

Arevon Achieves Robust and Scalable BESS Performance Monitoring with N3uron

[Arevon](#) is one of America's most trusted leaders in utility-scale solar and energy storage. The company develops customized, integrated energy solutions in communities across the United States, supplying homegrown, reliable, and cost-effective energy to utilities and businesses. Arevon develops, builds, finances, owns, and operates solar, energy storage, and solar-plus-storage projects as well as distributed generation assets.

Many of Arevon's sites are hybrid plants with Battery Energy Storage Systems (BESS), and some are BESS-only plants. Across its diverse portfolio, Arevon needs consistent visibility into operational data to effectively monitor performance, optimize operations, and ensure reliable energy delivery.

However, each project often involves different Engineering, Procurement, and Construction (EPC) contractors who may select varying SCADA platforms and control systems based on their own expertise and preferences, creating data silos that must be bridged to maintain centralized oversight. This requires standardized real-time data acquisition between external contractors and internal Arevon systems.

The Challenge

The EPC contractor at one of Arevon's projects implemented N3uron as its SCADA controls platform, and Arevon needed to establish the data pipeline infrastructure to connect with the EPC's chosen system. Justin Johnson, Chief Operating Officer at Arevon, explained: *"As this was our first standalone BESS project, we did not have an existing data pipeline in place to stream real-time data offsite and into our internal systems. To establish this pipeline, we decided to set up our own cloud-hosted N3uron instance and leverage the N3uron Links functionality due to its simplicity."*



The project's aim was to stream BESS-related data into Arevon's internal systems to be displayed in custom analytics dashboards that Arevon was building at the time. The company was creating new BESS KPIs with this data and monitoring the results of various tests taking place during the project's commissioning phase.

"As project owners, we did not always have easy access to the plant's SCADA, so N3uron helped us gain this easy, consistent access. The only initial requirement for this project was low-latency streaming data and a simple and efficient application to manage it, which N3uron satisfies completely," said Justin Johnson.

Solving Pain Points

The flexible, modular, plug-and-play design of N3uron's platform enables real-time data flow and simplified integration across platforms and applications. This made it easy to consolidate, model, and process the project's operational data in a single source of truth.

Equipped with data acquisition and data delivery modules — plus edge computing and visualization modules fully compatible with all of the main leading SCA-



DAs currently available on the market — the N3uron platform enabled Arevon to build a future-proof data pipeline infrastructure, free from vendor lock-in, dependencies, or technical debt.

The [N3uron Links](#) feature, which connects each N3uron node to other nodes for data exchange, made it easy to exchange data with the project's EPC. *"We chose N3uron because the counterparty we were working with at the time of project conception was using N3uron, and using N3uron ourselves was the easiest way to integrate with them due to the N3uron Links feature,"* said Justin Johnson.

Project implementation did not present major hurdles, according to Justin Johnson: *"Honestly, we have not encountered any major issues relevant to N3uron over the course of this project. N3uron has been the missing puzzle piece that fits perfectly."*

A Flexible, Reliable Data Streaming Solution for IIoT Connectivity

Arevon deploys N3uron instances on dedicated servers on-site. Each local N3uron instance connects

to the local plant [Historian](#) or Power Plant Controller (PPC) via the [DNP](#) or [OPC UA](#) modules. All local N3uron instances stream data offsite — via [N3uron Links](#) — to an aggregator N3uron instance in the cloud, hosted on a single AWS EC2 server. From there, data is sent via the [MQTT Client](#) module to AWS IoT Core and other AWS services for processing and storage.

By connecting N3uron to either the plant Historian (which stores historical operational data) or the PPC directly, Arevon can access both real-time operational data and control status information.

Arevon's N3uron instances are split into two categories:

- **Actively self-managed:** Since 2021, beginning with their first BESS project, Arevon has installed and managed N3uron instances internally.
- **Accessed but not actively self-managed:** Prior to 2021, Arevon also contracted with a company ([Power Factors](#)) which deployed and managed N3uron pipelines at many existing projects.

Across both categories of N3uron instances, Arevon operates a total of 35 sites, each with a local N3uron node managing between 250 and 80,000 tags per node. While all BESS projects fall into the first category, Arevon's solar capacity is split roughly evenly across the two.

