Businesses: Solar Water Heating for Farms

From RVR

Solar Water Heating for Farms

Having an adequate and reliable supply of hot water is essential in the production of high quality milk on any dairy farm. Hot water is necessary for the cleaning of milking machines and pipelines, receivers, and bulk milk storage tanks. Hot water must be available in adequate quantities and at the required temperatures for each cycle in the cleaning process.

Failure to have adequate supplies of hot water at suitable temperatures can lead to rapid increases in bacterial contamination and subsequent reduction in milk quality. Milk quality reductions can lead to a loss of quality premiums or, in the worst case, a refusal to accept the contaminated milk at the processing plant.

Hot water requirements vary from farm to farm and are dependant on the number of cows, number of milking units, pipeline sizes and lengths, and system layout (receivers, plate coolers, etc.). Generally, a minimum hot water requirement is about 15 litres of 77°C water per milking unit for each rinse/wash/rinse cycle.

Water temperatures required for various milking equipment rinsing, washing, and sanitising cycles are as follows:

1. Pre-rinse cycle 35°C - 45°C
2. Wash cycle 65°C - 70°C
3. Acid rinse cycle 35°C - 45°C
4. Sanitise cycle 25°C

Fuel Cost

On dairy farms, hot water is often produced by water heaters using electricity. This is convenient but very expensive. Electricity can cost up to €0.1640 per unit (kWh) (plus VAT @ 13.5%) for an ESB customer on the rural 24hr tariff.

On a 50 cow dairy farm, there will be about 200 litres of water needed for a wash cycle. This will cost about €3.00 per heating cycle.

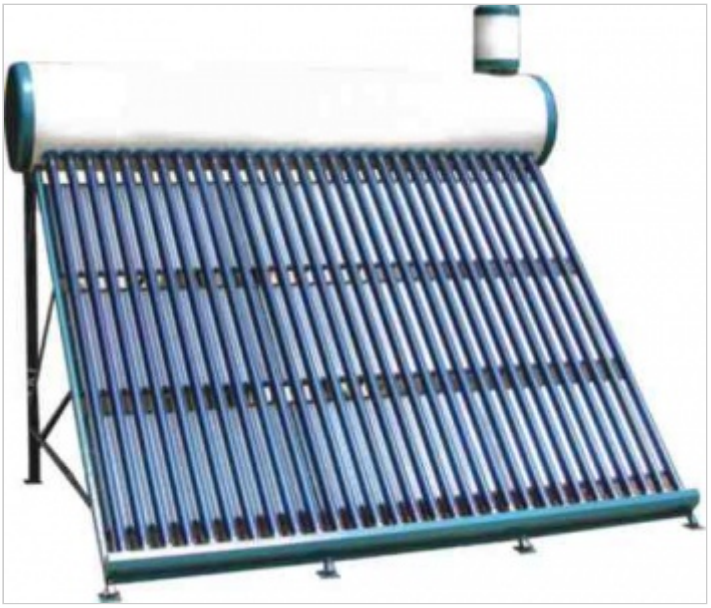
Why Solar?

Solar heating can save the farmer money. Solar energy is free and can make a substantial contribution to water heating in the summer months when hot water usage is at it's peak. It can be supplemented by electricity when sunshine levels are not sufficient to heat all of the water needed.

Solar heating reduces emissions of CO_2. Solar heating is environmentally friendly because it replaces the use of fossil fuels such as oil, coal and gas used to generate electricity.

