Case Study
MHH Solartechnik GmbH
Industrial Rooftop Bottrop

Bottrop, Germany

Solar Frontier´s CIS thin-film modules are an excellent choice for low tilt angle rooftops and partial shadowing.

Site Overview	
Location	Bottrop, Germany
Coordinates	51.52° N, 6.92° E
Average global irradiance	950-1000 kWh/m²/yr
Average temperature	9.6 °C, 49.3 °F
Average precipitation	930 mm/yr, 36.6 in/yr

Technical Overview	
Date onstream	November 2011
System capacity	42.75 kWp
Panel type	SF150-L (150 W)
Number of installed panels	285
Tilt angle, orientation	12°, 0° S
Expected output	37,433 kWh/yr
Total CO_2 reduction	33,165 kg/yr, 73,116 lbs/yr
Inverter	2x Danfoss TLX 12.5 Pro + 2x Danfoss TLX 10.0 Pro +

Financing Bank

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"We have installed Solar Frontier CIS thin-film modules for the first time and are very excited about the excellent output and easy installation. As the modules are framed, we were able to use proven clamping techniques. It is very important for us that the modules are environmentally friendly and produced neither with cadmium nor lead. We were also convinced by the good price performance ratio of the Solar Frontier modules."

Stefan Stamm, Owner and Managing Director of Elektro Schrey GmbH

MHH Solartechnik is a pioneer in photovoltaic systems with over 20 years of market experience. The company has developed into one of the largest photovoltaic system suppliers in Germany and is able to provide local and personal support to customers nationwide with over 100 employees. The company´s head office is located in Tübingen and with sales offices in Munich, Nuremberg, Braunschweig and Duisburg. With deep experience working with suppliers and customers at every level of the solar value chain, MHH is a professional partner from the planning stage to turnkey solar systems.

The MHH customer Elektro Schrey GmbH installs superior quality and highly customized solar installations, mainly in the range of up to 50 kWp. Managing Director of Electro Schrey GmbH, Stefan Stamm attaches great importance to the use of high-quality modules and well-known inverter manufacturers.

In November 2011, a commercially used roof-mounted solar installation with Solar Frontier CIS thin-film modules was connected to the grid on a storehouse in Bottrop, in the Ruhr area. The 285 installed CIS modules are efficient and economical at the same time and have a total installed capacity of 42.75 kWp. The rooftop installation is expected to produce 37,433 kWh, and reduce CO_2 emission by 33,165 kg per year.

The challenge of this installation was to compensate for the low tilt angle of only 12° and also for partial shadowing during the afternoon hours. Even under these conditions, considered to be suboptimal, Solar Frontier´s CIS thin-film modules perform better than other technologies because of their high shadow tolerance. In addition to the high efficiency of the modules even under partial shadowing and low-light conditions, the lead and cadmium free content were also compelling factors.

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