

Energy Reduction

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January 2012 Rev 3

ICIS strategies for Energy Reduction in a manufacturing site utilising Building and Automation data with ICIS Plant Energy

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Introduction

Energy reduction programs are becoming as important to a site as process improvement ones. With energy prices at an all time high and further increases in the future, cost reduction projects can now generate a strong return on investment over a number of years. However, energy costs alone are not the sole driving force behind energy reduction programs, the environmental cost is now also starting to come to the forefront. With the new EU commitment of a 20% reduction in Carbon Emissions by 2020 sites must now look closely at there energy consumption and waste generation in order to begin identifying heavy users and tackle excessive consumption. By doing so now a site can start to implement programs that enable them to reach their reduced energy targets and help avoid possible penalties.

One of the most vital components of this of an Energy reduction program is the ability to visualise and incorporate a sites energy consumption into its business information world through the use of performance measurement techniques with business data displays and graphical results. Analysing energy information in this way not only opens up a sites energy usage for review but also embeds the review process into the business aspect of a site, thus ensuring the continued monitoring and review of energy usage from Management through to Production and Engineering.

Building & Automation Data

Overview

Building (BMS) and Automation (SCADA/DCS) systems can provide the true raw data for energy analysis. These systems, be they BMS, Data Historians or SCADA / DCS applications can record the majority of metered data required for energy analysis projects, which is then used in performance and analysis calculations. Sites where meter information is not available can use alternative techniques, such as ICIS Virtual Metering, in order to build energy consumption data.

For example:

- Virtual meters for motors and valves to map their energy consumption
- Map vendor skids such as Chillers against an average hourly consumption rate when they are used
- Use mathematical techniques on standard flow and power meters to obtain total usage values

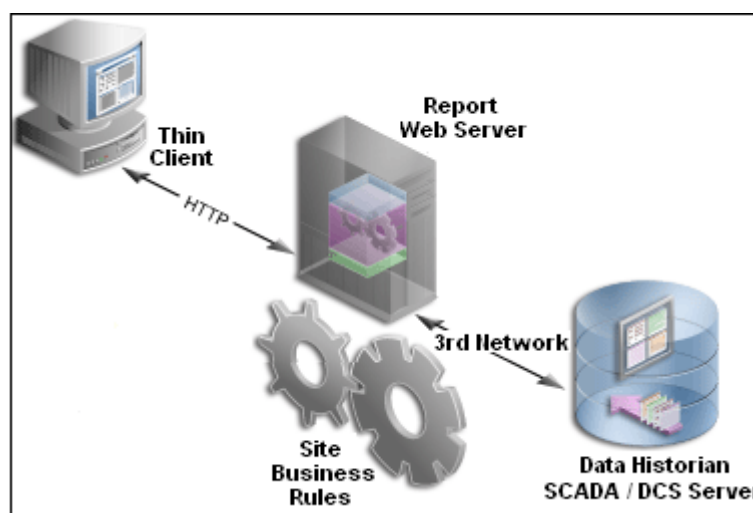
These sample alternative techniques based on ICIS Virtual Metering technology, show that by using the raw building and automation data already recorded by a site it can begin to utilise it through an energy monitoring and analysis application such as the ICIS sustainability platform in order to start its energy reduction program.

The Information Transfer

Once a site has identified its available building and automation data it can begin to extract it from the control systems. Automation data resides in the data repository of a BMS, Historian or SCADA / DCS system.

Note: It is not required for a site to purchase large third party Historians in order to make this data available to the new energy business application. Indeed some sites may even embark on these excessive projects to get their energy data without realising that in doing so they may only be using 10% of the actual functionality of the Historian. Review our white paper on Automation Utilisation for further details on these systems and alternatives.

The building and automation data can be accessed via standard ICIS interfaces to the control system repositories with the necessary pieces of raw data extracted into the ICIS energy monitoring and analysis application.



Automation Information Transfer

Once the required data is sourced the site can begin to review the energy information that has been built up through the business rules defined during the design stage of the project.

