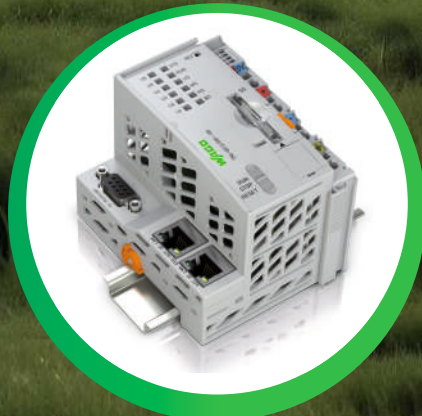




Pacemaker  
Energy



  
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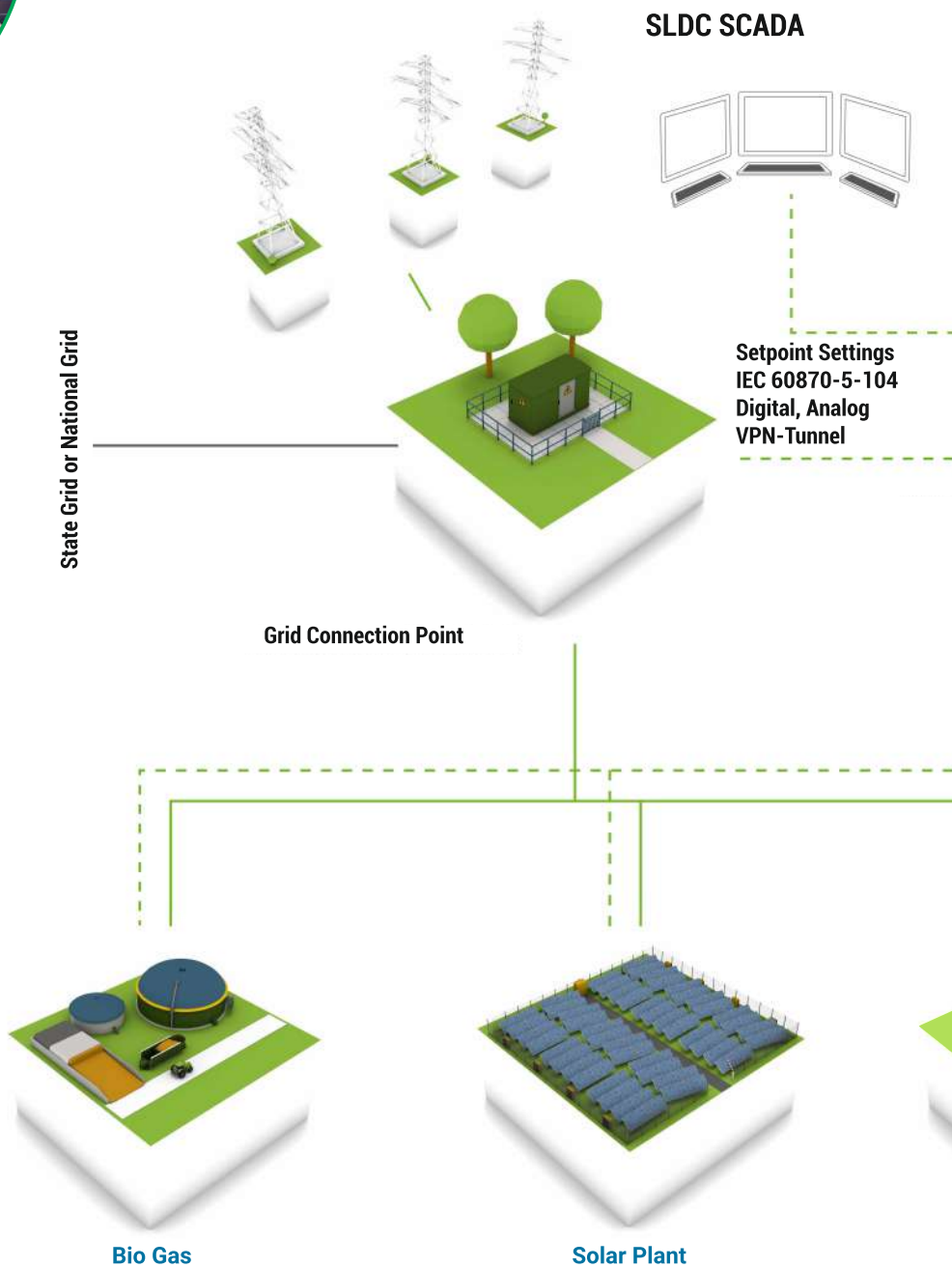


