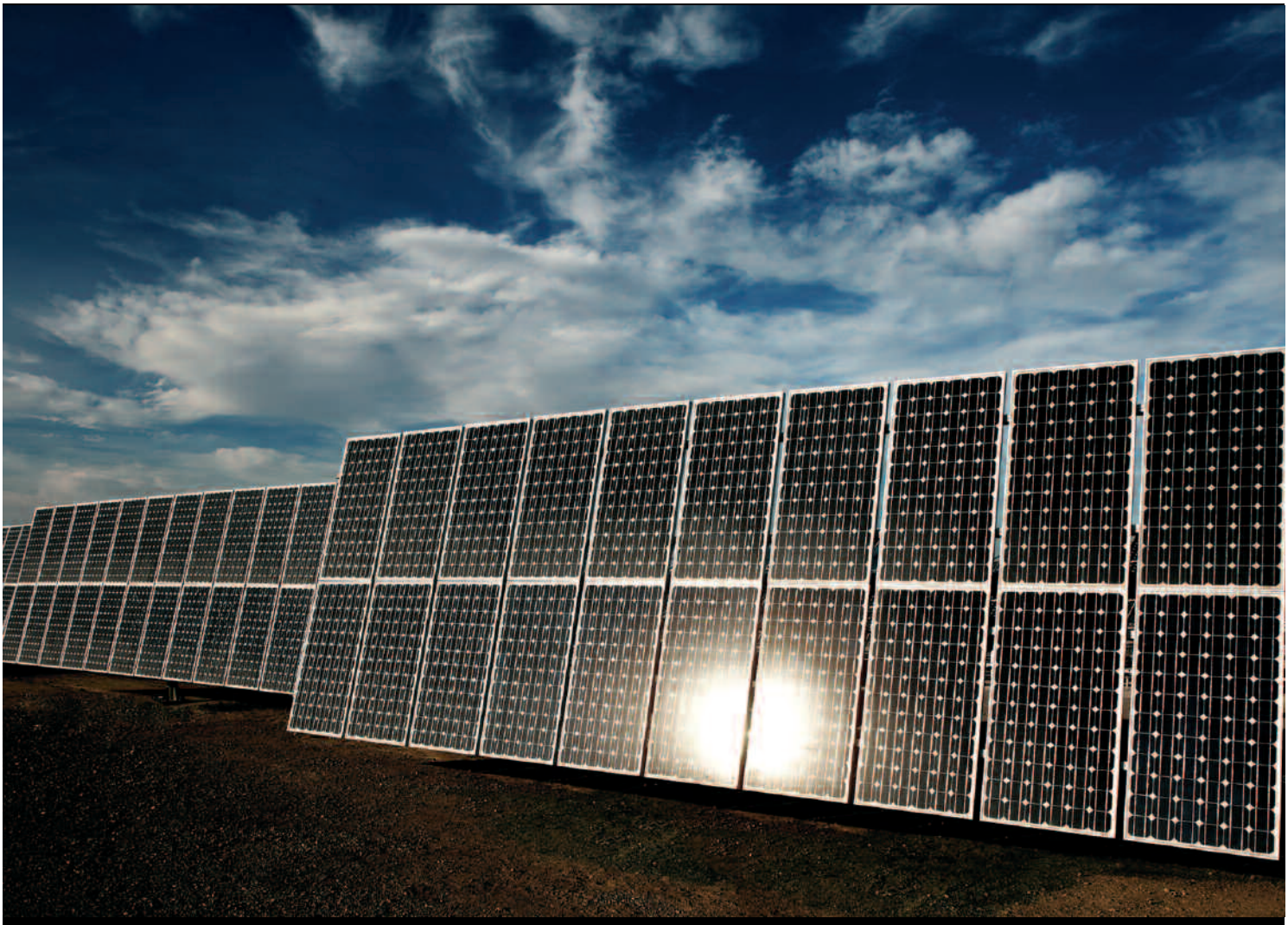
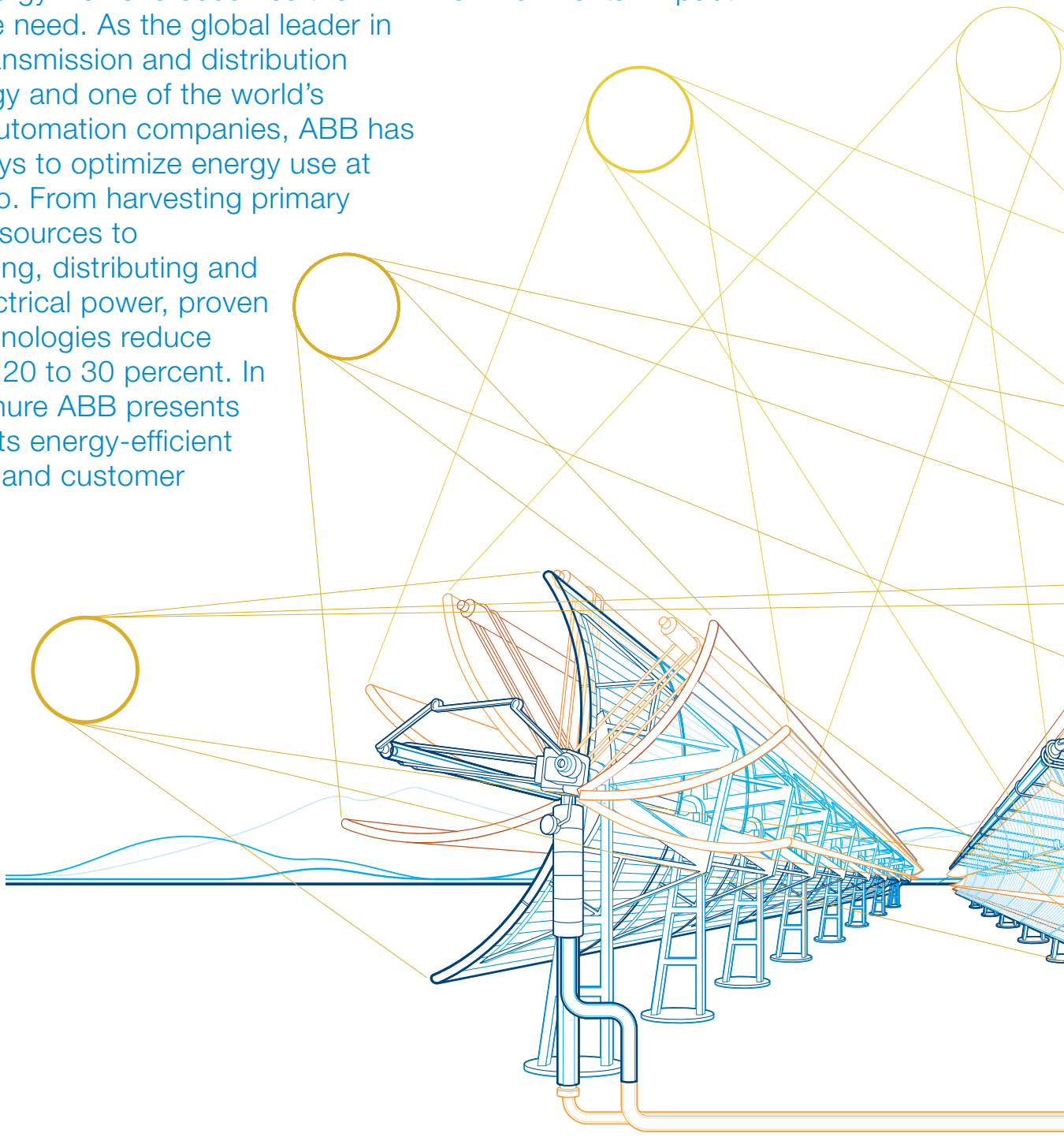


