



## Calling all module makers...



Rogier Reinders

PES met up with Rogier Reinders, Global Marketing Director at The Dow Chemical Company, to learn about the positive effect the ownership of Dow Corning's silicones business will have on the PV industry and the customers of both entities.

**PES:** Welcome back to PES Solar/PV China magazine. Thanks for talking with us. It's been a while, so would you like to remind our readers about the background of your organisation and any changes there have been since we last spoke?

**Rogier Reinders:** On June 1, 2016, The Dow Chemical Company (NYSE: Dow) announced the successful completion of the transaction to restructure the ownership of Dow Corning. Dow is now the 100 percent owner of Dow Corning's silicones business, which had revenues greater than \$4.5 billion in 2015.

Dow Corning's silicones technology and product platform bring a highly complementary and growth enabling new chemistry to Dow that is aligned to the company's strategy, to go narrower and deeper in attractive industry segments, where Dow is already a leader today.

This is excellent news for customers of both Dow and Dow Corning. Bringing together the two companies will drive exciting opportunities for new product offerings, increased geographic reach and expanded R&D power, to bring innovations to customers faster. This is also true for our solar industry customers.

**PES:** You are active in a number of industry sectors. How important is the solar business to Dow Corning?

**RR:** We have heavily invested in our solar business to benefit our global solar customers and to advance the industry.

The types of materials we offer range from faster-than-typical frame sealants; sealants with higher instant green strength; silicone encapsulation for glass-glass modules that are more reliable and have longer warranties; to electrically conductive adhesives that are ready for back-contact cells for hetero-junction cells or for back-contact cells with a back-contact sheet.

We collaborate with customers to develop, evaluate and test silicone materials for solar applications. All of our materials would interest module makers who want to differentiate in the end market. And that is precisely why solar is of relevance to Dow Corning: we see the opportunity to differentiate going forward. In addition to our Dow Corning technology, we know Dow is able to deliver polyolefin material to the marketplace as an encapsulant, which I believe could be a strong alternative to ethylene vinyl acetate (EVA).

**PES:** We know that you offer material solutions across the value chain, what are you currently working on? What are the benefits in terms of technology and to the end user?

**RR:** We are working on all kinds of advances with a variety of customers. A key part of our current development revolves around boosting efficiencies and driving down production costs for customers.

As a trusted technology partner with solar businesses along the value chain — including cell and module manufacturers, installers, project developers, utilities and investors — Dow Corning understands their needs for reliable, high-performance and cost-effective photovoltaic (PV) solutions.

The great benefit of silicones, for example, is their amazing performance and durability in the toughest environments. We have decades of proven performance — first in construction and electronics applications and now in solar applications.

Silicones have long-term elasticity and flexibility. They are resistant to damage and degradation from wet weather, ozone, ultraviolet radiation, temperature extremes, thermal shock, chemicals, oxidation and corrosion. Silicones are resistant to aging and don't harden, crack, peel, crumble, dry out, rot or become brittle like many organics. They exhibit excellent dielectric and strong adhesive properties. And we can modify the many great properties to meet a customer's specific application needs.

**PES:** Which Dow Corning products and

solutions are seeing the most interest currently?

**RR:** Dow Corning® brand Electrically Conductive Adhesives (ECA) are products that come to mind. Our customers are leveraging the ECA benefits really effectively.

Electrical interconnection has typically been done with soldering, which is time-consuming. ECAs are alternatives that create adhesion between two parts and also conduct electricity. Our silicone ECA products have advantages over soldering and over epoxy polymer ECAs. Silicone's intrinsic reliability and flexibility are just some of the performance benefits.



Silicone ECAs also enable modules with very thin cells, which can save materials. The thin cells often can't tolerate the heat used for soldering, but our ECAs bond at lower temperatures.

We also have developed a solution to support back-contact cells using a conductive backsheets (CBS). Our silicone ECA (Dow Corning® PV-5802 Electrically Conductive Adhesive) makes the connection between a patterned metal foil and the cells. We have also been collaborating to find successful connections for alternative, lower-cost materials for CBS, such as aluminum and copper-coated aluminum.

