



Sustainability Introduction

**Energy Management Opportunities with the
ICIS Sustainability Platform**

Des Cooling (ICIS)



Supply and Demand Energy Management

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Supply Side Energy Management

- Change of electricity tariffs
- Change suppliers – gas and electricity
- Combined contracts with other sites on gas and electricity
- Input into the development of the National Allocation Plan (NAP) for emission trading

Demand Side Energy Management

- Implement monitoring and measurement system (Water, Gas and Electricity)
- Implement energy reduction projects (Power, Water, Steam)
- Raise energy conservation awareness across the organisation
- Need to involve each site in identifying and implementing opportunities for energy reduction

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Power



Water



Steam



Oil / Gas

- The ICIS Sustainability Platform is a Web based Portal application used for Energy and Emission Monitoring and Analysis that allows various users (Technical and Non-Technical) to review the Energy characteristics of an Organisation.
- The ICIS sustainability Platform brings visualisation to Energy Consumption, Carbon Emissions and Costs throughout an entire organisation from device to building via a users desktop browser with the aid of Dashboards, Charts and Reports.
- Who uses it ?
 - **Management:** To review building, processes and equipment energy usage / cost and emission generation over the course of days, weeks and months
 - **Engineering:** To review consumption information of buildings and equipment over varying periods of time and processes. It also allows for the review and analysis of energy targets and to monitor any energy or emission improvement changes.
 - **OE Projects:** To aid in the review and analysis of energy and emission reduction programs and drive changes in relevant departments. The tools are at the heart of these Operational Excellence programs with sharing of information available through Forums and custom reports.

SEP Certification and ISO 50001

- Superior Energy Performance is designed to encourage participation among plants of all sizes and levels of experience in managing energy
- ISO 50001 is central to dealing with Energy Management and is being adopted by many organisations as the standard of choice that will allow for SEP certification
- SEP certified organisations should meet the following criteria

PARTNER	CERTIFIED PARTNER
<p><u>Basic Criteria</u></p> <ul style="list-style-type: none"> • Conformance with energy management standard • Measure and audit energy performance improvement 	<p><u>Basic Criteria</u></p> <ul style="list-style-type: none"> • Conformance with energy management standard • Measure, verify, and certify energy performance improvement
<p><u>Performance Levels</u></p> <ul style="list-style-type: none"> • Energy performance improvement required 	<p><u>Performance Levels</u></p> <ul style="list-style-type: none"> • Energy performance improvement required, minimum requirements set by program • Two Pathways Available: Energy Performance or Mature Energy
<p><u>Method of Verifying Result</u></p> <ul style="list-style-type: none"> • Self Declaration 	<p><u>Method of Verifying Result</u></p> <ul style="list-style-type: none"> • Third party verification via on-site review

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Sustainability Action Plan

- For Organisations entering into a proactive sustainability campaign on a site their best practice approach is to follow a strategic Sustainability Action Plan (SAP).
- A Sustainability Action Plan is divided into the Five Pillars of excellent management:
- **Commit** - Commitment to sustainability by an organisations management team
- **Identify** - Develop a real understanding of energy use and identify users
- **Plan** - Plan how to put your policy goals and savings opportunities into action
- **Action** - Gain commitment and implement changes
- **Review** - Monitoring and reviewing are vitally important stages in closing the loop

The ICIS Sustainability Platform empowers an organisation to implement a successful Sustainability Action Plan by addressing each of the Five Pillars, thus enabling an organisation to focus attention and resources where the greatest impact and savings are to be made without having large capital investment .

What Level of Investment

- Although there are no definitive rules on what to spend on an Energy Management system a guideline for an organisation can be provided based on the level of expenditure on Energy .