Energy efficiency for a new era
ABB technology in action

Power and productivity
for a better world™

ABB and energy efficiency

Did you know that as much as 80 percent of available energy is lost in the process of making and distributing electricity and in its inefficient consumption? That means just one-fifth of the energy we have becomes the power we need. As the global leader in power transmission and distribution technology and one of the world's leading automation companies, ABB has found ways to optimize energy use at every step. From harvesting primary energy resources to transporting, distributing and using electrical power, proven ABB technologies reduce waste by 20 to 30 percent. In this brochure ABB presents some of its energy-efficient products and customer projects showing how energy saving technologies, either in new applications or where existing equipment and installations have been upgraded, have improved efficiency and reduced environmental impact.



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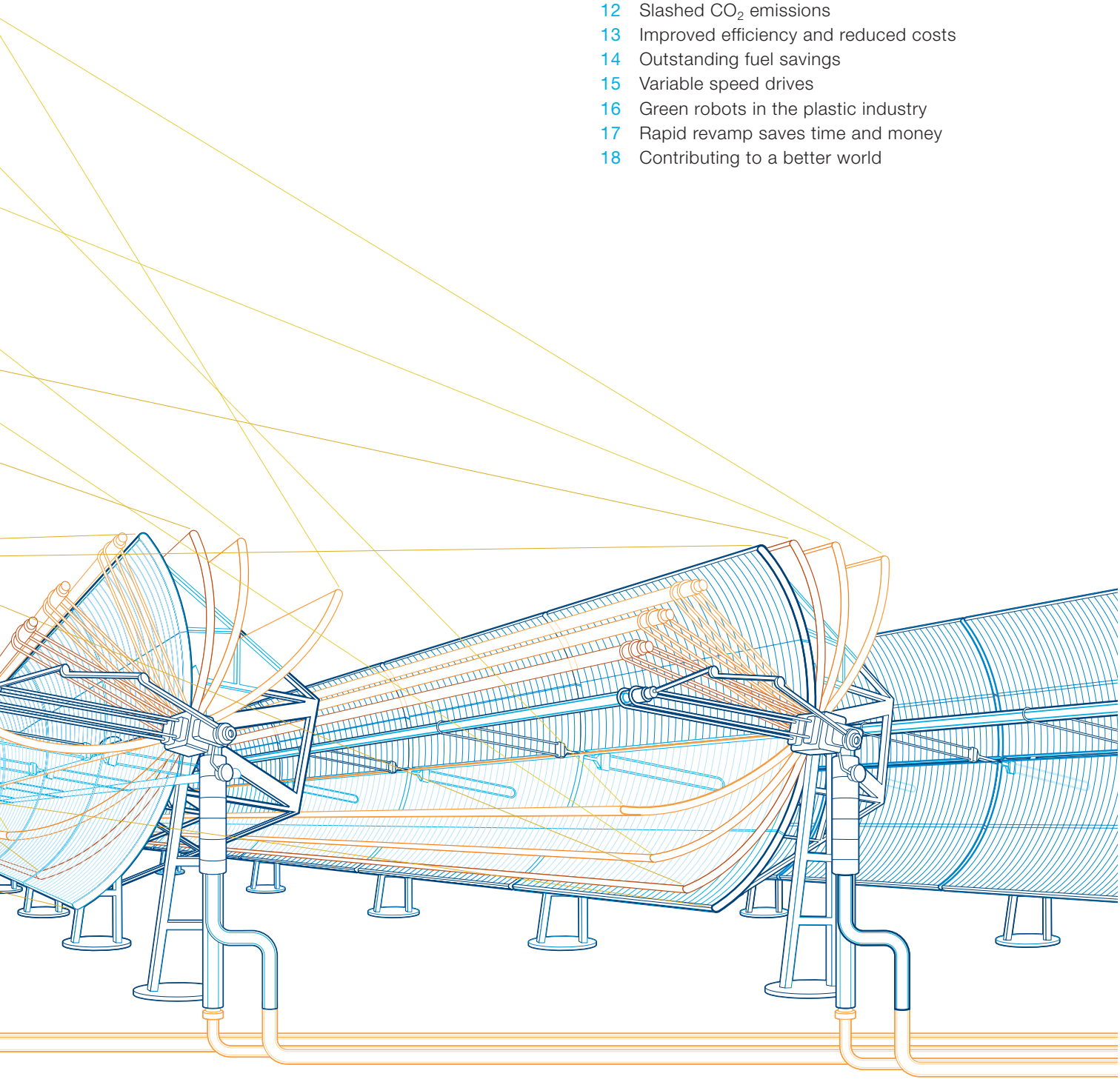


Payback time just over 12 months
Motors and drives save CHP plant $5 million a year

ABB high-efficiency motors and variable speed drives are saving Sweden's largest combined heat and power plant $5 million a year in reduced energy cost – all in a payback time of just over12 months.

Mälarenergi operates Sweden's largest combined heat and power (CHP) plant. It provides some 13,000 customers in the city of Västerås (population 134,000) and surrounding area with 1,500 GWh of district heating a year.

