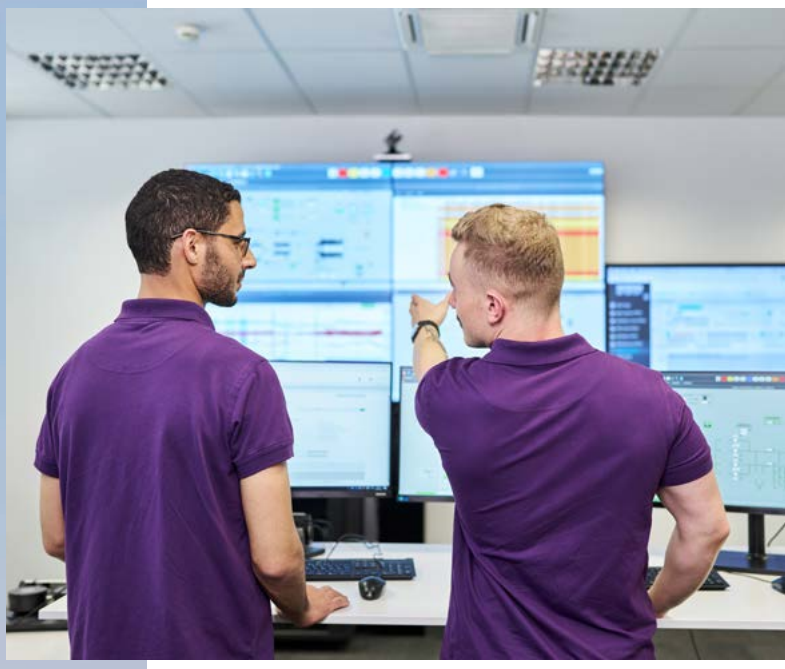


Integrated controls for hybrid power plants

Omnivise Hybrid Control

siemens-energy.com/hybrid-controls

SIEMENS energy



Omnivise Hybrid Control (OHC) integrates different technologies to make sure, that all components in your hybrid plant interact perfectly.

Omnivise Hybrid Control

Omnivise Hybrid Control (OHC) is Siemens Energy's control solution for medium and large scale microgrids and hybrid power plants. It is capable of managing a wide variety of different distributed energy resources in an autonomous and coordinated way, ensuring reliable 24/7 operation. With its flexible and scalable system architecture, it also supports very complex microgrids and projects with more assets.

Omnivise Hybrid Control facilitates the integration and synchronization of various energy assets, such as wind turbines, energy storage systems, hydrogen electrolysis, solar PV, or synchronous condensers. By using Omnivise Hybrid Control, operators can manage combinations of these resources to achieve a harmonized and balanced energy output that contributes to the stability and reliability of the electrical grid.

The Omnivise Hybrid Controller, when integrated with Omnivise Energy Management, provides an intelligent platform for energy market participation. This system offers advanced production and price forecasting across various energy markets, e.g. day-ahead and intra-day markets, enabling plant owners to optimize the timing and revenue of energy sales. This includes strategies for balancing energy supply and demand and leveraging storage assets to shift energy delivery to the most advantageous times.

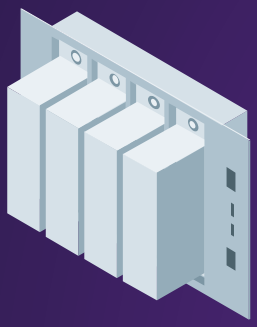
Standard functions:

- Power exchange and load sharing functions
- Control of conventional generation, including diesel and gas
- Integration of renewable energy sources and battery storage
- Islanding, black start, and resynchronization capabilities
- Frequency and voltage regulation
- Reserve management and load shedding
- Peak shaving for demand management
- Measurement acquisition and archiving
- Event management, monitoring, data archiving, and reporting

Advanced functions:

- Integration of hydrogen resources
- Integration of thermal resources
- EMS with optimal unit commitment
- Generation and load forecasting

Omnivise Hybrid Control consists of three main components



Hybrid controller

based on Omnivise T3000

The Hybrid Controller provides core automation for hybrid plants, enabling real-time monitoring and control of all generation and storage assets. With integrated microgrid control functions, automated 24/7 operation is provided.

