contact

2|12

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

Generating power from the sun

Power and productivity
for a better world™

contact 2|12

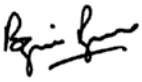
Bazmi Husain
Country Manager and
Managing Director
ABB Limited, India

Dear friends,
India has traditionally been dependent on fulfilling its power needs through fossil fuels, however, this has its own issues as the country develops and the economy expands. Solar energy today has emerged as the frontrunner when it comes to renewable energy sources. There is no question why it should not be as India receives abundant sunlight, over 300 days! Some of the initiatives taken by government at the central and state levels have helped in ensuring that clean energy is given priority over fossil-based plants.

ABB in India has been working with its customers in India to power the solar dreams of the country with an array of products and customized solutions. Our solar inverters and compact substations are enabling customers harness solar energy by making power networks smarter and helping to protect the environment and fight climate change.

This issue of Contact features glimpses of some of the solutions we have provided to significant projects we had an opportunity to be part of, as well as some global successes we have achieved. In addition, we are also featuring some of the innovations and global expertise we intend to bring to the Indian market.
We hope that you find this issue of Contact an interesting read.

Best regards,



Bazmi Husain

Contact 2|12 • Customer news magazine from ABB • copyright 2012 • **web:** www.abb.com • **email:** contactmagazine@in.abb.com • **Publisher:** ABB Group • **Layout:** Shilahar Associates, Bangalore, India • **Cover picture:** De Nittis PV plant, Foggia – Puglia, Italy

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For a better world

Glimpses of ABB

Seizing the solar initiative in sunny Gujarat

Gujarat is transforming into a major solar hub, with a projected yield of 1000 MW by 2013. ABB is partner to solar projects across the state, demanding the best in technology and quality

40 MW solar PV plant, Bitta

Infrastructure conglomerate, Adani Group, commissioned a 40 megawatt (MW) solar power plant in Bitta in Gujarat's Bhuj district in December 2011. The plant marks Adani Group's foray into the renewable energy sector and was commissioned in a record time of five months. Over 4 lakh thin film photovoltaic (PV) modules are mounted on approximately 21,700 mounting structures to generate 40 MW electricity. The Group also envisions setting up another 100 MW solar power plant in the future, as a further commitment towards clean and green energy. Currently, the power generated from this solar plant is connected to Netra substation in the same district.

For ABB this was one of the biggest solar substation orders in India. The scope included supply, erection and commissioning of a 66 kilovolt (kV) switchyard with two 66/11 kV, 25/31.5 mega volt amperes (MVA) power transformers, 11 kV medium voltage indoor switchgear, 10 two-way ring main units (RMU) and 18 three-way RMUs. Dhinesh D, Project Manager for the Power Systems division, ABB in India said, "Meeting the rigorous parameters set by the customer, within the short time frame specified, proved to be a tremendous challenge. Despite this, we were able to deliver all products, from transformers to RMUs, on time. The solid support of our supply chain and divisions and the overall coordination of effort was critical to the successful execution of this project."

ABB is also executing 765 kV projects for Adani Group in other locations; in Tiroda, Koradi and Akola.

The Group's entry into the solar space was greatly facilitated by Gujarat Government's policies and the preferential tariff regime established to encourage participation of developers in this priority area. This initiative by the Government of Gujarat has set an example at the national level. Gujarat's solar capacity today corresponds to two-thirds of the installed capacity of the entire nation.

1 MW solar PV plant, Surendranagar

Rajesh Power Services Private Limited, part of the Siddhi group of companies based in Gujarat, decided to diversify as a renewable power producer as recently as 2010, when the company signed a power purchase agreement (PPA) with the Gujarat Government and the state electricity board, Gujarat Urja Vikas Nigam Limited (GUVNL). The very first project that was awarded to them was the setting up and commissioning of a 1 MW photovoltaic (PV) solar power plant in Surendranagar, roughly 100 kilometers from Ahmedabad.

The company commissioned the plant ahead of schedule. Efficient delivery depends on the reliability that an established partner can provide. ABB's quick reaction in delivering two PVS 800, 500 kilowatts (kW) solar inverters and one 1,250 kilovolt ampere (kVA) solar compact substation (CSS) from our manufacturing facility in Nashik, helped our customer to make good on the commitment to deliver, not just on time, but well before the deadline. Given the tight schedule, our team showed

exemplary speed and commitment towards delivering to this small turnkey project.

Karan Dangayach, who heads business development at Rajesh Power, spoke about the company's aspirations, "Our first priority will be to build on our strength as an EPC contractor. The solar power sector in India is witnessing dynamic growth. More and more solar power developers are looking for reliable EPC partners, in fact, we have already secured 10 MW worth of business in 2012 and we are only halfway through the year."

ABB works closely with companies which have interests in renewable power and clean energy and offers products and solutions to reduce the environmental impact of energy systems. We manufacture and supply a broad range of high quality products for the solar power market, suitable for a wide range of applications, from the smallest residential building to large power plants.

Canal-top solar PV plant, Chandrasan

About 25 kilometers from the city of Ahmedabad is a strange sight – instead of water sparkling in the distributary canal, blue solar panels stretch as far as the eye can see. The one-kilometer canal-top solar farm has transformed the lives of people who farm along the Narmada canal.

In the canal, water is lost through evaporation and the action of the wind. Algae clogs the motors of irrigation pumps.

The one megawatt (MW) Narmada Solar Energy Plant project was awarded to SunEdison with a mandate to provide solar power and conserve canal water.

'Floating windbreakers' connect to free floating barrels that rise with the water level, lifting the panels above. By this clever stratagem, water is shielded from the wind, yet allowed to flow unimpeded, accounting for an annual saving of almost seven million liters of water.

The panels are cooled by the water flowing below, adding a further 15 percent to power generation capacity, as compared to land-based solar plants. In the long term, if just ten percent of the 19,000 kilometer canal network in Gujarat is dedicated to canal-top solar farming, it has the potential to produce 2,200 MW of power while freeing 11,000 acres of arable land and saving about 2,000 crore liters of precious water every year.

ABB too had a part to play in this intelligent solution. We received an order for a compact substation (CSS) with a 1 megavolt ampere transformer, based on delivery time commitment. The CSS was shipped out from Nashik, Maharashtra and installed in short order. Soon after, in July 2012 we received a follow-up order to install a ring main unit, a type of switchgear.

On April 25, 2012 what the press called "the world's first canal-top solar power project" was inaugurated in Chandrasan.

For more information: www.abb.com/solar

Reaping the desert sun

Leading edge electrical balance of plant equipment for Punj Lloyd's solar plant in Rajasthan reduces lead time and delivers cost benefits

In the heart of Rajasthan's Thar Desert, 140 kilometers from Jodhpur, the village of Bap presents a vista of endless desolation marginally fragmented by a scattering of human habitation. Only the most persistent survive in the more or less perpetual environment of drought and acute scarcity.