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Energy**



# Welcome to Pacemaker Energy

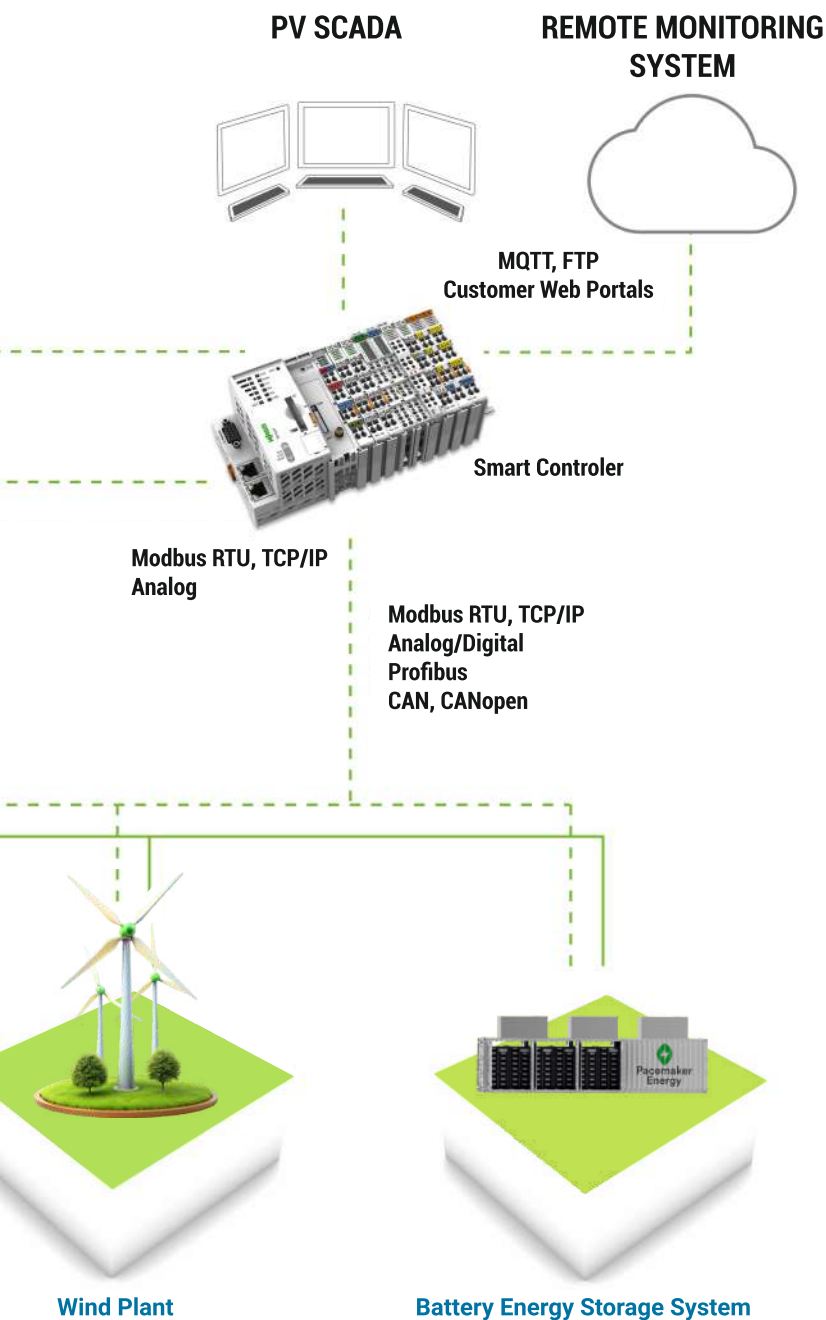
At Pacemaker Energy, we are dedicated to empowering the renewable energy industry with state-of-the-art automation and energy storage solutions. Our mission is to provide comprehensive, end-to-end services that ensure the seamless operation and optimal performance of renewable energy plants.



# Our Core Expertise

## Battery Energy Storage System:

- **Off-Grid Systems:** Reliable energy storage solutions tailored for remote and off-grid applications.
- **On-Grid Systems:** Integrated storage solutions that enhance grid stability and efficiency.
- **Large-Scale Storage:** Scalable battery solutions designed to meet the needs of utility-scale renewable energy projects.



## Complete Renewable Plant Automation:

- **PV SCADA Systems:** Cutting-edge solutions for monitoring and controlling photovoltaic installations.
- **SLDC/RLDC Telemetry RTU Panels:** Ensuring efficient and reliable communication with state and regional load dispatch centers.
- **Power Plant Controllers:** Advanced controllers designed to maximize plant efficiency and reliability.
- **Web Monitoring Systems:** Real-time, web-based monitoring tools for enhanced operational management.
- **Weather Stations:** Accurate meteorological data to support precise energy production forecasting.

At Pacemaker Energy, we are committed to delivering innovative solutions that drive the future of renewable energy. Explore our offerings and discover how we can help you achieve your energy goals with reliability and efficiency.

