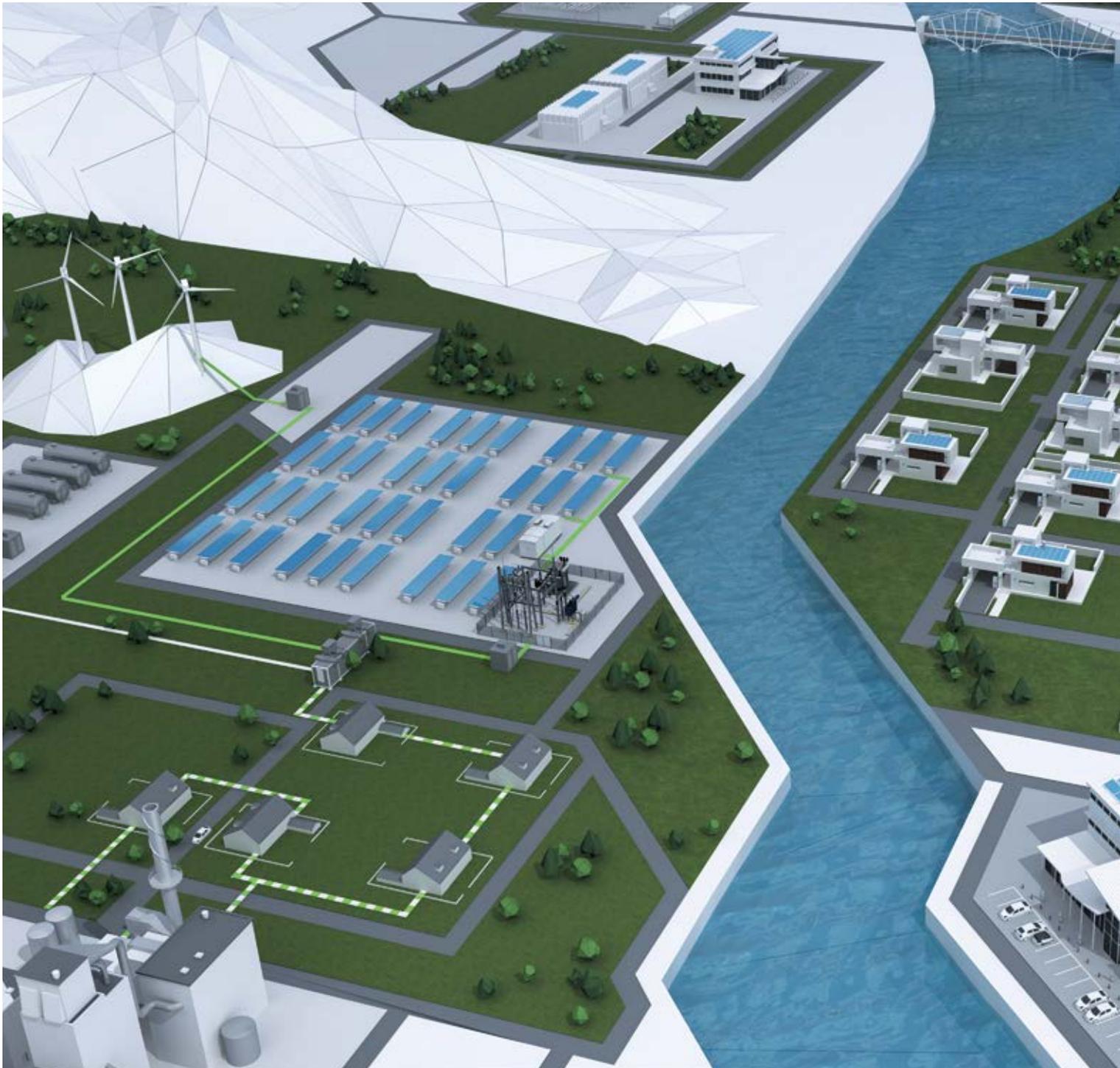




ABB in solar  
Everything you need for sustainable  
success

# Your expert partner

Solar power is entering a new phase. Technology advances and lower costs mean that it has growing potential everywhere from homes to large-scale centralized generation plants and remote locations.



To help you take full advantage of these new opportunities, ABB offers the industry's most comprehensive portfolio of products, systems, solutions and services, backed by expertise and experience in solar power gained over decades.



### A new wave in solar

The world faces an unparalleled challenge: meeting growing global electricity demand with minimal environmental impact. As a competitive source of energy, solar is a key contributor to solving this challenge – especially as electricity costs rise and solar systems become increasingly economically viable.