Rajasthan's maximum daily temperature, varying between 40-45 degrees celsius, and occasionally rocketing up to 49 degrees proved ideal for Punj Lloyd Solar Limited's 5 megawatt (MW) solar photovoltaic (PV) power plant, with its 80,000 solar modules stretching across more than 40 acres of barren wasteland. A feature peculiar to Bap is the virtually flat terrain that makes it a shadow-free area and therefore, the ideal location for generating solar power and the plant is expected to reduce carbon emissions up to 5,500 metric tons per year.

This was the engineering, procurement and construction (EPC) firm, Punj Lloyd's first solar turnkey project. It was commissioned in a record time of less than three months, due in some part to ABB's optimization of systems and processes. Our innovative electrical balance of plant (EBoP) solution covers every electrical control and instrumentation system and each component in the power plant, leaving aside the generator and turbine.

We take responsibility for the complete EBoP package, from engineering, supply, manufacture and delivery, to site, installation, commissioning, testing and quality. Direct control over all engineering and project management functions enables ABB to ensure the best performance and quality of engineering workmanship and deliveries. It also makes us the single point of responsibility for inverter and all electrical works, allowing for a unified design philosophy for inverter and electrical throughout the project, reduced lead time and cost benefits for our customer.

Punj Lloyd solar plant site at Bap, Rajasthan

From the early 1990s we have been involved at a pioneering stage in just about every type of PV and concentrated solar power (CSP) technology developed across the world – this unique expertise allows us to offer everything from EBoP solution to turnkey photovoltaic power plants and complete power and automation solutions for CSP plants and for PV installations.

Smart grids are the future and ABB is at the forefront in developing the technologies and solutions that will integrate traditional types of large-scale, centralized power generation with small-scale, localized types of renewable energy like solar and wind, creating a single, optimized network with multi-directional power flows and real-time grid monitoring and market mechanisms.

For more information: www.abb.com/solar

Just imagine:

- About one-third (33%) of the land's surface area is covered by deserts
- According to Professor David Faiman of Ben–Gurion University the technology now exists to supply the world's entire electricity needs by using 10% of the Sahara Desert for solar farming
- Desertec Industrial Initiative is investing in North African solar and wind installations over the next 40 years to supply electricity to Europe via cable lines running under the Mediterranean

PVS 800 range of solar central inverters

From zero to 100 MW in less than two years

Our solar inverter combines maximum efficiency and high reliability with lowest auxiliary power requirement in the industry

The Indian solar market is one of the fastest growing solar markets in the world. The Indian Government's policy response to this rapid growth was the launch of the Jawaharlal Nehru National Solar Mission, which triggered technological developments, particularly in the solar inverter market.

ABB in India entered the solar market in 2010. Less than two years later, we have reached the magic figure of 100 megawatt (MW) capacity supplied and 85 MW commissioned. The 100 MW of solar power generates 160 million kilowatt hours (kWh) per year. In real terms: it takes about 480-500 units to power one rural home for a year; hence, 160 million kWh has the potential to light up 320,000 homes. The 100 MW of renewable energy used, also offers substantial carbon savings of almost 87 tons per year.

D Chawla, Manager for Low Voltage Drives offers a perspective on our collective global experience in inverters, "Irrespective of area of application, just in terms of hardware alone, we have supplied up to 100 gigawatts (GW) in capacity worldwide, i.e. more than 100 times the output of all solar installations in India today."

ABB inverters offer grid-supporting features such as low voltage ride-through, anti-islanding and power factor compensation as in-built features, thus ensuring reliability with the Indian grid. "What you want is high total efficiency with high reliability and long life; and that's what our product is good at," says D Chawla.

Our customers

We partner leading EPC companies like Tata BP, whom we supported in the commissioning of one of the major grid-connected solar power plants in India. Along with Tata BP, we commissioned the 17 MW-capacity solar power plant spread over 100 acres of land in Mithapur, Gujarat. Other customers include ACME group that set up a 15 MW plant that operates on solar PV thin film technology at Wadgam, Khambhat in Gujarat, and Gujarat Industries Power Company Limited's (GIPCL), 5 MW solar power plant at Vastan Mines of Surat Lignite Power Plant in Gujarat. We have also delivered EPC solutions to customers like Punj Lloyd Delta Renewables Private Limited for the 5 MW PV power plant we established for them in Bap, Rajasthan.

What makes us different?

- Maximum efficiency at 98.6%
- High reliability offers long-term benefits
- Lowest auxiliary power requirement in industry
- Compact, modular design
- On-time and ahead-of-schedule delivery
- Complete range of life cycle services
- In-built redundancy – easy to maintain/replace
- Seamless conversion from DC to AC with grid-supporting features

For more information: www.abb.com/solar www.abb.com/drives

Energy storage – why do we need it?

Delivery of power on demand depends on reliable energy stores to provide power bridges that support short-term gaps, safe shutdown and back-up needs

It's not that energy storage is a whole new concept, it has, in fact, been an integral component of electricity generation, transmission and distribution systems for more than a century. Traditionally, energy storage needs have been met by physically storing fuels for fossil-fuelled power plants, and by using generated power in pumped hydro storage schemes.

Recently however, there has been a shift in the power landscape towards using and integrating renewable energy, mostly wind and solar energy. Although renewable power generation is more sustainable in the long run, the delivery of reliable power on demand remains a major challenge.

Wind and solar power installations are affected by seasonal and diurnal changes and can only generate power intermittently and with a highly variable output. This is where energy storage plays a crucial part in supporting the grid – when the wind is blowing or the sun is shining, excess power should be stored and made available during both, suboptimal generating conditions and during peak demand.

Such fundamental changes in the architecture and controllability of the grid must be supported by smart, efficient power transmission and distribution networks. For these networks to deliver and distribute power efficiently, the storage of energy at appropriate times and locations becomes vital; both, to balance generation with consumption, and to maintain grid stability.

The right energy storage solution for the job

ABB has a long history of delivering energy storage solutions, including pumped hydropower schemes that go back over a century and more than a decade's experience in battery energy storage systems.

Our technologies address a wide range of power needs from merely tens of kilowatts up to hundreds of megawatts, thus, utilities, industrial customers and rail operators around the world continue to deploy these technologies. These facilities help balance power demands and supplies, by stabilizing network voltages and frequencies, providing power bridges to support short-term gaps, and safe shutdown and back-up needs. Eventually, our solutions are designed to enhance flexibility, increase energy securities and minimize environmental impacts.

Examples of our recent installations worldwide include Switzerland, Sweden and the UK.

Switzerland's largest battery energy storage project

ABB recently commissioned the largest battery energy storage project of its kind in Switzerland with EKZ, a leading distribution utility and one of the largest energy companies in Switzerland.

To provide additional power to the grid on demand, we supplied and installed a battery energy storage solution using Lithium-ion (Li-ion) batteries that can provide one megawatt of power for a duration of 15 minutes.

The storage facility is integrated with EKZ's power distribution network and is being used to evaluate performance in key areas such as balancing peak loads, intermittent power supply and the viability of the solution for grid optimization.

Battery energy storage increases the role of renewables in Sweden

Falbygdens Energi is a Swedish utility with a significant portion of wind power connected to the grid in the Swedish city of Falköping.

