Module tech under the microscope

John Parnell, Head of Content, Solar Media

ABSTRACT
From 400W panels, multi-busbars, glass-glass, new materials and fresh designs, module technology is more advanced and more varied than at any other time. Having pulled together a throng of senior PV technology experts for our PV CellTech conference, PV Tech's head of market research, Finlay Colville, discusses the need to match these advances with a dedicated event this November.

It's always nice when someone tells you directly that you can't do something to set out and prove them wrong.

Photovoltaics International, its sister title PV-Tech.org and their publisher Solar Media were told in the early phases of planning the inaugural PV CellTech conference, that pulling together a string of CTOs and R&D heads from the some of the biggest firms in the cell processing supply chain would not be possible. Following the event's second outing in March 2017, we have now done it twice.

Dr. Pierre Verlinden, Chief Scientist at Trina Solar, Qi Wang, Chief Scientist at JinkoSolar and Dr. Markus Fischer, Director of R&D Processes at Hanwha Q CELLS, are among the names that have joined us since. In November his year, we'll be putting together a similarly stellar line-up catering for everything the PV manufacturing supply involves once the cell is complete.

"There hasn't been this type of event before," says Finlay Colville, chair of both conference and head of market research at PV Tech. "Our experience from doing the PV CellTech event in the last couple of years is that this is a high-tech industry so showing data to back up the claims and predict future trends is absolutely critical and I'm convinced that module suppliers will gravitate towards this event as being an excellent forum to talk about their products."

The motivation for the conference is rooted in the additional complexity, sophistication and sheer variety of technologies that could theoretically differentiate identical sets of cells rolling off the same production line.

"Similar to cells, modules have really moved on in the last four to five years. It used to be that module assembly was a very low-tech, low-barrier-to-entry part of the value chain. A lot of the work was manual. Now modules are 60-, 72- even 90-cell [formats]. We will have 72-cell modules exceeding 400W by the end of next year. Multi-busbars on the modules have really driven another level of power increases and there is a significantly greater level of automation on the production lines as well," explains Colville.

"We're starting to see glass-glass, new types of glass, new materials, bifacial modules...Actually keeping track of that – which manufacturers are genuinely producing state-of-the-art modules in terms of power performance and reliability and consistency with the cells they are using – is a huge issue now compared to a few years ago. Back then everyone's module factory was the same and a lot of people were buying cells from just a small group of players."

Changes

These changes in technology are not trifling either. These are not niche developments springing up in isolated pockets. Recent research by Colville has shown that by 2018 the ratio of mono versus multi modules will be around 50:50 (see Figure 1).

The International Technology Roadmap for Photovoltaic (ITRPV) forecasts a less dramatic but more varied shift in the make-up of chosen encapsulants out to 2025. Likewise for module interconnection materials, backsheets, frame materials, metalization, busbars...the list goes on.

Bifacial modules are waiting in the pipeline to begin grabbing significant share from markets where conditions on the ground, literally, make the additional expense pay back for investors. Trina Solar and SolarWorld are already bringing these to market.

