Central Heating Systems

Today most people consider a central heating system to provide heat energy via a boiler fuelled by Gas, Oil or Solid fuel to provide hot water which is circulated via a pump and pipes to radiators or underfloor pipes, known as a ‘wet’ system.

It has been common in the USA and in the UK for the heating to be provided by heating the air in the building directly and pushing this warm air through ducts into rooms for central heating.

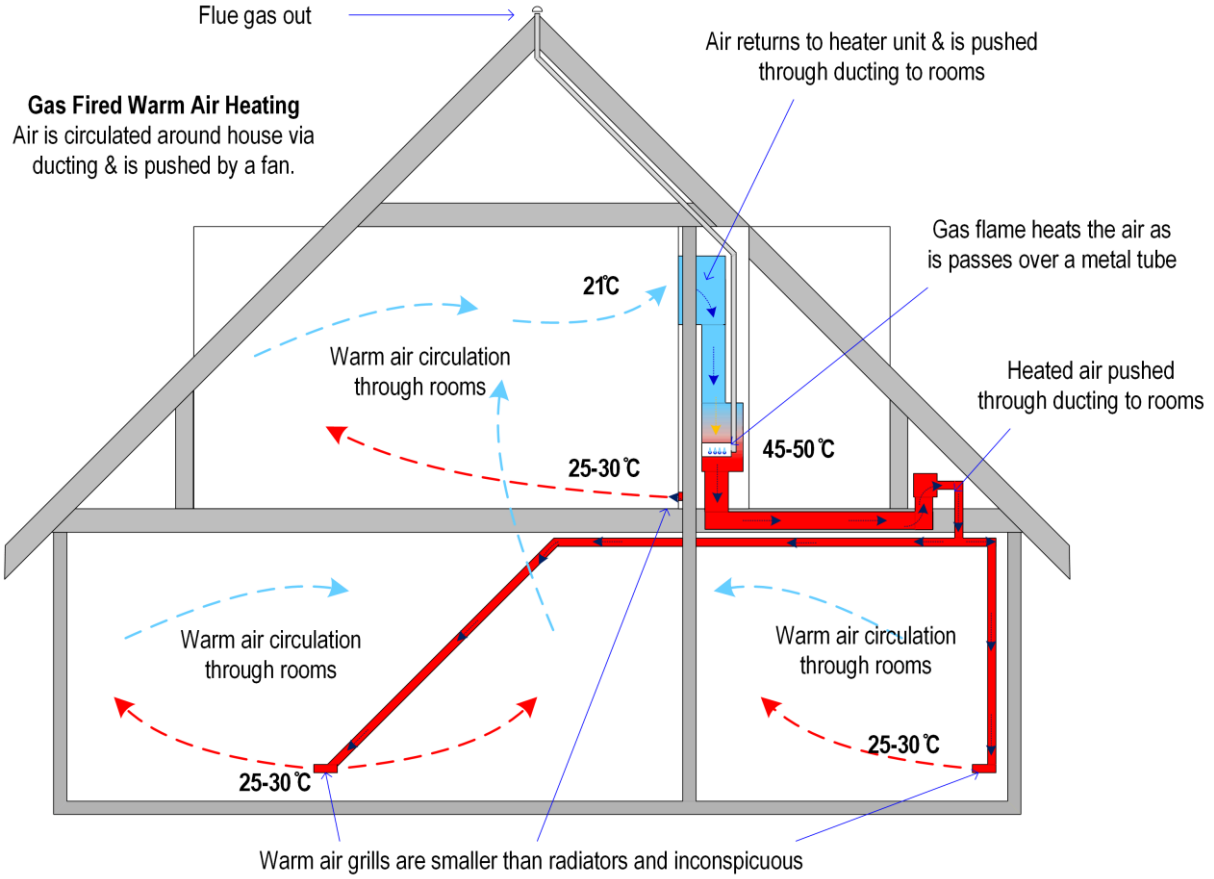
During the past 36 years we have had two houses which have used a Gas Fired Warm Air heating system (many properties in Anagh Coar also had this system installed).

