Greater bankability for your large-scale solar installation

Balance-of-system solutions for PV power plants and large commercial buildings

Schneider Electric

More than

3 GW

The combined capacity of large three-phase inverters installed worldwide by Schneider Electric

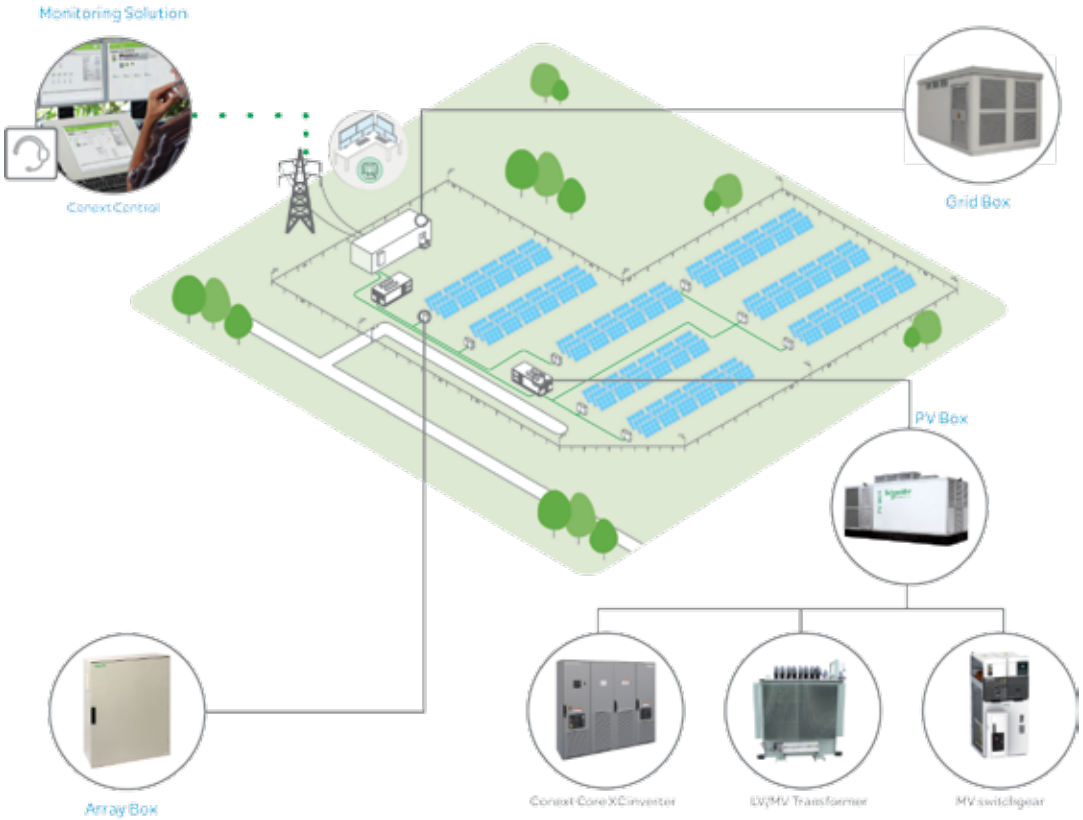
Make a smarter, more sustainable investment in photovoltaic power

When it comes to large-scale solar, Schneider Electric™ has both the experience and the proven technology to help make your investment a success.

Schneider Electric solutions for PV power plants and large commercial buildings combine proven products with the kind of support only a global company can provide. Our balance-of-system solutions include everything you need to efficiently distribute and manage locally generated solar energy, from panel DC output to the grid connection.

This brochure presents an overview of our large-scale photovoltaic solutions and solution-brick components. Additionally, we offer a wide variety of additional products and services to customise your photovoltaic installation, from switchgear and transformers to protective equipment.

Solutions for PV power plants and large commercial buildings



Schneider Electric solutions for medium-to-large photovoltaic applications include everything you need to efficiently distribute and manage locally generated solar energy, from panel DC output to the grid connection.