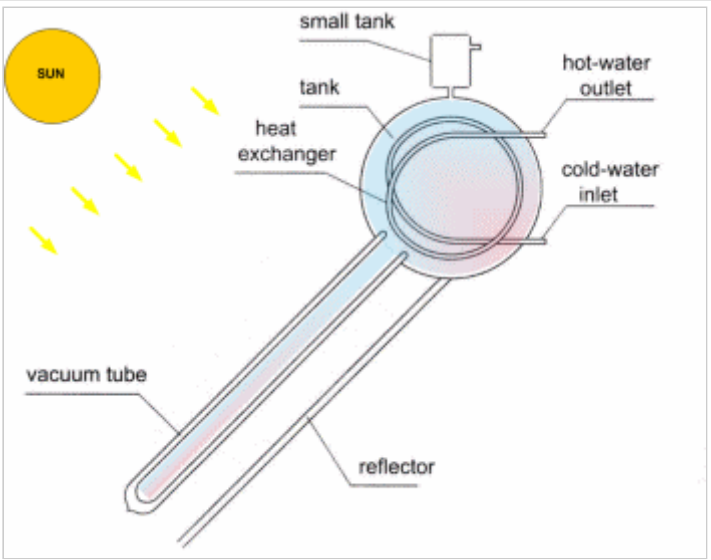
How does it work?

The principle of operation is simple. The solar collector is supplied complete with a mounting frame as shown in the picture. The frame must be mounted so that it is firmly secured to a flat surface. The mounting must be secure enough to support the weight of the unit and resist the force of the wind.



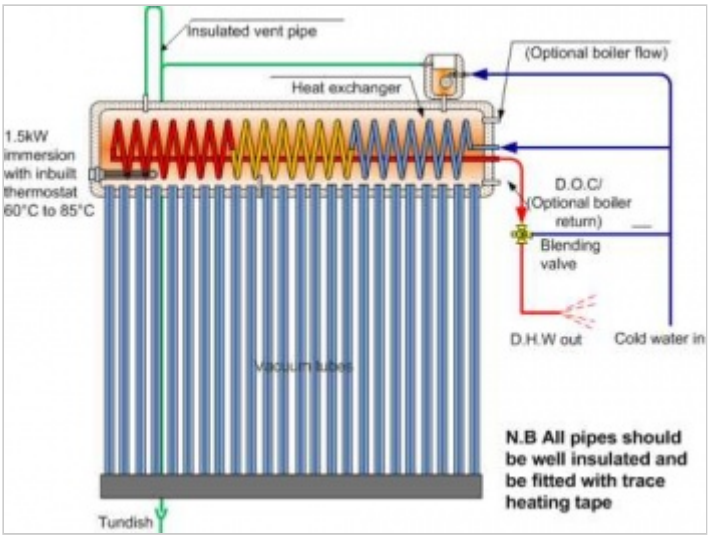
Solar Collector

The solar energy collector is must be mounted so that it faces in a southerly direction. The collector is fitted with specially designed vacuum tubes. These allow sunlight in but do not allow heat out. The tubes contain water which is heated by the solar energy. This water rises as it is heated and gradually fills the tank with hot water. The tank temperature can rise as high as 85°C on sunny days.



How it works.

The tank contains a heat exchanger coil. One end of the coil is connected to the cold water supply and hot water is produced at the other end. This water is used for washing and sterilising the milking equipment.



Solar water heater installation pipework.

The water contained in the solar tubes and tank is never mixed with the hot water produced by the system. This means that hot water used for cleaning is never stored and there is no risk of legionella growth or other contamination which may be a problem with other types of water heater. This is a further advantage which ensures the highest level of hygiene.

The solar water heater is also fitted with an electric immersion heater. This has an inbuilt thermostat which comes on automatically when the tank temperature is below 60°C and turns off when it reaches 85°C.

Farm Solar - Installation Example

Michael O Callaghan operates a 100 cow dairy farm near Castlemahon, County Limerick, Ireland. He had been using electricity to heat a 250 litre water heater for hot water production. The water heater was fitted with two 3 kW immersion heaters. Electricity for water heating had been a major cost so John decided to try the RVR Solar water heating system when his old water heater began to leak.


Solar Water Heating System installed on roof of Dairy.

In the past, Michael used to do a hot wash each evening and a cool wash each morning. In order to get the best use of the solar energy, he changed to performing the hot wash in the morning.

The system has been working very well and Michael is making substantial savings on his electricity costs.

Further Information

Further information on this solar product can be found at the following product group:
http://www.rvr.ie/default.aspx?subj=catalog/ProductsList&catIdPath=0_70_74_252