SCADA

Application Server

The SCADA (Supervisory Control And Data Acquisition) application server facilitates centralized supervision, data acquisition, and visualization, offering operators a comprehensive view of plant performance.





Energy Management System

with dispatch optimization

Omnivise Energy Management Solution forecasts energy production by leveraging advanced analytics to accurately predict output from wind and other renewable energy sources. EMS includes dispatch optimization ensuring optimal energy flows while balancing demand and supply while maximizing the efficiency of hybrid operations.

Test our EMS Demo and learn more about EMS for hybrid power plants!

Grid connected mode

Grid code compliance

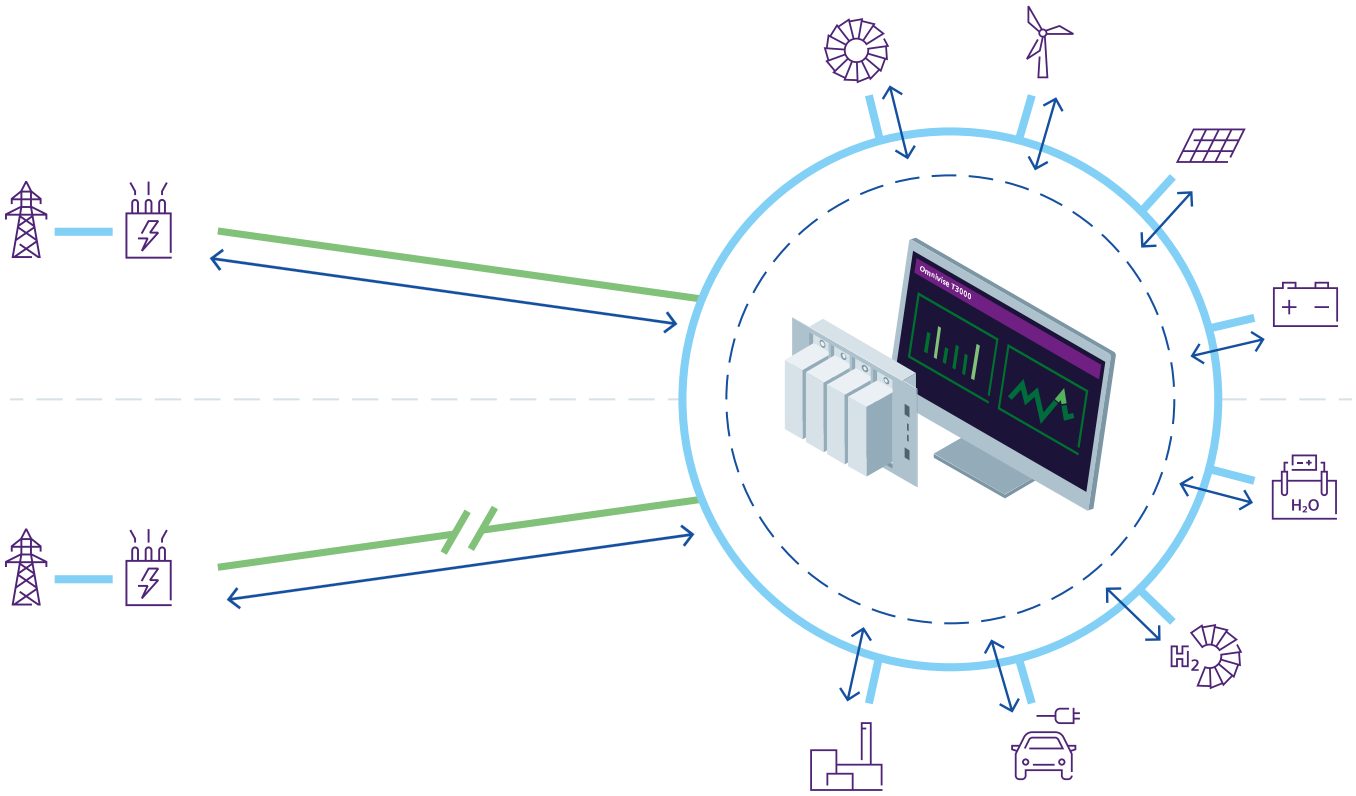
- Tuning controls towards local grid code requirements
- Observation of TSO commands and limitations
- Coordinated response of plant assets towards grid code

