

MICROGRIDS

# Sustainability. Now is the time.

SIEMENS

THE ENERGY TRANSITION

# Starting today to help ensure a better tomorrow.

The energy transition is the switch from fossil fuels as power to zero-carbon energy sources. The ultimate aim is to leverage renewable energy to reduce carbon emissions and limit climate change. With the effects of climate change having an impact on everyone, decarbonization of the energy sector must take place globally – and urgently. **Now is the time.**

The transformation of the energy world is being advanced through renewable energy sources, digitalization, and the shift from centralized, unidirectional power to distributed energy systems. Data from 2020 shows that more than 80 percent of all new electricity generation capacity came from renewable energy. Together with consumers' demands for cleaner energy, this transformation is driving the development of microgrids.

**Microgrids are efficient, resilient, and sustainable distributed energy systems.**

Microgrids contain all the elements of complex energy systems, they maintain the balance between generation and consumption, and they can operate on and/or off the grid. They are ideal for supplying power to remote regions or locations with no connection to a public network. In addition, more and more industrial operators are using microgrids to produce the electricity they need cost-effectively, sustainably, and reliably.

Microgrids use a variety of energy sources, including combined heat and power, photovoltaic and wind power plants, as well as small hydro-power and biomass power plants. Biodiesel generators and emergency power units, storage modules, and intelligent control systems ensure the security of supply.

