3|12

contact

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

Energy efficiency – doing more with less

Power and productivity
for a better world™

contact 3|12

Bazmi Husain
Country Manager and
Managing Director
ABB Limited, India

Dear friends,
India is growing and so are our energy needs. Unfortunately, the gap between the electrical energy we produce and our requirements has been steadily increasing, affecting growth and the stability of our power network. Our attempt to add more generation capacity is at a cost to the environment. And, reducing demand at the cost of growth is not a real option.

Energy efficiency has the promise of reducing the gap in the most economical and environmentally friendly manner in the near term. In the longer term, efficient use of energy will allow our economic growth to be sustainable.

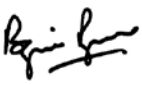
ABB has invested in technologies to improve the efficiency of electricity generation, transmission and distribution, to make more energy available at the point of use. Our optimization solutions, network management solutions, high voltage DC transmission and flexible AC transmission are some examples.

Our high-efficiency motors, drives, control systems, energy management systems, lighting solutions, turbochargers and charging solutions all make energy go further in industry, residential and commercial buildings and transportation.

Here we feature glimpses of some solutions we provide as well as global successes through innovations and expertise that ABB has pioneered in the field of energy efficiency.

Welcome to the world of energy efficiency – the alternative fuel!

Best regards,



Bazmi Husain

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News

Energy efficiency

For a better world

Product news

In focus

Expanding the Saudi power grid

Orders, worth around $170 million, were booked to execute substation projects for the Saudi Electricity Company (SEC), the country's national power transmission and distribution operator.

The design, supply, installation and commissioning of a substation will help meet the increased demand for electricity in and around the central pilgrimage area of Makkah, which hosts millions of the faithful every year. The substation deploys our compact and robust gas-insulated switchgear (GIS) technology, and will be accommodated in a multi-storied building. Its considerably smaller footprint is ideally suited to tight spaces.

International Monetary Fund (IMF) estimates population increase from 28 million to approximately 37 million by 2020, with nearly 85 percent living in urban areas. Saudi Arabia has among the highest residential electricity consumption in the world. The country is executing an ambitious Ninth Development Plan (2010-2014) aimed at raising its installed power generation capacity by more than 20 gigawatts (GW) to reach around 72 GW by 2014.

For more information: www.abb.com/substations

Center for learning, Faridabad

On the 18th anniversary of Low Voltage Products (LP) operations in India, a training and demo center, the first of its kind in Northern India, was inaugurated. It will display the full range of products from LP and Discrete Automation and Motion (DM) divisions and be open to and benefit both customers, as well as internal sales engineers. The training center can accommodate classroom training for 12 participants at a time. It features a live Robot Demo facility and KNX training for system integrators kicked off in November 2012. The new center will ideally be used in different ways to showcase latest offerings to prospective customers and to offer training to engineers, authorized service dealers, customers and end users.

For more information: www.abb.com/lowvoltage
www.abb.com/robotics

In brief

Making a mark

The Golden Peacock Global Sustainability Award 2012 was presented to ABB in India on 11 October 2012 at Nursery Pavilion Hall of Lord's Ground, Marylebone Cricket Club (MCC) in London.
In Nashik, the vacuum interrupter (VI) team won the 13th Annual Greentech Environment Excellence Award 2012 in the Silver category for outstanding contributions to energy conservation.

Riding the metro

On his visit to India, our Group CEO, Joe Hogan caught a ride in the pride of Bangalore, the newly started metro service from MG Road to Byapanahalli. Earlier this year, the Bangalore Metro project team from ABB received an award from BMRCL for successfully completing one million safe man-hours.

Investing in India

To help customers access technology at more competitive prices, ABB is investing in local production of gas-insulated (GIS) and hybrid switchgear (PASS), and distribution transformers in Gujarat. The facility will be operational in 2013.

Boiler fingerprinting for captive power plant

Rising fuel costs and tightening emission norms are forcing captive and utility power plants to be more energy-efficient and reliable. Recently, we were invited by a captive power plant customer to conduct an energy audit of an under-performing boiler and recommend the means to improve performance in terms of efficiency and reduced fuel bills. This included the issue of steam balance mismatch between steam generation and steam utilization.

The ABB team visited the plant, interacted with plant management, engineers and operators to understand the key concerns. Based on the plant data collected, a detailed, steady state and dynamic performance analysis was carried out. Both, control loop designs and tuning were investigated and the reasons for under-performance of some of the key control loops were identified. All the key findings were presented, along with recommendations for improving the performance of the boiler, and are to be implemented shortly. The typical investment towards implementing the solution is in the range of 60-70 lakhs INR, while typical benefits range from 30-70 lakhs INR per annum.

For more information: www.abb.com/energyefficiency

India service tie-up with SAIL

SAIL, one of India's largest steel manufacturers, operates 10 steel plants, five of which are Integrated Steel Producers. It is currently in the process of modernizing and expanding its plants, extensively adopting state-of-the-art technologies, and requiring re-deployment of a large part of its workforce.

Over a period of two years, we will train about 4,000 employees across the various plants of SAIL.

This will facilitate SAIL in developing and enhancing technical competency, to adapt and maximize returns on deployed technologies. ABB has a huge installed base of products, systems and solutions across all SAIL plants, measuring, controlling and optimizing many process-critical applications.

