DENT INSTRUMENTS – CASE STUDIES

1. Utility Products Magazine

ELITEpro Shows California How to Get the Biggest Bang for Their Energy Buck

Written by Mary Conley, October 2006

DENT Instruments became a key tool in California's public policy when the state decided to encourage utility customers to invest in alternative energy sources. California instituted the Self-Generation Incentive Program (SGIP) to encourage business owners – as well as homeowners – to install solar power, wind turbines, micro-turbines, engines or fuel cells to ease their demand on the state's strained electrical grid. DENT's ELITEpro helped make sure that the state knew exactly what it was paying for.

The state had given hundreds of millions of dollars to consumers to help with the installation of on-site generation systems, but eventually regulators and SGIP administrators realized they needed to quantify results to make sure they were getting what they paid for. Because incentives were based on the capacity of the generators' rated outputs, continued funding of the program became dependent upon determining actual performance of real projects versus reliance on manufacturers' ratings.

Meanwhile, customer response to the SGIP and the new $3.3 billion California Solar Initiative was growing rapidly. In order to maximize the impact of the incentive funds, the California Public Utilities Commission (CPUC) realized it needed to make the programs performance-based instead of capacity-based. But how could they determine that performance in any real way? DENT's ELITEpro was the solution.

SGIP administrators came to Nexant, Inc., a company that consults on energy usage and distributed generation technologies, who had used DENT's products successfully for years.

Until DENT Instruments and Nexant came into the picture, the SGIP program managers had no way to determine how much energy the alternative sources were actually generating on their own. Jeff Cox, Nexant Inc.'s Program Manager, knew that the DENT ELITEpro could give them the answers.

"I've been in the industry 20 years and started using the whole range of DENT products in 1993. I've tried everybody else's products in the metering business, but nobody else can do what DENT can do as well as they do it," says Cox. "I'm a fanatic for their stuff. They save you lots of work at the project site and provide solid data transfer from remote installations."

Cox pointed to the dependability and reliability of the ELITEpro as major factors that simplify his company's work. In a marketplace where distributed energy systems often involve uncommon electrical distribution configurations – often made in other countries – the ELITEpro has never failed Nexant's needs. He finds the software very accessible, easy to use, and produces accurate results regardless of the system being measured.

"Say you have a wind turbine out in the desert. You've got 6 hours of drive time just to go out and find the specs on it. You take those down, drive back 6 hours, order a competitor's unit, wait a few weeks for it to show up, then drive back to the turbine to install it. With DENT, you don't have to go through all that. You can order it generically, drive out there once, and install it right away. You just saved yourself 12 hours of driving and you get a product that works straight out of the box. What's most important about DENT," he adds, "is that when you go back to get the data – it's always there. Other systems frequently fail to record or leave you with no data when you need it most."

With DENT's range of CT's for the ELITEpro, Cox has been able to install it wherever the Self-Gen program needed measurements – on anything from a small house to a huge industrial plant. In addition, the ELITEpro helped them report on elements that the program's designers hadn't contemplated when estimating the impact of solar and wind on the state's peak power profiles. This is crucial in a state like California that has suffered from rolling blackouts during peak periods. The ELITEpro in solar systems helped them realize that peak power production drops significantly by 3:00 in the afternoon when the state's demand for more power is at its highest level. The DENT units also showed how important location is when considering solar power for sunny inland installations versus California's foggy coastal cities.

Thanks to the functionality and accuracy of the ELITEpro, California can now better use its energy incentives to target them where they'll do the most good for consumers and the environment. And Nexant, Inc., is happy to have been part of making that happen with the help of DENT products.

2. DENT Helps University Claim $6.5 Million Rebate

Written by Kyla Merwin Cheney, April 2005
Featured in *American School & University* magazine, May 2005

When the local electric company said, "turn off your lights," the University of Washington listened. Seattle City Light recently required the major university to reduce its overall energy consumption, and it offered big rewards for doing so.

The problem: UW staff had to implement an energy conservation program,*and* be able to demonstrate their accomplishments in reducing their use of electricity.

John Leaden, maintenance coordinator for the UW, came out of retirement to support the university's new program. "We implemented several projects to meet Seattle City Light's requirements to reduce energy consumption," said Leaden. Renovation projects included replacing T-12 fluorescent lamps and magnetic ballasts with T-8 lamps and energy efficient electronic ballasts. They also installed adjustable speed drives on pumps and motors in major ventilation systems, as well as making HVAC control upgrades.

