

ABB

2|15

The customer magazine  
of ABB in India,  
Middle East & Africa

# contact



## Brightening lives with the power of the Sun

**Harnessing the power of the sun 6**

Solar systems' worldwide installed base to surpass 400 GW by 2018

**Powering Emirates Global Aluminium's solar field 10**

Delivering Dubai's first grid connected captive solar plant

Power and productivity  
for a better world™





06

### Harnessing the power of the sun

ABB expects the worldwide installed base of solar systems to cross 400 GW in the next three years.

11

### Solar for refrigeration company

A sealed, maintenance-free solar solution will help cut costs at Jordanian refrigeration company.

## contact 2|15



**Frank Duggan**

President, Region Asia,  
Middle East and Africa

Dear friends,  
If I was asked to describe what the solar industry meant to ABB; I would say the past, the present and the future. In the past, we have pioneered some of the leading technology and pioneering innovation in solar. Today, we have the most comprehensive portfolio of products, systems, solutions and services along the solar PV value chain that enables the generation, transmission and distribution of solar power for grid-connected and microgrid applications. And for the future, we know that solar power has ability to brighten lives even in remote locations and are playing a pivotal role in enabling it. We at ABB are prepared to take solar industry to the next level.

In this issue, you can read about the widespread impact of solar power from pumps to planes. Learn more about our solar pump innovation which is making the lives of farmers in Egypt and India

much easier. At ABB, we are technology pioneers, and that's the reason you will also read about our partnership with Solar Impulse, the airplane that is flying around the world without a drop of fuel.

Our faith in renewable energy is seen in our product launches like the new range of line voltage regulators (LVRs) for distribution networks that are designed to boost reliability as grids take in more renewable electricity.

We are excited that the industry is moving towards a clean future and keen to continue playing a part in bringing power and productivity to the world.

Enjoy the issue!

Best regards,

Frank Duggan



19

**Canal topping**

The 10 MW canal top solar power plant in India generates clean energy and prevents water loss from an irrigation canal.

14

**Brightening up lives**

Access to electricity is a key enabler in the fight against poverty.

## News

- 04 **ABB wins \$85 million order to boost Qatar's power, water supplies**  
ABB and Samsung SDI join forces to develop microgrids globally
- 05 **ABB strengthens manufacturing and service footprint in Saudi Arabia**  
ABB's \$52 million robots order to boost manufacturing flexibility at Ford's newest China factory

## Solar Focus

- 10 **ABB power Emirates Global Aluminium's mini solar field**  
Dubai's first grid connected captive solar plant helps UAE's primary aluminium manufacturer reduce electricity consumption
- 12 **New line voltage regulator to ease integration of renewable energy**  
Economic and environment-friendly solution for voltage control contributes to the evolution of smarter and greener grids

## For a better world

- 16 **ABB Sustainability Report 2014 - Snapshot**
- 17 **Designed for well being**  
ABB's Azipod electric propulsion eliminates noise and vibration
- 18 **ABB helps China manage drought and restore one of its most pristine lakes**  
The \$33 million agreement will help improve plant productivity and availability

## Did you know?

- 20 **Energy consumption facts**

## Close up

- 22 **Power of the Sun**  
Glimpses from the first leg of Solar Impulse's round the world journey

## In brief

## ABB hosts Network Control user group

ABB hosted a Network Control user group meeting with customers from the Middle East and Africa at the ABB Learning Zone in Abu Dhabi, UAE. The latest release of Network Manager was presented and demonstrated at the meeting. The event also hosted technology presentations by partners such as HP, Mitsubishi and BAER.

At the event, participants learned how ABB's Enterprise Software portfolio will help predict and manage power outages smartly and efficiently. The ABB Outage Lifecycle Management (OLM) solution is a key part of utilities' holistic approach – plan, prepare, communicate and respond – to reduce both total outage duration and the amount of time individual customers lose power in an outage.

## Sign up for the High Voltage Academy course in May/June 2016

The High Voltage Academy is a power technology educational program hosted by ABB Power Products in Sweden. The academy is located at ABB's premises in Ludvika, Sweden. Product areas include power transformers and transformer components, high voltage circuit breakers, surge arresters, capacitors and instrument transformers. For detailed course program, please log into <http://www.abb.se/cawp/gad02465/1d7ccd00e92c8a68c1257e6c0032f9b2.aspx>

# ABB wins \$85 million order to boost Qatar's power, water supplies

ABB has won an order worth around \$85 million to provide turnkey substations to help integrate electricity from a new independent water and power plant (IWPP) into the country's grid.