ABB has been supplying Mälarenergi with 0.3 to 5.7 MW motors and ACS1000 and ACS800 variable speed drives for the plant's pump applications since 2000 as part of a long-term program to improve energy efficiency and reduce operating cost at the facility.

"We are in constant dialogue with ABB about the performance of our motors," says Peter Karlsson, Mälarenergi's production manager. "Without their guidance, I doubt we would have had the courage to implement this program. ABB experts explained clearly how the system would operate in all situations and at all possible loads."

Renewing equipment

The first phase of the program was to replace the old motors on the four heating pumps with new ABB 1.5 MW motors with ACS1000 medium voltage drives. This was followed by a new 5.7 MW motor and drive for the feedwater pump, and later a 1 MW motor and drive for the accumulator pump.

The result was a massive annual cost saving of $5 million and an average payback time for the six applications of just over 12 months.

Improved network stability

Dick Wahlund, Mälarenergi's project manager, explains the benefits of the motor and drive solution in relation to the four heating pumps.

"The solution enabled us to reduce the size of the motors and use one pair of control pumps instead of two. That gave us a major saving. New motors use less energy than old, which also gave us a saving. And, we have no need for the electric boiler that we previously required and which was expensive to run."

The payback time for this solution was only three months. Just as significantly the solution has stabilized the network and eliminated fluctuations in pressure and flow.

With so many major benefits – lower energy consumption, reduced operating costs and network stability – Mälarenergi is continuing its investment program in energy efficient ABB products. The utility recently equipped the four primary air fans with ABB motors and ACS800 variable speed drives.

"The payback on this latest investment is rapid. It has reduced energy consumption as well as maintenance requirements."

Energy savings of up to $4,000 per month
Power factor correction cuts energy consumption

ABB's power factor correction technology has enabled the U.K.'s premier amusement park to make optimum use of its existing power supply and reduce the energy consumption of its latest white-knuckle ride by 25 percent.

Blackpool Pleasure Beach is one of the U.K.'s biggest tourist attractions. Famed the world over for its rides and entertainment it welcomes 6.2 million visitors every year. Its policy of continuously investing in new rides makes it a favorite among adults and youngsters alike.

The addition of new rides and attractions puts constant pressure on the local electricity network and calls for innovative ways to manage the supply and cost of power.

In 2004 Blackpool Pleasure Beach added a new blockbuster ride – the Bling – at a cost of $4 million. The ride consists of giant gondolas which spin and flip in three different directions 30 meters above ground and at speeds of up to 90 kilometers per hour.

Consumes vast amounts of power

Bling consumes considerable amounts of energy. Prior to construction the ride was expected to place a big demand on the existing three-phase power network and draw around 1400 A per phase.

Concerned that Bling's voracious appetite for electricity would necessitate a complete revamp of the power network, the Pleasure Beach approached ABB for a solution.

By installing its state-of-the-art power factor correction technology, ABB succeeded in reducing the supply current needed to 1200 A per phase and in reducing the power consumption of the ride by 25 percent.

With total energy savings running at up to $4,000 per month during the peak season, the ABB equipment is expected to pay for itself in less than three years.

The power factor correction solution consists of one bank of capacitors totaling 300 kVAr. ABB also supplied a new transformer and switchboard control, as well as making the connection to the local power distribution network.

Efficient electricity delivery
Powering the world’s tallest building

Burj Dubai in the United Arab Emirates is one of the most spectacular projects ABB has been involved in. With a height of more than 800 meters it will be the world’s tallest building when completed in 2009.

Burj Dubai’s power needs are equivalent to that of a small town and ABB's job is to ensure the reliable delivery of electricity to everything from lighting and elevators to the ventilation, heating and air conditioning system.

Use power efficiently

Ken Isaksen, marketing manager of ABB’s medium voltage factory in Skien, Norway, explains: “When the temperature reaches 50°C in summer and the air humidity is 90 percent you need to be able to control the indoor climate. To do so you need a stable power supply, equipment that protects critical parts of the electrical system, and power monitoring and control systems that enable you to use power efficiently, while at the same time reducing the risk of blackouts to a minimum.”

The medium voltage switchgear for Burj Dubai was developed and produced by ABB in Norway. Several other ABB countries contributed to the project with Resibloc transformers, low voltage switchgear, heating, ventilation and air conditioning equipment, motors and drives, and supervisory control and data acquisition system software.

“ABB offers a complete range of electrical equipment and software, developed to meet customer requirements and based on more than 100 years of experience in the power transmission and distribution industry,” says Isaksen.

Compact and lightweight

Burj Dubai is spectacular and spacious. Its popularity has been phenomenal and its prices accordingly if you want to rent office space or an apartment. The owners want to maximize the area available for commercial purposes.

“In most projects footprint is important, and our compact and lightweight medium voltage switchgear is perfect for Burj Dubai. For every square meter of space you save, you have one more square meter to sell, says Isaksen.

Optimizing energy operations
Managing energy resources for 18 paper mills

ABB's cpmPlus Energy Management System enables UPM-Kymmene, one of the world's largest paper producers, to manage and optimize its energy operations at 18 paper mills in Europe.

The cpmPlus Energy Management System (EMO) provides UPM with historical, realtime and forecasted data on all aspects of its energy operations, and enables operators to make real-time decisions on whether to generate, buy or sell energy.

Each mill predicts its energy consumption – electricity, steam, water, natural gas – and sends the data to a control center in Finland or Germany, where the information is used to plan and optimize the use of power resources throughout UPM's extensive European operations.

"With the EMO system we can plan our operations to meet our objectives," says Pasi Svinhufvud of UPM-Kymmene. "We use energy when it's cheapest and procure it from the sources that have the best market conditions for production."

The total system includes 18 mill level systems and two control center systems. Each mill and the control centers have their own database servers. In total, there are more than 40,000 database tags and 50 interfaces for data collection. Up to 600 users can access the system at any one time.

The combined annual power consumption of the18 mills is some 20 TWh a year, a vast amount that is equivalent to 20 percent of Finland's annual power consumption.

