TIGI Case Study – Industrial Laundry Solar Thermal Heat

Executive Summary

In this case study, honeycomb collectors have been demonstrated to be a commercially viable solution for an industrial process heat application – an industrial Laundry.

System Location

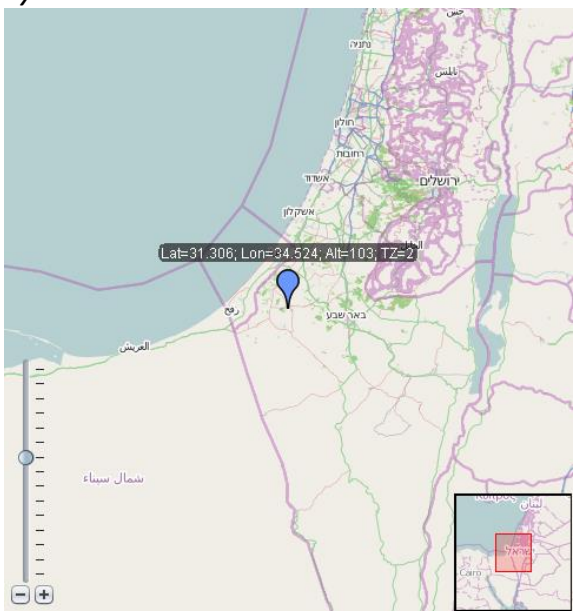

Figure 1: system location: Urim, Southern Israel, Lon: 34.524°, Lat: 31.306°, Alt: 103 m.

System at a glance

Location	Urim, Israel
Application	Industrial laundry
Collector gross area	40.7 m^2
Storage capacity	5 m^3
Hot water load	4-5 m^3/day, 6 dpw
Annual energy savings	63.5 MWh
Annual energy savings	6050 m^3 gas (LPG)
ROI*	3 years

* No subsidies

System Setup

20 TIGI collectors (40.7 m^2 gross) were installed in sub-arrays of 5 collectors as shown in Figure 2. The tilt angle was 30 degrees and the orientation was 15 degrees towards the east in order to accommodate roof geometry. This also gave a bias towards morning hours, which was beneficial in this case.

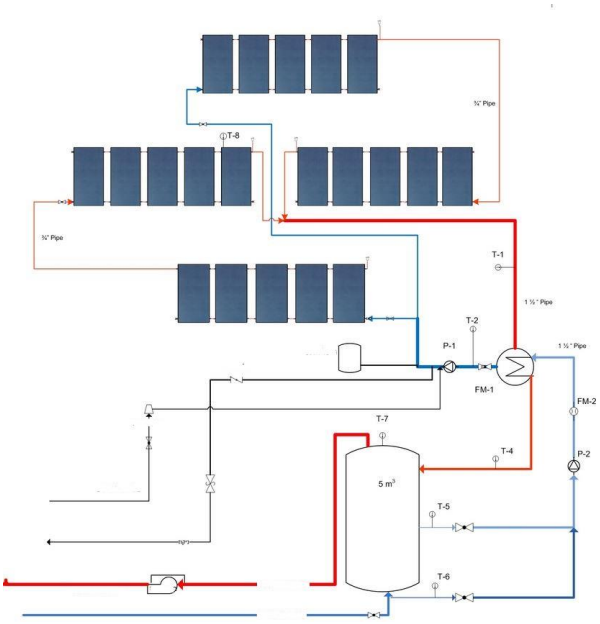

Figure 2: Collector Setup

This setup allowed for the collection of data including instantaneous solar irradiance, ambient temperature, collector inlet and outlet temperatures and flowrates at 5 minute intervals. An example of the temperature data and its time dependence over a 24 hour period in mid March is shown in Figure 3.

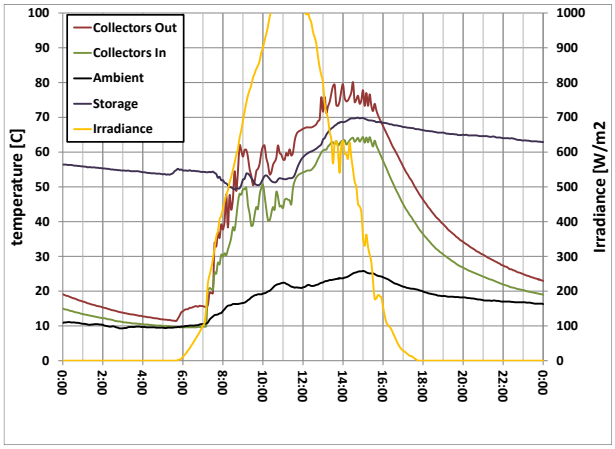

Figure 3: Temperature and irradiance profiles for Urim on March 16th, 2014.

As can be seen, the most intensive usage hours are from 8 am to 2pm, when the storage tank temperature dips as low as 50 C. The remaining load is taken by an in-line gas heater in peak user hours. However as solar irradiance rises, the solar thermal system is able to

bring storage tank temperatures back above the required supply temperature of 65 C in preparation for the following day.

Performance Analysis

Similar results to those shown in Figure 3 have been collected over a 3 month period from April to June 2014. This data has been analyzed in order to compare with the predicted monthly performance using a Polysun model relying on collector performance parameters determined during certification testing at SPF in Rapperswil Switzerland. In the results which follow, the red bar indicates the predicted performance by simulation while the blue is the measured energy delivered by the collector array. As seen in figure 4, the actual performance is slightly above the predicted performance in two of the three months recorded and slightly below in the third. This is likely the result of year over year variations in solar irradiance, combined with uncertainty in the thermal characteristics of the storage tank. Based on these preliminary monthly data, the annual normalized system performance is expected to be greater than 1,400 kWh/m² gross/year and in line with expectations.

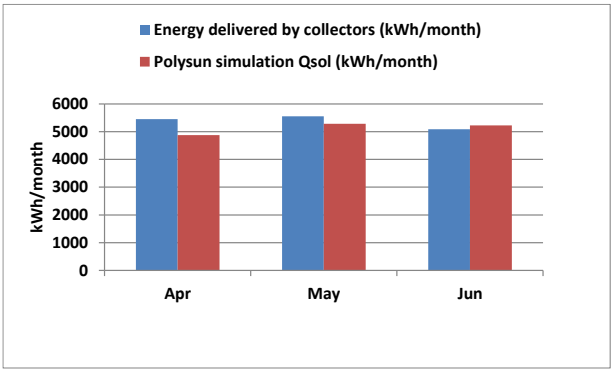

Figure 4: Measured system performance vs Polysun predicted performance for months of April, May and June 2014.

Installation Images

Picture 1: Honeycomb collectors at Urim.

Picture 2: On the roof of the laundry

Picture 3: The back of the collectors showing collector-level overheating prevention