The IWPP will utilize Qatar's natural gas resources to produce 2,520 megawatts (MW) of power and desalination capacity of around 600 million liters of water daily, helping supply drinking water and power.

Qatar is building ambitious infrastructure including rail, energy and water desalination facilities. Such projects, undertaken with expertise from ABB, will help prepare the country's economy to accommodate a growing population that exceeds two million now and is expanding at about three times the rate of Gulf neighbours.

"We have an extensive presence and track-record in the region and are pleased to contribute to Qatar's efforts



**Qatar is building ambitious infrastructure.**

to expand capacity and address the growing demand for electricity and fresh water," said Claudio Facchin, president of ABB's Power Systems division. "This success supports the re-focus of the Power Systems division and ABB's Next Level strategic thrust on growing markets."

# ABB and Samsung SDI join forces to develop microgrids globally

ABB and Samsung SDI, the leading manufacturer of lithium-ion batteries, have signed a Memorandum of Understanding to promote microgrid solutions globally.

The two companies will establish a global commercial alliance to develop and market modular and scalable microgrid solutions, utilizing lithium-ion batteries for energy storage.

The combination of ABB's global market presence, its leadership in grid technology and its global service footprint with Samsung SDI's leading lithium-ion battery technology will enable accelerated growth of the market. It will make microgrid solutions a viable alternative to promote and broaden access to electricity in emerging markets and remote areas while also providing power reliability, resiliency and security to developed markets.



**ABB CEO Ulrich Spiesshofer with Namseong Cho, President and CEO of Samsung SDI.**

# ABB strengthens manufacturing and service footprint in Saudi Arabia

ABB inaugurated a new facility in Dammam in the presence of His Royal Highness Prince Saud bin Nayef, the Governor of the Eastern Province of Saudi Arabia. The facility has also already bagged its first order.

The key factors that contributed to the success of the order were proximity to customers to provide quick service, and the ability to meet the short delivery time of 16 weeks.

The campus is spread over 68,000 square meters and incorporates a manufacturing unit for high-voltage GIS and a service workshop for motors and drives. It will employ about 190 people.

Located in the eastern part of the country in Dammam, home to the largest port in the Arabian Gulf, the new unit will manufacture GIS across voltage levels from 145 kilovolt (kV) to 420 kV.



The facility has already bagged its first order.

# ABB's \$52 million robots order to boost manufacturing flexibility at Ford's newest China factory

ABB will boost the flexibility and efficiency of Changan Ford Automobile Co., Ltd.'s new production facility in Harbin, China. The robots will be used to make Ford's new Focus model.

ABB will provide robots including the IRB 6700 and IRB 7600 for Changan Ford's new highly-automated "Body in White" welding production line. Included in the order is ABB's GateFramer car body framing positioning system, capable of producing up to six vehicle models on the same line, with just 18 seconds needed to switch to a different model.

ABB robots at the new Changan Ford plant will bolster the carmaker's flexible manufacturing allowing it to respond swiftly to changing consumer behavior while reducing investment costs compared to traditional production lines.



ABB robots at the Changan Ford plant will bolster the carmaker's flexible manufacturing.

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.



ABB supplied the inverters and plant management system.

# ABB powers Emirates Global Aluminium's mini solar field

Dubai's first grid connected captive solar plant helps UAE's primary aluminium manufacturer reduce electricity consumption

The United Arab Emirates' primary aluminium manufacturer, Emirates Global Aluminium ("EGA") recently unveiled a mini solar field at one of its core operating assets - Dubai Aluminium ("DUBAL", also known as EGA Jebel Ali). The new array will generate enough power to run the electricity requirements of the site's residential area office in the daytime, including air-conditioning. This is the first captive application for consumption in an industrial unit, which is connected to grid.

The development reflects EGA's on-going commitment to save electricity and use renewable energy sources, wherever possible. Other energy-conservation efforts in various operating and administration areas of EGA Jebel Ali have saved approximately 40,000 MWh since April 2011.

ABB supplied the inverters and plant management system for the mini solar field. ABB's Aurora inverters and Aurora Vision® Plant Management Platform help installers with easy integration and give the customer a real time view of how much energy has been harvested.

