

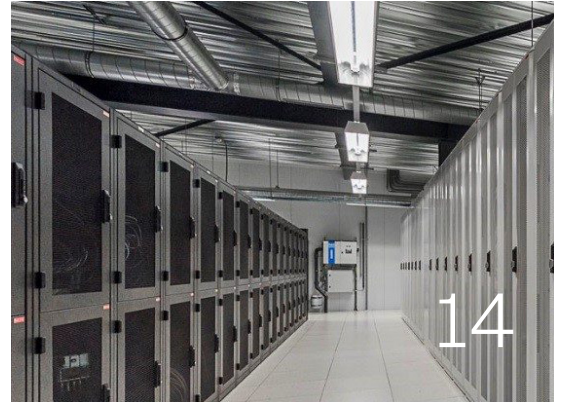
power

A power protection
magazine of the
ABB Group

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EDITORIAL



Dear reader

On behalf of ABB power protection, I am very excited to welcome you to this edition of the power magazine. Highlighted in this issue are several articles that demonstrate ABB power protection's technological advancements, as well as, the importance of strong partner and customer alliances.

Speaking of alliances, it is essential to maintain strong partner and customer relationships to gain and maintain loyalty throughout the lifetime of a given product. As the VP of field services, power protection in North America, it is my passionate duty to ensure my service teams deliver best-in-class service offerings. Our service group offers a comprehensive power quality service portfolio for commercial and industrial enterprises in a broad array of markets. Preventative maintenance, installation, de-commissioning, upgrade, repair and professional services are key programs delivered by one of the nation's largest technical service teams for both organic and multi-brand critical power equipment.

Our team encompasses more than 100 field engineers positioned across the United States to provide our customers with the finest national coverage and focused local delivery. From servicing and installing UPS, generator, or battery equipment, to battery monitoring and emergency repair, our customer service teams are committed to maintaining any critical power network with innovative, cost-effective solutions.

Additional service advantages include: self-performing UPS maintenance, counter-to-counter same-day service on UPS parts, Critical Asset Portfolios™ (CAP), which summarize system performance within all customer facility locations. Our dedicated account service coordinators guarantee prompt response with a single toll-free phone call. All inquiries are answered 24 hours a day, 7 days a week, 365 days a year, by an internal ABB staffed customer service call center. To learn more about ABB power protection's extensive service offerings, please visit www.abb.com/ups/service-ups-and-power-conditioning or contact us at 800 292 3739.

In this issue, read about how ABB has converted an abandoned underground mine to become possibly one of Europe's largest and greenest data centers. Located on Norway's west coast, between Måløy and Nordfjordeid, the six-story mountain hall facility sets a new standard for the data center industry. Additionally, our UPS group shares a success story on how a long-term relationship with partner, Rittal, brings modular uninterruptible power supply technology to the Dubrovnik Airport in Croatia, ensuring continuous, clean power for its critical operations.

Did you know that ABB power protection earns daily curtain calls at a Theater in Taiwan? ABB's PCS100 AVC-40 supports center stage by protecting the curtain control system and ensuring seamless opening and closing for performances! Check out the article in this issue.

ABB signs a partnership agreement with EMS Solution Joint Stock Company. This agreement fosters a regional commitment to delivering the power protection product portfolio. EMS values its relationship with ABB and works to deliver products and services that improve energy efficiency, reliability and productivity for industry, utilities, infrastructure, and data centers in Vietnam.

And finally, this issue closes with an article that speaks to big data and big business. With the world's hunger for data centers growing exponentially, ABB's wide range of data center offerings are positioned to make a difference. Focusing on delivering the most flexible and reliable solutions, positions ABB to provide intelligent data center solutions; intelligent data needs intelligent power, ensuring our customers businesses run efficiently and safely 24 hours a day.

Please continue to stay tuned to power. As we approach the close of the year, we look forward to providing our success stories, accomplishments and product showcases.

Enjoy this issue of power.