The training will be conducted mostly at SAIL plants, as well as ABB locations, and will cover a wide portfolio. For improved training effectiveness, the modules are developed to include theoretical and hands-on exercises using specially designed training kits/simulators.

For more information: www.abb.com/service

Why energy efficiency?

Using energy more efficiently is critical to business and national competitiveness. It's also the fastest, most effective way to protect our environment by breaking the link between economic development and climate change.

Mechanical hoist drum at Totten mine, Sudbury, Ontario, Canada – equipped with energy-efficient drives from ABB

We have been in the energy business for over 120 years and ABB technologies are used along the entire energy value chain, from the extraction of resources and their transformation into electricity, liquefied natural gas or refined petroleum products, to their efficient end use in industry, transportation and buildings.

Utilities

Power generation is by far the largest energy consuming industry. The efficiency varies widely with the fuel and technology used: in traditional coal-fired plants, only about 35 percent of fuel consumed is converted into electricity.

In addition to high conversion losses, power plants consume on average, 5 percent of the electricity they generate. Using sophisticated control systems and energy-efficient equipment can reduce energy consumption by 10 to 30 percent.

We also address thermal energy efficiency of boilers – by automating their future efficiency, one chemical plant was able to realize $300,000 in energy savings across four boilers, as well as improved performance, from a $75,000 investment.

Nine percent of all the electricity generated worldwide is lost in transmission and distribution. Flexible AC transmission systems (FACTS) enable more power to travel over existing networks, which is critical in dense urban areas.

And, ABB high voltage direct current (HVDC) electrical transmission and high-efficiency power and distribution transformers reduce power losses over great distances. This can help integrate renewable energy from remote locations into the grid, or to bring reliable electricity to remote mines or offshore platforms.

Industry

Just six process industries account for two-thirds of the global final energy consumption: iron and steel, oil and gas, chemical and petrochemicals, non-metallic minerals, pulp and paper, and non-ferrous metals. Despite significant improvements through energy efficiency, there is still room for ways, which complement rather than change production processes in energy-intensive industries.

We help customers improve efficiency in two ways:

1) Through leading technologies: In

Improving energy efficiency has the clearest impact on saving money, improving business results, and delivering more services for consumers. The UN global initiative on Sustainable Energy for All

2011, the global installed base of ABB variable speed drives saved some 310 million megawatt-hours of electricity, the equivalent of the annual power consumption of 75 million EU households.

2) Through our experts, who help customers understand where and how they use energy, and then identify and implement opportunities for improvement. Over ten years of experience in many industries, we have learned that energy savings of 5 to 35 percent can often be created.

Transportation
Innovations for shipping

Around 90 percent of world trade is carried by some 70,000 vessels that make up the international shipping industry. Fuel accounts for 30-40 percent of the cost of running a cruise ship and between 50-60 percent for most merchant vessels. ABB's Azipod®, the world's first rotating propulsion device, fitted to the outside of a ship's hull, is now installed on half of all cruise liners built over the past two decades, reducing energy consumption of open-water vessels by 5 to 15 percent.

ABB's experts have worked on some 3,000 marine automation and control systems around the world, which are

Dual hoist ship-to-shore cranes – Busan, South Korea

supported and maintained by experts at 22 marine service centers.

We are also developing a complete suite of software products, known as Smart Marine Integration (SMI), to monitor, control and optimize every energy consumption process during vessel operation. Some components of it are already available and Finland-based Viking Line, has selected ABB's energy management system for a new ultra-energy-efficient passenger vessel that will have almost zero GHG emissions.

Keeping rail energy usage on track

Rail is seeing renewed interest as a sustainable and energy-efficient form of transport, capable of reducing congestion, emissions and noise.

We supply components for both rail infrastructure and rolling stock, and are one of very few independent suppliers to offer a complete traction package to rolling stock manufacturers. We have solutions to transfer power efficiently from grids to railways. Our regenerative braking systems capture and store energy that would otherwise be lost, and high-efficiency turbochargers boost the performance of diesel engines.

In just 13 months we developed a new traction converter to refurbish the first fleet of high-speed InterCityExpress trains operated by Deutsche Bahn, Germany's national rail operator, cutting energy by at least 12 percent. This is the first project worldwide involving the exchange of high-speed train converters while leaving all other components of the traction chain and all interfaces unchanged.

Buildings

By 2050 there will be 4.5 billion people in cities around the world, creating an urgent need for infrastructure. Old buildings offer room for improvement, while modern buildings house energy-intensive data centers and sophisticated air conditioning systems.

ABB's intelligent building control system, based on the KNX global open standard, is increasing efficiency in thousands of new and existing buildings in more than 60 countries, enabling customers to reduce energy consumption by about 50 percent, with a payback period of between one and five years. Three ABB i-bus® KNX-equipped buildings in Singapore, including the region headquarters of Xilinx, Applied Materials Inc, and the Singapore National Library, have won prestigious BCA Green Mark Platinum awards from the Building and Construction Authority for their energy efficiency.

Annual consumption for heating and ventilation can be cut by as much as 45 percent using very simple methods, such as individual room temperature control, combined with moderately reducing the room temperature, or heating control based on the outdoor temperature.