A balance-of-system solution from Schneider Electric typically includes:

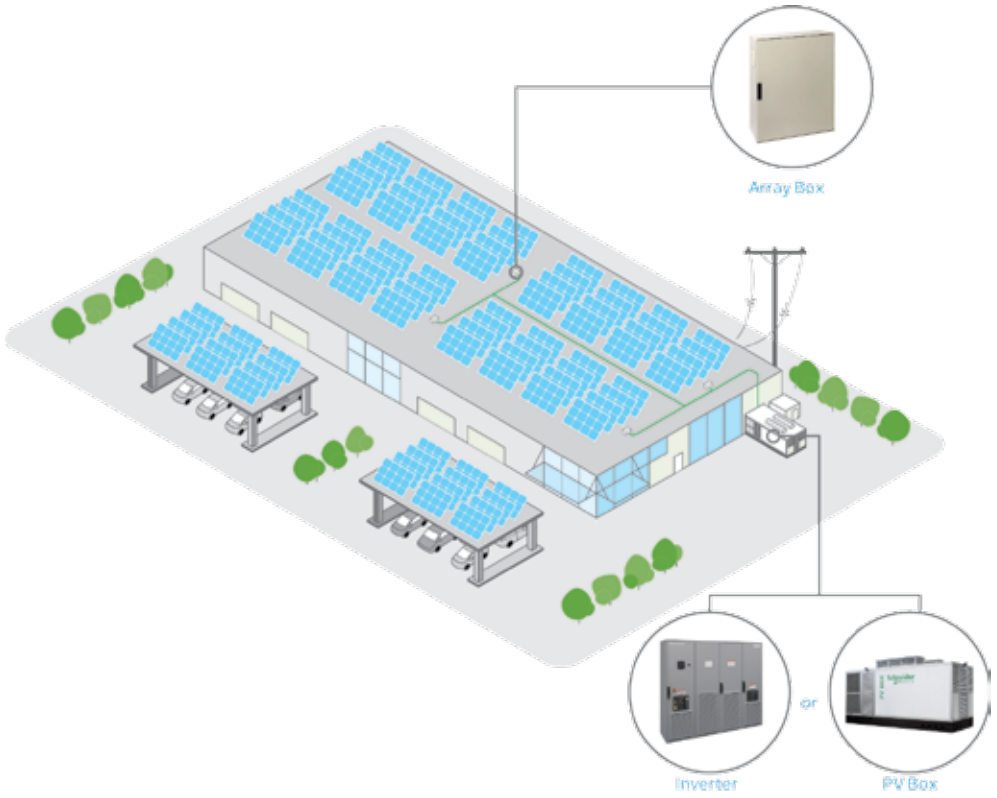
- Power collection and string monitoring
- Power conversion integration to the grid
- Supervision, monitoring, and control

Large utility PV solutions

- Array box
- PV box including solar inverters, LV/MV low losses transformer, MV switchgear, and protection relay
- Grid connection substation
- Conext Control: SCADA, monitoring, and control system

Medium to large commercial PV solutions

- AC panel boards or switch boards in building or utility grid
- AC disconnect switch
- Solar inverters
- DC disconnect switch
- Recombiner / DC Combiner Box
- String Combiner / Array Box
- Conext Control: SCADA, monitoring, and control system



The benefits you get:

- Seamless solution from a single, bankable supplier
- Simplified project planning and reduced installation and commissioning costs
- Low cost of maintenance
- High energy harvest
- Solution package optimised for the lowest possible LCOE
- Protection of the value of your assets

Six reasons why you should choose Schneider Electric PV solutions

1

Support from a bankable partner

The promise of abundant, clean power is attractive, but it takes more than promises to make a business case for a large-scale photovoltaic installation. It takes reliable energy-management technology, comprehensive solutions, and the expectation of a good return on investment. It takes the long-term support of a bankable partner.

After more than 177 years in business, and with annual sales of over €24.2 billion, Schneider Electric™ has the experience and the resources to support large photovoltaic investments from start to finish. Our presence in over 100 countries allows us to offer best-in-class balance-of-system solutions that meet local standards and enjoy local service support, practically anywhere in the world. Moreover, as the global specialist in energy management, there's no one better positioned to help you efficiently harvest the power of the sun.

2

Faster, simpler installation

Schneider Electric solar solutions reduce the complexity of installing and commissioning a new PV plant or large commercial application. Pre-assembly and pre-testing of solution bricks allow fast and simple deployment on site. On-site work is also expedited, thanks to predefined installation and commissioning procedures concerning all solution bricks.

Our pre-configured solutions include:

- Quick-sizing of the entire solution in the design phase
- Pre-defined and fully validated solution bricks from a single supplier
- Verified and tested interoperability of all solution bricks
- Simplified, fast and cost-effective project execution

3

Reliable products and proven performance

Schneider Electric solar products are designed to the highest standards. All equipment is verified and certified according to international standards for protection devices which operate in harsh climates and industrial environments. Our rigorous testing surpasses industry standards, to enhance the robustness of our solutions over the lifetime of each installation.

