



Arizona Electric Power Cooperative Solutions for Smart Grid

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John Franklin, Logic Systems Administrator, AEPCO CEMS

Results

- Ability to add or remove components to reporting systems to accommodate changing environmental regulations
- Simple and fast tuning changes to achieve optimum performance of power generation units given any unforeseen deviation in the system
- Ability to do more with less
- Remote equipment start and control functionality without the added costs of RTU interfaces and complicated configurations
- Drag and drop new devices with full functionality to quickly update one-line diagrams, keeping maintenance costs to a minimum

Operational efficiency, real-time data collection, and secure operator control are key to a "run anything from anywhere mindset."

When systems have to be built over time—due to budget, manpower, or time constraints—consistency and ease of use are essential. That goes for both the HMI/SCADA systems being built and the tools being used to build them. GE Digital's iFIX is the tool this small power-generating cooperative is using to provide big-time information sharing.

Arizona Electric Power Cooperative (AEP CO) is a rural Generation & Transmission (G&T) cooperative located in southeastern Arizona. It was formed in 1961 by four distribution cooperatives operating in southeast Arizona. Arizona Electric Power Cooperative (AEP CO) owns and operates the 600 MW (gross rated) Apache generating station in Cochise, Arizona, which is east of Benson and south of Willcox. The company also includes Southwest Transmission Cooperative, Inc., (SWTC), the transmission side of operations, and Sierra Southwest Cooperative Services, Inc., (Sierra) which provides the manpower and support services that make generating and transmitting electricity possible. All three cooperatives are members of Touchstone Energy. Now these six cooperatives serve more than 115,000 residential and business customers. A total of seven generating units provide wholesale electrical power to member service areas ranging from southern California to New Mexico.

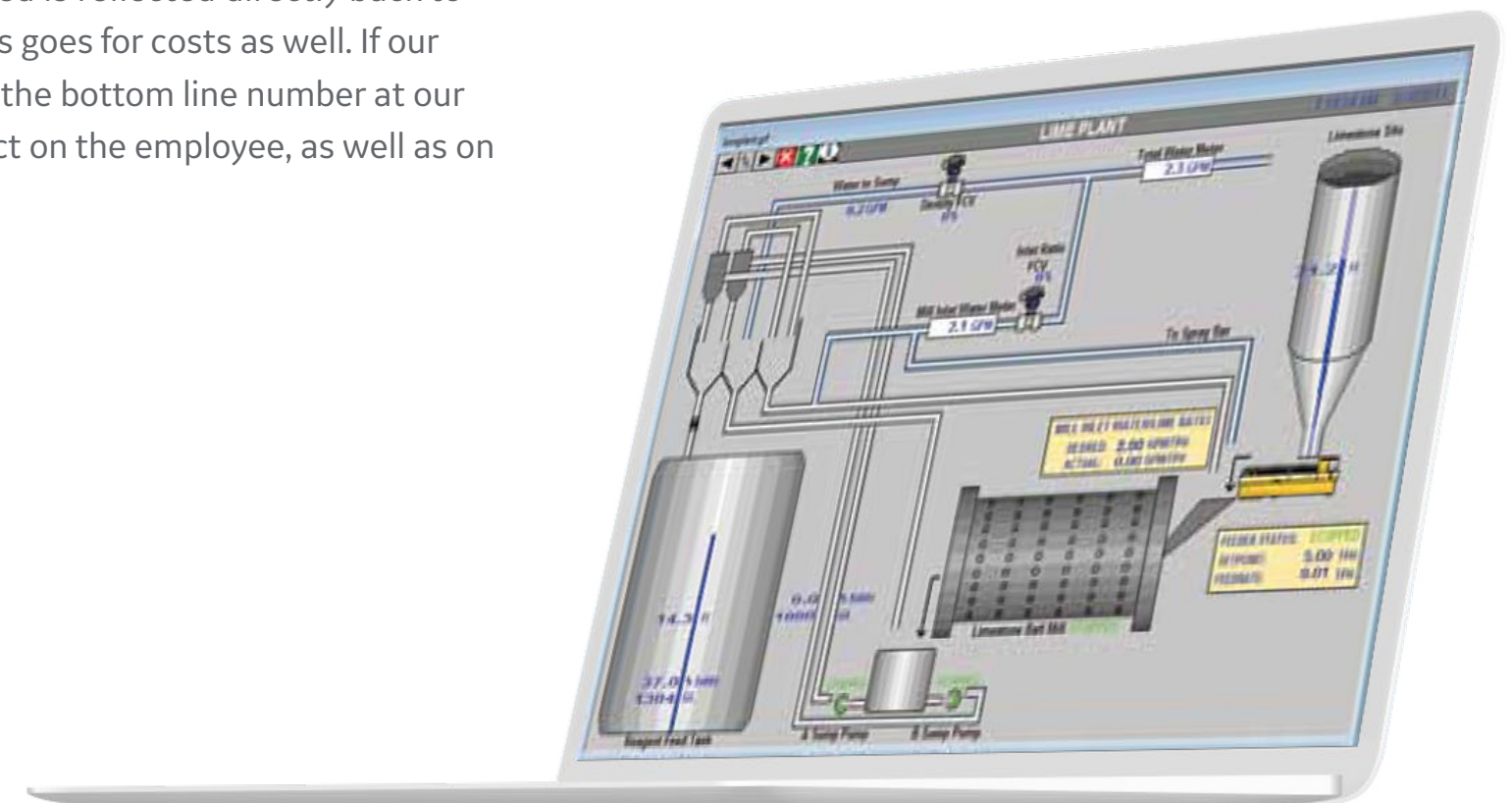
AEPCO is on par with larger investor-owned utilities in terms of operational efficiency. AEPCO plant operations consist of 60 employees working 24/7. Approximately 40 maintenance technicians handle mechanical, instrumentation, and other plant maintenance tasks. Engineering staff includes two results (performance) engineers, one mechanical engineer, one electrical engineer, and one controls engineer.