The university then had to *verify* that they had installed the projects they'd committed to, and more importantly, that they had saved the electricity they'd predicted. "We used almost everything in DENT Instruments' product line to verify savings in lighting applications," said Leaden. The ElitePro™ energy logger, for example, interfaced directly with lighting systems in targeted campus buildings. The university continues to use DENT's ElitePro™ to monitor electrical consumption of various lighting and motor applications.

"What DENT provides is a very easy-to-use recording medium," explained Leaden. "All we have to do is download the data into an Excel spreadsheet to see the consumption profile." That profile allows Leaden to compare actual consumption with operating schedules to detect variations and recommend changes to control programs or upgrades of equipment or maintenance procedures.

The pay off: The university's ongoing electric use had been dramatically reduced, along with the associated energy costs. *And*, as an added bonus, Seattle City Light rebated $6.5 million to the University for their conservation projects.

3. Students Bridge Needs Between Government & Business: Federal program trains students, advises manufacturers, conserves energy, and boosts revenues

Written by Michael Chimack, October 2004

What does a University of Illinois undergrad, a printing company, and a malfunctioning air compressor all have in common? In most cases, nothing. If, however, they're involved in one of 26 Industrial Assessment Centers being funded by the U.S. Department of Energy, the answer is: *plenty*. These Centers are designed to provide graduate and undergraduate students with paid internships in practical energy conservation. In turn, qualified industrial manufacturers receive free energy management expertise targeted on two objectives: reducing energy consumption/waste/pollution and saving money.

The federal government also has a keen interest in reducing our dependence on foreign oil. As economic forecasts are pointing to dramatic increases in energy costs, manufacturers are seeking more aggressive cost-cutting strategies. Through these designated Industrial Assessment Centers (IACs), students serve as a bridge between the objectives of business and government.

At the University of Illinois, for example, nine students – under the supervision of Dr. William Worek, Center Director – conduct 30 energy assessments a year for small and medium sized manufacturing plants in Illinois and northwest Indiana. "We help industrial plant managers achieve a better understanding of the required energy use to manufacture their products," said Worek in a recent interview. "We supply them with recommendations on how to operate their equipment at peak efficiency and, in turn, boost their bottom line."

Industrial Assessment Centers have been in place since 1976, when the federal government launched four Centers as a component of the National Energy Strategy. According to the Department of Energy's web site, these Centers have been highly successful. In addition to the obvious benefits to the manufacturers in increased productivity and cost savings, this program trains, motivates and helps prepare students for careers in energy management. It also helps reduce industrial energy waste and pollution, and offers university faculty new insights to apply to their engineering curriculum. The assessments also provide valuable data and

energy trends to the Department of Energy (currently available through the Center for Advanced Energy SystemsatRutgersUniversity).

Recommendations from the industrial assessments have averaged about $55,000 in potential annual savings for each manufacturer, according to the Department of Energy.

To conduct energy audits and assessments, the University of Illinois relies on energy meters provided by DENT Instruments. “In the course of our assessments – of lighting systems, production equipment, electric chillers and compressed air systems – we have to determine peak electric demand and total energy used,” said Worek. “We use DENT energy meters to help us understand how those pieces of equipment operate within a typical production day. Once we understand how they operate we can recommend changes that result in energy savings.”

The IAC team determines how energy is being used throughout manufacturing plants. “DENT’s meters allow us to track how air compressors cycle, or if lights are ON when they should be OFF, for example,” said Worek. “If lighting systems are not functioning properly, that’s a huge opportunity for savings. This intervention can save plants from hundreds to thousands of dollars a year, depending on the size of the plant.”

Compressed air systems are another area audited by IAC team. “One of the most complicated systems to understand is air compressor systems,” said Worek. “We monitor compressed air equipment with DENT power meters to determine how a compressor is operating. A meter will tell us, for instance, how the ‘trim’ compressor is loading in a multiple compressor system. The goals are to: A) understand how the system is controlled so we can understand annual operating cost of the compressed air system, B) address air system demand issues such as repairing leaks, insuring proper use of compressed air plant-wide, and C) determine the cost associated with those end uses. The ultimate goal is to shut off a compressor if possible. It’s always the same endgame: conserve electricity, save money, and raise bottom line of the company.”