# Battery Energy Storage System

Pacemaker Energy offers state-of-the-art Battery Energy Storage Solutions designed to meet the demands of various applications, including off-grid, on-grid, and utility-scale projects. Our solutions are engineered for reliability, efficiency, and seamless integration, ensuring optimal energy management across all environments.

## Our Equipment and Solutions

### 1. Modular Battery Rack

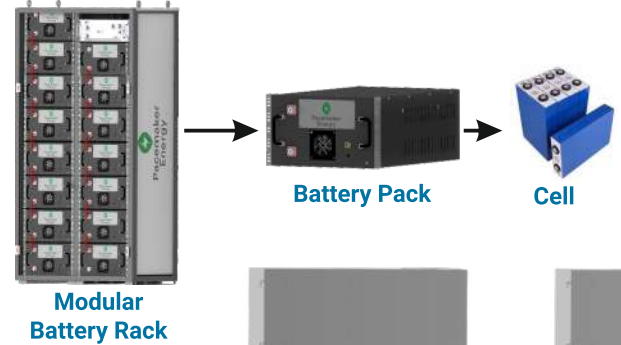
Our battery storage systems are built using modular battery racks that can be easily scaled to match the energy requirements of any project. Each rack is composed of the following components:

**Components:**

Battery Modules , Battery Cells

**Capacity:** Up to 5 Mwh

**Cycle Life:** 8,000 cycles



### 2. Smart Battery Management System (BMS)

We deliver and integrate a Smart Battery Management System that provides comprehensive management of the energy storage process. Key features include:

- **Control System:** AI-powered BMS
- **Efficiency:** >85% round-trip efficiency
- **Data Reporting:** Real-time analytics with historical data storage



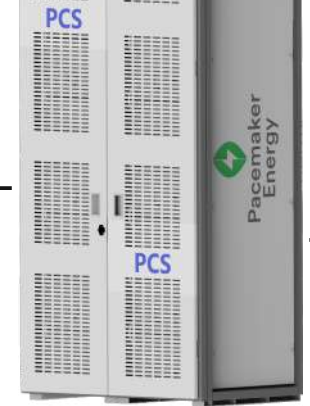
**BMS**

### 3. Power Conversion System (PCS)

Our Power Conversion System is designed to efficiently convert stored energy for use or return to the grid.

**Key Features Include:** These systems are designed to handle the complex demands of renewable energy storage and distribution.

- **Inverter Efficiency:** >98%
- **Power Factor:** 0.9 lagging/leading
- **Response Time:** <1 second



**PCS**

### 4. EMS, Grid Integration, and Stability Support

Pacemaker Energy provides comprehensive end-to-end Energy Management System (EMS) solutions tailored for Battery Energy Storage System (BESS) projects. Our EMS is designed to optimize energy usage, enhance grid stability, and ensure efficient management of energy flows between the grid, storage systems, and loads.

**Key Features:**

- **Integrated EMS:** Streamlines energy management processes, enabling effective forecasting and decision-making.



**Energy Management System**

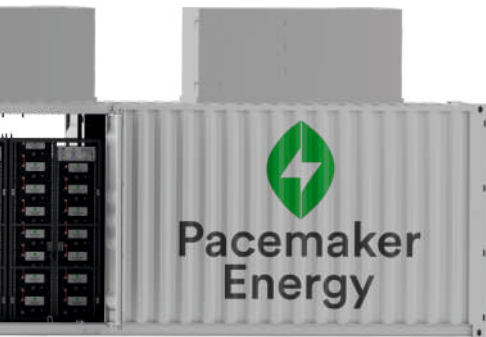
**Technical Integration:**

- **Grid Communication Protocols:** MODBUS, DNP3, IEC 61850, IEC 60870-104
- **Grid Support Functions:** HVRT, LVRT, VSG Function, Black Start Support
- **Frequency Regulation Precision:** Maintains stability within  $\pm 0.2$  Hz

## 5. Durable Enclosures and Environmental Protection

Pacemaker Energy delivers robust, weather-resistant enclosures that protect the storage system from harsh environmental conditions. Our equipment is designed for long-term reliability, even in extreme temperatures and challenging environments.

