



DURABLE, RELIABLE MATERIALS KEY TO SUCCESS OF TURKISH SOLAR PLANT

DUPONT™ TEDLAR® POLYVINYL FLUORIDE FILM-BASED BACKSHEETS HANDLE HARSH ENVIRONMENT AND PERFORM RELIABLY FOR DECADES

BACKGROUND

Like many countries, Turkey has set ambitious goals for renewable energy. The nation's target: to develop 30% of total installed capacity from renewable sources by 2023, including five gigawatts (GW) of solar energy. A one-megawatt (MW) crystalline silicon photovoltaic plant in Kilis, south-central Turkey, designed and built by Magtek Enerji Sanayi in 2015, is contributing towards the achievement of this energy goal.

The province of Kilis is located in the southern foothills of the Taurus Mountains, west of the Euphrates River on the northern edge of the Syria Plain. The site's proximity to the Syrian border – only 25 kilometers away – was just one of the challenges for Magtek, which managed the project from beginning to end, including design, construction and connection to the grid, on behalf of Turkish investor Erkan HATABAY GES.

As one of Turkey's leading Engineering, Procurement & Construction (EPC) companies, Magtek has the knowledge, expertise and partner relationships required to successfully manage a project like this one. At 21 meters wide by 976 meters long, the size of the Kilis solar plant makes it unique, both for Magtek and Turkey. The unusual topography and dimensions of the plot of land selected for the solar plant meant that construction costs were 15% higher than for a nearby PV site with a conventional square shape. (The fencing perimeter alone totaled 1,900 meters.)

After one year in production, the Kilis solar plant was generating 1,700,000 kilowatt hours (kWh) per year – providing a stable source of power to local homes, and contributing to Turkey's national energy goals.



Aerial views of the 1 megawatt solar plant in Kilis, Turkey

CHALLENGES

Three key challenges had to be addressed in order for the project to succeed: the impact of the environment and resulting restrictions on both workers and construction; the proximity to the Syrian border; and the need to ensure that the solar panels and all Balance of System (BOS) components would deliver optimal performance for power output and lifetime, resulting in the strongest possible return on investment for the system owner.

The system was built during the holy month of Ramadan in soaring daytime temperatures of up to 47 °C. Thirty-two workers were involved, starting work at 4:30 a.m. and finishing at 13:00 p.m., before the heat became unbearable. In addition, heavy shelling and bombardments from the direction of Syria could often be heard, and plumes of smoke were sometimes visible in the distance, which put the workers on edge and required constant reassurance that they would be safe.

The logistics of getting all the necessary equipment to the site were also a challenge. Forgetting a screwdriver meant walking almost two kilometers (there and back) to get it from the truck, which could only park at the end of the site, due to the narrow strip of land. The site was strewn with large rocks, which required four excavators and two diggers to remove. Only small trucks could access the site via a four meter wide dirt track.



The rocky terrain and the solar panels fixed at an azimuth of 37 degrees to help maximize production

The technology of the panels and the BOS components was central to the success of the project. The panels had to be reliable and durable in a region which sees annual solar irradiation of 2,000kWh/sqm, the highest level in Turkey.



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Solar panels are expected to function – with minimum maintenance – for 25 years or more. The specification of materials that have been proven to perform well and reliably over time, particularly for the backsheet protection of the panel, are key to achieving this result.

“We are strong when our partners are strong,” said Hakan Engin, General Manager, Magtek. “Working with world-class players such as JinkoSolar for the panels, Multi-Contact for the connectors and cables, Socomec for the inverters and Schneider Electric for the AC and kV switchgears is the winning combination, and gives both the investor and us confidence that the system will perform well and reliably for 25 years or longer.”

SOLUTION

The system took two months to complete and connect to the regional grid. Featuring 1,029 JinkoSolar 260Wp solar panels made with Tedlar®-based backsheets – the only backsheet with proven field performance of more than 35 years – the panels are installed portrait style. The azimuth is set at 37 degrees to balance the power gain in the morning when the temperature is cooler with the afternoon power loss when temperatures are hotter. The installation is grid-connected by the local utility company Toroslar Edas, at a Feed-in-Tariff of 0.13\$/kWh.

Magtek enjoys a strong business relationship with JinkoSolar, the world’s leading solar panel manufacturer, which uses DuPont™ Tedlar® polyvinyl fluoride film-based backsheets, protecting the panels from the environment and providing essential electrical insulation. Tedlar®-film-based backsheets are durable, offer high UV resistance, superior water resistance, and are reflective to enhance the effectiveness of the solar cells.

“We are proud to use world-class materials from DuPont in our solar panels,” said Arda Kristaporyan, country manager, JinkoSolar Turkey. “Quality cannot be taken for granted and has always been our key focus. We are extremely pleased to see the outstanding field performance of our partners using our modules, which makes us stronger and helps us to maintain our leadership position in the market.”

To learn more about DuPont Photovoltaic Solutions, visit photovoltaics.dupont.com