Types of stress testing we perform include:

- Multiple environment over stress testing (MEOST), a rigorous reliability assessment that's unrivaled in the photovoltaic industry
- Temperature humidity bias (THB)
- Salt-fog testing
- Highly accelerated life test (HALT)
- Custom reliability testing (for 3-phase systems)

Up to 342 GW
is the cumulative PV capacity estimated to be installed globally in 2016

(Source: the European Photovoltaic Industry Association)

4

Flexible solutions for any project

82MW ground-mounted installation in Senftenberg (Germany)

5.2MW rooftop installation in North Carolina (USA)

Whether your solar investment is designed for 1 MW or 100 MW, whether it's located in an urban environment or off the beaten track, Schneider Electric has state-of-the-art technology to match your needs. Our easily configurable products are compatible with a wide variety of installation architectures and PV technologies, including thin film and crystalline modules, CPV modules, and trackers. Moreover, with our modular solution bricks, global monitoring, and scalable solutions, your solar installation is ready to meet future challenges.

Our flexible solutions feature:

- Conext Core XC inverters that meet local grid interconnection & safety standards
- Customisable PV Boxes compliant with local regulations and suited to local environmental conditions
- Configurable and evolutive monitoring and control system via Conext Control
- Robust Array Boxes

5

Powerful monitoring and control

In order to protect a large-scale PV installation and best optimise its performance, you need powerful insight into the operation of the system and an intelligent, reliable means of control. Schneider Electric comprehensive solar solutions provide that and more. With our global monitoring & control system, Conext Control, you get the tools you need to manage and protect your solar investment and to optimise your energy harvest.

Our monitoring and control solutions offer:

- A global vision of installation performance
- Oversight and control over multiple sites
- Data processing, allowing prediction of problems (module ageing and failure, electrical defects)
- Alarm management in case of failure (SMS, email, online control interface)
- Easy remote isolation of fault-affected area of PV installation
- Simpler diagnosis of existing problems and replacement of equipment
- Customisable utility interface and plant controller

740TWh

The amount of power projected to be generated by solar PV energy in 2035

Source: World Energy Outlook

6

A stronger, more secure return on investment

The defining measure of success for any business operating a large-scale PV installation is a good ROI. Schneider Electric solutions can help you achieve that kind of success by reducing unnecessary costs and enhancing installation performance.

Here are some ways Schneider Electric can help improve your ROI:

CAPEX reduction

- Reduced engineering, installation, and commissioning costs through the use of standardised architectures and neatly interfaced solution bricks

OPEX reduction

- Highly serviceable design and availability of local technical experts trained on the total solution help to cut downtime
- Reduction of service costs for complete PV plants through remote diagnostics and control capabilities