- **Temperature Range:** -20°C to 50°C
- **Ingress Protection:** IP54-rated enclosures
- **Materials:** High-quality, corrosion-resistant steel



Battery Energy Storage System

## 6. Comprehensive Service and Support

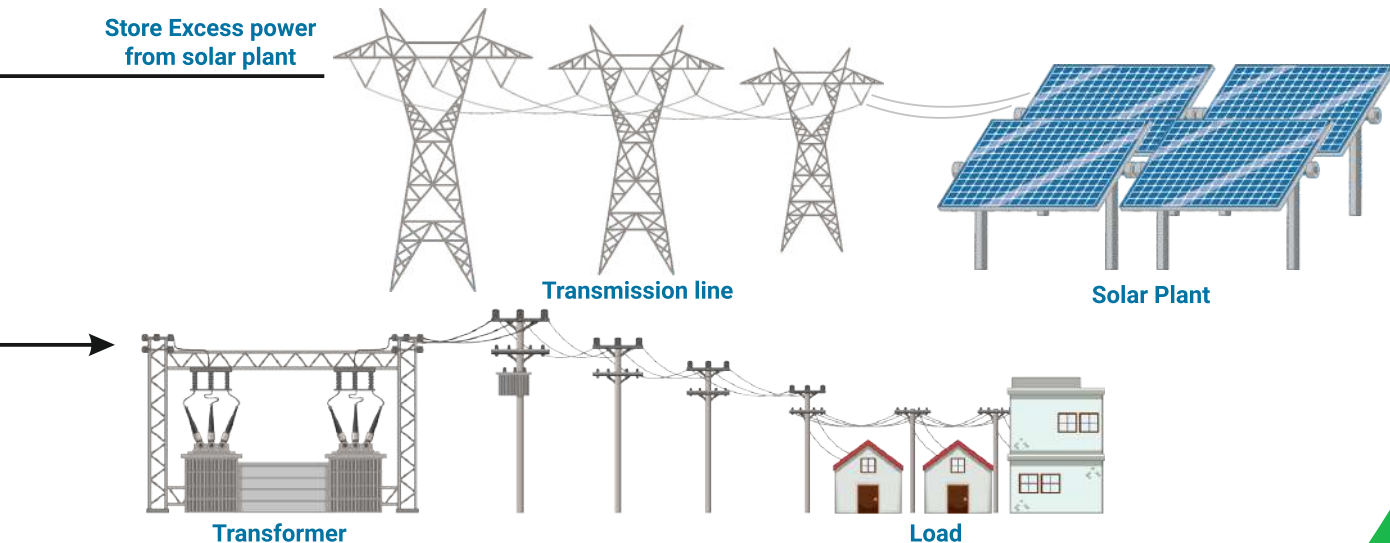
Pacemaker Energy not only supplies the equipment but also provides a complete range of services to ensure optimal performance of the battery energy storage system throughout its lifecycle. Our offerings include:

- **Project Management:** From initial consultation to final commissioning
- **Installation and Testing:** Ensuring compliance with all relevant standards and regulations
- **Ongoing Support:** Maintenance, upgrades, and monitoring services to ensure long-term success

## 7. Security and Compliance

We understand the importance of security in energy storage systems. Our solutions incorporate advanced security features to ensure:

- **Encryption:** AES-256
- **Access Control:** Multi-factor authentication
- **Compliance:** Meets all relevant industry standards and regulations



### Flexible Operation Modes:

- **Peak Shaving:** Mitigates peak demand by discharging stored energy.
- **Load Shifting:** Stores energy for use during high-demand periods.
- **Frequency Regulation:** Quickly responds to fluctuations, stabilizing grid frequency.
- **Backup Power:** Offers emergency power during grid failures.
- **Demand Response:** Adjusts energy usage based on grid signals and market conditions.
- **Automatic Generation Control (AGC):** Maintains grid frequency by automatically adjusting power output in real-time.

