

# Same sun. More power.™

In recent years, the solar industry has focused particularly on manufacturing capacity. However, if we want to meet the fast-growing future demand for renewable energy, just stepping up the volume will no longer be enough. This is why multinational Royal DSM N.V. focuses on adding value to the industry through innovations that make solar panels more efficient, durable and economical. In this interview, PES talks to Jan Grimberg, DSM's Business Director Solar, to find out more about the latest developments in anti-reflective coatings, backsheets and – new – light-trapping technology.

**PES:** Could you briefly introduce DSM and the role it plays in the renewable energy industry?

**Jan Grimberg:** DSM is a globally operating science-based company that focuses on health, nutrition and materials. Since 1902, we've been providing the world with solutions and innovations that improve people's lives. In the past years, DSM has become increasingly active in renewable energy in order to realize the company's ambition to enable and drive the transition to a low fossil carbon economy.

DSM is active in renewable energy in a number of fields. Drawing on DSM's unique position in biotechnology, materials sciences and chemistry, the company is pioneering advances in renewable energies such as cellulosic bio-ethanol and in renewable building blocks such as bio-based succinic acid. In addition, DSM focuses on developing technologies and material solutions that increase the efficiency of solar modules at every stage of the value chain. Particularly, we are leading in high-quality anti-reflective coatings.

**PES:** What have been the main changes in the solar business in recent times?

**JG:** The solar industry is changing very fast, and growing even faster than we thought it would. In my view, this growth is also desperately needed. As the World Climate Summit in Paris at the end of 2015 again confirmed, renewable energy should be sky high on everyone's agenda. Compared to mid-2015, for example, the installation base of solar in the US and China has increased significantly. The industry has reacted to this increase by growing its manufacturing capacity. This has even led to a shortage of wafers and cells. Growth in solar at DSM in 2015 was on average 20 to 25%, with the strongest growth in the second half of the year.

In addition, there is an increasing need for new high-efficiency technologies to lower the levelised cost of energy (LCOE) of solar. Nevertheless, adaptations to new technologies are relatively slow. Among other things, this has been due to the fact that the market has been focusing a lot on simply meeting market demand – getting the volume out.



Jan Grimberg



Finally, we see an increasing focus on the regional diversification of modules. In the past, all modules were more or less the same, irrespective of where they ended up. What you increasingly see now is that the design of the modules is adjusted to the climatic circumstances in certain areas. For example, in dry, arid areas you need better anti-soiling properties than in rainy countries.

**PES:** This presumably means that solar/PV is still a growing business area for DSM. How are you capitalising on this growth?

**JG:** Yes, it certainly is. We're following developments in the industry very closely, all of which point to growth. China has added another 5 GW this year. Given that the total global installed solar base was some 55 GW in 2015, this is a huge addition. On top of this, the US has recently extended its Investment Tax Credit (ITC), which will continue to drive investments in solar in the US. As a result, there are tremendous opportunities for DSM. To make this growth happen within DSM, we are expanding our solar teams, not only to

keep up with the growth, but also to be able to expand our portfolio.

**PES:** DSM is renowned in the industry for its anti-reflective coating (ARC) technologies. Is this still a key part of the business for you? Could you tell us a bit more about these technologies and their potential impact on the market?

**JG:** Yes, absolutely. For us, ARC is a stepping stone into the solar industry and it plays a key part in our strategy. What we're currently focusing on is not only improving our existing anti-reflective coatings, but also adding certain properties and features to the coating, such as anti-soiling properties. The whole soiling issue has recently moved much higher up on the agenda of module companies, EPC companies and solar park owners.

In dry, arid regions especially you see that soiling can really reduce the power output. Add to that the extra costs of frequent cleaning and you can immediately see the benefit of a coating with anti-soiling properties. Of course, you will still need to clean the panels every now and then, but the dirt will come off much more easily, because it doesn't stick to the surface as much.

We're currently testing the coating at several sites around the world. You quickly realise that dirt comes in many shapes and forms, depending on the region. So that's where diversification comes in again. An important target for DSM is to design an anti-reflective coating with anti-soiling properties that lasts for the lifetime of the solar module.

**PES:** We have noticed that DSM has recently expanded its solar portfolio and moved into the photovoltaic backsheet space. We are intrigued... Could you tell us more?