Vast resources

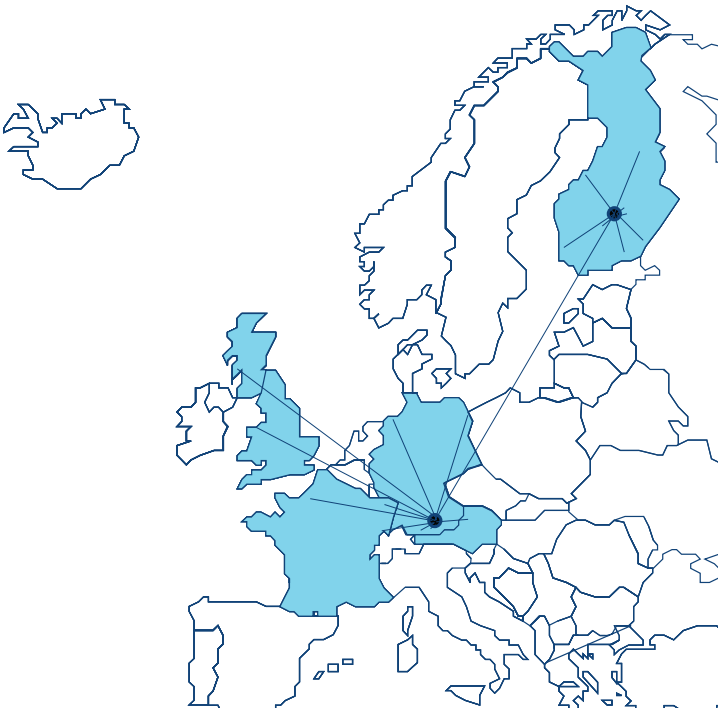
Although UPM-Kymmene generates 70 percent of its energy needs and is selfsufficient at its eight mills in Finland, its ten other European mills buy their power on local energy markets.

ABB's EMO system enables UPM to forecast and coordinate the mills' needs, place bids on the power trading markets for the purchase or sale of electricity, and trade CO_2 emissions on behalf of all 18 mills on the European Emissions Trading Scheme.

EMO improves profit

Opportunities for cost reduction are biggest when both electricity consumption and prices vary over time, which is common in process industries and open electricity market environments. Typically, the overall cost reduction can be two to five percent of the total energy cost.

The cpmPlus Energy Management System is in operation at some 40 installations worldwide in industries like pulp and paper, steel, oil and gas, power utilities and building management.



Flexible power and reduced emissions
NorNed is the longest underwater high-voltage cable in the world

Green and renewable power will flow to the continent from Norway through subsea cables and surplus energy from Holland the opposite direction.

The 580-kilometer NorNed HVDC transmission link, with a 700 MW transmission capacity, is the longest underwater high-voltage cable in the world. The contract is with the two state-owned power grid companies TenneT in the Netherlands and Statnett in Norway. The interconnection will lead to power trading between the two countries and increase the reliability of electricity supply.

The security of supply will be improved since production resources in a larger area will be available as a back-up in the event of network disturbances. The electricity market will benefit as the link will enable electricity trading between two distant, isolated markets.

Environmental benefits

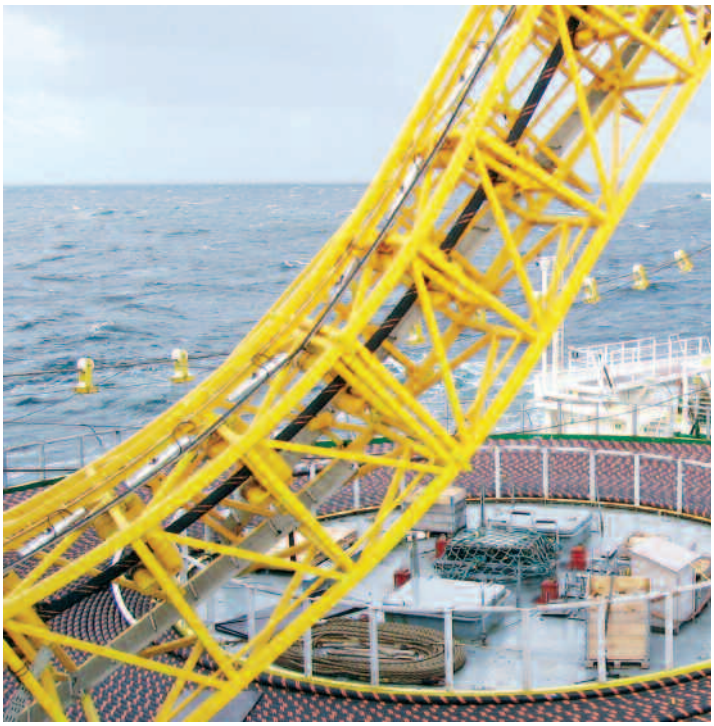
Scandinavia has a largely hydro-based production system whereas the Netherlands and surrounding countries have a system based largely on fossil fuels. Hydropower is easily regulated and stored in existing dams. This allows the Dutch grid to be optimized by using hydropower to cover peak loads during the day. At night, power can be transmitted to Scandinavia, thereby saving electric energy in water dams.

The result is more stable output from the fossil-fuelled plants, thus minimizing emissions. By introducing an alternative to non-renewable energy sources into the European market, power grid companies in Norway and the Netherlands hope to reduce CO_2 emissions by 1.7 million metric tons per year. Additionally, the stabilized grid will allow integration of new renewable generation in the form of wind power.

The HVDC technology

HVDC technology offers the unique capability to build long underwater or underground cable transmission lines with low losses. Traditional AC transmission systems with underwater cables cannot be longer than about 60 - 100 km. Beyond this, the losses are prohibitive.

The NorNed cable, with a length of 580 km, has losses of only about four percent. HVDC systems, by controlling the power flow, stabilize the grid in the interconnected networks and increase the security of supply. HVDC systems cannot be overloaded and will not contribute to cascade tripping of lines.



Solar heating cuts CO_2 emissions
Clean low-cost solar heating for a whole community

A state-of-the-art ABB process control solution is enabling one of the world's largest solar heating plants to provide a Danish community with low-cost district heating while cutting CO_2 emissions by 4,500 tons a year.

The 8,000 square meters solar heating plant provides the 3,300 inhabitants of Braedstrup in Denmark with environmentally friendly heating, while simultaneously reducing the heating bill of each consumer by $140 a year.

Reducing emissions

The plant is part of a larger combined heat and power (CHP) plant which supplies Braedstrup with district heating and electric power. The solar heating plant supplies heat to 1,250 households corresponding to 95 percent of the town's total heating needs, thereby reducing the need for heat generated by natural gas and avoiding 4,500 tons of CO_2 emissions a year.

"Solar heating must function in combination with power heating and it must be operated constantly based on an economic yardstick, but it has been shown that solar heating does not inhibit, but on the contrary, increases flexibility in electricity production. And a survey has shown that in terms of national as well as company economics, it is extremely profitable to extend CHPs with solar heating," explains Per Kristensen, managing director of the Braedstrup Fjernvarme district heating plant.

