

As major markets like China, Japan, U.S. and India continue to ramp up installations and new markets like Middle East and South America emerge, the promise of utility solar continues to be a bright spot of the industry.

Harnessing the power of the sun

ABB expects that in the next three years the worldwide installed base of solar systems will surpass 400 GW

In the last ten years, the global solar industry has experienced steady double digit growth of the photovoltaic installed base. In 2008, the global solar installed base was approximately 15 GW and by the end of 2014 the installed base of solar products grew 10 fold to exceed 170 GW.

The total annual investment exceeded \$83 billion in 2014. Also, Solar PV is now emerging as the largest employer worldwide in the renewable energy industry representing 2.5 million jobs. The industry is truly coming of age.

ABB expects that in the next three years the worldwide installed base of solar systems will surpass 400 GW. In 2014,

a record number of solar projects were awarded in the Middle East with a combined capacity of 294 MW, a four-fold increase over the previous seven years combined.

In the early years, the photovoltaic market expansion was fueled by government incentives and subsidies; particularly in Europe where the local governments set renewable energy targets as a percentage of the total generated energy. The purpose of the renewable energy targets are to reduce carbon emissions by installing non-carbon emitting renewable power plants in order to displace carbon emitting generation from the overall energy supply.



Competitiveness not incentives

Future growth will be stimulated by the continual increases in competitiveness of the photovoltaic industry and by less dependence on incentives. In the last five years, the cost of installed solar systems has declined by over 70%, and it has driven the levelized cost of energy (LCOE) for solar electric power to so called 'grid parity' levels and beyond in many parts of the world. ("Grid parity" is defined as the equivalent price per unit of electricity as one would buy it from the local utility).

The first markets evolved in Europe as the region was the first to introduce feed in tariffs (FiT) and subsidies to support this



The global solar market is now well established in residential, commercial roof-top, and utility scale ground installed applications.

new technology. In the past few years, the markets grew very quickly in the USA, China, Japan, India, and Australia. There is also a strong case for solar rise in the Middle East: while solar prices are coming down, the cost of generating electricity from natural gas is going up.

A good example of the regional move toward solar can be found in Egypt, as

pointed out in the Middle East Solar Industry Association outlook 2015. As its natural gas infrastructure continues to age it is becoming more expensive for Egypt to generate power using natural gas than from solar. Egypt has therefore turned its attention to seeing how it can take advantage of its abundant potential for solar and wind energy. In November 2014, Egypt's Ministry of Electricity unveiled a landmark program which will seek to introduce 2,000 MW of large-scale solar PV power projects and 300 MW of rooftop solar power projects by 2020. The fact that about 176 companies subsequently responded to the Ministry's invitation to

ABB Group is the only company in the industry that can provide all electrical components for the connection of photovoltaic panels to the grid.

submit proposal for this Feed-in Tariff (FIT) program is a clear signal that solar has become a compelling source of energy in the Middle East region.

Emerging solar markets

"We expect in the near future that the next market expansion will occur within the emerging countries in the Middle East, Africa, and South America," said Dr. Alex Levrán, Head of Solar Industry Segment Initiative, ABB.

"The global solar market is now well established in residential, commercial roof-top, and utility scale ground installed applications. Steep price erosion has adversely impacted the profitability of the industry in the recent past. However, we see clear signs that the industry is migrating through global expansion towards profitable growth."

As part of the philosophy of 'Power and Productivity for a Better World', ABB has designed solar energy operated water pump drives to assist farmers irrigate the fields in the remote sites that do not have electricity.

Solar pump drive: remote locations

"ABB in India has designed and re-engineered the solar pump drive locally. The drive maximizes power conversion ability while being durable in harsh environments, and provides farmers freedom from dependence on grid and rising diesel expenses," said Subir Pal, President Discrete Automation and Motion, ABB India. "The benefits of solar pump solutions have been recognized by the government. The government has ambitious plans and has incentivized the use of solar pumps for agricultural use."