“When I started here in 1992, I was one of 12 electrical technicians. Now it’s six,” said John Franklin, who is CEMS/Logic Systems Administrator. His department’s staff of three is responsible for the network infrastructure, servers and workstations, PLC/PAC/DCS programming, and maintenance and design. This also includes all associated applications such as emissions monitoring, security, data archiving, and disaster recovery.

As a not-for-profit utility, AEPCO answers to its members, who in most cases are its neighbors. “Our member, cooperatives direct when and how we spend money,” said Franklin. “Any savings obtained is reflected directly back to the cooperative member. This goes for costs as well. If our department is able to reduce the bottom line number at our level, it can have a direct effect on the employee, as well as on the member’s electric bill.”

After many years with AEPCO, Franklin has seen it all—and probably built the interface so others can see it too. iFIX from GE Digital is the engine for AEPCO's HMI/SCADA systems. This powerful software solution, designed to help electric utilities of all sizes quickly and easily install and configure SCADA capabilities, provides real-time data collection, database management, dynamic data display, and secure operator supervisory control.

Franklin said AEPCO's SCADA system was designed one upgrade at a time over many years with a "run anything from anywhere mindset." The system now encompasses almost the entire facility, including coal handling, water treatment, remote well sites, DCS interface for boiler/turbine control, remote gas turbine control for peaking units, and even plant security. It's a human-machine interface (HMI) that doesn't see beyond the plant, but it sees everything within it. That global access to information is helping AEPCO and its small staff of engineers, operators, and maintenance technicians ensure continuous system uptime.



Defer hardware upgrade costs

AEPCO's first iFIX-based application, built in 1994, was an upgrade to the plant's water treatment system and lab. "We maintained the original PLC from the upgrade, but have kept the HMI/SCADA portion evolving with the release and upgrades of iFIX along the way," said Franklin.