Aurora Vision Plant Management Platform is the next generation of PV plant monitoring and management. This is a cloud-based solution, available through a web browser user interface to your PV plant data, which provides highly interactive, real-time access to key performance and operations metrics to help plant management optimize decisions and accelerate the alignment with business goals. Aurora Vision has many dashboard views that allow fleet wide management of performance and assets through reports,



diagnostics, analytics, or event alert and management.

"The reason ABB was chosen for our project was range of inverters that ABB has available. We also didn't want to compromise on the quality of equipment used in the pioneering project and ABB was an obvious choice for high quality products," said Tayeb Al Awadhi (Vice President, Power and Desalination, EGA Jebel Ali).

# ABB's solar solution in Jordan cuts costs for refrigeration company

Fully sealed, dust proof, maintenance free solution



The trio inverters have an extended temperature range.

**A**l Burj Stores, a company in Jordan that provides refrigeration for fast-moving perishable goods recently connected a 420 kWp PV system on the roof of its new warehouse to the local electricity grid. The PV plant, outfitted with ABB inverters is expected to offset 77% of the current electric consumption at the facilities by generating 714,000 kWh per year.

The PV system will power warehouse operations while feeding excess electricity back into the local utility, resulting in credits that will help Al Burj reduce its energy bill. Seventeen ABB Trio solar grid-tie inverters convert the direct current from the solar panels to alternating current needed to run the warehouse or be fed back into the grid.

The optimum fit of the TRIO comes from its construction characteristics:

- Fully sealed, dust proof enclosure
- Extended temperature range with natural convection cooling without fan exposed to sand and dust
- Maintenance free

The distributed architecture of the plant with 17 string inverter coupled with the dual input of the TRIO offers granularity of control increasing the immunity of the plant to the negative effect of panel aging and uneven dust accumulation on panels. Similarly, the multi inverter architecture maximize the uptime by reducing the impact of accidental damage to any component of the plant.

An additional benefit is offered by the detachable and configurable string

combiner compartment included in the TRIO, used in Jordan avoids the need for external AC and DC switch gears and protection panels.

The roof has thus been transformed into a clean, efficient and predictable power plant that will help Al Burj avoid emitting 850 tons of carbon dioxide emissions per year.

The Jordan national strategy seeks to diversify energy sources, setting a 10 per cent renewable energy contribution to the total energy mix by 2020.

Al Burj's site is one of the first FMCG cold store warehouses in Jordan to benefit from a solar PV project, a development that's been driven by Jordan's plentiful sunlight and favorable policies that support investments in renewables. (Jordan, with more than 300 sunny days a year, has excellent potential for solar energy generation) Al Burj is also relying on the Internet of Things, Services and People to keep track of energy from the PV installation, with ABB's web-based PV plant monitoring solution that allows customers to manage the plant by enabling remote monitoring and analysis of system status, performance and energy production.

"Our business of operating cold stores is an energy-intensive operation," said Wael Shokerat, CEO, Al Burj Stores. "This project will significantly contribute to a reduction in our annual electricity expenditure. It will also be a sound investment for our company due to the expected quick recovery of the initial investment thanks to favorable renewable energy policies enacted by the local government."

The PV system was installed by Mustakbal Clean Tech, a solar specialist firm that specializes in turnkey implementation and integration in the Middle East and North Africa.



This latest line voltage regulator addresses a key stability challenge.

# New line voltage regulator to ease integration of renewable energy

Economic and environment-friendly solution for voltage control contributes to the evolution of smarter and greener grids

**A**BB formally launched its line voltage regulator (LVR) product family for distribution networks that will boost reliability as grids receive more electricity from renewable energy installations.

Increasing amounts of energy from renewable resources, especially wind and solar, lead to more dynamic and intermittent power entering the mix. This can result in instability and frequent variation of voltage levels in the distribution network, which can pose a risk to electrical equipment if beyond the maximum allowable level set by regulators. The line voltage regulator is designed to help manage these variations and adjust the voltage accordingly.

## MV and LV grids

ABB offers line voltage regulators for medium-voltage (MV) and for low-voltage (LV) grids. The MV regulator is available for

ratings up to 8 Mega Volt Ampere (MVA) and the LV regulator for ratings up to 250 Kilo Volt Ampere (kVA), and both allow the voltage to be adjusted by up to  $\pm 10\%$ . Both products are designed for quick installation and have low energy losses.

