

Sustainability on film

Since speaking to Steve Davies, EMEA PV Market Manager at DuPont Teijin Films and Alessandro Anderlini, Business Manager responsible for the EMEA markets in Coveme's PV Solar and Specialty Films Divisions last year, how are the issues around sustainability and reliability of products being addressed and what more can we expect in 2022 and beyond? PES caught up with them both for an update.

PES: Thanks for taking the time to speak with us again Steve and Alessandro. In last year's interview you both highlighted the sustainability benefits that halogen free backsheets offer. Can you tell us some more about the track record of the use of your products and how that fits with your sustainability strategy?

Steve Davies: I think it is critical that we focus on the performance of our products when it comes to discussions around sustainability, because there is no such thing as a sustainable backsheet if it cannot protect the module throughout its lifetime. Working in partnership with Coveme, we first commercialised the Mylar® UVHPET™ range of products in 2008 and since that time our products have protected well over 200 million modules without a single reported in field failure.

Alessandro Anderlini: Since the first introduction in 1988 and more recently when we developed a complete PET based version in 2008, our backsheet has been installed all over the world, from cold, hot and high humidity climates to extremely dry conditions such as deserts.

As a matter of fact, we haven't had any reported failures so far. That includes onsite inspections, including ground installations in the Czech Republic, operational for 8 years, 6 years in Australia, 7 years in USA and 14 years in Italy. None of these have shown any sign of backsheet failure like delamination, cracks, chalking, yellowing or hot spots.

PES: How do Coveme and Dupont Teijin Films ensure the reliability of their products?

AA: The development of our backsheet starts from a deep analysis of market needs, thanks to the collaboration with key TIER 1 PV module producers, followed by the selection and qualification of raw materials.

The design of the backsheet's structure is another fundamental step to ensure high performance and reliability, specifically



Steve Davies

developed for the module and installation type it is destined for.

Finally, real life conditions are simulated in our in-house quality centre specifically dedicated to solar, where accelerated ageing tests are carried out on laminates and final application samples. Each of the mentioned steps is subject to a highly stringent and quality protocol, which is constantly monitored and optimized.

SD: The performance of the Mylar® UVHPET™ range is underpinned by the right selection of raw materials, manufacturing excellence with film lines uniquely suited to deliver the complex needs of films for backsheets, stringent quality assurance processes and finally internal and external weathering testing.

We would argue that not all PET films are equal and it is the combination of scientific and manufacturing expertise that make our products a trusted solution in this market.

PES: Replicating the effects of weathering over many years in an accelerated ageing test is clearly a



Alessandro Anderlini

challenge. What developments are there in weathering testing?

AA: The IEC test protocol of a backsheet is definitely not enough to replicate more than 30 years in the field. That is why our backsheet has undergone extreme accelerated sequential tests like MAST from DuPont showing no sign of mechanical degradation as well as negligible yellowing.

In addition, our customers performed IEC x 3 as well as MAST and PVEL sequential testing on PV modules where all critical parameters like colour change and power loss were measured and remained within targets.

SD: We are very proud of our weathering protocols, which we believe exceed industry standards. In addition to the various IEC tests we conduct, we also like to monitor the performance of our products in real life installations in a variety of different climatic conditions.

Probably the most demanding test we perform is where we assess the impact of direct exposure to sunlight, exposing the film to approximately 10 times more UV than it

would see as a backsheet. Here our data not only correlates with the IEC test protocols but suggests a product lifetime far in excess of 30 years.

PES: Despite the critical role of a backsheet, there have been a number of high profile failures of various structures over the years. What concerns do you have about the current performance of backsheets in the market?

SD: Over the time I have spent in the PV industry I am still surprised at the focus on cost over demonstrated performance from parts of the value chain. There are numerous examples arising now of field failures from some PVDF based backsheets, which for me is a double negative, as not only are halogenated materials being used, but they are not performing in their primary task of protecting the module.