With advances in shingled cell modules, our silicones are a good choice. Silicone materials can provide the soft, flexible interconnection needed in these structures.

**PES:** Currently there is a lot of interest in high-efficiency solutions and cost-effective production — how challenging is this for you?

**RR:** First, we love a challenge!

Silicon chemistry is well-suited to these challenges. It can enhance performance in all kinds of interesting and unique ways, and it helps deliver sustainability in solar materials.

We can use silicone ECAs as an example of cost-effective production. Only a small amount of an ECA is needed per module. They can contribute to higher throughput. They also create a joint at a lower temperature — providing a flexible joint. This enables newer technologies, such as back-contact modules with CBS, shingled modules, and emerging concepts. It's

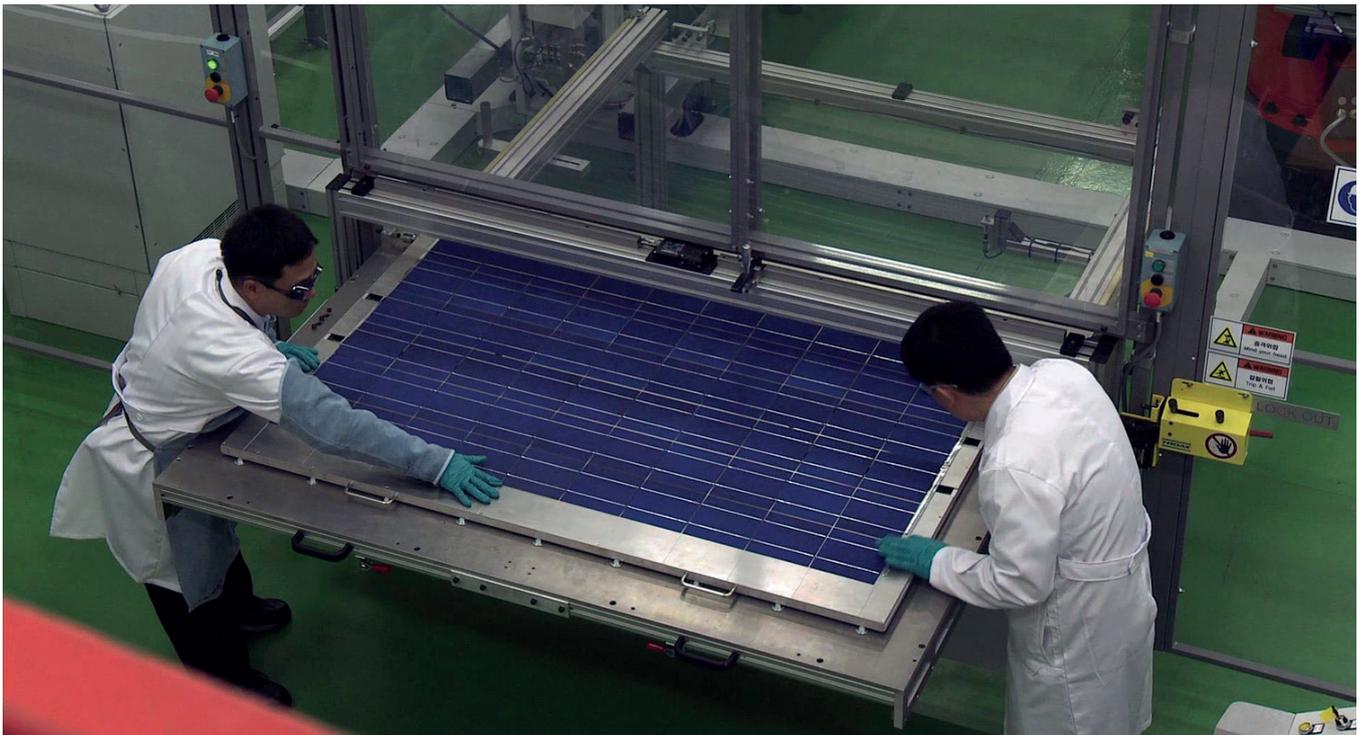
about better adhesion and improved connectivity, using lower-cost materials.