ABB was selected to supply an innovative dynamic energy storage solution, for the utility's power distribution network, to maximize the integration of renewables into the power chain. For this project, we utilized our battery energy storage expertise to store locally produced energy from wind turbines to create a storage capacity of 75 kilowatts (kW) in cycles of up to 60 minutes. The stored energy will then be used to stabilize the grid and help balance peak loads during the day.

Dynamic energy storage installation in the UK

ABB recently worked with UK Power Networks, which supplies power to over eight million homes and businesses in the UK, to develop a dynamic energy storage solution. The installation enables renewable energy generated by local wind power plants to be fed into the power network when needed. It also ensures that some of the energy is kept in reserve to regulate power flow to compensate for the intermittence of wind power and to support power quality in the event of a fault.

To meet these needs, we implemented a turnkey DynaPeaQ® solution, incorporating SVC Light®, which included eight stacks of 13 Li-ion battery modules located in an 11 kV grid.

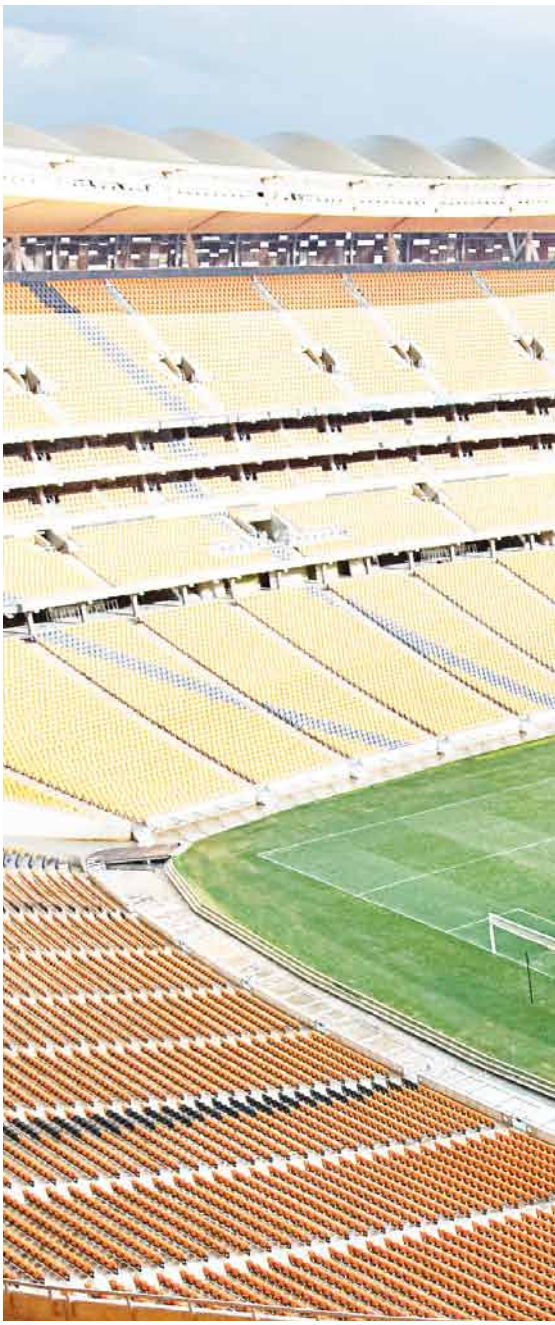
Together, these high-power density modules can store up to 200 kilowatt hours (kWh) of electrical energy.

The installation provides dynamic voltage control in the distribution system and, at the same time, enables dynamic storage of surplus energy from the wind power plant. This surplus energy is used to level out peaks in grid loading to provide grid stability.

For more information:
www.abb.com/energyefficiency

Shining a light on EURO 2012

60,000 football fans enjoyed ideal lighting conditions throughout the Group matches and during the knockout stages with centralized, intelligent lighting controls for large spaces



As the 14th UEFA European Football Championship EURO 2012, kicked off, all eyes were on Poland, one of the hosts of the event, where 16 teams were battling it out for the coveted trophy.

On June 9, 2012, 30,000 football fans gathered beneath the lights controlled by ABB's i-bus® KNX technology at the Arena Lviv stadium in the Ukraine while watching Germany play Portugal at Arena Lviv, a dedicated football stadium and one of eight around the world to host UEFA's Euro 2012.

Although the stadium was reputed to be the smallest venue, rather than its size counting against it, it proved to be an added attraction for football fans for an up close look at the action on the pitch. During the three Group B matches, in the evenings, fans and players alike, depended on optimal lighting throughout the stadium, creating bright moments off the field. Our control system ensured that no one had to sit or play in the dark. It provided centralized control of lighting systems and, through its intelligent software provided energy-efficient lighting by optimizing the brightness of the stadium to suit the natural light conditions.

On June 11, Sweden played Ukraine in the first of the tournament matches at the Stadium, in Kiev. At this stadium 60,000 football fans enjoyed ideal lighting conditions throughout the group's matches and during the knockout stages.

One hundred i-bus KNX DALI gateways connected the lighting systems in the stadium from the locker rooms to the VIP lounge and the KNX-based building control system helped rapidly control the brightness and light so that the fans got the best football experience.

Many English and French football fans had already experienced optimal lighting at the airport of Donetsk, Ukraine, where our modern building system technologies controlled the lights, and guided football fans towards their group matches.

ABB has been part of such big events in stadiums similar to those used in the Euro Cup on earlier occasions, like the 2010 World Cup. At this event we supplied dry-type transformers which served the Green

Our technologies make us partners in major sports stadiums around the world

Point stadium in Cape Town, which has a retractable roof and a seating capacity of 68,000. Similar transformers in the 500 to 1000 kVA range have been installed in the Soccer City stadium, located in Soweto, Johannesburg. This stadium, with a seating capacity of around 100,000, was the focal point of the tournament and was chosen as the venue for the opening and closing ceremonies and key matches of the tournament.

For more information: www.abb.com/knx

KNX: One system. One standard. Many interconnected functions.

- Maximum flexibility
- Offers safety and security for both people and property
- Energy–saving with climate, shutter, heating and lighting control
- Quick and simple adaptation to individual needs and use of premises, such as sports stadiums
- Replaces separate control solutions typical of technology with a single, optimal, energy–efficient system

DeNittis PV plant, Foggia – Puglia, Italy

Harnessing Italy's solar power potential

Successful delivery of 14 photovoltaic power plants in Italy with a combined generating capacity of 100 MW in just 9 months

2011 was a year of intense activity in the solar photovoltaic (PV) market. With new installations adding 29 gigawatts (GW) of solar energy across the globe, the solar PV market marked a tremendous 58 percent year-on-year growth. Italy came to the forefront as the single largest solar market, for the first time overtaking Germany, the world leader in PV. As the engineering, procurement and construction (EPC) partner of 14 PV plants, ABB was ready to step up to the challenge when the window of opportunity appeared. We are proud of having taken part in this defining moment in Italy's solar power industry especially as this is a success we can replicate elsewhere in the world.