Solar energy is abundant, clean and scalable for installations of any size. Along with other renewables, solar will support economic revitalization around the globe as it enables economic growth to be decoupled from environmental impact. Government-backed incentives and subsidies for solar installations are becoming a thing of the past, as solar schemes look increasingly commercially attractive in their own right.

### Driving long-term success

With a comprehensive solar solutions portfolio, supported by a global sales, service and manufacturing footprint, ABB has everything you need to ensure solar power installations of all sizes are as efficient, reliable and well-managed as possible – all while maximizing return on investment.

Our solar offering includes inverters, low-voltage products, monitoring and control systems, grid connection, stabilization and integration products, as well as complete electrical balance of plant solutions. ABB also offers a wide range of support and maintenance services, including remote operations and diagnostics, that will help ensure your solar installations deliver optimal performance.

ABB has been supplying solar power solutions since the early 1990s, and we are uniquely positioned to leverage our expertise in power electronics, smart grids, distributed control systems and many other parts of the energy chain.

We can meet your every product, solution and service need – right up to the connection with the photovoltaic (PV) panels – whether for residential and commercial rooftop applications, utility-scale PV plants and grid connections, grid integration solutions, or microgrid solar applications.

ABB's vision is power and productivity for a better world, and solar is a perfect fit. With our passion for technology and innovation, our global presence and local competencies, and our commitment to renewables, ABB is helping to drive the growth of solar to its full potential.

In short, ABB is here to help drive your long term success in solar power.

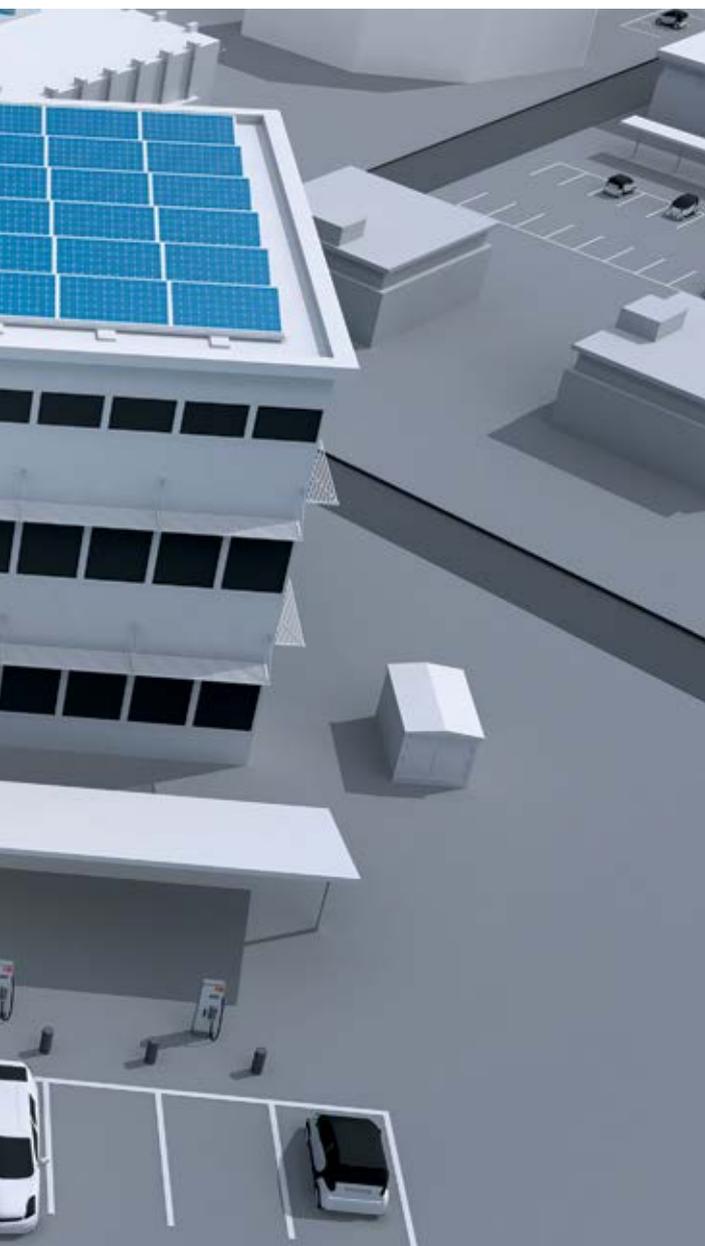
# Smart solar for smart buildings

Almost 40 percent of end-use energy demand comes from residential and commercial buildings, and this is likely to grow as more people migrate to urban areas. At the same time, consumers and businesses are looking to 'go green' and optimize their energy usage through efficiency measures and on-site generation.