Franklin Maxson
VP of Field Services
Power Protection, North America

ABB solutions power Europe's greenest data center in Norway

With ABB technology Lefdal Mine Datacenter plans to become Europe's biggest, with the smallest environmental footprint



There was a time when the mineral olivine used to be excavated for industrial purposes, like making steel. Now, that steel is coming back underground to house a data center. Lefdal in Norway plans to become Europe's largest and greenest data center.

The Lefdal Mine data center, operational since May 2017, is built 150 meters into a mountain in what was formerly an underground mine for excavating olivine - also known as the gemstone peridot - a green, high density-mineral used in steel production. Located on Norway's west coast, between Måløy and Nordfjordeid, the six-story mountain hall facility sets a new standard for the data center industry.

The massive data center is powered exclusively by renewable energy produced locally, while being cooled by water from a nearby fjord, which is the second largest in the country and has four glaciers connected to it. ABB has supplied the critical power infrastructure, which provides clean energy generated by four glacial hydropower stations and two windmill farms with a combined capacity in excess of 300 MW.

Data centers are among the biggest consumers of energy. Yet Lefdal Mine is remarkably energy efficient, because it uses cold water from the 565 meter-deep fjord as a coolant. The data center is located below sea level, eliminating the need for expensive high-capacity pumps to lift the fjord's water to the cooling system's heat exchangers. The result is that the data center's cooling solution will have power usage effectiveness (PUE) – the industry standard for energy efficiency - of between 1.08 and 1.15 for 5 kW rack, making it among the greenest data centers in the world with 30-40 percent energy savings over traditional data centers.

"Cooling is crucial, because these servers generate huge amounts of heat. Because water cooling is so efficient, these server containers can run up to 50 kW of power, where you would normally expect just 7-8 kW with traditional air cooling," said Mats Andersson, Marketing Director, Lefdal Mine Datacenter.



Data centers are the backbone of our daily life. They store all the data generated by smart devices, businesses and social media. Without them, we wouldn't be able to check for traffic, or the weather, or see the latest updates of people we follow. Tech firms, large and small, also rely on data center storage to serve their customers worldwide. Therefore reliability is everything in a data center. Maintaining secure operations 24 hours a day is crucial, with redundant systems in place to ensure the data center is always operational.

To meet the powering challenges due to the physical size of the facility, ABB has built a medium-voltage backbone for the entire facility. To meet any emergency situation, ABB also provides a decentralized UPS (uninterruptible power supply) system, which means that each section inside the data center has its own UPS installation. If there is a problem with the grid, the UPS kicks in within a couple of milliseconds and ensures reliable power supply until the backup generators come online.

ABB has been an integral partner from the beginning of the project, providing tailored power supply solutions and extensive knowledge and expertise for such a challenging engineering project. Providing a powering system that can remain reliable as the center grows—to 200 MW from the current 10 MW in phases over the next three years—is of particular importance. When its growth is complete, Lefdal will be among Europe's largest data centers.

"At ABB we are very proud of our participation in this truly innovative project," said Ciaran Flanagan, Global Segment Leader Data Centers. "The quest for energy efficiency never ends and is not just a desire, it's now a responsibility and one we take seriously at ABB. We are truly delighted to be part of the team."

About 120,000 m² (1.3 million square feet) of white space is currently available in the data center, much of it in containers shipped by Rittal and parked in the former underground mine passages. "ABB was one of the first to be involved in the project, because everything starts with power. You need transformers, you need generators. So, based on the good relations we have, we started to discuss how to get ABB on board," said Andreas Keiger, Executive Vice President, Rittal.

Lefdal Mine Datacenter is coming up at the right time – when Norway is aiming to become a superpower for green data centers. The nation has a surplus of renewable energy – 97 percent of electricity generated in the country comes from renewable sources, mainly hydropower, according to Innovation Norway. The nation's solar sector – though still less than one percent of power generation – is growing fast, with panel installations growing by more than 300 percent in 2016.

The Norwegian government is looking to encourage more digital innovation to create new industries that create jobs and boost economic growth. In February 2018, the government released its data center strategy 'Powered by Nature,' which stressed that attracting data centers and international investments is an important part of their industrial policy.

