

Case Study

Solar Thermal Refrigeration

Compression technologies partnered with solar assisted heat absorption. A 1MW, 60,000Sq. ft. refrigerated fruit packaging facility based in Kent, UK.



Image 1: The 1 MW cooling system on the roof of the Chingford fruit facility. Source SCE picture gallery

Clients Position

In addition to the heavy importance of reducing costs, Chingford Fruit have a strong in house commitment to installing technology and products that reduce harmful emissions into the environment.

Over recent years Chingford Fruit has installed LED lighting, human Interface controls, voltage optimization, along with energy monitoring equipment throughout their 60,000 sq. ft. site. All which have substantially reduced the buildings energy consumption. Until now however they struggled to find a solution for their largest energy consumers - Refrigeration & HVAC.

Colin Ormerod, Central Services Manager at Chingford said “we have been on the lookout for credible efficiency solutions for our refrigeration and air conditioning plant for some time. We came across the Solar Cooling option. last year, and it really captured our interest. Although I have to say, it did take some time to convince our refrigeration contractors, however they are now fully on board having had first-hand experience of the product and the installation process, to the point where they have actually presented the Solar Cooling system to a number of their other clients”.

Although the data logger shows a reduction in energy consumption of c. 92,500kWh over the evaluation period. Colin Ormerod also confirmed that production in the plant was actually much higher than the previous year in comparison, and therefore the true saving is more likely well in excess of 100,000kWh.

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Image 2: the solar thermal collectors installed in parallel on the roof of the Chingford fruit facility. *Source SCE picture gallery*

The rooftop on the Chingford Fruit facility has had 54-solar thermal collectors installed in parallel across 750kW of the 1MW cooling capacity refrigeration system. The installation itself was completed by an accredited Solar Cooling installation partner, who managed the installation process in partnership with Chingford's existing refrigeration contractors.



Image 3: the solar thermal collectors and the refrigeration system on the roof of the Chingford fruit facility. *Source SCE picture gallery*

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Usage data is monitored and stored by the client's in house t-mac technologies system, which measures all water, gas and electricity usage throughout the facility on an individual plant basis. The installation of the Solar Thermal system was commissioned on February 27th 2016, at this point direct year-on-year comparison began. The data below covers the period February 28th 2016 to May 10th 2016.

Meters					
345,320.28kWh					
Meter	Data	Min	Max	Mean	%
Plant Room - HT Pack C:Delta	21,699.19kWh	0.00kWh	19.69kWh	0.01kWh	6.28%
Plant Room - LT Pack B:Delta	71,879.00kWh	0.00kWh	19.50kWh	0.04kWh	20.82%
Plant Room - EVAP Panel D:Delta	43,069.69kWh	0.00kWh	6.00kWh	0.02kWh	12.47%
Plant Room - EVAP Panel A:Delta	58,297.81kWh	0.00kWh	8.19kWh	0.03kWh	16.88%
Plant Room - EVAP Panel B:Delta	26,454.69kWh	0.00kWh	3.81kWh	0.01kWh	7.66%
Plant Room - LT Pack A:Delta	108,388.12kWh	0.00kWh	23.75kWh	0.06kWh	31.39%
Plant Room - EVAP Panel C:Delta	15,531.78kWh	0.00kWh	2.09kWh	0.01kWh	4.50%

Figure 1. Screenshot prior to solar installation.
Source clients' t-mac system

Meters					
252,794.59kWh					
Meter	Data	Min	Max	Mean	%
Plant Room - HT Pack C:Delta	19,953.81kWh	0.00kWh	16.81kWh	0.01kWh	7.89%
Plant Room - LT Pack B:Delta	51,670.25kWh	0.00kWh	20.88kWh	0.04kWh	20.44%
Plant Room - EVAP Panel D:Delta	32,798.00kWh	0.62kWh	9.69kWh	0.02kWh	12.97%
Plant Room - EVAP Panel A:Delta	47,376.38kWh	0.00kWh	14.25kWh	0.03kWh	18.74%
Plant Room - EVAP Panel B:Delta	18,486.12kWh	0.00kWh	6.56kWh	0.01kWh	7.31%
Plant Room - LT Pack A:Delta	70,754.75kWh	0.00kWh	21.50kWh	0.05kWh	27.99%
Plant Room - EVAP Panel C:Delta	11,755.28kWh	0.00kWh	3.50kWh	0.01kWh	4.65%

