Case study : Zagorje ob Savi (Slovenia)

Name of the project:	District heating - Zagorje ob Savi
Adress of the project:	Integration of solar district heating system in Zagorje Ob Savi
Name and type of the owner:	Javno podjetje Komunala Zagorje, d.o.o., Public Company
Owner contact person:	Marko KOS, Head of energetic deparment Phone: +386 3 56 67 722 E-mail: marko.kos@komunala-zagorje.si

Context of the study

District heating system (DH) supplies with heat 21 heat station, which constitutes 964 apartments with a total area of 50,659 m^2 and 85 business premises. Because only in three heat station need heat for domestic hot water (DHW) the DH system in summer time is turn off. Two biomass boilers with capacity of 5 MW and one oil boiler with capacity 7 MW is used for heat production. The second one is used only for backup.

With integration of solar system they would like to produce the heat for DHW mainly in summer time and reduce the production cost of thermal energy. The heat storage presents the DH net with capacity 100 m^3.

Support

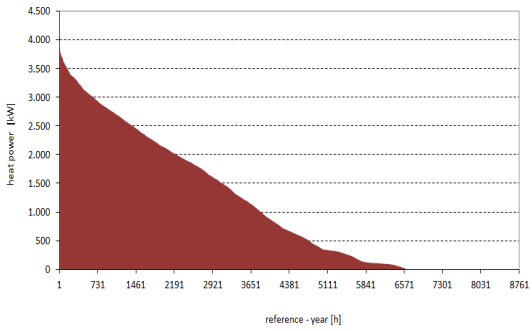
There are currently no calls for tenders with grant financial incentives for new investments in renewable energy use.

Up to 30.6.2014 there is only tender for loans for environmental investment or renewable energy use. The minimum annual interest rate on the loan is three months EUROBOR + 1.5%. The maximum period loan is 15 years.

SDH plant

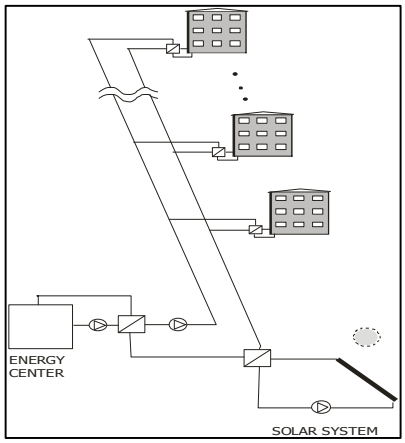
SDH system concept

For heat response of buildings and DH net was use numerical program TRNSYs witch was successfully validated in year 2012. For the analysis, we considered meteorological data from test reference year. The annual consumption of thermal energy from the DH is 9,1 MWh / year. Of this, 92,6% is used for heating buildings, 4,7% for DHW and the rest represents the heat losses from DH net.



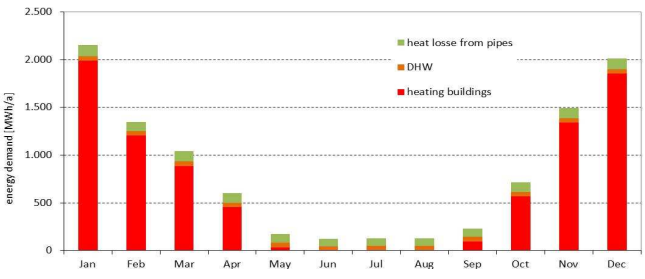
SDH technical data

The location for solar collectors is on the roof of the energetic building and on the roof of nearby manufacturing building with total area 1500 m^2. Due to improper slope and orientation of the existing roof is necessary to install solar collectors on the steel construction. The maximum collector area is then 744 m^2. The solar system is connected to the return of DH net. The DH net will be used as heat storage. Due to the high temperatures in DH net about 65 °C in summer time the selective flat-plate and vacuum tube collectors ware selected.