The Energy Map & Site Business rules

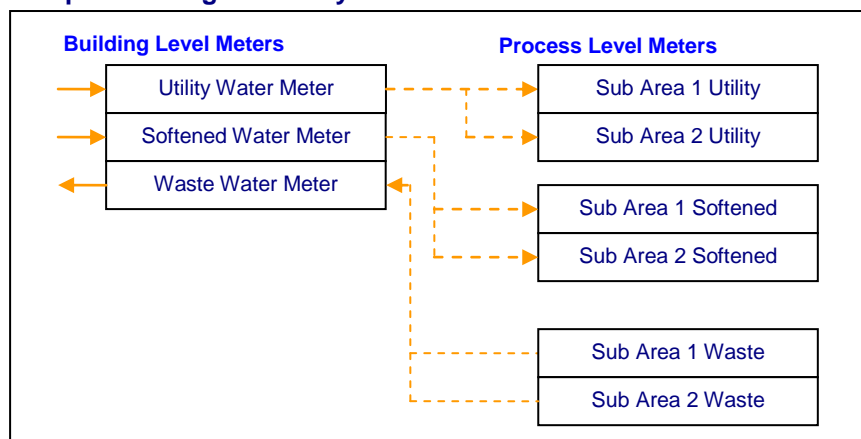
On identification of the available data and automation interfaces required, a site needs to begin the task of establishing the energy map and any business rules it needs. A number of steps are involved in this, but upon completion of the task a site will have a tool that enables them to accurately review the energy usage and performance characteristics of the site, thus aiding in energy reduction programmes.

ICIS Energy Map Design

The ICIS energy map at its core is the assignment of relevant energy consumers into logical areas and where possible the arrangement of the metered data into a stream scenario. What this will enable a site to achieve is the generation of an Upstream and Downstream energy consumption modal. Here the Upstream is the total metered data for a main building that management may want as a summary overview, with the downstream modal being the sub-divided users in a building used for engineering reviews in order to identify heavy users and target them for energy reduction programs.

An example of this modal for site water can be seen below. Here management will be interested in what the water consumption and waste generation of a building is, however engineering and operations will require the user data in order to target specific ones for a reduction program.

Sample Building Meter Layout



Sample Building Water Meter Map

The mapping can continue right down to actual components with ICIS virtual metering, for example on a power map large motors and HVAC units can be isolated for review.

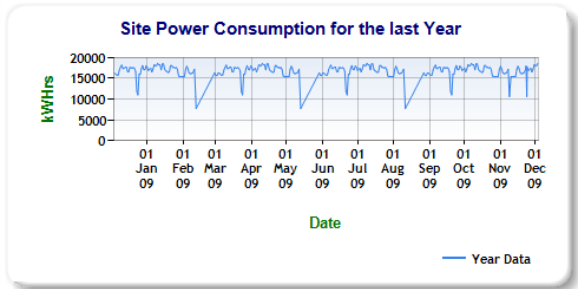
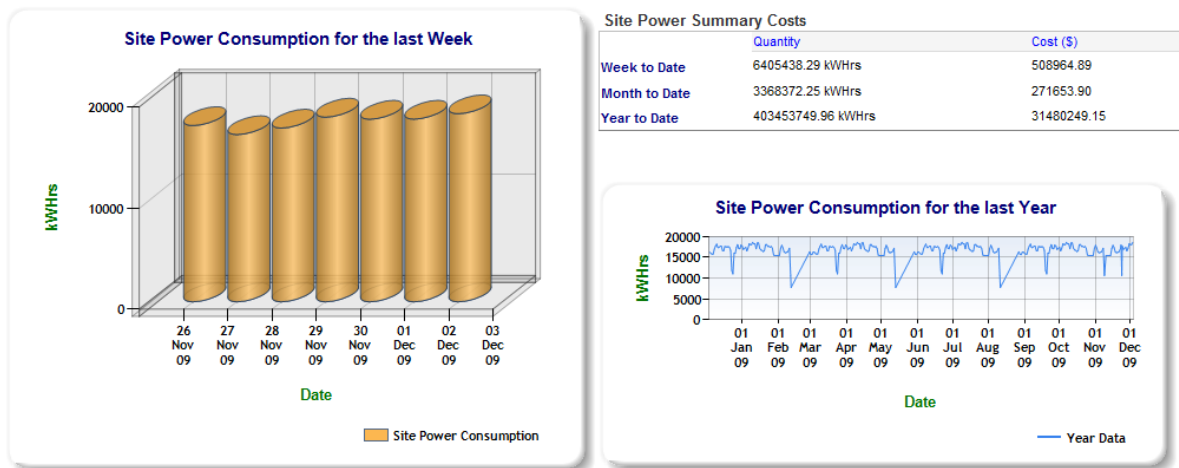
ICIS Business Rule Definition

The business rule definition aids a site where metered information may not be available, or indeed if metered data is available but the grouping of results is required as opposed to individual item monitoring. The rules also aid in the design of any specific performance calculations (or handle any possible anomalies) that a site may require in their result front end displays. The rules as mentioned earlier can range from allocating energy usage to motor run hours, to integrating flow meter values for total consumption. The rules in their very nature are site dependent and as such their value should not be underestimated. Well-defined business rules can be vital for the successful design and building of a site's EMS in order to generate accurate results and filter out any inconsistent data. Incorrectly designing them will lead to inconsistent analysis results that will not be of benefit to the site. This will also leave end users with a potentially inaccurate system that they will not use. Once the map and rules have been correctly identified the site can move on to define what data they wish to display in the system and customise any standard components offered in order to meet their needs.

