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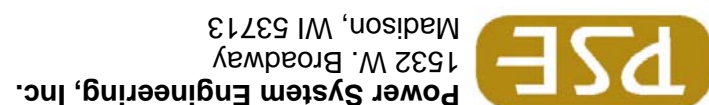
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PSE provides a full range of engineering, economic, and planning services to utilities nationwide. Some of our services include:

- Communications (Fixed and Mobile)
- Technology Work Plans & Strategic Plans
- Transmission & Distribution Studies and Planning
- Transmission & Distribution Line Design
- Daily Operations & Engineering Support
- Rates and Cost of Service Studies
- Time of Use and Dynamic Pricing
- DG Rates and Contracts
- Energy Efficiency & Demand Response Evaluation
- Load Forecasting with & without Demand Side Management
- Carbon Footprint Studies
- Consulting on AMI, SCADA, IVR, OMS, GIS, CIS, etc.

Please be sure to give the PSE team the opportunity to present our ideas on how we can work together. We are confident that our full range of services can meet your needs. Visit our website for a full list of services and additional contacts.

the power to help you succeed.



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The Utility Edge

Spring 2010



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The Power (Savings) of Information

PSE is currently the third-party evaluator of an innovative energy efficiency pilot. The pilot, which is designed as a large-scale behavioral experiment (80,000 residential members), randomly distributed an educational report aimed at motivating residents to improve the energy efficiency of their homes. The report provided residents with a comparison of their energy use to that of similar households.

Throughout the pilot, PSE examined the sample selection; program design; and, finally, data outputs. Three standard methods of measuring energy efficiency impacts were used to evaluate the energy savings: the True Impact Test, an Ordinary Least Squares econometric model, and a Fixed Effects model. All measures showed a consistent energy savings of around two percent. These findings are robust with a high degree of confidence attached to them. The random selection process provided the study with statistically significant control and treatment groups.

Examining the cost effectiveness of the pilot is important. The program performs well on an avoided cost per kilowatt-hour basis, which makes it an attractive alternative to power purchases or expanded generation capacity. In addition, a pilot such as this should be compared to other existing energy efficiency or demand-side management (DSM) programs to gauge how it may complement or replace them. Determination of optimal strategies could lead to reduced costs per kilowatt-hour. As more energy efficiency programs become available, it is important to reevaluate a DSM portfolio to optimize it for the utility.

PSE is excited about this pilot because of the potential it suggests for low-cost energy savings at other utilities. If you are interested in more information about how PSE can assist your utility in optimizing and refining your existing DSM programs or establishing new DSM programs, please contact us.

What's New at PSE

This fall, PSE will host the "Demand Response Symposium: Emerging Opportunities." This two-day workshop will present a state of the industry overview, including business drivers for new demand response programs; impacts on forecasted power supply trends; new time sensitive rate structure opportunities; new AMI, home automation, and energy efficiency technologies impacting demand response; and overall vendor maturity/readiness.

We will also present real-world strategies relevant to electric utilities today, including how to create a business case, how to migrate away from an existing DR program, how conservation voltage reduction (CVR) fits into the overall strategy, tactics for marketing and subscription, and what to do with all the data: how small, medium, and large utilities can benefit from meter data management (MDM) technology.

This class will be lead by PSE subject matter experts and other outside industry leaders. Please stay tuned to PSE's website for more details when plans are finalized.

Upcoming Events:



May 23-26, 2010

PSE's Rick Schmidt will present *New Wireless Options for Utilities: Know the Strengths and Weaknesses* at the Smart Grid Symposium.

Stop by and visit us at booth # 537



Rural Electric Power Conference

May 16-18, 2010

PSE's Jeff Triplett will present a paper titled *Evaluating Distribution System Losses Using Data from Deployed AMI and GIS Systems*.



May 18-21, 2010

PSE's Erik Sonju will present system protection/sectionalizing and system planning at NRECA's IDE.



June 14, 2010

PSE's Steve Fenrick and Erik Sonju will present an overview of performance benchmarking tools.