Located next to the CHP plant, the solar energy field consists of 641 solar panels with the capacity to produce 4,000 MWh of energy a year. The energy collected by the panels is either distributed directly to the district heating network or stored in the accumulator tank, depending on market factors such as consumer demand and the cost of electric power and natural gas.

Equipped with a state-of-the-art ABB process control solution based on the AC500 scalable programmable logic controller (PLC), the plant has been successfully operating since August 2007.

Making the system work

The AC500 controls the entire solar heating plant and performs complex calculations related to the operation of the plant and the amount of solar energy that can be captured.

One of the most innovative functions of the solution is to compare daily solar energy recovery with the cost of natural gas and the market price of electric power. This enables Braedstrup Fjernvarme to decide whether to use the solar energy directly or store it in the 2,000 cubic meter accumulator tank which holds 110,000 kWh of heat.

The $2.5 million investment is expected to generate $184,000 a year in income and savings over the next 25 years.

Increased productivity
Boosting process performance in aluminum furnaces

ABB's AL-EMS Aluminum Electromagnetic Stirrer has achieved some remarkable results in productivity, energy efficiency and availability at one of the world's leading producers of aluminum strip.

ABB's AL-EMS Aluminum Electromagnetic Stirrer was installed in 2005 at Sapa Heat Transfer's aluminum production facility at Finspång, Sweden to boost productivity and reduce operating costs at a 28 ton melting furnace.

Sapa Heat Transfer is one of the world's leading producers of aluminum heat exchanger strip for the automotive industry.

Measured benefits achieved by AL-EMS include a 17 percent increase in productivity combined with an 11 percent reduction in dross. Energy consumption fell by 7 percent (750 MWh a year) while greenhouse gas emissions have been reduced by 7 percent. Process performance has also improved and product quality is enhanced.

"Our operators are very satisfied with ABB's electromagnetic stirrer," says Anders Johansson, process development manager for metallurgy at Sapa Heat Transfer. "It has helped us increase and maintain productivity, save energy and improve our working procedures."

Improved process performance

Effective and reliable stirring of the melt is a prerequisite for higher productivity and improved process performance in metallurgical processing.

In the aluminum industry, stirring is traditionally performed manually or by hand. This requires the furnace door to be open and exposes staff to heat. Forklift trucks and rakes are used to stir the melt and skim the dross, which often leads to damaged furnace linings over time.

AL-EMS eliminates the disadvantages and dangers of the conventional method. There is no physical contact with the melt, no moving parts and little in the way of maintenance.

An ABB innovation

Electromagnetic stirring (EMS) is an ABB innovation based on the principle of the linear motor. An induction coil is placed on the side or bottom of the furnace and a travelling magnetic field is generated when electricity is applied to the coil. Stirring is the result of the interaction between the magnetic field and the electrically conducting metal bath.

EMS effectively improves heat transfer, thereby also improving energy consumption. It lowers the surface temperature of the melt and significantly reduces oxidation and the formation of dross. Reduced oxidation increases productivity and energy transport in the melt. If too much oxidation takes place, the aluminum has to be replaced – an energy intensive process that requires 12 MWh of energy to make one ton of aluminum.

"The system has been operating perfectly since installation and has not required any additional maintenance," says Johansson. "There is no wear and tear on the furnace, even though it is in continuous operation, 24 hours a day."

ABB's electromagnetic stirrer is installed in more than 1200 steel and aluminum furnaces worldwide.

Fresh air turned into energy
Efficient wind power solutions in Finland

Energy efficient ABB components promote sustainable development. They are the natural choice for renewable energy source utilization, such as wind power.

Finland's largest wind farm, the Kemi Ajos in Northern Finland, includes 10 three megawatt turbines, with a total production capacity of 30 megawatts. The turbines are partly placed on artificial islands built in 3–8 meters of water in front of the Ajos harbor. Total investments amount to EUR 50 million. Owner is Pohjolan Voima.

"Ajos is a good example of the increasing investments in wind power in Finland today. With the commitments to CO_2 free power generation, utilities are developing extensive plans to invest in both onshore and offshore parks. ABB is well positioned to provide advanced technology for both," says Matti Vaattovaara, VP Sales, ABB Power Systems.

The crucial substation

The Ajos wind farm is connected to the national grid with an 11 kilometer, 110 kilovolt power line. In addition to transformers, the ABB delivery included a 110/20 kV substation that receives power from the wind generators, transforms it and then feeds it into the national grid, thus forming a crucial point in the distribution of electricity.

Energy efficient drives

ABB also delivered direct drives based on the permanent magnet motor technology. Direct drives lack gearboxes and by that, decrease energy losses and enable higher production efficiency, space savings and lower maintenance costs.

Wide portfolio

ABB is the largest supplier of electrical products and services to the wind industry, ranging from transformers, switchgear and substations, to generators, drives, cables, control systems, power products and local power grid connection to help maintain the reliability of the power network.

Slashed CO_2 emissions
Major energy savings and emission reductions for Stora Enso

Stora Enso, one of the world's largest papermakers, has cut oil consumption and slashed CO_2 emissions at one of its largest paper mills with the help of ABB technologies.

The Skoghall paper mill in central Sweden reduced annual oil consumption by 60,000 cubic meters and cut CO_2 emissions by about 170,000 tons a year following a two-year revamp of the mill costing $290 million.

Skoghall is the world's largest producer of liquid packaging board for dairy and beverage cartons.

"This was a very large project which was implemented without stopping production," says Peter Olsson, engineering manager at Skoghall.

"The demands placed on project planning were extremely high, as were the demands on equipment with regard to availability, security, user friendliness and energy efficiency, to ensure that the mill will be competitive for years to come."

The Skoghall mill is gigantic. Every day 100 truckloads and two trainloads of logs arrive at the mill to be processed into pulp and paper. In less than an hour, each of the two 300-meter long paper machines can produce enough paper to make two million milk and beverage cartons.

