SCADA Versus Web-Based Monitoring

Clients often ask PV system integrators and consulting engineers for recommendations on how best to monitor their assets and manage their portfolios. The variety of platforms available differ in cost and technical capabilities. However, most fall into two broad categories: supervisory control and data acquisition (SCADA) systems and web-based monitoring systems. Here we briefly consider the differences between these two platforms within the context of megawatt-scale PV systems. We also present 10 key questions to consider when selecting a platform.

Differences between Platforms

Many in the industry tend to use the terms *SCADA* and *web-based monitoring* interchangeably. However, there are important differences. On one hand, the traditional power sector has been using SCADA systems since the late 1980s, long before high-speed Internet connectivity became ubiquitous, and they provide active plant control. On the other, web-based monitoring systems are relatively new and generally focus more on data acquisition than on plant control and operation.

SCADA systems. Utility-scale power plants require not only large-scale data collection, but also a means of control. For example, a utility or independent system operator (ISO) may require a PV power plant to operate according to a contractually mandated schedule. In other cases, the utility or ISO may send commands directly to the on-site SCADA system via an energy control network. Traditionally, plant operators use SCADA systems with an on-board network historian server to meet plant control and data collection requirements like these.

SCADA platforms typically include software that is purchased up front. The purchaser owns the software licenses and the data collected. Providers generally do not sell SCADA packages as a service, but they do make annual updates available for a fee. The main difference between SCADA and web-based monitoring is that SCADA packages are typically designed to communicate with industrial automation controllers and provide enhanced control capabilities. As a result, the operator interface allows not only for monitoring and data collection, but also for direct control of plant operations, either locally or remotely.

Commercial plant operation requires such a high level of reliability that a firmware-based device—such as a programmable logic controller (PLC) or a similar type of smart relay—is necessary for plant control. Unlike a computer server, which is constantly executing many programs that are subject to interruption, a PLC runs only one application.

Web-based monitoring. The rapid growth of the solar industry over the last decade has spawned a multitude of companies that sell web-based PV monitoring software and services. Although some equipment manufacturers and system integrators offer their own monitoring platforms, lending institutions often impose independent monitoring requirements. Therefore, third-party companies typically provide data collection software and services optimized for PV applications. AlsoEnergy, Draker, Locus Energy and Solar-Log are a few of the vendors in this category. Providers typically sell web-based monitoring according to a software-as-a-service delivery model. The client pays up front for the site communications software and then pays a monthly fee for data storage and maintenance.

Choosing the Right Platform

When deciding between SCADA and web-based monitoring platforms, consider the following ten questions.

What is the size of your project? For projects of more than 10 MW in capacity, which typically have control requirements mandated by the utility or ISO, we recommend looking into a SCADA system. A web-based monitoring platform is good for individual projects of less than 10 MW in capacity and also for distributed generation sites.

What is the size of the overall portfolio? Some web-based monitoring systems are sufficient for site-level monitoring but do not manage multiple-site portfolios. In other cases, the client may have different monitoring platforms at different sites and may be looking to consolidate. If the client has a multiple-vendor portfolio, we recommend consolidating at a corporate level rather than changing equipment at the site level.

Does the utility have control requirements? If the utility requires plant or tracker control or the ability to allow operators to manually change setpoints, a SCADA package is preferable because you can customize it. Some web-based monitoring companies now provide limited control capabilities.

What level of data granularity do you need? Utility-scale plant operations require more in-depth data analysis than smaller PV systems need. With a SCADA system, the client owns and has easy access to all the data. A software developer can provide custom data analysis tools. Web-based monitoring systems provide a basic data analysis tool; they also typically allow clients to download data in comma-separated value (CSV) format, which they can manipulate in Microsoft Excel or other software.

How are monitoring costs amortized? Providers often customize SCADA systems for particular projects, so the software engineering costs are site specific. However, the project's EPC budget usually includes the

cost of SCADA licenses and software development. With a web-based monitoring platform, after buying the communications software the owner must pay a monthly subscription fee once construction is completed. Terms vary from provider to provider, depending on who owns the site hardware and the data.

What is the makeup of the client's labor force? Sophisticated clients with in-house engineering resources are likely to benefit greatly from a SCADA system because of the flexibility and granularity of data it can collect. Clients without in-house engineering resources can contract with a SCADA integrator or use a web-based monitoring platform if the inherent system limitations are acceptable.

Is a customizable solution required? SCADA systems are generally customizable and are well suited to complex reporting. Web-based monitoring systems generally come equipped with standard, off-the-shelf features.

Where does the hardware reside? Web-based monitoring systems require minimal site hardware but have few levels of redundancy, which could be a problem in the event of a power or network outage. SCADA systems can employ local servers with remote backup and can be integrated with complex redundant systems on a utility scale.

Is the provider financially viable? The solar industry is relatively young, and many providers of web-based monitoring systems are less than 5 years old. As the industry matures, the sector will likely experience consolidation, and some of these companies may not survive. In contrast, mature companies—such as ABB, GE, Invensys, OSIsoft, Rockwell Automation and Siemens—provide most utility-scale SCADA systems. These mature companies are more likely to remain viable in the longer term as compared to start-up companies backed by venture capital. Long-term viability is important, given that many PV power plants have 20-year power purchase agreements.

Who will manage O&M? If clients perform all of their own maintenance, it is advantageous to have a single platform monitor all sites and have this platform tie into a computerized maintenance management system (CMMS) that can centralize functions such as work order management, scheduling and trouble tickets. Web-based monitoring and SCADA systems have varying levels of support for CMMS systems. If CMMS integration is a client's goal, take a close look at these feature sets when selecting a monitoring platform.

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