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A Customer Magazine
of the ABB Group
New Zealand

insider



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The business, product and strategy

Power and productivity
for a better world™



A full-page background image showing a view of Earth from space. The Earth's horizon is visible at the top, with a bright blue atmosphere. The surface is covered in white clouds and blue oceans. In the center, a space station with multiple solar panel arrays is orbiting. The sky is a deep, dark blue. The text 'PCS100 platform' is overlaid in a large, dark blue, sans-serif font. Below it, the text 'supporting environment and industry' is overlaid in a smaller, white, sans-serif font.

PCS100 platform

supporting
environment
and industry



06 Environmentally friendly force

ABB provides power supply to new frigates

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Contact Us

Power protection : www.abb.com/powerquality
 Grid interconnection : www.abb.com/powerelectronics
 Energy storage systems : www.abb.com/powerelectronics



08 Powering Up

Spinning flywheel storage



Environmentally friendly force

PCS100 SFC Technology

It is natural to demand a power supply solution from land, whenever possible. Especially as it is both more environmentally friendly and inexpensive to provide power to ships this way instead of using their diesel generators while docked. Fewer hours of operation and reduced maintenance of diesel generators saves money. Through land-based power supply, fewer emissions of both nitrogen and carbon dioxide are significantly reduced. CO₂ emissions can be reduced by as much as 75-96 percent compared with light-fuel-generated power from ship generators.

ABB supplies power supply to new frigates

The Danish Navy is leading the defence industry with environmentally friendly power supply. This a true fact after the finance committee of the Danish Parliament granted a total amount of 47.5 million DKK for a new power supply solution to the three new frigates of the Danish Defence, which will be based in Korsør Harbor. The shore-based solution from ABB means that the inhabitants of Korsør will be free of noise and air pollution from the diesel engines of the frigates.

It is often a nuisance to the local community, when ships in a port produce their own power by means of diesel generators. The generators are noisy and discharge large quantities of nitrogen (NOX) and carbon dioxide (CO2). However, when the three new frigates of the Danish Defence move to Korsør Harbor, neighbours will sleep and breath easier.

As one of the world's largest producers of energy technology ABB will deliver the solution, which the Danish Defence has selected in cooperation with the consulting engineers Moe & Brødsgaard.

Shore power is always favoured, especially as it is both more environment friendly and cost efficient to have the power delivered in this way, compared to a solution where the ships run their own diesel generators when they are in port. Bjarne Kilde, who is project manager of the Danish Defense Construction and Establishment Service (FBE), prepared the tender, which ABB won. He says, the reduced operating time and the lower demand of maintenance for the diesel generators will save the Danish Defence department a lot of money.

Power from shore much more energy efficient

ABB is met with an increasing demand for shore-based power supplies to ships from shipping companies in both Denmark and the rest of the world. This applies especially to ships which are berthed alongside the quay for many hours, like cruise ships and ferries.

There is a clear trend in Europe, particularly Sweden, for countries to focus on the considerable environmental advantages they obtain when choosing solutions where the ships are supplied with power from shore connections.

This power comes more and more often from sustainable energy sources and is produced in a far more energy efficient way, according to Jonas Kehr, sales manager of ABB.

ABB's solution means that the NOX and CO2 discharge will be reduced by 96 % and 75 % respectively, compared to light fuel-generated power from the ships' own generators. During the periods when all three frigates are berthed at the quay in Korsør, the inhabitants of Korsør town will avoid exposure of up to nine tons NOX and 450 tons CO2 each month.

The complete solution from ABB is expected to be ready for operation in the first quarter of 2012

Technical data

ABB's scope of supply includes an advanced control system complete with all electric equipment, from 10 kV 50 Hz switchgear, to the three 440 V 60 Hz quay cabinets. Several low voltage power distribution panels and a large number of transformers are also included.