Over this time we have found the heating to be reasonably economical to run and a bit cheaper than a ‘wet system described above. The warm air is delivered to the rooms at between 25°C and 30°C at the outlet. This is at a similar temperature to a system with underfloor heating pipes.

The house is well sealed (*air tight*) and the warm air system ‘modulates’ the air flow around the building, by controlling the fan speed. The burner fires up first to warm the main heating section within the unit (*the burner gas and air do not mix*) first and the fan starts and increases speed during the initial warming period. When the thermostat sensors the increase in temperature (*thermostat in hall, by kitchen door*) the fan speed decreases and over time remains at low speed unless an increase in temperature is required.

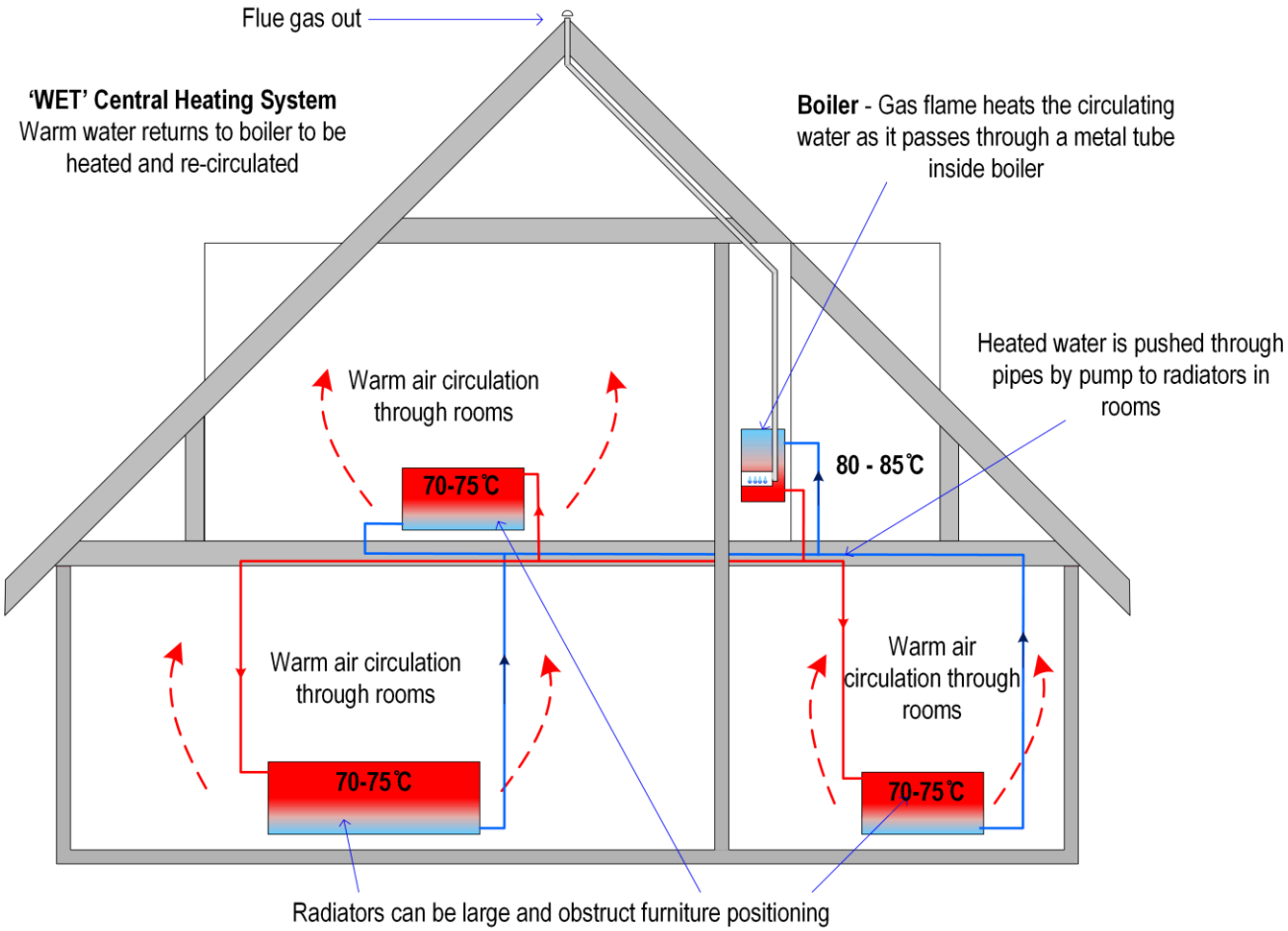
Domestic Hot water is provided by a separate gas fired heater within the main unit and this hot water is stored in a cylinder in a cupboard in the next room. (*Not shown in sketch*)