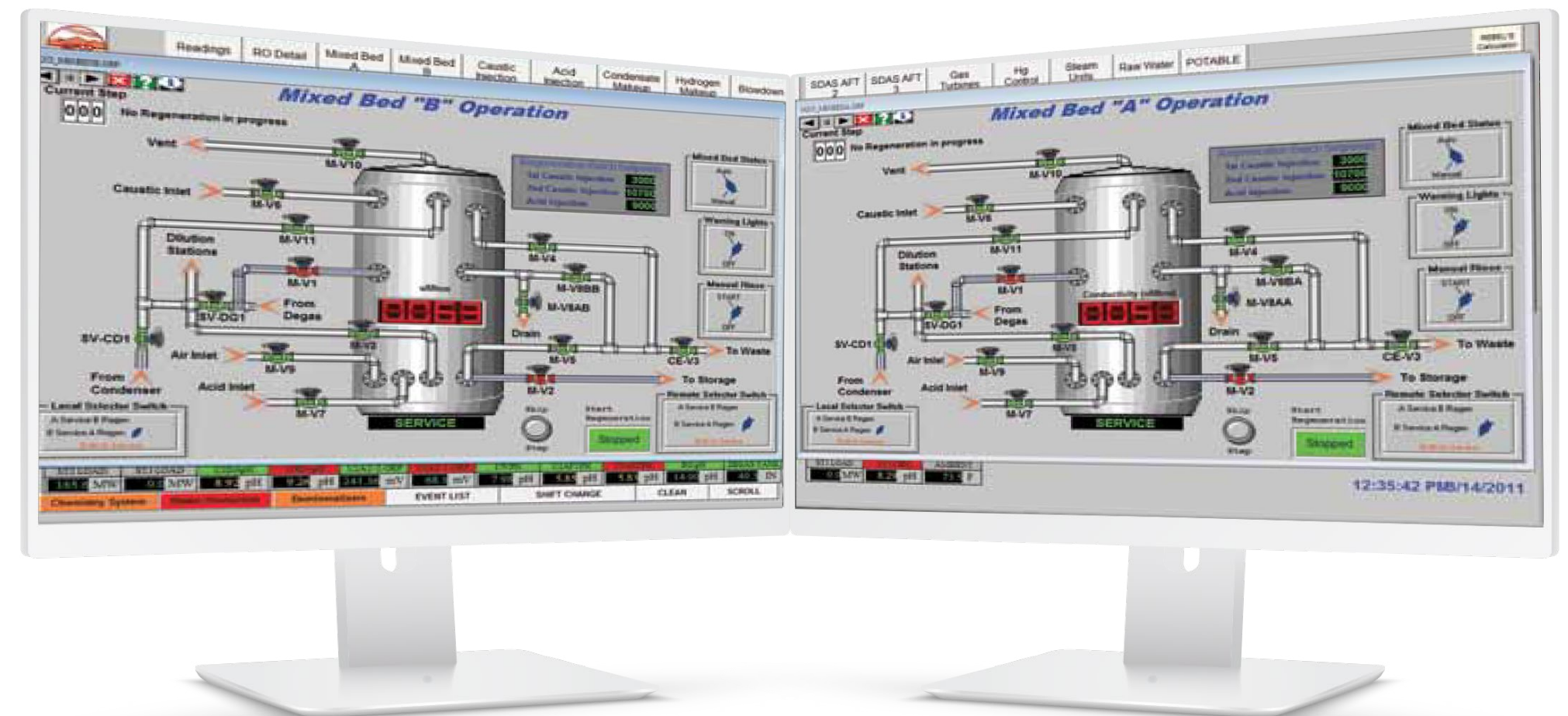
This approach let AEPCO gain newer interfaces and remote capability, while deferring costs of hardware upgrades. It also lets them keep a consistent interface no matter what hardware or new system is being considered.