High-efficiency motors and the alternating current (AC) drives used to control them offer further efficiencies as motors consume about 40 percent of a building's electricity, and AC drives can reduce energy consumption in these applications by as much as 80 percent.

Putting it all together

Many technologies that improve energy efficiency are readily available. However, often, the greatest potential for savings often lies in the gaps between production processes and functional silos – manufacturing, facilities management, maintenance and support processes such as electrification, compressed air, steam and water.

For this reason, ABB advocates a holistic approach – understanding where and how energy is used so you can prioritize projects which will bring

Interview

Energy efficiency as a sustainable, competitive advantage

Jim Kelly, head of ABB's global energy efficiency initiative, discusses the potential and the challenges of energy efficiency.

Why is energy efficiency such a hot topic today?

It's high on the radar of countries and industries alike because energy is increasingly one of our greatest challenges. Security of energy supply is a very real problem, from generation shortfalls to unreliable power quality. Businesses in locations with comparatively high energy prices are finding it more and more difficult to compete in a global marketplace.

At the same time, the world has become intensely aware that we can't continue meeting the challenge of secure, affordable energy only by adding new carbon-based thermal generation capacity. Industrial energy efficiency doesn't command the media attention of solar power or electric cars, but it is a workhorse for tackling climate change.

Are the technologies to create this savings already available?

Yes. There are a slew of automation and power solutions that are well proven. It's not just the technical features – there is ample evidence of the business benefits. Naturally there are cost savings, but in addition, companies who learn to do more while using less energy are more competitive overall and enjoy enhanced reputation.

We've also found that, improving energy efficiency often provides the greatest business benefits, and then ensuring their successful implementation. This improved 'energy transparency' also helps build the business case for future efficiency investments, creating a process for continuous improvement much like those for quality and operational excellence.

operational benefits. For example, improperly tuned boilers not only waste energy, but they are often unable to respond quickly to changes in steam demand – this can hurt product quality and reduce plant throughput.

So are a lot of companies embracing these technologies?

We see a big disconnect between recognition and action. In an ABB-commissioned global survey of top industrial executives, while about 90 percent acknowledged that energy efficiency will be a critical success factor for their business in the coming decades, only 40 percent had invested in energy efficiency in the past three years and only a third had undertaken a plant-wide energy audit.

How do you account for this gap?

It really comes down to a lack of facts and resources. Many manufacturers simply don't have transparency as to where and how their energy is used, preventing optimization. In addition, other priorities such as quality, productivity and safety improvements also place demands on both human and capital resources resulting in energy efficiency improvements being relegated down the priority list.

This lack of information makes it difficult to build the business case for investment, and for management to have confidence that they will reap the intended savings.

How can companies overcome these obstacles?

More and more we see operating companies turning to partners like ABB who are equally fluent in technology on the plant floor and cash flows in the board room. For example, financing is often a critical hurdle and requires new approaches such as performance-based contracts that will pay for improvements out of operating expenses instead of CAPEX.

These contracts can include guaranteed savings metrics to reduce performance risk. In today's lean operating environment, many manufacturers of course know their processes well, but in many cases don't have the experts to identify and implement energy efficiency improvements themselves. Therefore, to have a partner who can take you through the full cycle of identification, evaluation and implementation can often be the difference between a worthy project sitting dusty on a shelf, or realizing meaningful, sustainable savings.

For more information:
www.abb.com/energyefficiency

Auxiliary converters and battery chargers for WAG 9 locomotives

Keeping India on the go

Power electronics transform heavy-haul freight locomotives of the Indian Railways, one of the top five, longest rail networks in the world.

Main-line locomotives are the workhorses of the railways, hauling thousands of tons of freight across long distances. More than 60 percent of freight haulage takes place on the electrified section of the golden quadrilateral (rail tracks connecting Delhi, Mumbai, Chennai and Kolkata) that covers the busiest routes.

Recently, Central Railways received six of the WAG 9 series of locomotives from Chittaranjan Locomotive Works, equipped with the very latest insulated gate bipolar transistor (IGBT) converters supplied by ABB. The youngest member of the high voltage switch family, IGBT controls the flow of high currents through a 15 volt high-impedance voltage source, using very low control power to do so. Simply put, IGBTs are used for the delivery and control of power to the motor in the traction system of electric engines.

It replaces the previous inverter generation represented by gate turn-off (GTO) thyristors, offering as much as about four times higher switching frequency. This reduces the current requirement and consequently the heat generated, it also provides smoother acceleration and reduces traction noise.

The WAG 9 weighs in at 135 tons compared to the 127 tons of conventional engines, giving it better traction on steep inclines and increasing haulage capacity from 5050 metric tons to 5500 metric tons. The IGBT technology has been successfully used in high-speed trains in Europe and Japan.

Ajni Loco Shed in Central Railway's Nagpur Division will receive 15 engines in all, through the year. Explaining the significance of adding the new WAG 9 to its stable, Divisional Railway Manager, Brijesh Dikshit said, "Sandwiched as it is between the Deccan Plateau and the Sahyadri Range, the Nagpur Division has some of the most treacherous track within the subcontinent. Hauling 5000-plus tons up steep gradients and through torrential monsoons has been a tremendous challenge. The fast switching that the IGBT power device allows, requires a smaller braking distance and allows quick brake release when needed."