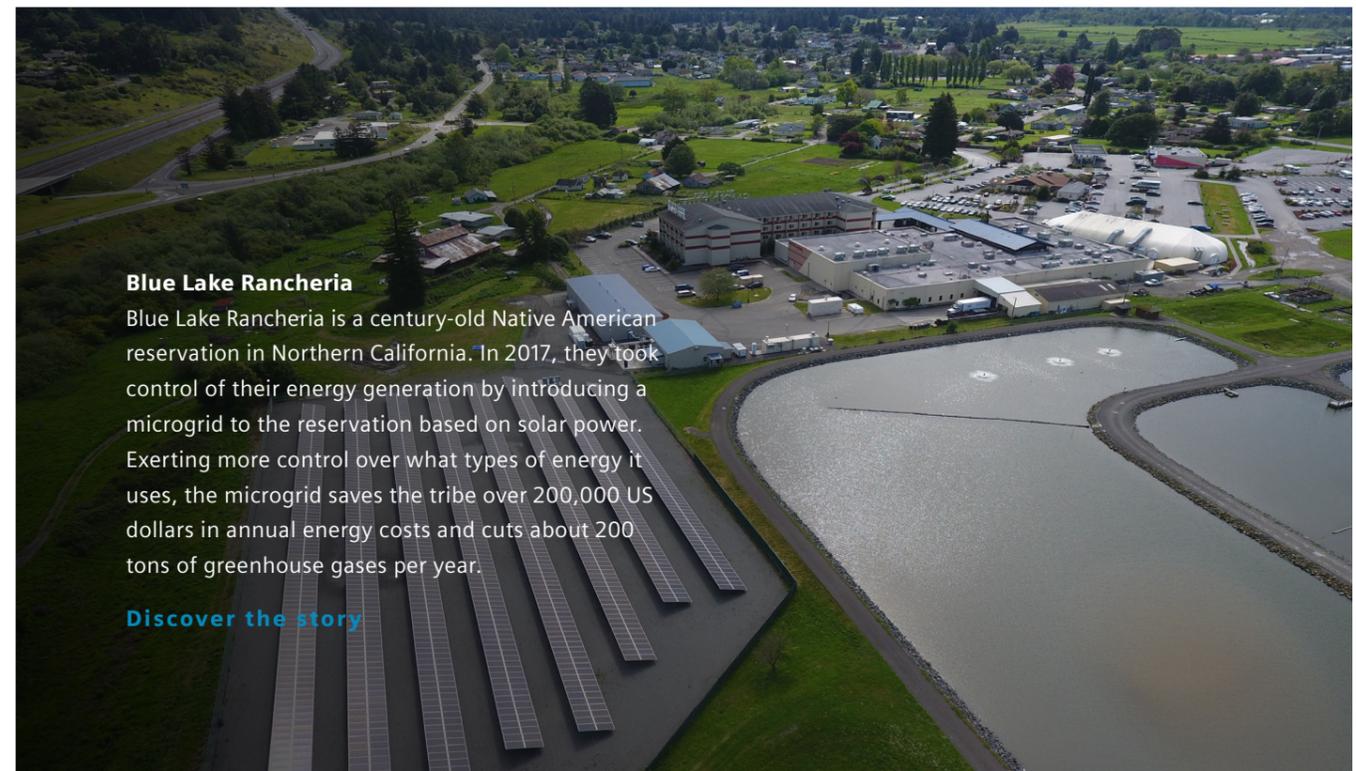
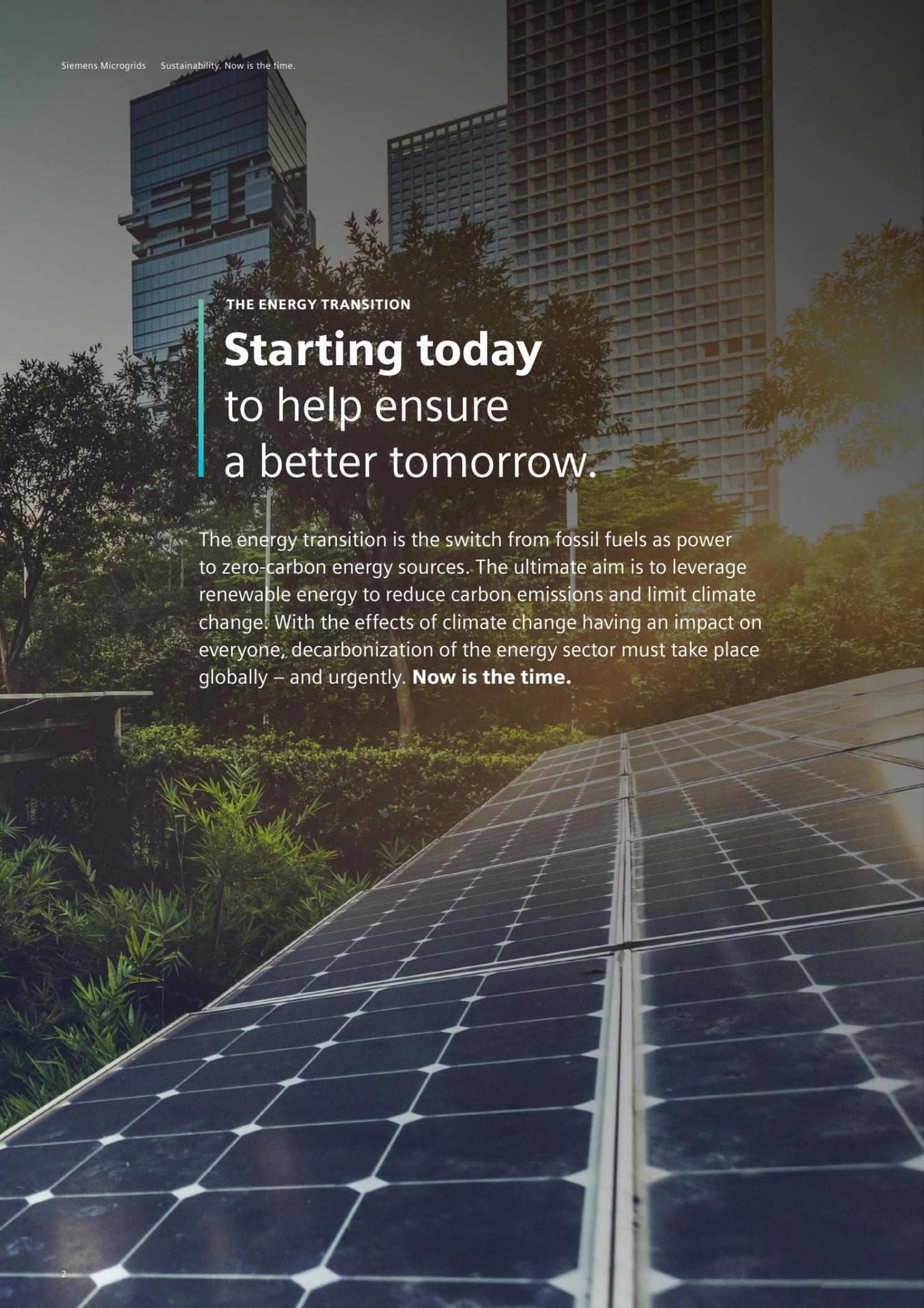
**The right controller makes the difference for managing the microgrid.**

To manage the energy generation and distribution, to monitor and control the energy, to prevent outages, and to feed energy back into the grid, we provide a comprehensive portfolio of products, solutions, and services. At the heart of it all is Microgrid Control – a SICAM application. Microgrid Control reliably controls and monitors your microgrid. It ensures your independent power supply and balances out grid fluctuations as well as fluctuations in energy consumption.