When choosing the solution, the Danish Defence has attached great importance to the efficiency and the reliability of the plant. Therefore they selected ABB's new 50/60 Hz static converters, which are based on modular and redundant power electronics, with the highest efficiency in the market.

See more on ABB's ship to shore power technology at :

www.abb.com/powerelectronics
(grid interconnection products)

Innovation highlight

PCS100 Static Frequency Converter (SFC)

Not all the world is at the same frequency

ABB's PCS100 SFC (static frequency converter) is the answer to bridging the gap in today's industry environments, where equipment has different voltages and frequencies.

Providing the ability to shift power to and from the 60 Hz to 50 Hz grids, the PCS100 SFC is the economical answer to running your industrial equipment overseas, or your overseas equipment here.

Typical applications include:

- Where load frequency is different to the local supply
- Relocation of industrial plants; and
- Supplying power to docked ships

ABB offers a complete product range from 125 kVA to multi MVA. The system is internally configured as a parallel arrangement of modular rectifiers and inverters all controlled by a central master controller. Each rectifier draws a clean sinewave current at unity power factor from the utility supply. Each inverter produces a clean sinewave voltage to supply the output load. Due to the modular design the system is compact and easily serviceable. In the unlikely event of a failure the system offers hot redundancy. Meaning it loses only the fraction of the failing power module and continues to operate. Repair can be scheduled with minimal downtime due to module replacement.



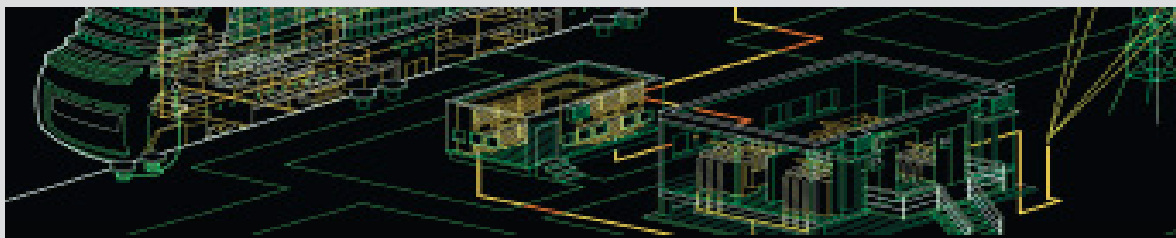
Advantages

- 50 Hz to 60 Hz and 60 Hz to 50 Hz conversion at any voltage via transformers
- Unity power factor rectifier with a THDi of < 3%
- High efficiency 95% typical
- Overload capability of up to 200%
- Able to parallel with multiple PCS100 SFC or other generators
- Very high system availability through advanced power module redundancy
- Provides output immunity to input disturbances (voltage sags, frequency shifts)
- Islanding capability



www.abb.com/powerelectronics
(grid interconnection products)

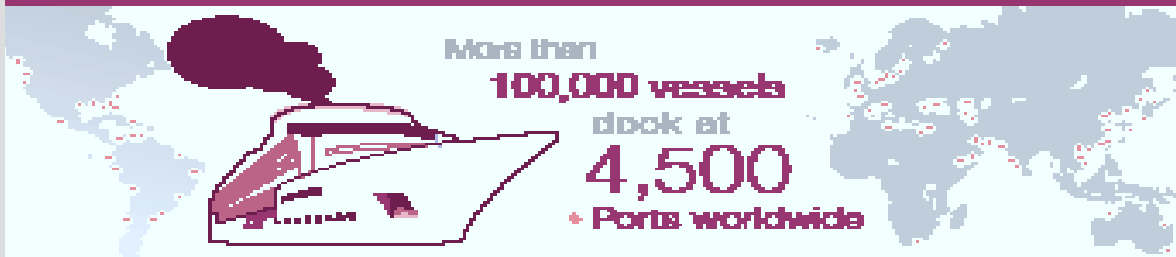
ABB infographic



Eliminate port emissions Why can't all ports have clean air?