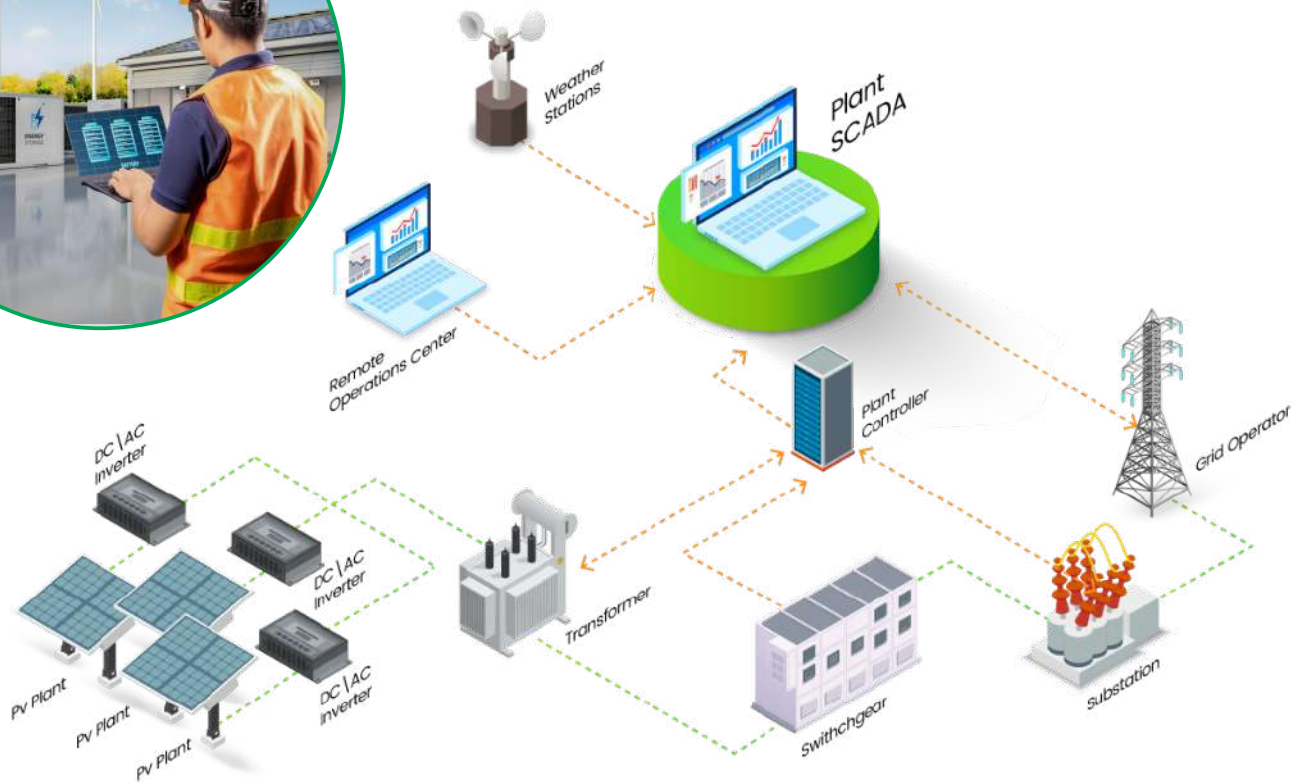


# PV SCADA Systems

## PV SCADA Systems: Cutting-Edge Solutions for Solar Plant Monitoring

Pacemaker Energy delivers the best PV SCADA Systems designed for comprehensive solar plant management. Our solutions offer:

- ◆ **Real-Time Monitoring:** Continuous tracking of solar plant performance, ensuring efficient operation and immediate response to issues.
- ◆ **Advanced Control:** Remote control and adjustment capabilities to optimize plant performance and rectify issues promptly.
- ◆ **Data Analytics:** In-depth analysis and reporting tools that provide insights into plant performance, efficiency, and trends.
- ◆ **User-Friendly Interface:** Intuitive dashboards that make monitoring and management straightforward, with customizable views tailored to user needs.
- ◆ **Seamless Integration:** Compatibility with various control systems and devices, ensuring a unified and efficient management approach.



# SLDC/RLDC Telemetry RTU Panels

## SLDC/RLDC Telemetry RTU Panels: Reliable Solutions for Grid Communication

Pacemaker Energy provides the best SLDC/RLDC Telemetry RTU Panels, ensuring efficient and reliable communication with state and regional load dispatch centers. Our panels offer:

- ◆ **Reliable Data Transmission:** Accurate and timely transmission of grid and equipment data to dispatch centers.
- ◆ **Robust Communication Protocols:** Supports multiple communication protocols including MODBUS, DNP3, IEC-60870-104, IEC-60870-101, and IEC 61850 for compatibility with various systems. This enables flexible integration with different grid management and monitoring systems.
- ◆ **Real-Time Monitoring:** Continuous updates and alerts on system status for prompt responses.
- ◆ **Enhanced Security:** Advanced encryption and secure communication channels to protect data integrity.
- ◆ **Remote Diagnostics:** Facilitates troubleshooting and maintenance from remote locations, minimizing downtime.





# Power Plant Controller

Power Plant Controller: Superior Solutions for Optimal Plant Performance

Pacemaker Energy supplies the best Power Plant Controller, offering:

- ◆ **Master PPC:** Centralized control unit managing all plant operations and subsystems.
- ◆ **Slave PPC:** Specialized control units that operate under the Master PPC, focusing on specific plant sections.
- ◆ **Hybrid PPC:** Versatile control units combining features of both Master and Slave PPCs for flexible plant management.

## Features:

- **Active Power Control:** Adjusts power output to match real-time demand and stabilize the grid.
- **Reactive Power Control:** Regulates reactive power to maintain voltage stability and improve grid reliability.
- **Frequency Control:** Ensures consistent power frequency to prevent grid disturbances.
- **Voltage Control:** Manages voltage levels to ensure stability across the plant and grid.
- **Load Shedding:** Automatically reduces output during overloads to protect equipment and maintain grid stability.
- **Automatic Generation Control (AGC):** Dynamically adjusts generation levels in response to grid frequency changes.
- **Real-Time Data Processing:** Provides immediate adjustments based on real-time performance data.
- **User-Friendly Interface:** Advanced control panels with intuitive displays for easy management.