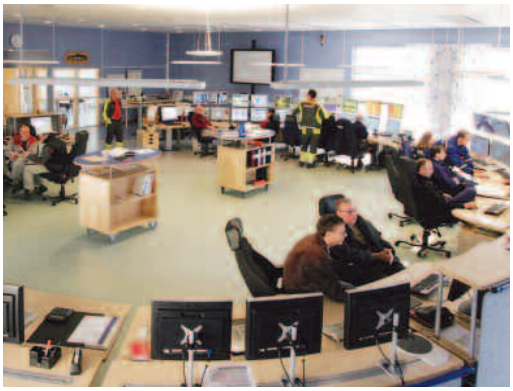
The major energy consumers are the boilers that produce steam to power the turbines that generate electricity for the mill. They were revamped by Stora Enso. ABB's extensive contribution to the project included:

- High-efficiency process motors.
- Variable speed drives to help adjust the speed of the motors to the processes they are running (many industrial users waste energy by operating their motors at full speed even when not required).
- MNS Motor Management INSUM which combines motor control, monitoring and protection in a single microprocessor-based system with direct communication to higher level control systems.
- Extended Automation System 800xA to control the recovery boiler, where waste from the pulping process is burned to produce steam. The system collects and analyzes data in real time from thousands of devices, enabling operators to run operations at their optimal level and get the most out of the energy consumed.
- Instrumentation to measure flow, temperature and pressure and feed the data to the 800xA control system.
- ABB MicroSCADA to help prevent blackouts and network disturbance, plan power consumption, and provide total control over the power supply with real-time data from the substations.
- Project management, construction, configuration, commissioning and training.

Reduced oil consumption

The revamp of the recovery boiler and the conversion of the oil boiler into one that burns organic waste – mainly bark, sawdust and other waste wood - helped reduce oil consumption by some 60,000 cubic meters, enough to provide 30,000 Swedish homes with oil-based heating.

Critically, for an energy-intensive industry like Stora Enso's, Skoghall now generates 40 percent of its electricity needs as opposed to 15 percent before the revamp.



Improved efficiency and reduced costs
Taking service to the next level

Having delivered two-thirds of the process automation and safety systems at Norwegian oil and gas fields, ABB plays a major role in the energy efficient operations of offshore and onshore installations.

Over the years, ABB has been selected by major players in the oil and gas industry like BP, ConocoPhilips, ExxonMobil and StatoilHydro to provide cutting-edge process automation and safety systems that control the complex operations at oil and gas fields.

Service has always been an important part of ABB's offering to the global oil and gas industry. Now, with new technology and a new type of service contract, ABB can take on even more comprehensive tasks, with significant environmental and economic benefits.

To help its customers better manage their automation systems and applications, ABB has developed a new and comprehensive concept through which it takes full responsibility not only for traditional service and maintenance tasks but also the daily operation of automation systems.

In 2007, Norske Shell became the first company to sign this type of contract with ABB, for its flagship Ormen Lange gas processing plant and the Draugen oil platform.

Remote operations and service

The concept is ideal for the industry's longterm strategy for extending the productive lifetime of oil and gas fields and of running operations by remote access to improve efficiency and reduce costs.

The Service Environment™ program meets the industry's stringent demands in terms of information security, which means ABB can operate, service and upgrade the systems by remote from its three onshore service rooms in Oslo, Bergen and Stord.

Ease of access to systems and information from land give the customer benefits such as shorter response times and broader access to competence clusters. There will also be huge savings in terms of sending experts to the sites, especially offshore – and with less impact on the environment.

The five-year contract with Norske Shell covers ABB and third-party automation equipment and software on a shared service, single-point-of-access basis.

Record-breaking Ormen Lange

Ormen Lange is the deepest natural gas field ever exploited. The gas is piped 120 kilometers to the Norwegian mainland for processing and then pumped along the world's longest underwater pipeline (1200 kilometers) to England for distribution in the U.K. supply network.

ABB's scope of supply to the Ormen Lange development is extensive and includes the process automation, safety and information management systems that control the onshore gas processing plant and the flow of gas through the pipeline, as well as energy efficient variable speed drives that power and control the gas compressors.

ABB is the world's leading supplier of process automation systems to the oil and gas industry. One in three oil and gas automation systems are supplied by ABB worldwide.

Outstanding fuel savings
Azipod® propulsion systems reduce ship fuel consumption

ABB's Azipod® podded propulsion systems are reducing fuel consumption and greenhouse gas emissions on a wide range of vessel types – including the world's largest luxury cruise liners – up to 20 percent.

Launched in 1990, Azipod is an ABB innovation that brings wide-ranging and well-documented benefits to ship designers, shipbuilders and ship operators alike.

For ship designers Azipod's flexibility allows more payload to be transported at higher speed using less power. For shipbuilders it means simpler hull form and structure, fewer parts and large savings in weight and space.

And for ship operators it brings unrivalled operational performance compared to conventional shaftline propulsion - approx 10 percent reduced fuel consumption and greenhouse gas emissions, unrivalled maneuverability, and near-elimination of noise and vibration.

More than 90 vessels – cruise liners, icebreakers, tankers, drilling rigs and offshore supply ships – have been equipped with Azipod to date. They include Royal Caribbean's renowned Freedom class of cruise ships, the world's largest cruise vessels in terms both of gross tonnage and passenger capacity.

The three 160,000 ton liners – Freedom of the Seas, Liberty of the Seas, and Independence of the Seas – each carry 3,634 guests and 1,360 crew on 15 passenger decks and have a cruising speed of 21.6 knots.

They will shortly be surpassed in size by Royal Caribbean's Genesis series of luxury cruise liners, which will weigh 220,000 tons and carry 5,400 guests. The two Genesis vessels – recently named as Oasis of the Seas and Allure of the Seas – will both be equipped with three Azipod propulsion systems.

Outstanding fuel savings

ABB's latest addition to the podded propulsion range is CRP Azipod®, a contrarotating propeller system that has achieved remarkable savings for Japan's leading ferry operator.

Shin Nihonkai Ferry equipped two of their newest high-speed ferries with CRP Azipod and cut fuel consumption by 20 percent and reduced the number of vessels required to operate its longest route from three to two, thereby making substantial reductions in operating costs.

The transportation capacity has increased by 15 percent, thus opening up new business opportunities for Shin Nihonkai in the freight transportation.

The two RoPax (roll on-roll off passenger) ferries are the largest and fastest RoPax vessels in Japan and the first vessels in the world to be equipped with CRP Azipod. They have been operating successfully since 2004.

Variable speed drives
Optimizing pump speed to save energy

A study by the Lappeenranta University of Technology (LUT) and a Finnish paper mill reveals that the consumption of specific energy using throttling control may require up to three times the energy compared to a solution using variable speed drives combined with optimized pump control.