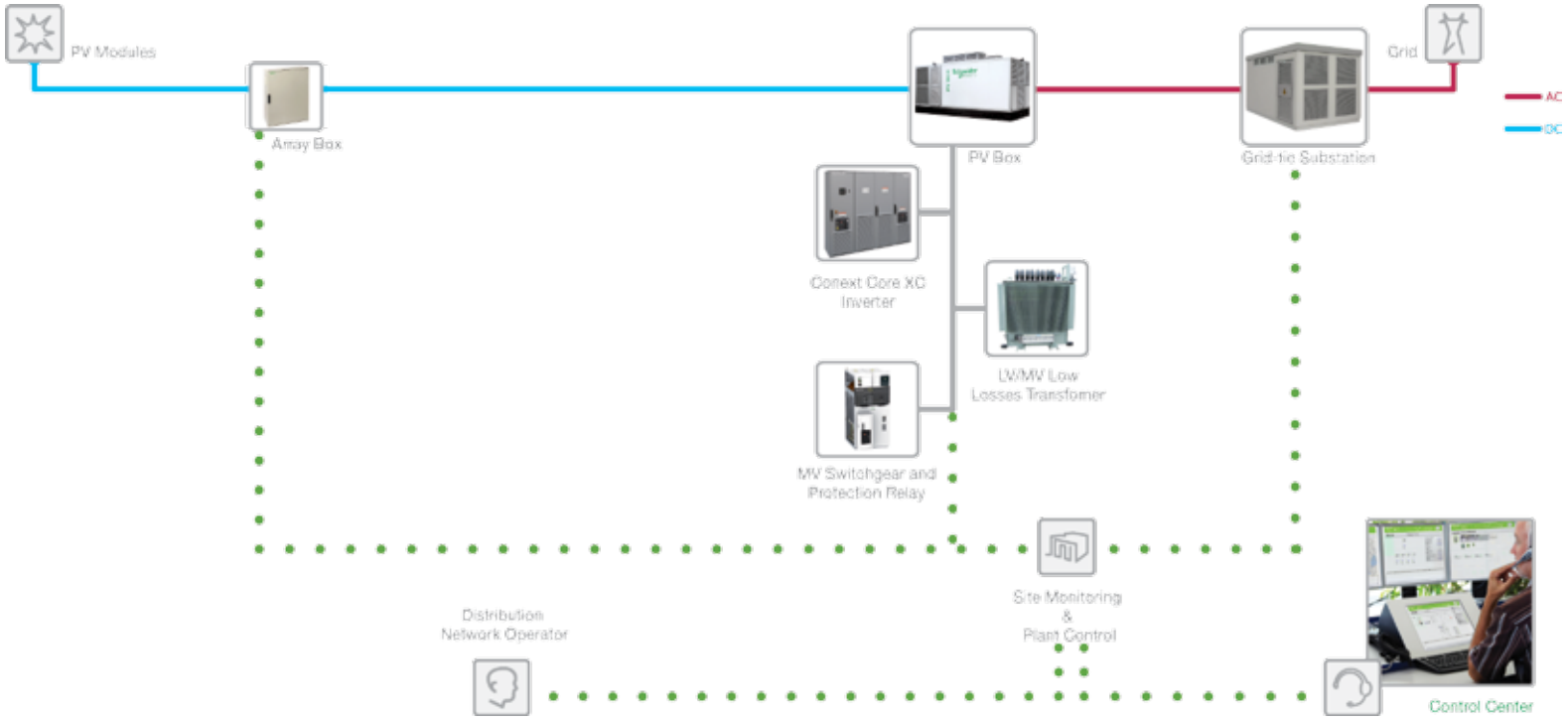
Guarantees on electrical power production

- Standard and extended warranties
- Various commitment levels, from intervention time to technical availability and performance of the complete PV plant
- Enhanced uptime thanks to qualified and reliable design
- Assurance of a long-term maintenance capability thanks to bankable supplier
- Best-in-class inverter efficiency (peak of 98.9% for Conext Core XC)

The sheer strength and integrity of the Schneider Electric company is head and shoulders above the competition. Your inverter is the heart and soul of your photovoltaic system; you simply can't afford anything but the best.

— Kenny Habul, CEO of SunEnergy1

Get a comprehensive, dependable balance-of-system solution



Every Schneider Electric photovoltaic solution is optimised to get the best performance for your investment. Our PV system architectures are built upon a core of dependable, flexible components, including our customisable PV box, high-efficiency Conext Core XC inverters, robust array boxes, and an intelligent monitoring and control system through Conext Control.

This combination of field-proven technology and innovative features gives you a balance-of-system solution that you can depend on, from a single bankable supplier.

PV Box

The PV Box is a power conversion system. In a PV plant installation, it operates between the DC field and the AC MV-grid connection point. The PV Box performs the DC power concentration, the DC/AC conversion and the AC voltage elevation to the grid voltage level. It ensures the protection of maintenance staff and equipment against electrical faults, such as those caused by short-circuits, ground faults, or lightning. The optimised versions of the PV Box allow a reduction of the BOS cost, increased reliability, and a faster deployment.

Features and benefits:

- Compact, light-weight, and transportable via standard-sized trucks
- Solution delivered pre-assembled, configured, and tested, reducing on-site labour and project time
- MV transformers and switchgear allow easy adaptation to any grid voltage and code, up to 36kV
- Safe and convenient for maintenance, with all equipment replaceable via doors
- Optional power meter installation and monitoring
- Qualified design for harsh environments, maximising inverter energy generation and reducing risk of downtime

Schneider Electric also offers designs adapted to customer needs based on special country requirements. Some examples*:

North American version

German version

Indian version

* Execution according to national standards and regulations

Each PV Box contains the following Schneider Electric equipment:

Conext Core XC grid-tie inverters

Features and benefits:

- Best-in-class efficiency with 98.9% peak, 98.6% weighed EU
- Patent-pending fast-sweep MPPT (maximum power point tracking) algorithm
- Fully configurable grid interactive features enabling easy upgrades throughout the entire life cycle
- Design based on field-proven Schneider Electric industrial power drives
- Standard 1000 Vdc input for longer string lengths and lower BoS costs
- Integrated switchgear with Masterpact NW air circuit breakers

