Integrated systems for controlling energy

The industry is looking for ways to control systems using more than one energy source, believes Matthew Gordon of HWA member Honeywell

hot water association

There is increasing interest in using alternative energy sources for space heating and domestic hot water, both to reduce energy costs and to be 'green'.

The different energy sources supplying a heating system may include conventional gas- or oil-fired boilers, heat pumps, solid fuels (including biomass) and solar panels.

Due to the unpredictability and variability of some alternative supplies, it is often necessary to have two or more forms of energy to meet the needs.

Storing energy – especially the kind that is produced by solar panels – is much more important than with a boiler-only system. This storage is usually provided by heating water in a cylinder or thermal store.

Cylinders normally heat the domestic hot water (DHW) and, in the case of thermal stores, can sometimes include the space heating system (in which heat discharge may be through radiators, convectors and low-temperature heating circuits such as underfloor heating).

STORAGE CYLINDER

In systems with solar heating, the DHW storage cylinder usually has two heating coils.

One is at the bottom and linked to the solar panels; this provides full tank heating to maximise the benefit of solar power.

The second coil is served by either the boiler or another supplementary energy source, and used to top up the hot water if necessary. This is in the middle of the cylinder, so only heats the top half to avoid wasting fuel.

An immersion heater may be fitted at the top of the tank: this will be used only in the unlikely event of boiler failure.

In our climate, the DHW may need topping up by the boiler to meet a family's needs during half of the year, but fuel consumption can be reduced even at these times by programming the controller to check the stored temperature each day during the early evening.

The boiler then comes on only to raise the temperature if it is below say, 40°C. This check need be performed only once to bring on the boiler if necessary.

If the boiler were to maintain the stored water temperature consistently throughout the evening, there would be hot water overnight unnecessarily. Some of the available energy from the solar system would then be wasted the next day.

MULTIPLE SOURCES

Installers need a reliable, convenient means to equalise and control these multiple energy sources to make maximum use of renewable energy sources in the mix.

This may be achieved in large buildings by means of a building management system, but this solution is too expensive and complicated for domestic and light commercial or industrial buildings, whose needs can be satisfied by standalone controllers.

Standalone controllers are available with basic pre-loaded programs to reduce planning and start-up effort

In such premises, installers need standalone controls that have a simple architecture and hardware, and are supplied with basic pre-loaded programs to reduce planning and start-up effort. Controllers have been developed precisely for such installations.

They can be used individually or can operate with other identical controllers on a small proprietary network, if necessary, using a communications protocol that is future-proofed for upgrading at any time.

Built-in algorithms ensure maximum efficiency from energy sources such as oil, gas and woodburning boilers, solar collectors and district heating exchangers.

They also have built-in weather compensated control, and so respond to outside temperatures, ensuring comfort and economy.

These controllers satisfy the needs of installers and occupiers in that they are easy to set up and operate. The user panel has a large back-lit LED display and a single rotary control that is also a push button.

This makes it easy to select, change and confirm set values and times – and difficult to make mistakes.

A controller can control two mixed circuits, a direct heating circuit along with domestic hot water and also two boilers or other heat sources.

Two boilers can be fired alternately to even their duties, or together at times of maximum demand.

Up to five such controllers can be linked via a two-wire bus to form a control system.

Controllers provided with an OpenTherm interface can exchange data easily with certified devices such as condensing boilers, enabling them to be applied with even more versatility.

GREEN AND EASY

While a heating system that uses renewable energy and includes more than one energy source is obviously more complicated than a system with a single boiler, installers should not be fazed by such projects or deterred from attempting them.

Products such as the ones described above make it easy for installers to provide their customers with energy-efficient, easy-to-use heating and hot water systems that use two or more energy sources and which, importantly, make maximum use of renewable energy sources in the mix.

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