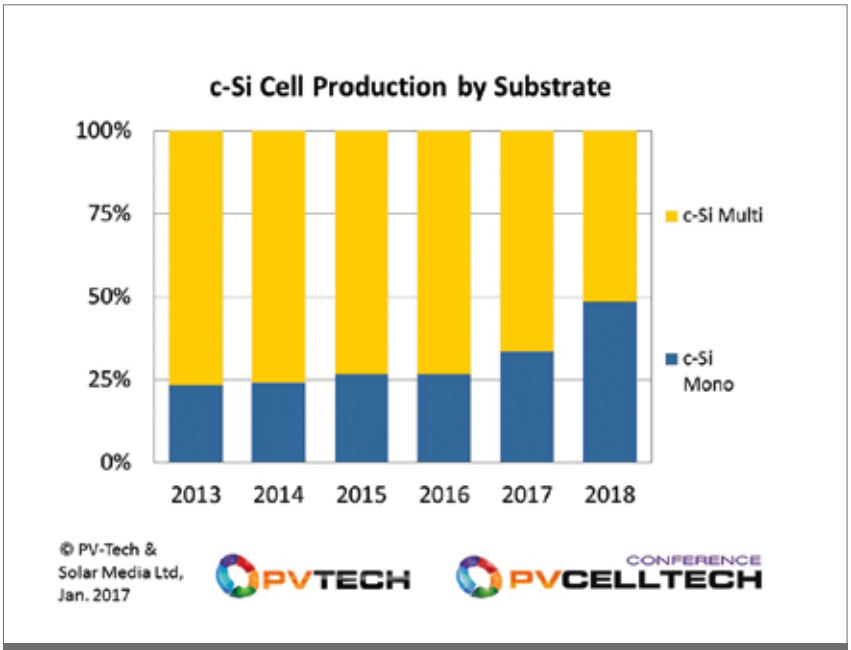
Marketing

While there is never any shortage of people willing to line up and explain why their product is in fact the best, PV ModuleTech shifts the onus on to the technology and bold claims will be backed by data.

As the number of routes to increased power and efficiency grows, with differing side effects for other performance and reliability indicators, the event will look to provide a more transparent approach to assessing the relative merits of these.

"If you look now at how module suppliers back up their claims of being the best there really are very few platforms on offer. Obviously they have marketing collateral that they bring out through their websites, through trade shows, datasheets, brochures, but that is all done in-house. It's not done in an independent platform or forum. The trade shows and the related exhibitions are always 100% marketing platforms as well, so really an independent event to provide

Finlay Colville at the inaugural PV CellTech conference in Malaysia.



Source: PV Tech & Solar Media Ltd.

The changing balance of mono versus multicrystalline silicon production in the coming year.

that third-party voicing of why modules are performing in a certain way and how the quality, reliability and consistency is there is something that almost all module suppliers would jump at; the industry is dying to get qualified, technology-driven data analysis from an independent source about how modules are put together, the materials used in them and the performance.

"It's a perfect platform for the module makers to the show the industry, their supply chain and also the people buying modules from them, the data that backs up the claims with regard to specifications, performance, materials, reliability, testing, to take away the typical marketing claims and pull in the data and the technology surrounding the modules," adds Colville.

"PV CellTech was designed to fill this gap between the big solar exhibitions that have side events that are unregulated and badly attended and the highly academic events like PV SEC and IEEE that are largely there for the academic community to talk about blue-sky research or what is going on in the universities and research institutes.

"If you look at the module side, there is nothing like this and again we have this gap between the big exhibitions demonstrating modules and the module research spoken about at the academic conferences. Again, it's about identifying the overlapping technology with the commercial manufacturing. The key questions are what is happening in the real world and what are the technical issues important to the commercial success of module design and supply?"

> "The key questions are what is happening in the real world and what are the technical issues important to the commercial success of module design and supply?"

How we put it together

Finlay Colville explains the approach used to ensure PV ModuleTech connects the dots between technology and real-world commercial success.

"Fundamentally, it's a dedicated upstream conference specific to modules. What we're doing internally at PV Tech is a number of surveys and internal research to really identify the top 10 or so categories that are important for module supply. Then we've identified leading experts in each of those ten categories to form a technical advisory board. It is the technical advisory board that then sets the agenda and also determines which companies are the best ones to be invited to stand up and talk about their modules or technology or materials. The next stage is ensuring that we have a senior level technology driven senior executive to talk. It's not a platform for sales and marketing people to convince the audience why supplier a is better than suppliers b,c and d. We make sure we find the right person from within the company as the speaker. So, in terms of the speakers, it is invite only. That means it's altogether a different type of event to one where you have sales and marketing people, often region-specific, basically trying to convince the whole audience that they are the best."

Benchmarking

As end-market demand and manufacturing capacity have ballooned in recent years, the legacy systems for ensuring a manufacturer was legitimate have become obsolete. Most manufacturers with anything approaching a reasonable amount of capacity are able to make claims that, on paper at least, put them shoulder to shoulder with the largest and most sophisticated manufacturers. This is, in part, the motivation for the conference.