"This latest line voltage regulator can automatically adjust the voltage based on the actual load or generation mix in the distribution system, addressing a key stability challenge posed by the increasing amount of renewables entering the power network," said Bernhard Jucker, President of ABB's Power Products division. "It can make an important contribution in the evolution of smarter and greener grids. This development is in line with our Next Level Strategy, and addresses the dynamics of the evolving power grid."

ABB developed the LVR in conjunction with Germany's "Networks of the future/ Smart Country" initiative. It has worked

with the German utility RWE AG to test it on distribution grids in Germany, as well as separately in Switzerland where since 2014 it has been successfully smoothing out the typical voltage fluctuations generated by a solar power station in a rural area.

Recognized as the world's largest transformer manufacturer, ABB offers a complete range of power, distribution, traction and other special transformers designed for reliability, durability and efficiency. It offers both liquid-filled and dry-type transformers as well as services for complete lifecycle support, including replacement parts and components.

# Substation to deliver clean energy in the UAE

ABB GIS substation will increase grid reliability at the MBR Solar Park in Dubai

The global capacity of solar photovoltaic systems is growing fast. According to the International Energy Agency, it rose by 34 percent to 137 gigawatts (GW) in 2013 and is set to expand to 403 GW in 2020.

The United Arab Emirates is leading the deployment of solar power in the Middle East. The Mohammed bin Rashid Al Maktoum (MBR) solar park located in Dubai is one of the biggest renewable energy projects in the Middle East and North Africa. It is expected to cover an area of more than 40 square kilometers and produce 1,000 MW of clean energy when completed in 2030. It will support the Dubai Integrated Energy Strategy 2030, adopted by the Dubai Supreme Council of Energy to diversify the energy mix, under which natural gas is expected to contribute 71 percent of electricity, followed by nuclear (12 percent), clean coal (12 percent) and solar (5 percent).

This utility scale solar photovoltaic plant, which covers 4.5 square kilometers, will produce enough electricity to power more than 30,000 homes serving 130,000 people. Its addition to the UAE system displaces the need for power from fossil fuels that would have produced about 250,000 tons of carbon emissions annually.

"We are working to achieve the goals of UAE Vision 2021 and Dubai Plan 2021 to support Dubai's economic growth, through diverse and secure Energy supply and Efficient Energy use, while meeting environmental and sustainability objectives. DEWA is also committed to achieving the Dubai Integrated Energy Strategy 2030 to generate 7 percent of Dubai's total power output from renewable energy by 2020 and 15% by 2030," said HE Saeed Mohammed Al Tayer, MD & CEO of DEWA.

## **Increase transmission capacity**

ABB's gas-insulated switchgear (GIS) substation will enhance transmission

capacity, boost power supplies and strengthen the reliability of the grid for the Middle East's state-of-the-art solar park.

"ABB is proud to be part of UAE's milestone project by bringing 'Clean power from the Desert' to this fast growing nation power. This substation will help UAE's aim to deliver clean solar power and increase the use of renewable energy" said Novak Stevanovic, Head of Power Systems UAE, Saudi Arabia and Gulf.

ABB is responsible for the design, installation, commissioning and start-up of the plant. Key products to be supplied include eleven bays of 400 kilovolt (kV) and twenty one bays of 132 kV GIS, power transformers, as well as the protection system, automation and control system, surveillance and communication. The substation will also be IEC 61850 enabled to support open communications automation and protection.



Dubai is aiming at 7% renewable power contribution to its total power output by 2020.



Solar power can help in remote connectivity.

# Brightening up lives

Access to Electricity is a key enabler in the fight against poverty

According to the World Energy Outlook 2014, nearly 1.3 billion people worldwide – a population equivalent to that of the entire OECD – continue to live without access to electricity. Nearly 97 percent of those without access to electricity live in sub-Saharan Africa and developing Asia; 84 percent of them reside in rural regions.

### ABB's Access to Electricity

"Access to Electricity" is a demand driven bottom up approach to rural electrification that was launched in 2002 as part of ABB's contribution to common efforts, in line with its social policy. The program focusses on productive use of affordable electricity and promotion of local economic growth. In 2015, ABB in India announced the expansion of its flagship sustainability initiative 'Access to Electricity' program

	People without access to electricity (million)	Electrification rate (%)
Worldwide	1,317	80.5
Africa	587	41.8
Asia	675	81.0
Latin America	31	93.2
Middle East	21	89.0

to more than 500 households across five villages in Barmer, Rajasthan. Over a period of time the program has covered seven villages in Barmer, reaching out to almost 1,200 households and impacting more than 7,000 lives.