The challenge

Setting up the 24 megawatt (MW) Canino PV power plant in Lazio was a test of our mettle in end-to-end project delivery. There were many layers of complexity in the execution of the project: hilly terrain, poor

ABB solar offerings

- Turnkey solution – design, engineering, supply, installation and commissioning
- Quick turnaround – qualifies our customers for high feed-in tariff
- Trusted engineering, procurement and construction (EPC) consortium partner
- Best-in-class substation monitoring and control system – efficiently transfers power from plant to grid
- High optimization and low power losses – push peak performance ratio above customer expectations
- Electrical balance of plant (EBoP) solution
- Remote monitoring, operation, diagnostics and maintenance from a dedicated control center in a remote location
- Full range of power and automation equipment – transformers, switchgear, inverters, protection devices, medium voltage cabinets, medium and high voltage cables, distributed control systems and control software, low voltage systems, auxiliary systems (such as lighting and ventilation)

A trusted partner for turnkey solar PV plants

Over a period of 45 years we have successfully completed 300 EPC projects worldwide in diverse industries.

soil condition, the magnitude of installation over a 95-hectare site and just as daunting, management of a 500-strong workforce. Civil works, installation and commissioning were carried out simultaneously at different places on the site and the plant was delivered in just five months.

The Canino plant supplies 103,488 modules, making it the largest lease financing PV project ever undertaken in Italy. As a result of high optimization and substantially lower power losses, the site is operating at 87 percent instead of the expected peak performance ratio of 81.5 percent.

In Foggia, three plants with a combined capacity of 39 MW were completed six weeks ahead of schedule. We were responsible for remote monitoring the plants from a dedicated PV control center in Genoa, almost 400 miles distant. Also in Foggia, four plants in a 10-kilometer area were set up three weeks ahead of time, despite delays caused by heavy winter rains. The multi-plant project has a combined capacity of 15 MW.

The Helios ITA-3 parks with two 5 MW plants, in Brindisi and Mesagne were completed in under ten weeks, well ahead of schedule and under budget. Each plant comprises 22,500 polycrystalline modules mounted on single-axis trackers. Remote operation and maintenance are carried out via the control center in Genoa.

In Sicily our company was the EPC contractor for Falck Renewables that operates solar, wind, biomass and waste-to-energy plants in Italy, UK, France and Spain. The three PV power plants at Spinasanta, Cardonita and Sugherotorto with a combined generating capacity of 13.1 MW use almost 57,000 photovoltaic cells and a support structure at a tilt angle of 20 degrees.

In Liguria we provided a turnkey solution for a large-scale roof-top PV plant. Located on the roof of a commercial building in the town of Cairo Montenotte, the plant incorporates 3,840 PV panels on fixed structures and provides 0.864 MW of electric power. This power is not used by the facility; instead it is transferred to a 15 kilovolt (kV) distribution network.

The success

Our turnkey solutions reduce the cost and risk of constructing and operating photovoltaic power plants, consequently allowing for rapid deployment. It was a real challenge to meet the time constraints on the delivery of all 14 power plants. Even so, 12 were completed ahead of schedule and a 24 MW plant was built and commissioned in five months.

There is good reason why we are second to none in speed and efficiency: for one, as leaders in power and automation, we draw on our vast manufacturing capacity for solutions. Both, procurement channels and supply chain processes are designed for speed and efficiency. Secondly, we meet pressing deadlines by successfully collaborating with local subcontractors in Italy with a proven track record. Lastly, our EPC competence and electrical expertise come into play in managing and executing complex processes on site.

In conclusion, we have a long and successful track record as EPC partners. Over a period of 45 years we have successfully completed 300 EPC projects worldwide in diverse industries – power generation, oil and gas and water, to name a few. With our EPC center of excellence located in Genoa we were perfectly positioned to execute turnkey projects for the local Italian market.

For more information: www.abb.com/solar

Did you know?

ABB has long been at the forefront of the solar power industry.
In the 1980s ABB developed the plant automation platform for the world's first concentrating solar power (CSP) test facility in Spain, and is now a leading supplier of turnkey CSP plants based on the uniquely cost-effective technology of its partner, Novatec Solar.
In 2010 we delivered comprehensive solutions for the world's first integrated solar and combined cycle power plants in Algeria, Egypt and the United States.
And, in PV power plants we have an extensive reference list of solutions that not only covers the length and breadth of Italy, but much of the northern Mediterranean as well.

Novatec Solar technology holds the key to renewable energy development

Transforming energy systems

Saudi Arabia enters a new solar era as renewable energy options hold the promise of sustainable and efficient generation of electricity

The Kingdom of Saudi Arabia is likely to spearhead the region's emerging trend towards adoption of alternative and renewable sources of energy. In 2010, the Government of KSA established the Saudi Energy Efficiency Board (SEEC), as energy efficiency was identified as a national priority. One of the objectives of the SEEC was to propose a national energy efficiency plan in order to rationalize energy usage in the country. Thus, KSA's first grid-connected solar power plant was inaugurated in 2011. The Kingdom of Saudi Arabia is entering into a new era of producing electricity through solar energy in the country. Saudi Arabia launched its first solar power plant on Farasan Island in June last year. This marked a significant step in the government's efforts to produce clean energy.

Solar – key to a bright future

Saudi Arabia has set an ambitious target of installing more than 40 gigawatts (GW) of solar power capacity by 2032, of which, 60 percent would come from concentrated solar power (CSP) and remaining from photovoltaics (PV). Concentrating solar power technology is being looked at as a pathbreaking initiative by the country as it will need to install much more CSP capacity than any other country has ever done, while continuing to develop other sources to achieve its overall renewable energy target. The CSP target could be responsible for the generation of 75 to 110 terawatt hours (TWh) of electricity per annum once it starts operations.

According to research report, 'GCC Renewable Energy Sector Analysis,' solar holds the key to renewable energy development in the Gulf Cooperation Council (GCC) region as it is the single most abundant renewable source of energy available there. Huge investments and research studies are happening in efforts to tap the solar energy in the region as part of the renewable energy development. Almost 85 to 90 percent of the money being spent on renewable energy development is being put in solar energy. The research report documents all the initiatives being taken in the individual countries to help boost their power production from solar energy. The future of solar power in the GCC region, according to the report, is as bright as sunshine.

Saudi Arabia is one of the top ranked nations with respect to residential consumption of electricity. Almost half of its power consumption is accounted for by residents. The key drivers for a strong initiative towards renewable energy is the growing understanding and acceptance by the public and private sector of the benefits of using solar power.

The government has been pushing for renewable energy as an alternative source to meet the growing domestic demand. About 20 percent of the country's electricity is produced currently by utilizing exhaust gases old power plants and through solar energy projects.

ABB as preferred partner

We have been working closely with the public utilities, Saudi Aramco, the world's largest oil producer, and the KA-CARE, the Saudi government body responsible to drive renewable energy. We are committed to be a strong industry partner and play a leading strategic role in order to achieve the Kingdom's ambitions to transform its energy system into a sustainable and efficient generation park. Localization, knowledge transfer, R&D efforts, education are just some keywords which explain what partnership means for us.