Annual Utility Costs	Approximate Justifiable Capital Cost
\$125,000	Up to \$25,000
\$250,000	Up to \$40,000
\$600,000	Up to \$50,000
\$1,250,000	Up to \$150,000
\$2,500,000	Up to \$200,000+

- *Based on DOE and the UK Carbon Thrust survey spanning industries over a 15 year timeframe

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Expected Returns

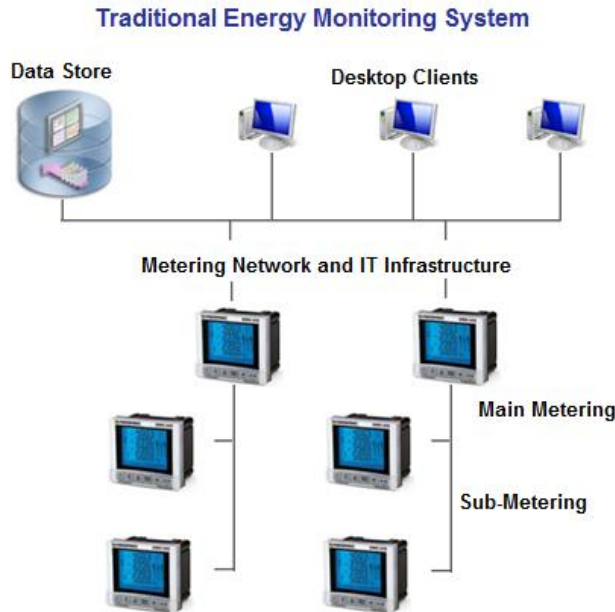
- The DOE and UK Carbon Thrust surveys indicate that the average savings from the correct installation and implementation of an Energy Management system can save an Organisation:

5 to 15 Percent on Annual Energy Costs

- Best practice approach is to conduct a front end study and implement a Pilot Program that that can be expanded upon quickly and easily once the results have been determined
- The ICIS Sustainability Platform offers you the most cost effective and non-intrusive solution on the market today
- ICIS Sustainability Platform empowers an organisation to control their Energy Management program in a structured format that follows Best Practice guidelines
- With our Traditional and Unique Virtual Metering systems at your disposal an Organisation can quickly and efficiently begin their Energy reduction program

The Traditional Approach

- Traditional Metering systems used for Energy Analysis require the installation of multiple sub-metered devices across a site and tend to focus on one Energy type such as Power.
- This leads to the requirement of:
 - Large Project Capital Expenditure and slow ROI
 - Sub-Metering Hardware
 - Network Infrastructures
 - Plant Downtime



The ICIS Difference – *Virtual Metering*

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- ICIS Virtual Metering (Patented) removes the requirement for the installation of multiple sub-metering components and it focuses an Organisations attention onto actual Energy Consumption information identifying the Energy Users, Costs and covering all Energy Types.
- Virtual Metering offers:
 - Greatly Reduced Project Capital Expenditure
 - No new Metering Hardware or Network Infrastructures
 - Zero Plant Downtime
 - Flexible, Scalable Installation and Expansion
 - Unrestricted and Unlimited growth without any 3rd party involvement
 - Back filling of Energy data



Utilisation of existing Infrastructure



ICIS Virtual Metering – A Modular Approach to Energy Management

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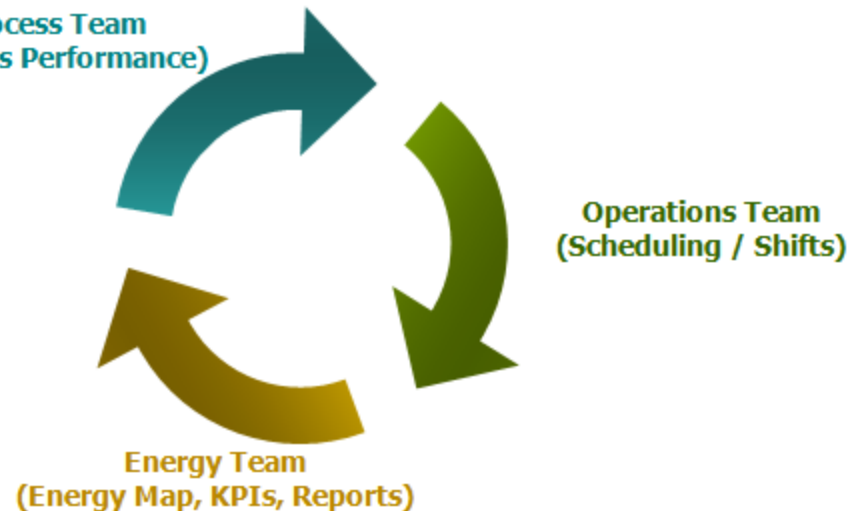
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- ICIS Virtual Metering (Patented) provides the ability for a site to start a reduction program on a small modular scale and offers unlimited expansion potential at the end users pace without any need for further investment, training or external resources.
 - Map a number of devices of interest for an area or equipment group
 - Build a profile map of consumption, costs and emissions
 - Address the reduction opportunities of these items
 - Expand the analysis to additional areas and devices when ready
- Mapping an Organisation in this Virtual way offers the flexibility of creating a specific area and device profile right up to the entire overview of an organisation.
- It empowers an organisation to utilise their existing wealth of information and knowledge currently available on site.

