

## Solutia: Utilizing Sub-Metering to Drive Energy Project Approvals Through Data

Solutia, Inc. has a long history with sub-metering, dating back to the construction of some of its first manufacturing plants in the late 1950s by its then parent company, Monsanto. A progressive technology, sub-metering is the installation of metering devices to measure actual energy consumption for individual pieces of equipment or other loads.

As part of its aggressive corporate sustainability goals, Solutia established a target of reducing energy intensity by 10% in calendar year 2010, which immediately gave the existing sub-meters a new purpose. They became tools that allowed plant managers to understand how each piece of equipment utilized energy. The company's data-driven culture was extremely receptive to expanding the use of the sub-meter data to drive decision making. According to Solutia's Director of Energy Management and Sustainability Yancy Farrow, another important benefit to sub-metering is that it enhances the ability to verify and quantify monetary savings, which simplifies the process for obtaining project financing.

### Sub-Metering Culture

By 2010, all 24 of Solutia's worldwide manufacturing plants utilized sub-meters, which are used to measure electricity consumption, steam flow, and natural gas flow. Solutia has utilized some form of data management software, such as a Data Historian, to collect the information yielded by sub-meters for more than 20 years. Solutia is currently using an automated IP21 Data Historian system that stores data as old as 10 years for some pieces of equipment. After a lengthy screening process, this particular software was selected based on the ease of interaction with Solutia's existing process control equipment, as well as its reported reliability and functionality. Solutia purchased IP21 for use with the Aspen Process Explorer™, which provides robust, real-time analyses of process data to enable managers, engineers, and operators



Solutia plant, Trenton, Michigan.

*Courtesy of Solutia*

### Solutia: Company Overview

Solutia Inc. formed in 1997 as a spin-off of Monsanto Company's former chemical division.

Solutia manufactures specialty chemicals that are used in solar energy and electronic devices, as well as architectural, automotive, consumer, and industrial applications.

The company is headquartered in St. Louis, Missouri, and has 24 global manufacturing locations, eight of which are located in the United States.

Solutia became a *Save Energy Now* LEADER Company in July 2010. By committing, the company pledged to reduce energy intensity 2.5% on an annual basis, with a long-term goal of 25% total reduction. The company has pledged that their largest four U.S.-based plants will participate in the initiative. Although not enrolled in the U.S.-based *Save Energy Now* LEADER Initiative, Solutia's two largest EU manufacturing units are held to the same targets.

to make better decisions and improve performance. Employees can access the system from any company network computer—onsite or offsite—to review current and historical data trends, which provide for a thorough analysis of energy performance. Sub-metering data has played an important role in decision making at Solutia, including the timing and prioritization of various maintenance efforts, as well as equipment selection.



Courtesy of Solutia

Amp meter used at a Trenton, Michigan, plant to gather data on electrical usage.

Energy representatives are engineers who have assumed energy management responsibilities, in addition to their main duties. Solutia has found that having energy representatives from a variety of engineering backgrounds, (mechanical, chemical, electrical, environmental, maintenance and project engineering) gives the company a diverse perspective for problem solving

and identifying best practices. The energy representative assigned to each plant reviews the sub-metering data on electricity, steam, natural gas and water consumption on a regular basis. The plant staff then discusses the results to identify potential issues and make quick course corrections as needed. Site energy representatives are responsible for understanding, monitoring, reporting, and making midcourse corrections to the energy systems in the plant to achieve the targets set for them. They utilize various site resources, including engineering, maintenance, operations, finance personnel, and ultimately report their findings to the plant managers.