Gas Fired Modulated Warm Air – As Installed



The air temperatures are low at 25-30°C and so are safe for children and elderly folk. The outlet grills are very small compared to the equivalent size for a radiator and allow an increased potential for positioning of furniture, without the risk of drying out of the wood in the furniture. Also there is very little maintenance required apart from an annual service visit which is similar in price to any gas boiler service cost.

Gas, Oil or Solid Fuel 'Wet' Central Heating with Radiators



The boiler may be positioned on the ground floor in utility room or outside in the garage, hot water from the boiler is circulated by a pump at high temperature to radiators to warm the rooms in the building. Water circulates at around 70°C which is hot enough to cause severe burns should young or old skin come into contact for any length of time! When the thermostat sends a signal to the boiler it turns off the fuel supply until more energy is required to provide heating again.

Fossil fuel boilers are about 95% efficient when new, unless maintained correctly this efficiency can drop to 90%

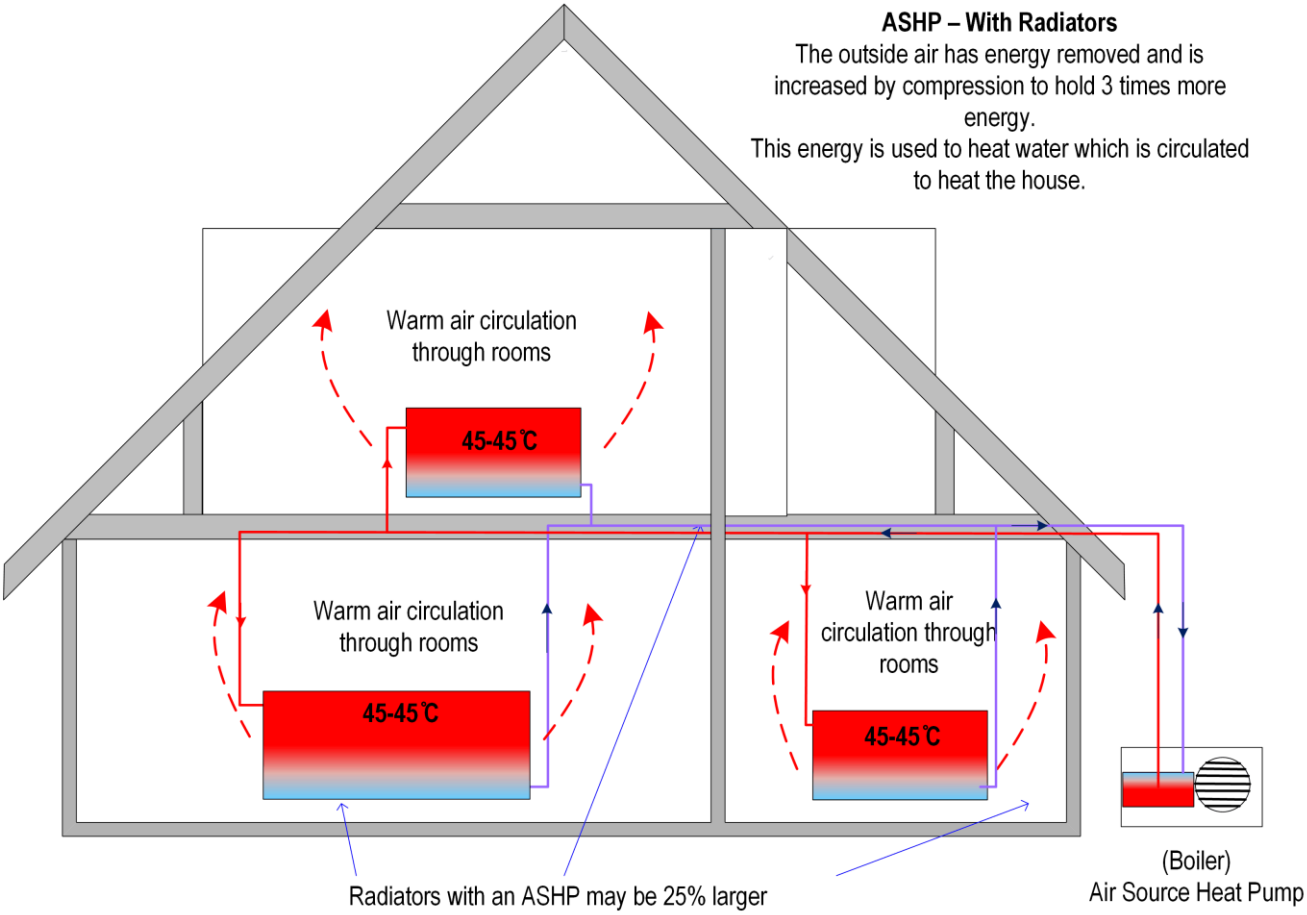
Notice all of these systems have a flue to expel the noxious combustion gases to outside.