Figure 2. Screenshot with solar installation.
Source clients' t-mac system

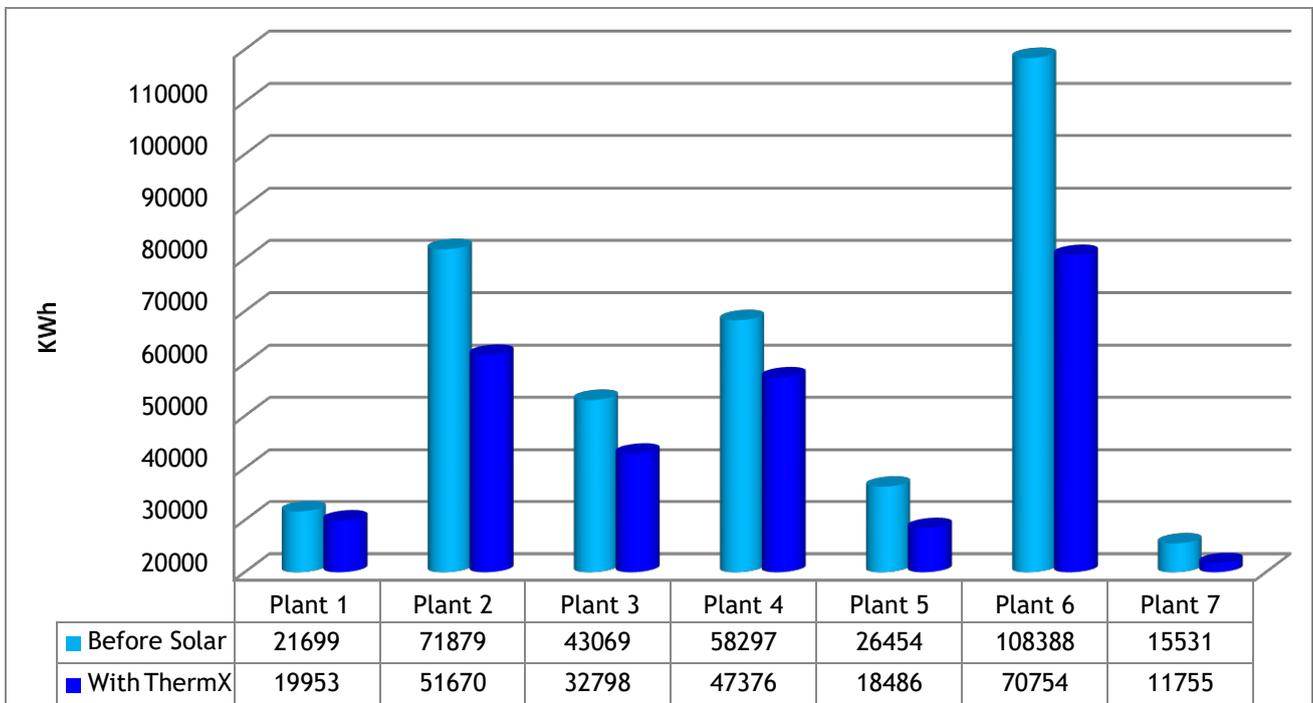


Figure 3. The prior vs. evaluation period figures, transferred from the t-mac data system on a bar graph. Source SCE image gallery

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The Solar Cooling system is an innovative, green technology designed to harvest the free energy from the sun, thus creating thermal energy to increase the efficiency of the refrigeration process, in this particular case by c. 27%.

Original Proposal

Provide a solution with the goal of reducing overall energy consumption within the site, while providing a return on the clients' investment below 3-years.

“So far we are tracking way better than the figures that the Solar Cooling originally projected. I am personally very excited to see the results and assuming the tracking continues at the same trend, we will see a return of our investment well below 2-years. It is now highly likely that we will be installing the Solar Cooling onto our HVAC systems, at some point in the very near future” - **Colin Ormerod**.

The Solar Cooling can be retro-fitted onto most well-known HVAC and Refrigeration systems of all sizes, with the proviso that the system has variable load ability - inverter, staged, screw-type, and digital scroll for example. In standard cooling units, the compressor has to manage the full compression load, however at the time it is most needed (i.e. when the sun is out), the system takes over a level of the capacity, allowing the compressor to reduce its workload, significantly reducing the amount of electricity consumed by the entire system. Subsequently, the whole system has a much easier life and is therefore less prone to maintenance issues.

Benefits

- *Reduced electricity overhead
- *Reduced equipment maintenance costs
- *Extended equipment lifespan
- *Reduced CO2 emissions
- *Future proofing against potential carbon taxation

Project Partners

- SolX
- Chingford Fruit
- t-mac data technologies
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“This area of the UK benefits from around 4.5-hours of unbroken per day on average over the year, therefore why let the sun be the problem, when it can actually be the solution” - **Chris Micallef, Technical Director**.



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To find out more...

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Energy earns, or simply burns...the choice is yours