Power exchange and balancing

- Control and limitation of export and / or import capacity
- P, Q, cosφ mode
- Frequency following mode

Ancillary services

- Frequency response
- Voltage support
- Activation of committed reserves



Off-grid mode

Islanded operation

- Stabilization of islanded power system
- Monitoring and balancing of generation with consumption
- Primary & secondary frequency response
- Voltage balancing

Black start

- Re-energization and black start
- Grid re-synchronization (if applicable)

Control of loads

- Baseload
- Load shifting / Peak shaving
- Demand side management

Hybrid plant solution hierarchy

Tertiary layer:
optimization in min resolution

Asset model/ Energy system design | Demand/ Price forecast | Omnivise Energy Management | Energy trading/ Bidding

Omnivise Energy Management



Secondary layer:
real time control in msec resolution

SCADA | **Archiving** | **Events and alarms**

Sequence of operations | Frequency regulation | Voltage regulation

Islanding & resynchroni-sation | Generation automation & load shedding | Operation modes | Events & alarms reaction

Modbus TCP/RTU, DNP 3.0, OPC UA, Profinet, IEC 61850 ...

Omnivise Hybrid Control



Primary layer:
asset control

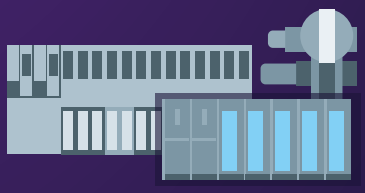
Breakers | **Meters** | **STATCOM**

Group controllers

PV | Gas/ Diesel | Wind | Fuel Cell | CCPP | Energy storage | H_2

Distributed energy resources

Local control
Provided by asset OEMs





OHC is based on Omnivise T3000

Siemens Energy's most reliable and scalable plant control hardware

The Omnivise T3000 control system is at the core of the Omnivise family of solutions. This integrated control solution empowers operators to seamlessly manage hybrid energy systems and integrate renewables – all from a unified platform. The T3000's system architecture, remote access, service concept, and cybersecurity features are among the factors that make it the perfect fit for hybrid plant operation, now and in the future.

Omnivise Hybrid Control is based on Siemens Energy standard plant control hardware.

Advantages at a glance:

- Flexible platform for all automation and communication tasks.
- Runtime environment for demanding and complex optimization and programming tasks.
- Ensured support during the entire lifecycle.
- A wide range of connectivity options allows efficient control system design.
- Scalable modular setup for easy expansion.
- Integrated dual redundancy link results in smaller footprints and reduced wiring efforts.
- Integrated Cybersecurity.

Omnivise T3000 provides flexible connectivity options, including:

- Modbus RTU/ASCII and TCP
- DNP3.0 serial, over UDP2 and over TCP
- IEC 60870-5-101 and -104
- IEC 61850
- Connect S7/PCS7 via Black Box
- OPC UA Client (DA, AC)

Cybersecurity: Protecting critical infrastructure

Siemens Energy's Omnivise T3000 takes a top-down methodology to ensure the cyber resilience of the entire hybrid plant, encompassing all interconnected devices and systems to prevent breaches and ensure reliable operation.