The IAC team chooses DENT Instruments because they’re extremely easy to use. They’re compact, so we can bring a lot into the field without having to rent a truck to carry them. The software is also very user-friendly. The meters are robust in that they can measure electric demand directly, as well as power factor, volts and amps. We exclusively use the ElitePro™ with high memory option and have converted most of our older loggers to high memory. We don’t know what we’ll need until we’re in the field. Without the high memory option, we’d have to send manpower back into the field to download data, or risk losing data.

Recent energy audits at a manufacturing plant saved that particular company nearly $50,000 in the first year our recommendations were implemented. **The problem**: the plant had a decentralized air compressor system – with multiple compressors of different horsepower located in various areas of the plant – feeding a common header. We monitored those systems to discover how the compressors were being controlled. What we ultimately discovered was that several compressors were fighting each other – cycling on and off frequently. That was causing two problems: 1) the cycling compressors were using energy but not necessarily supplying any air, and 2) that cycling frequency could affect the longevity of the compressors.

The solution: once we used DENT’s energy meters to understand the generation side of the compressed air system, we were able to understand which compressors were not contributing to the system as designed. Then we went into the plant and assessed the distribution side of the air system.

The recommendations: we recommended that they repair leaks and shut off local compressed air supplies to equipment that were either not being used or in SETUP mode. We also recommended that they replace compressed air use with high-volume, low-pressure blowers where applicable. The end result was a lower volume of required compressed air, thereby allowing for shutting off two compressors (150 HP total), which demonstrated savings of 750,000 kilowatt-hours, and nearly $50,000 dollars in less than one year.

New and emerging technology offers manufacturers– and the national IACs – tools with which to analyze energy consumption. With reliable data, literally “in hand,” these meters and the accompanying software can add significantly to the bottom line of manufacturing companies, schools and universities, health facilities and corporations.

4. Jefferson County School District (Denver, CO) Has High Praise for the ELITE

Written by Kyla Merwin Cheney, February 2004
Featured in *Utility Products Showcase* magazine, April 2004

In the chilly hills of Lakewood, Colorado, near Denver, Jeffco Public School District had a problem. They were spending too much money on energy bills. Combined with that, they didn't have the additional budget to hire an energy management staff. In response, Jeffco senior management devised an innovative solution. They took four teachers out the classroom and, with the appropriate training, made them Certified Energy Managers.

This team of four was promptly charged with the mission of reducing energy costs at the school district. Realizing that they couldn't manage what they hadn't measured, they turned to DENT Instruments, headquartered in Bend, Oregon. With the simplicity and low cost of DENT's ELITE™ energy data logger and accompanying software, they were able to data-trend precise energy use, right down to 'when' and 'where'. In addition to providing critical data, DENT's ELOG ™ software provided management with practical analysis tools in the form of charts and graphs.

Marv Roemer, Supervisor of Maintenance for Jeffco Public Schools, said the energy management program has been a tremendous success, though it was met with initial skepticism, both from principals and HVAC technicians. "They were a little paranoid about changing the status quo; about teachers coming in and telling [the technicians] how to run their equipment," Roemer reported. "They definitely changed their attitude. It's become the way we do business with energy maintenance." Further, it has inspired new programs. "People are looking at other ways of saving energy, bringing other ideas forward."

The energy management team has also served a vital role in educating school staff on ways to save energy. "They are as much educators and managers," said Roemer. "They reinforce the fact that you can't have units running all night long."

DENT's ELITE ™ data logger has enabled Jeffco to check accuracy of utility billing, measure electrical consumption of kitchen equipment, verify electrical savings of lighting upgrades, measure total loads of HVAC equipment, and track electrical panels for power interruptions. This data helped the management team reduce waste, streamline operations, and track ongoing improvements, resulting in lower out-of-pocket expenses.

Heavy on the minds of the energy management team was the responsibility to use the taxpayers' money wisely, and to gain credibility in their community. Said Jim Faes, Energy Manager at Jeffco, "We have proved ourselves to be good stewards with the tax dollars we spend on utilities." Said Roemer, "These four guys have saved this district so much money that it's hard to fathom what would happen without them."