In the upcoming expansion in Barmer, each household will be provided a kit that will include a solar panel, two lamps, a portable lantern, wall switches, control unit with rechargeable battery, USB port and adaptors. The feasibility and implementation

is dependent on the requirement and use by local stakeholders. ABB trains the villagers extensively in the upkeep of the batteries and the charging patterns for continual maintenance of these systems.

The three main 'Access to Electricity' projects of ABB :

### Ngarambe, Tanzania

In a public-private partnership project in Tanzania, ABB teamed up with local authorities and the global conservation



**ABB with the Solar Impulse pilots announces partnership with PACT Myanmar.**

organization WWF to set up a mini-grid, fired by a diesel generator, which provides the village of Ngarambe with four hours of electricity a night. The electricity has replaced the traditional, more expensive source of fuel, kerosene.

ABB supplied the generator, installed underground cables and low-voltage equipment, and trained local people to run the power supply. Recent advances include:

- A new electricity-driven sawmill has opened, providing employment for 30 people and leading to more sustainable logging
- A new sunflower and sesame press, operational after dark, is also raising incomes
- Children who are able to study after dark are passing school exams in increasing numbers
- Nurses at a health clinic are able to treat patients after dark

### **Rajasthan, India**

The project in India – based on a public-private partnership – has brought together ABB, the state government of Rajasthan and an NGO to provide power to desert hamlets. The program started in 2005 when one hamlet was provided with power generated by solar panels, and this has now been extended to several more hamlets with 1,200 households covering more than 7,000 people. The costs of installing the panels have been shared equally among ABB, the NGO and the villagers.

Consequent development:

- The productivity of weavers and tailors has risen by 50 percent and 40 percent respectively over the past two years.

They can now work at night avoiding searing daytime temperatures which can rise as high as 50 degrees Celsius.

- Children can now study after dark, and the number attending school has doubled in two years
- Electricity has replaced kerosene, reducing the danger of fires and easing health problems
- The nurse at a health clinic can now treat patients at night, and dispense advice on an electrically recharged mobile phone to patients far and wide.

### **Sunderbans, India**

In 2012 ABB and WWF-India set up a solar power project to enhance community access to clean, reliable, efficient and cheap energy for household lighting in Tipligheri village in the Sunderbans. A decentralized community owned and managed solar photovoltaic charging station was set up in the village. More than 74 households and local shops in the village have so far gained access to electricity.

Consequent development

- Access to clean, reliable and cheap energy has allowed majority of the participants in the scheme to replace kerosene lamps with fluorescent lamps.
- Providing options to use energy services for local entrepreneurship development and facilitate income generation
- Reducing human-wildlife conflicts due to reduced need to collect fuel wood from the forest

### **Myanmar**

In 2015, ABB announced its partnership with Pact Myanmar to bring electricity in the form of solar power to approximately

3,500 individuals from villages in rural areas of Mandalay, Central Myanmar. The project involves establishing solar battery charging stations to be run by women's groups in remote villages in the Tada Oo township. Power from the stations will be sold back to communities, thus bringing economic self-sufficiency, greater entrepreneurship and equality to the townships. Financial support will also be provided for villages to purchase photovoltaic equipment at the community level.

# ABB Sustainability Report 2014 - Snapshot



**\$1.5**  
billion  
invested in R&D in 2014

**445**  
TWh energy saved  
by ABB drives



**140,000**  
employees

**150**  
nationalities



**\$41.5**  
billion  
orders  
in 2014

**51%**  
of revenues  
related to energy efficiency  
and renewable energy

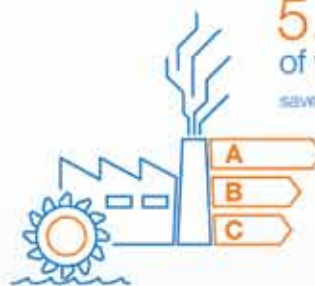


**1** company delivering  
power and productivity  
for a better world



**\$9**  
million  
spent on community  
projects in 2014

**28**  
awards  
for good corporate  
citizenship worldwide



**5.2 million m<sup>3</sup>**  
of water  
saved through reuse and recycling

**200+**  
energy efficiency  
projects under way



**500**  
managers trained  
on human rights

**94,000+**  
employees  
trained on anti-bribery principles in 2014

**175**  
supply chain  
assessments in 2014



**2,500+**  
critical suppliers trained  
since 2011

# Designed for well being

ABB's Azipod electric propulsion eliminates noise and vibration



The Azipod thruster can reduce fuel consumption by 20%.

