Universities Use PI System for Sustainability and Savings

The PI System includes:

PI Interfaces | Over 400 interfaces to BMS, BAS, EEMS, METERS and other control devices. Identify your building and facility control systems and OSIsoft will have an interface to them.

PI Visualizations | Tools to allow the development of graphics and trends and the ability to publish on the web using Microsoft Sharepoint.

PI Analytics | The ability to do real time calculations of KPI's such as efficiency and carbon footprint.

PI DataLink | Real time reports in Excel that can be published to the web using Microsoft Excel Services.

PI DataArchive | Years of on line archive of real-time data at original fidelity.

PI DataAccess | JDBC, OLEDB data access to the PI DataArchive using standard SQL.

Introduction

America's colleges and universities – world leaders at educating students and advancing frontiers of knowledge – face very significant operating challenges. Students are finding it more difficult than ever to afford an education; budgets are impacted by erratically performing endowments; operating costs including health care, personnel, and energy have all risen dramatically in the first decade of the 21st century.

At the same time, colleges and universities are rising to meet an urgent social responsibility around ***sustainable energy management***. This challenge has the highest possible visibility across the academy.

Professors of science, engineering, public policy, economics and other disciplines are working diligently on issues related to energy, the environment and global warming.

College presidents are publicly embracing the school's responsibility for leadership and action.

> *"Climate change caused by our use of carbon fuels is one of the most significant and pressing challenges of our time. At UC Berkeley, the nation's leading public teaching and research university, we are aggressively addressing climate change through our teaching and research, as well as through policy and collective and individual action on our campus."*
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> *UC Berkeley Chancellor Robert Birgeneau (Testimony to the United States Senate, Committee on Environment and Public Works, April 3, 2008)*

Students are demanding that the school practice what it preaches. Among other things, they are asking for the tools to manage their own carbon footprints.

Campus administrators are tasked with finding and implementing practical responses to these powerful organizational directives.

Empowering Campus Energy Efficiency

University Sustainability Projects

Academia, together with industry, is playing a leading role in the emergence of alternative fuel technologies. Developing clean energy is a vital part of a long-term sustainability strategy and will be the focus of much investment. The return on this investment will be uncertain for many years.

The most practical way to reduce greenhouse gas emissions is to invest in strategies that conserve energy. ***With conservation, the return on investment is immediate both in sustainability and economic terms.***

Energy conservation is not a new challenge. Competitive industry has been addressing this challenge for years as a matter of survival. The processes and technologies used by industry are being applied to campuses to meet these same challenges.

Campus facilities are vast organizations that contain diverse equipment and systems, including: electricity generation equipment, automation and control systems, massive HVAC systems, waste management systems, and a multiplicity of sensors, meters, and gauges.

Universities are undertaking a wide range of conservation projects, with a variety of ROI profiles, including: construction of LEEDS certified buildings, performing energy efficiency retrofits (e.g., building insulation), high efficiency lighting and HVAC systems, occupancy sensor light switches, conversion to high-efficiency variable-speed motors, installing carbon dioxide sensors for ventilation systems, installing heat recovery systems, and many other initiatives.

The key to conservation success is visibility into cost and performance data that spans the entire chain of energy production and use across the university.

The PI System

The PI System is a real-time data infrastructure that allows for measurement and analysis of critical operating data across the enterprise. PI Systems have been monitoring manufacturing and power companies since 1980. Many leading Fortune 500 companies have installed PI Systems. In power and utility companies, PI is a leader in smart grid data management for operations, transmission and distribution, and new initiatives like meter data capture and renewable energy. As an example of the importance of PI in data centers, Microsoft has chosen the PI System to manage all of its data centers for energy consumption.

On university campuses, the PI System enables a comprehensive range of conservation and energy management strategies, from relatively simple to complex:

- Develop continuous improvement initiatives based on operating data from across the enterprise;
- Develop key performance indicators (KPIs) that are widely disseminated to stakeholders across the University;
- Review building operations, functionality of controls, appropriateness of sequences of operations, time scheduling, and numerous other building operation parameters;
- Monitor production and use of electricity, steam, hot water, chilled water and/or natural gas within individual buildings;
- Reduce maintenance costs and downtime of expensive assets;
- Shift loads in response to variable energy pricing
- Administer conservation challenges by dorm or by sub-school;
- Measure effectiveness of conservation strategies;
- Deliver compliance reports;
- Operate a micro-grid.

In universities, a PI System may be the most effective return on investment available to conserve energy, save money, and get into the game. It can be cost-justified on the basis of a single initiative and go on to serve in many capacities.

Selected PI Systems in Universities

At ***Harvard Medical School***, a PI System is the foundation of an energy management process tasked with reducing greenhouse gasses 30% by 2016, amounting to $7.5MM in annual energy savings.

