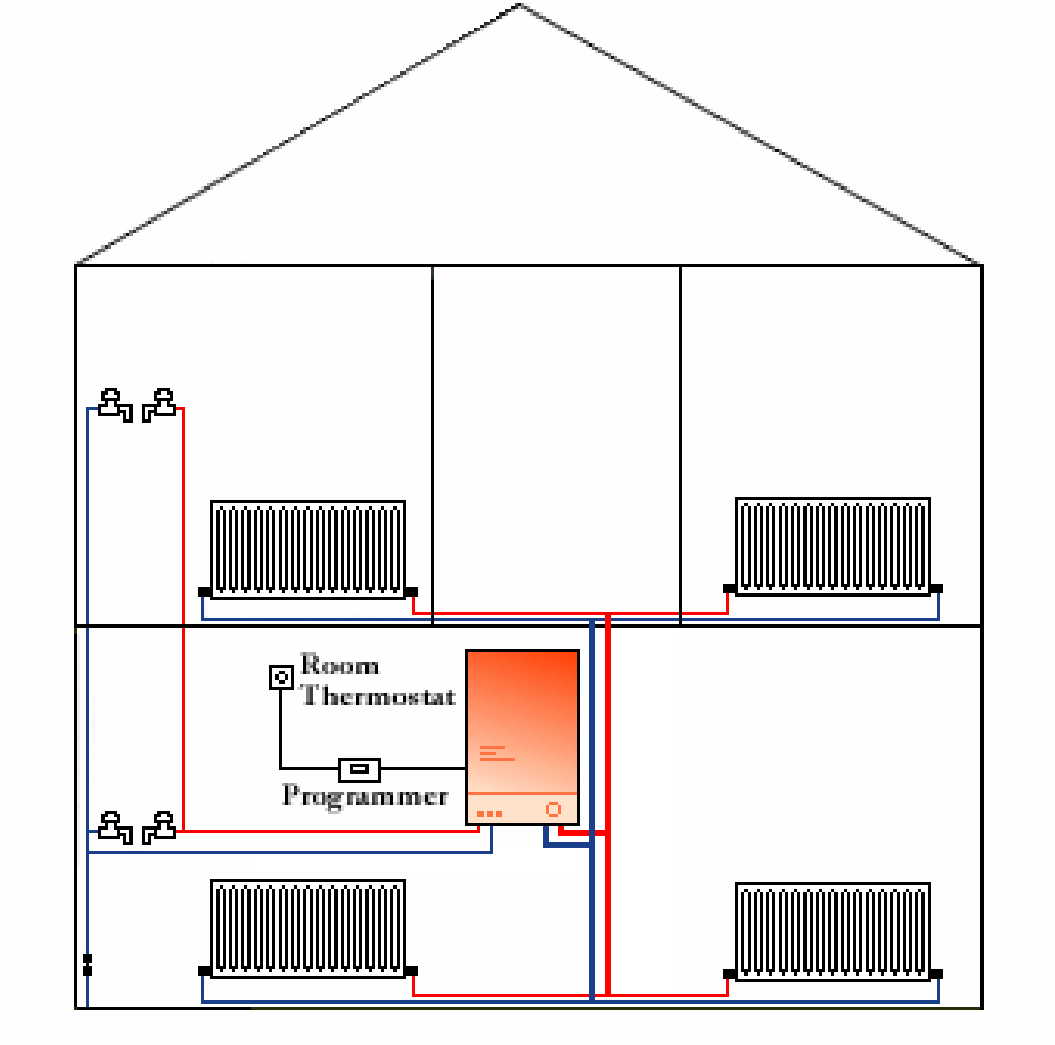
GSHPA GROUND SOURCE HEAT PUMP ASSOCIATION

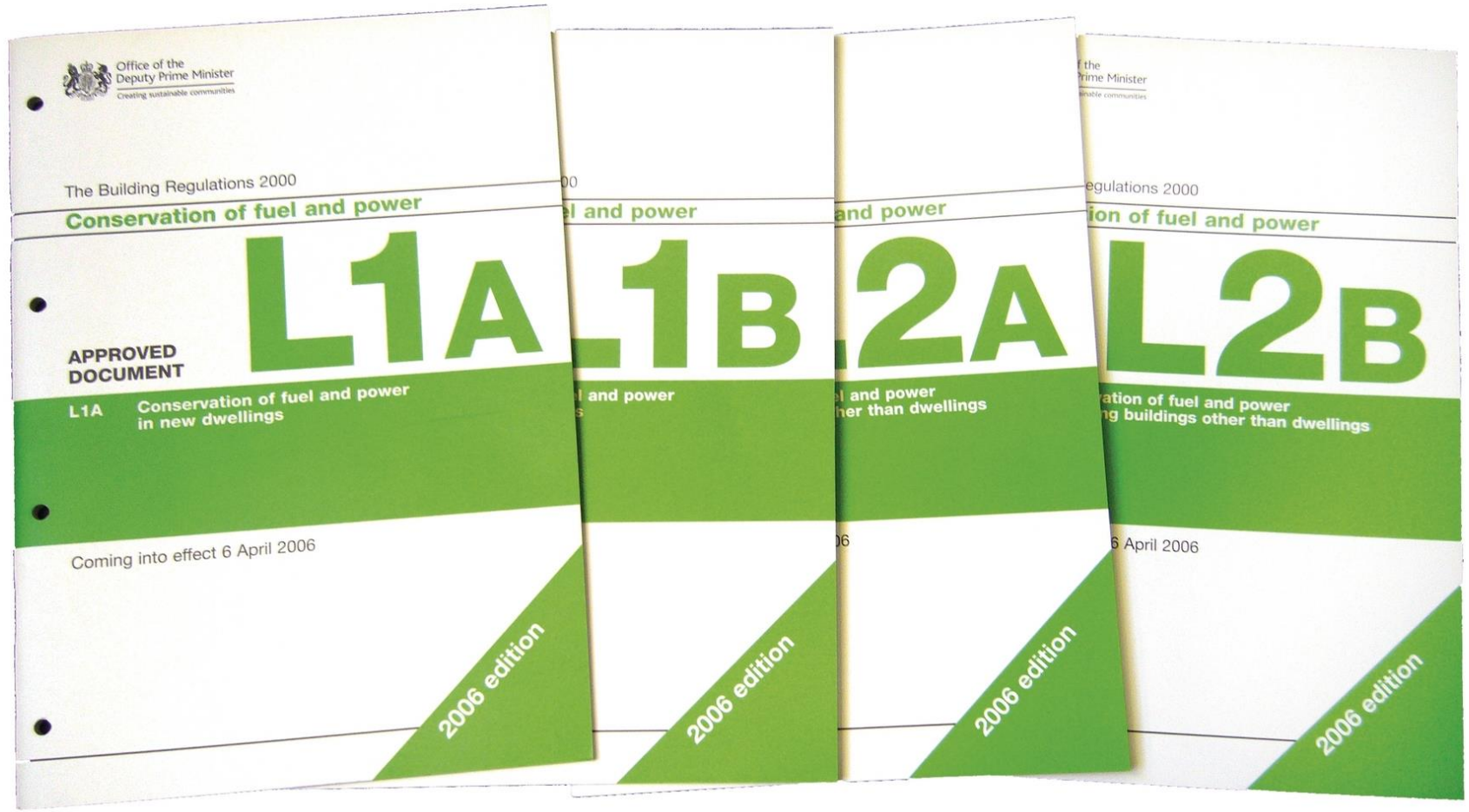
Steven A Hunt & Associates

CIBSE


HOLLOW BRICK
HOT AIR
FIRE


F&E cistern
Vent pipe
CWSC
Cold feed
Radiator
Primary flow
Primary return
Pump
Boiler


Room
Thermostat
Programmer


Office of the
Deputy Prime Minister
Creating sustainable communities
The Building Regulations 2000
Conservation of fuel and power
L1A
APPROVED
DOCUMENT
L1A Conservation of fuel and power
in new dwellings
Coming into effect 6 April 2006
2006 edition
L1B
2006 edition
L2A
2006 edition
L2B
2006 edition

Component	1965	1974	1981	1990	1995	2006	2013
Roof	1.42	0.6	0.35	0.25	0.25	0.25	0.25
Wall	1.7	1.0	0.6	0.45	0.45	0.35	0.35
Window	5.7	5.7	5.7	5.7	3.3	2.2	2.2
Floor				0.45	0.45	0.25	0.25
Air Perm						10	10

Component	1965	1974	1981	1990	1995	2006	2013
Roof	1.42	0.6	0.35	0.25	0.25	0.25	0.25
Wall	1.7	1.0	0.6	0.45	0.45	0.35	0.35
Window	5.7	5.7	5.7	5.7	3.3	2.2	2.2
Floor				0.45	0.45	0.25	0.25
Air Perm						10	10