For years, the world's largest and most-advanced cruise ships have relied on ABB's Azipod electric propulsion system not just because they're more energy efficient and maneuverable than other kinds of thrusters, but because they eliminate noise and vibration that could disrupt passengers' voyages.

Mercy Ships, the international charity that's treated more than 2 million people aboard its shipboard hospitals since its founding in 1978, is now turning to the Azipod to incorporate these same qualities into what will be the largest hospital ship in the world, currently being called Atlantic Mercy.

## Increased efficiency and noiseless

The 174-meter vessel, to be delivered in 2017, will include nearly 7,000 square meters of hospital space, six operating rooms and facilities for 950 patients when in port – and the world's most-advanced electrical propulsion system and power plant from ABB.

Patients being offered shipboard medical assistance ranging from cleft-palate surgery to acute care will experience the same comfort Azipod offers for luxury cruises: a quiet, rumble-free environment where they can concentrate on getting well.

"We have done many challenging new buildings over the years but this is truly a fantastic project to work with," said Staffan

Stenfelt, the new building manager at Stena RoRo, which is managing construction of the Atlantic Mercy by China Shipbuilding Industry Corporation at its Tianjin Xingang Shipyard. "To know that the work we do on behalf of Mercy Ships can contribute to the well-being of so many, makes ourselves and partners such as ABB very proud to be involved."

## Reduce fuel consumption

ABB's Azipod C thruster package being built at the company's manufacturing facilities in Shanghai, China, for Mercy Ships will mark the first time a hospital ship has been equipped with ABB electrical propulsion system, providing profound new meaning for the company's motto: "Power and productivity for a better world."

The Azipod thruster – a gearless propulsion system where the electric drive motor is inside a submerged pod beneath the ship – can reduce fuel consumption and emissions by 20 percent, compared to other thrusters.

## Steady power

And aboard the Atlantic Mercy, the ABB's electric power plant will provide steady electricity, regardless of whether reliable local power is available or not.

"Our ships have to be pretty self-sufficient and able to provide, not only for the hospital, but also for the 400 plus crew, staff and family members who serve on board," said Jim Paterson, senior vice president of marine operations for Mercy Ships. "A reliable power source and distribution system is critical for this to happen."



With this project, ABB is helping preserve the Fuxian Lake.

# ABB helps China manage drought and restore one of its most pristine lakes

The \$33 million agreement will help improve plant productivity and availability.

China's famous Fuxian Lake, in a region hit by drought in recent years, will be returned to normal levels thanks to an ambitious emergency water project where ABB is deploying its control technology. Fuxian Lake is home to at least a dozen species of fish found only in its pristine blue waters. Some 155 meters beneath its surface, archaeologists have discovered the remains of an ancient kingdom that may have slid into the lake during an earthquake 1,750 years ago.

However, recently, the region surrounding one of China's deepest freshwater lakes has been hit by drought, in the process threatening Fuxian Lake's water quality and putting economic development of the surrounding area, including Yuxi City, increasingly at the mercy of the weather.

To tackle the challenge, officials enlisted ABB starting in July 2014 to provide sophisticated automated control equipment that will form the backbone of an ambitious emergency water project. This system will redirect ample water supplies from Dalongtan Lake, to the east, through more than 70 kilometers of pipeline connected

to the drought-hit region.

For the project, ABB is providing 21 redundant sets of AC 800M controllers, with around 5,300 input and output signals, as well as four engineering stations and eight operator stations.

ABB's equipment will help monitor, control, record, manage and automate the diversion system's three pump stations and their respective electrical equipment, while enabling communication between the relay protection system, video monitoring, the direct-current control system and the integrated information management system.

"Using Dalongtan Lake as a new water resource will indirectly fill the water for Fuxian Lake, letting it recover gradually to its normal water level," said Anne-JiaQi Yang, Hub Business Unit Manager, Control Technologies, China. "And the local government will also promote the ecological protection of Dalongtan Lake, to ensure that it remains a sustainable water resource for the region surrounding Fuxian Lake."