Email studnerc@powersystem.org with questions, comments, or for more information.

Case Study: Power Factor Correction

In a previous newsletter, PSE introduced the Commercial and Industrial Facilities Design group, which assists with the engineering needs on the commercial and industrial (C&I) customer side of the meter. PSE has provided engineering services on both sides of the meter on several past projects, and now a joint effort between our C&I Facilities Design and Resource and System Planning groups to complete a power factor correction study proved another success.

The load considered in this case study consists of approximately 250 aeration fans, which are used to move air through a sugar beet storage pile. The goal is to freeze the storage pile during the late fall and early winter months to ensure that the sugar beets will keep until they can be processed in the spring. Each of the 250 aeration fans is rated at 7 ½ HP and operates over a wide range of power factor depending on the density of the storage pile. The running power factor can be as low as 65 percent.

The main challenge of this particular project was that the rural electric cooperative had limited capacity based on the seven miles of existing #1/0 conductor between the substation and the freezer pile site, and the existing load on this feeder. Based on an assumed 65 percent power factor, the 250 aeration fans required approximately 1700 kVAR. The first design approach was to put a capacitor bank on the primary side of the service transformer; however, based on the fact that the fans are cycled in groups and can also all run at the same time, the capacitor bank needed to be stepped to match the load. The concern was that the service transformer would need to be sized (requiring a 2.5 MVA transformer) to handle the real and reactive power requirements.

After the initial design analysis, the Resource and System Planning group and Commercial and Industrial Facilities Design groups discussed the possibility of locating the capacitor bank on the secondary side of the service transformer. A capacitor bank with automatic 50 kVAR steps was designed into the customer's electrical distribution system to increase the power factor to 95 percent on peak. The stepped capacitor bank also included reactors sized to ensure that the capacitor bank was detuned to avoid harmonic resonance issues.

By providing the required kVAR for the aeration fan motors on the customer's electrical distribution system to increase the power factor to 95 percent, the cooperative was able to free up enough capacity on its line to potentially serve an additional freezer pile. The design model for the first freezer pile will be replicated in the future. Overall, the successful joint effort between two different design groups within PSE provided the cooperative with stronger customer relations and ensured a very satisfied industrial customer.

Ask PSE a Question

Utility managers, directors, and regulators want to know more about the frequency and timing of rate increases. For example, "When will we have to increase rates again?"

A casual "that depends" won't suffice when the utility must be prepared to answer the same question from its customers. When a customer asks when their rates will change, (and *why* the rates are changing), utilities should be prepared with a clear view of the future and a defined set of goals.

We've found that utilities that have established a rate plan with a strategic planning perspective are able to respond quickly and with confidence to the continuously changing environment.

A **strategic rate plan** takes various rate design objectives into consideration and, given the judgment and goals of the utility, produces a multi-year projection of planned rate schedule changes while addressing key issues such as:

- Timing of future rate increases with the aim of avoiding rate shock, providing rate stability, and setting expectations for stakeholders.
- Elimination or reduction of cross-class subsidization between various rate schedules in consideration of the utility's cost of service study results and established rate increase allocation guidelines.
- Rate design that, over time, moves closer to the utility's goals for revenue needs, cost of service, revenue stability, promotion of efficient resource use, member acceptance, and fairness.

PSE recommends that you consider doing a strategic rate plan soon, if you haven't already, to keep your utility on track and focused.

Evaluating Losses Using Data from AMI and GIS Systems

Loss evaluations, which quantify losses and determine where those losses are being incurred, can net positive returns by identifying cost-effective loss mitigation techniques. However, traditional loss evaluations have been limited due to lack of data. Geographic Information Systems (GIS) and Advanced Metering Infrastructure (AMI) are two tools that can fill the information gap.