For more information: www.abb.com/solar

HVDC transformer at Songo

Clean power from Mozambique

Songo-Apollo HVDC link to transmit 2 gigawatts power from the hydro plant on the Zambezi river to neighboring South Africa

A small but fast growing economy, Mozambique in south-east Africa is poised to become the largest exporter of coal, and with hydro power and more recently, the discovery of two enormous gas fields in Mozambique waters, a major energy exporter.

The Cahora Bassa hydro plant on the Zambezi river produces 2,075 megawatts (MW), most of which is exported to neighbouring South Africa via a 1,400 kilometer (km) high voltage direct current (HVDC) transmission line. Jointly owned by Hidroeléctrica de Cahora Bassa in Mozambique and Eskom, South Africa's public utility, the HVDC transmission system comprises two parallel lines stretching from the Songo converter station in Mozambique to the Apollo station near Johannesburg.

First installed in the late 1970s, the Songo-Apollo link was largely destroyed during 25 years of civil war. Finally, a restoration project repaired or replaced nearly all the 4,200 transmission line towers, bringing the system back online in 1998.

In 2006, Eskom contracted ABB to upgrade the Apollo converter station's capacity from 1,920 MW to 2,500 MW, and also lay the groundwork for a future upgrade to 3,960 MW. Now ABB is modernizing Apollo's sister station in Mozambique.

The capacity at Songo station remains the same, but it will get new converter transformers, smoothing reactors, arresters and measuring equipment. The DC equipment will be commissioned in the second half of 2013 and the transformers a year later. As with the Apollo upgrade, this project will enhance availability and reliability, ensuring a steady flow of power from Cahora Bassa.

The two gigawatts of clean, reliable hydropower supplied by Mozambique is critical to South Africa, beset with recurring power shortages. For Mozambique, the energy exports represent an important source of income. The Cahora Bassa plant is already one of the largest generation facilities in the South African power pool, and the HVDC transmission line linking it to the South African market will provide an efficient highway for the plant's output for years to come.

Cahora Bassa Dam, Mozambique

Demand for clean energy is increasing rapidly and infrastructure projects like Songo will play a vital role in the African continent's economic success story.

For more information:
www.abb.com/energyefficiency

Going green with hybrid power plants

Complementing fuel generation with solar energy for higher output and lower fuel consumption and CO_2 emissions

At present, fossil fuels dominate the electricity generation landscape of the Middle East where, both the costs of inland fuel-burning and the environmental impact of CO_2 emissions have raised concerns.

ABB's integrated solar combined cycle (ISCC) addresses this issue by employing the region's abundant solar irradiance into highly efficient, reliable and environmentally-friendly hybrid power plants. The concept combines conventional fossil fuel-powered steam turbines and a solar thermal steam generator to provide reliable and clean power.

Unlike classic, open-cycle, gas-fired power plants, releasing high temperature flue gasses directly into the atmosphere, ABB's combined cycle solution makes use of this residual thermal energy, by producing steam in a heat recovery steam generator (HRSG). In parallel to this heat recovery generated steam, ABB Novatec's Fresnel-based solar boilers produce a second stream of superheated steam. Due to the high solar thermal steam parameters achieved in the solar boilers, the two streams can operate independently, resulting in high flexibility.

World's first solar hybrid coal-fired power station of ABB in Liddell, Australia

Increased energy efficiency – decreased emissions

This solar-augmentation process results in an increase of output power of the otherwise low-efficiency, fossil fuel-fired power plants. In addition, it results in a significant reduction in fuel consumption and CO_2 emissions. This hybrid approach with the integration of solar power helps mitigate the effects of the fluctuant nature of solar irradiation. By modulating the fuel input of the plant, these fluctuations can be compensated, resulting in a permanent coverage of the grid's power needs.

ABB Novatec's power plant in Liddell, Australia, is the world's first integration of solar thermal technology with a traditional coal-fired power station. The project commenced in early 2011 and was completed in January 2012. The 9.3 megawatt (MW) power station consists of four rows of linear Fresnel reflectors, covering an area of 18,000 square meters, almost the size of three football fields.

Enhanced oil recovery

Apart from utility electricity generation, the idea of complementing fuel generation with solar energy can be particularly useful for reducing the fuel consumption of energy-intensive industries. For the major oil producers in the Gulf Cooperation Council (GCC), the solar-based enhanced oil recovery (EOR) displays the potential of significantly increasing the amount of extracted crude oil, while lowering the fuel costs. By injecting solar generated steam into the oil beds and heating them, the viscosity of the heavy crude oil can be reduced and facilitate its pumping to the surface. Already technologically proven, the concept can increase the amount of extractable oil from aging wells by upto 60 percent. The on-site infrastructure, together with the pre-existing operating licenses, further enhance our high-efficient, clean electricity generation concept into a profitable turnkey solution.

ABB innovation and development of hybrid power plants provide a more energy-efficient option for electricity generation in the Middle East, which relies heavily on fossil fuels. In addition, the EOR method can increase the amount of oil extracted by using solar generated steam – both technologies are a vital step forward to lowering the environmental impact of CO_2 emissions, which is an increasingly pressing issue, both in the Middle East and around the world.

For more information: www.abb.com/solar

Lethabo plant goes on stream

ABB builds first South African solar power plant in record time as part of a pilot scheme to reduce the national utility's carbon footprint

The inaugural ceremony at the Lethabo solar PV plant in November 2011

Completing the first South African solar power plant in record time, ABB has surpassed industry expectations. The greenfield photovoltaic (PV) power plant, based adjacent to the Lethabo power station in Gauteng, was completed in just 75 days and will provide power for the plant's administration buildings, while reducing the facility's auxiliary power consumption.

The Lethabo project, which was commissioned by Eskom, South Africa's national utility, was inaugurated in November 2011 by national Public Enterprises Minister, Malusi Gigaba. ABB was tasked with pioneering a single axis tracking solar PV system with a peaking capacity of 575 kilowatts (kW) and an annual production potential of 12.5 million kilowatt hours (kWh).

Similarly, ABB also won the Eskom PV contract for installing a fixed-tilt solar PV power plant at the Kendal station, in Mpumalanga, with a 620 kW capacity and an annual production potential of 11.4 million kWh. This project was successfully launched on November 25, 2011.

Both PV projects form part of a pilot scheme aimed at eventually reducing Eskom's carbon footprint. To optimize productivity, high-efficiency ABB monocrystalline PV panels were selected because of their uniquely efficient concept for PV power plants. The approach combined high levels of customization, rapid turnkey delivery and system optimization technologies that enable the plants to generate around 20 percent more energy than alternative designs.

The PV plants are designed to operate independently to produce electrical power for use by the existing power stations and will be capable of remote operation and monitoring.

The technologies, several of which are patented by us, include a programmable logic controller (PLC) that increases tracker accuracy and an automatic switching system that optimizes the number of panels connected to each inverter enabling the plant to harness more energy at all times, even during periods of poor light like dawn, dusk and cloudy weather.