Ships consume fuel when they stay at the port. This creates pollution, noise and vibration in the port area. The solution to this problem is shore-to-ship power. It allows direct connection of ships to a harbor's electric grid.

Global shipping



Business as usual

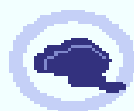
Ships burn fuel even at port...



...resulting in



noise



emissions



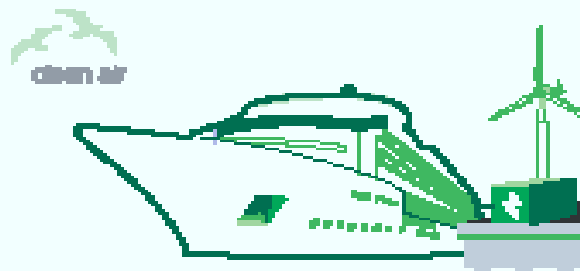
vibration

900 Million metric tons of CO₂ emitted annually at ports world-wide

220x Equal to 220 coal-fired plants

Shore-to-ship power

Any ship can be connected to the power grid



Benefits



1 cruise ship connected to the grid in the port could annually save

\$750,000 in operational cost



\$3,200,000 in respiratory and heart treatments in the US alone

CO₂ emissions equivalent to **2,500 cars**





Powering up

State-of-the-art solar power stations are first in high penetration solar photovoltaic and diesel power stations

ABB technology aids the use of sunlight to generate electricity in two of the hottest towns in Australia

Two towns synonymous with mining, isolation and, most importantly, intense sunlight are known as 'the hottest towns in Australia'. For 161 consecutive days to 20 April 1924, the temperature in these towns never dropped below 100°F (37.8°C). All good reasons why high penetration solar photovoltaic (PV) diesel hybrid power stations have been recently situated in these regions to replace existing power stations coming to the end of their service life.

A central problem in many remote or isolated small scale PV arrays is that the electrical grid can be unstable due to the significant fluctuations occurring in energy production. The issue most acute in soft grids is the remote area and isolated networks, mine site electrical distribution and community power supply. However, the problem also exists in large networks at the end of long distribution lines, at the interconnection point of wind farms and other critical nodes.

Analysis of replacement power station options in this scenario showed that a high penetration solar PV and diesel power station would be cost competitive with diesel generation over the 20 year life expectancy of the asset. The latest energy storage technology is used to store energy from the solar panels and stabilise power quality between the diesel power station and the solar farm are a key aspect of the project.

Spinning flywheel storage.

Integrated kinetic flywheel technology, supplied and manufactured by ABB's research and development centre in New Zealand, stores the solar power, as well as stabilizing power quality between the diesel power station and the solar array. A rapid energy source and sink system that is based on a modern flywheel and bi-directional inverter. The technology combines a low speed flywheel with a solid state insulated gate bipolar transistor based inverter to create the grid stabilizing device. The energy that is required to prevent under frequency is drawn from the flywheel at a rate of 1 megawatt per 5 milliseconds. Alternatively, the system can absorb energy surges at the same rate and prevent grid conditions being driven out of the utility specifications.

The full solar energy systems installed will generate over 1.155 MWh of renewable energy per annum. They will supply 30 per cent of the annual energy for both towns, up to 65 percent of day time energy, that will result in savings of 405,000 litres of fuel and 1,093 tonnes of greenhouse gas emissions each year.

For more information on the range of ABB energy storage and grid stabilisation products please visit:

www.abb.com/power-electronics/energy-storage-&-grid-stabilization

Portugal solar market heating up

Lux Research's latest Solar Demand Forecaster says steadily rising internal rates of returns (IRR) for the six major solar technologies will push Portugal to a nearly 400 MW annual market in 2016.

IRR is the discount rate at which the net present value of future cash flows from a capital investment equals zero. Capital expenditures are the primary factor in determining a market's IRR, along with incentives and operating expenses. Put simply, it provides an apples-to-apples metric for investors to compare demand and project growth for solar across disparate markets.