Rooftop solar PV systems are among the few power generation technologies that can be installed right at the point of consumption. They have the potential not only to put consumers in greater control of energy costs, but also to provide a highly efficient way of balancing energy supply and demand – when implemented in the right way.

ABB's wide range of solar inverters, including micro and string inverters, low-voltage products and energy storage systems come together to enable residential and commercial consumers both to optimize their energy consumption and to ensure it is fully coordinated, and compliant, with the local grid.



### Realizing the full capabilities of smart buildings

ABB understands how solar can be intelligently integrated with building control and automation, as well as electric vehicle charging.

Our residential and commercial solar solutions also offer the intelligence to interact with the grid through remote automation, control and communications systems. This makes them a fully integrated part of smart grids and enables advanced applications like demand response and virtual power plants.

Our rooftop solar offering therefore helps maintain the vital balance between generation and demand. It helps ensure grid reliability, utilize solar generation peaks effectively, manage peak demands and protect distribution grid infrastructure as load increases.

It's a win-win situation for grid operators and consumers.

# Tap into our power plant expertise



Successfully deploying solar PV plants and grid connections requires utility-scale capabilities. ABB has the expertise and experience needed to deliver a complete solution to maximize revenues by optimizing the efficiency and uptime of your PV plant.

**ABB can provide every element you need – connecting everything from the direct current (DC) output of the PV panels up to the medium- or high-voltage grid – along with system design and optimization expertise.**

We are a one-stop shop, whether you require specific products or wish to source the entire electrical balance of plant (EBoP) for your solar project. Our expert teams ensure you have a grid connection solution that complies with specific requirements, anywhere in the world.

Drawing from our global experience in delivering solar solutions, we also offer a wide range of services to help you get the most from your plant – ranging from remote monitoring, to full operation and maintenance (O&M).



### Electrical balance of plant

Through our EBoP solutions you gain access to ABB's full range of capabilities, built on years of knowledge and expertise in engineering, system integration, control systems and power electronics, together with one of the industry's broadest product portfolios.

Our complete range of low-voltage products specifically designed for solar applications meet every need from the strings connected to the PV panels on the DC side to the alternating current (AC) grid connection point, including factory finished, wired and certified combiner boxes with remote string monitoring.

Additionally, our portfolio of products for PV tracking systems includes all key components – from drives and motors to PLCs (programmable logic controllers) and low-voltage products – needed for accurate and reliable tracker performance.

ABB offers the industry's widest range of central inverters, including megawatt-scale, containerized solutions, which house all the electrical equipment needed to rapidly connect a PV plant to the medium-voltage (MV) grid. These comprise inverters, MV switchgear and transformers and DC connections, and are designed to deliver high-efficiency performance with proven technology that meets country-specific grid codes.

### Grid connection

ABB also provides all the products and solutions needed to connect larger PV plants to the medium- or high-voltage grid, from transformers and switchgear to containerized compact substations – containing MV switchgear, distribution transformers, low-voltage switchboards, connections and auxiliary equipment – through to turnkey substation projects.

### Plant automation and operations and maintenance

ABB's plant-level automation platform helps you maximize revenues by optimizing the performance, efficiency and uptime of your PV plant. It enables real-time monitoring and full automation and control of PV panel tracking, inverters and grid connection, while enabling grid code compliance at all times.

ABB can also increase plant asset value by providing remote monitoring and operations services from one of our dedicated management centers. Additional services include preventive or predictive plant maintenance, maintenance planning and spare parts management, and a financial analysis tool.



# Grid integration

As an intermittent, widely dispersed source of energy, solar presents a challenge to power grids. It demands sophisticated solutions to balance supply and demand and avoid stress on the grid.