In addition to the impact of weathering, I think one area we need to explore more is the physical protection provided by backsheets. Increasingly we are seeing the use of relatively thin, soft coatings as the outer protective layer of backsheets and I think there needs to be more focus on whether these coatings provide adequate protection against the kind of damage which can occur in transportation, installation and maintenance of modules.

AA: Unfortunately some of the wrong choice of material type is driven by the quest for low costs, resulting in major field failures. The additional cost for repairing or replacing PV modules in the field, not to mention the energy interruption of the solar installation, have impacted heavily on revenues in PV investments.

For this reason, it should be clear that well established components with a long, successful history produced by experienced and quality driven converters should be priority when it comes to BOM selection.

PES: What are the challenges and focus for the future for the backsheet industry?

SD: Circularity is increasingly becoming an issue for the solar industry and I believe designing for recycling is something that will impact every part of the value chain. From our point of view, we will continue to explore the potential for a closed loop recycling process for backsheets, and also believe this will drive further adoption of non fluorinated backsheets.

AA: We are experiencing an interesting trend in HJT cell technology that requires a higher degree of moisture protection from the backsheet. For this reason we developed several aluminium-based and aluminium-free solutions, with different degrees of WVTR level according to customer needs both in coloured and transparent versions.

Also, clear backsheets for the bifacial market are finally experiencing a real volume demand competing directly with glass/glass with the advantage of an easier and faster module production process and lower cell breakage rate.

Last but not least, Coveme is proud to be the first converter to introduce a full range of recycled backsheets made with DTF r-PET films with a minimum of 33% post consumer recycled content, content contributing to the ECO sustainability of PV modules and helping to reduce the carbon footprint.

PES: Do you think this is where the future of sustainability in this market lies, in recycling materials?

AA: Material recycling is surely an important element, especially when it comes to EoL, but to push forward sustainability as a whole the environmental impact of material sourcing, production



processes, transportation and installation must also be considered.

Coveme continues to invest in new technologies that guarantee not only the quality and reliability of our products but are virtuous also from an environmental point of view.

Last but not least, we have commissioned an LCA study of our PV products which is undergoing, and plan to publish our first sustainability report by the end of the year.

PES: Do you think this can be done while not compensating on quality?

SD: Whether we are using recycled material from single use packaging waste or looking to implement a closed loop process for backsheets, the key point is to choose the right recycling technology.