Virtual Metering provides the common link of information sharing between departments

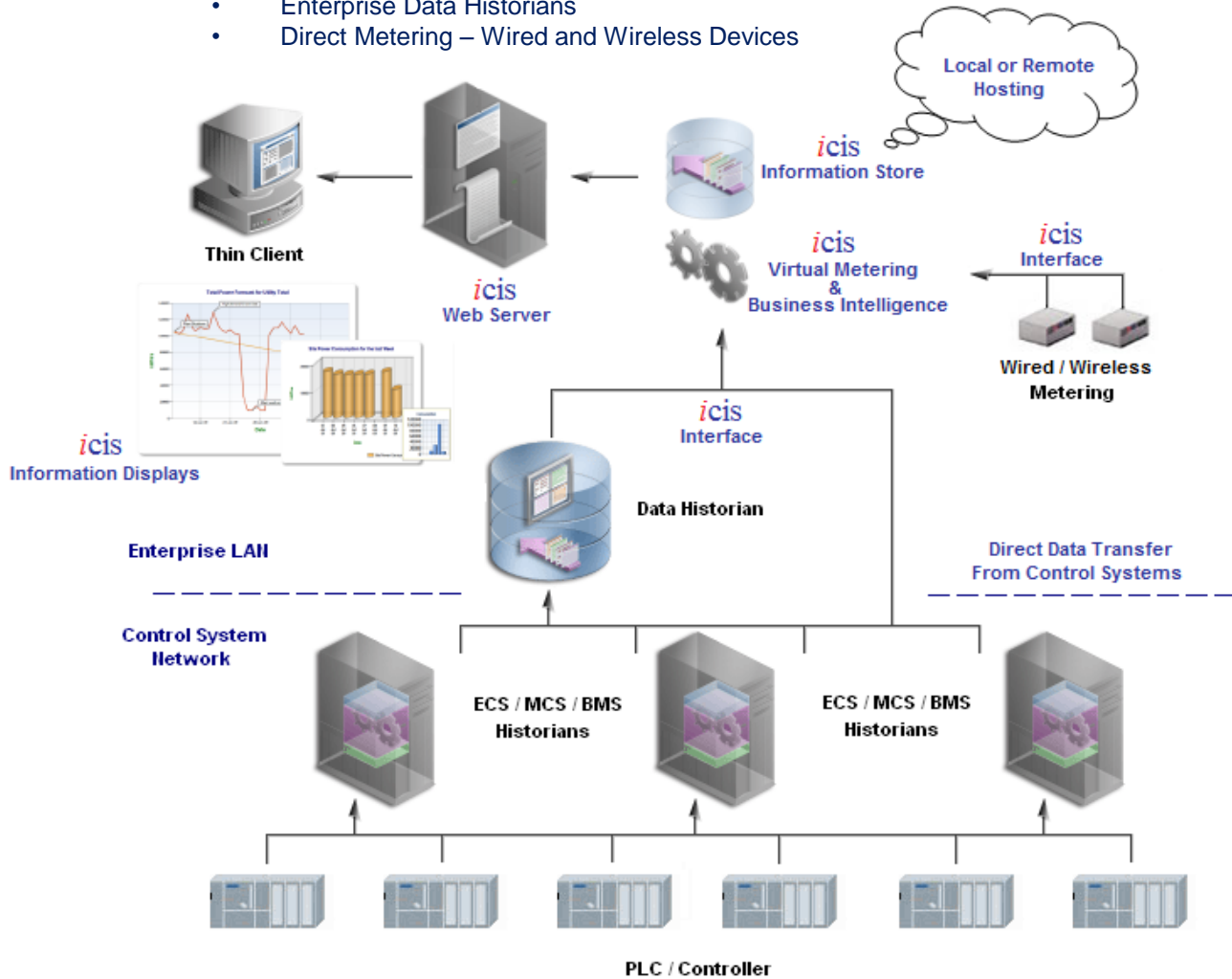
- **Energy** – Identify Users
- **Process** – Identify Why
- **Operations** – Identify Changes

Process Team
(Process Performance)



How is Virtual Metering Data Sourced?