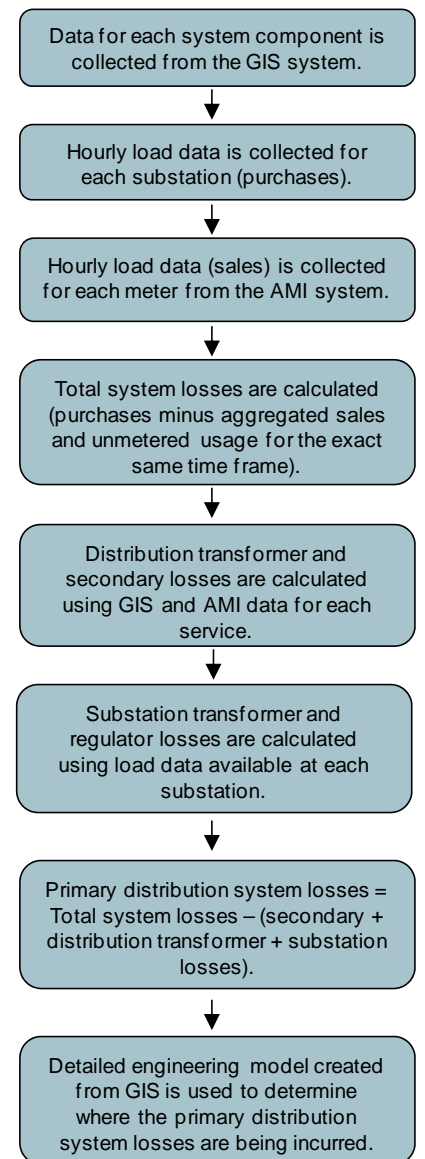
A GIS database can include any type of data needed by the utility, but detailed information on each piece of equipment, especially conductors and transformers, is most useful for loss evaluations. Correct electrical connectivity is also highly desirable to create electrical models of the system by extracting data from the GIS database in a format that can be imported into a commercially available engineering analysis software package.

A fully deployed AMI system can be used to obtain meter readings for any timeframe, including interval load data on an hourly basis, which can benefit loss evaluations in the following ways:

- Load data associated with a particular account can be used to accurately calculate secondary and distribution transformer load losses.
- Sales (energy "out") at each of the end-use meters can be aggregated and compared to the utility's wholesale power purchases (energy "in") to determine total losses for each substation area. If a SCADA system is installed with revenue-grade accuracy, losses can be further identified by substation feeder or along parts of a feeder.

It can be a challenge for a utility with a large number of meters to collect hourly interval load data over an extended period of time. So, a more manageable approach for utilities is to collect load data for select system states, from light loading to peak loading conditions, and apply a detailed loss calculation for these hours.

The flow diagram on the right illustrates the steps for completing loss calculations by system component for individual hours of specific time periods. PSE has found that this detailed hourly loss calculation methodology has given utilities much greater insight into when and where losses are being incurred across the system. This in turn has led to more informed decisions regarding how best to reduce losses.



AMI: Business Analytics

Advanced metering infrastructure (AMI) systems are a good example of an automation system that collects gigabits of information over the course of a year in the form of consumption and voltage information, etc., but only a small fraction of that data is put to good use beyond simple meter reading. Many utilities that have recently deployed AMI are aware of a gap between the data these expensive capital investments are capable of capturing and the reporting capabilities of the existing software.

In response, lower-cost advanced statistical software referred to as meter data management (MDM) is becoming more available in the utility space. These sophisticated software systems are capable of providing actionable intelligence that drives **business analytics**, a methodology by which a utility makes optimized, informed decisions to enhance its business. The software "scrubs" the AMI data (a process referred to as verification, estimation, and editing, or VEE) and uses a built-in report generator to collect, assemble, analyze, and present clean, reliable data in user-friendly reports that utility staff can then turn into planning and action.

In the next few years, due to interval billing and other data-intensive applications, the amount of data coming into the utility will increase exponentially. Thus, business analytics will become increasingly vital.

PSE will be working with our clients to assist them with business analytical reports and report interpretation to maximize their AMI data. Please contact us if you are interested in learning more.