ABB's turnkey solution included the design, engineering, erection, grid connection and commissioning of the groundbreaking solar plants. The electrical, control and automation equipment as well as the optimization technologies to be deployed were also manufactured by us.

Rapid delivery was facilitated by our well-proven concept of pre-assembled, factory-tested electrical balance of plant modules, and by our expertise in project execution, which, in the case of Lethabo and Kendal, have cut weeks off the conventional delivery time to enable the plants to be fully operational in record time.

For more information: www.abb.com/solar

"The world-class technology will give ABB in South Africa the opportunity to transfer skills in solar technology, further complementing and enhancing local capabilities in engineering and project management."

– Goetz-Dietrich Wolff
Manager of Power Generation business in South Africa

Spotlight falls on solar desalination

Innovative, energy-efficient technology addresses the challenge of providing fresh drinking water in water-scarcity zones

At present, countries in the Middle East face a major water challenge due to the scarcity and rapid depletion of freshwater resources. This is further complicated by the heavy financial and economic burden in providing desalinated and treated wastewater. ABB's innovative energy-efficient technology for the water industry evoked a lively discussion at the event, among researchers, executives, decision and policy makers, and other stakeholders.

Discussions at the 10th Gulf Water Conference in Doha, Qatar, covered water security and food sustainability, management of natural resources, groundwater and surface water, management of the municipal water sector and desalination technologies – the topic we focused on.

Solar desalination is a technique used to desalinate water using solar energy. High drinkable water scarcity zones usually correspond to high Direct Normal Irradiance (DNI) areas such as the Middle East. ABB offers products for the complete water cycle from collection, through purification and transportation to distribution and re-use, serving customers with enhanced, efficient and reliable products and solutions.

Focus on energy efficiency

Desalination plants play an essential role where increasing demand for potable water outpaces the availability of natural resources. Our portfolio includes a wide range of products and solutions for Reverse Osmosis (RO), Multi-Stage Flash (MSF), Multiple-Effect Distillation (MED) and hybrid desalination plants, with a specific focus on energy efficiency.

Juha Alopaeus, Country Manager, ABB in Qatar, attended various sessions at the conference during the three days. He said: "The event offered a useful platform to discuss ABB's technology geared towards the water industry. Solar desalination offers the most promising option for use of solar energy and ABB has a strong focus towards solar desalination plant opportunities which are of particular importance to this region."

At the conference, a white paper on 'Solar Desalination: Important Technology Aspects,' was presented by Shrikant Bhat, Control and Optimization Group, Research Department, and Senthilmurugan S, from Water Industry Sector Initiative.

In addition, we hosted a networking booth to discuss and present solutions, systems and products for the water industry with specific focus on desalination, solar, pumping stations, water distribution and irrigation networks.

For more information: www.abb.com/solar

Leading innovation in solar desalination technology

Hotel Show, Dubai
Increasing energy efficiency in hotels

Rising energy demands and energy costs world over have brought more and more people around to the view that energy efficiency is the alternative fuel. At The Hotel Show in Dubai, UAE, ABB showcased the i-bus® KNX technology which encourages efficient energy usage. Meanwhile, the thrice-nominated KNX team from ABB in Egypt walked away with the 2012 KNX Award at the Light and Building Fair in Frankfurt, Germany.

"The hotel industry has started to focus more on automated solutions that provide greater energy efficiency, convenience and ease of use. Buildings with our technology are easier to manage and control, it allows an everyday working or living environment to be easily adapted to the individual's needs while saving energy."

– Tarek Zakaria, regional manager for KNX building technology, Middle East and Africa

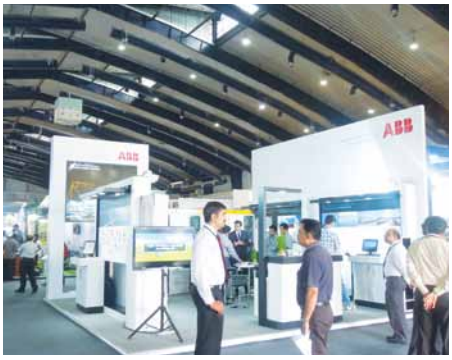
Automation solutions for buildings

Solarcon, Bangalore and Renewable Energy World, New Delhi
Capturing the power of the sun

With the world's focus firmly on the need for increasing the proportion of renewables in the energy mix, ABB shared its portfolio of solar energy solutions at Renewable Energy World 2012 exposition in New Delhi and SOLARCON in Bangalore.

"The intensive preparation that went into displaying our solar portfolio and the in-depth discussions that followed with various clients and visitors really paid off. The renewables industry is going through a consolidation phase in India and the demand and opportunities for extending power infrastructure have resulted in an open, professional and specific exchange of information."

– Subir Pal, Country Manager, Industry Segment Initiative (ISI)



SOLARCON, Bangalore

Renewable Energy World, New Delhi

Aquatech, New Delhi
Managing a precious resource

Conservation is the most environmentally sound way of reducing demand for water that is a fast depleting resource all over the globe. ABB shared its contributions to sustainable resource management at Aquatech, the largest international water show in India.

"We rolled out our complete package of solutions for instrumentation, control and electrical (ICE) on a LCD screen, from motors, switchgear and automation, through desalination, water supply, sewage treatment and effluent treatment plants to lift irrigation, canal automation and non-revenue water. We got great mileage from Aquatech, closing two orders for instrumentation on the spot."

– Ravindra Akki, Country Water ISI, Manager, India

Forthcoming events in the region

Southern Gulf and Pakistan

ADIPEC 2012
www.adipec.com 11-14 November

Let ABB present convincing evidence on how we can increase asset performance by 6%.

Ask for proof on how we can achieve the extra output and we will show you how we can lower cost and add more value to your business by focusing on the real issues you are grappling with today:

- Extend asset life and reduce operational expenditure
- Reduce emissions and energy consumption
- Make optimal use of assets and take quick decisions
- Stabilize power input and improve power quality
- Safer operations

Visit us at Adipec 2012, November 11-14, Abu Dhabi National Exhibition Center (ADNEC), Abu Dhabi, UAE.

Seatrade Middle East Maritime

Visit us at Seatrade Middle East Maritime, November 27-29, 2012, Dubai World Trade Center – UAE, Stand M1.
And find out more on increased uptime on turbochargers and reduced operation cost.

Central Africa and Egypt

MEPCON12

Get to know the latest technology trends at Middle East Power Systems Conference MEPCON '12 from December 23-25. The 15th international conference at Alexandria in Egypt will explore power systems in depth, from smart grids and power electronics to FACTS and HVDC transmission systems.

India

5th ELAsia 2013
INTERNATIONAL EXHIBITION ON POWER, ELECTRICAL AND LIGHTING

Visit us at ELASIA 2013, the international exhibition on power, electrical and lighting from January 4-6, 2013, at BIEC, Bangalore, where you can see the very latest low voltage product offerings from ABB.

