Background information on Solar Heat Storage

**History**:

Offgrid renewable energy systems require energy storage methods; electricity can be stored in batteries and solar heat is often stored as hot water. What is generally missing are heat batteries with sufficient temperatures for cooking and frying (about 200 degrees C).

The research at NTNU has been made in collaboration projects with several African universities, and motivated in energy technology for rural African conditions. Electrical charging of heat storages is a current research topic in this collaboration project. This has relevance for the Norwegian marked as well.

**Background numbers and figures:**

It is more efficient to collect high temperature heat directly from solar concentrators than to use photovoltaics (PV) and heating elements. Solar thermal research has therefore focused on integrating heat storage systems with concentrating collectors.

One objective of the current work is to explore methods for electrical charging of a heat storage. Given a PV installation, the idea is now to collect otherwise wasted electricity and convert into high temperature heat. When the electrical batteries are full, the available PV capacity should be directed to a latent heat storage, to provide energy for cooking and space heating after sunset.

**Current situation:**

Units which can store excess electricity from PV (diversion load) or from wind or hydro generators (dump load) in terms of high temperature heat are not available today. Two prototypes are currently being tested at NTNU; one outdoor grill and one portable unit, both based on nitrates for latent heat storage.

**Future trends:**

House roofs are in the future expected to be heat and electricity collectors. Local energy storage can be attractive solutions from the consumer point of view (more economic than grid connected PV). Distributed resistive loads in a smart grid system can also open for better optimization of hydro power turbines, by providing some load control from the producer.

**Additional information:**

- work in progress.

See report from previous project:

http://folk.ntnu.no/ojn/Solar/Files/SolarFinalReport[13].pdf

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