

# SOLAR HOT WATER

Solar hot water systems use solar energy to directly heat water. These systems have been available in Australia for decades, but are currently only used in about 8% of homes<sup>123</sup>. In Australia, demand for new solar hot water systems has declined since a peak in 2009<sup>124</sup>.

**Configurations.** Solar hot water systems are generally found either with:

- A solar collector along with a horizontal tank, integrated as a single unit (so called close-coupled arrangement); or
- A ground-standing vertical tank connected to a roof-mounted collector with pipes (so called split-system arrangement).
- Close-coupled systems are simpler and require no pump since water can flow between the tank and the collector in a the mosiphon operation.

**Collectors.** There are three general types of solar collector that are commonly used for domestic water heating: evacuated-tube collectors, glazed flat-plate collectors and unglazed collectors. Unglazed collectors are generally only used for pool heating and will not be considered any further for this reason.

**Evacuated-tube collectors.** Evacuated-tube solar collectors, although more expensive, are the most Efficient of the three collector types (<sup>125</sup> pp 18). The collectors have a row of glass tubes.

Each tube has two glass layers with a vacuum between the layers, allowing low heat loss in the manner of a vacuum flask. Within the glass tube is a metal pipe which absorbs the solar radiation and transfers it to the water. Evacuated-tube solar collectors are highly tolerant to frost and over-heating conditions, and retain reasonable performance even when the incident solar energy is sub-optimal.

***Flat-panel collectors.*** Flat-panel solar collectors are simpler and cheaper, but still reasonably Efficient. They consist of a dark rectangular collecting surface covered with a glazing element for insulation. Water passes behind the collecting surface allowing heat to pass into the water. Flat-panel collectors are widely used in both split-system and close-coupled configurations.

***Boost power.*** When heating water using the sun, solar systems offset mains energy use. When there is insufficient solar radiation, these systems boost water temperature using mains gas or mains electricity. At these times efficiency is obviously lessened, but on average efficiency is improved. In the case of conventional electric boosting, a typical system might draw 3.6 kW. As such, a caution about the use of electric-boosted solar is the potential impact on a 100% renewable power grid during times of winter peak demand.



**FIGURE 3.28**

**a close-coupled tank and solar collector exploits thermosiphon action to avoid the need for a pump [alternative Technology association (aTa)]**



**FIGURE 3.29**

**Commercial solar hot water system with evacuated tubes for a function center in Sydney. [J. Osborne]**

### **Technology Benefits**

Compared to conventional gas and electric systems for providing domestic hot water, solar thermal hot water systems have the advantage of using solar energy to reduce mains energy requirements by as much as 90%, and normally by at least 65%.

## **Costs**

Solar hot water systems have a higher up-front cost than conventional electric or gas systems. A study by Choice in 2008 <sup>126</sup> revealed indicative costs starting at \$3900 installed. This cost is reduced somewhat by government rebates at both state and federal level <sup>127</sup>. The rebate situation is fluid, and eligibility can vary depending on the type of system being replaced.

Source: <http://decarboni.se/publications/zero-carbon-australia-buildings-plan/5-hot-water-systems>