Component	1965	1974	1981	1990	1995	2006	2013	2022
Roof	1.42	0.6	0.35	0.25	0.25	0.25	0.25	0.16
Wall	1.7	1.0	0.6	0.45	0.45	0.35	0.35	0.26
Window	5.7	5.7	5.7	5.7	3.3	2.2	2.2	1.6
Floor				0.45	0.45	0.25	0.25	0.18
Air Perm						10	10	8

Component	1965	1974	1981	1990	1995	2006	2013	2022	LETI
Roof	1.42	0.6	0.35	0.25	0.25	0.25	0.25	0.16	0.12-0.15
Wall	1.7	1.0	0.6	0.45	0.45	0.35	0.35	0.26	0.10-0.12
Window	5.7	5.7	5.7	5.7	3.3	2.2	2.2	1.6	1.0-1.2
Floor				0.45	0.45	0.25	0.25	0.18	
Air Perm						10	10	8	1

Net Zero Carbon

Net Zero Carbon

2050

Net zero carbon – Construction: *"When the amount of carbon emissions associated with a building's product and construction stages up to practical completion is zero or negative, through the use of offsets or the net export of on-site renewable energy."*

Net zero carbon – Operational Energy: *"When the amount of carbon emissions associated with the building's operational energy on an annual basis is zero or negative. A net zero carbon building is highly energy efficient and powered from on-site and/or off-site renewable energy sources, with any remaining carbon balance offset."*

UK Green Building Council Definition – Net Zero Carbon

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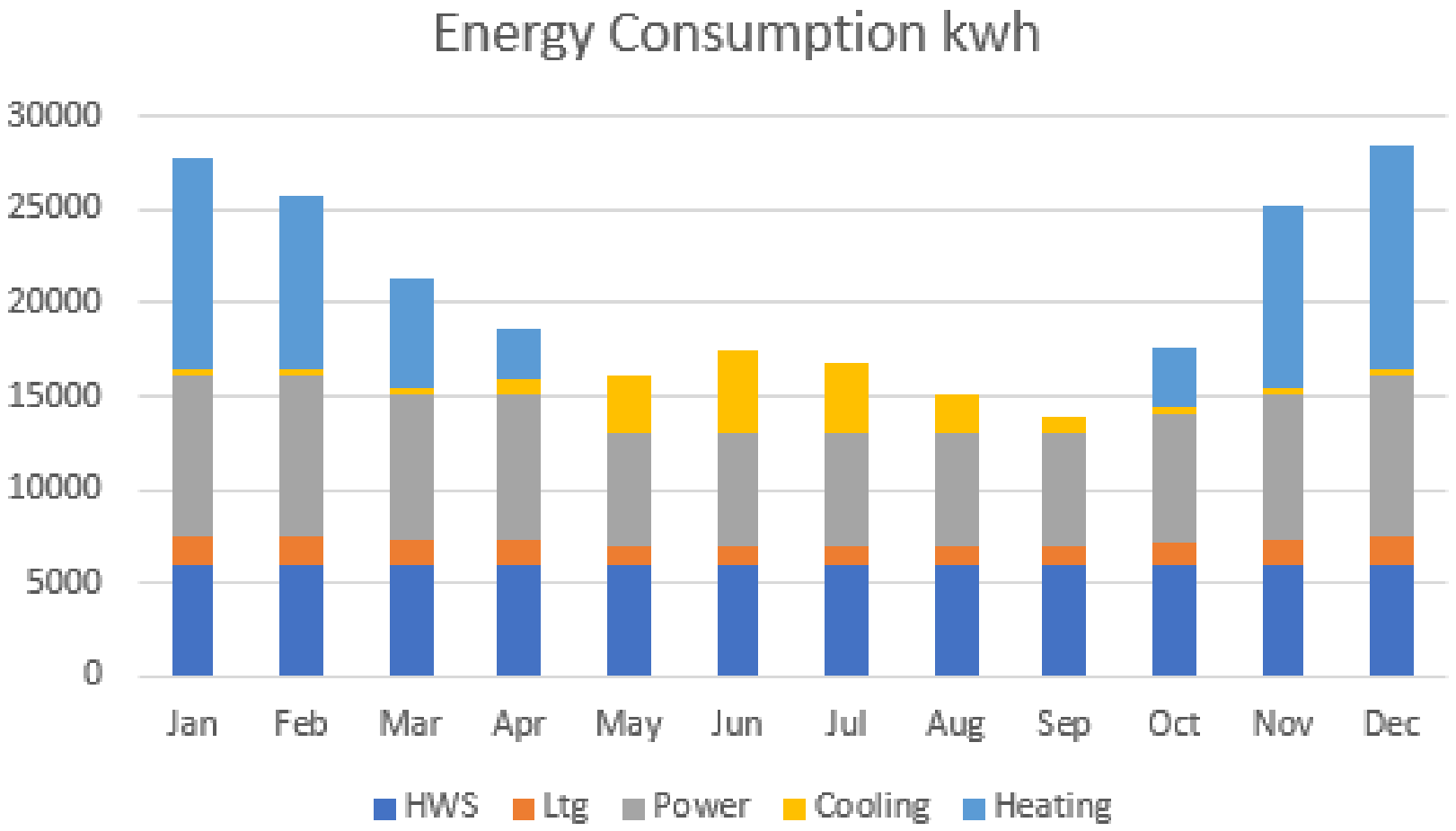
UK Green Building Council Definition – Net Zero Carbon