Omnivise T3000 is certified according to IEC 62443, supports network segregation, and meets the highest cybersecurity standards by deeply integrating security into the entire design process, a concept we call "secure-by-design." This approach allows T3000 operators to comply with cybersecurity regulations both now and in the future.

Hybrid plants are classified as "critical infrastructure" and need to fulfill cybersecurity regulations

Cybersecurity regulations:

Enforce cybersecurity standards also in energy systems rated as critical infrastructure in almost any country

- NERC CIP (US and many countries in America)
- KRITIS (Germany)
- NIS (Europe)

With Omnivise T3000's integrative system, there is only one „system under consideration"

The entire system can be designed according to IEC 62443

Requirements from regional regulation authorities:

- Cybersecurity legislation and regulations in place world-wide
- Different standards and regulations per country or region
- Further internal company guidelines & legal requirements

A secure control system along the complete hybrid plant lifecycle with Omnivise T3000

Layer architecture

Components and systems with similar security requirements are combined into security zones

Zoning

Separate safeguards for each layer ensuring that a compromise in one layer does not undermine the integrity of the entire solution

Hardening

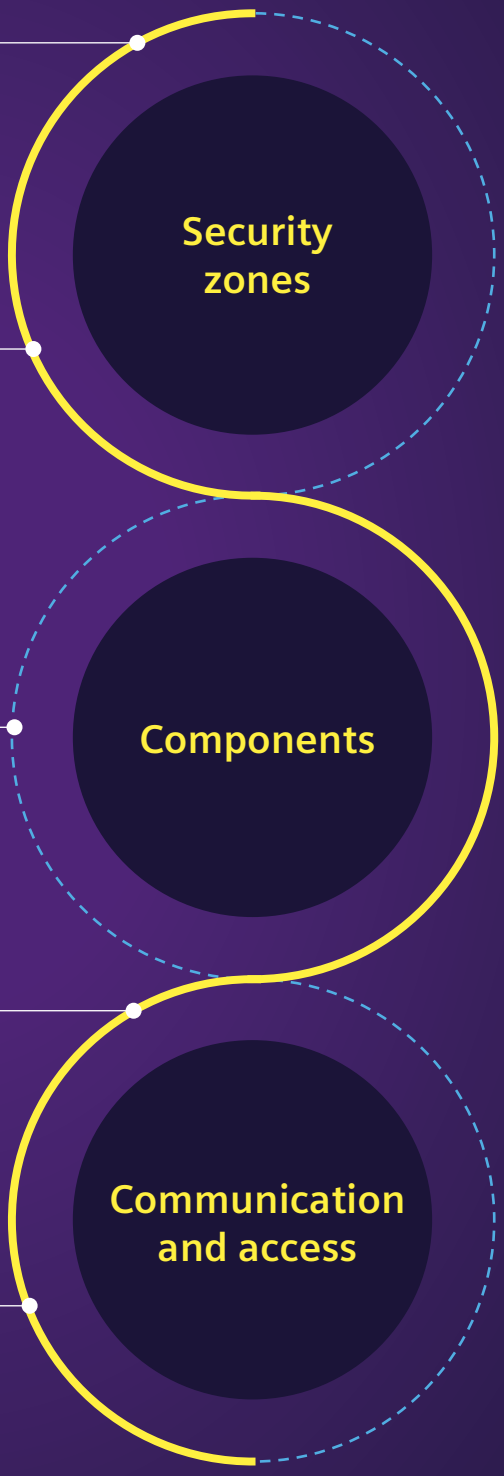
Component hardening based on CIS benchmarks

Patching

System/Security Updates and Patches are vital keeping the system secure and stable

Segregation

Critical network elements are separated from Internet/less critical networks to limit access



Why Omnivise is the best choice

Siemens Energy Omnivise solutions facilitate each phase of the planning, development and operations of a hybrid plant. Siemens Energy experts work with clients to determine which solutions align with their projects. The result for clients is a coordinated approach across the project lifecycle that achieves compliance with TSO requirements – and provides tools to optimize the financial return on investment.