## POWER PLANT CONTROLLER



PPC USER INTERFACE

MODBUS / IEC - 60870 - 5-104 / DNP3 / IEC 61850

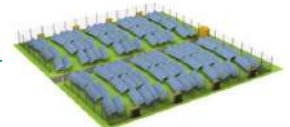


MODBUS  
IEC - 60870 - 5-104  
DNP3  
IEC 61850

MODBUS / IEC - 60870 - 5-104 / DNP3 / IEC 61850



NETWORK CONNECTION POINT



PV PLANT



WIND PLANT



BATTERY ENERGY STORAGE SYSTEM

### Power Plant Control DNV-GL APPROVED

- **Active Power Control**
  - $P_{\text{sell}}, P_{\text{SM}}$
  - $P(f), P(U)$
- **Reactive Power Control**
  - $Q_{\text{sell}}, \cos\phi_{\text{sell}}, Q_{\text{SM}}$
  - $Q(U), Q(U_{\text{db}})_{\text{ext}}, Q(P)$



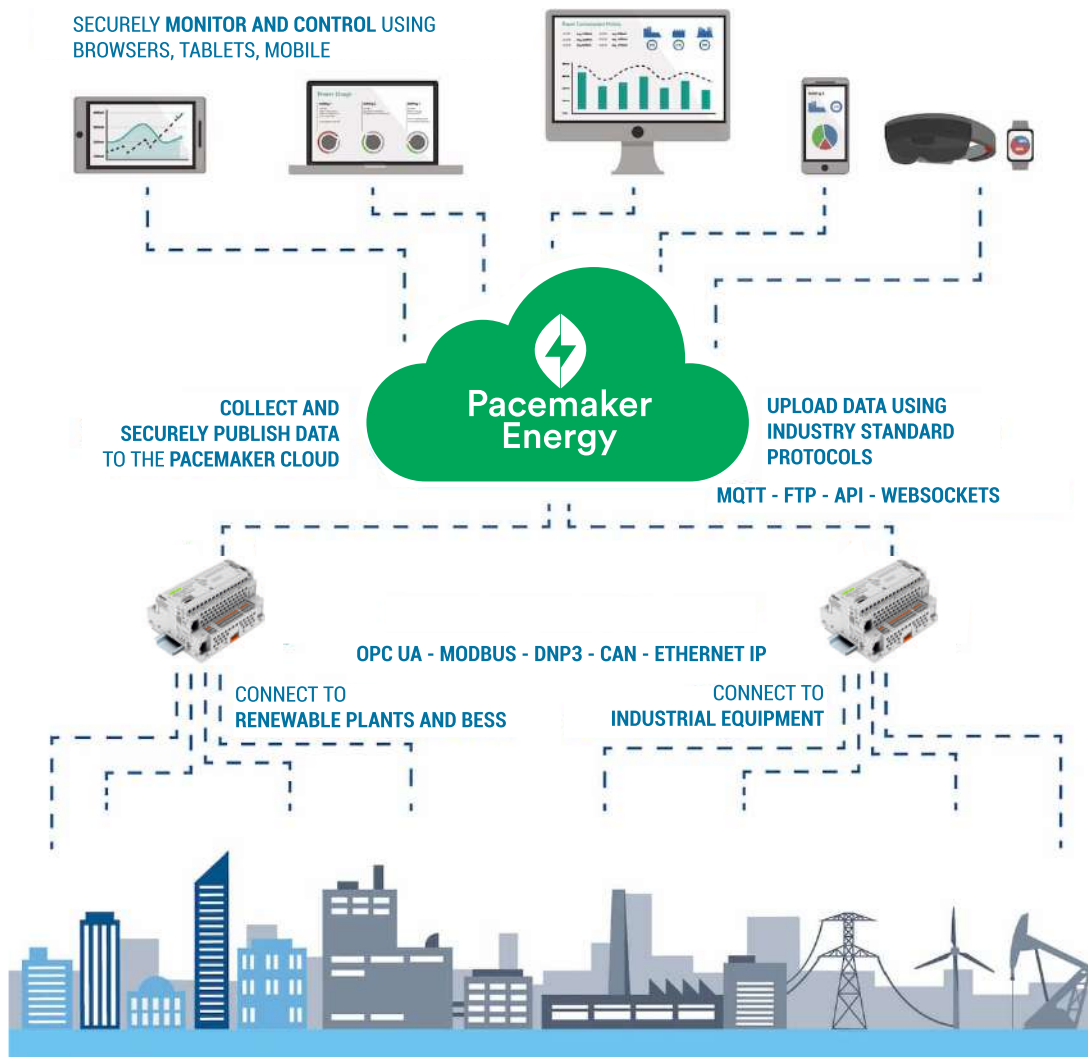


# IoT Based Web SCADA Systems

**IoT Based Web SCADA Systems:** Cutting-Edge Solutions for Integrated Monitoring and Control

Pacemaker Energy provides state-of-the-art IoT Web SCADA Systems, designed to enhance operational efficiency through advanced web-based technology. Our solutions feature:

