

# Case Study

## CAMBRIDGE SOLAR LTD

### Residential Rooftop, Soham



Mill Farm, Soham, UK



### 4 % more energy

production compared to mono-crystalline modules – installed at the same roof.

System capacity: 1.95kWp CIS + 2kWp m-Si,  
Reference period: 1 year (01/01-31/12/2014)  
Modules compared: CIS vs. mono-crystalline modules (m-Si)

Soham Mill Farm proves Solar Frontier's CIS technology competitive advantages: 4% more energy production compared to the mono-crystalline modules installation. (Image: Umesh Patel)

#### Site Overview

Location	Mill Farm, Soham, UK
Coordinates	52.21° N, 0.19° E
Average global irradiance	1,069.5 kWh/m <sup>2</sup> /yr
Average temperature	9.6 °C, 49.28 °F
Average precipitation	541 mm/yr, 21.3 in/yr

#### Technical Overview

Date onstream	December 2013
System capacity	3.95 kWp
Panel type	SF150-L (150 W), m-Si (250 W)
Number of installed panels	13x SF150-L, 8x 250Wp m-Si
Tilt angle, orientation	30°, SE
Expected output	3,245 kWh/yr
Total CO <sub>2</sub> reduction	1,369 kg/yr
Inverter	SolarEdge SE4000

#### Financing Bank

Private Investment

*"As an Engineer, with a keen interest in renewable technology, I was intrigued by the performance claims of CIS modules over mono-crystalline (m-Si) but wanted to see the evidence for myself - the decision at Mill Farm to install an array of half CIS modules and half mono-crystalline has provided an opportunity to do this in a real installation and so far the claimed benefits of CIS modules have proven to be sound."*

Umesh Patel,  
Owner, Mill Farm

Mill Farm is located in Soham in Cambridgeshire. With a large, 30° pitched roof and South East facing aspect it was an ideal proposition for a Solar PV installation, aided by the UK's 'Feed-in Tariff' scheme. Also on the site of the domestic residence is a 19th century windmill, which is undergoing restoration. In turn the income generated from the PV installation will be used in the restoration of the mill in years to come.

Cambridge Solar was approached and one option for the 4kWp installation was the use of Solar Frontier's CIS modules. However, as the number of panels is greater for a given output, the additional cost of the installation needed to be justified. As there seemed to be little comparative data against mono-crystalline panels, it was decided to use a mix of both and compare the output data. Paired with SolarEdge Power Optimizers, the data for each half of the array could be monitored whilst also ensuring that any issues with partial shading or cloud cover would be minimized. The black framing of the modules also meant that the visual impact as low as possible in order to fulfil 'listed building' planning conditions.

The array went online in December 2013 and yield data has been collected since. Overall, the system has exceeded the predicted yield but reassuringly the Solar Frontier PowerModules have consistently generated more energy per kWp than the mono-crystalline panels. Data collected over the summer months indicates that the 'light soak' effect and consistent performance in higher temperatures explain the good performance in strong sunshine, whereby the CIS modules produce much greater output unlike the mono-crystalline which degrade in high temperatures. As a whole the installation has exceeded expectations!

#### About Solar Frontier

Solar Frontier is committed to creating the world's most ecological, economical solar energy solutions. Our proprietary CIS technology (denoting key ingredients copper, indium, and selenium) has the best overall potential to set the world's most enduring standard for solar energy. For more information visit [www.solar-frontier.com](http://www.solar-frontier.com) and [www.solar-frontier.eu](http://www.solar-frontier.eu)