Franklin said that AEPCO insists that everything integrate with iFIX as the front end. "We want to keep our own HMI. iFIX is the easiest way to hook to a variety of things. We're doing turbine control upgrades now, and we told the integrator that the interface with iFIX is essential. We haven't found anything that iFIX couldn't overcome," he said.

Regarding tuning changes, for example, information can be brought out to the operator's display using iFIX. That means, given the proper training, the operations staff have the ability to achieve optimum performance of the units given any unforeseen deviation in the system. Upgrading the HMI/SCADA system would require additional networking and/or a new PC with the vendor's choice of HMI—not to mention control room real estate to house the HMI, and weeks of development.

iFIX includes an open and layered architecture that supports hundreds of off-the-shelf drivers and OPC clients and servers. Its open, vendor-independent approach enables integration of virtually any legacy system.

Keeping the HMI platform the same allows simple changes within the iFIX workspace, without interrupting the existing processes, said Franklin.



Remote start enabled without cost of total system upgrade

AEPCO Manager of Process Control David Landwerlen was the first to see the power of using the software development kit (SDK) supplied with iFIX. He was the driving force behind the entire single platform idea, and the first to recognize how thinking out of the box could provide a long-term benefit for the company. Landwerlen used the SDK to write a variety of interfaces within a couple of weeks, while still performing his other job tasks.

On another occasion, Landwerlen hired an integrator to develop an open framework driver using the iFIX SDK. “This had a minimal cost impact to the project (approximately \$1,000), and it was also modifiable, so we could tweak the driver as needed,” said Franklin.

When AEPCO looked at its turbine controls, three of the four gas turbines at the plant were being controlled with older technology that had no or very limited communication options. “We wanted the ability for remote start and control functionality without the added costs of RTU interfaces and complicated configurations,” said Franklin. “And, we told the integrator upgrading the controls that the interface with iFIX is essential. We frequently have to work around what companies provide, and iFIX lets us do that easily.”

Using iFIX, AEPCO was able to write its own communication drivers that allowed hooks to the turbine control systems. This gave AEPCO the ability for remote start and control functionality, without the added costs of remote terminal unit (RTU) interfaces and complicated configurations. “If we had taken the RTU approach, it would have been almost as costly as a total system upgrade, around \$150,000, and we still would have had the cost of an HMI package,” said Franklin.

Startup times also are faster and more efficient because remote start is available immediately and does not require an operator. Keep in mind—although this is commonplace now, AEPCO implemented this in the early 1990s.



Tools familiar to Microsoft Windows users

Microsoft VBA is embedded throughout iFIX, enabling customization to meet user-specific requirements. iFIX includes an open and layered architecture that supports hundreds of off-the-shelf drivers and OPC clients and servers. Its open, vendor-independent approach enables integration of virtually any legacy system.

“Sophisticated tools in iFIX make it easy for the smallest utilities using in-house resources to implement accurate and consistent SCADA without the need for IT specialists,” said Bill Pezalla, Energy Industry Manager for GE Digital. “Users can perform maintenance and troubleshooting with tools that are immediately intuitive to Microsoft Windows users.”

iFIX users can drag and drop new devices to quickly update one-line diagrams, keeping maintenance costs to a minimum. For the production of operator displays, users can drop a device into a picture, and iFIX automatically adds a tabular display of all related secondary points—with the perfect operator dialogs for safe, consistent control.

Collect every data point

Initially, AEPCO’s focus was on getting information out to the people who needed it. At this point, Franklin said that mission is accomplished and he cannot think of any data AEPCO is not collecting.

“We collect every point on the plant, from rainfall to visitors on site,” he said. “Our goal is to give the operator and the engineer all the information possible to aid in plant performance and reliability.”

Notification tools range from Web services to PC-based kiosks to automatic notifications. Any event or action can trigger a detailed notification to email recipients, or a simple text message to mobile phones. Management likes to know when there are load changes and basic unit starts, and that information is sent to their personal data access devices (PDAs) and smart phones.