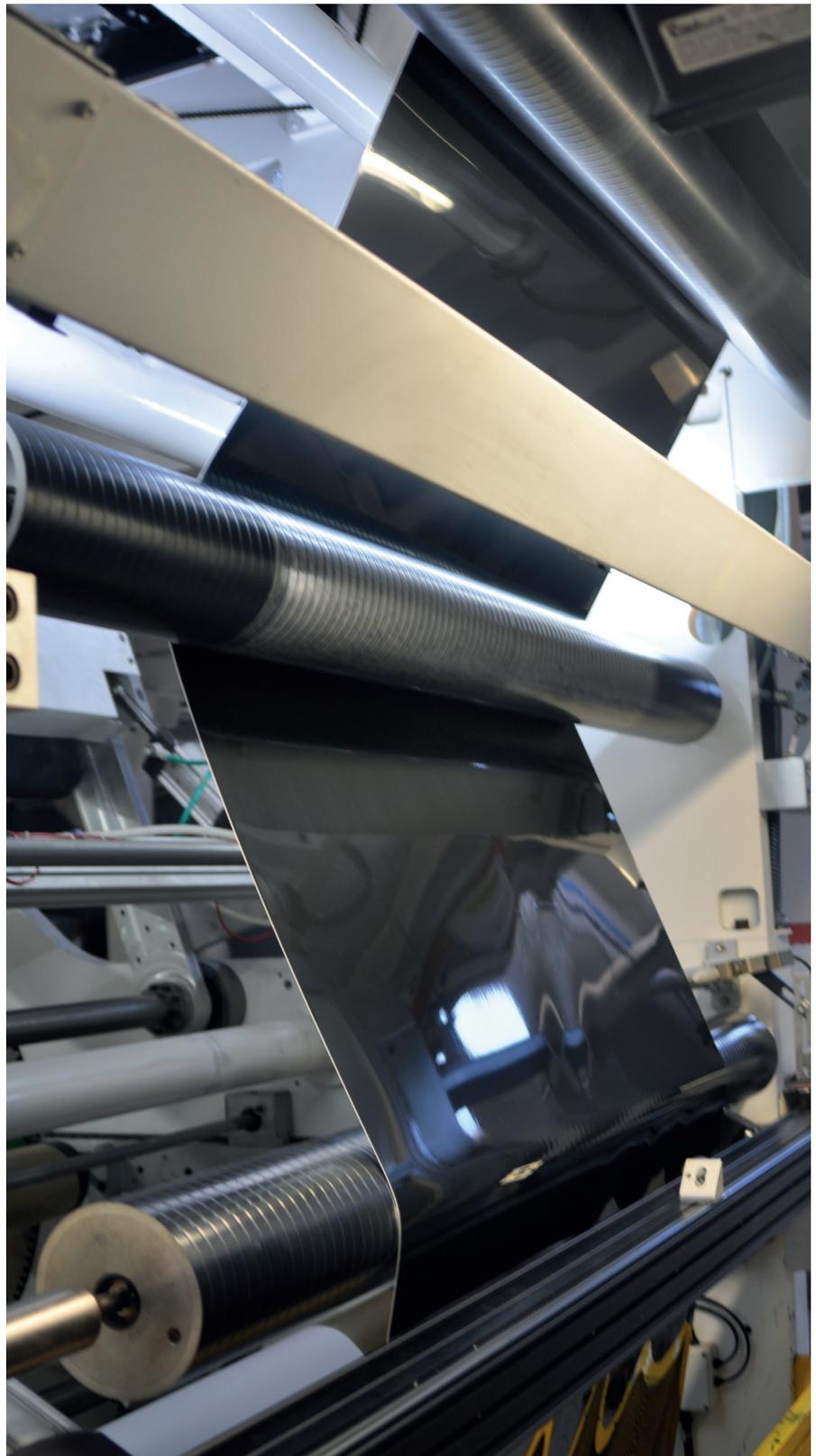
Mechanically recycled material will never be suitable for an application as demanding as backsheets, but using our LuxCR™ process we have proven that post consumer recycled content can be incorporated into backsheet films without any deterioration in material properties. With our initial trials into closed loop recycling of backsheets we have also proven that it is technically possible using monomer recycling processes to recover the PET component of a backsheet.

We are confident that monomer recycling processes can generate new raw materials with properties that are indistinguishable from virgin material, and our focus now is on whether the logistics and economics are viable for the future.

AA: With our dyMat® ECO range, made with DTF's rPET, Coveme is the first PV supplier worldwide to offer to solar module manufacturers 1000VDC and 1500VDC backsheets made of recycled polyester (rPET). dyMat® ECO products are subject to the same thorough testing and certification protocol as Coveme's standard products which means pv manufacturers can now offer the market a solar module of guaranteed performance combined with a recycled component and low carbon footprint.

PES: And for you both, are there plans to continue what has been a successful partnership so far for DuPont Teijin Films and Coveme?

SD: Absolutely, I am a great believer in open innovation across the value chain, particularly when it comes to some of the major sustainability challenges. I think DuPont Teijin Films and Coveme is extremely well placed to address some of the big themes in the solar industry such as the need for greater circularity, the increasing adoption of bi-facial technology and the onshoring of module manufacture in Europe and the US.



AA: In a PV market scenario where geopolitical and technological factors continue to change and influence decisions worldwide, it is fundamental to maintain strategic collaborations with reliable partners that share the same approach and priorities. This is the reason why we'll

continue and strengthen the cooperation to meet the new challenges in terms of product technology, reliability and high volume demand.

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