



The essential partner for manufacturers of active facades

Words: Sébastien Eberhard, CEO and Peter Roethlisberger, COO Solaxess

Solaxess SA is a Swiss company specializing in the design of materials for the photovoltaic (PV) industry, intended for the realization of architectural projects. Thanks to technology developed by CSEM, and three years of reliability and certification, Solaxess contributes significantly to the aesthetic improvement of photovoltaic panels. Now, they are an integral part of buildings, whether on facades, terraces or roofs.

The company is active in distributing its products to PV panel manufacturers around the world. Our films, 0.1 to 0.5 mm thick, are integrated onto standard PV modules during their manufacturing process. This means it's possible to obtain a white, grey or other light-coloured PV panel that is completely uniform.

The main innovation is the capacity to maintain optimal performance, with excellent aesthetics. This specificity is essential for the development of so-called 'active' facades in the field of BIPV (Building Integrated Photovoltaics).

Our films allow builders, developers, and architects to treat PV panels as a new building element in their own right.

These new photovoltaic panels are totally invisible, even from close up. They could be mistaken for aluminum, Eternit or lacquered metal panels.

Solaxess has now moved in to new premises specially adapted to its development.

Modules with the Solaxess technology have successfully passed TÜV tests

Standards: EN IEC 61215-1/-2:2016, EN IEC 61730-1/-2:2016.

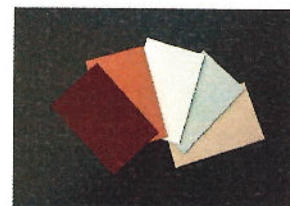
This means that TÜV-approved PV panel manufacturers can offer their own white certified modules, with a minimum of effort



It's now possible to have PV modules that conform to an aluminium plate.

This is what we presented at Intersolar Munich in 2019.

Aesthetics and 100% uniformity respected: no cells are visible!



We have extended our colour range and developed other darker tones such as terracotta and grey. These colours allow for optimal performance.



Marin-Epagnier, canton of Neuchâtel, Switzerland

We have also modified the properties of our product and simplified the application during module manufacturing. This new product is in the process of being certified and is expected to be available in spring 2020.

Real world advantages of white modules

Performance

After months of tests and comparisons between black and white modules from the same manufacturer, we can see that instead of a 38-40 % reduction, flashed measurements, the average power loss under real conditions is only 30%. The monitored white modules demonstrated a performance significantly higher than expected.

In addition, panels made with our technology

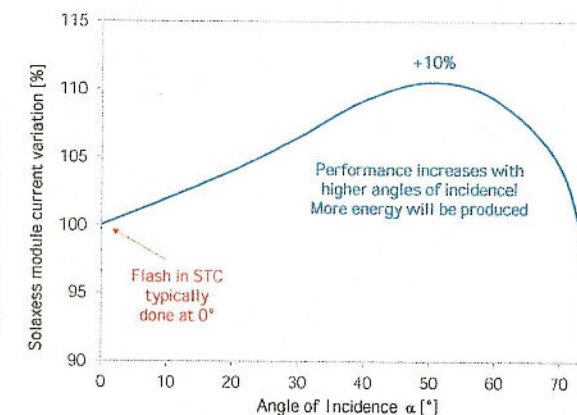
have an additional technical aspect that allows them to have an improved performance when positioned vertically.

Temperature range

It is proven that the temperature at the back of our panels, based on our technology, is significantly lowered. This reduces the buildings' temperature increase during the summer period and thus leads to a significant reduction in energy consumption for cooling i.e. air conditioning.

Cleaning

Composed of hydrophobic nanoparticles, our solution cleans itself on contact with water. Dust and other dirt adhere less and are cleaned when it rains.



Specular reflectance measurement

Matt appearance, glare-free

In addition, it has been shown that modules manufactured with our technology do not dazzle, which is very important for facade installations. They are covered with ETFE, a polymer widely used in construction.

After months of testing and establishing an efficient manufacturing unit, we now supply our products to all manufacturers of photovoltaic solutions, who wish to design active facades, building walls, balcony barriers, roofs and tiles, which meet aesthetic criteria. This is requested in certain regions or required by heritage protection authorities etc...

Ongoing projects

The Solaxess film is now being produced through strategic partnership, with industrial partners in Europe. With its production chain now set up, Solaxess is in a favourable position to showcase the technology through various projects this coming year.