**Blue Lake Rancheria**

Blue Lake Rancheria is a century-old Native American reservation in Northern California. In 2017, they took control of their energy generation by introducing a microgrid to the reservation based on solar power. Exerting more control over what types of energy it uses, the microgrid saves the tribe over 200,000 US dollars in annual energy costs and cuts about 200 tons of greenhouse gases per year.

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**BENEFITS**

# Microgrids with Microgrid Control offer a range of benefits across the board.

There are several reasons why the Siemens microgrid solution has become an ideal answer to the energy transition and is already a trusted solution for millions of people across the world.



**LEMENE Project**

To build a microgrid for a business district located in the Marjamäki industrial area, in Lempäälä, Finland, Lempäälän Energia chose an energy system centered around Microgrid Control – a SICAM application. It integrates, controls, and optimizes various system components to provide a cost-effective and environmentally friendly energy system while guaranteeing a secure supply of electricity.

[Discover the story](#)



**Sustainable**

Microgrids reduce carbon dioxide emission significantly by using primarily renewable energy sources – such as biomass, wind, or solar power. This makes them especially attractive for remote sites, campuses, and utilities. Because Microgrid Control enables independence from the grid, microgrids are also ideal for islands in charge of their own power generation.



**Flexible**

With your own microgrid and Microgrid Control, you have the opportunity to optimize your power according to availability, efficiency, or cost. On sunny days, you can switch to solar power – and on cloudy days supplement it with natural gas to be more cost effective. A wide range of protocols and common transmission media also means that communication is flexible.



**Efficient**

Using sophisticated software, operators can optimize power usage based on demand, utility prices, and other factors. With Microgrid Control, you can optimally dispatch generation or storage to ensure your microgrid is always operating in an efficient and reliable state. During a grid blackout or resynchronization, Microgrid Control ensures a smooth transition.



**Scalable**

Thanks to the use of scalable base products, Microgrid Control can be seamlessly integrated into existing distribution grids for ongoing continuity. The solution can be adapted as energy infrastructure plans change over time. With the use of open interfaces and international standards, the solution supports migration and is prepared for future extensions.



**Resilient**

Microgrids are designed to provide uninterrupted 24/7 power and to balance load demands for organizations with changing power needs. Relevant applications include critical infrastructure, industrial areas, and remote locations. The high performance of Microgrid Control ensures you have a resilient system for many years.



**Extra income**

By feeding excess energy from your microgrid back into the utility grid, you can provide green energy to other users and actually earn money in the process. You contribute to the amount of energy in the grid system and get paid for this energy. In fact, over time, Microgrid Control helps you to earn money to finance the microgrid system.

## SIEMENS SOLUTION

# A clever systematic approach to mastering the challenges of microgrids.

To integrate microgrids or distributed energy resources (DERs), we support you in several steps to reach the most efficient system. DERs produce and supply power on a small scale, and involve rooftop solar panels, backup batteries, or emergency diesel generators. These are connected to lower-voltage distribution systems, such as industry sites, campuses, hospitals, or business buildings.

Then there are microgrids. These are localized power grids that can disconnect from the grid with the aim to operate autonomously. They put the energy transition in your hands. Their autonomous operations also makes them more resilient to fluctuations, and allows you to rectify disturbances faster.

The top choice for managing autonomous and connected power grids is Microgrid Control – a SICAM applications. It monitors and controls the power generation and supply in a way that is so efficient and reliable that you can save costs over the long term. Thanks to flexible communication, seamless continuity of energy, and migration concepts, you can rest assured that you have optimal use of the system.

**Define and simulate, integrate the right controller, monitor and improve the system.**

Several portfolio elements help you to create a microgrid solution that meets your requirements perfectly. We will work with you to design and deliver a comprehensive and integrated microgrid solution for your energy infrastructure project. Our proven expertise with complex decentralized energy sources, leading control systems, and transmission and distribution systems, along with our suite of services, make us an ideal partner.