**PES:** You say the durability of PV modules is by and large a very important factor for lowering the cost of PV generated electricity — please expand on this.

**RR:** Long term performance is important in any industry — from automobiles to cosmetics. Product performance and durability can be what set different solar manufacturers apart. Consumers of solar energy, like municipalities and utilities, need to know their installations carry the promise of a long lifetime with minimal problems.

Standard EVA modules have a 25-year lifetime. The glass-glass modules are not as easy to make, but we see manufacturers claiming a 30-year lifetime. With silicones, the latest ones we have seen are at 40 years.

What does module lifetime mean? It means a specification of 20 percent, or less, power degradation over the lifetime. So we are seeing manufacturers using silicones



claiming at least 10 more years of performance under warranty than what we had been seeing in the market.

The excellent performance and proven durability of silicones make them important for PV module makers to consider. When your customers need your promise, your guarantee, our silicones can help you deliver.

**PES:** Can you tell us more about double-glass, or glass-glass, PV modules with silicone encapsulation? Do you see a big future here?

**RR:** We do see a big potential for double-glass modules, and we've been working with customers to help reduce total cost of ownership while increasing output. Some of the top 10 module makers are either currently using silicone for making glass-glass modules or are considering it.

We've seen that using a new silicone-based encapsulant (Dow Corning® PV-6212 Cell Encapsulant) — instead of an EVA film or other organic encapsulants — can significantly reduce potential induced degradation (PID), which is one of the major causes of cell inefficiency.

The encapsulant's high transparency allows greater light transmission, creating higher efficiency. It offers greater protection from chemicals and moisture and is largely unaffected by extremes of temperature, UV light and humidity.

A new double-glass frameless bonding material (Dow Corning® PV-8303 Ultra-Fast

Cure Sealant) has performed exceptionally well in mechanical load testing. It outperformed conventional glass-to-backsheet modules in hail and ice impact testing. And it makes panel installation easier and standardized.

With the mechanical, thermal, environmental and dielectric protection offered by our encapsulant, a service life could extend from 25 years (a standard EVA module) or 30 years (a glass-glass module) to a new 40-year service time (a glass-glass module with our silicone) — with an annual power degradation of less than 0.5 percent.

We have seen substantial commercial success with our silicones, but we don't just offer a material. We can be a customer's development partner to solve challenges.

**PES:** Speaking from a global standpoint, which geographical regions do you anticipate being key for Dow Corning as we move into 2017?

**RR:** We continue to see Asia as a vitally important and growing region. We have a long-term commitment to Asia and to China. Dow Corning entered the China market in 1973 and began manufacturing in China in 1997.

Regarding China's solar market development, we invested in facilities, worked closely with Chinese solar manufacturers and developed new cost-reduction technology. This year, we are participating in the SNEC show, and I will give a speech at the conference about

our solutions and collaboration with Chinese players.

In 2012, we expanded our Solar Solutions Lab in the China Business and Technology Center in Shanghai with cutting-edge PV research and testing capabilities that support the needs of customers in Greater China.

This facility is dedicated to improving customer service by shortening the innovation cycle that turns market opportunities and new ideas into profitable solutions.

On-site laboratory capabilities include performing environmental testing, testing new silicone encapsulation technologies, testing new technology for module installation, and optimizing solar module production processes based on new silicone materials for PV.

At the same time, we have our eyes open for tropical and desert end-user regions, as some of those geographies are particularly well-suited for silicone glass-glass modules.

**PES:** Any final words?

**RR:** We are proud of offering so many PV solutions and we are committed to the future of the solar industry. There are so many exciting advances on the horizon. Being part of the larger Dow — with its strong offering in solar (polyolefins, for example) — will only make our relevance to the industry greater.

[www.dowcorning.com/solar](http://www.dowcorning.com/solar)