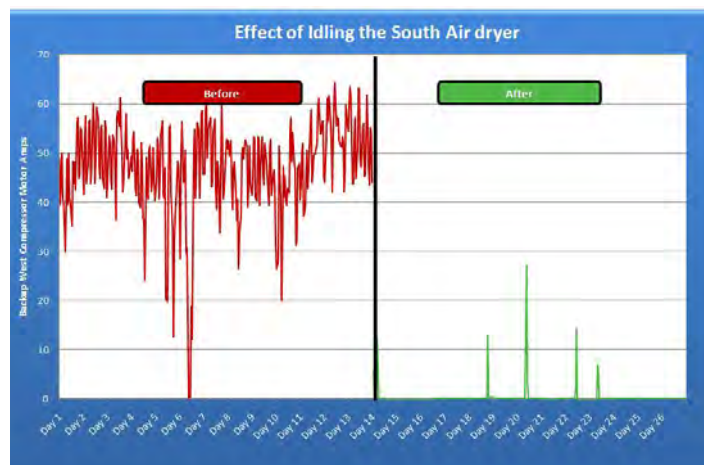
Site energy representatives compile the high-level data into a monthly report that goes to the Director of Energy Management and Sustainability for review. This data is used to compare the performance of the company's plants. The Director inputs the data into a comprehensive spreadsheet that calculates various metrics related to electricity use, greenhouse gas emissions, steam consumption, and overall energy use. This custom spreadsheet, which was developed by Solutia, converts all energy sources to million British thermal units and all production to metric tonnes, which allows for a direct comparison of performance by individual plants and divisions, as well as benchmarking at the sector level. Site performance is measured against its own energy intensity in the baseline

year and shown as a percent reduction of energy intensity versus the 2009 baseline. Performance comparisons between sites are done at the percent improvement level rather than at the energy intensity level. Given that every facility varies in its scale and operations, each facility's energy intensity is bound to differ. By comparing performance across plants, Solutia is able to gain insight into energy usage and process differences, ultimately determining best practices that can be applied to other sites.

### Bringing Sub-Metering to Michigan

Energy audits performed at Solutia's Trenton, Michigan, plant revealed the need for additional sub-metering. The Trenton plant was built in 1956 and remained with Solutia after its divestiture from Monsanto in 1997.

When Solutia established its new sustainability goals in 2010, the Michigan plant staff, led by plant manager Gary Williams and energy representative Teri Geeting, began examining their equipment to identify opportunities for energy savings. During a thorough walkthrough with the Director of Energy Management and Sustainability, the audit team narrowed in on a backup air compressor that engineers believed was running when it was not needed. The team determined that using sub-metering to verify



Data report from the electric sub-meter installed on the air compressor. This report helped the energy team correlate the time the unit was running as well as when a specific air dryer was in operation, which resulted in the team removing the air dryer from normal operation and using it only as maintenance spare, saving Solutia thousands of dollars annually.

Courtesy of Solutia



Courtesy of Solutia

South Air Dryer that Solutia made into a backup unit rather than equal-run unit based on sub-metered data.

when the air compressor was running and what load it was under was the most efficient and effective way to solve the problem. They submitted a request to their plant manager for funding to install a sub-meter on the unit. This request was quickly approved, and a \$1,500 sub-meter was installed.

The electric sub-meter installed on the backup air compressor to measure the amps had a data logger and connected to Solutia's network so that the data collected could be viewed remotely. The resulting data highlighted an inefficiency of the South Air Dryer and allowed the plant manager and energy representative to quantify the financial impact of the efficiency difference. The installation of the relatively inexpensive sub-meter gave the Trenton plant staff the knowledge needed to change their operating practices, and the South Air Dryer now serves as a backup dryer instead of an equal-run unit. The sub-metered data yielded

insight into payback time. In the case of the air compressor, the Trenton plant team was able to verify savings of \$19,000 per year in electricity costs, which is less than a one-month simple payback period on the sub-meter.

Sub-metered data has enabled other successes at the Trenton plant as well, including the identification of a damaged air line that froze during inclement weather. The quick identification of this problem allowed staff to reroute the air, preventing energy waste and avoiding a potential shutdown of the entire plant. In addition, Solutia has used sub-metered data to make the case for installing pressure control loops and variable frequency drives on pumps, compressors and fans that were not running optimally.

## Conclusion

Obtaining financial support for projects, including sub-metering equipment and installation, is difficult for all organizations where departments compete for funding. This can be especially true in rapidly growing companies like Solutia. However, as Solutia's experience has shown, utilizing effective tools that yield good results in short payback periods makes it easier for staff to justify the cost of future projects.

Solutia continues to use sub-meters at all of its facilities to understand how equipment is running and to identify quick and inexpensive energy efficiency solutions, like reducing the run-time for the air compressor unit in Michigan. Without question, Solutia has achieved many energy efficiency successes because of their sub-meters. That success rests, in large part, on the support of trained staff, as well as the automated flow of energy data, which is a vast improvement over manual collection in the field. Solutia has discovered that having accurate, real-time data enables effective, real-time solutions.