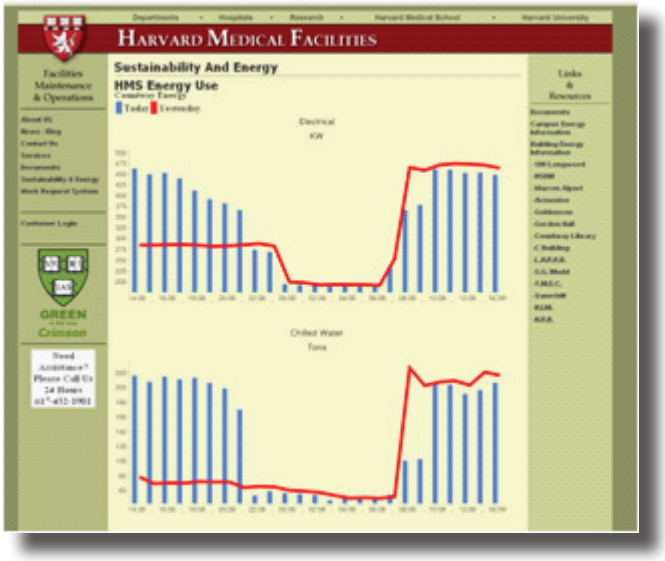

Figure 1 | Harvard Medical School PI System

The PI System connects to over 18,000 maintainable assets and is used to monitor energy usage (15 Mw electricity, 70K lbs/hr steam, 10K tons chilled water), analyze critical events, model building performance, view impact of operational changes, and provide alarms and notifications via Blackberry for monitoring critical processes.

At ***University of Rochester***, the PI System began as a solution to manual metering and month-behind billing practices. In addition to capturing data from all energy and water meters, the PI System now monitors the campus-wide plant control and building automation systems. The data is available to everyone from engineers to students. The mantra is "you can't manage what you can't measure."

http://meters.energy.rochester.edu/default.aspx

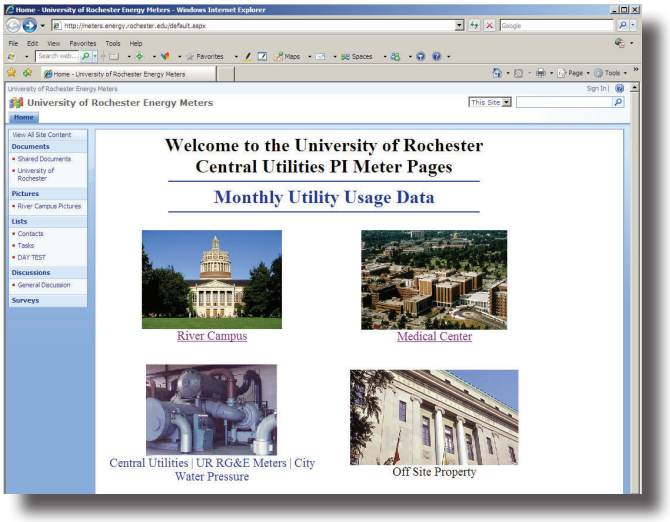

Figure 2 | University of Rochester

At the ***University of Iowa***, facility managers have used a PI System since 2003 to monitor steam, electrical, and chilled water distribution systems; to analyze loads for future growth planning; and to support academic research on boiler SCADA systems.

At ***Queen's University***, a PI System has been in continuous use since 2003, supporting conservation science and research into renewable energy sources.

http://livebuilding.queensu.ca/

Figure 3 | Queen's University PI System

Users report high satisfaction with the reliability, efficiency, security, and other performance characteristics of the PI System.

Summary

Colleges and universities are among the most data-focused organizations on the planet. Without a PI System, campus operating and energy usage data remains hidden, unavailable for use. But with a PI System – to capture, integrate, contextualize, store, and visualize data – the university has a rich tool that can be deployed in many ways by managers and curious stakeholders across the institution.

The PI System excels in complex operating environments. It is proven in industries far and wide. It connects to everything, requires nothing else in order to be effective, and goes to work immediately in ways that save energy and money.

Put the PI System to work at your university. For more information, drop us an email at universities@osisoft.com

Carbon Footprint Calculation

The need for sustainable and socially responsible energy sources has brought the concept of carbon (or more specifically, CO_2) footprint into our vocabulary. Determining the CO_2 footprint of an item or service may seem mysterious or difficult. In reality, calculating a CO_2 footprint is relatively straightforward. CO_2 footprint calculation is just a matter of understanding the energy that goes into a product or service. Industries where energy is a very significant cost have carefully monitored energy consumption and thus CO_2 footprint for years. These same approaches can be applied to calculate the CO_2 footprint of buildings on your campus.

CO_2 footprint calculation is a measurement of the energy consumed, adjusted for the portfolio of energy sources. Things do get complicated; energy consumption varies over time and the energy portfolio varies over time as well. For example, an electricity utility may have coal, gas, and wind generation capacity. To calculate the CO_2 footprint of lighting a building for a given day requires an accurate trend of electricity used over time and an accurate trend of the utility's portfolio over time. The PI System, interfaced to your building automation, equipment will record your energy consumption during the course of the day. Your utility can supply the generation portfolio; if this is available via the Internet the PI System can automatically collect this as well.

CO_2 footprint reporting regulations may or may not be required. Regardless, this calculation is a great way to understand the overall sustainability of your energy consumption. Also, energy is a significant cost. Measuring consumption and understanding what you are producing with it is the first step towards increased energy efficiency. Increased energy efficiency is true savings as well as a step towards a more socially responsible approach. The PI System and OSIsoft can help you meet this requirement.