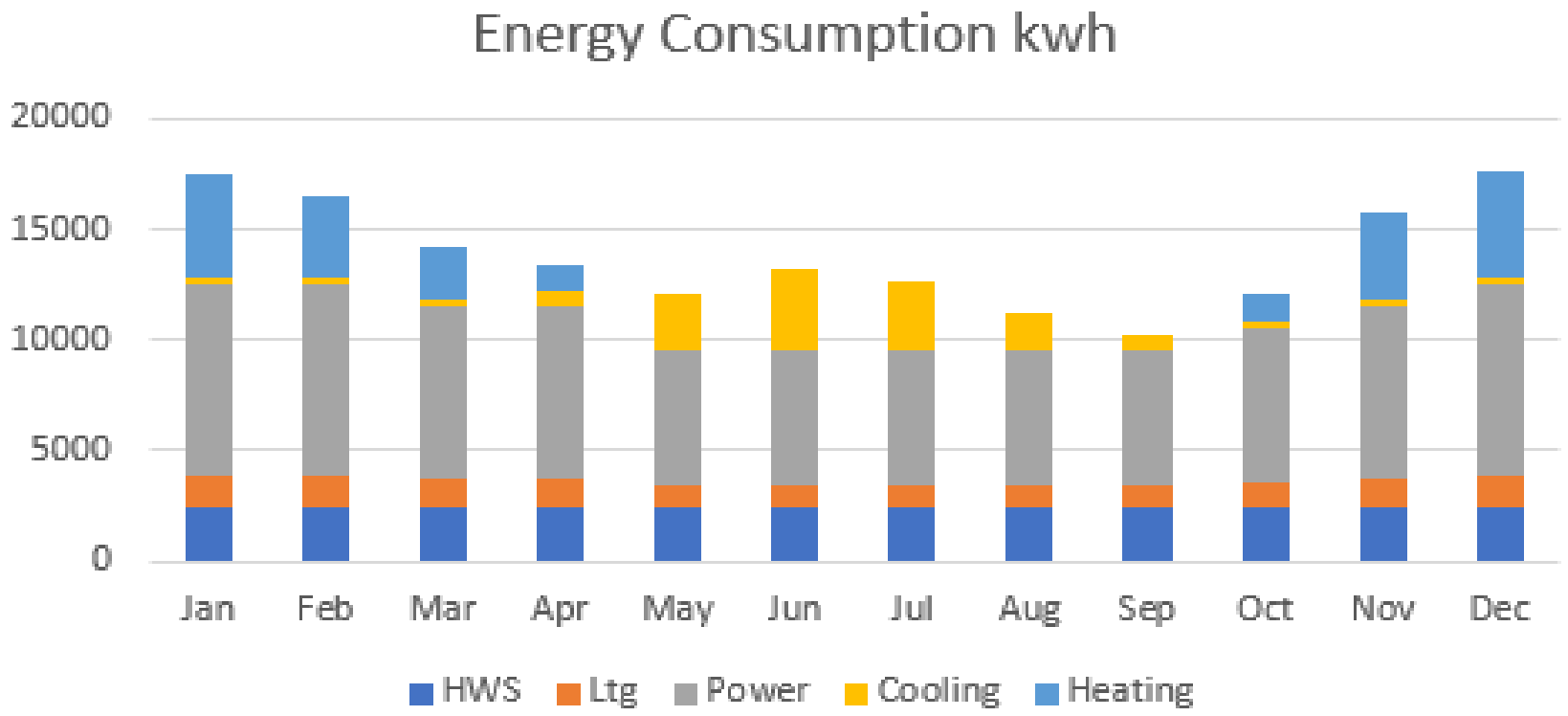
Embodied Carbon

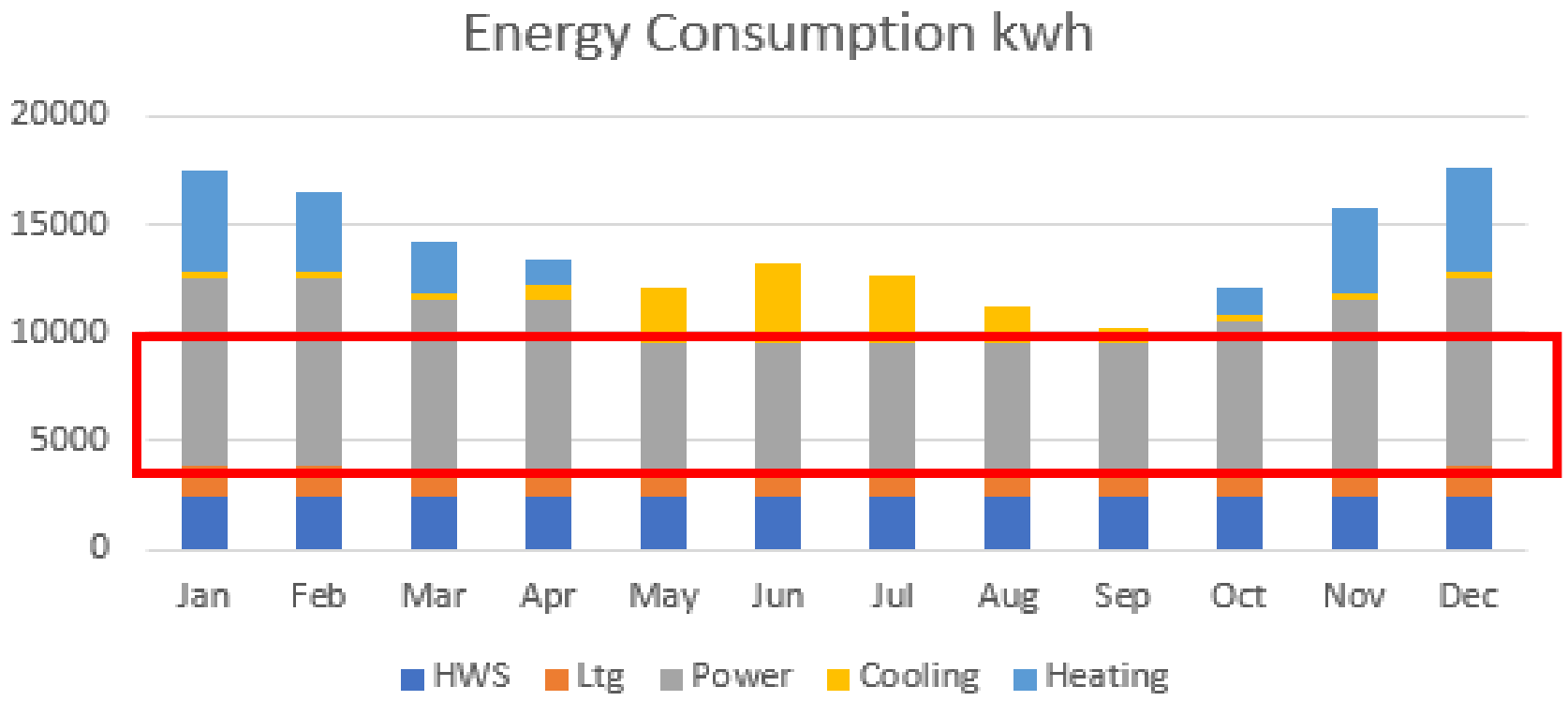
Manufacture, transport and installation of construction materials