Siemens Energy Omnivise solutions can be configured to meet the specific needs of a site or facility. Omnivise solutions can integrate, manage and optimize a wide range of energy assets, giving clients maximum flexibility to select their preferred asset mix for a hybrid plant. Depending on client needs, Omnivise solutions can help stabilize micro-grids, maximize financial returns, minimize emissions, or balance a range of performance metrics.

Our experienced engineers are familiar with grid requirements and power generation assets. Siemens Energy teams can draw on an extensive knowledge base to model assets, design site-specific control systems, plan for compliant grid connections, and implement adaptable, easily maintained operations. As a result, Siemens Energy Omnivise clients have the capabilities they need to make informed decisions throughout the project lifecycle.

Songtsam Basomtso Linka

Green and low-carbon operation with Omnivise T3000 microgrid control system



The Songtsam Basomtso Linka, in Southwest China, is the first green and low-carbon hotel of Songtsam Group that supports the country's green energy transition in China.

It is the largest and most advanced hotel in the Songtsam Group, designed with sustainable symbiosis with local culture and natural landscapes in mind. The hotel at an altitude of 3,480 meters (approx. 11,417 feet) has 122 rooms and suites.

The hotel

As the green energy technology partner, Siemens Energy designed and implemented the hotel's energy system, with solar energy as the main electricity source, replacing approximately 1 million kilowatt-hours of traditional energy consumption per year. Due to the problem of daily and seasonal imbalance of photovoltaic power generation, the hotel is equipped with heat storage, oxygen storage and other facilities for local consumption and storage utilization of photovoltaic energy, so that the hotel can maximize the independent supply of green energy.

The task

Songtsam Group sought a sustainable solution to minimize the hotel's carbon footprint while meeting demands for electricity, heating, and oxygen. Since exporting power to the grid wasn't permitted, the strategy focused on maximizing renewable energy use—first by powering non-controllable loads like kitchen and guest rooms, then using surplus energy for controllable loads such as heat pumps and oxygen generation. This approach also helped balance PV fluctuations by adjusting controllable loads.

The project faced a tight schedule and required seamless integration of photovoltaic tiles, air heat pumps, oxygen generation, and energy storage. Teams from Songtsam and Siemens Energy collaborated with strong commitment to ensure smooth operation and establish the hotel as a model for low-carbon development in China.

The solution

Through collaboration with Songtsam, Siemens Energy installed transformers, distribution cabinets, and software, providing guidance on the selection of solar panels, air heat pumps, and heat storage tanks. This ensured the successful deployment of the Omnivise T3000 system in China.

In addition, in the whole low-carbon energy system solution, the powerful system compatibility and intelligence of our proven Omnivise T3000 control system (including Hybrid Controller) achieves the balance of hotel energy supply and demand, economy and low-carbon goals. The control system can monitor, analyze, and automatically regulate the hotel's energy consumption process in real-time, and ensure the long-term stable, efficient and safe operation of the hotel's energy system through multi-energy complementarity, optimized scheduling, and digital operation and maintenance.

The Omnivise T3000 control system is currently used in more than 3,700 units worldwide and the Songtsam Basomtso Linka project is the first application of this Hybrid Control system in China.

The result

The hotel's energy system is equipped with real-time monitoring capabilities, allowing for continuous tracking and analysis of energy consumption to ensure optimal performance and responsiveness.

Designed for durability and reliability, the energy system supports long-term stable, efficient, and safe operations, contributing to the hotel's sustainability and operational excellence.

Advanced digital tools enable optimized scheduling and streamlined operation and maintenance processes, enhancing efficiency and reducing downtime across the hotel's energy infrastructure.

Learn more about this success story!





Learn more about
Omnivise Hybrid Control

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