The introduction of the IGBT-based converter has improved the input power factor so the loco can build up power in a shorter time and maintain it for a longer time than its predecessor. However, the three-phase WAG 9's single, greatest advantage is its per-axle isolation. Earlier, the GTO converter per bogie forced three axles out of service in case of traction motor failure, now if one wheel develops a problem; the engine continues to run on five wheels.

The ultra-modern technology brings ease of use, especially as the microprocessor-based step-less control incorporates an effective slip/slide control system – for the first time allowing the loco operator to maintain speed in bad terrain or weather.

Technological R&D in this field continues to raise blocking voltages, increase switching frequency and reduce losses, and holds out even more potential for optimization in the future.

For more information: www.abb.com/railway

Taking the motor world by storm

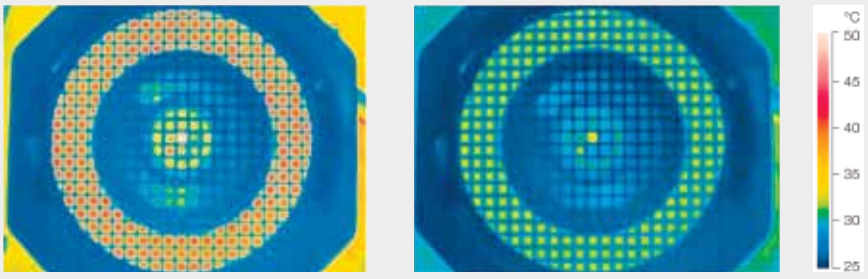
ABB's synchronous reluctance motor and drive packages continue to raise interest eleven months after being voted Europe's automation product of the year.

High output SynRM motors (the motor on the right in the image above) provide the same output as traditional induction motors (the motor on the left in the image above) that are up to two frame sizes larger – thus, enabling smaller, lighter and more cost-efficient pump and fan installations.

And, as they provide double the power of an induction motor of the same size, this enables increased flow without the need to mechanically modify the system to accept a larger motor.

High output SynRM motors are also more energy-efficient, with 10-20 percent lower energy losses than those of IE2 induction motors, thus, providing a commercially competitive alternative to traditional and other new motor technologies.

Temperature scans from a thermal imaging camera



Induction rotor

Synchronous reluctance rotor

How is all this possible?

"The SynRM integrates the best of two worlds," says Ari Tammi, ABB product manager for motors. "It combines the performance and efficiency of permanent magnet technology with the simplicity, cost-efficiency and service-friendliness of induction motors."

From the outside, the SynRM looks like a conventional induction motor. But on the inside, it is nothing like it, instead it uses an innovative rotor design that has neither magnets nor cage, thus virtually eliminating rotor losses and giving the motor a uniquely cool operating temperature.

This in turn reduces the temperature of the bearings and extends their service life and maintenance intervals. As about 70 percent of motor failures are related to bearings, the lower bearing temperature can prevent unplanned motor stoppages, thereby increasing motor availability and reliability.

Not surprisingly, the new SynRM has generated major market interest, winning Europe's foremost automation award at the SPS IPC Drives Fair in Germany in November 2011.

"The first SynRM high output motor and drive packages are now available for pump and fan applications," says Linda Stenman, ABB product manager for drives. Later we will see the launch of SynRM packages designed for IE4 super-premium efficiency levels that offer even more choice to variable speed motor users."

For more information: www.abb.com/motors

Lighting the largest women's university in the world

University lighting solution wins international award

A winning ABB solution for the new Princess Nora Bint Abdul Rahman University in Riyadh, Saudi Arabia, provides energy-efficient lighting and heat protection across an eight-square-kilo meter campus.

The solution was named winner of the KNX Award 2012 in the international category for Asia earlier this year. It is thought to be the largest solution ever to use devices that comply with the global KNX standard for energy-efficient home and building automation control.

Princess Nora University is the largest women's university in the world. The new purpose-built campus opened in January 2011 and accommodates 40,000 students and 12,000 staff. It covers an area of 8 square kilometers and comprises 800 buildings; including classrooms, halls of residence, research centers, recreational and sports facilities, a library, a 700-bed hospital, as well as kindergartens, schools, mosques and its own 10-station, driverless, overhead metro system.

The ABB i-bus® KNX solution enables the university to automatically and remotely control lighting and sun protection systems in each of the 800 buildings using one single interface. A similar i-bus KNX solution controls the lighting in each of the 10 campus metro stations.

With strong sunlight and temperatures of up to 50 degrees Celsius to contend with, sun and heat protection are key features of our solution. Thousands of blinds provide protection from the sun's glare and prevent high levels of solar heat from entering the buildings. The blinds shift automatically according to the position and strength of the sun, or can be adjusted manually, resuming their automatic settings via presence detectors when people leave the room.

Each building is divided into zones with presence- and daylight-dependent lighting control. Classrooms and lecture halls are equipped with dimming and darkness control to facilitate presentations, and large rooms and halls are divided into smaller lighting areas to create ambience and save energy. When no one is present in a room, the climate control system automatically adjusts to eliminate waste of energy, by shutting down air conditioning.