- ICIS sources raw data (Real and Virtual) from a variety of locations
 - Automation Systems – BMS, DCS, ECS, SCADA
 - Enterprise Data Historians
 - Direct Metering – Wired and Wireless Devices



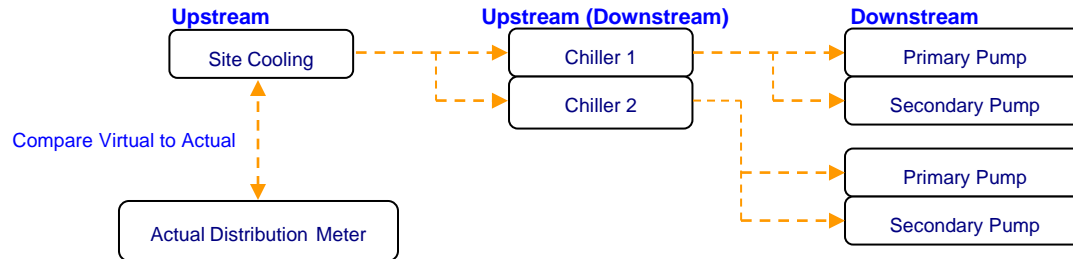
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An Energy Map with ICIS Virtual Metering

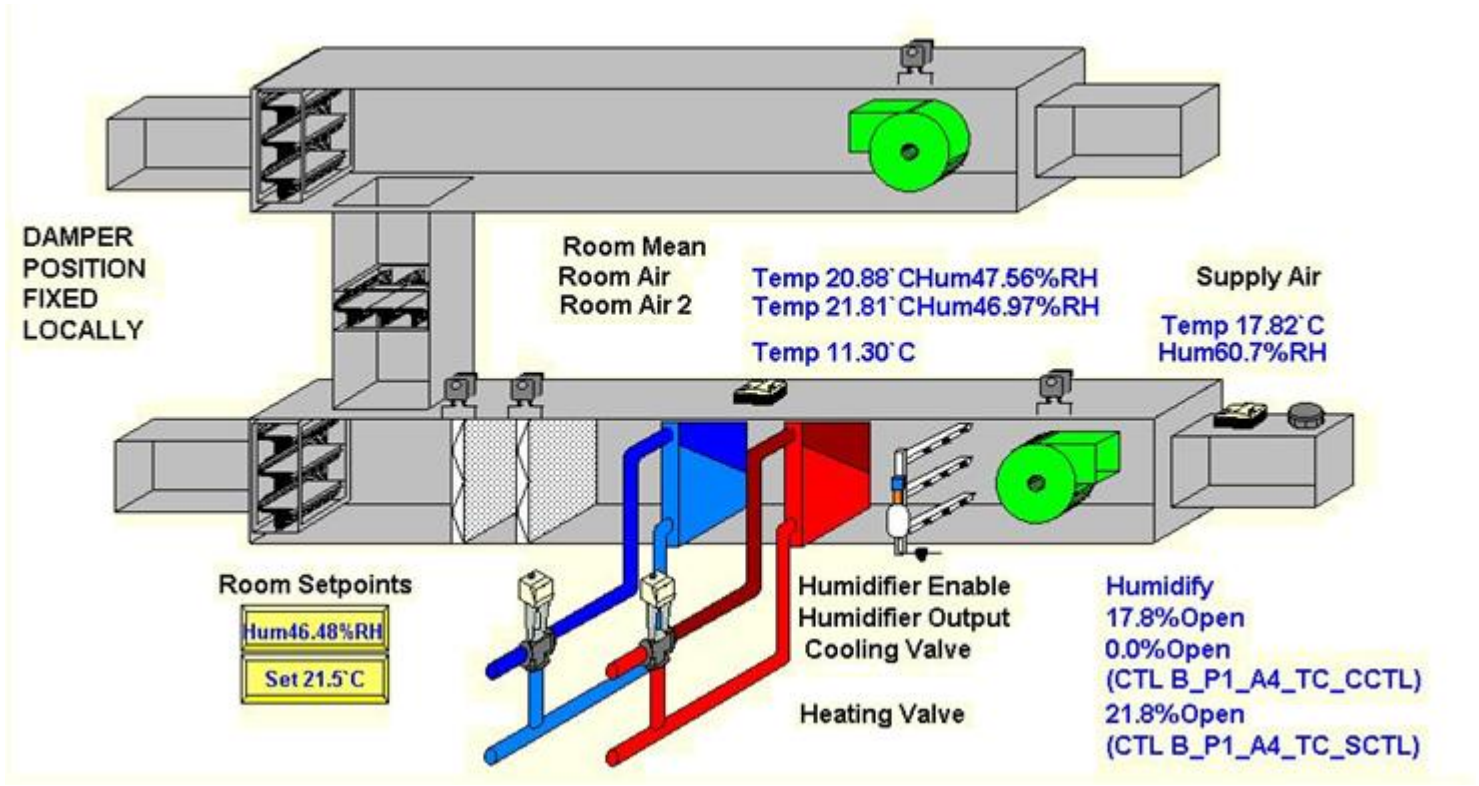
- An Energy Map is the logical break-up of an Organisations Energy consumption into specific Areas, Equipment and Devices.
- ICIS Virtual Energy Metering (Patent Pending) uses raw data from a Control System (BMS, DCS etc) such as Motor Commands or Direct wired Modbus I/O (Feedbacks) and translates this into Energy Consumption Information for that specific device.
- Energy consumption information is calculated for a Device (Motors etc) or Unit (Heat Exchanger etc) using ICIS Mathematical techniques whether it be for Power, Water or Steam consumption.