Solar integration and export

Dedicated solutions for integrating solar power in the utility grid and trans-continental transmission via HVDC enable our customers to optimize operations and boost profitability

We support our customers right from selecting the optimal generation solutions through to enabling the reliable and profitable employment of their solar power. This translates to developing and embedding dedicated solutions for grid integration and commercialization of solar electricity. There are a range of solutions available such as: micro-grid approaches for distributed generation, dedicated energy management tools and high voltage direct current (HVDC) transmission lines for enabling the export of the Middle East's solar power.

Dedicated solutions for grid integration and commercialization of solar power

Micro-grids integrate solar power

Depending on the penetration level – share of the total instantaneous power in the grid – the reliable integration of electricity originating from intermittent sources such as solar irradiation requires precise pre-processing steps, voltage and frequency regulation and control. ABB PowerCorp manages to fully integrate solar power into the existing grid, by employing SMART GRID control and automation techniques (Distributed Power Control and Dispatch Systems), as well as an innovative, fast and highly charged/discharged efficient flywheel storage for grid stabilization.

HVDC the highway for solar export

Favorable trends around solar generation in the Middle East and North Africa (MENA) region have brought the vision of exporting solar electricity, considerably closer to reality. It is ABB's groundbreaking discovery of high voltage direct current transmission that has built the highway that makes this export possible, technically reliable and economically feasible. Through HVDC transmission, large amounts of power can be sent over long distances, with both, low capital expenditures and significantly decreased resistive and capacitive losses. ABB's HVDC Light, specifically designed for underground or underwater transmission, is the ideal candidate for exporting ME solar energy undersea. Together with the other 11 industry founders of the Desertec Solar Initiative, we are focusing on the feasibility, financing and construction of the interconnection plan.

The solar plants to be built in North Africa need to be interconnected, but most of all, the power needs to be transmitted over to Europe through HVDC as it is across the sea.

Smart energy management

The gradual shift from a centralized power flow, to a multi-actor energy market, calls for a strategic employment of the generated power. Our dedicated tools enable customers to both optimally operate their plants and profitably participate in the energy market. By employing Intelligent Solar Information Systems (ISIS®), the solar plant owner can easily perform a real-time remote monitoring and operation of his installation via Internet Explorer.

Dedicated demand/response management tools facilitate the coordination between the solar plant, other generator types and the loads existing in the grid and thus enable the strategic operation of the plant. Tools such as Ventyx Virtual Power Plant, enable both the utility to incentivize the selling of clean solar energy and the environmentally conscious users to choose it.

For more information: www.abb.com/solar

Highly efficient and cost-effective CSP power plants

Leading through innovation

Applying a range of efficient and reliable solutions suitable for harsh desert climates, from concentrated solar power to solar steam

We are committed to providing the most efficient, reliable and competitive solar solutions for high direct normal irradiation (DNI) regions between 1,800-2,500 kWh/m^2/year and hot climates such as the Middle East. To support this, ABB has established strategic partnerships with the provider of the best performing concentrated solar power (CSP) solution: Novatec Solar.

ABB Novatec's CSP solution

In March 2011, ABB acquired 35 percent of Novatec Solar's shares and integrated their innovative Fresnel Linear Collector technology into the company's power generation portfolio, making ABB a turnkey supplier of highly efficient and cost-effective CSP power plants. Linear Fresnel reflectors use long, thin segments of flat mirrors to focus sunlight onto a fixed absorber located at a common focal point of the reflectors. These mirrors are capable of concentrating the sun's energy to approximately 30 times its normal intensity. Novatec Solar is the pioneer developer of the first commercial CSP Plant called Puerto Errado in Murcia, Spain, operating since 2009 at a power plant efficiency of 38 percent.

Employing the Fresnel reflector principle, ABB Novatec's CSP plants achieve performances appreciably higher than the traditional parabolic trough plants. Super thin, flat and light panels are used which are not only inexpensive to manufacture, but also easy to transport, install and maintain. The secondary reflector contributes to the superheating of steam up to 500 degrees centigrade, which translates into a significant efficiency gain, especially in regions with high environmental temperatures.

Solar steam and its range of applications

Besides CSP plants for power generation, there are other ways of using process steam generated directly in Novatec's Linear Fresnel Collectors. ABB Novatec's solar boiler can successfully be employed for retrofitting low-efficiency gas-fired plants, a predominant component of the current Middle Eastern energy mix. The CSP augmentation employed in the integrated solar combined cycles (ISCC) power plants is based on heat recovery and steam superheating in Fresnel boilers. The integrated solar combined cycle concept is a hybrid power plant. It is a conventional gas turbine combined cycle and a solar thermal steam generator that provides reliable and clean power. Due to the high solar thermal steam parameters achieved in Novatec's Fresnel-based solar boilers ABB's ISCC cycle provides high solar shares at very low cost.

Another clever way of using solar generated steam is for oil recovery purposes, the so-called Enhanced Oil Recovery. According to a recent report by SBI, conventional oil recovery methods are only able to extract about 10-30 percent of the potential oil from any given reservoir, leaving nearly 70-90 percent of the reservoir's oil in the ground source.

Injecting solar steam into the oil fields, heats the reservoir, reducing the viscosity of the untapped heavy crude oil and facilitating its pumping. EOR technologies can increase the quantity of extractable oil from aging wells up to 60 percent. (Source: US Department of Energy – http://www.fossil.energy.gov/programs/oilgas/eor/index.html)

Further applications which are of great interest and focus in the Middle East are solar cooling and solar desalination where ABB's long experience enables the design of all components in a way to reach economical optimum regarding output and efficiency.

For more information: www.abb.com/solar

Spurring Africa's growth

Custom-made solar solutions expand local engineering capabilities, benefitting both, the people and the environment of the African continent

Africa has an abundance of natural resources and many African countries are counted among the fastest growing economies in the world. So, on the one hand the continent continues to grow exponentially, while on the other, the World Bank has estimated that more than 500 million Africans are living without electricity. It is estimated that by 2015 Africa will produce 20 percent of global oil and by 2040 the African population may exceed that of India or China. With growing economies and booming populations, providing reliable electricity is becoming a huge challenge. Transmission and distribution grids in many parts of Africa are operating close to capacity, and although new grids are being built rapidly, many Africans still have no access to electricity.

A lucrative marketplace, Africa has been identified by ABB as a key growth market. With our industry expertise and comprehensive environmentally-conscious portfolio, we are currently operational in more than 15 countries on the African continent: namely Algeria, Angola, Botswana, Côte d'Ivoire, Democratic Republic of Congo, Cameroon, Egypt, Ghana, Ivory Coast, Democratic Republic of Congo, Kenya, Mauritius, South Africa, Uganda, Zambia and Zimbabwe.

To accommodate the growth on the African continent, South Africa and Egypt have been identified as centers of excellence in an initiative called the Focus Africa Re-wire strategy. The two countries will continue to drive sales in Africa by recruiting and training additional sales engineers who will be active in the market

Johannesburg – the commercial hub of South Africa

with existing customers while developing and extending our customer base.