The solution presents its users with significant benefits. Most important is access to power and irrigation in remote areas. There are also no recurring expense on fuel and electricity and the supply is uninterrupted during day time and will not depend on the monsoons for irrigation, which means in countries like, India, the farmers can have at least two crop cycles every year.

Numerous installations have been made in many Indian states as well as in African countries such as Egypt.

Complete solar solutions from source to socket

Through the acquisition of Power-One, the second largest inverter manufacturer in the world, ABB has installed over 18.5 GW of solar energy supplied by over 1.5 million photovoltaic inverters. In addition, ABB has installed over 66 full power plants delivering over 1.2 GW of solar power in 14 different countries. ABB has over 350 MW of solar power under full Operation and Maintenance (O&M) contracts at 55 different sites. "With the acquisition of Powercorp, we are delivering leading technology for the integration of renewable energy into micro-grids", added Levrán.

"ABB Group is the only company in the industry that can provide all electrical components for the

connection of photovoltaic panels to the grid. We have a broad portfolio of products, solutions and services that support all three market segments: residential, commercial and utility on a global scale. For residential and commercial markets, we have developed the global low voltage product portfolio. We have a global offering of single phase and three phase inverters as well as a wide range of monitoring systems," Levrán pointed out.

ABB is well positioned to address the global utility markets with solar inverters, medium and high voltage transformers, low, medium, and high voltage switchgears with medium voltage reclosers and vacuum circuit breakers, and substations.

"We deliver a full range of battery energy storage solutions from 25 kW to 70 MW and active voltage regulation devices for medium and high voltage applications. In addition to the products/components, we also deliver full engineering system design, electrical balance of plant and simulation capabilities" he added. Our comprehensive monitoring systems include distribution grid automation, forecasting, load and demand planning solutions. ABB offers total lifecycle support at every stage for any solar installation that includes tailored service contracts that cover all equipment and solutions. ABB's mission is to help customers achieve a maximum return on investment through improved capacity, efficiency and reliability.

Solar pumps to solar planes

ABB's commitment and belief in solar is obvious in its partnership with the Solar Impulse 2. ABB partnered with the pilots of Solar Impulse 2 for the round the world flight. The plane has successfully taken off from Abu Dhabi in February and is now visiting countries to spread the solar message. Three ABB engineers are embedded in the project.

Why choose ABB?

- Consulting capabilities
- Cutting-edge technologies and a long history of innovation
- Complete product portfolio from the source to the grid
- Strong local presence to support customer needs
- Global manufacturing and engineering footprint
- Global installed base and proven track record
- Significant service presence to support

ABB solar products help water extraction in remote areas in Egypt

Half of the energy produced around the world is used to operate pumps. Compared to diesel generator pumps, the solar pumps are environmentally friendly, with a long lifetime and low maintenance costs. When enough solar radiation is available, the ABB solar pump drive starts automatically and the motor connected to it begins to run the pump to draw water. At sunset, the drive turns off the motor and the water flow ceases.

ABB in Egypt has recently outfitted the Al-Shalateen underground water extraction station with the ABB solar pump drive, ACS355 for Spark Renewables. This

water extraction station will help a massive land reclamation project in the Al-Shalateen desert located behind the city of Al-Shalateen, for developing its population, agriculture and trade using renewable energy to produce power. Egypt has an ambitious target of using 20% clean energy to generate power by 2020.

The use of ABB technology in this project will help by providing the customer energy savings with the lowest environmental impact. ABB has supplied and installed ACS355 solar pump drives for the water station and will also support with technical know-how and qualified

service. The ABB drives provide uninterrupted flow, even during drastic changes in irradiation. Built-in MPPT (maximum power point tracking) functionality helps with the reliability, even when the equipment is installed at remote sites.

The product was chosen owing to ABB's advanced technological expertise, which includes the MPPT feature that ensures maximum power output from the solar pump drive. The availability of service and technical support helped boost the customer's confidence in this product.



ABB has supplied and installed ACS355 solar pump drives for the water station.