- **IoT Integration:** Connects seamlessly with a wide array of IoT devices and sensors, capturing real-time data across your plant.
- **Web-Based Access:** Offers a secure, user-friendly web interface for monitoring and managing plant operations from any location.
- **Real-Time Data Visualization:** Provides instant visualization of operational data through customizable dashboards and interactive charts.
- **Advanced Analytics:** Leverages data analytics to generate actionable insights, optimize performance, and predict potential issues before they arise.
- **Remote Control and Management:** Allows remote access for controlling and adjusting plant settings, ensuring flexible and efficient operations.
- **Scalable and Modular Design:** Easily adaptable to growing data needs and additional devices, providing future-proof solutions.





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Energy



# Weather Stations

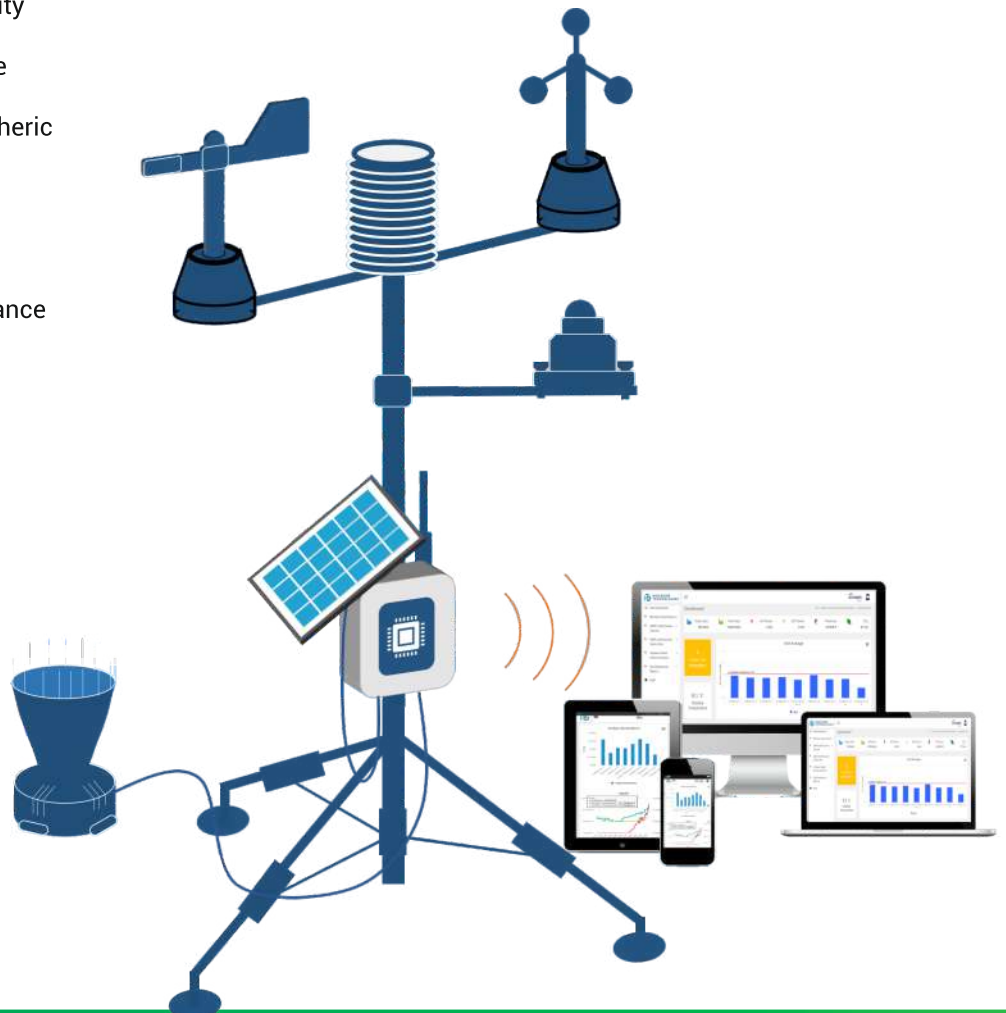
**Weather Stations: Comprehensive Solutions for Accurate Solar Plant Monitoring**

**Pacemaker Energy Provides the best Weather Stations, Featuring:**

- ◆ **Comprehensive Data Collection:** Measures a wide range of meteorological parameters crucial for solar plant operations.
- ◆ **Real-Time Monitoring:** Continuously updates weather data to support dynamic energy production adjustments.
- ◆ **SCADA Integration:** Seamlessly integrates with SCADA systems for enhanced operational management.
- ◆ **Data Logging:** Long-term storage of weather data for trend analysis and performance forecasting.