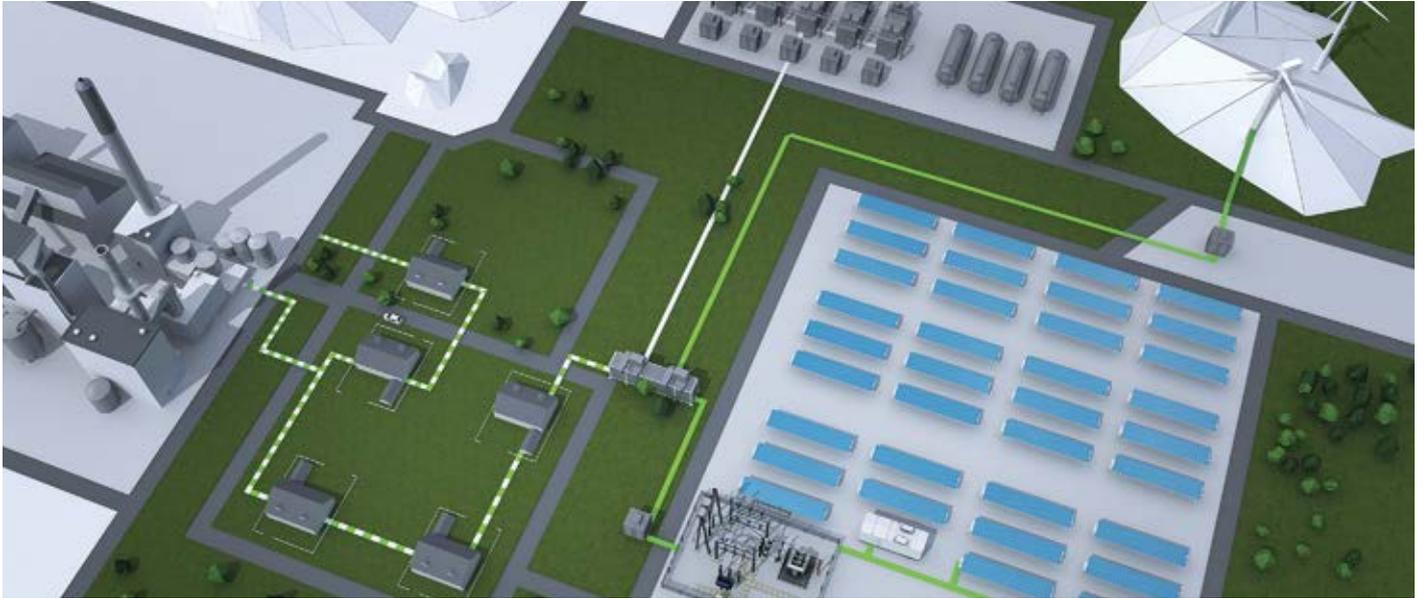
**ABB is uniquely positioned to help you integrate solar power into the grid as smoothly, efficiently and economically as possible. We have the advanced technologies needed for successful grid integration for installations of all sizes both at the connection point – with inverters, which provide local system management and intelligent connection to the grid – and at system level with our smart grid solutions for distribution grid automation, forecasting, load and demand planning, and energy storage.**

ABB also has a wide range of systems and solutions for transporting power efficiently over great distances such as FACTS (flexible AC transmission systems) and HVDC (high-voltage DC) technologies.

Our industry-leading software solutions will help you take advantage of the higher penetration of renewables through automated grid stabilization and more efficient ways to improve voltage stability and quality. Furthermore, our forecasting software can help you plan for future resource expansions based on evolving energy and environmental policies, market structure and pricing. It can also enable you to reduce the uncertainty associated with solar power generation commitments by taking advance weather data into account.



# Bringing power to isolated and remote areas



Addressing growing demand for electricity and clean water in isolated and remote areas is key to social and economic development, and provides new business opportunities. ABB has two proven solar solutions to help you address this expanding demand: microgrids and solar water pumps.

## Microgrids

A microgrid is an integrated energy system with distributed generation and multiple loads able to operate as a single autonomous grid, whether connected to the main power grid or not.

Grid-connected microgrids can isolate themselves from the main grid during power outages, which is important for premium power applications such as data centers or campuses, as well as for disaster backup. In areas where the grid is either unavailable or weak, microgrids that complement or replace conventional diesel generation with solar PV can provide a reliable electricity supply while dramatically reducing fuel consumption and carbon footprint.

Whether providing access to electricity where there is none or enabling remote industrial locations to minimize fuel costs, ABB's advanced microgrid products, control, grid stabilization and energy storage solutions are designed to ensure grid-quality power at all times.

ABB has been delivering reliable microgrids around the world since the 1990s, and continues to pioneer their development. Our in-depth knowledge and experience help create solutions designed for safety, continuity and environmental-friendliness, as well as being fully compliant with local grid codes and utility practices.

