



Utility Gathers Real-Time Data with SCADA System

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The Public Utility District (PUD) of Klickitat County in Goldendale, Washington provides electric, water, and sewer services to the nine thousand plus customers within the county, spread across approximately 1,500 square miles. Their electrical power system includes fourteen substations and a fifty percent share of a ten megawatt hydroelectric plant on the McNary Dam.

Klickitat PUD contracted with Chelan PUD (Wenatchee, WA) to manage their power supply, effective October 1st, 1997. This contract required Klickitat PUD to provide Chelan PUD with real time process data from their substations so that Chelan PUD could make sound purchasing decisions. Klickitat PUD realized that providing that data would require state of the art SCADA technology integrating all of the substations to a central point of operations.

Since real time SCADA is relatively new to the electric power industry, Klickitat PUD wisely conducted an extensive search and evaluation of SCADA systems equipment providers and systems integrators. Their search led them to Programmable Control Services, Inc. (PCS); a Rockwell Software Strategic Provider based in Spokane, Washington.

As the deregulation of the power industry unfolds a new competitive environment, public and private utilities alike are finding it necessary to make their operations as efficient and cost effective as possible. In order to accomplish this task, the industry is focusing on PLC-based SCADA systems for their generation, transmission, and distribution

facilities. One such system was recently commissioned by Public Utility District no. 1 of Klickitat County in Goldendale, Washington.

The Public Utility District no. 1 of Klickitat County (KPUD) provides electric, water, and sewer services to more than nine thousand customers within the county, spread across approximately 1,500 square miles. In 1997, KPUD contracted with the Chelan PUD in Wenatchee, WA to manage the power acquisition for KPUD. For this, Chelan PUD would need to monitor KPUD loads and resources on a real time basis in order to make purchasing decisions. KPUD's current system did not have the data collecting capabilities required to address this need (having only standard metering devices).

Bringing SCADA to the Public Utility Industry

To remove these deficiencies, KPUD undertook a capital project to implement SCADA (Supervisory Control And Data Acquisition) county-wide for their power system. KPUD prepared a complete specification for the SCADA system based on the following goals:

- ▶ Real-time data collection with four second update
- ▶ Fail-safe, robust, long term operation
- ▶ Established equipment manufacturer and support network
- ▶ Timely and cost-effective implementation

Using these specifications, KPUD conducted an extensive search and evaluation of SCADA systems equipment providers and systems integrators. Many candidates were reviewed, with proposed systems ranging from traditional RTU's to custom hardware and software. PLC-based systems from all the major manufacturers were represented among the proposals. After carefully studying each proposal, KPUD chose Programmable Control Services, Inc.; a leading Allen-Bradley authorized control systems integrator based in Spokane, Washington.

PCS provided Klickitat PUD with a complete SCADA system using state-of-the-art Rockwell Software and Allen-Bradley equipment. The system consists of SLC 5/03 controllers at each of the fourteen substations, and a master controller; an SLC 5/04 with a KTX card interface to a Windows NT PC running RSView32, as the primary operator interface application.

The master PLC gathers load data from all of the substations on a polled by exception basis via radio modem link to each substation PLC processor, or by backup telephone modem link in the event of radio communications failure. ESTeem radio modems are used because they provide a preferred connection to Allen-Bradley architecture. The backup telephone modem link is facilitated by a Microsoft Visual Basic program that receives and transmits data through Rockwell Software's RSLinx DDE server.

Providing Real-time Data

The load data from all point of delivery substations is logged by RSView32 to a file that Chelan PUD accesses at regular intervals. A BASIC module in the master PLC system is programmed to provide a modem interface that will transfer data directly from the master PLC system to Chelan PUD at a four second update rate.

Current process data is displayed by the RSView32 application, and also logged to disk or printer. The process data includes items such as phase/line voltages and currents, KW, KVA, KVAR, power factor, and equipment status like recloser position. Data is displayed in both instantaneous and demand/peak forms. In addition, KPUD uses logged data to generate substation load profiles and power factor profiles

Responding to Alarms

The system provides complete alarm information that is displayed on the operator interface terminal (OIT), voice enunciated through the OIT's sound card or an external P.A. system, and then logged to disk or printer. Alarms include items like over/under voltage, over/under current, equipment condition (i.e. transformer over-temperature, regulator position). The system can page operations personnel in the event of an alarm, and a touch-tone telephone interface is available for operator retrieval and acknowledgement of alarms, and remote operation of the system.

Implementing Remote Operation

The RSView32 OIT application provides an interface for KPUD to operate equipment at substations as far away as seventy miles, including the operation of reclosers, and remote voltage reduction to avoid demand levels.

In the period since the system was started, KPUD has learned things about their process with the help of the SCADA system. For example, the SCADA system provided KVAR profile data at the Bingen substation indicating that the load was lagging during the week and leading on the weekends. Further investigation determined that an industrial customer with a highly inductive load did not have enough capacitor banks to compensate and was leaving the banks on line on the weekend when the inductive load was offline.

KPUD used this data to calculate the size of the capacitor banks needed and is currently installing the banks to compensate for the weekday load. They are also working with the industrial customer to coordinate their capacitor banks for the weekend load. The new capacitor banks will be switched on and off automatically by the SCADA system based on the KVAR reading.

"Making these changes reduces power costs by avoiding power factor penalties levied by BPA," says Jim Smith, systems engineer for KPUD. "Without the SCADA system we may never have seen this opportunity. If PCS wants to bring another utility client down to see the system, I will gladly help them sell it."

The commercial environment for electric utilities today is very different from what it has been in the past and it continues to change. Such changes are requiring electric utilities to manage their power distribution systems with quicker response and greater efficiency. KPUD's SCADA system is an excellent tool for efficient power management through increased response to changing load. In addition, the system provides quicker notification of substation alarms allowing for fast response or repair.

Having selected the combination of Allen Bradley equipment and PCS integration services to create a world class power distribution SCADA system, KPUD is well positioned for efficient and cost effective operations in the face of industry change. **SC**

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