"There isn't a benchmarking process that dives into quality and performance supported by data. There are numerous ranking systems by third-parties that have never built a module, never supplied a module and are not in the module supply arena. There are many ranking systems that use weird and wonderful algorithms to generate a top ten, but rarely have these ranking systems been of any use. We've had companies going bankrupt within 12 months of appearing in some ranking systems," Colville points out.

"So it's really about having an absolutely independent platform for companies to explain, whether or not they are supplying 50MW of very high-spec modules for the Japanese residential market or it's a company supplying multi-gigawatt volumes to utility-scale companies. These are very different types of companies and they will have absolutely mastered what's important in terms of the module design. But ranking systems try to commoditise and standardise the industry as opposed to really breaking out which modules are best for which environment."

Commodity no more

It is becoming an increasingly difficult argument to consider solar panels as an undifferentiated commodity. Whether it's the increasing data from older assets, whch offers the ability to identify lost revenue from underperforming plants, or simply the growing choice on offer for different end-uses in different geographies, investors are better educated on solar technology than they have previously been.

"The recent pace of technology change in the last few years means a lot of the investment community are asking suppliers, 'Are your modules mono- or multi-? Are they 60- or 72-cells? Are your modules in the US market next year coming out in 400W? Is your module production being specified for residential markets or have you got dedicated 1500V modules to be used specifically for harsher environments in India and the Middle East?'

PV ModuleTech will follow the same successful format as PV CellTech, providing an independent forum for in-depth exploration of emerging technologies.

> "We've got the investment community asking those questions because they realise that a module is not a module. It's not a standard product across all manufacturers."

"We've got the investment community asking those questions because they realise that a module is not a module. It's not a standard product across all manufacturers," says Colville. "The module suppliers and the whole supply chain of materials and equipment are having to address which are the best modules and why. Not only on the roof or on the ground, but also across different countries, and I think that the investment guys absolutely want to know who has got the modules that will allow the company to grow globally and not be just confined to certain smaller parts of the market or just certain countries because their modules are not going to operate in warmer or more humid environments."

Networking

Part of the attraction of drawing together such a large group of senior PV technology executives is the focused networking opportunity on offer.

"PV ModuleTech will be a dedicated two-day event not in China, not in the US; we've chosen Malaysia again, and over the two days, the only issue on the table is modules. Module quality, module performance, module materials, equipment, certification...That means you end up with a few hundred of the top people globally driving the module improvements, that are behind the certification, the people that are producing the vast amount of modules being used. When you have the key stakeholders together in the same place for a couple of days so the scope for networking and business opportunities is absolutely immense. We saw that at PV CellTech, because of that environment, and we expect the same again."

PV ModuleTech will be held in Kuala Lumpur, Malaysia, on 7-8 November. Further details are available at moduletech.solarenergyevents.com

What they said about PV CellTech

"The PV CellTech conference was a fantastic opportunity to discuss PV manufacturing issues, opportunities and prospects with key players and prepare this industry for the TW level." Dr. Pierre Verlinden, VP, Chief Scientist and Vice-Chair of State Key Lab Technology Dept, Trina Solar.

"A very well organised event with an impressive selection of speakers and topics covered." Stuart Wenham, Centre Director, University of New South Wales.

"It was absolutely amazing to me to see such a good conference with outstanding talks along with a networking opportunity with all the most important experts who are driving and dominating the PV industry. All the family members got together and it felt like a family event every single minute." Dr. Christian Buchner, Vice President, Business Unit PV, SCHMID Group

"The PV CellTech conference presentations gave an excellent overview about the current most discussed topics in cell processing. Having assembled key representatives of most of the leading c-Si cell manufacturers and institutes provided a great overview about today's activities and about the roadmap to the future of c-Si PV." Dr. Markus Fischer, Vice President R&D Processes, Hanwha Q CELLS.

"In two days I was able to hear perspectives from top cell producers, technology leaders, major equipment suppliers and leading academics on critical topics to the industry. What a unique opportunity to gain a great perspective on the progress within the industry, its challenges and the bright future ahead. This was an outstanding and worthwhile event." Peter Cousins, VP R&D, SunPower.

"It was truly one of the best PV conferences I have participated in. Also a great start for more successful future events." Homer Antoniadis, CTO, DuPont Photovoltaic Solutions.