For Web-based communications, AEPCO uses Microsoft’s hosting reporting services, real-time unit status with iFIX Web Server, and diagnostic tools such as iFIX Webspace.

PC-based kiosks are located in key satellite areas such as water treatment and gas turbines. A user slides in their access card and a touchscreen keyboard comes up. Users can get the same information at a kiosk that they can anywhere else in the plant, but user-based restrictions prevent unauthorized access.

Because iFIX easily enables multiple methods of secure access to important systems, AEPCO can do more with less. For example, “it used to take three operators to run a facility,” said Franklin. “Now they can start or stop any facility from kiosk.”



Protect assets

Franklin's department has since shifted its focus from data dissemination to protecting assets and merged its site security access control into the iFIX system. Using iFIX along with tools such as smart cards for both user log-ins and physical access, security is now inclusive in the SCADA system.

All computers and card readers are integrated under iFIX. When someone swipes their card at a door and is let in, the system posts a picture of the person and what door they came in. If an operator is at his workstation, he or she uses the card to log in. If the person forgets to log out, the computer automatically logs him out. This helps AEPCO comply with National Energy Regulatory Commission (NERC) standards.

"We've been doing this for five years," said Franklin. "It was our way to track who started what pump, and now it helps with compliance. We don't use electronic signatures, but this tells us what everyone is doing."

Franklin said iFIX has allowed AEPCO to stay uniform in its approach to control and monitoring, and enabled the two-level lockdown method for security and logging of all user events. "It also means we don't have to train on other HMI packages. This has kept the facility clear of any parasite or mini HMIs that tend to pop up with new projects," said Franklin.

Currently AEPCO is upgrading its sequence of events recorder/annunciation system, boiler combustible gas monitoring, and mercury monitoring applications. The sequence of events recording is monitoring key points at the facility at a 10ms scan rate. It sends this data to the iFIX View clients at a buffered 1 second scan and to a SQL database with the subsecond time stamping for root cause analysis using Web services. As with the previous upgrades, AEPCO expects to gain greater system reliability.

The iFIX open architecture makes upgrading the applications easier, because "we can focus on getting the most out of our field hardware choices without fearing communication issues," said Franklin. "With environmental regulations always changing, we have to be able to add or remove components to our reporting systems. iFIX allows for this to happen with minimal impact to the operations staff."

Information access is aided by GE Digital's Historian. AEPCO has three Historian servers archiving approximately 40,000 iFIX data points to a series of drives. These provide access to a rolling three years of historical data. Franklin uses these in conjunction with Webspace to give the results engineering departments as much information as possible.

Overall, the benefits of the iFIX SCADA system are increased reliability and speed of response. "In addition to a reduction in equipment failures, tuning changes that used to take hours are much simpler and quicker now," said Franklin. "We also have quicker response time due to global access to information."

Services for small utilities

Small utilities and municipalities are looking for practical, easy-to-implement solutions. With older technology in need of upgrading and fewer employees around to do the work, HMI/SCADA systems need to integrate easily with legacy systems while providing utility-specific application support that allows customization. GE Digital specializes in electric utility SCADA and load management (demand-side load control decision making) for electric utilities. It has been involved in all aspects of SCADA and other real-time computing applications for the electric industry since the beginning of the 1990s.

The iPower SCADA option was developed with electric utilities in mind, including rural cooperatives, municipal authorities, and independent distribution utilities seeking a single platform from substation automation through to control room SCADA.

iPower SCADA is working hard for a number of NRECA cooperatives in the U.S. and for other utilities across the globe. These utilities are unanimously enthusiastic that the combination of iFIX and iPower SCADA is a great match for the operational, technical, and commercial requirements of rural cooperative SCADA.

iPower makes SCADA easy to own, with low total cost of ownership. iPower is so easy to deploy and use, coop staff don't have to be IT experts to maintain in, and so valuable staff time and resources can be devoted to critical operational tasks.





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