With such incentives and a fast-growing need for more data centers powered by renewable energy, Lefdal Mine will have an edge with its unique location and engineering. As more of the world becomes digital, ABB will be powering Lefdal and Norway ahead.

Dubrovnik airport rolls out new data center with ABB power technology

Modular uninterruptible power supply system from ABB ensures continuous, clean power for a critical data center at the popular Adriatic destination



A new data center for Dubrovnik Airport in Croatia is relying on advanced ABB technology to ensure continuous, clean power for its critical operations. ABB has provided its DPA UPScale ST60 uninterruptible power supply (UPS) system to the data center's contractor, Rittal GmbH & Co. KG, for installation in the facility.

The project marks the latest step in the long history of collaboration between the two companies – an involvement that has recently expanded following an announcement of global expansion of their strategic collaboration in data center infrastructure operations.

With construction of a new terminal building, the amount of data that needed to be generated and stored to serve the nearly two million people using the airport each year demanded construction of the new data center. ABB and Rittal offered a complete solution for the airport data center that uses ABB's DPA UPScale ST 60 system CBAT-120 battery cabinets and the Rittal IT solutions. The solutions include a Rittal security room for highest physical security, an energy-efficient IT cooling device Liquid Cooling Package (LCP), TS-IT racks, the CMC monitoring system for monitoring humidity or temperature, and the modular power distribution technology.

A loss of power even for a fraction of a second in a data center can prove to be costly and dangerous if crucial data is lost. And with an increasingly busy airport, it is critical that IT systems are available 24/7. ABB's UPS offers immediate backup power for data centers in case of a dropout in power from the utility grid. The ABB system, built with a decentralized parallel architecture (DPA), is modularized. Each module houses all the hardware and software needed for autonomous operation. With multiple modules, the system ensures critical power will be maintained by at least one module even if a failure occurs in another portion of the system.

Aleksandar Radosavljevic, ABB Sales Manager Croatia, said, "The ST60 helps speed deployment, improve adaptability and increase system availability while reducing total cost of ownership. It is ideal for the airport data center."

The ST60 supplies on-demand power and integrates the power rack, power distribution unit, backup rack and monitoring and management solutions with easy selection of optimized configurations.

The fact that the complete data center solution comes from one vendor makes the project planning simpler, commissioning easier and ensures that the project can be implemented in a short time frame.

Rittal has supplied ABB UPS systems to its customers for many years. In 2013, Rittal and ABB agreed to deepen their partnership on an international level to support their growth strategies.

"Rittal deploys ABB UPS systems as standard modules," said Dejan Dokmanovic, Rittal Managing Director Croatia, "and leverages additional local ABB services to provide solutions for data centers and strengthen sales activities and services in local markets."

ABB's power protection technology takes center stage

Active voltage conditioning earns a curtain call at a Theater in Taiwan

— 01 ABB's PCS100 AVC-40 designed for sag correction in large commercial and industrial applications.

A performance is not complete without bows and applause at the end—and, certainly, the final curtain fall. To help ensure its shows are a hit from beginning to end, a Theater in Taiwan, has ordered an ABB PCS100 active voltage conditioner (AVC-40) to be installed to protect the curtain control system.

The theater ordered a PCS100 AVC to protect the curtain control system so that it can open and close smoothly during performances without any power quality issues. The theater previously had experienced many troubles with a system during rehearsals when the curtain would not rise. A reliable curtain control system is paramount for a professional performance.

The existing curtain control system had been made by a European company. The rated voltage was 400 V + -10%. However, the nominal voltage in Taiwan is 380 V, and because the theatre is located at the end of power feeder, the voltage at the theatre is approximately 370 V. If the load increased during a peak period, the voltage would drop below 360 V and would make the stage curtain control system abnormal; the curtain might not rise or lower when

required during a show. It was proposed to the customer that a PCS100 AVC could be installed to up the voltage to 400 V to solve this issue.

