RES4LIVE
ENERGY SMART LIVESTOCK FARMING
TOWARDS ZERO FOSSIL FUEL CONSUMPTION

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AGRICULTURE & INNOVATION

Innovative Photovoltaic-Thermal (PVT) systems for dairy cattle farms

Intensive livestock farming consumes a considerable amount of thermal and electrical energy, especially in dairy farms where hot water is needed for cleaning the milk tanks, barn, and disinfection of the milking machines. Therefore, Photovoltaic thermal (PVT) collectors, that convert solar radiation into usable thermal and electrical energy are a promising form of renewable energy generation for agriculture and livestock farming specifically. A heat storage tank can be used to store excess heat during the day for use at night.

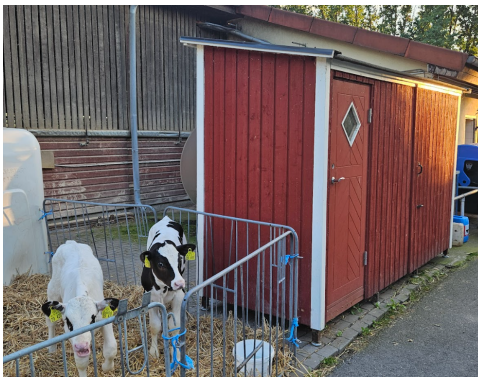

Figure 1: Solar house with solar pumping station, 1500L heat storage tank, and electrical

In dairy farms with milk storage, heat can be recovered from the milk chillers to pre-heat any water for domestic hot water use. It was decided to use high performing PVT collectors to further heat up the pre-heated water to the desired 60°C for hot water use in the farm.

LVAT Dairy Farm PVT Installation Highlights

- 24 Solarus concentrating PVT collectors (55 m^2) were installed to take heat from the heat recovery system and further heat the water to the desired domestic hot water temperature for the farm.
- Expected annual solar heat supply to the farm of 7.5 MWh with 24 Solarus PVT collectors.
- Expected annual electric PV supply to the farm of 4 MWh with 24 Solarus PVT collectors.
- Annual maintenance costs are less than 500 EUR.
- With the heat recovery system and PVT installation, the e-boiler for domestic hot water is only expected to run during the winter for top up of heat.
- Expected return on investment is less than 8 years, which can be reduced with increasing gas and electricity prices as well as increasing price volatility.

Figure 2: Concentrating PVT installation at LVAT dairy farm in Potsdam, Germany

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