



**Electro Industries
GaugeTech**

Monitoring Case Study

San Roque Multi-Purpose Project

Accurately Metering Power Plants

Using the Most Advanced Power Monitoring

Available Today



Background:

San Roque Power Corporation (SRPC) is a special-purpose company incorporated in the Philippines. SPRC is a provider of electrical power, irrigation, flood control, and water quality control. SPRC provides electrical power through its power plant, SRMP.

SRMP has an installed rated capacity of 345 megawatts (MW). It operates primarily as a peaking plant during periods each day when the electrical output of base and intermediate load power plants cannot meet consumer demand.

SRMP can operate year round at its dependable capacity of 85 MW for a minimum of eight hours a day, even during periods of extreme drought. Whenever surplus water is available, the SRMP can provide either extra peaking capacity (beyond 85 MW), generate off peak power, or perform a combination of the two.

Based on the historic flow data for the Agno River, average annual energy generation is approximately 1,000 Gigawatt-hours (GWh). About 250 GWh of that is energy arising from the plant's dependable capacity of 85 MW. This is the basis for the capacity payments under the PPA. The remainder of the 1,000 GWh is surplus power that reduces dependence on imported fuel oil and lowers the variable operating expenses of other power plants.

The SRMP offers substantial power benefits in addition to the peaking capacity and energy provision, considered in the economic analyses conducted by NPC and the National Economic Development Authority. Most of these benefits are unique to large hydroelectric facilities.

For example, the water turbines can be maintained in "spinning reserve" when not on line; that is, turning at 60 hertz under no load, able to deliver as much as 400 MW within seconds in the event of a regional power outage. This capability improves the overall quality of power needed by high technology industrial consumers.

Even if completely shut down, the turbines can be restarted and energized in a matter of minutes, as no warm up cycle is required. In addition, the water turbine-generators have "black start" capability, which enables them to be the initial source of power following a blackout so that other plants can be restarted. They can also be used to stabilize system voltage and frequency, and can serve as a source of reactive power.

Goals:

Because of the extensive demands on the SRMP and the criticality of its efficient functioning, SRPC required a monitoring system that would give accurate and complete readings of all power parameters for the Turbine Generators in their plant. They also needed the system to provide extensive data logging capabilities and analysis of meter readings. To summarize, SRPC required:

- Accuracy of meter readings
- Historic logs that could be retained in case of power failure
- Power monitoring for every station
- Ability to record and display the following parameters: KVAR, PF, FREQ, 3 PHASE VOLTAGE, 3 PHASE AMP, KWH

Nexus 1250 as the Solution:



SRPC chose the Nexus 1250 from Electro Industries/Gauge Tech as its solution. The Nexus 1250 was chosen over other monitoring systems due to its many design advantages. The Nexus 1250 met all the system requirements set forth by the SRPC, and exceeded them. Since the Nexus was an auto-calibrating design, SRPC was confident that the readings provided were accurate and verifiable even in the extreme heat of Southeast Asia.

Listed below are some of the features of the Nexus 1250 Meter, which led to its being the choice of the SRPC.

- Precision Accuracy Specifications - this unit complies with and exceeds ANSI C12.20 and IEC687 accuracy requirements.
- Auto-calibration with Temperature Compensation
- Dual Internal References Accurate to 1PPM
- 16 Bit Waveform and Fault recorder- the unit records up to 512 samples per cycle for an event. Voltage and current are recorded with pre- and post-event analysis.
- Measures and Records Harmonics to the 255th Order
- Records Status Input Triggers, Additional Inputs, and Sub-Cycle Transients
- Records and Displays Real Power - Vars, VA, PF, 4-quadrant energy demand, Voltage, Current, Reactive Power, Apparent Power, Frequency, etc.
- Advance Reporting and Analysis
- Multiple Programmable Memory Logs

- Onboard Communication for Every Application- 4 Isolated High-Speed Communication Ports, Multiple Socket Ethernet Interface, Onboard Internal Modem and 8 Built-In Digital High-Speed Status Inputs.

Results:

The Nexus 1250 meters were used primarily by SRPC to monitor the power generated by Turbine Generators for overall quality of power needed by their electrical consumers. Using Nexus technology, SRPC was able to get energy metering compliant data, and use historical logging features to obtain data and results redundantly with the existing SCADA system.



Looking Forward:

Today, SRPC Engineers are pleased with the accuracy of the Nexus 1250 Meter and are exploring other capabilities of the Nexus Meter. They are looking at better utilizing the

Nexus fault analysis and transient recording capability to pinpoint and diagnose power reliability issues and concerns. Using the Nexus multiple communication paths, they will be able to bring back engineering level fault and waveform records while the system is “on-line” with the energy monitoring software system. This is invaluable tool for insuring the SRPC will be able to provide reliable power in the future.

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