Elsewhere in Europe, high solar potential and favorable IRRs for investors are countered by uncertainty surrounding incentives - which could slow growth moving forward.

Italy and Germany will remain the Continent's most stable markets with returns hovering near 9% and 22% through 2016, respectively, thanks to annual incentive step-downs.

New Jersey, USA - where high Solar Renewable Energy Credit prices pushed IRRs into the 40% range in 2010 and early 2011 - is beginning to suffer the effects of dramatic oversupply, forcing a collapse in prices with no floor in place.

California - the largest market in the USA - will continue to see steady growth thanks to stability and visibility with step-down incentives and recent Renewable Portfolio Standard legislation.

India, with quarterly IRRs skyrocketing past 20% thanks to the newly introduced National Solar Mission, could become one of the strongest demand markets through 2016 - if subsidies are extended past 2013, as expected.

Top 5 Locations by IRR (2Q11)

1. New Jersey, USA
2. Portugal
3. Australia
4. Italy
5. India

The six major photovoltaic technologies tracked by Lux Research are monocrystalline silicon (c-Si), multicrystalline silicon (mc-Si), cadmium telluride (CdTe), copper indium gallium diselenide (CIGS), thin film silicon (TF-Si), and high concentrating photovoltaic modules (HCPV).

www.sustainablebusiness.com



The wind business

The world has a bottomless appetite
for electricity

ABB's success and global presence

Market share

Our wind business had a record year in 2010. Orders grew to \$2 billion worldwide, compared with \$400 million in 2006. Success is based on a global presence in the wind market, for instance in China, where we have been active from the early days of industry. A growing offshore wind market has opened opportunities, and we are already a major supplier of AC and DC grid connections for offshore wind parks. Our components are installed in more than 30,000 wind turbines around the globe. Hundreds of ABB substations connect wind power plants to local power grids.

What we provide

ABB has been in the wind power business since the mid 1970s and produces the main electrical drive train components that generate the electricity, including the generator, the converter, breakers and switches to protect and disconnect the electrical systems, motors for yaw and pitch (side to side, up and down) motion control and other auxiliary systems, PLCs for turbine control, transformers and medium-voltage switchgear to connect the turbine to the wind park collection grid.

Wind is inherently unstable, so power plants must fulfill grid code requirements set by local utilities to ensure the power grid will remain stable during normal operation and fault conditions. We have much experience in the design of grid code compliance systems and manufacture each one of the components that make up these systems.

Our strategy

A global sustainability agenda makes a mature and proven renewable generation technology like wind power an attractive business. Continued growth is expected, driven by China, the industry's largest market as well as new offshore projects in Europe and growth in smaller markets like Brazil, India and Eastern Europe.

More demanding local grid codes are expected, and smarter solutions will be needed to integrate wind energy with other sources of distributed generation, and we are well positioned to support these developments. We are now present in all major wind markets with local factories, and will add new facilities in the USA, India and Brazil.

News in brief - industry highlights

European wind energy targets 2020 and 2030

From a current base of 84 GW or 5.3% of Europe's electricity, EWEA has published a vision document predicting that in less than ten years, that will jump to 230 GW and 15.7%. The main growth area is Ireland, which will increase more than four-fold to over 50% of electricity generation from wind.

US Report looks at benefits of grid investment

A report by the Center for Rural Affairs in Nebraska says that there are significant rural benefits to investment in transmission, linking with wind farms that provide employment and community support. The report also refers to an earlier Bloomberg statement that generation from farms in windy areas costs US\$65 per MWh, below new coal generation at US\$68.

EU Presidencies want to integrate wind

Onward EU Presidency countries Poland, Denmark and Cyprus have indicated that they will support the renewables sector, working on the integration of wind into the electricity network.