MV Switchgear and Protection Relay*

Features and benefits:

- Cubicles designed to withstand harsh environmental conditions
- Optimised dimensions
- The addition of functional unit modules possible
- Circuit breakers protect both transformers and lines
- Simplified switching operations and remote control
- Reduction of losses thanks to the low RI2 value

Transformers*

Features and benefits:

- High-efficiency amorphous, oil-immersed or pad-mounted liquid transformers
- Natural or air-forced cooling systems
- Includes protection and monitoring devices
- Several models available to meet IEC or UL standards

*model varies by country

Higher flexibility to fit your PV installation and to enhance PV plant performance

Array Box

The Array Box is a string combiner box installed between the PV modules and the inverter. It allows the the connection of several strings of PV modules in parallel while protecting and monitoring your PV power plant.

Features and benefits:

- Several performance levels, from basic protection to protection, control, and full-performance measurement.
- Easy to install & terminate cables
- Flexible design allowing a large selection of monitoring and control features
- Easy to service
- Enhanced uptime thanks to qualified and reliable design

*model varies by country

Grid-Tie Substation*

The grid-tie substation ensures the connection of the power plant to the grid. This connection may be medium or high voltage depending on local grid code and regulations. The grid-tie substation doesn't only host protective equipment and revenue grade energy meters, but also components of the monitoring system, weather sensors, and the interface by which the grid operator is able to communicate control requests such as reactive power production or active power limitation to the power plants.

Features and benefits:

- Flexible design integrating Schneider Electric knowledge of local grid requirements.
- Benefit of Schneider Electric long-term relations with grid operators.
- Use of grid operator-approved products.
- Easily available thanks to Schneider Electric global footprint
- Integrated in Conext Control, the Schneider Electric monitoring and control system for PV power plants.

Conext Control, the intelligent monitoring solution

Conext Control is a single, standardised solution that integrates process, supervision, and monitoring functions. The system is highly flexible, with a customisable utility interface, as well as easily deployed to facilitate implementation at multiple sites.

Above all, Conext Control provides intelligence vital to the business of generating photovoltaic energy. Real-time production data and trend analysis allow operators to optimise the solar harvest. Diagnostics and remote control capability help reduce intervention costs, while smart alarms let service staff make prompt decisions and react accordingly in the event of a problem.

Features and benefits of Conext Control:

- True SCADA monitoring & control solution from data collection, display, and trend analysis, to control and data storage
- Standardised solution offers high cost-efficiency
- Customisable to fit specific needs
- Fast deployment and easy scalability for multi-site monitoring and control
- Robust system able to withstand tough environmental conditions
- Minimisation of site interventions thanks to remote monitoring & diagnostics

A trusted partner for all phases of your project

Count on professional support from concept to commissioning

Setting up a new PV installation is a major undertaking. It's important to ensure that every phase is executed thoroughly and professionally, from day one. Schneider Electric can help during each step of development. We provide a complete spectrum of system packages and services for PV projects, from feasibility studies to commissioning. Here are some examples of what we offer:

Consistent concept and feasibility study for the power conversion system

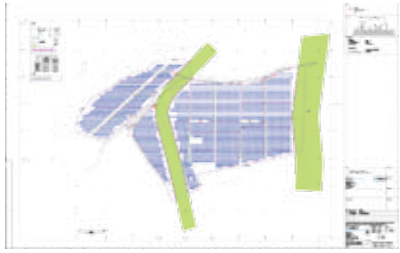
- Expertise in PV system architectures
- Prediction of global performances of PV installation
- System simulation with reference tools, such as PVsyst or Autocad with Helios 3D
- Detailed project and life cycle cost estimation of the installation
- Reliable project scheduling based on a solid experience

Robust design for large PV installations

- Optimised design to boost overall installation efficiency
- Products and solutions tailored to all PV module technologies
- Easily scalable power architecture thanks to a "solution brick approach"
- Expertise in medium voltage grid connection design for utility code compliance: integrated MV protection and grid interactive functions

Execution & commissioning

- Worldwide execution & commissioning capabilities through regional project and engineering centres
- Leveraging of the Schneider Electric network of qualified suppliers and partners
- Supervision of on-site work to ensure efficient installation of our PV solutions
- Commissioning following strict, proven procedures
- Broad experience of PV site commissioning, enabling fast achievement of plant performance



Enjoy greater peace of mind with service contracts

You can count on Schneider Electric for assistance in all situations involving preventive maintenance, diagnostics, or repair. Our global presence enables us to offer skilled local support, reducing downtime, and increasing your energy harvest.