ABB won this order because of the compact size of the PCS100 AVC-40. Derek Low, power conditioning salesperson at ABB, explained, "The PCS100 AVC-40 has a small footprint. It can easily fit into equipment rooms or confined spaces, in this case near the dancer's preparation area, eliminating the need to design and build added floor space. This made the product more so the perfect solution".

With industry-leading efficiency exceeding 98 percent, the PCS100 AVC-40 has minimal heat rejection, resulting in minimal costs for electricity and cooling. The PCS100 AVC-40 requires no batteries, since it draws the additional energy required to make up the correction voltage from the utility supply. With no ongoing maintenance costs typically associated with batteries, the cost of ownership for a PCS100 AVC-40 system is very low.





PCS100 AVC-40

Superior voltage
conditioning for commercial
and industrial applications

The PCS100 AVC 40 is designed for sag correction in large commercial and industrial applications. Available in ratings from 150 kVA to 3600 kVA, the PCS100 AVC-40 offers continuous protection from the most common utility voltage problems found in modern power networks. Failsafe, worry-free operation even in harsh electrical environments and a faster return on investment due to low operation costs will ensure your business is protected from power quality events. abb.com/ups



ABB signs partnership agreement with EMS

Partnership to simplify and improve customers' access to innovative solutions for power protection

EMS Solution Joint Stock Company (EMS) in Vietnam has officially become a distributor and partner of ABB's power protection product group in the Vietnam market. ABB Vietnam has established itself as a reliable and competent technology partner to government, commercial and industrial sectors and has become a well-known name in power and automation technology.

EMS has worked with ABB Vietnam on a number of projects and they have built a cooperative and cohesive relationship. ABB is confident that the partnership is the winning combination of an extensive product portfolio and technical expertise with detailed knowledge of industries and applications together with a local market presence. Through the channel partnership, ABB aims to simplify customer access to the extensive range of power protection products that includes uninterruptible power supply (UPS) and power conditioning products.

In March 2018, in the framework of an ABB Channel Partner meeting, which was hosted by the Electrification Products division at the JW Marriott Hanoi hotel; the General Manager of EMS Solution JSC, Mr. Hoang Van Truong received the certificate of Distributor and Official Partner of ABB for the Vietnam market.

Working in partnership with ABB, EMS is committed to delivering products, systems and services that improve energy efficiency, reliability and productivity for industry, utilities, infrastructure, and data centers in Vietnam.

"It is such a great honor for EMS to work with and to be a partner of ABB for the Vietnam market. Signing previous partnership agreements with ABB for UPS and now power conditioning products is a big milestone in our effort to provide customers with flexible and comprehensive power solutions. We strongly believe that ABB's innovative technologies and expertise can help us follow our direction and focus," said Mr. Hoang Van Truong – General Manager of EMS Solution JSC.





—
01 Mr. Hoang Van Truong
receiving the certificate
of Distributor and Official
Partner of ABB for the
Vietnam market.

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02 Stock image

ABB's power protection product group has a complete range of power protection products to ensure a continuous clean electrical supply. All bases are covered when it comes to the power protection of sensitive loads. Covering applications from computer rooms, right through to large data centers, industrial equipment, and critical processes and plant protection. From a few kVA, right through to applications of many MVA and a wide range of supply voltages, ABB has the UPS and voltage conditioning technology for every need.

Bruce Bennett, Global Channel Manager for power conditioning products at ABB welcomed EMS to the global power conditioning partnership during a recent visit to EMS headquarters in Vietnam. "We are very impressed with the structure, experience, and talent EMS brings, and look forward to collaborating with them in the growing market for power conditioning solutions in Vietnam."

Big data, big business

For ABB, the world's hunger for new data centers equals an opportunity to make a difference

In the fields of central Iowa, huge steel, concrete and glass monoliths are rising from the corn.

Much of the region's artificial brainpower will soon hum inside, aided in part by ABB equipment, and the future promises to bring more of the same to fields around the world. Possibly, much more.