Local Co-op takes slice of wind farm action

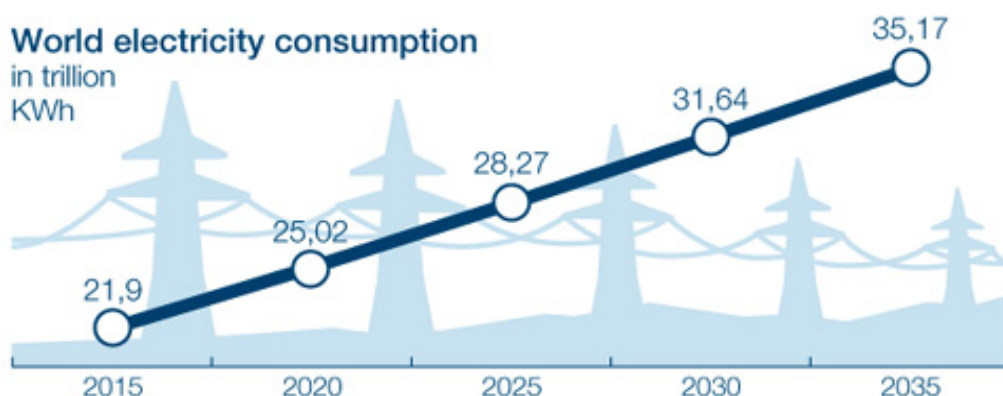
If you stay in an apartment complex, you may find that your suite is independently owned while being run by the apartment complex.

A wind farm in South Dakota, USA, has hit on a similar model. The Crow Lake Wind Project totals 108 turbines, with seven owned by hundreds of local investors. The developer hopes that local ownership will reduce opposition to wind farms.

source : NZWEA

World electricity consumption

in trillion KWh



+84%
by 2050

Electric Drive

The business, product and strategy

What will be the impact of electrical cars on our power networks? The biggest constraint for electrical grids is the possibility of large numbers of EVs recharging during peak usage times. This can be mitigated by managing charging around peak usage times - for example, charging overnight or when renewable generation such as wind is very high.



Electric vehicle (EV) infrastructure

Market potential of the EV business

Electric vehicles need charging options. ABB expects investment in electric vehicle charging infrastructure to exceed \$1 billion per year before 2015 - more if heavy vehicle applications are also included. There is global interest in the EV and hybrid EV sector. For example, China this year announced a 10 year, \$15 billion plan to make it a leader in the production of hybrid and pure electric vehicles, aiming for sales volumes of \$5 million units by 2020.

A study issued by the World Bank in April 2011 estimates global sales of plug-in vehicles will be 10 percent of new vehicle sales by 2020, and the global market for electric vehicles will be worth \$250 billion in 10 years.

Currently, public recharging infrastructure for EVs is very limited or non-existent in most cities, apart from some significant pilot projects and other programs.

To enable and encourage widespread consumer use of EVs, we need a system with enough public recharging locations to allow drivers to recharge on a regular basis during the day. Such infrastructure will effectively increase the daily driving range of EVs, (as well as hybrid electric vehicles using electricity).

ABB Acquires Epyon

The acquisition of Epyon B.V., an early leader in electric vehicle charging infrastructure solutions focusing on direct current (DC) fast-charging stations and network charger software, enhances ABB's strategy to expand global offering of electric vehicle infrastructure solutions.

What ABB provides

ABB is now producing infrastructure for electric vehicle charging. Prototypes have been built and tested in various countries around the world. AC standard home and public chargers will be available with in Q3 2011. DC fast chargers are available now for pilot projects, and the target for the product release is end of 2011 – beginning of 2012.

Experience with grid infrastructure, power electronics and low voltage products will help ABB deploy charging stations at a sustainable cost.

Strategy

ABB has plans to cooperate with infrastructure operators, electrical utilities, oil companies, and automotive manufacturers as appropriate. We have numerous collaborations with some of these already in North America, Europe, and Asia, however the only one publicly announced is with Ecotality in North America where ABB made an equity investment in January 2010 and will be supplying all infrastructure hardware in the future.

