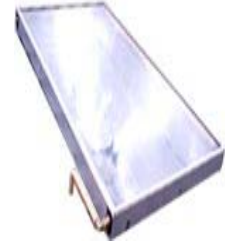


These application notes are for general guidance and information only. Users will need to undertake independent analysis for specific sites if any of these measures are to be implemented. Consideration should be given to engaging the services of a suitable consultant to assist with this task.

Summary

Solar hot water is one of the most straightforward and more effective methods of harnessing the energy. As domestic hot water represents a significant portion of the energy usage in the hospital environment, the opportunity to incorporate solar hot water should be investigated.



The solar contribution to the domestic hot water heating load could exceed 80% depending on the collector areas installed.

The payback period of these systems can be around 7 years where natural gas is used as the primary heating fuel. Where high cost fuels, such as LPG, are used and in inland areas the payback period can be under 3 years.

Background

Domestic hot water (DHW) is a substantial energy user within a hospital environment accounting for around 15% of the total energy used (around 25% of the gas usage).

Solar energy can easily provide over half of the DHW heating requirements. This technology is well developed with several manufactures selling suitable systems into the market place. Solar domestic hot water systems can heat and maintain the water temperatures at around 60 degrees Celsius. In a hospital environment best efficiencies can be achieved by configuring the solar system so that it can either operate to preheat the incoming cold water or heat all of the hot water. During periods of low solar gain, the solar panels may provide an increase in temperature to the incoming cold water, with gas DHW heating providing the final temperature “lift”. During periods of high solar gain, the solar panels may raise the entire incoming water to the required temperature, effectively eliminating the need for additional heat.

Opportunities and Constraints

The opportunity to install solar panels exists at all hospital sites to varying degrees. As domestic hot water heating forms a significant portion of the hospital energy load, any method to reduce this demand for energy is beneficial.

Solar hot water heating is suitable for all locations within Victoria. Where high cost fuels are used to provide the domestic heating hot water, such as LPG, the economic benefits may be substantially higher.

The solar panels need to be arranged such that they face the sun. As such the panels need to generally have a northerly aspect, ideally within an arc of 30 degrees from north. It is often the available roof areas that are suitable for panel installation that become a limiting factor on the available size of the solar collector array.

Impact of Implementation

The installation of a solar heating system should not affect the operation of the hospital, as there is generally no change to the domestic hot water distribution within the buildings. The new system would also typically be installed in the back of house areas. Therefore, any retrofit works would not be expected to the key operation of the functional areas of the hospital.

As the solar system is generally passive with few moving parts, there is typically minimal ongoing maintenance required to the system. Periodic cleaning of the panels may be required if there is a substantial build up of material on the collector surfaces that the normal washing effect of the rain has not removed.

All areas of Victoria are considered to be subject to frost. Therefore any proposed solar system should consider the use of non toxic anti-freeze as the circulation fluid to the solar collectors to protect against frost damage and corrosion.

Analysis

A typical solar panel installation of say 60m² collector area costs in the order of \$50,000. This can lead to an annual saving in natural gas of around \$4,500 based on an average solar contribution of 20%.

A simple payback period for this example is under 12 years.

With a high cost fuel, such as LPG, the fuel costs are around 2½ to 3 times that of natural gas, therefore the cost savings are greater and the payback is reduced to around 4 to 5 years.

Conclusions

Solar hot water systems are an effective method of utilising the sun to reduce the demand for additional energy in a hospital. The economic return however is highly dependent on the solar contribution (proportion of solar compared to total hot water heating energy) and existing fuel costs

References and Sources for Further Information

- Australian Standard AS4234 Solar water heaters - Domestic and heat pump - Calculation of energy consumption
- seav.vic.gov.au
- www.greenhouse.gov.au
- SEAV "Model Technical Specification"