According to a study by Lappeenranta University of Technology in Finland, pump control based on variable speed drives can deliver energy savings of up to approximately 70 percent in parallel pumping installations. The biggest savings can be achieved in situations where there are significant fluctuations in the flow. The project leading to this remarkable conclusion involved both computer simulations and practical work on laboratory-scale equipment.

The project was undertaken at LUT's Department of Energy and Environmental Technology. It set out to qualify the differences in energy consumption in four applications with three different flow control methods. The simulations were performed with Matlab v. 6.1 and Simulink software, and the results were verified with actual measurements. The control methods compared were throttle control, standard pump control and optimized pump control.

- Throttle control: one pump is throttled and the others are on/off controlled.
- Standard pump control: one pump is controlled by a variable speed drive and the others are on/off controlled.

Control methods	Energy consumption		Flow	E_S
	(J/24 h)	(%)	(m3)	(J/m3)
Throttle control	177,114	0.0	2,254	78.58
Standard pump control	102,786	-42	2,257	45.54
Optimized pumpcontrol	57,050	-68	2,256	25.29

In optimized pump control, each pump has its own variable speed drive and the required flow is divided evenly between all the pumps. As a result, their rotational speed is the same. This case differs from the standard model in that the pumps are switched on and off in an optimized way. Optimized pump control technology is subject to a patent application by ABB.

The first simulated industrial example is typical real-life industrial pumping situations where new control technology can be applied. The example was taken from a Finnish paper mill, where Ahlstrom APP22-54 centrifugal pumps are used to pump chemically treated water to a desalinations unit. An energy analysis of the pumping facility was used as the basis for the simulations. In this case, a lack of background information made it difficult to draw the system curve.

The simulations, which relied on simplified system and duration curves, showed that in this case, throttle control uses considerably more energy than the other control methods. Optimized pump control is by far the most energy efficient method. The difference between standard and optimized pump control is over 45 percent. The consumption of specific energy with throttling is almost the threefold of that used with optimized pump control.

Green robots in the plastic industry
Robots increase efficiency and competitiveness

Robots are helping a Swedish manufacturer of plastic reels for the telecom and cable industries stay competitive on the global arena.

It was only five years ago that Axjo, a manufacturer of plastic reels, bobbins and other specialty products, assembled its products by hand. Today, the company's manufacturing processes – from huge plastic injection moulding machines with 20 robotic cells doing the assembly work – couldn't be more automated.

"In five years, we have doubled our turnover to 12 million euro without needing to employ new people," says Axjo part-owner Jacob Nilsson, President of Axjo. He was formerly the technical director. "This says a lot about the robotic technology we have heavily invested in the last five years. Through automation, Sweden becomes a low-cost country."

Reels are the backbone

Axjo is located in the picturesque little town of Gislaved in southwest Sweden in the province of Småland. Eighty percent of Sweden's plastic and polymer-based industry is located within a short distance from Gislaved.

Today, 70 percent of the company's products are plastic reels and bobbins that are used by telecom, cable, wire and fiber optic companies to store, ship and distribute cables in various forms.

A powerful player in a niche industry, Axjo has become one of Europe's biggest companies in the plastic reel industry. Customers include global companies such as Ericsson, Sandvik, Haldex, Draka, Habia, Nexans, Rebia, General Cable, NKT and Condumex.

The other 30 percent of Axjo's manufacturing in Gislaved includes customized plastic products such as baby rubber feeding spoons and baby potties for the Swedish brand Baby Björn. Axjo's third product group is medical instruments and tools.

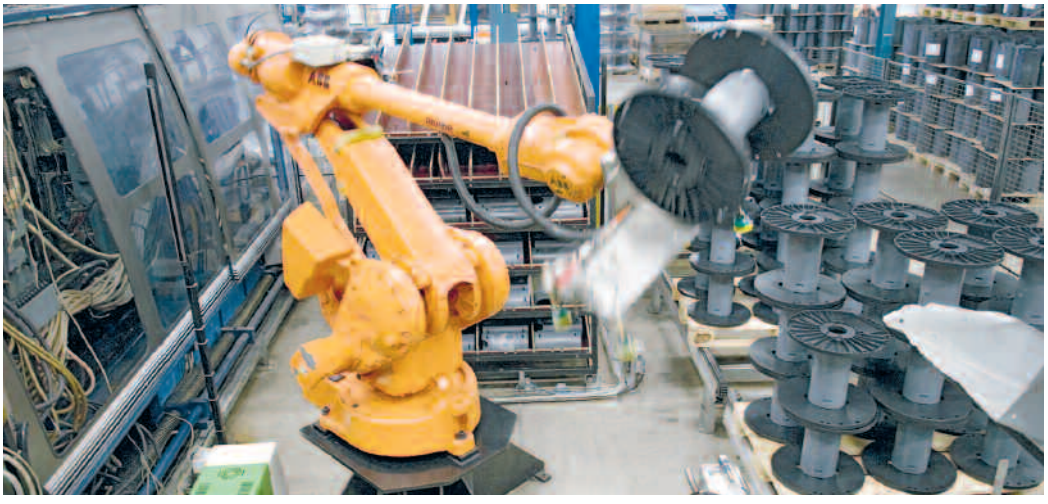
But reels are the backbone of Axjo's business. A reel is an object around which lengths of another material are wound for transport, storage or distribution. Generally a reel has a cylindrical core and walls on the sides to retain the material wound around the core.

Robot solution

Depending on the end user, Axjo's robots assemble these reels in either two or three plastic moulded pieces. While the assembly is quite a simple process for a robot, the designs and customized features for the end user require a lot of innovative thinking on the part of Axjo.

The flexible robotic solution, which includes four production cells for producing both the reels as well as the reel ends, uses IRB 4400 robots. Additionally, two cells with IRB 2400 robots are used for other products such as plastic storage boxes or the baby potties. The cells were developed and installed by system integrator Animex.

And then there is the environmental aspect. Recent legislation in Sweden and Finland is forcing reel users to recycle their reels. And Axjo has been instrumental in this effort, and pays its customers one Swedish krona per kilo returned plastic.



Rapid revamp saves time and money
Making a failed transformer energy efficient

ABB's rapid revamp of a failed transformer saved ScottishPower time and money and resulted in higher performance and a more energy efficient unit.

When the 400 MW combined cycle power plant at Shoreham by Sea on England's south coast suffered a major fault in its 220 metric ton generator step up (GSU) unit, the battle was on to get the facility back into operation as quickly as possible.

Repair rather than replacement

The problem faced by the customer was that the usual approach of buying a replacement transformer would take around 18 months and make a considerable hole in the power plant's budget. The operator, ScottishPower, was aware not only of the need to solve the problem but to do so in a way that would meet the very latest standards of energy efficiency.