• **For Example:**

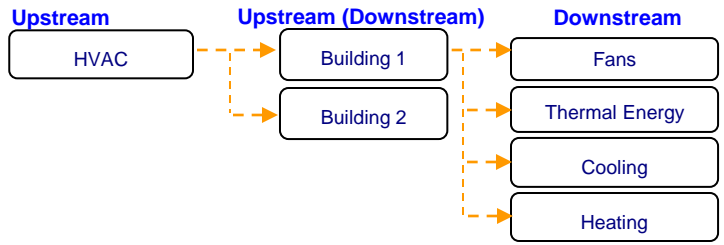


- A base Energy load is measured with Virtual Metering, here it's a Chiller Pump scenario
- The base loads are the lowest Downstream items of this Energy Map
- The base loads are then combined to provide a rolled up Upstream load value for the actual Chiller
- These rolled up Chiller loads can now also be considered as Downstream of another load such as a Building or Equipment Grouping.
- These loads can themselves be combined to form a new Upstream Item. Hence the process allows for the building of a complete site Energy Map profile without having to install any sub-metering hardware.

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HVAC Energy Map



Virtual Meters for:

- Fans
- Thermal Energy
- Heating
- Cooling
- Water

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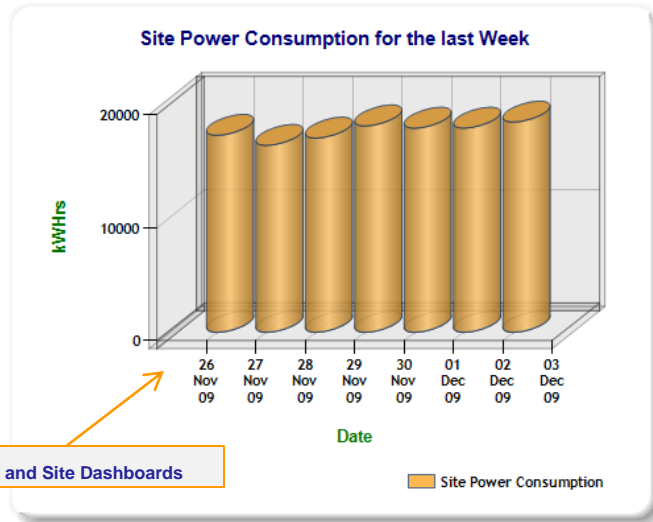
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Why use the ICIS Sustainability Platform?