Future Heating

Please be aware that the Isle of Man Government is likely to follow the UK lead and prevent the use of fossil fuel boilers for central heating system in the next five years. If considering replacing the central heating (on this or any other property) consider installing a Heat Pump System.

Either an Air Source of Ground Source, both of which are more expensive that the current traditional central heating systems but have the advantage of being far cheaper to operate per year that the fossil fuel systems. Thus you will make savings over the years that follow.

ASHP - Radiator system



Using an ASHP to replace the gas fired warm air unit, may require larger radiators than other fossil fuel heating systems (*by around 25% in output*) due to lower water circulation temperatures.

The larger radiators intrude further into the room due to length or depth, further reducing the potential options where furniture may be located.

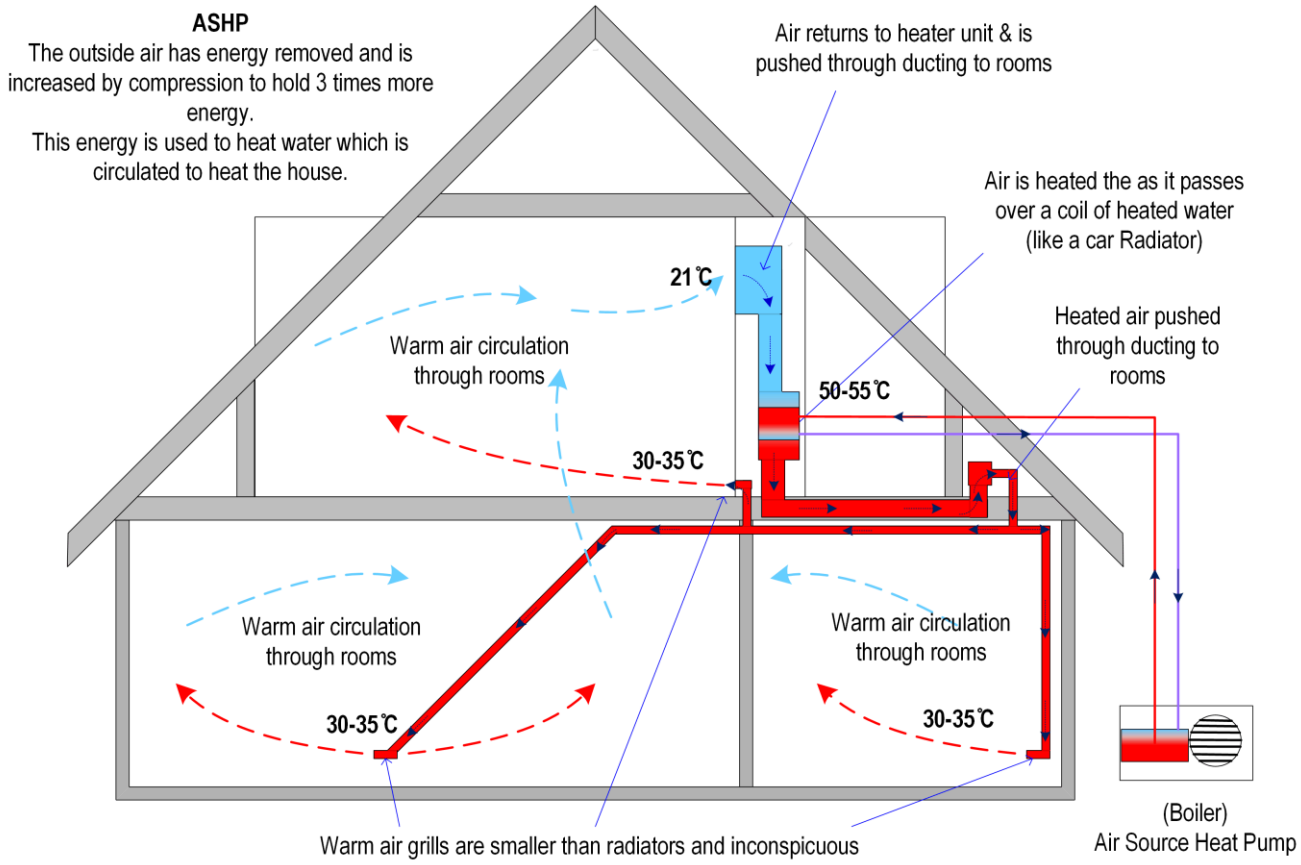
Pipe work will be required to supply radiators with hot water and flooring will be lifted to allow this work to be done. Should underfloor heating on the ground floor be considered a thin ‘over-floor’ system should be installed to save major disruption on the ground floor.

With an ASHP there would be no flue required so the house can be made more air tight and reduce energy consumption further. With no flue required there is no need to supply combustion air, so no risk of noxious gasses entering the home and the removal of a point of entry for cold external air in winter. Also because there are no burning fuels, or high temperatures, far less risk of burns to young or older skin or from ignition and possible fire within the house.

Warm Air - Air Source Heat Pump system

The Gas Fired Warm Air Unit could easily be converted to run on an Air Source Heat Pump system by removing the heater unit and replacing with an Air Handling unit containing a water coil, this piped to the outside ASHP unit. Very little disturbance to the internals of the house, and leaving the addition of solar PV and hydro for increased energy savings a possibility.

Safe low temperatures remain but running costs are greatly reduced as for each kilowatt of energy used produces around 3kW of energy. (*Most run at about 300% efficiency, while a ground Source is 400-500% efficient, but are a more expensive purchase*)



With a ducted warm air system you have the benefit of moving the air around the home which reduces the chances of condensation and if you have an air leak no damage to the property. Having hot water circulating around the building increases the chances of a water leak occurring due to several factors, mainly electrolysis due to different metals being used and the consequential need for an inhibitor to reduce the chance of internal corrosion and a leak occurring. This inhibitor also requires replacement at a five year period increasing the cost of maintenance.

Domestic Hot Water can be provided by the ASHP system, but you could install a ‘stand-alone’ system, which while being smaller provides hot water for about 35% the cost of current fossil fuels and electric immersion heaters – is a derivative of a Heat Pump, specifically designed to provide hot water.