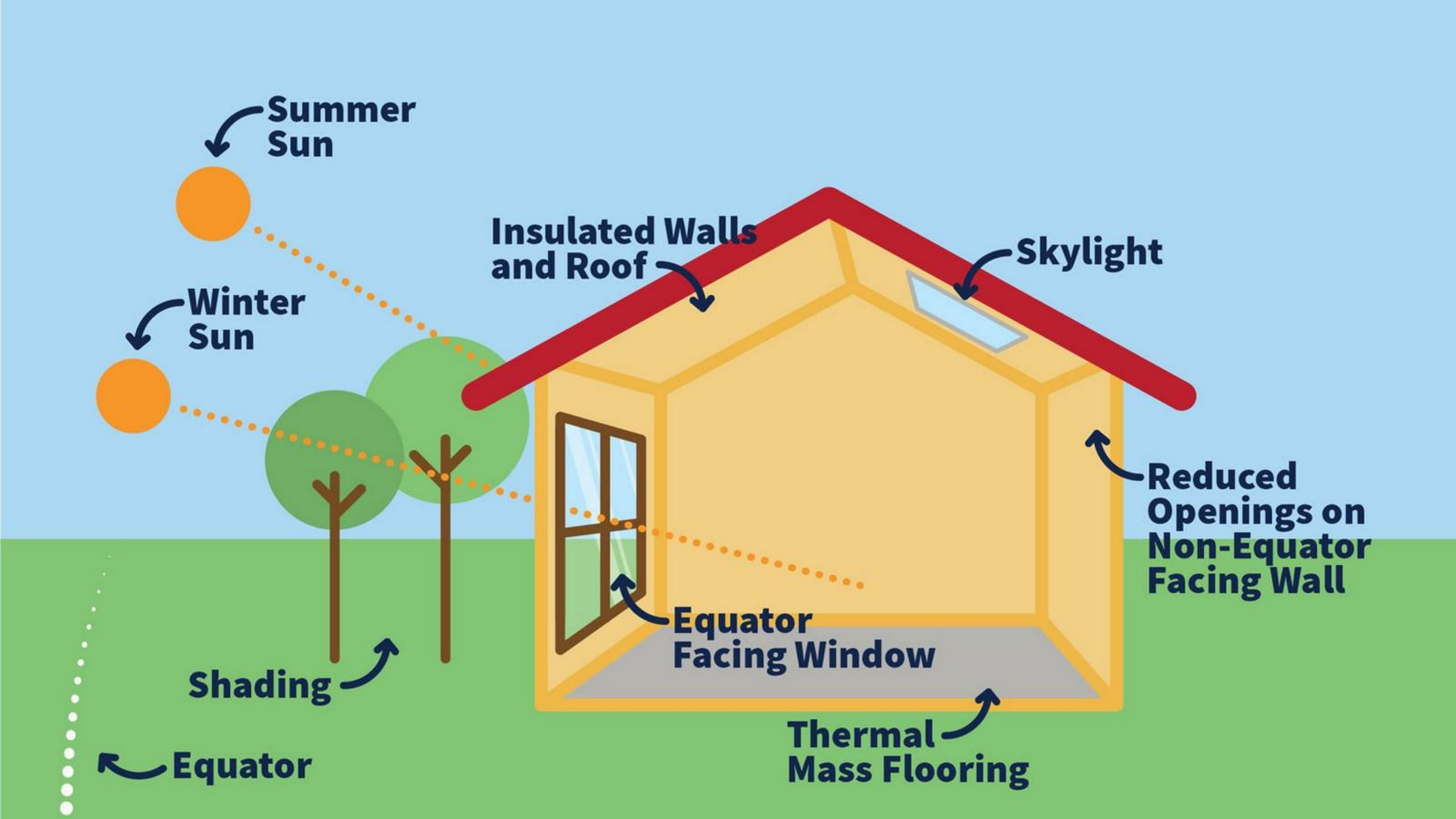
Operational Carbon

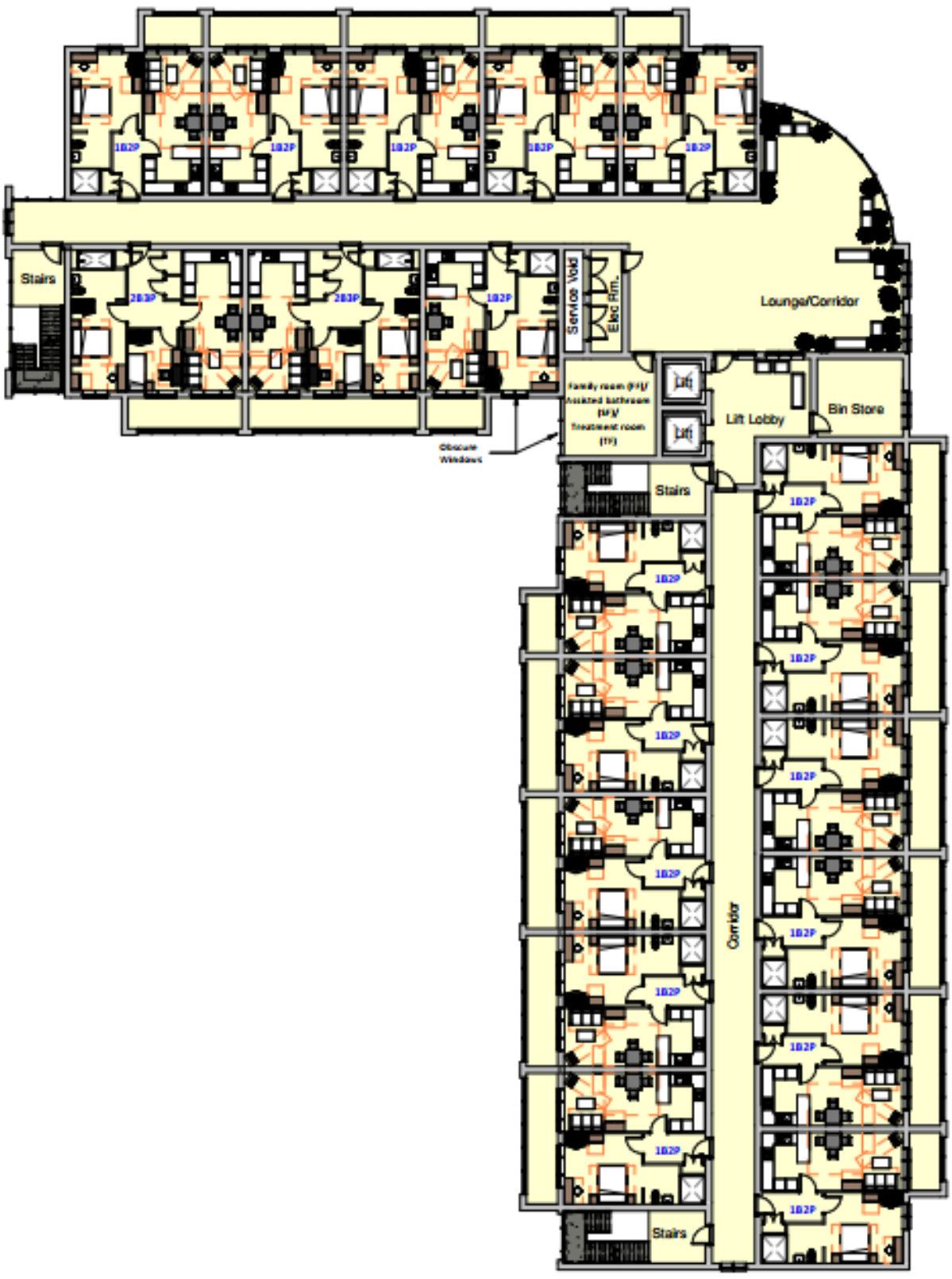
Building energy consumption

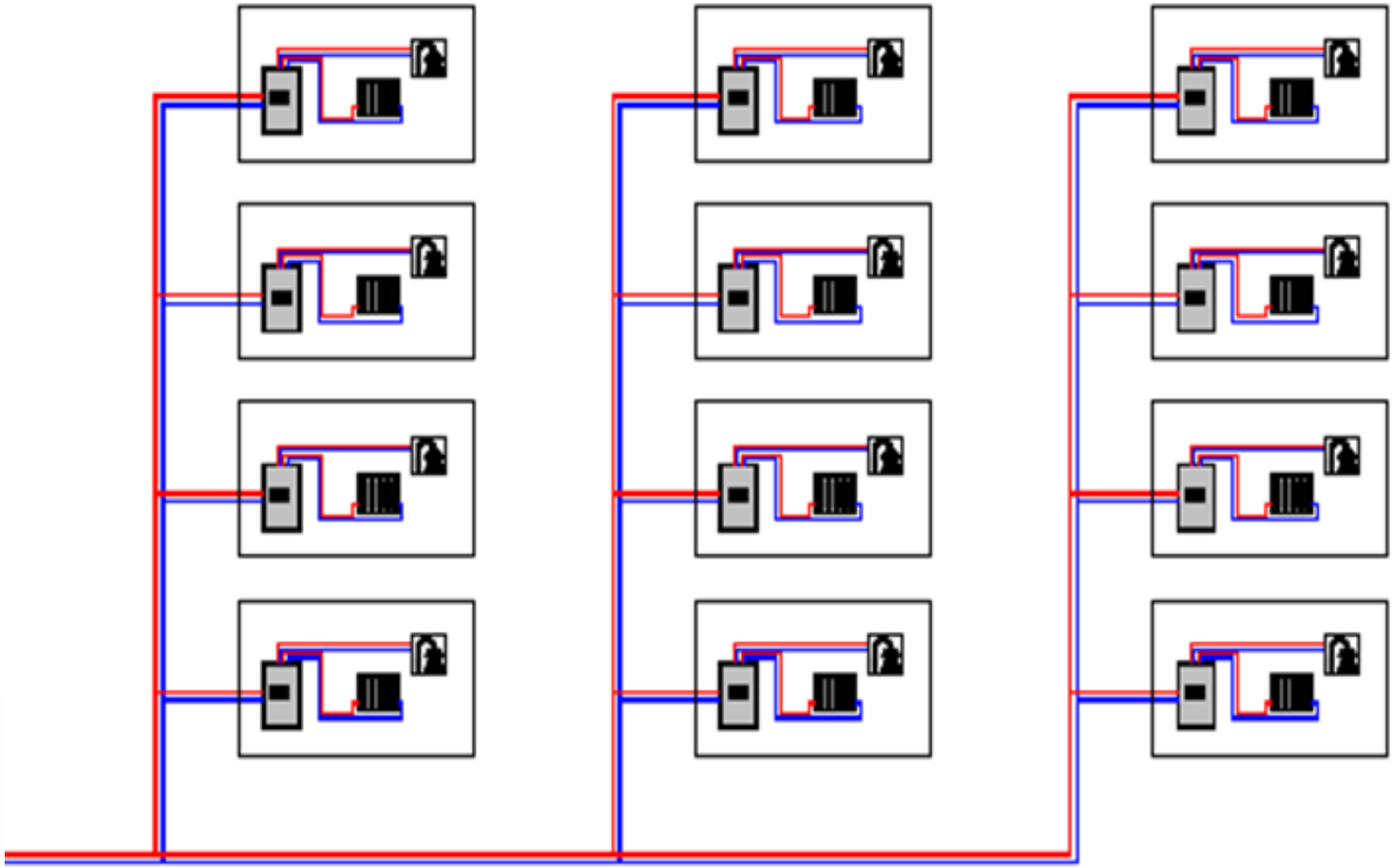

Energy Consumption kwh
30000
25000
20000
15000
10000
5000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
HWS
Ltg
Power
Cooling
Heating


Energy Consumption kwh
20000
15000
10000
5000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
HWS
Ltg
Power
Cooling
Heating