Modular Digital Foundation for Real-Time BESS Performance Monitoring

Fully customizable, with modules for Industrial IoT & DataOps, the N3uron platform provided a flexible digital foundation for real-time monitoring. By using the following N3uron features and modules, Arevon built a reliable streaming data pipeline facilitating standardized data access, IT/OT integration, and real-time monitoring.

- **CAISO ADS:** N3uron's [CAISO ADS Client](#) enables automatic awareness and acceptance of Automated Dispatch System (ADS) requests. Arevon uses this module for their plants in California to instantly receive, schedule, and execute CAISO ADS commands in SCADA systems and PPCs. N3uron seamlessly integrates with any local PPC and SCADA system to automatically perform all changes required to meet CAISO ADS requests. To eliminate operator error risk, this integration is implemented via the other N3uron modules, which allows for automatic coordination of adjustments across all plant devices (such as inverters, capacitors, and batteries).
- **DNP Client:** N3uron's [DNP Client](#) provides a reliable way of connecting to any Distributed Network Protocol (DNP3) compliant device through Ethernet or serial communication. N3uron DNP Client acts as the master station connected to DNP3 slaves, also known as outstations.
- **OPC UA:** N3uron's [OPC-UA Client](#) enables the platform to make outgoing connections to any third-party compliant OPC UA server and is fully integrated with all other N3uron modules. Arevon uses this module for seamless BESS SCADA integration.
- **Historian:** N3uron's powerful [Historian](#) module stores the BESS system's historical data, which is critical for manufacturers to maintain the warranty. Arevon uses Historian to store data for up to 3 months on-premise in case of a downstream data pipeline issue.
- **N3uron Links:** [N3uron Links](#) are secure tunnels that enable seamless, firewall-friendly, real-time communication between nodes. Arevon uses N3uron Links to aggregate data to its central cloud-hosted N3uron instance. N3uron Links also includes a built-in Store & Forward mechanism to preserve data integrity even when the system experiences intermittent connectivity.
- **MQTT:** N3uron's [MQTT Client](#) provides seamless connectivity to any MQTT broker, enabling robust, bi-directional communication by publishing and subscribing to data. Arevon uses the MQTT module to send data from their central cloud-hosted N3uron instance into AWS for further processing. The MQTT Client publishes and subscribes data to/from AWS IoT Core.

Time-Saving, Cost-Efficient, and Seamless DataOps

Since project implementation in 2021, Arevon has experienced major time and cost savings:

Noted Justin Johnson: *"The cost of use is extremely low due to the one-time licensing costs and optional Support & Maintenance program costs. We've never had any issues or deliberations over the cost impact of operating N3uron. The performance, in terms of data latency and efficiency in moving data into and between N3uron instances, has met our expectations. In terms of time saved, all I can say is thank God for N3uron."*

As for how project implementation differed using N3uron compared to other products, he said: *"We can only compare it to logging in to plant SCADA directly. There is almost no comparison to be made here in terms of efficiency of time and ability to build on top of: N3uron wins."*

“The cost of use is extremely low due to the one-time licensing costs and optional Support & Maintenance program costs. We’ve never had any issues or deliberations over the cost impact of operating N3uron. The performance, in terms of data latency and efficiency in moving data into and between N3uron instances, has met our expectations. In terms of time saved, all I can say is thank God for N3uron.”

– Justin Johnson,
COO of Arevon.

Even beyond the first BESS project, N3uron helped standardize Data Acquisition System (DAS) technology at most of Arevon’s projects: *“Instead of worrying about integrating with different applications and managing standardization of different data structures, we rely on the diverse catalog of N3uron data connector modules to bring data into N3uron, and from there our pipeline is standardized across projects.”*

Future Plans for Portfolio-Wide Implementation of N3uron

Arevon’s streaming data pipeline powered by N3uron enables real-time visibility and intelligence to optimize the structuring and long-term performance of renewable energy projects. Visibility supports the sustainable development and operation of affordable, safe, and emissions-free energy generation, which is central to Arevon’s mission.

“We plan to implement N3uron on-premise across all of our projects in the foreseeable future,” said Justin Johnson, “We also plan to upgrade our N3uron cloud deployment by adding additional nodes, backup and reserve instances, and migrating from plain MQTT to MQTT Sparkplug. In addition, we intend to expand our use of N3uron’s Fleet Manager platform to simplify centralized management and monitoring across our entire portfolio.”