

Rethinking solar module selection

Choosing the right solar module involves far more than comparing efficiency and power output. Ignacio Espinosa, Head of EU Technical Team at JA (formerly JA Solar), discusses how selection priorities are changing, why local conditions matter and the developments likely to influence solar projects over the coming years.

PES: Ignacio, welcome to PES Solar. Solar module technology has developed considerably in recent years, but choosing the right module isn't simply about efficiency or power output anymore. How have you seen the priorities change?

Ignacio Espinosa: One of the biggest changes we've seen in recent years is how developers and engineering, procurement and construction (EPC) contractors assess module technology and its contribution to overall system performance. Historically, the focus was largely on power output and conversion efficiency. While these remain important, there's now a greater understanding that module selection must also consider how the entire PV system will perform throughout its operational life.

This is influencing how manufacturers approach product development. Advances in cell architecture, module construction, sealing design and mechanical robustness are not simply about improving efficiency.



They also help reduce reliability risks, improve durability and maintain consistent energy generation over time. These characteristics become particularly important when considering the different environmental and operating conditions modules may encounter during 30 years of service.

For developers and EPCs, the challenge is understanding how these design choices affect installation, reliability and project economics, rather than comparing modules on their initial specifications alone. Technological progress should be judged not only by improvements in individual performance figures, but also by its contribution to the installation's long-term performance and financial returns.

PES: In your experience, what do EPCs and developers most often get wrong when selecting modules?

IE: One common mistake is placing too much emphasis on nominal power output while overlooking energy yield over the project's

lifetime. A few additional watts of nameplate power may look attractive during procurement, but factors such as degradation, temperature coefficient, reliability, manufacturer track record and warranty conditions can have a greater influence on lifetime performance and return on investment.

Long-term support is another consideration that can be underestimated. Beyond the module itself, EPCs and developers benefit from working with financially established manufacturers with international experience and dedicated local teams that can provide technical, commercial and after-sales support throughout the project.

It's also important to consider whether a module is suitable for the particular site. Environmental conditions, installation configuration and expected operating temperatures all need to be taken into account, rather than relying solely on performance measured under standard test conditions (STC).

In short, it's important to evaluate modules based on total lifecycle value rather than purchase price or frontside power alone.

PES: Are you seeing different module selection priorities across European markets, or are developers generally looking for the same things?

IE: Europe is far from a single, homogeneous market. Priorities vary considerably depending on the country, project type and installation conditions.

In the commercial and industrial (C&I) sector in markets such as Spain, for example, there's strong demand for medium-format modules that balance power output with ease of handling and installation flexibility. For utility-scale projects, developers and EPCs may favour larger, higher-power modules to maximise energy production and improve project economics.

Residential installations have different requirements. Homeowners and installers often place greater emphasis on appearance, which has increased demand for full-black modules, particularly in markets such as Germany and the UK.

Beyond power and aesthetics, compliance with local regulations and individual project requirements is becoming more important.

Depending on the application, developers may need enhanced hail resistance, specific certifications for carport structures, particular fire performance ratings, lighter modules for rooftop installations or greater mechanical load capacity to accommodate different mounting systems and environmental conditions.

Module selection is becoming much more dependent on the application. Rather than relying on one product for every situation, developers and EPCs are looking for manufacturers with portfolios that can meet the different technical, regulatory and

installation requirements found across European markets.

PES: Could you share an example of a project where challenging environmental conditions influenced the choice of solar modules?

IE: Coastal installations are a good example of why local conditions need careful consideration. While attention often focuses on solar installations directly over water, corrosion risks aren't limited to floating solar projects. Modules installed close to the coastline can also be exposed to salt, humidity and airborne corrosive particles throughout their working life.

A module that performs successfully on an inland project won't necessarily be suitable for a coastal installation. Conditions can vary considerably depending on the distance from the sea, prevailing winds, local climate and the design of the installation.

Although most modern modules are certified to recognised salt mist corrosion standards, these tests assess performance under defined conditions. They cannot represent every situation a module might encounter over 30 years of operation. That's why coastal projects need to be assessed individually, with manufacturers involved early enough to understand the environmental conditions and recommend an appropriate solution.