"Fuxian Lake is among China's most pristine lakes, with water so clean that

people can drink it directly from the lake," ABB's Yang said. "With this project, ABB is helping to preserve this natural wonder and in the process clearing the way for the region's residents to develop their economies in a sustainable way."

## The ABB advantage

With ABB advanced technical solution, computer monitoring system will

- Enhance the automation level of pumping station monitoring and operation management
- Ensure the safe and reliable operation of pumping station
- Improve the operation maintenance personnel's working conditions
- Realize unattended operation mode
- Improve economic efficiency of the pumping station

# Canal topping

A new space-efficient 10 MW photovoltaic power plant in India generates emission free energy while preventing water loss in an irrigation canal.

One of the world's most innovative solar power projects was inaugurated in January 2015 by UN Secretary General Ban Ki-moon.

Located on the outskirts of Vadodara city in Gujarat state, India, the 10 MW photovoltaic (PV) power plant is built on a 3.6 km stretch of irrigation canal. The plant not only generates a significant amount of emission-free energy, it also prevents evaporation and eliminates the need to use valuable agricultural land for construction of the plant.

The plant has saved an estimated 16 hectares of land and will prevent 90 million liters of water from evaporating each year. The cooling effect of the water beneath the PV panels boosts panel efficiency by an estimated 7 percent.

Based on its successful track record in India's solar power industry, ABB was selected by the plant's engineering, procurement and construction (EPC) contractor, to provide a fully integrated electrical balance of plant and automation

solution for the PV power plant.

ABB's integrated high-performance solution includes a broad range of ABB power and automation products, which are designed and optimized for PV power plants. These include central inverters, transformers, indoor and outdoor switchyards, and connection to the local distribution network in compliance with utility grid codes. ABB was responsible for design, engineering, installation, testing and commissioning of the EBoP solution.

## Canal irrigation network

The plant has generated huge interest in India and other parts of the world for its ability to produce clean renewable energy and save water and land – this in an area where water and land are a scarce resource. Hence the participation of Ban Ki-moon in the opening ceremony. The success of this pioneering concept is now being evaluated for implementation in other Indian states as well.

Gujarat state has one of the world's largest irrigation networks. Some 19,000

km of canals distribute water to vast tracts of farmland throughout the state. It is estimated that if 10 percent of the network was used for canal-top power generation, it would generate 2,400 MW of clean energy. It would also save more than 21 billion liters of water annually and eliminate the need to use 11,000 acres of land for plant construction.

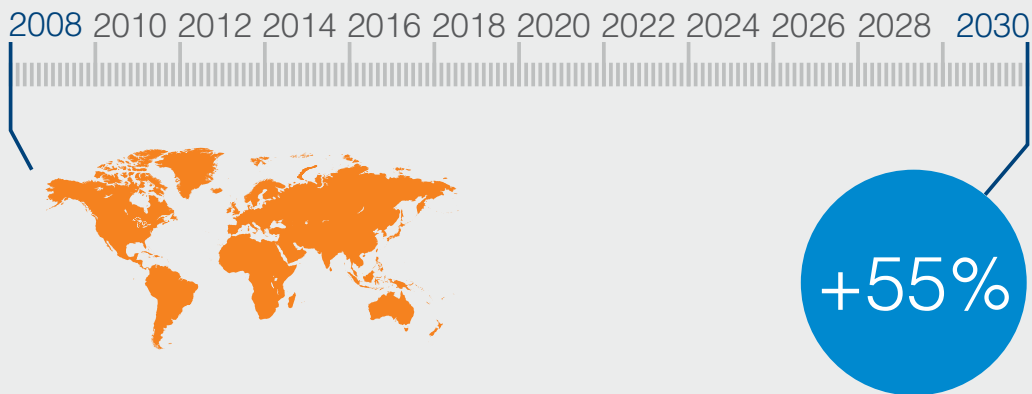
ABB has long been at the forefront of India's growing PV power industry – providing complete and fully integrated power and automation solutions for more than 10 utility-scale PV power plants with a generating capacity of between 1 MW and 50 MW. These include the 50 MW Sakri PV plant in Maharashtra state, which uses advanced thin-film technology.