## Features:

- **Thermometer:** Measures ambient temperature to assess its impact on solar panel efficiency.
- **Anemometer:** Measures wind speed to understand its effects on dust accumulation and panel cooling.
- **Pyranometer:** Measures solar radiation intensity, essential for evaluating solar energy availability.
- **Hygrometer:** Measures humidity levels, which can affect panel performance and maintenance needs.
- **Barometer:** Measures atmospheric pressure to aid in weather forecasting and plant management.
- **Rain Gauge:** Measures precipitation levels to monitor potential impacts on maintenance and performance.
- **Wind Vane:** Measures wind direction to assess the impact on dust deposition and panel orientation.
- **Snow Sensor:** Detects snow accumulation on panels, which is critical for energy production in snowy climates.
- **Soil Moisture Sensor:** Measures soil moisture to manage dust levels and maintenance requirements around the plant.
- **UV Sensor:** Measures ultraviolet radiation to monitor potential UV-related degradation of solar panels.
- **Irradiance Sensor:** Provides detailed sunlight intensity data for precise energy potential calculations.



# Why Choose Pacemaker Energy?

- **Innovative Technology:** Cutting-edge battery storage technology combined with expert engineering.
- **Comprehensive Solutions:** Full-service delivery, from equipment provision to project execution and ongoing support.
- **Scalability:** Solutions tailored to the specific needs of your project, whether small-scale or utility-scale.
- **Reliability:** Durable, high-performance systems designed for long-term operation in any environment.

## For Battery Energy Storage System:

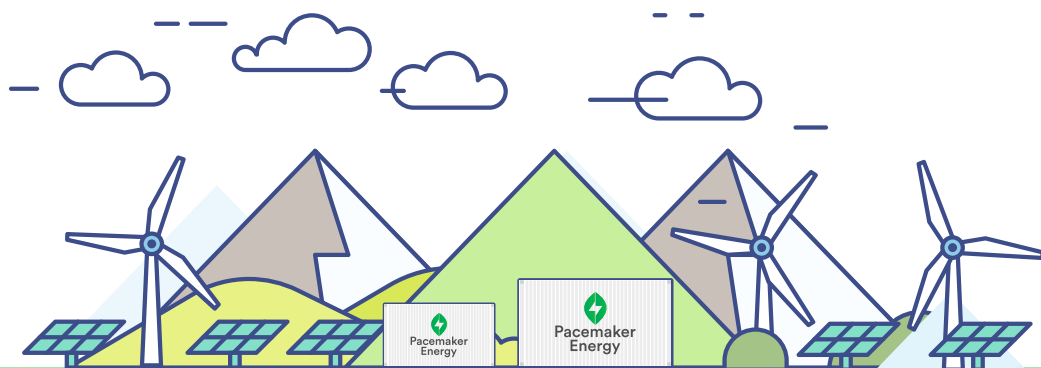
- **Explore Solutions:** Learn more about our off-grid, on-grid, and large-scale storage systems designed for diverse energy needs.
- **Inquiry Us:** : Obtain a customized quote for our advanced battery storage solutions and services.

## For Renewable Plant Automation Solutions:

- **Schedule a Consultation:** Discuss your needs for PV SCADA systems, SLDC/RLDC telemetry RTU panels, power plant controllers, web monitoring systems, and weather stations.
- **Inquiry Us:** To Get a detailed quote tailored to your renewable plant project requirements.
- **Book a Demo:** Experience our renewable plant automation solutions and see how they can optimize your operations.

### Ready to Enhance Your Renewable Energy Projects?

Whether you're interested in our comprehensive renewable plant automation solutions or cutting-edge battery energy storage systems, Pacemaker Energy is here to help you achieve your energy goals.





# Pacemaker Energy

## AREA OF SERVE

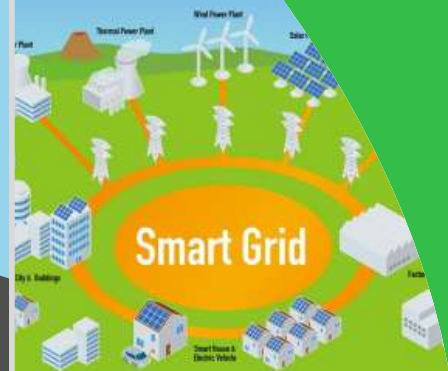
### SMART CITY



### BATTERY STORAGE



### SMART GRID



### SPACE DEFENCE



### SCADA



### POWER TRANSMISSION & DISTRIBUTION AUTOMATION



### OIL AND GAS



### SUBSTATION AUTOMATION



### IOT SOLUTIONS



## Pacemaker Energy Pvt. Ltd.



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