Following some initial installations, including a residential building in Switzerland, other projects will be launched in the coming months in Denmark, Sweden, and South Korea, including a major project of more than 16,000 sqm in Switzerland.

Conclusion

Our primary objective is to offer the best solution in terms of efficiency, without compromising the aesthetics of the building. Architects can continue to build structures with light or homogeneous colours, without

having to integrate unsightly elements to produce energy.

We no longer consider the photovoltaic panel in the traditional sense of the term, i.e. only as a source of energy, but also as a building material. The building envelope thus becomes active and defines not only its aesthetics, but also provides it with the necessary energy it needs for its autonomy.

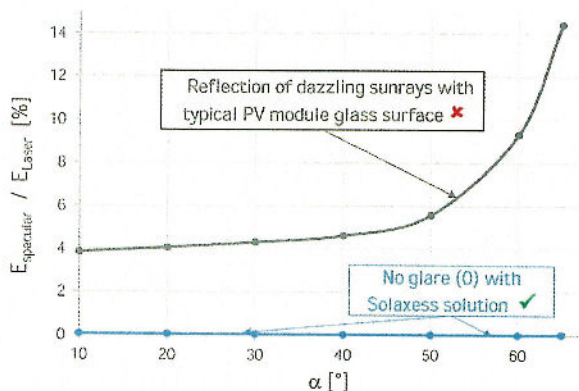
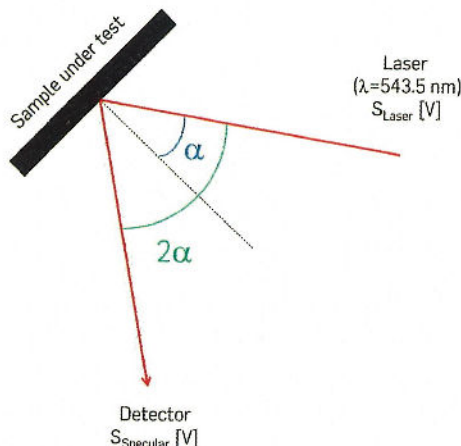
If you are a PV panel manufacturer looking for new markets and want to participate in the

development of architectural projects that focus on the design of intelligent, beautiful and integrated buildings, then our product is the right one for you.

Several panel producers are already working with our technology and we would be happy to assist you in the installation and qualification of your future aesthetic panels.

We are confident in the sunny future of the active facade.

www.solaxess.ch/en/home/



Awards and recognitions

Winner of the Zurich Switzerland & Liechtenstein 2016 Climate Prize, construction & housing

pv magazine award 2017 for top innovation

Winner of Inventor - Domain 2018 award

Winner of "Prix SUD 2018" for sustainable start-up

Nominated for TOP100 Swiss start-up Award 2019

Partner in the European Be-Smart project

Member of the World Alliance for Efficient Solutions, created by the Solar Impulse foundation

CONNECTED

Conext™ XW Pro
Conext™ Gateway
Conext™ Insight 2
Conext™ Quick Fit

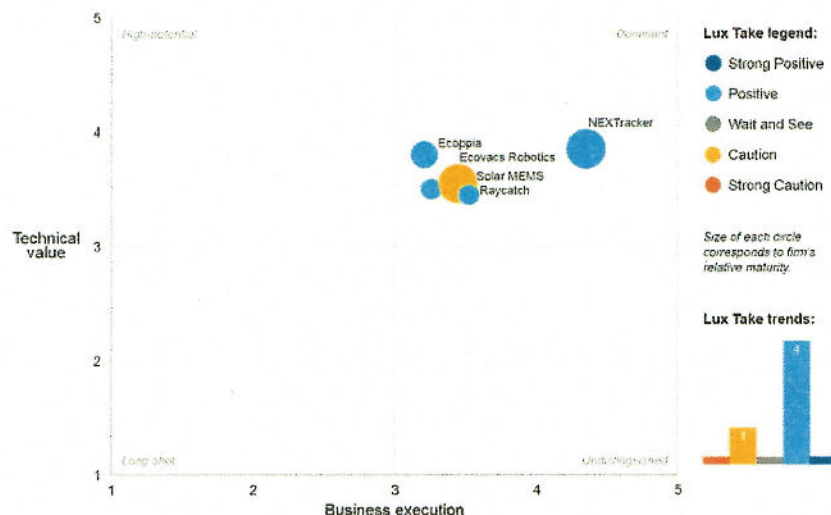
Our bundle is Rule 21 compliant with a full development roadmap to meet evolving utility requirements in North America. We offer solar solutions designed to adapt to next generation grid requirements.

