

Using unvented systems with solid fuel

This is the second of two articles by Martyn Griffiths, technical consultant for the Hot Water Association

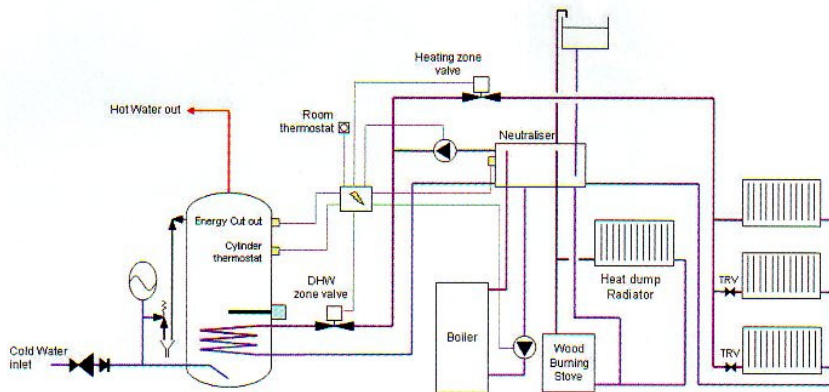


Figure 1: Gas/oil heating boiler with a solid fuel stove

elsewhere. A common solution for lower output appliances is a heat dump radiator sized to at least match the output of the appliance in turndown mode.

Alternatively, a buffer tank might be appropriate, as described in last month's article.

In situations where the boiler must be used on gravity circulation but the cylinder requires pumped circulation, one solution is a neutralising vessel.

This serves the dual function of providing a safety vent for the primaries and also establishes a neutral pressure zone where gravity and pumped circuits can be combined.

The neutralising vessel and the similar low-loss headers are a good means of combining the outputs of several appliances, such as where a wood burning stove may augment another heating boiler, as shown in Figure 1.

One alternative to using an unvented system is the use of a thermal (primary) store.

These produce mains pressure hot water by instantaneous heat transfer from a vented store of primary water that can also serve as a neutralising vessel and buffer tank. This is demonstrated in Figure 2.

One final consideration is that many solid fuel appliances are installed in rural areas where power failures are not uncommon.

The system must be designed so as not to become unsafe in the event of power failure.

Whatever system is chosen the message remains the same.

It is now possible to enjoy the benefits of mains pressure hot water when using solid fuel appliances, provided that adequate precautions are taken to safely disconnect the heat source in the event of the cylinder overheating and, if required, to divert excess output elsewhere.

The Hot Water Association is working with bodies such as HETAS and associated trade organisations to give further detailed guidance on this subject.

This includes participation in the Renewable Energy Systems Integration Group.

www.reintegration.co.uk

Further information will also be posted on the HWA website www.hotwater.org.uk.

In last month's article, we looked at installations that use a single heat-producing appliance on a fully-pumped primary circuit and where the boiler output can be controlled directly from the external system controls.

This article looks in more detail at other possibilities, including situations where even at maximum turndown the appliance may have a significant heat output and we will also examine the option of coupling a biomass stove to supplement the main heating boiler.

It should be noted that this article is geared at small-scale domestic installations and is for broad guidance only.

Any specific solutions for connecting solid fuel to unvented systems should be cleared with the manufacturers of the relevant equipment to prevent any possible injury to people or damage to equipment and property.

Many solid fuel appliances use an internal mechanical thermostat that controls

an air damper or similar mechanism and are not able to respond to an external control signal.

These appliances might be suitable for pumped primary systems but others are designed solely for gravity circulation.

Some appliances may also have an internal 'quench' coil. This means that, should the primary temperature approach 100°C, then cold water will be passed through a cooling loop inside the appliance to absorb the heat output safely, therefore discharging the resulting heated water

outside the dwelling. This function should always be regarded as a last resort to protect the appliance from damage.

Unvented cylinders are normally designed with indirect heat exchangers suitable for pumped circulation and, in order to comply with G3, the heat input must be isolated if the energy cut-out trips.

These features preclude the possibility of using the hot water store as a heat dump, except for a short overrun period, so any excess heat from the boiler must be diverted

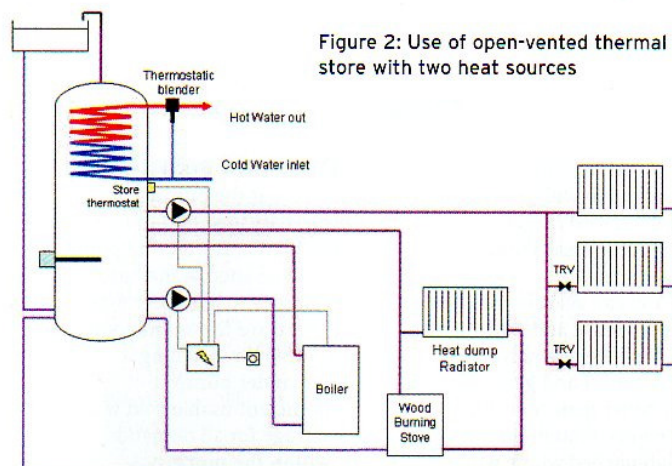


Figure 2: Use of open-vented thermal store with two heat sources