Quotes for Cost for Heating Replacement

Heating Type	Boiler	Heat Emitters	Total
Gas	£5,128.00	£3,600.00	***£8,728.00***
Oil	£6,185.00	£3,600.00	***£9,785.00***
ASHP + Radiators	£11,536.85	£3,600.00	***£15,136.85***
ASHP – Warm Air	£11,536.85	£2,000.00	***£13,536.85***

VAT @ 5% should be added to the above figures.

Indicative Running Costs

Our annual standing order to Manx Gas covers our heating and hot water costs and is currently (£84x12) £1008.00 from which we usually get a rebate.

The list below provides an indication of the cost to run various heating systems for 10 Hilltop rise if the heating were to be switched on 24/7 for 244 days for average weather conditions over the last nine years. It assumes the house is unoccupied for this period and so removes the 'human occupation factors' for a fair comparison of fuel costs.

Left column shows the cost if the house was built to the current IoM building Regulations for Part L – Energy Conservation. We had an energy audit in February 2015 and made some improvements to air tightness and this resulted in the reduction in energy costs following the completion of the air sealing work as shown in the right hand column (May 2019)

All Build Types Fuel Cost of 244 days Energy Use					Current Building Regulations	Audit in Feb 2015	Audit in May 2019	
Total 244 day Energy Use (kW)				kW	*14026.01*	*17264.16*	*13416.24*	Kilowatts
Fuel Cost		Per useful kW p	Effi'cy %	Cost per kW p				
Electricity		*https://www.gov.im/media/1364386/domestic-heating-feb-2019.pdf*						
(Inc Standing	Radiator/Fire	***19.98***	100%	18.98	£2,802.40	£3,449.38	£2,680.57	£'s Annual Cost
	Comfy Heat	***13.47***	95%	12.85	£1,889.30	£2,325.48	£1,807.17	£'s Annual Cost
Air Source Heat Pump		***5.35***	300%	14.67	**£750.39**	**£923.63**	**£717.77**	£'s Annual Cost
Gas								
Natural Gas - Band A		***11.38***	90%	10.24	£1,596.16	£1,964.66	£1,526.77	£'s Annual Cost
Natural Gas - Band C		***9.49***	90%	8.54	**£1,331.07**	**£1,638.37**	**£1,273.20**	£'s Annual Cost
Cylinder Central Heating		***9.62***	90%	8.66	£1,349.30	£1,660.81	£1,290.64	£'s Annual Cost
Mini Bulk Gas Tank		***9.56***	90%	8.60	£1,340.89	£1,650.45	£1,282.59	£'s Annual Cost
	LPG Gas fire	***23.08***	57%	13.15	£3,237.20	£3,984.57	£3,096.47	£'s Annual Cost
Natural Gas Fire		***17.77***	57%	10.13	£2,492.42	£3,067.84	£2,384.07	£'s Annual Cost
Heating Oil (28 sec)								
	900 litre	***6.16***	90%	5.54	£864.00	£1,063.47	£826.44	£'s Annual Cost
	450 litre	***6.61***	90%	5.95	£927.12	£1,141.16	£886.81	£'s Annual Cost
Solid Fuels								
	House coal	***7.64***	75%	5.73	£1,071.59	£1,318.98	£1,025.00	£'s Annual Cost
	Anthracite	***7.72***	75%	5.79	£1,082.81	£1,332.79	£1,035.73	£'s Annual Cost
	Phurnicite	***9.21***	75%	6.91	£1,291.80	£1,590.03	£1,235.64	£'s Annual Cost
	Taybrite	***7.26***	80%	5.81	£1,018.29	£1,253.38	£974.02	£'s Annual Cost
Wood								
Wood Chip (*Moisture Content <30%*)		***4.00***	90%	3.60	**£561.04**	**£690.57**	**£536.65**	£'s Annual Cost
Manufactured Heat logs		***12.31***	80%	9.85	£1,726.60	£2,125.22	£1,651.54	£'s Annual Cost

Should you have any questions on the heating system please feel free to call me (Trevor) on 435052 when I will be pleased to answer any questions on the property or heating system you may have.