

How to implement decentralised hot water systems

Introduction

Decentralised hot water systems are those where individual heaters are installed close to the points of supply. They are most often used when:

- There is very limited hot water demand in summer and use of a decentralised hot water system means that large boiler plant used for heating and hot water can be switched off.
- Very long pipe runs would lead to high heat losses from a centralised hot water system.

Suitably applied, decentralised hot water systems can be installed with payback periods of under 4 years.

The technology

There are two main types of decentralised hot water systems:

- Storage systems which provide high hot water flow rates, for example, multiple hand washing facilities.
- Instantaneous systems, with no water storage. Suitable for space limited areas due to their smaller unit size. They are also suitable for irregular demand as no hot water is stored. Such as hand washing facilities that are rarely used.

Both storage and instantaneous systems can be fuelled by either electricity or gas.



Storage systems

Water heaters incorporating storage systems can be either vented or unvented. Unvented water heaters will require the provision of a high pressure relief valve which must discharge to a safe location, these account for the vast majority of decentralised hot water systems. Vented devices do not require a relief valve; however unvented systems have the advantage that they can deliver hot water at mains pressure to standard taps. Storage systems should ideally have a time control fitted to ensure that the stored water is only being heated at times when it is required.



Typical storage water heating system

Instantaneous systems

Instantaneous systems do not store water, they take cold water direct from the mains and it is heated as it passes through the unit. As no hot water is stored, it allows the unit to be left for long periods without fear of bacteria build-up and energy use is roughly proportional to water usage. Choosing units which are also combined with water saving outlets, such as aerating taps can allow further savings to be made when the water is used directly for hand washing.



A typical instantaneous water heating system



Application

Decentralised hot water systems are generally used either in summer only, where they enable large boiler plant to be switched off, or year round where a long pipe run would lead to high losses from a centralised hot water system.

The hot water may be required for many different uses. The suitability of instantaneous and decentralised hot water storage systems for a range of common uses is provided below:

Application	Storage system	Instantaneous system
Hand basin used regularly	Suitable – set timer for usage pattern.	Suitable
Hand basin used infrequently	Not suitable – will lead to energy being used when no hot water is required.	Suitable
Multiple hand basins in toilets	Suitable	Suitable – models are available serving multiple outputs
Larger hot water demand e.g. input to dishwasher	Suitable	Less suitable – requires flow rate to be sufficient



Specification checklist

The following table lists the key parameters that you should define through discussions with your supplier when carrying out a project to install decentralised hot water systems.

Item No	Parameter	Comments
1	Fuel	Gas supply available or only electricity?
2	Physical space available	Smaller space limits options available.
3	Location	Under sink/over sink/wall mounted/free standing. Must be located close to point of use.
4	Flow rate/volume required	Most manufacturers will provide sizing guidance.
5	Hot water storage or instantaneous heating	See Application Table.
6	Single or multiple points to be supplied	Multiple points must be in close proximity – deadlegs must be limited as defined by the Building Regulations and/or heater byelaws.
7	Vented or unvented operation and venting provision	If unvented, a suitable location is required for discharge from high pressure relief valve (see manufacturer's literature). Vented devices do not require this.
8	Electrical power requirements	When using an electric heater, it is necessary to consult an electrician to ensure the local distribution board has sufficient capacity.



Commissioning procedures

The commissioning should be carried out by a reputable heating contractor. Parameters requiring commissioning are:

- Temperature set point: Avoid overheating the water as it will waste energy. For storage systems, take into account the need to store water above 60°C to minimise the risk of bacterial growth.
- Time controls for storage systems: Ensure that the water is not heated when the premises are unoccupied.
- Flow rate: This may be controllable and should be set to the lowest level appropriate for the application.

Common problems

Lime scale can be a problem in hard water areas. Specifying scale-resistant elements will help prolong the life and improve the efficiency of the system. Periodic de-scaling will also be required – consult the manufacturer's guidelines. Alternatively, consider water softening.

Freezing of the appliance will cause damage. Ensure that pipes are suitably lagged if exposed and that the unit is drained if it is at risk of freezing.

Finding a supplier

Hot water boilers, fuelled by gas or oil, suitable for use in decentralised systems are supported by the Government's Enhanced Capital Allowances Scheme and a list of ECA approved hot water boilers can be found at www.eca.gov.uk.

Manufacturers of electric water heaters can be found by carrying out a web search, or by contacting a local electrical or plumbing wholesaler. Ask for references to ascertain whether the product has performed successfully in other, similar situations.

Decentralised hot water systems should always be fitted by a reputable heating contractor.

If you do not already know a suitable contractor try contacting a recognised Trade Association for details of their membership, for example:

- The Heating and Ventilating Contractors Association (HVCA) – telephone number 020 7313 4900 – www.hvca.org.uk



The business case

The following example is based on replacing the hot water supplied by a gas boiler, along 15m of un-insulated heating pipe servicing a single sink with hot water with a single point of use, instantaneous, 3kW electric hot water heater. Hot water from the sink is only used for an average of 250 hours per year.

Assuming that the pipe loses heat at a rate of 90W/m, and that the hot water is in operation for 12 hours per day, the heat losses through the pipe would be 7392 kWh per year. Taking the cost of gas to be 2.5 p/kWh this will cost about £185.

Taking the cost of the electricity to heat the water to be 7.9p/kWh, the cost of the electricity to heat the water will be about £60 per year, whereas using the existing gas system it would be about £204, taking into account the gas to heat the water used as well as the losses from the pipe. Using the electric heater saves about £145 per year.

Typically such an electric water heater will cost about £500 to buy and install. This means that the payback period will be about 3.5 years.



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