**JG:** Backsheets are a crucial part of the module design and at DSM we're always looking for new ways to add value through our technology or material designs. This is why we've partnered up with Suzhou Sunshine New Materials Technology Co. Ltd, a Chinese start-up company, to combine their backsheet design with DSM's extensive polymers and materials knowhow. The resulting product will be able to lower the LCOE for the end customer, which will add value to the industry as a whole.

**PES:** What makes this backsheet technology unique?

**JG:** Typically, backsheets are made of a polymer stack of materials, with several layers pressed together. Our PV backsheet is based on a co-extrusion process. In this process, you bring different melt streams together, which form one layer when it cools down. But that one layer can be made up of different layers of materials. It's a process that gives us a lot of freedom to design high-quality backsheets, which in this case, consist of various polymers, including a very durable polyamide.

This outcome is a backsheet that combines high power gain with very high durability. It also has very good barrier properties, protecting the inside of the module from moisture.

Lastly, its excellent electrical insulation properties make it more suitable for the higher-voltage modules (1500V) that are increasingly being used.

**PES:** You also introduced the light-trapping technology at the Intersolar exhibition in Munich, last June. What does this technology bring to the market?

**JG:** This light-trapping technology features uniquely shaped corner cubes that prevent light from reflecting off the glass, while internally reflected light is captured or "trapped". In this way, light from higher angles of incidence, especially during morning and evening hours, is guided more effectively to the cells.

We have optimised this light-trapping technology to be specifically suited for bifacial modules. A textured layer on the backside of the module eliminates light losses caused by the gaps between the cells.

It also allows more of the diffused light hitting the backside of the solar module to enter the module. We have developed a full technology package consisting of a patented texture ideally suited for bifacial modules, embedded in an outdoor durable polymeric layer, including the coating and imprinting technology.

The layer delivers more than 4% additional energy yield to bifacial modules, so you can imagine that we are very happy with this new development, which is currently being evaluated by the first customers.

**PES:** Is R&D still a priority for DSM?

**JG:** R&D is crucial. Personally, I believe it has become even more crucial than before. Everyone in the industry wants to lower the



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costs of solar. At first, this was done by squeezing the whole solar value chain as much as possible. This has now been squeezed to the max and the only way to get to even lower LCOEs is through innovation.

You need new, innovative materials that are more efficient in the field. You can only achieve that through sound R&D. And this also means teaming up with others in the industry.

At DSM, we’re great believers in open innovation. For us the best way forward is to combine our technologies and insights with those of other companies to add value for the end customer.

**PES: What kinds of solar R&D projects are you currently working on?**

**JG:** Besides anti-soiling properties and general improvements to our anti-reflective coating, we’re also working on electroconductive backsheets. These are very specific backsheets that can be combined with modules using back-contacted cell technology.

However, the adaptation of this technology by the market has been slow, because the backsheets were either not available or much too expensive. The electroconductive backsheets we’re working on will make

using this technology more economical.

**PES: Geographically speaking, what are your key markets?**

**JG:** We’re a global company, so we act globally. In terms of solar, we’re particularly expanding in the US, China and India, which are our key growth markets. But the solar market is growing all over the world, so we’re closely following developments. For example, the Middle East seems like an interesting new market. We’re also active in Europe, of course, where the market is relatively mature; but here, too, there’s room for growth.

**PES: Which aspect of the solar industry do you currently find most exciting?**

**JG:** Renewable energy is needed more than ever. Being able to contribute to a more sustainable world with a materials science company such as DSM and to make the transition to renewable happen through our innovations is very rewarding.

Over the past few years, we have seen that DSM is trusted for its coatings, which also creates belief that we can do more. In the end, you’re doing it to improve people’s lives, both now and for generations to come.

**PES: And what are your biggest challenges?**

**JG:** The main challenge for the industry lies in adapting to new technologies. Because module companies are required to give 25-year guarantees, the market is a bit risk averse.

Companies want to make very sure that they won’t run into problems after a number of years. That intrinsically puts a break on being open to real innovation. When you add new technologies to the market, you need to be sure that they’re going to be reliable. That’s why solid and sound R&D is so important.

**PES: What are your thoughts about the prospects for 2016 and 2017 with regard to DSM and the solar industry in general?**

**JG:** I have great confidence in the solar market. The industry is way beyond the infancy stage. It’s a crucial industry that will make a major contribution to putting renewable energy on the map.

I’m also very confident that DSM will play an important role in this. I’m sure that by the end of the year, we’ll be seeing many more exciting new developments that will help make solar parks more efficient than ever. As we say at DSM: “Same sun. More power.” ■

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