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Methodology: The Lux Innovation Grid (LIG) below evaluates companies based on primary research done by Lux Research analysts. These interviews allow Lux to conduct in-depth evaluations, resulting in the LIG chart's x-axis scores for business execution (focusing on factors like partnerships, momentum, management team, and more). Meanwhile, the LIG chart's y-axis scores each company's technology (focusing on the technology solution itself as well as IP position, key metrics, and more).

A number of companies have already set the lead in addressing O&M shortfalls



inspections, while start-ups are driving coupling analytics with imaging to improve fault identification. A case in point: Cleandrone offers two drone-delivered services: an inspection service dubbed Sherlock, and a cleaning service called Cleandrone.

Sherlock provides infrared imaging of photovoltaic plants for fault identification and preventive maintenance. The surveys are conducted autonomously and image processing algorithms can identify disconnected panels and hot spots, or bypass diode failures. Cleandrone is equipped with a squeegee and cleaning fluid to wash the surface of dirty modules. The system has incorporated computer vision and artificial intelligence to detect module surfaces and is able to recollect cleaning fluid.

In addition to these start-ups, existing suppliers of balance of system components have a natural avenue to introduce digital services. For instance, leading single-axis tracker supplier NEXTracker acquired Bright Box to improve its tracking controls. Machine

learning algorithms were implemented to maximize production per row when weather fluctuations obscure direct sunlight. While this currently offers a 2% to 6% gain in electricity yield, the company is likely planning to expand this capability to offer predictive maintenance services for the entire system.

Another existing opportunity is via cleaning robots. Multiple companies are developing water-free robotic cleaning systems, reducing operation and maintenance costs compared to manual cleaning in desert environments. Ecoppia is an early mover in the space, having now reached over 300 MW of deployments in India and the Middle East. Standard operation consists of sending out cleaning order to the robots at a regular cadence or after a soiling event, such as a dust storm. However, there is opportunity to make this autonomous through a combination of weather forecasts and performance monitoring. Introducing machine learning software here can optimize a system's yield by how many cleaning runs is needed based on site-specific conditions.

Companies introducing digital technologies to solar plant operations are just in early stages, as is the research on reducing degradation through the adoption of new materials. However, both initiatives will positively impact solar economics: reducing annual costs by optimizing operation and maintenance procedures and increasing energy generation by eliminating different modes of degradation. Low systems costs are here to stay, reducing the need for subsidies; but the lifetime challenge remains.

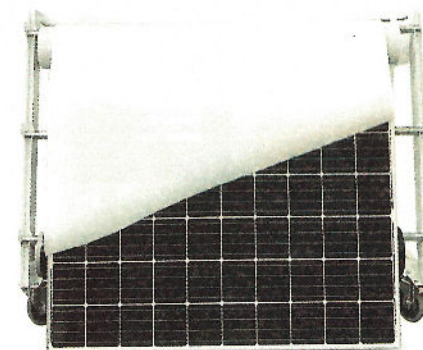
www.luxresearchinc.com/

Tyler Ogden is a Lead Analyst at Lux Research, covering innovation and emerging technologies within electricity generation. He has years of experience in tracking the evolution of the solar industry and how it is converging with energy storage and utility transformations. He holds a B.A. in Physics from Hampshire College.

SOLAXESS
white solar technology

100% integrated photovoltaics

Your partner for the production of BIPV elements - active facades



-10°C reduced temperature

The film reduces the module's operating temperature. A reduction of around 10°C was measured at the back of the module when the outdoor temperature was 25°C. Compared with standard black PV modules, this temperature reduction leads to:

- A better relative performance in real outdoor conditions, particularly in warm climates
- Reduced building air conditioning needs

Large PV facade power output

White 110 Wp/m ²	Beige 125 Wp/m ²	Light Terracotta 127 Wp/m ²
	Light grey 132 Wp/m ²	Dark Terracotta 147 Wp/m ²

Values obtained with 156 x 156 mm² mono-crystalline PERC p-Si cells under STC. These measurements are flashed, but in real conditions, our technology allows for better performance.

www.solaxess.ch