



## NEWS RELEASE

# **Advanced CIS Production Lines Feature in New Solar Frontier Plant as Construction Proceeds on Track**

## ***Tohoku Plant model for future global expansion, to reduce production cost and deliver product upgrades***

**Tokyo — November 5<sup>th</sup>, 2014** —Solar Frontier announced today that it is installing newly enhanced proprietary CIS production lines at its upcoming production facility, Tohoku Plant. Based on established technology at Solar Frontier's Kunitomi Plant, the improved production lines will enable best-in-class production costs with new product advantages.

On track with its planned construction schedule, the plant is to be completed in March 2015. The Tohoku Plant features upgrades from Solar Frontier's existing proven production lines using advanced technology developed in R&D at its Atsugi Research Center (ARC). The lines will enhance Solar Frontier's leadership in CIS as well as help further adoption of thin-film technology around the world. The plant will also drive the availability of distributed energy solutions in Japan, especially for the residential and commercial markets in the Tohoku area.

Satoru Kuriyagawa, Chief Technology Officer of Solar Frontier, commented: "The Tohoku Plant manufacturing process leverages cutting-edge technology developed at our ARC, partnered with proven line technology from our Kunitomi Plant to deliver significant enhancements. For example, precise processes such as the formation of the CIGS absorption layer (the heart of CIS thin-film modules), the patterning process, and electrode formation are now faster and can be controlled more accurately. With significant advances in all areas, this factory delivers faster, more compact and more efficient production, in turn enabling significant cost reductions."

The new lines will also enable important product upgrades, including adjustments to the voltage and current of the modules. The upgrades will enable more freedom in system design and make placement of cables and other wiring more efficient. Also, leveraging Solar Frontier's world record-breaking 20.9% conversion efficiency technology, modules coming off the mass-production line will achieve efficiencies of over 15%.

These product improvements build on the performance advantages of CIS, a technology that generates more kilowatt-hours per kilowatt-peak in real world conditions compared to crystalline silicon panels. Generating more kilowatt-hours per kilowatt-peak installed is a key factor in the financial success of residential rooftop and commercial projects. Whether partially covered by shadow or when operating at higher temperatures, Solar Frontier-manufactured CIS modules show more robust, stable power output than crystalline silicon panels in real operating conditions.

Tohoku Plant will become a model plant for future global expansion, and Solar Frontier is currently assessing possible sites for production facilities outside of Japan in line with worldwide demand growth and Solar Frontier's mid-term growth plans.

**Tohoku Plant Construction Site Photos**



Photo 1: Exterior of the Tohoku Plant building  
(October)



Photo 2: Installation of Solar Frontier's proprietary  
production machinery underway in the Tohoku Plant

**You can follow the construction of Tohoku Plant on Solar Frontier's photo journal webpage:  
<http://www.solar-frontier.com/eng/photo-journal/index.html>**

### **About Solar Frontier**

Solar Frontier K.K., a 100% subsidiary of Showa Shell Sekiyu K.K. (TYO:5002) ("Solar Frontier"), has a mission to create the most economical, ecological solar energy solutions on Earth. Building on a legacy of work in solar energy since the 1970s, Solar Frontier today develops and manufactures CIS (denoting copper, indium, selenium) thin-film solar modules for customers in all sectors around the world. Solar Frontier's gigawatt-scale production facilities in Miyazaki, Japan, integrate compelling economical and ecological advantages into every module: from lower energy requirements in manufacturing to the higher overall output (kWh) of CIS in real operating conditions. Solar Frontier is headquartered in Tokyo, with offices in Europe, the U.S.A., and the Middle East. Visit [www.solar-frontier.com](http://www.solar-frontier.com) for more information.

### **Showa Shell Sekiyu K.K.**

Showa Shell Sekiyu K.K. is listed on the Tokyo Stock Exchange and has roots dating back more than 100 years in the downstream energy business.

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