As a center of excellence, South Africa provides support to Angola, Congo, Kenya, Tanzania and Mozambique. These countries form part of the sub-Saharan region. Predictions in the World Bank's latest 'Global Economic Prospects' report indicate that the sub-Saharan African region is expected to record a 5.3 percent growth in 2013 as global firms and domestic demands remain robust. Despite a slower projected growth, developing countries are expected to account for more than half of the global growth from 2012 to 2014. Huge investments in infrastructure are an integral part of the springboard for economic growth for both South Africa and for the whole southern African region. The reliable supply of electricity, therefore, remains a pressing issue on the continent.

While globally coal remains the main source for the production of electricity (40 percent), with natural gas accounting for more than 20 percent, almost half of the electricity-producing countries of the world have an emission factor of below 500 g CO_2 / kWh in 2009. However, Africa, with its large share of coal in the power mix, continues to be a very high CO_2 emission producer, presenting both challenges and opportunities for the introduction of greater levels of energy efficiency through the deployment of alternative and renewable sources.

Through energy efficiency, companies – and countries – can improve their sustainability significantly, allowing them to focus their effort on other important elements such as staff and skills development.

Globally, the energy efficiency of thermal power plants alone has improved by three percentage points since 1990. However, strong disparities still exist between developed countries and the developing world, where efficiency is low, mainly due to aging plants and the large share of coal in thermal generation. Africa in particular needs to be smart and forward thinking with its technology and automation investments.

With its recognized expertise in power grid efficiency improvements, ABB has worked with many power companies and authorities around the world to reduce the rate of transmission and distribution losses. However, most of these improvements were effected in developed countries, mainly through the use of low-loss conductors and transformers, the standardization and upgrading of transmission and distribution voltages, and reactive power control. It is now our aim to play an even bigger part in driving the fast-track developmental agenda for Africa, particularly south of the Sahara by strategically deploying the most suitable of our many innovations.

ABB recently launched a new concept for turnkey concentrating solar power (CSP) plants based on a low-cost, highly efficient and highly scalable technology that uses considerably less material, land and water than any other CSP technology. The ABB-Novatec Solar concept can be used to generate energy in a wide range of applications including stand-alone or hybrid power plants, as fuel-savers in existing power plants, in desalination and district cooling plants, and in industrial processes that require steam. This is a fine example of a solution ideally suited to the African continent's requirements.

Expanding local engineering capabilities and working with customers to develop custom-made solutions that will benefit the people and the environment while making the business more sustainable is ABB's key objective for Africa. It has the technology, the expertise and the experience to leverage its footprint with production in all five divisions.

One of sub-Sahara's most recent wins is the five-year Full Service® contract with Namibia Custom Smelters (NCS). ABB will manage all maintenance to improve productivity and equipment reliability at the

Enhancing local engineering capability

copper smelting and converting plant in Tsumeb, some 425 kilometers north of the capital, Windhoek. We will also provide process optimization, energy consulting and equipment life cycle services, mainly through the retained maintenance staff and management who will be further trained to meet our performance standards.

The plant houses two primary smelting furnaces and three converters. It has an annual production capacity of 200,000 tons of copper concentrate from the treatment of complex copper concentrates containing gold, silver and arsenic. The smelter is one of only a few in the world which is able to treat arsenic-bearing copper concentrates.

Another exciting project is the Rand Water project in South Africa. This project includes the supply, delivery, installation and cold commissioning of 78 switchgear panels to four Rand Water sites namely, Amazimtoti, Vereeniging, Lethabo and Palmiet. Rand Water is an organ of state, reporting to the Department of Water and Environmental Affairs. Their distribution network includes over 3,056 kilometers of large diameter pipeline, feeding 58 strategically located service reservoirs. Its customers include metropolitan municipalities, local municipalities, mines and industries and it supplies, on average, 3,653 million liters of water to these customers daily. In order to ensure continuity of supply, Rand Water invests huge resources to expand, upgrade and maintain its infrastructure. An important aspect of this infrastructure development program involves the security and quality supply of its electrical energy to the various treatment, pumping and distribution stations. In order to achieve the safe and reliable supply of electrical energy, they have embarked on a medium voltage switchgear replacement project which spans across the various areas of its operation. ABB in South Africa was awarded phase one of the switchgear replacement project in February 2012 at a value of R21.5 million. Our superior technology and compliance to the IEC 62271 standard, coupled with extensive experience and credibility in the water industry, were some of the key factors in winning us this order. The estimated date of completion for phase one is June 2013, and once complete, it will assist in enabling Rand Water to continue to supply high quality potable water to the Gauteng region.

A pioneer project in the region involves a 2 x 300 megawatt (MW) interconnection between a converter station in the Caprivi strip in Namibia, close to the border of Zambia, and another converter station, about 300 kilometers north of Windhoek. Known as the Caprivi Link Interconnector, the project spans over a distance of 950 kilometers, with AC voltages of 320 kilovolt (kV) and 400 kV on the two ends of a bipolar 350 kV DC overhead line. This is the first HVDC Light® project to be built with overhead lines. ABB was responsible for system engineering including design, supply and installation of the two converter stations and earth electrodes. This is the first time that this technology will be used for overhead transmission lines. The Caprivi Link Interconnector will increase grid reliability and enable the establishment of power trading in the southern African region.

The African continent certainly has established itself as the world's current focus for business growth opportunities and ABB is poised to leverage those opportunities, while contributing in a significant way to the sustainable development of a great continent.

For more information: www.abb.co.za

Executive editor: Karen Wilds
Editor-in-chief: Sanaj Natarajan
Production team:
Ali Kelani, Anita Ramkumar, Arnab Sarkar, Claire Hill, Devaashish S. Savant, Erika Velazquez, Giridhar Sharma, Ivor Vidjen, Michael Wachter, Natasha Mathebula, Peter Stierli, Rakesh Shastri, Rubi Rakha, Sanaj Natarajan, Tamara Chetty Tuija Elomaa-Maenpaa, Wendy Joseph

Contact is published in English for circulation among ABB customers and stakeholders with an interest in ABB offerings, products and technologies.

Preview 3|12

Energy Efficiency – doing more while lowering costs and emissions

ABB has been in the energy business for 120 years. Using energy more efficiently will not only contribute the lion's share of emissions reductions needed, it is arguably the most sustainable and cheapest way to reduce emissions and address global energy security. Energy-efficient systems can pay for themselves in energy saving, sometimes within months, and further reduce operation and maintenance costs in the long term. Plug in to the next issue of Contact to understand how we help our customers squeeze the most value from each unit of energy they use.

Connect renewable power to the grid?

Electricity generated by water, sun and wind is most abundant in remote areas like mountains, deserts or far out at sea. ABB's leading power and automation technologies help renewable power reach about 70 million people by integrating it into electrical grids, sometimes over vast distances. Our effort to harness renewable energy is making power networks smarter, and helping to protect the environment and fight climate change. **www.abb.com/betterworld**

Naturally.

Power and productivity
for a better world™

ABB