Solar Process Heat Installation

Laundry Laguna in Marburg, Germany

Company description

Laguna is a medium-sized laundry situated at a commercial area in Marburg, Germany. The main processes are washing, drying and ironing of laundry. Working time is from 7:30 am to 15:30 pm, the plant is not operated at weekends and usually there are no company holidays. Two gas-fired steam boilers (300 kW each) generate steam, which is distributed to the different processes by a steam network. A significant share of 50 % of the steam is consumed directly. The condensate from the steam not used directly returns to the feed water tank.

Reasons for installation

The process heat system was installed by the German company Wagner & Co. Solartechnik to demonstrate the feasibility of a newly developed solar thermal collector for the generation of process heat up to 130 °C (RefleC-collector). The management of laundry Laguna highly supported the project.

The laundry is run by a social organization, partly employing also mentally handicapped people. Because of its social commitment the company also feels a responsibility for a sustainable production, supported by renewable heat generation.

Technical description of solar thermal installation

In July 2010, a solar thermal system with 57 m2 aperture area (40 kW) and 3.3 m3 buffer storage volume was installed. The system supports the partly open steam network of the laundry by pre-heating of demineralized make-up water (20 °C – 90 °C). Also solar pre-heating of feed water (90 °C up to max. 120 °C) is demonstrated.

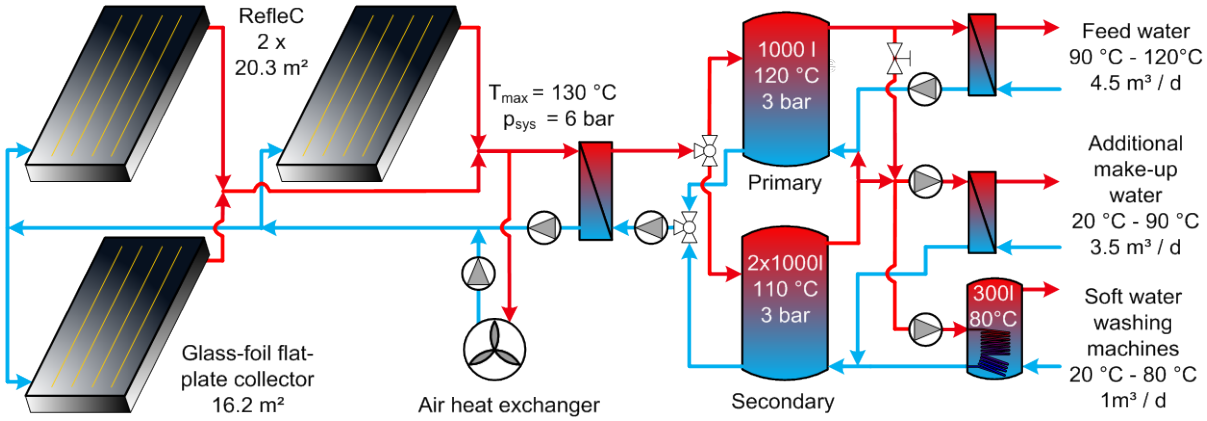

Fig. 1: System design scheme of the solar plant (simplified). Source: S. Heß, Fraunhofer ISE

On the process level, process water for the washing machines is heated (20°C – 80°C). The collector field works at temperatures up to 130°C. An extensive monitoring of the installation is done by Fraunhofer ISE, which is the research partner of Wagner & Co. for the project.

Results & conclusions

The major part of the heat generated was used for the heating of make-up water, which emerged to be a very rewarding process for the integration of solar thermal energy, since the temperature level is low and the heat demand is high and relatively constant during the week. Since the operator of the plant optimized the heat generation and distribution system in the course of the installation of the solar thermal plant and took actions to smoothen the overall thermal load profile (control adjustments), the company was able to shut down the second steam boiler completely. This was, the company´s gas consumption was reduced by 8 %.

Pictures

Picture 1: Collector field on the roof of the laundry. Reference flat-plate collectors (glass-foil, front) and newly developed RefleC-collectors (back), Source: S. Heß, Fraunhofer ISE

Picture. 2: Buffer storages of the solar thermal system with control unit and piping. In the front is the primary storage, in the middle the two secondary storages and in the background (orange) the buffer storage to supply the washing machines with process water.
Source: [Eis11]

Picture. 3: Washing plant of the laundry, (left side top), ironing machine (left side bottom) and steam boiler room (right) with steam boiler (front) and feed water tank (upper floor).
Source: S. Heß, Fraunhofer ISE

Further Information

[Eis11] Eisenmann, W., Kramp, G., Hess, S., Klemke, M. “Development of an improooved flat-plate collector with external reflectors for the generation of process heat up to 150 °C”, final project report, funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Coelbe, 2011 URL: http://edok01.tib.uni-hannover.de/edoks/e01fb11/668455144.pdf