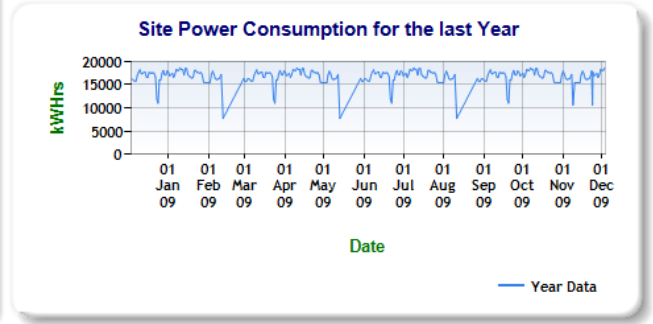
- ICIS enables a site to obtain Energy / Emission analysis and cost information from existing meter and IT / automation infrastructure without the need for new hardware or metering devices.
- Obtain Energy / Emission consumption and costs from non-metered sources such as motors and control valves by utilising Automation data sources such as your BMS, DCS, SCADA and Historians.
- ICIS allows for the creation of over 30 true Virtual Energy Meters (Patented) for Power, Water and Steam; plus the building of grouped meters that allow for the creation of building and equipment consumption profiles.
- Combine both metered and non-metered sources to build a complete Energy Map and Emission profile for an Organisation, its separate sites and a cost per Batch.
- Back-fill energy and emission consumption information using stored Automation data for instant historical Energy analysis post installation.
- ICIS provides powerful web based analysis and cost reporting tools and Energy information sharing through the use of Forums and Messaging.
- ICIS removes the cost overhead that other Energy monitoring solutions have with their need for the retrofit of devices and installation of new metering equipment.
- ICIS can either be hosted locally on a site or remotely.

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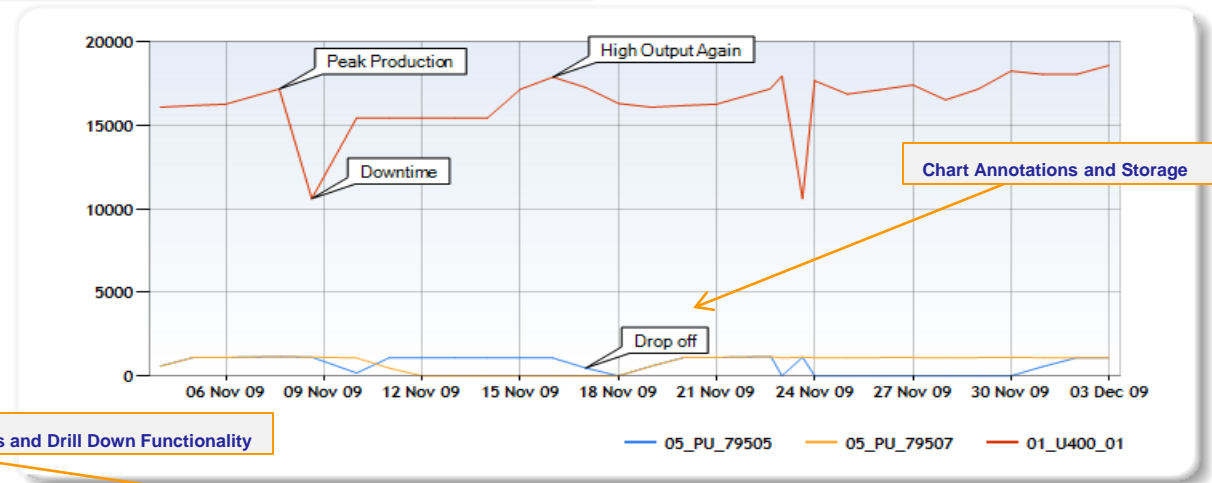