Your photovoltaic installation is in safe hands with Schneider Electric:

- Comprehensive warranty extensions, preventive maintenance, and uptime/availability programs available for the entire balance of system
- Global support infrastructure, with local Schneider Electric presence in 100+ countries
- Worldwide leadership in power electronics and electrical distribution technologies with over 50 years of experience
- Worldwide network of Customer Care Centers providing remote technical support

100+
is number of
Schneider Electric
service centers worldwide

			Preventive Activities		Corrective Activities		
	Spare Parts Availability	Technical Support	Spare Parts Costs	Labor Costs	Spare Parts Costs	Labor Costs	Performance Guarantee
Essential	☑	☑		☑			
Optimum	☑	☑		☑		☑	
Elite	☑	☑	☑	☑	☑	☑	
Ultra	☑	☑	☑	☑	☑	☑	☑

We offer a variety of service contracts to best meet your technical and financial needs. Contract duration and reactivity commitments are defined according to your requirements within a service level agreement.

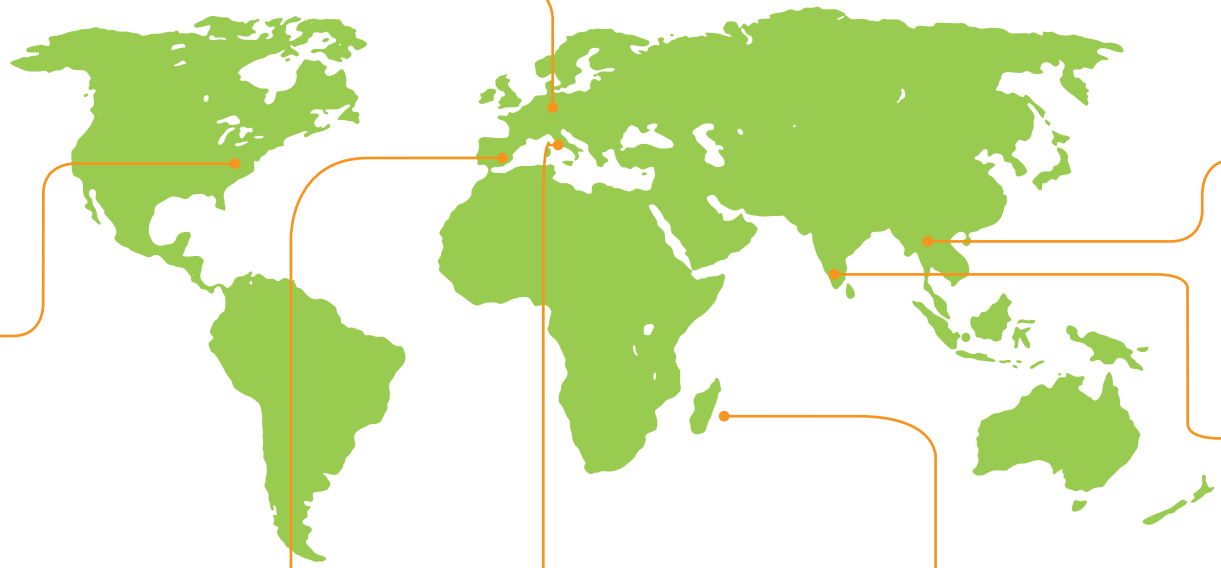
Features and benefits:

- Bankable guarantees, reducing financial risk profiles for investors
- Asset management cost optimisation
- Prediction of issues before they occur
- Round-the-clock access to specialists
- Reduced downtime and restart time
- Expert recommendations

Our solar solutions are everywhere under the sun

82 MW power plant
in Senftenberg, Germany

5.2 MW power plant
in North Carolina, USA



10 MW power plant in
Spain, Moratalla

43 MW power plant in Cellino
San Marco, Italy

18 MW power plant
in La Reunion, France

7.5 MW powerplant
in Petchabun, Thailand

5 MW power plant
in Osiyan, India

Our mission is to bring higher efficiency, greater reliability, and a better return on investment to clean solar-energy projects everywhere. As a global company, able to offer local product availability and services practically anywhere in the world, we're able to support new photovoltaic investments and to help maintain their performance for years to come.

Discover more about our solar solutions!

Visit www.schneider-electric.com/solar
and download our FREE Bankable Solutions guide!

See our solutions on YouTube at www.youtube.com/schneidersolar

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