The Power of the ICIS Front End

The front end application for users embarking on energy reduction projects is as important as the previous work executed in building the site energy map and business rules. The front end will be a users window into the energy analysis and performance results of a site so it must be designed in such a way to allow ease of use for a diverse range of users. The ICIS sustainability platform is one such tool that allows for a Management performance overview and an Engineering analysis tool all in one. The application is designed for the monitoring and analysis of all the major site energy types and not just a specific one.

By utilising tabular and graphical displays users can quickly review energy usage and isolate excessive user consumption and waste.



	Meter Description	Target Value	Average	Variance
Utility Water	Meter1 Building Water	80m ³	5.32m ³	70.81m ³ 49.91%
Softened Water	Meter2 Production Water	100m ³	5.32m ³	4.34m ³ 13.10%
Waste Water	Meter3 Building Waste	45m ³	0.03m ³	6.69m ³ 2.90%

Sample ICIS Sustainability Graphics

By utilising user friendly front-end displays more diverse and non-technical groups of users can engage in a sites energy reduction program.

Energy Reduction

Upon completion of the application role out a site can begin the job of site analysis and energy reduction. The ICIS sustainability platform allows for instantaneous site reviews to help kick off its improvement programs. Teams can be established to review building areas and units in their functional locations. In doing this excessive users can be reviewed and energy reduction programs rolled out.

As the platform does not require high-level Automation or energy understanding, teams from within various operational groups of a site can become involved. This leads to a sense of ownership from various site personnel, which in turn offers a more supportive and productive role for non-engineering groups in energy improvement programs.

What a Site will gain

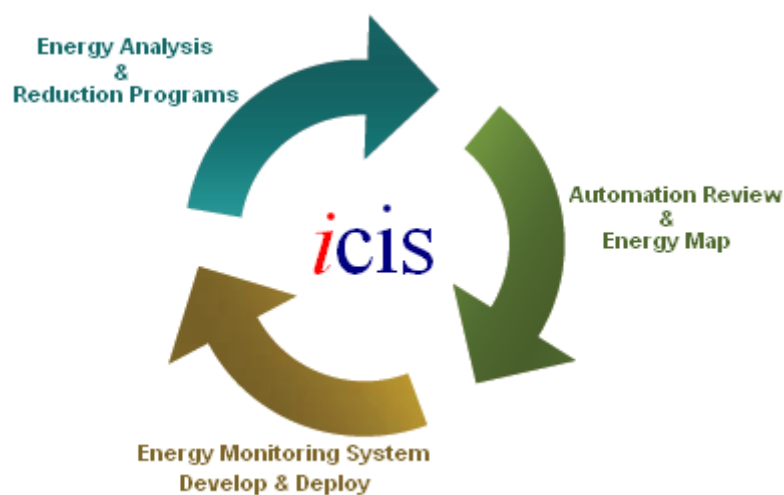
By using the ICIS sustainability platform a site will begin to develop a real understanding of its performance and consumption of energy within its organisation.

In summary a site will obtain:

1. A necessary window into the site energy usage for Management which integrates the information into their business world
2. A live review of energy targets and costs, which enables a review of whether each area of the site is meeting them
3. Isolate variability's and excessive consumption and waste in the sites energy usage

4. Utilise various operational teams to generate performance reports for energy improvement programs with engineering
5. Develop a real understanding of a sites energy performance characteristics
6. Drive costs down by analysing the sites energy usage environment
7. Create site wide involvement in energy reduction programs with the benefit of multiple user interaction and not just engineering personnel
8. Link production runs to energy usage and cost

These benefits and more can be generated by the successful implementation of an energy monitoring system into a sites management program.



The Energy Reduction Project Lifecycle

About Us:

icis provide custom BMS, Data Historian and SCADA / DCS reporting solutions for a variety of systems. As we are not affiliated with any specific vendor and have crossed the divide in terms Automation Integration and Enterprise Reporting we can provide unbiased consultancy reviews and recommendations for your best path forward in terms of plant reporting. Contact us to see what we can do for you in terms of a site / system design review and study.

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