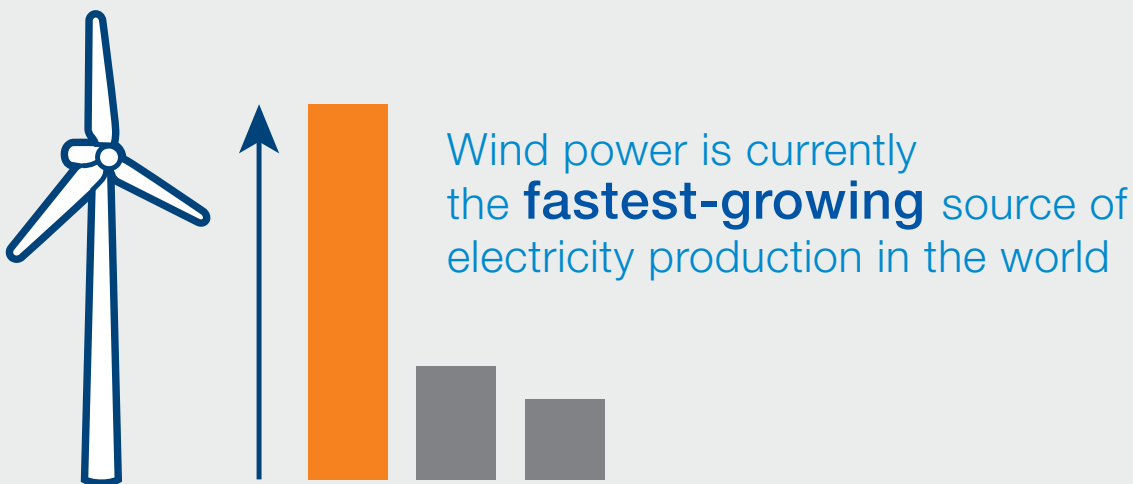
The plant saves 90 million liters of water from evaporating every year.

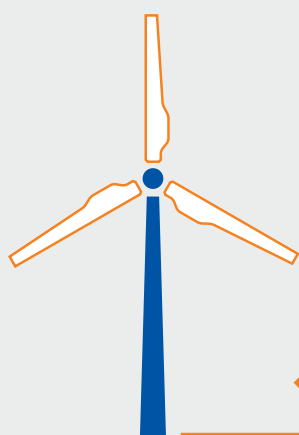
# Did you know?

From 2008 to 2030,  
world energy consumption is  
expected to increase by **more than 55%**



**1.3** billion people in the world do  
not having access to electricity; renewable energy is  
making energy access more achievable.





A single wind turbine can power

**500** homes



**80%**

of all renewable energy  
generated comes from hydropower



In 1921, **Albert Einstein**  
won the Nobel Prize for  
his experiments with  
solar energy and photovoltaics



## Power of the Sun

The first solar powered aircraft Solar Impulse, completed half its round the world tour in 2015, stopping over in India, Myanmar, China, Japan and Hawaii. The historic flight took off from Abu Dhabi, UAE and will return to the gulf country. Following the most demanding leg of its route, crossing the Pacific Ocean - a flight that lasted five consecutive days and nights - the team decided to continue its journey in 2016 in light of the weather conditions over the next three months.

ABB is a proud sponsor of this solar flight, Solar Impulse as a testimony to our belief in renewable energy and solar power.



**Executive editor:** Jyotsna Ravishankar

**Editor-in-Chief:** Manashwi Banerjee

**Editorial & Production team:**

Erika Velazquez, Rabia Naveed, Rakesh Shastri,  
Latifa Al-Marzooqi, Rubi Rakha, Shubhadha Sujith

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Preview 3|15

## Why ABB for manufacturing?

Manufacturing at ABB ranges from assembly of customized industrial robots to advanced production of electrical switches and breakers. From generator to user, our products support the efficient use of electric power in industrial, commercial and residential applications.

The innovative products we make drive the world's largest ships, connect remote renewable power sources with consumers and automate complex industrial processes. Our employees focus on using resources effectively in order to help customers use energy efficiently.

In the next issue, explore and understand our manufacturing capabilities in India, Middle East and Africa.



## From source to socket, no one provides more solar solutions

Solar energy plays an important role in answering the world's need for the power with less impact on the environment. ABB offers the industry's most comprehensive portfolio of products, systems, solutions and services to optimize the performance, reliability and return on investment of any solar installation - from residential rooftops to commercial applications and utility-grade power plants. With a proven track record in solar since 1990s and our expertise from solar systems to grid connection and integration to smart grids and microgrids, no one provides more solar solutions from source to socket than ABB. [www.abb.com/solar](http://www.abb.com/solar)