One key aspect of our total solution is our consultancy service, which ensures you have the most reliable and efficient system operation with maximum return on investment.

Another valuable offering for microgrids is our containerized energy concept. This modular solution – which includes PV inverters, MV transformers and switchgear, energy storage and grid stabilization systems – can be delivered as pre-engineered, prefabricated blocks in standard-sized containers. This reduces transport costs, and speeds installation and commissioning time, reducing cost and risk.

In addition, ABB's advanced microgrid control system ensures smooth and efficient operation based on a secure, distributed Internet-based control architecture which can be fully supervised and managed from any location.

## Solar pumps

In addition to power, water is a vital resource for remote communities and their agricultural economy. ABB's solar pumps reduce or eliminate the need for diesel motors, and provide a reliable source of power for irrigation.

Using a PV panel as its power source, the ABB solar pump is able to pump up to 90,000 liters per day, noise- and pollution-free, completely independent from the grid.

# Services to maximize ROI

ABB's extensive global service network is ready to provide total lifecycle support at every stage for any solar power installation, from initial concept, through life to replacement and recycling. We offer tailored service contracts that cover all equipment and solutions. Our aim is to meet your needs precisely to help you achieve maximum return on investment through improved capacity, efficiency and reliability.



## Training

ABB offers classroom- and Internet-based product and service training that covers both theory and practical exercises to help you get the most out of your solar installation.



## Maintenance

ABB helps ensure long service life for our equipment by providing on-site preventive maintenance. This comprises annual inspections and component replacements in line with specific maintenance schedules. We also offer equipment reconditioning at our authorized service workshops.

## Repairs

If a problem should arise, ABB's highly skilled and experienced service team can carry out effective repairs either on site or in a local repair workshop, so that downtime is minimized.



## Spare parts

With ABB's support, lack of spare parts is never a problem thanks to our extensive global stock holding of spares for both current and legacy equipment.



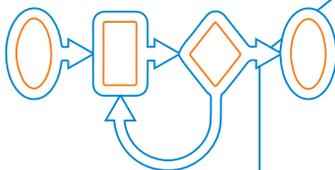
## Replacement and recycling

ABB can advise on the best replacement equipment while ensuring that existing equipment is disposed of in a way that meets the local environmental regulations.



## Operation and maintenance

Through our extensive range of services for maintenance and management of utility-scale PV plants, you get guaranteed levels of performance and the highest levels of capacity, flexibility and reliability to maximize revenues.



## Upgrades and migration

ABB is able to advise on upgrades and migration to the latest hardware and software upgrades that can continue to maximize the performance of your solar installation.

## Remote monitoring

ABB offers remote monitoring solutions for solar installations of any size, from rooftop to utility-scale. The benefits are faster repairs, lower service costs and ultimately lower total cost of ownership.



# Solar solutions for every need

ABB's broad product portfolio enables us to fulfill any solar application, from residential and commercial premises to large PV plants, in power ratings from several kilowatts to hundreds of megawatts. This means we can meet your solar requirements precisely in terms of power electronics, communications, and country-specific grid and safety codes.



## Solar inverters

ABB is a global leader with the industry's most extensive portfolio of solar inverters and solutions.

In addition to their basic function of converting DC from the PV panels to AC suitable for powering loads and connection to the grid, inverters provide the intelligence behind PV systems. They control the PV system to maximize the energy harvest from the panels and manage grid stabilization through monitoring and communication. This makes inverters critical to the integration of solar into the smart grids of the future.



## Low-voltage products

ABB offers a complete range of low-voltage products specially designed to meet any installation requirement. It includes products for switching, control, protection, metering and monitoring, as well as combiner boxes. We are also the largest supplier of components to the inverter OEM market.



## Products for tracking

ABB's portfolio of products for PV tracking systems includes all key components – from drives and motors to PLCs and low-voltage products – needed for accurate and reliable tracker performance.



## Grid connection and integration

ABB provides a comprehensive portfolio of products and solutions needed to connect PV plants to the medium- or high-voltage grid. These include dry-type, pad-mounted and liquid-filled transformers, and a series of switchgear products that can serve virtually any requirement. We also offer containerized compact substations and turnkey substation solutions.

## Related offerings

- Building automation
- Electric vehicle charging
- Smart grids
- Battery energy storage

## PV plant monitoring and control

ABB offers a complete plant automation platform, including monitoring and control. In addition, we can provide remote management of PV plants from dedicated control and service centers.

# Contact us

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