By using lighting control efficiently and by reducing the need for air conditioning with presence detection and effective sun and heat protection, our solution is helping to make Princess Nora University a landmark in energy-efficient building control.

Not only does the i-bus reduce building energy consumption by around 40 percent compared to technologies that do not use the KNX open standard, it has opened the possibility for many of the university buildings to apply for green or gold ratings within the LEED standards (Leadership in Energy and Environmental Design) of the US Green Building Council.

ABB was selected for the project by the two main construction companies that built the university, Saudi Oger and SBG, and the two system integrators subcontracted to install the solution on the construction companies' behalf: MTTS and Honeywell HBS respectively. The KNX award was made to MTTS.

Our i-bus KNX solution for the new Terminal 3 building at Delhi Airport was the previous winner of the biennial KNX Award for 'International Category – Asia' in 2010.

For more information: www.abb.com/knx

Cutting the cost of wastewater treatment

An award-winning ABB MV drive has reduced energy consumption at a US wastewater treatment plant by more than 1 million kilowatt-hours a year.

The ACS 2000 medium voltage variable speed drive was installed in July 2011 and has achieved some remarkable results within its first year of operation at the City of Beloit Water Pollution Control Facility (WPCF) in Wisconsin, United States.

The facility treats an average of 5.5 million gallons (20.8 million liters) of wastewater a day from the city's 37,000 inhabitants, as well as industrial waste from local businesses and biological waste from food processing plants.

Like many wastewater treatment plants, Beloit uses a conventional activated sludge process for treating the wastewater. At the heart of this process are the aeration basins in which microorganisms break down the organic matter in the wastewater. These bacteria require oxygen to survive, which is provided by huge aeration blowers that blow air through diffusers at the bottom of the basin.

Aeration blowers typically account for 50 percent or more of the electricity consumed by a wastewater treatment plant, and Beloit is no exception. Prior to the installation of the ACS 2000, the aeration blower system at Beloit WPCF was controlled by an inlet throttling valve – a common solution for blower control, that operates at fixed speed and does not offer the same operating and cost benefits as variable speed drives.

For Beloit WPCF these benefits are wide-ranging and include soft start capability, ease of installation, direct-to-line (transformer-less) connection to the power supply network, minimal harmonic distortion, non-requirement of medium voltage power factor correction, compact and lightweight footprint, short payback time and low total cost of ownership.

These benefits are enhanced by an ABB DriveMonitor™ intelligent diagnostic system that performs remote and real-time monitoring and diagnostics of the drive via a wall-mounted PC connected to the telephone line.

Once the ACS 2000 was installed, the power consumption of the aeration blower system dropped by more than 30 percent and total plant energy consumption by 15 percent, which is more than 1 million kilowatt-hours (kWh) a year. At an average composite rate of $0.62/kWh, the annual savings for the city of Beloit amount to $75,000.

Sewage water purification tank – Beloit, Wisconsin, USA

For more information: www.abb.com/water

How does ACS 2000 help save more?
Scan to watch the video

Towards a sustainable cement industry

Major players are prioritizing energy-efficient ways of improving specific energy consumption. ABB is the leading supplier of medium voltage drives for cement plants in India, which help users to enhance plant efficiency and overall productivity.

ACC cement plant - Thondebhavi, Karnataka

The cement industry is among the biggest consumers of electrical energy. A vast amount of energy is used at every stage of the process, accounting for more than 50 percent of total production costs. India ranks as the second largest cement producing country in the world. This means that efficient processes and technologies will not just lower the nation's consumption of a critical resource – they will effectively reduce the carbon footprint of the industry.

Holcim

We received the first major order in the energy efficiency domain from Holcim in India, to improve specific power consumption of their cement plants. The ACS 5000 and ACS 2000 range of 6.6 kilovolt (kV) medium voltage (MV) drives will enhance energy efficiency at three plants, replacing existing damper controls. There is a huge potential to further enhance the efficiency by providing the MV drives for other process critical applications like pre-heater fans, mill separator fans, cooler fans in cement production area and also extend it to captive power plants to cover boiler feed pump (BFP), primary air and secondary air (PA/SA) fans and induced draft (ID) fans.

Fans in the cement industry are usually large and consume a major part of electrical energy. Traditionally, Indian cement producers use cascade converters – also called Slip Power Recovery Systems (SPRS) – to control the speed of process fans. However, due to inherent limitations of SPRS, such as operation in weak networks and higher harmonics, they are now considering the variable speed drive (VSD) solution. With the use of VSDs, the energy consumption can be reduced from 90 kWHs/ton to about 70 kWHs/ton of cement produced.

In the future

With the demand for cement increasing by eight percent annually, Holcim has long term plans to increase capacity as well as improve efficiency. What we can offer is an overall efficiency improvement through assessment services, fingerprinting of cement and captive power generation processes for assessing the current level of performance and identifying bottlenecks. Preventive maintenance solutions also have a greater role, as does the implementation of solutions based on high-efficiency motors, drives, process analyzers, process control systems, optimization solutions, energy management solutions and production scheduling.