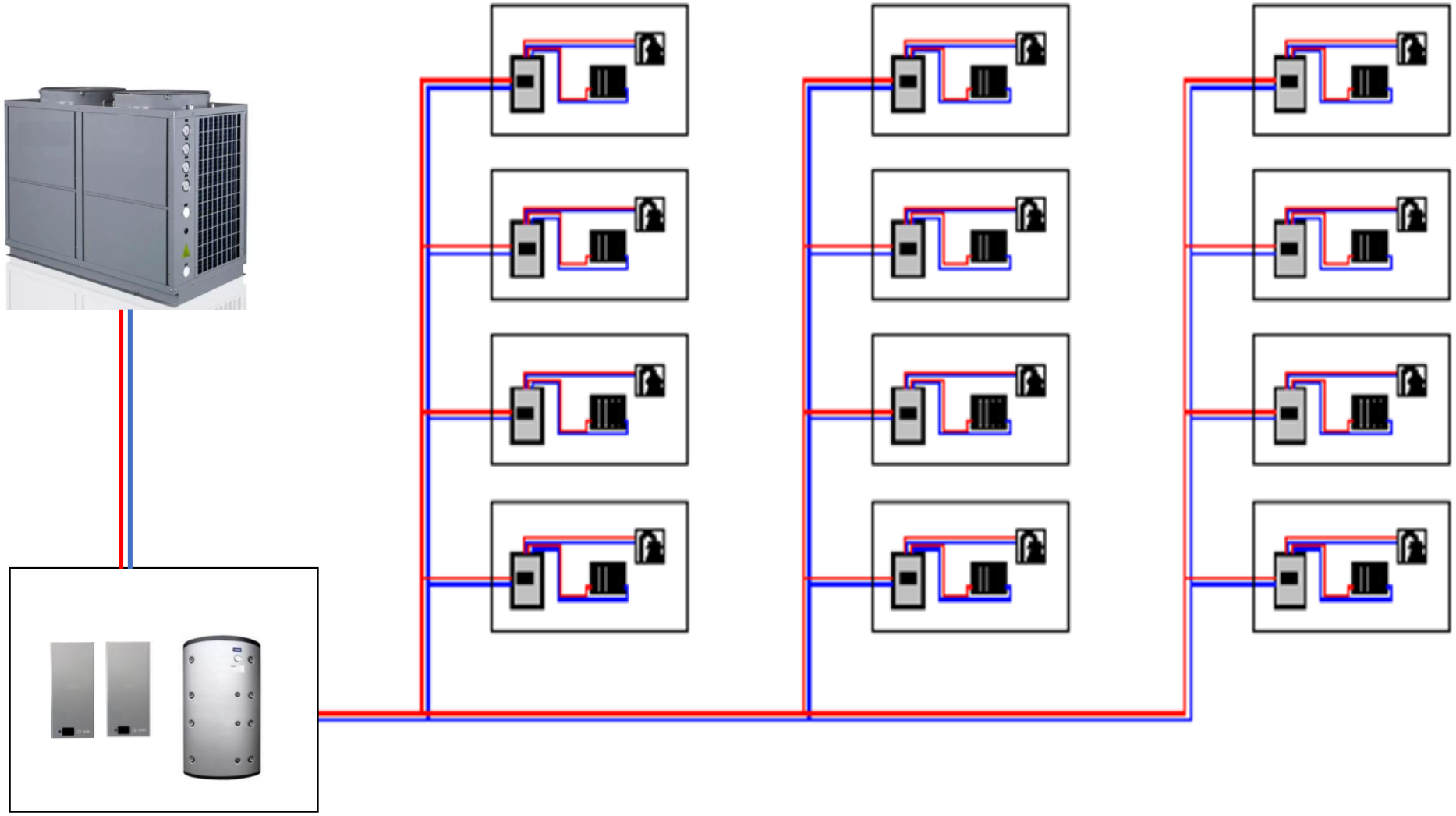

Energy Consumption kwh
20000
15000
10000
5000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
HWS
Ltg
Power
Cooling
Heating


Summer Sun
Winter Sun
Insulated Walls and Roof
Skylight
Reduced Openings on Non-Equator Facing Wall
Equator Facing Window
Shading
Thermal Mass Flooring
Equator

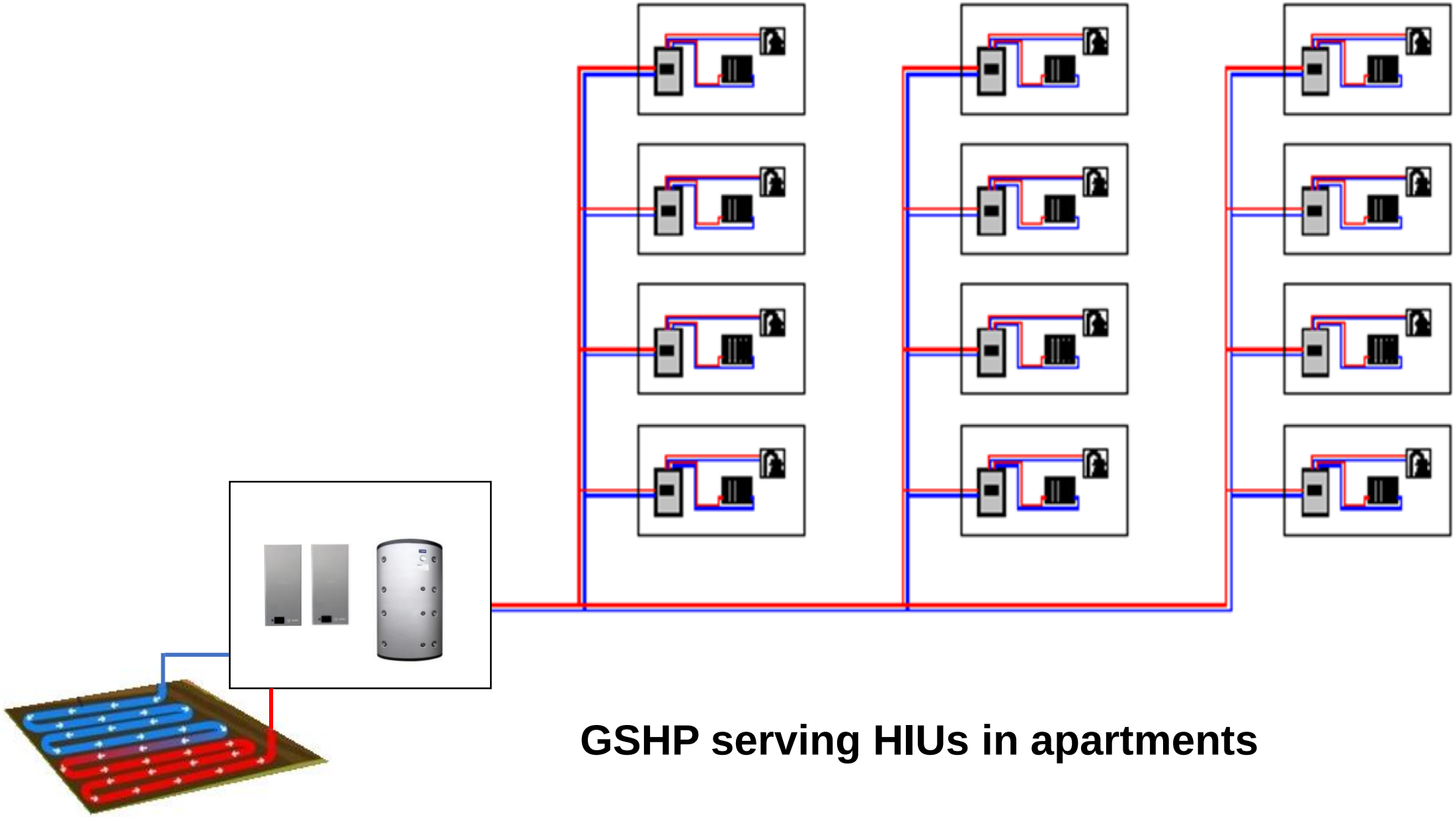

1B2P
2B3P
Stairs
Service Void
Elec Rm.
Lounge/Corridor
Lift
Lift
Lift Lobby
Bin Store
Family room (FF)/
Assisted bathroom
(FF)/
Treatment room
(TF)
Obscure
Windows
Stairs
Corridor
Stairs



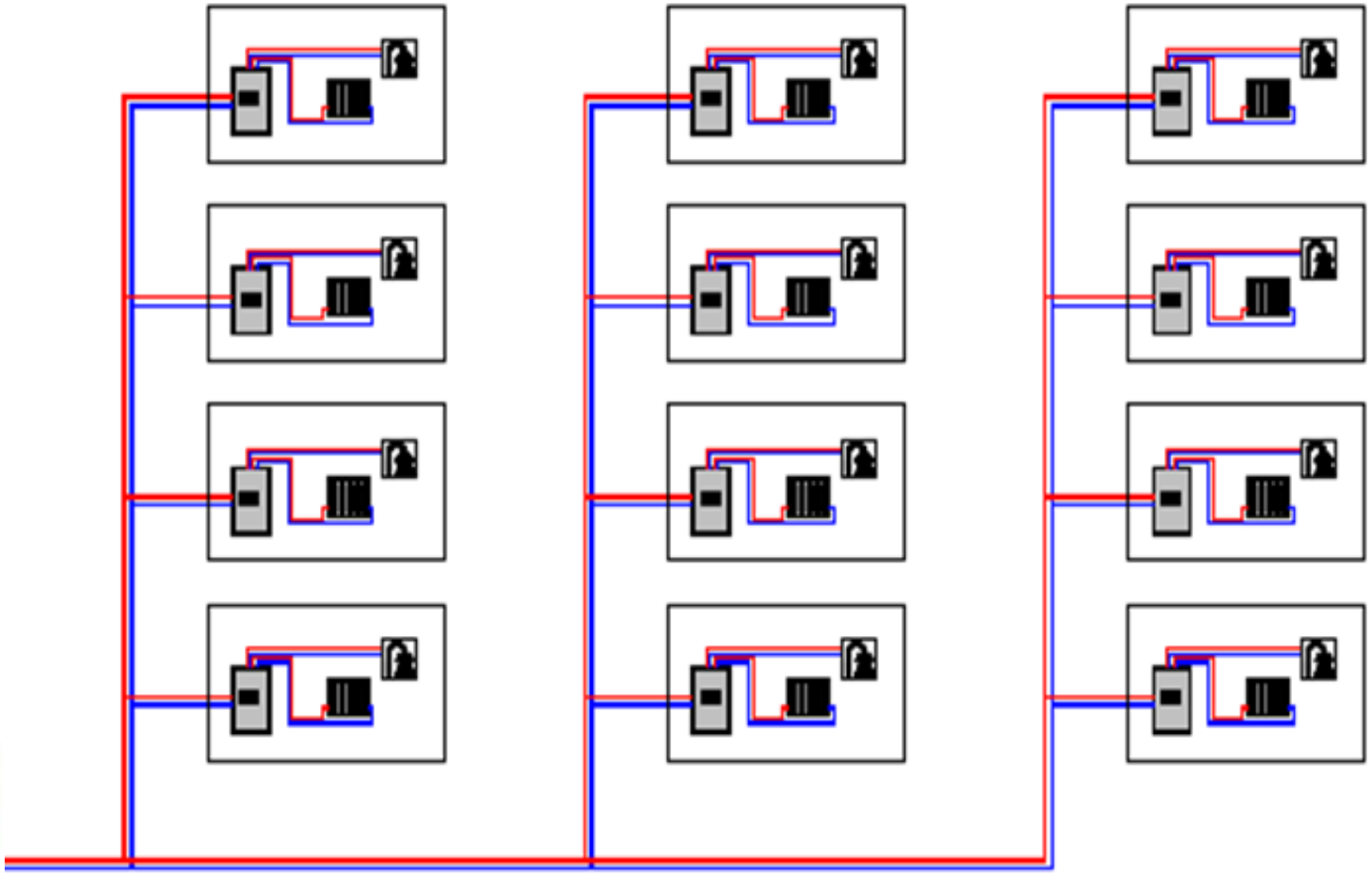
Central gas fired plant serving HIUs in apartments