The single 4760 MVA 21/132 kV GSU transformer is vital to the operation of the power plant. Its role is to step up the 21 kV terminal voltage produced by the generators to the 132 kV required by the grid.

ABB's power systems service team in the U.K. was quickly called in to test and diagnose the problem, which was traced to a failure in the winding mechanism. The team's recommendation was that the GSU transformer should be repaired rather than replaced.

Time and cost savings

This would not only deliver a considerable time saving, it would also provide a substantial cost benefit to the customer. And, it would bring the unit up to the latest requirements for energy efficiency. Not only would it meet current quality standards and technology, it would have nearly the same life-cycle as a brand new transformer.

Within days ABB had stripped the transformer and shipped it to ABB's transformer service workshop in Norway, where it was de-tanked and stripped to its component parts. The winding failure diagnosed by ABB's specialist team in the U.K. was confirmed as correct. Repairs were then undertaken on schedule and within budget.

A tremendous achievement

ABB was able to supply a very fast and economical solution to a serious problem.

Repairs took half the time of supplying a new transformer, the cost was 25 percent lower than a new unit, and ABB ensured that the repaired unit met all the latest energy efficiency and performance standards.

Gary Murray, manager of Shoreham Power Station, said: "The transformer remanufacturing project has been a tremendous achievement thanks to the hard work, dedication and team work shown at every stage, both on site and in the factory."

"We especially appreciate the way that ABB responded to the urgency of our situation by rescheduling its factory work-flow to bring this project forward. As a result, the station has been returned to service safely and even earlier than expected."

Contributing to a better world
Seeking continuous improvement

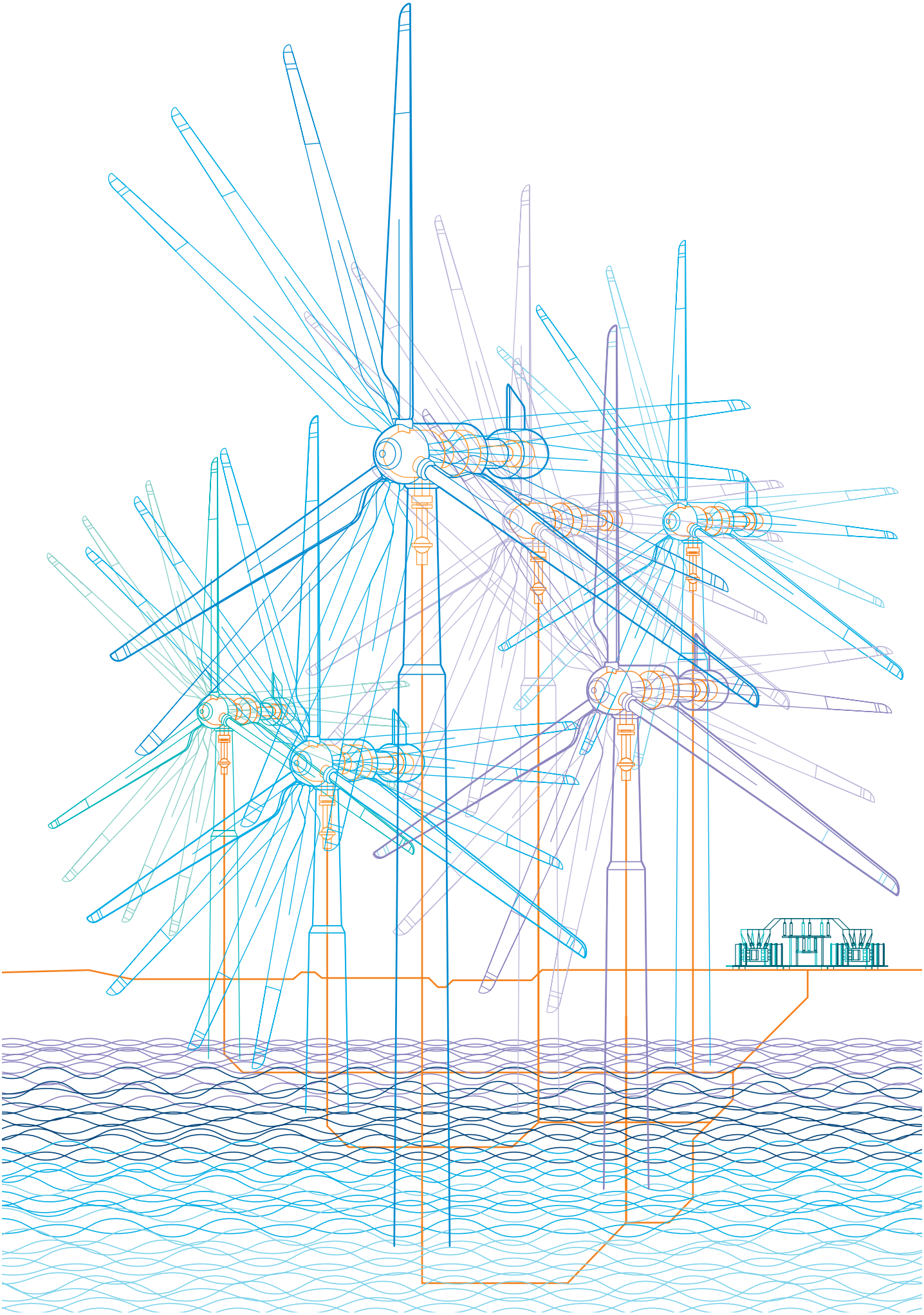
Energy efficiency is a core element of ABB manufacturing processes and products. This enables ABB to help customers to use electrical power effectively and to increase industrial productivity in a sustainable way.

The link between energy efficiency and mitigating climate change is clear. According to a recent study by the International Energy Agency, 80 percent of projected CO_2 emission reductions by 2030 will be delivered through energy efficiency.

ABB recognizes the issue's importance: A significant proportion of ABB's revenues come from products that increase customers' energy efficiency.

And ABB's strategy through to 2011 identifies environmental concerns as a key driver of market growth.

All industrial activities have varying degrees of environmental impact caused by emissions, waste, and the use of energy and materials that result in pollution and depletion of natural resources. ABB has been working for many years to reduce its impacts, both within its own plants and offices, and those caused by its products. As part of these efforts, ABB now uses less material and energy, streamlines its means of transportation and is making increased efforts to design products that can be recycled.



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