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

Winner of the National Energy Conservation Award, 2012

The Grinding Unit of the Thondebhavi ACC cement plant in Karnataka secured second place for outstanding energy-efficient practices in the cement industry.

Energy efficiency tops ACC priorities

"Not everyone knows that the Indian cement industry is second only to Japan in global energy efficiency comparison."

What are the opportunities and challenges you see, especially on the energy front?

Many challenges lie ahead of us, especially when it comes to energy. Energy costs (coal, coke and electricity) are spiraling along with the currency depreciation. Quality of coal and limestone is an issue and availability of coal is a cause of concern. Power shortages have been driving us to set up captive power plants (CPPs) to fulfill our energy needs.

Then there is the increased pressure of complying with mandatory energy regulations such as Perform, Achieve, Trade (PAT), where we must meet energy reduction targets and Renewable Power Obligations (RPO) where we have to either buy Renewable Energy Certificates (RECs) or generate renewable energy. In some regions, lower capacity utilization as a result of inadequate demand is pushing up specific energy consumption. And finally, we must factor in the high cost of financing.

But where there are challenges, there are opportunities for long term capacity growth. To make the most of these, our focus is on improving efficiencies across the cement plants, captive power plants and power generation from renewable power sources. Other opportunities include upgrading old plants, co-processing of industrial and municipal wastes in cement kilns, generating power from waste heat in kilns, increased usage of waste from other industries like fly ash and slag to make blended cements. All these initiatives also help in minimizing the CO_2 emissions in the cement manufacturing process.

How is ACC geared to address these; what are the energy efficiency initiatives being rolled out?

ACC is taking a holistic approach towards challenges and opportunities. The focus remains on key areas for sustainable growth: energy performance improvement in the manufacturing process and captive power generation. Research and development in the area of blended cement and other sustainable products is important to our future. We are also looking at waste recovery power generation and the generation of renewable energy.

What are your expectations from ABB as a partner in your energy efficiency journey?

As a premier electrical product supplier, we expect ABB to come out with innovative solutions to improve the energy efficiency of older plants, which will allow the industry, including ACC, to implement energy efficiency across all plants. In many large energy efficiency improvement projects like waste heat recovery systems, high efficiency motors and medium voltage drives have long payback periods.

We have been working with ABB for many years and our relationship is measured in decades. We use ABB products and systems in almost all our plants with confidence as they consistently offer the desired performance.

Profile

K N Rao
Director, Energy and Environment, ACC Limited

K N Rao is a post-graduate chemical engineer from IIT Madras with more than 30 years of rich experience in the fields of energy and environment. His current assignment includes energy conservation and associated projects implementation; environment compliance and environment projects implementation, sustainable development, CDM projects and renewable energy projects. Prior to this assignment, he headed the pollution control systems business of ACC. Currently, he is working on behalf of ACC as co-chair for the WBCSD – CSI India for the low carbon technology roadmap 2050 for the Indian cement industry, sectoral expert for BEE for the cement sector for PAT methodology development and implementation, co-chair for CII Green Cementech, member of CII Green Council, member of Sustainability Committee of FICCI, IMC and Bombay Chamber of Commerce.

ABB solves 100 year old electrical engineering puzzle

Development of a DC breaker for high voltage transmission will help shape the grid of the future.

Recently, ABB announced a breakthrough in the ability to interrupt direct current, solving a 100-year-old electrical engineering puzzle and paving the way for a more efficient and reliable electricity supply system.

After years of research, we have developed the world's first circuit breaker for high voltage direct current (HVDC). It combines very fast mechanics with power electronics, and will be capable of 'interrupting' power flows equivalent to the output of a large power station within 5 milliseconds – that is thirty times faster than the blink of a human eye.

The breakthrough removes a 100-year-old barrier to the development of DC transmission grids, which will enable the efficient integration and exchange of renewable energy. DC grids will also improve grid reliability and enhance the capability of existing alternating current (AC) networks. We are in discussions with power utilities to identify pilot projects for the new development.

"ABB has written a new chapter in the history of electrical engineering," said Joe Hogan, CEO of ABB. "This historical breakthrough will make it possible to build the grid of the future. Overlay DC grids will be able to interconnect countries and continents, balance loads and reinforce the existing AC transmission networks."

The Hybrid HVDC breaker development has been a flagship research project for our company, which invests over $1 billion annually in R&D activities. The breadth of our portfolio and unique combination of in-house manufacturing capability for power semiconductors, converters and high voltage cables (key components of HVDC systems) were distinct advantages in the new development.

HVDC technology is needed to facilitate the long distance transfer of power from hydropower plants, the integration of offshore wind power, the development of visionary solar projects, and the interconnection of different power networks. ABB pioneered HVDC nearly 60 years ago and continues to be a technology driver and market leader with many innovations and developments. With over 70 HVDC projects, our company accounts for around half the global installed base, representing an installed capacity of more than 60,000 megawatts (MW).

Deployment of HVDC has led to an increasing number of point-to-point connections in different parts of the world. The logical next step is to connect the lines and optimize the network. We are already working on the construction of multi-terminal systems and the latest DC breaker innovation is a major step in the evolution of HVDC grids. In parallel to the new hybrid breaker development, we have an established HVDC grid simulation center developing solutions for future DC overlay grid operations.