Data centers are among the fastest growing elements of the information age.

Loosely described, a data center is a large shell with a tightly controlled environment filled with interlinked computers. Collectively, the world's data centers hold the servers that power the information cloud used billions of times a day by everything from cell phones to company computers to home security systems.

The world's centers are expected to serve more than 20 billion "connected devices" by 2025, up from an estimated 8 billion today. Already in 2016, the world's data centers processed 7,744 tweets per second, along with 62,388 Google searches and more than 2.6 million emails. Internet traffic alone has surpassed 1 billion terabytes – enough to process about 5,000 times the words ever spoken by mankind.

All of that data, of course, rides on electricity, and ABB is here to give it the road to travel on.

To function effectively with very little, if any, downtime, a data center needs reliable power supplies, process controls that can minimize energy use and detect hot spots, efficient switchgear and miles upon miles of reliable cabling and connections.

About 40 percent of the total cost of a typical new data center is invested in power delivery, routing and controls (the rest is mostly spent on cooling systems, engineering and construction labor). In the power delivery arena, ABB supplies almost everything, including grid connections, monitoring and control systems, medium voltage distribution, uninterruptible power supplies and batteries, low voltage distribution and cabling, giving clients a virtual one-stop opportunity to wire a center with a reliable, low-maintenance power system.

Combined with the technical expertise of ABB Ability™, the opportunity is global.

All factors came into play when ABB was approached recently to install a new 1 megawatt 'TriLine' distribution system with several DPA 500 uninterruptible power systems in an expanding Serverius data center in The Netherlands. The project also included installation of the world's first touch-safe busbar system — the ABB SMISLINE TP — with its safe, easy-to-install plug-in modules, and an ABB Circuit Monitoring System to monitor and analyze energy consumption.

Meanwhile, in the fields of Iowa, ABB's low voltage installation products are helping to fuel a data center building boom, with sales to construction contractors aided by a key distributor.

For just one building project in West Des Moines, a \$1.26 billion monster that started rising from the ground in 2014, Thomas & Betts, a member of the ABB Group, has sold more than \$1 million worth of Color-Keyed connectors, Blackburn grounding equipment and tooling, Carlon® enclosures, Elastimold® connections and Superstrut™ cable tray systems through local sales agent Midwest Equipment Company and distributor Van Meter, Inc.



01

01 Stock image

The contract was secured based on ABB and Van Meter's ability to help write product specifications for the building and do onsite training. It also depended on Van Meter's willingness to stock a huge amount of product to support the project's demands.

Occasionally, a little flexibility and old-fashioned inventiveness helped, too: when tooling dies went on back-order, managers from Thomas & Betts rustled up die kits to keep the project supplied until the production order came through.

Ultimately, as is often the case with installation products, great customer service carried the day. That is perhaps best heard through Van Meter regional sales and operations coordinator, Nathan Graham's own words.

"Midwest Equipment and Thomas & Betts have been the best suppliers to work with," he told us. "We have put them through a number of trials including scheduling and expediting product,

working to find new solutions, requesting technical answers for special instances as well as servicing and certifying a large amount of tooling. Every time we called on Midwest Equipment and T&B, we were answered with informative professional help that kept a large number of people supported."

We love to hear that kind of praise coming from a major customer, because it spells success going forward.

From ABB's perspective, the ability to provide quality equipment to the core of the world's future technology is deeply satisfying. We understand that intelligent data needs intelligent power, and we focus on delivering the most flexible, reliable and intelligent data center solutions for our customers, ensuring their businesses run efficiently and safely 24 hours a day.

At the end of the day, that helps to make the world a better place for all of us.



Power conditioning

Designed for commercial
and industrial applications.

By choosing from ABB's PCS100 power conditioning solutions you are selecting from a portfolio of advanced technologies and expertise. The product range includes the active voltage conditioner, static frequency converter and low and medium voltage UPSs. A unique line up giving superior value to operations in the industrial, utility and commercial sectors. Providing energy efficiency, high reliability and increased productivity.

abb.com/ups