The largest project ABB is involved in is the US-based EV Project through ABB's North American partner Ecotality, which will source the future charging infrastructure from ABB.

This project will deploy more than 15,000 standard charging points and more than 300 DC fast chargers in North America over the coming year. First installations are already underway.

There are numerous players moving into the infrastructure operator space including electrical utilities, oil companies, retail store operators, and dedicated electric vehicle infrastructure companies. We will typically act as supplier to these companies and enable our chargers to support their network. In the case of standalone home installations net work integration is not necessarily required, but could be purchased (with an installation subsidy) in a similar manner to mobile phone plans.

The difference between AC standard charging and DC fast charging

AC standard charging is intended for situations where the car will be parked for some time, such as home and office. It can deliver a full charge in about four hours, depending on battery size and available charging current.

DC fast charging is intended for when the EV driver needs a rapid recharge to accommodate a change in plans, or for longer distance travel. It can deliver a full charge in 30 minutes or a partial charge in five minutes that will add another 30 km to the vehicle's driving range. The two charging solutions - AC and DC - work together as part of an integrated e-mobility infrastructure system and are entirely synergistic, not competitive.

How long does a DC fast charger take to charge an EV? How far can it travel?

ABB's DC charger takes 30 minutes to store 25 kilowatt hours (kWh) of energy in a battery. The consumption of an electric vehicle is between 150 and 200 watt-hours (Wh) per kilometer, so that 25 kWh corresponds to a trip of between 125 and 170 km. Depending on the average speed, that is about two hours under typical driving conditions on a highway. So, let's say 30 minutes charging for two hours driving. This is in the range where it becomes possible to make longer trips with electric vehicles. Given the developments in charging and battery technologies, electric vehicles combined with DC fast charging are becoming a real alternative for longer distance travel as well as short trips.

Charge a car in five minutes (like at a gas station)

This option is expected to become available late in the second half of this decade. The basic technologies to make it happen already exist. It is a question of taking advanced batteries and turning them into mass-produced battery packs taking into account size, reliability and cooling. Ultra-fast charging will first appear on heavy transit vehicles and short haul service vehicles, where implementation is targeted before 2015.

Ultrafast charging is ideally suited to taxi fleets, light goods vehicles, and ABB is increasingly working on heavy vehicle applications such as buses and trucks. Even short-range ferries could use fast charging systems to allow a change to battery power.

PCS100 Product training 2011

Register your interest now for 8-10 November



Enhance your technical ability and knowledge in the PCS100 product range. Interactive practical training with real devices for demonstration purposes and functional exercises

Product training

Products, applications, markets and technical basics

- Power protection
- Frequency conversion
- Grid connect interfaces

Marketing

- PCS100 tools and support

Hardware

- Power modules, aux.module, interfaces

Control modes, interfaces, options

- Power protection
- Frequency conversion
- Grid connect interfaces

Order handling process

- PCS100 sizing and pricing

PCS100 outlook

- Ongoing and future developments

Who should attend

ABB partner channel sales and service engineers.

Training locations

ABB LV Power Converter product trainings are conducted in our well equipped manufacturing and R&D facility in Napier, New Zealand, by highly qualified engineers and instructors.

Enrolments

Register your interest for any one of our courses via email to : pq.supportline.nz@nz.abb.com

Confirmation

Confirmation of acceptance and course information will be sent approximately two weeks before the start of the course. We will inform you by email or phone if there are no vacant places.

Course program

The course program and all related information about the course times and venue is sent to the participants with the confirmation. The course normally runs from 9.00am - 4.00pm over a three day period.

Reservations

We reserve the right to change any course schedules, programs and their contents. A course could be cancelled due to minimal enrolment. The maximum number of students varies between 10 - 12 persons.