Fast, reliable and nearly zero-loss HVDC breakers and current limiters based on the hybrid HVDC breaker concept have been verified at component and system levels at ABB's high-power laboratories in Sweden and Switzerland, for HVDC voltages up to 320 kilovolt (kV) and rated currents of 2.6 kiloampere (kA). Thus, HVDC grids can now be planned. The next step is to deploy the breaker in a real HVDC transmission line to test under continuous full load conditions.

How does hybrid HVDC breaker work? Scan here

DC Breaker – why we need it

- Fast and reliable
- Isolates faults
- Clears faults in milliseconds
- Prevents collapse of common HVDC grid voltage
- Minimizes disturbances in converter operation

AC grids	vs	DC grids
– High active power conduction losses – Reactive power conduction losses		– Relatively low active power conduction losses – Zero reactive power conduction losses

Electric vehicles - a source of clean, off-road energy

Chevrolet Volt battery reuse

GM's partnership with ABB results in a prototype back-up power storage unit that uses electric vehicle batteries to power homes for the first time in the world. The energy storage project is also being readied for testing on the power grid.

Together, General Motors and ABB demonstrated the next stage in battery reuse, the repackaging of five used Chevrolet Volt batteries into a modular unit capable of providing two hours of electricity needed by three to five average American homes. The prototype unit provided 25 kilowatts (kW) of power and 50 kilowatt-hours (kWh) of energy to power all the support lighting and audiovisual equipment in an off-grid structure used for the event.

"In many cases, when an EV battery has reached the end of its life in an automotive application, only 30 percent or less of its life has been used," said Pablo Valencia, GM senior manager of battery life cycle management.

Last year, GM and ABB demonstrated how a Chevrolet Volt battery pack could be used to collect energy and feed it back to the grid and deliver supplemental power to homes or businesses.

This time, the energy storage system was run in a 'remote power back-up' mode where 100 percent of the power for the facility came from Volt batteries through ABB's Energy Storage Inverter system. A similar application could one day be used to power a group of homes or small commercial buildings during a power outage, allow for storage of power during inexpensive periods for use during expensive peak demand, or help make up for gaps in solar, wind or other renewable power generation.

These functions, along with frequency regulation on electric distribution systems, could someday be used by utilities to reduce cost to customers and improve the quality of power delivery. These applications are referred to as community energy storage to distinguish them from substation-size energy storage projects.

"We showed today how fast this research concept is turning into reality,"said Allen Burchett, ABB's senior vice president for Business Development in North America. "We will be installing it on the grid soon to complete the technical evaluation, and this will tell us all what smart grid applications are possible, like back-up power, reducing energy cost, strengthening utilities' distribution systems and storing surplus renewable energy."

Our research center in Raleigh, North Carolina, conducted the research and development, and the Medium Voltage business unit in Lake Mary, Florida, is managing the proof-of-concept testing, market research and product development. As the world's largest EV fast-charging company and leader in smart grid and energy storage, we work with other auto companies, battery manufacturers and utilities to help make electric power and industrial operations more productive and efficient.

GM is focused on ensuring that battery systems used in future Chevrolet, Buick, GMC and Cadillac vehicles provide environmental and societal benefits beyond their use in the vehicle.

For more information:

www.abb.com/electricvehicles

How can ABB help to build an e-mobility infrastructure? Scan here

Another European port goes green

Ystad, one of Sweden's fastest growing cargo and ferry terminals installs an ABB shore-to-ship power connection that enables it to use shore-side electricity while in port, thereby reducing noise pollution and cutting CO_2 emissions by 98 percent.

Eliminating CO_2 emissions at the Port of Ystad

Located on the southern tip of Sweden on the Baltic coast, Ystad is Sweden's fifth largest port, handling some 3,500 sailings annually, including daily ferry services to Poland and Denmark, as well as cruise ships in the summer and cargo vessels all year round.

Thanks to a strong and ambitious investment program, the port has enjoyed double-digit growth in tonnage over the past three years – one of the few ports to grow in the current economic climate. Part of that forward-looking program is a bid to become the region's greenest port by equipping all its berths with shore-side power connections.

Local partner, Processkontroll Elektriska, selected us to provide a turnkey shore-to-ship solution for all five berths at the port. We designed, engineered, supplied and built the entire solution, which feeds electricity from the local power grid to a specially designed ABB substation equipped with powerful frequency converters.

With a power rating of 6.25 megavolt amperes (MVA), the frequency converters are the most powerful in operation at any shore-to-ship installation in the world. They convert the power from 50 Hz, the standard grid frequency in Europe, to the 60 Hz load frequency at which most vessels operate. From the substation, the power is transferred via high voltage underground cables to shore-side cranes that connect the cables to the vessels.

Our solution has a unique flexibility, in that it adapts both the voltage level and frequency to match those of each vessel – enabling multiple vessels to be powered simultaneously at the port, regardless of any differences in the ships' voltage level or system frequency.

ABB pioneered shore-to-ship technology at the beginning of the millennium by delivering the world's first high voltage shore-side power connection for the Swedish port of Gothenburg in 2000. Since then, we have provided ports throughout Asia and Europe with shore-to-ship solutions, the most recent of which – prior to Ystad – was inaugurated in July this year at the Hoek of Holland in the Netherlands.