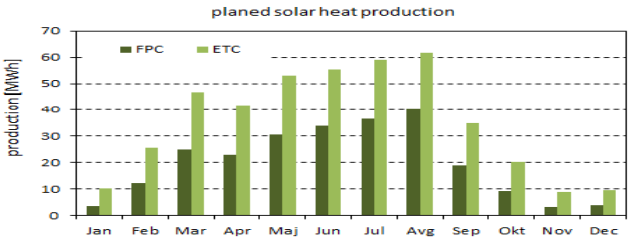


SDH energy balance (MWh)

The annual energy required in DH is 9,7 GWh, of which 8,4 GWh for heating buildings, 0,7 GWh for DHW and rest present the heat losses from DH net.



The annual planed production of energy from the solar system in the case of flat-plate collectors (FTC) is 239 MWh or 2,4% of total energy required and in the case of vacuum collectors (ETC) 427 MWh or 4,4% of total energy required.



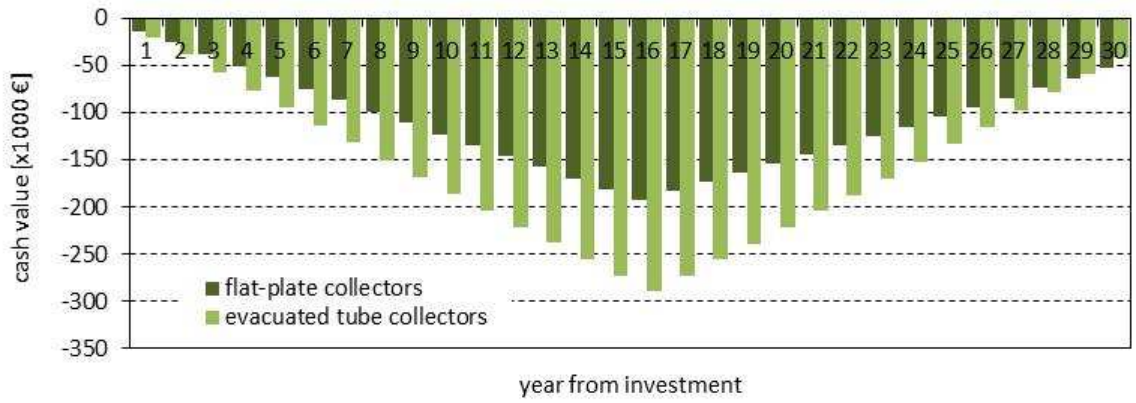
SDH economics

In the economic analysis the credit financing witch is defined by the call ECO Fund is taking into account (Public call for loans for environmental investments 50PO13). Crediting period is 15 years with the annual interest rate of 1,79%. Annual operating and maintenance cost are also taking into account.

	flat - plate collectors	evacuated tube collectors
Investment solar system [€/m^2]	*360*	*585*
Maintenance cost [€/MWh]	*1*	*1*

	Flat-plate collectors	Evacuated tube collectors
Total investment cost [€]	267.840	435.240
Yearly capital costs [€/a]	20.528	33.358
Maintenance cost [€/a]	239	427
Heat production [MWh/a]	239	427
Solar thermal heat cost [€/MWh]	87	79

Cash flow and cost savings is determined according to biomass saving at price of € 31 / MWh. The 1 % annual growth of biomass price is included. The payback period of the system with the flat-plate collectors as well as vacuum collectors is over 30 years.
Both cases are not economically viable because the payback period is longer than 20 years. In the 25 year lifetime of the solar system the estimated saving is 230.179 € for flat-plate collectors and 411.241 € for evacuated tube collectors.



SDH plant opportunities & threats, benefits & limits

Opportunities & benefits: Stable energy price for next 20 years. Reliable system with low maintenance costs. Increase energy independence. Installation of local heat pumps for DHW during the summer months means significantly lower temperature of DH net.

Treats & limits: High-temperature DH network (75 ° C) - low energy profitability of solar system. Without financial support - long payback period. Low cost energy source, current € 31 / MWh.

Photos

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