



## Can solar be viable for underfloor heating, Some guidance

There are some obvious issues heating a floor system by solar

- 1/ UF systems require constant input day and night to maintain stable heat in the thermal mass (Floor slab).
- 2/ Days with the least solar energy available are usually the days when the most heat input is required.

Storing solar energy in a thermal store can appear to offer a viable partial solution to the above but ....

### **Sizing an effective thermal store**

As a rough guide 1m of underfloor pipe contains around 0.33 litres of water so if a 180 square meter home's floor has 1000m of pipe within it, the water content of the floor is roughly 330 litres.

To initially heat a 180 sq m home with standard ceiling heights and insulation to current code via a 100mm floor slab requires a heat input of between 13 and 15kwh and will require 30 to 50% of this input to maintain the heated area with a typical delivery of 22 Litres per minute at a temperature of 45 degrees C.

For example a 500 L thermal store on this system heated to 70 degrees C. With extraction via a coil will achieve around 20-30 minutes blended input to the floor slab at the initial heat up stage, or around 40 minutes of supply when maintaining heat. before fully depleting the store. Once depleted the store will need time to fully recover before it can again contribute to the floor. The rate of solar collection will be relevant to the size of collector, In winter re charge of the store may only occur a couple of times on a good solar day.

### **Position and size of coils**

When used to heat a cylinder a coil will heat the body of water from its position to the top of the cylinder. Where a coil is used to extract heat its position in the cylinder will allow it to withdraw the heat from the body of water from its position to the bottom of the cylinder it will not extract heat from above the coil so a 500 L store will need an extraction coil at the top to provide its full 500l of potential.

**Importantly** Coils used for extraction of heat will need to be significantly longer than those used to input heat and must be sized to suit the flow rate and output temperature requirements.

### **Maintaining heat to the floor.**

A second heat source (usually a boiler or AW Heat pump) will always be required to maintain input to the floor between periods of solar availability and through the night. (In fact for the bulk of the heating requirement)

For the highest energy efficiency and to avoid transfer heat losses this heat source should input directly to the floor rather than via the store.

Connection of the different boiler /HP options will require specific pipe out configurations - hydraulic separation, differential bypasses etc,.

Consideration must also be given to the energy (heat) in the store during summer months when the floor is not heated. There may well need to be some means by which this can be dissipated – for example a spa or pool.

### **Our advice.**

Be very cautious before using solar in your floor, For the example above it would take over 50 Years to recover an investment of just \$4K through energy savings made from the solar contribution. There is nothing to gain from the capital investment of incorporating a thermal store and solar thermal with your floor heating system. If you do want to use the sun a dedicated solar Domestic hot water system or solar PV system would be a far smarter investment