Executive Summary
Through a number of pilot studies at various geographic locations in Europe, North America and Israel, we have validated in the field that TIGI’s Transparent Insulation equipped Honeycomb Collectors outperform alternative collectors exactly as predicted by independent testing at SPF in Switzerland.

Pilot Setups
Although the exact system configuration varied from site to site, the collector architecture was implemented in general in a fashion similar to that shown schematically in Figure 1.

Figure 1: 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 and efficiency data and it’s time dependence over a 24 hour period in early March in Boston is shown in Figure 2.
Figure 2: Temperature and irradiance profiles for Boston on March 2nd, 2011.

As can be seen, although ambient temperatures remained below freezing throughout the 24 hour period, collector output temperature rose above 80 °C in the early afternoon.

Performance Analysis
Similar results to those shown in Figure 2 have been collected during winter and spring at 3 different sites. This data has been analyzed in order to compare with the predicted collector efficiencies anticipated based on the independent testing performed by the internationally recognized evaluation facility, SPF in Rapperswil Switzerland. The efficiency calculation was based on the steady state model described in European Standard EN 1975-2 however minimum irradiance was set to the more demanding level of 500 Wm$^{-2}$ instead of 700 Wm$^{-2}$ to include data with X values greater than 1.

Performance Results
In the results which follow, the red line indicates predicted efficiency performance based on SPF testing report C1310 of the Honeycomb Collector. The grey line is predicted performance for a typical high end German flat plate collector.

Neve Yarak, IL Pilot Results

Figure 3: Actual collector efficiency calculated from temperature profiles from Neve Yarak test system in January, 2011.
Summary
TIGI’s Honeycomb Collectors have been installed and tested on 3 continents in varying climatic conditions during the winter and spring seasons of 2011. At all three sites, data indicates performance consistent with that predicted during independent testing at SPF, with efficiencies remaining above 50% even in the presence of 80 K temperature differentials between ambient and collector interior.