## Siemens Campus Microgrid

Located in Vienna's Floridsdorf district, the Siemens Campus Microgrid is an intelligent system for the company's optimization of its electricity and heating demand. It consists of photovoltaic power generation, e-charging infrastructure, battery storage, and Microgrid Control. The result is a safe, reliable electrical energy supply, along with a smaller carbon footprint and reduced electricity peaks.

[Discover the campus](#)



**SIEMENS SOLUTION**

# Four steps to your reliable microgrid and intelligent management.

## Step 1

Consultation and simulation to ensure you have the right solution for you.

The first step on the way to your own sustainable energy is the energy twin. We simulate your entire microgrid project using virtually integrated control modules to define the optimal microgrid design for your needs. What's more, we evaluate the baseline and solution benefits that you can expect over time. In the process, we can see together where the hitches could be and rectify these from the very beginning. At the same time, we ensure that your technical and economic requirements are met.

Depending on your location, we choose to rely on solar photovoltaic, combined heat and power (CHP), wind or hydro energy, or biomass, among others. In southern countries with lots of sunshine, for instance, solar photovoltaic naturally makes the most sense. For large office buildings, CHP is a viable option.

## Step 2

Finding the right controller for your microgrid solution.

The scope and design of your microgrid determines the appropriate controller to implement:

Microgrid Control – a SICAM application ensures reliable monitoring and controlling of microgrids. It protects your independent power supply from blackouts and balances out grid fluctuations and fluctuations in power consumption.

Spectrum Power™ MGMTS is a software solution for optimal microgrid management and control. Some of its advanced functions include seven-day load and generation forecasting, unit commitment optimization, load shed, seamless transition to and from island mode, and market participation tools.

## Step 3

Gathering data and monitoring to define benchmarks.

Face your energy management challenges with ease using near real-time performance data gathered from the Siemens solution. The cloud-based energy optimization for distributed resources gathers relevant data, supports the reporting of KPIs, and provides benchmarking data analytics. In fact, an entire smart city can be managed with this application – covering not only the grid, but also smart buildings, smart lighting, and electric mobility.

By combining historic and real-time data, you can increase transparency, benchmark assets and locations, as well as apply advanced analytics to maximize your performance. DEOP helps you to get the most out of your facility's energy production and consumption.

## Step 4

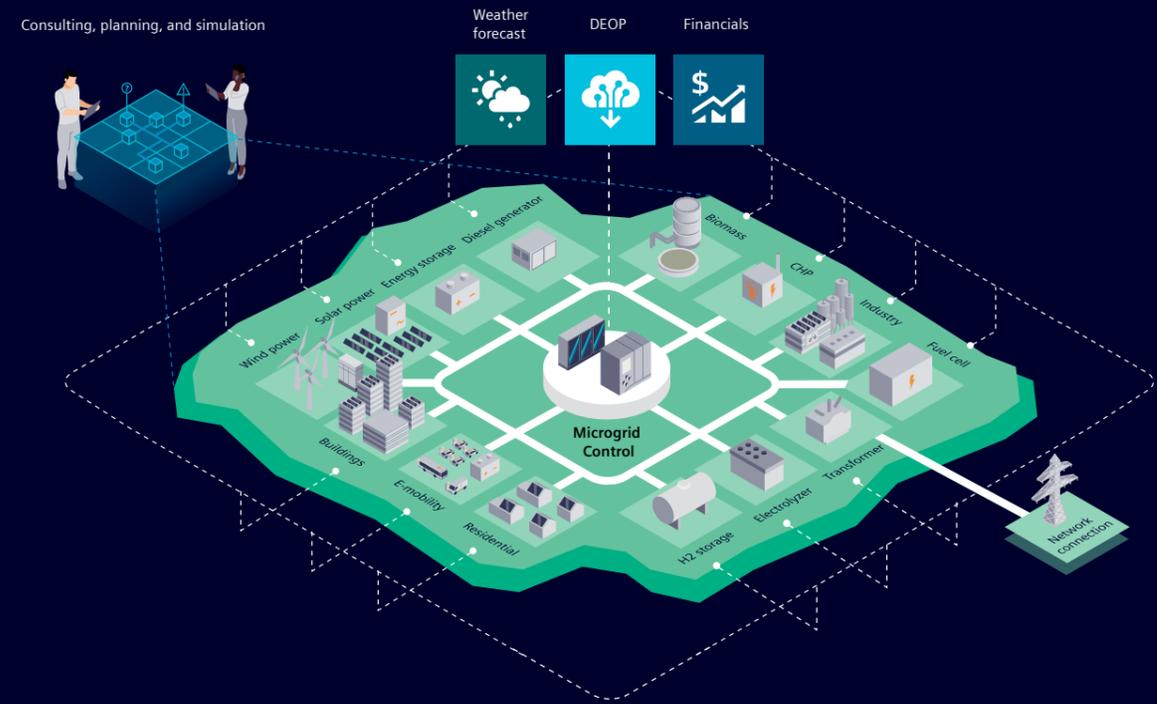
Expert data analysis for improved operational efficiency over time.