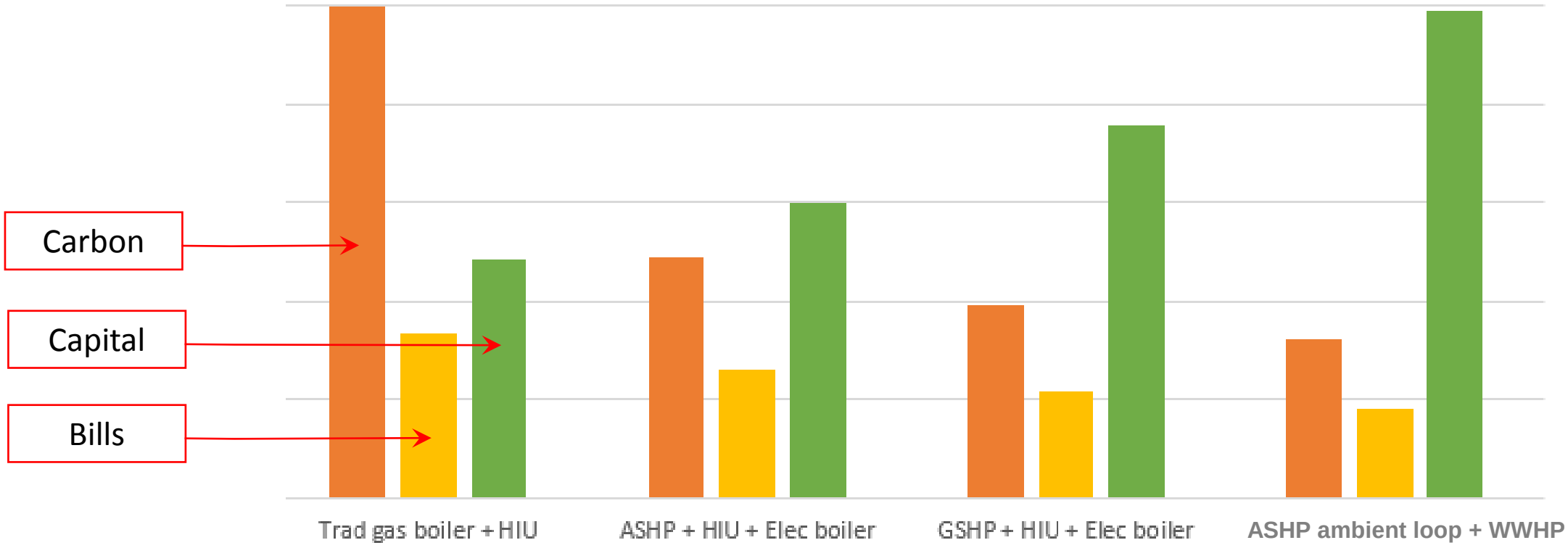
ASHP serving HIUs in apartments



GSHP serving HIUs in apartments

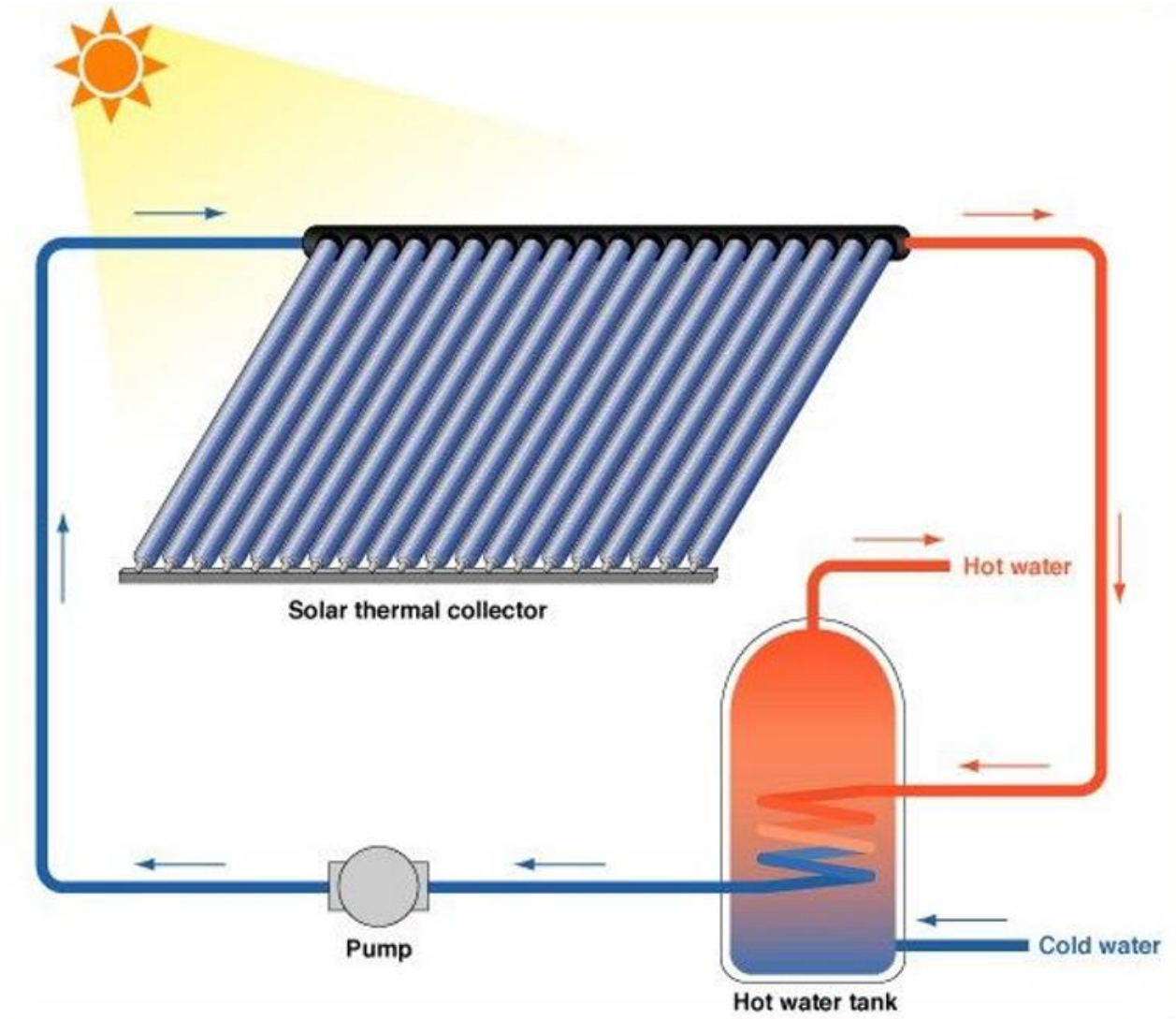


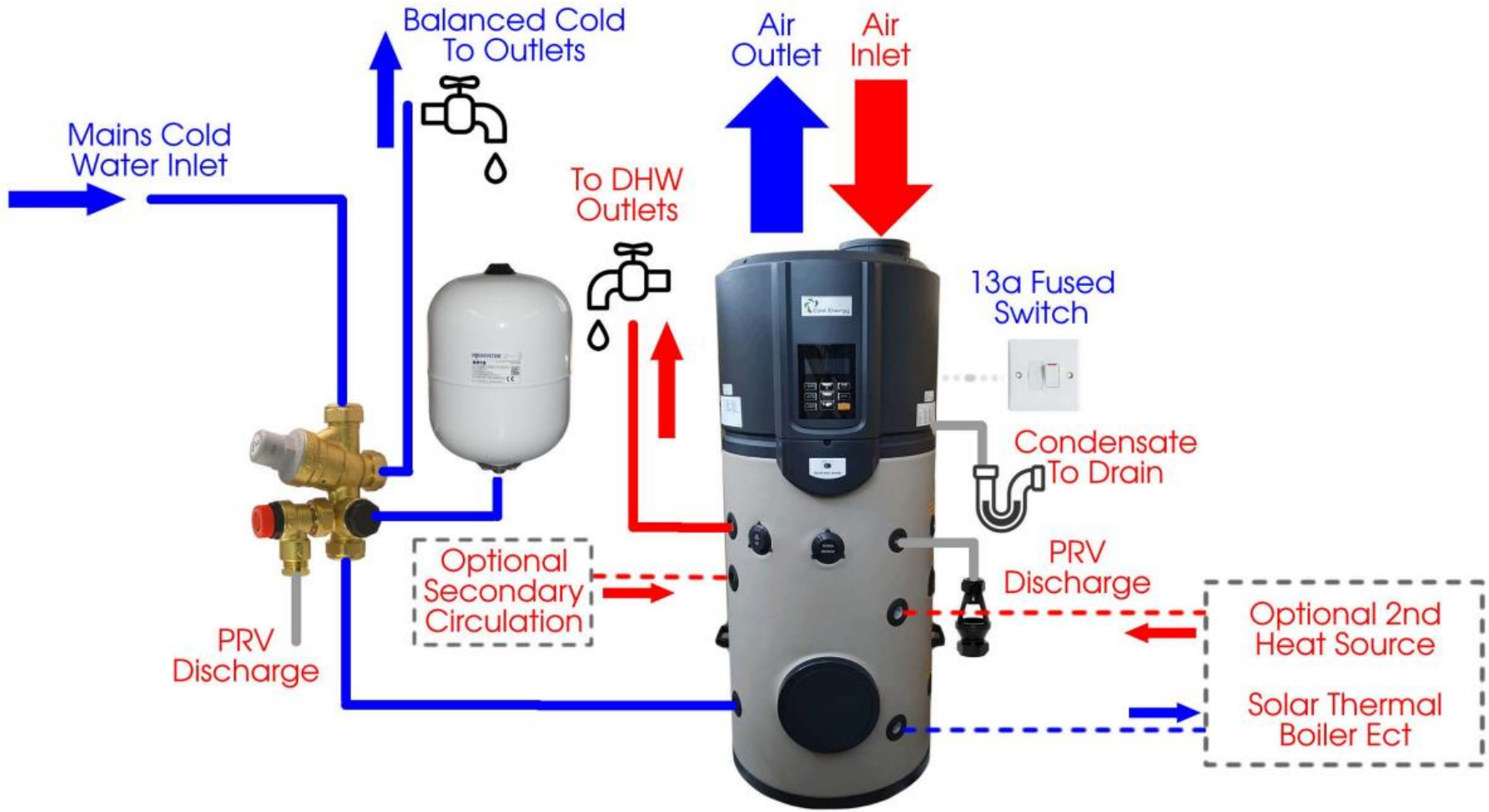