One example is the Saracen Sands Hotel & Conference Centre in Palermo, Sicily, where coastal conditions played an important part in module selection.

The hotel wanted to reduce rising energy costs and expanded its existing 150 kW rooftop installation with an 850 kW solar carport and battery storage system. Located close to the Mediterranean coast, the resort needed modules capable of withstanding prolonged exposure to salt mist, humidity and the associated risk of corrosion.

Installation partner Noon Srl selected 2,500 JA Solar bifacial double-glass modules.



Ignacio Espinosa



The Saracen Sands Hotel & Conference Centre in Sicily, where coastal conditions influenced the choice of solar modules

The double-glass construction helps protect the solar cells against moisture ingress and environmental degradation, supporting long-term reliability in challenging coastal conditions.

It's a good example of why the same module won't necessarily be right for every site. Matching the technology to the environmental conditions is essential to achieving reliable performance over the project's lifetime.

PES: Beyond performance and price, how are procurement priorities changing across the major solar markets?

IE: Customers are paying much closer attention to supply chain transparency, responsible sourcing and what happens to modules at the end of their working life.

Performance, reliability and value remain fundamental, but buyers also want confidence that the products they're purchasing have been manufactured responsibly and meet evolving environmental, social and governance (ESG) expectations.

Traceability is becoming particularly important. Integrated systems can help

customers understand where materials originate, identify supply chain risks and demonstrate responsible procurement. Reducing the carbon footprint of manufacturing is another priority. This includes using recycled materials and developing production methods that reduce the embodied carbon of solar modules.

At the other end of the process, the industry must address what happens when modules reach the end of their operational life. As existing installations are repowered, the volume of panels requiring recycling will grow. Making modules recyclable is only part of the answer. We also need to understand the environmental impact, cost and long-term viability of different recycling technologies.

Regulatory frameworks must reflect the volumes of solar panel waste expected in the future and when those materials are likely to enter the recycling system, so that adequate funding is available.

Procurement decisions therefore need to consider more than technical performance and commercial value. Supply chain accountability and end-of-life responsibility are becoming important factors too.

Customers will increasingly expect manufacturers to show what they're doing in these areas. Independently verified lifecycle assessments, traceable supply chains and verified carbon footprints will carry more weight, even where they aren't yet mandatory.

PES: Looking ahead over the next two or three years, which developments in module technology and solar project design do you believe will make the biggest practical difference?

IE: I see two developments having a particularly important influence on solar projects over the next few years.

The first is the continued development of tunnel oxide passivated contact (TOPCon) and back-contact (BC) technologies. There's considerable discussion about which technology will eventually dominate the market, but I believe both have distinct advantages and will continue to meet different requirements.

TOPCon is now a mainstream technology because it offers a strong balance of efficiency, manufacturing capability, reliability and cost-effectiveness. Meanwhile, BC technology is attracting growing interest because of its potential for higher efficiency, its cell architecture and its aesthetic advantages.

Rather than expecting one technology to replace the other, I think customers will increasingly choose according to the requirements of each project. Some installations will prioritise achieving the lowest cost per kilowatt-hour, while others will place greater value on energy density, appearance or particular design considerations. Having both technologies available gives developers and EPCs more choice.

The second major development is the changing role of solar within the wider energy system.

In the past, project discussions concentrated mainly on module efficiency, inverter selection and energy generation. Now, customers are looking beyond how much electricity they can produce. They also want to know how to store it, manage it and use it more effectively.

As battery costs continue to improve, we're seeing growing interest in integrated solar and battery energy storage system (BESS) solutions across utility-scale, commercial, industrial and residential applications. Storage can help increase self-consumption, reduce peak demand charges, support grid stability and improve the value of renewable electricity generation.

I believe this will change how solar projects are planned and developed. Rather than focusing on individual components, developers will need to consider the whole system, from how electricity is generated and stored to how it can be used most effectively.

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