DENT Instruments, a world recognized leader of instrumentation for data collection, has continued to refine and advance their ELITE™ product line. The**ELITE*pro***™, for example, makes energy measurement, data trending and sub-metering easy. This instrument, and accompanying software, helps pinpoint electric usage and quantify consumption by measuring, storing, and analyzing Volts, Amps, Watts, Volt-Amps (VA), Volt-Amps reactive (VAR), Kilowatts (kW), Kilowatt Hours (kWh), Power Factor and harmonics, encompassing a total of 144 different measurement parameters.

The **ELITE*pro™*** can monitor up to four single-phase loads or two three-phase Delta loads, or one three-phase Wye load. It includes four channels of current (0-6,000 amps), and three channels of voltage (0-600V ac or dc). The**ELITE*pro™*** also offers some power quality features such as the ability to view voltage, current, and power waveforms. It will calculate harmonics from DC through the 63rd then report total harmonic distortion (THD), crest factor and peak voltage & current.

The **ELITE*pro™*** can be mounted anywhere and with its wide range of recording intervals and a storage capacity of up to 100,000 records, is ideal for both short-term projects or long-term studies. Easy to use, Windows™ based software graphically displays recorded data, performs analyses and allows automatic, remote data collection via Internet, wired or wireless LAN systems, or telephone modems. Data is easily exported to popular spreadsheets and databases for special analyses. The **ELITE*pro™*** has been an instrument of choice utilized by most electric utilities across the country for a number of years.

5. Analysts Rely on Vendor Flexibility, Reliability and Cost Savings in Meeting Their Clients' Needs

Written by Kyla Merwin Cheney, February 2004

Electricity is not getting cheaper, anywhere. Regional utilities across the country are collecting data to help them understand their customers better and to forecast future energy needs. Researchers, analysts and consultants are finding that the energy measurement tools they choose contribute significantly not only to the accuracy of their projects, but also to the cost savings they can achieve.

The consulting firm of KEMA-Xenergy, of Oakland, California, helps utilities collect, monitor and evaluate data on energy usage. The state of California recently hired KEMA-Xenergy to conduct their Residential Appliance Saturation Survey, a research project measuring the energy consumption of appliances in households across the state. To assist them, KEMA-Xenergy turned to DENT Instruments of Bend, Oregon.

Erik Dyrr, Senior Engineer at Kema-Xenergy, said that DENT Instruments customized their DATA*pro* for this project, where loggers were installed in 200 residences across the state of California. The instruments are being used to measure whole house and air conditioning energy consumption. "There's a substantial cost for us to install loggers at each site," said Dyrr. "It's not worth it for us to purchase equipment that is unreliable. It's too expensive to go back in three-to-twelve months and not have recorded accurate data. DENT's loggers have been very reliable. That's one of the many reasons I continue to use them."

Dyrr also reported that the level of customer support DENT offers its customers is far superior to other instrumentation companies he has worked with. "They're a relatively small company, and more responsive to my needs," said Dyrr. "In larger companies, I'm thrown to their system. With DENT, I call up and talk to the same person who understands their products and who understands our company."

The instruments that DENT manufactures have also offered KEMA-Xenergy the flexibility they require in responding to the various needs of their different customers. "DENT has a whole line of products for research and evaluation," said Dyrr, "and we've used them all. We count on DENT Instruments for a wide range of products, flexibility, and the willingness to customize their products for our specific requirements. It allows us to respond better to our clients."

Hawaii Electric Company, for example, hired KEMA-Xenergy to evaluate their energy efficiency programs. "Since 1996, we've used various DENT loggers to monitor and evaluate energy savings at over 1,500 sites," explained Dyrr. "You can't beat the reliability and ease-of-use for the money."

KEMA-Xenergy has also used DENT's time-of-use SMART*loggers* to monitor over 700 solar and electric water heaters in evaluating the savings achieved with residential solar water heating. They've used DENT's Elite*pro* loggers to monitor everything from chillers and variable-speed drives, to heat pumps to water heaters. "It was great when they rolled this product out," said Dyrr, "because the Elite*pro* provides the same functionality, but beats all others loggers significantly in price."

One of the challenges facing all of KEMA-Xenergy's customers – and utilities across the globe – is meeting their budget. With their unique combination of reliability, flexibility, ease-of-use, and the most competitive pricing in the industry, DENT Instruments helps consultants and utilities meet their research and budget goals.