Attaining data is good – and leveraging it is better. We want you to get the most value from your microgrid solution. Siemens supports you in analyzing the data with powerful tools. Based on the analysis, we provide recommendations to improve the operational efficiency system and suggest structural changes. Once the improvements have been identified, the recommended changes can be simulated and the savings can be quantified.



PRODUCT OVERVIEW

These are the Siemens products that support you with managing your microgrid.



Check out these key applications for managing energy production and distribution with your microgrid.

**Consulting, planning, simulation**

Get the most out of your system with our expert concepts and design planning. We take an integrated approach to your microgrid design with the aim to evaluate the technical feasibility while considering your economic expectations. We start with a system analysis, followed by a detailed implementation roadmap and the evaluation of an independent energy supply for emergencies or for connecting to the main grid if necessary. Together, we define the balance between technical and economic feasibility, using efficient and sustainable energy sources while ensuring reliable, stable operation considering voltage and frequency control.

As an experienced partner, we support you in choosing the right concept, components, and design for your microgrid – enabling you to enjoy a profitable business case.

**Microgrid Control – a SICAM application**

Ensure your power supply remains independent while balancing out fluctuations. Microgrid Control lets you reliably monitor all components involved, including the integration of asset status, measurement, and monitoring devices. Control of voltage and frequency are also in your hands to ensure network stability. You can flexibly integrate various DERs, as the solution is vendor-neutral and uses all standard communication protocols. At the same time, Microgrid Control is devoted to your business thanks to its acceptance of customized functions and various grid requirements. It is built for harsh environments and failsafe operation.

Our team of experts is both global and local to support your needs – leveraging their full expertise in energy automation.

**Spectrum Power™ Microgrid Management System (MGMS)**

Forecast loads while considering current utility prices to decrease costs. Spectrum Power MGMS focuses on the optimal coordination of controllable generation (e.g. gas, diesel generators, CHP), non-controllable renewable generation (e.g. PV, wind), energy storage (e.g. batteries), and loads.

**DEOP – energy optimization for distributed resources**

Monitor performance and increase profitability with a cloud-based software solution. DEOP makes sure you have all data in one place: sensor data as well as data that is imported via APIs and other systems. This saves time and money – and you can be sure that your business decisions rely on correct and reproducible data and reports.

**Photovoltaic Plant Control – a SICAM application**

Reliably control and monitor the power you get from your photovoltaic plant. Photovoltaic Plant Control ensures continuous supply of renewable energy and controls the plant’s active and reactive power output by also integrating capacitor banks and battery storage systems. It can be seamlessly integrated into existing photovoltaic power plants, too.

**Power management – a SICAM application**

Digitalize your industrial power grid while ensuring day-to-day reliability. SICAM applications such as fast loading shedding and generation control improve the reliability of your grid even further and enhance its efficiency.



**Siemens South Africa Headquarters**

To set an example in Midrand, Johannesburg, Siemens has installed its own microgrid at its headquarters in South Africa. With the aim to become carbon-neutral by 2030, we are utilizing a one-of-a-kind solution, which includes a PV solar plant, along with Microgrid Control. This makes the facility able to manage energy production and consumption, as well as charge its electric vehicle fleet.

[Discover the story](#)

## CONTACT

### Reach out to us.

It would be our pleasure to tell you more in a personal talk – either face to face or digitally. Please get in touch with us to arrange an appointment.

[siemens.com/microgrids](https://www.siemens.com/microgrids)

Smart Infrastructure

Digital Grid

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