# Cell interconnection reimagined

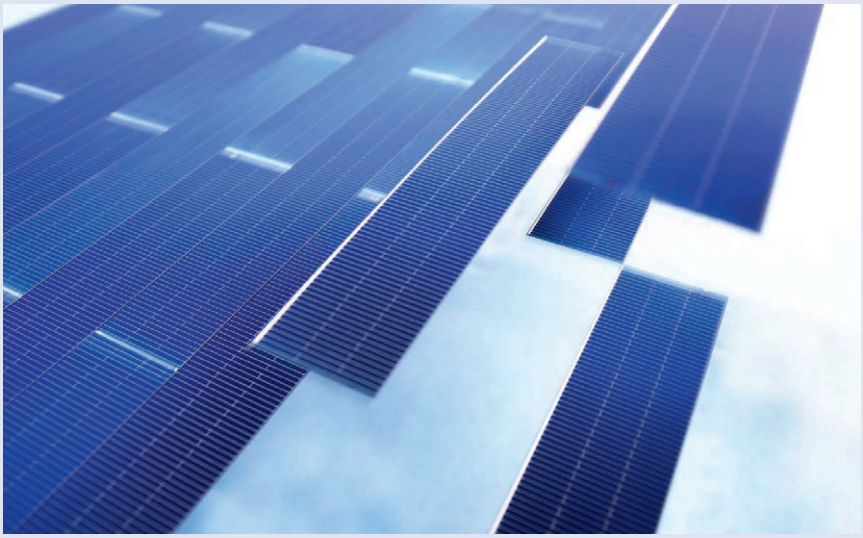
## M10: Shingle matrix interconnection

Equipment supplier M10 partnered with Germany's Fraunhofer ISE to develop its new approach to cell interconnection, which solves many longstanding problems manufacturers have faced at this stage of production.

Cells are first cut into strips, with the tool able to process these in various dimensions. These are then laid out in an offset pattern, similar to bricks in a wall. The cells are attached to each other using an electrically conductive adhesive. In operation, this means current flows over the entire surface, in parallel and simultaneously in series, meaning modules produced this way are not affected by partial shading.

M10's production tool can process up to 12,000 cell strips per hour, and is suitable for all cell types and formats, including cell size up to 210 mm and n-type TOPCon or heterojunction. By replacing soldered ribbons with glue, the tool eliminates downtime for ribbon changes, eliminates both lead and flux from the module production process, and reduces energy consumption and stress on the cells with a maximum temperature of 150 C.

Initially, M10 plans to target building-integrated products, since the shingled matrix leaves a uniform, aesthetically pleasing surface, and also leaves modules more flexible than standard full or half-cell products.



# Cutting into silicon emissions

## REC Solar: E2M silicon

By using a unique purification method, and recycling the kerf that flakes off from silicon ingots as they are sawn into wafers, REC claims it can produce silicon with 86% less energy and 96% lower carbon emissions than standard processing, making it "the world's greenest solar grade silicon," according to the manufacturer.

REC estimates that in 2017, lost silicon from kerf amounted to around 160,000 tons – a number that has only grown as more silicon wafers are produced. The company notes that simply collecting the kerf that's produced as wafers are sawn and heating it up to a typical silicon ingot pulling temperature is not sufficient. Its process of collecting, drying and organics removal prior to melting ensures that the 30% of silicon lost as kerf can be recycled. This serves both to reduce stress on the supply chain and cut down the amount of waste produced in silicon manufacturing.

REC further notes that the process, already in use at its facilities in Norway, requires energy input of 15 kilowatt-hours per kilogram (kwh/kg), compared to around 85 kWh/kg for the standard Siemens process. "As a result, Siemens-based solar grade silicon contributes more than half the total carbon footprint for a solar panel," the company explains. "With a footprint 96% lower than the conventional process, panels using REC's E2M can easily cut their carbon footprint in half."