Cancellation

In the case of cancellation, inform us as soon as possible. This will allow another applicants to attend the course. Your place on a course can be transferred to another person in your company or department.

Training schedule 2011

Course	Day one	Day two	Day three
One	8 February	9 February	10 February
Two	10 May	11 May	12 May
Three	9 August	10 August	11 August
Four	8 November	9 November	10 November
Agenda Am	PCS100 product platform overview	PCS100 frequency conversion	PCS100 sizing and pricing tools
Agenda Pm	PCS100 power protection	PCS100 grid connection	Outlook /future developments

Service and commissioning training 2011

Register your interest now for 22-24 November

Your knowledge. Your power.

ABB is a leading supplier of power electronic systems. This extensive experience and history of innovation helps customers around the world to improve plant performance and production.

Our customer awareness means that we are committed to support customers globally in their plans for growth. ABB offers a wide range of professional training courses adapted to meet the needs of customers and partner channels.

Benefits of the training

Service and commissioning training courses give valuable support to increase return on investment, reduce costs in down time and improve skills and motivation of personnel.

Training participants profit from our extensive experience and modern training infrastructures which enable them to :

- efficiently operate and maintain ABB PCS100 LV Power Converter systems
- troubleshoot problems faster
- extend the lifetime of the product

Training locations

ABB LV Power Converter product trainings are conducted in our well equipped manufacturing and R&D facility in Napier, New Zealand by highly qualified engineers and instructors.

Course profile

Our service and commissioning training courses are aimed to qualify maintenance engineers to undergo unsupervised first level support of ABB PCS100 applications. The main course goal is to learn how to operate, troubleshoot and maintain the system.

Upon completion of the course, maintenance engineers will be able to locate and identify hardware components, download fault loggers and important information for first analyses by support personnel, replace parts and perform preventative maintenance. Trainees will gain good practical experience using available tools and techniques through organised practical exercise.

Who should attend

ABB partner channel and customer service engineers.

Confirmation

Confirmation, reservation details, and all related course information including schedule and venue details will be sent approximately four weeks before the start of the course.



Enrolments

Register your interest for upcoming courses via email to : pq.supportline.nz@nz.abb.com

Training schedule 2011

Course	Day one	Day two	Day three
One	3 May	4 May	5 May
Two	5 July	6 July	7 July
Three	22 November	23 November	24 November
Agenda Am	PCS100 platform service introduction	PCS100 service power protection	PCS100 service grid interconnection
Agenda Pm	PCS100 platform service detailed	PCS100 service frequency conversion	Outlook /future developments

Preventative Action



Project feature

- 4. Shaping a future of stability**
Protecting commercial operations in Asia

Industry watch

- 6. The hidden element**
Helping take the squeeze off profit margins in gold mining sector

Product development

- 8. Hanover Messe 2011**
ABB demonstrates smart efficiency

Case Study

- 10. On shore and on board**
Standardisation in shore-to-ship power

Embracing Evolution



Project feature

- 6. The power to make a difference**
Marine mega yard takes ABB technology on board

Product development

- 8. Grid performance**
ABB provides smart technology for dispersed generation in energy grids

Industry watch

- 11. Brighter prospects for renewable energy**
Solar prospects for the second half of 2011 - Global wind energy market

Case Study

- 12. Competitive advantage**
Automotive giant breaks new ground with ABB technology

Inside ABB

- 14. Innovation highlight**
ABB's DC fast charger



Reducing gas emissions to the world's ports?

Absolutely.



As the world's leading company for energy and automation technology, ABB plays a vital role in creating solutions that reduce greenhouse gas emissions to the world's ports, and supporting the sustainable care of the environment. Our products can be found worldwide, providing the solution to port environmental protection challenges. We supply docked ships with electricity from the shore so they can turn off diesel engines that provide electricity for onboard systems such as heating, lighting and refrigeration. www.abb.com/powerelectronics

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www.abb.com/powerelectronics (grid interconnection products)

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