ASHP with ambient loop serving WWHPs in apartments

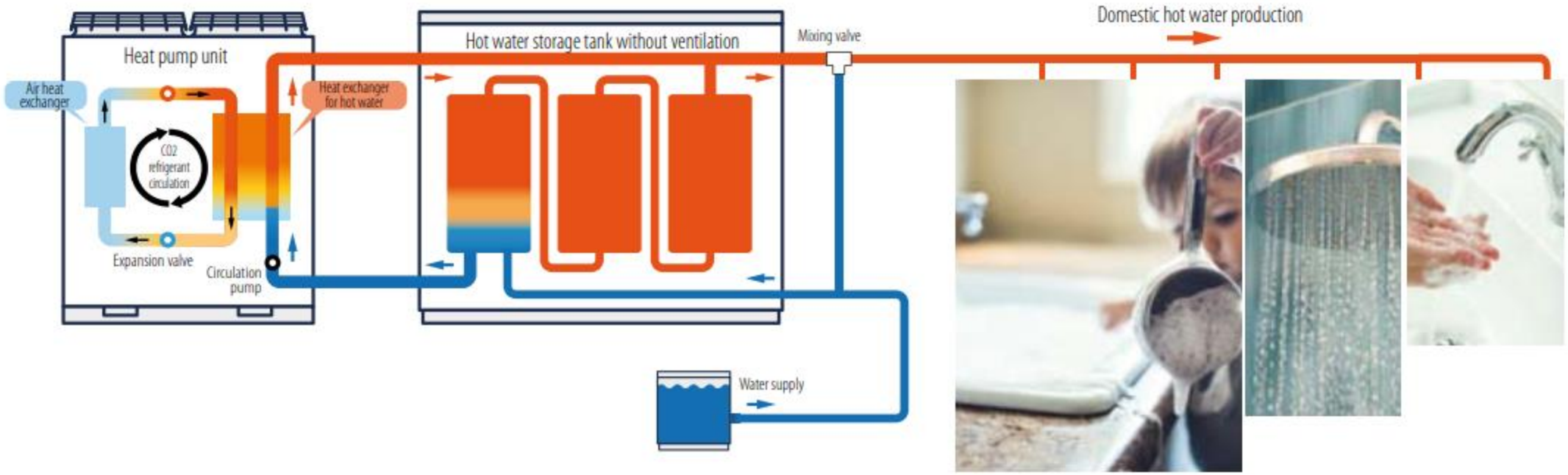

Carbon
Capital
Bills
Trad gas boiler + HIU
ASHP + HIU + Elec boiler
GSHP + HIU + Elec boiler
ASHP ambient loop + WWHP