We also supply turnkey shipside solutions for shore-side power connections, and have provided solutions for all types of vessels worldwide, including container ships, bulk carriers, liquefied natural gas (LNG) carriers, cruise liners and floating storage and off-loading (FSO) vessels.

For more information: www.abb.com/marine

Ystad shore-to-ship installation wins environmental award

On September 27, the port of Ystad was awarded Sweden's foremost marine environmental award by Maritime Forum, "for investing in a flexible shore-to-ship solution for both 50 and 60 Hz. The solution minimizes the shipside investment requirements for shipping companies, while improving the environment for the port's immediate surroundings."

Efficient shore-to-ship solutions – a possibility.
Scan here to watch the video.

Just launched

New technology solutions from India include a family of low voltage products, while a class-leading modular UPS comes to the Middle East market.

Low voltage product

Formula MCCB

Customizable mid-range circuit breakers for India

Formula MCCB has evolved from the Tmax range of MCCB. Potential market segments include critical power market (OEs from UPS, Genset market) and the telecom market that primarily require lower fault-level circuit breakers.

Advantages

- Conforms to IEC 60947-2
- No de-rating up to 50° C
- Compact dimensions
- Common range of accessories
- Available in 1P, 2P, 3P and 4 Pole versions
- Line-load reversibility

Low voltage product

Earth leakage relays

IEC 947-compliant protection relays in India

Earth protection relays allow monitoring of the low voltage distribution network and with this new series we can now offer a complete solution for earth leakage protection. We can offer B-type protection feature complying with IEC 947 as well as IEC 61009 (With B-type RCCBs). The complete range is tested in conjunction with MCCB and MCBs to comply with IEC 947 stipulations under Annexure M.

Advantages

- Adjusts sensitivity and tripping times
- Improved fail-safe function
- Auto resets after fault is rectified
- Frequency filtering for improved effectiveness
- Fault memory LED
- Digital display

Low voltage product

M2M meters

New measurement device in India

The made-to-measure device provides transparency on energy consumption, be it single phase or three-phase supply. Meant specifically for medium voltage and low voltage electrical panels, the product provides real-time analysis on parameters such as voltage, current, frequency, power factor and active and reactive power. One of the outstanding features of this meter is that it provides instant information on CO_2 emission-based energy consumption: important information for green building solution.

Advantages

- Multiple integrated functions
- 360° analysis of system performances
- Anticipates malfunctions
- Easy to install
- Intuitive, easy-to-use keypad
- Auto-diagnostic function

Power electronics and MV drives

DPA system

High-power, modular UPS now available in Middle East

UPS systems based on decentralized parallel architecture (DPA) do not share any common components. Each module contains all hardware and software required for full system operation. What does this mean for the customer? Very high power availability, increased flexibility, lower total cost of ownership and improved energy efficiency. Modular systems based on DPA are free of single points of failure and maximize the mean time between failure, while minimizing mean time between repair.

With DPA technology each UPS module has its independent:

- logic control
- control panel
- rectifier
- inverter
- battery charger
- static switch

Concept power DPA modules can be connected in parallel to provide redundancy or capacity, to 1.5 Mva. The class-leading design provides the highest power density/m^2 available.

Advantages

- Lower cost of ownership
- Simple installation and service
- Optimizes energy
- Advanced, scalable architecture
- True safe-swap modularity

Innovative marine propulsion

Breaking the ice

Ice-going ships from tankers to container ships with Azipod VI® propulsion can do what was once considered impossible – combine excellent ice-breaking and open water characteristics. In 1990, MV Seili, a buoy tender was the first to be fitted with Azipod, followed by MT Uikku a 16,000 DWT ice-breaking tanker in 1993 and Azipod-equipped icebreaker, IB Rothelstein on the Danube river, which became the first double acting ship in the world in 1995 – running in open water and astern in ice. The Azipod combines the advantage of the diesel-electric powertrain with the manoeuvrability of the azimuth thruster, offering design flexibility and great space saving, as well as 360°steering that provides full torque and thrust in any direction.

For more information: www.abb.com/marine

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

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Revitalizing the power grid

With demand for electricity rising year on year and concern for the environment bringing more renewable energy sources online, transmission system operators are under increasing pressure to enhance the flexibility of their grids to improve capacity and accommodate the demands of deregulated power markets.

ABB's expertise in power transmission systems and electrical optimization, grid reliability and blackout prevention offers sustainable solutions to the challenges of today, and tomorrow. From Flexible Alternating Current Transmission systems that enhance the security, capacity and flexibility of power transmission networks, to High Voltage Direct Current power superhighways, there are comparatively inexpensive and faster ways to provide more power and control in existing networks. Read the next issue of Contact to see how it's done.

Cities that consume 30% less energy?

As a leading producer of energy-efficient solutions, ABB helps deliver major power savings, without compromising performance. Our lighting control systems can deliver power savings of up to 50 percent, and our building automation up to 60 percent. While everyone else is talking about energy prices, power shortages and climate change, ABB is doing something about it, right here, right now. **www.abb.com/betterworld**

Certainly.

Power and productivity
for a better world™

ABB