Net Zero Carbon

Operational Carbon

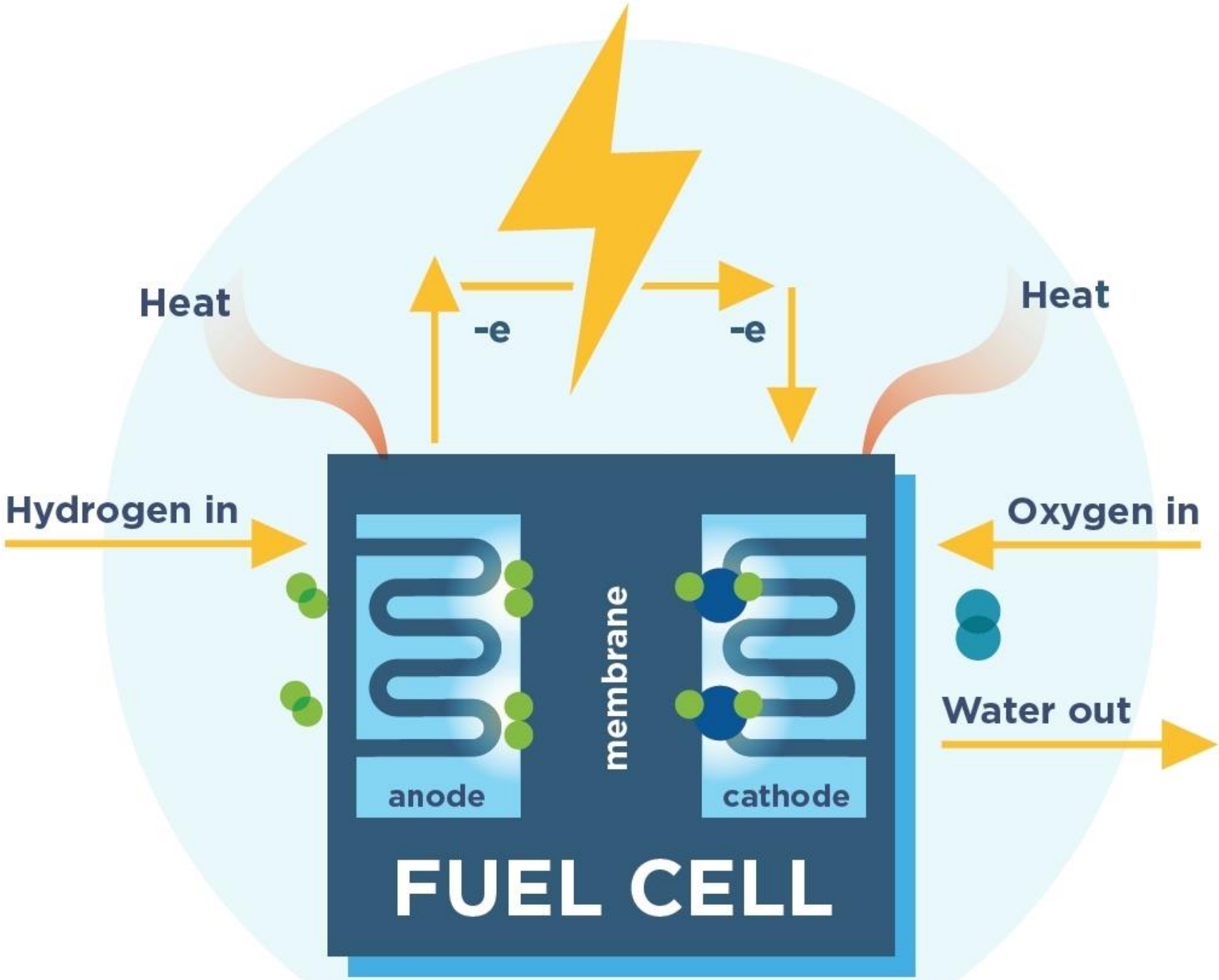

Solar thermal collector
Hot water
Pump
Cold water
Hot water tank


Balanced Cold
To Outlets
Air
Outlet
Air
Inlet
Mains Cold
Water Inlet
To DHW
Outlets
13a Fused
Switch
Condensate
To Drain
PRV
Discharge
Optional
Secondary
Circulation
PRV
Discharge
Optional 2nd
Heat Source
Solar Thermal
Boiler Ect


Heat pump unit
Air heat exchanger
CO2 refrigerant circulation
Expansion valve
Circulation pump
Heat exchanger for hot water
Hot water storage tank without ventilation
Mixing valve
Domestic hot water production
Water supply

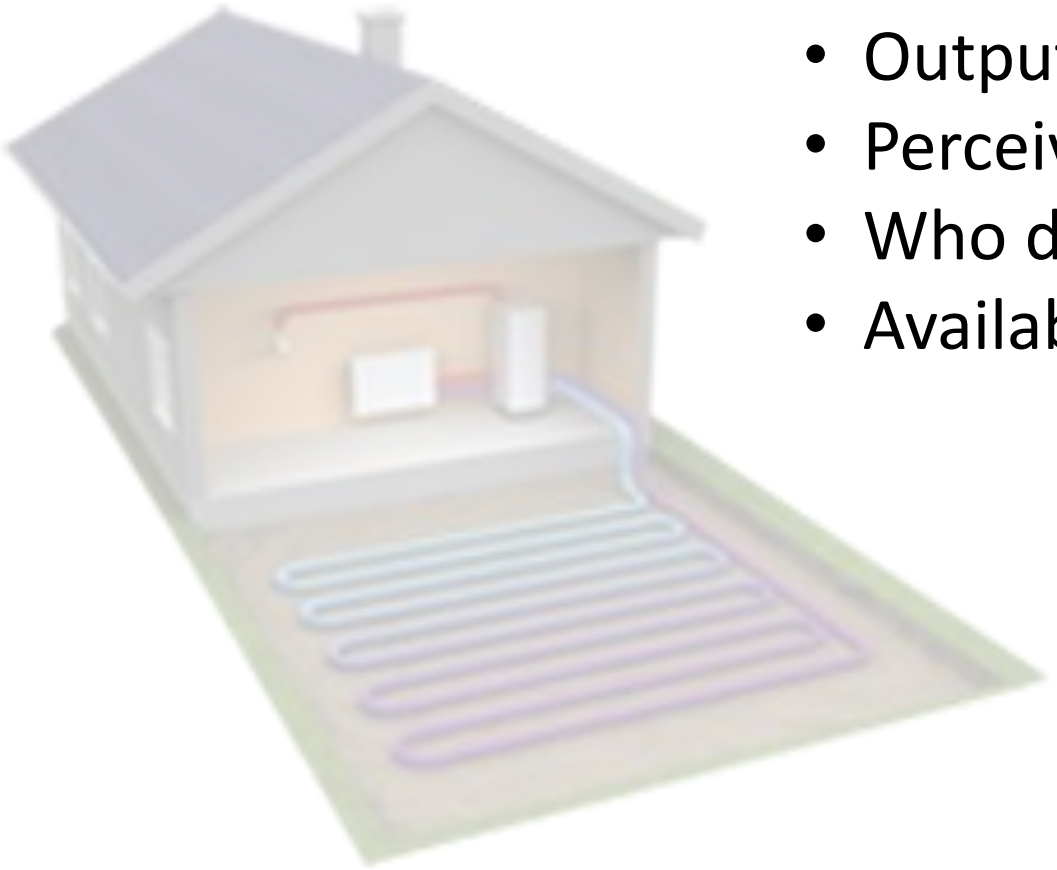

Sunamp
uniq


H2
HYDROGEN
ENERGY STORAGE


Heat
-e
-e
Heat
Hydrogen in
Oxygen in
membrane
anode
cathode
Water out
FUEL CELL

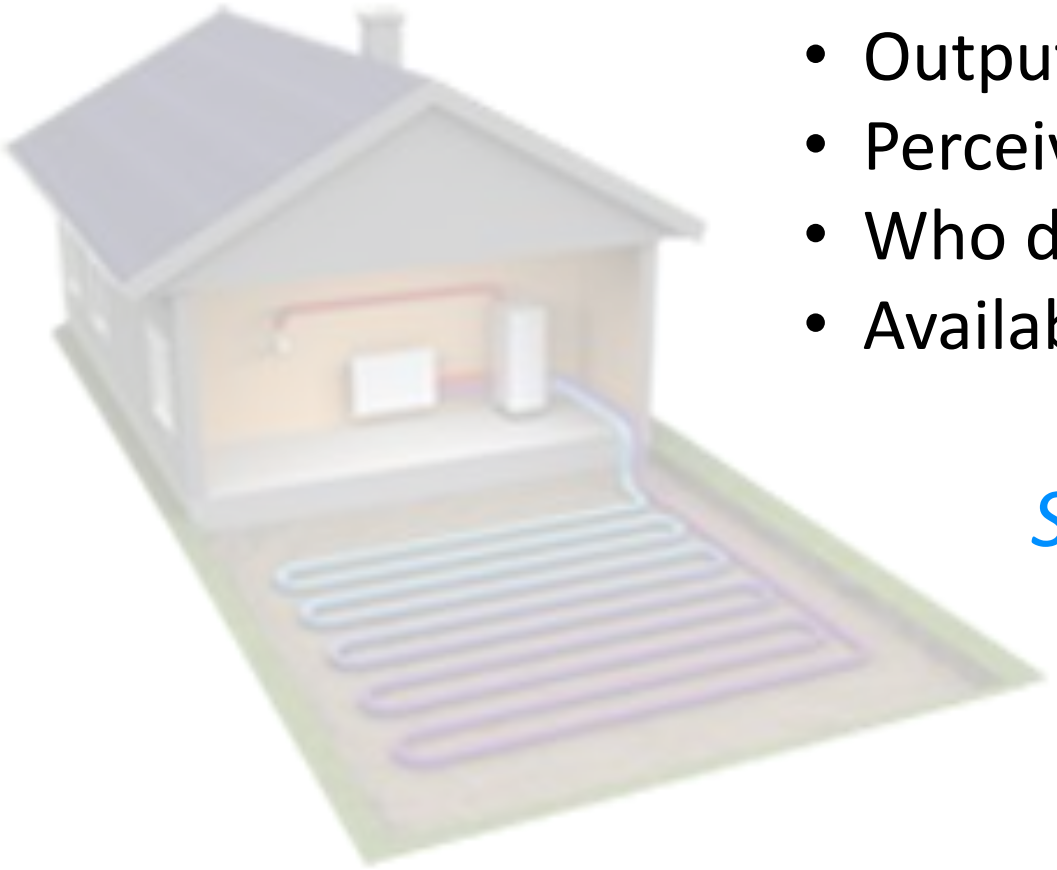

GI
sun
LONGINES
LONGINES
6
LONGINES
2
LONGINES

So what are the barriers to GSHP technology?



- Assumed high cost of bore holes/excavation
- Output performance
- Perceived reliability
- Who does what?
- Available suppliers

So what are the barriers to GSHP technology?



- Assumed high cost of bore holes/excavation
- Output performance
- Perceived reliability
- Who does what?
- Available suppliers

Solve these and the market opens up

THINGS TO REMEMBER

- NZC ambition
- True NZC includes ‘Unregulated’ energy
- Move from Fossil fuels
- ASHPs are leading the way
- GSHP Industry can improve their perception


That's all Folks!