Site Power Summary Costs

	Quantity	Cost (\$)
Week to Date	6405438.29 kWhrs	508964.89
Month to Date	3368372.25 kWhrs	271653.90
Year to Date	403453749.96 kWhrs	31480249.15



Building and Site Dashboards



Scorecard Status and Drill Down Functionality

Meter	Description	Location	Status	Target	Yesterday	Chart
05_PU_79505	Sec CHW Pump 05-PU-79505	Chilling/Sec. CHW Pumps	●	1000.00	1082.00	
05_PU_79507	Sec CHW Pump 05-PU-79507	Chilling/Sec. CHW Pumps	●	1000.00	1083.57	
01_U400_01	01USS-84500 (Side A)	Production Suite 3/QC Building	●	17000.00	18589.42	

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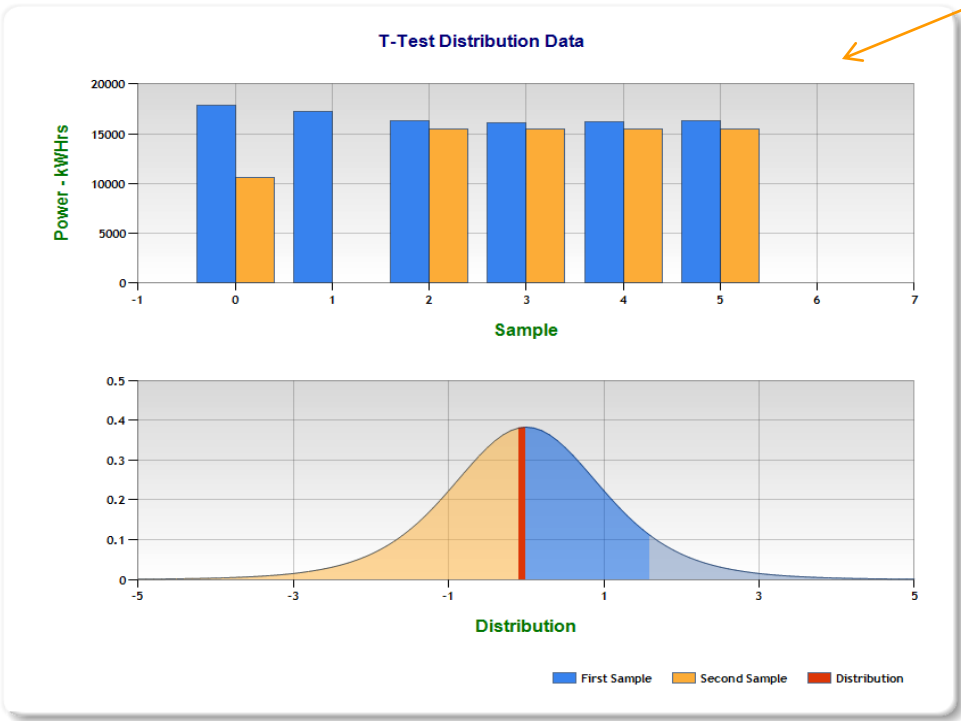
Test Distribution Data

Sample 1 Data	Mean: 14285	Median: 16264	Variance: 38.95%	Standard Deviation: 6334.9	Test Type T Test
Sample 2 Data	Mean: 10338	Median: 15439	Variance: 47.15%	Standard Deviation: 7279.2	T Test Type Paired
	T Value 1.636	Degree of freedom: 6	Probability 95		
	P(T<=t) - one-tail: 0.07649	t Critical one-tail: 0			
	P(T<=t) - two-tail: 0.153	t Critical two-tail: 0.06537			

Analysis of Variance (ANOVA) Data

Source of Variance	Sum of Squares	Degree of Freedom	Mean Square Variance
Between Means:	5.45E+07	1	5.45E+07
Within Samples:	5.59E+08	12	4.66E+07
Total:	6.13E+08	13	
F Value:	1.17	F Critical:	0.0041

- Statistical Analysis and Various Energy Analysis Charting Tools such as:
- Regression Analysis
 - Degree Day
 - CUSUM
 - Consumption
 - Comparison
 - Trending
 - Targets
- And much more.



Building Peak Usage Report

From: Sunday, November 01, 2009
To: Monday, November 30, 2009

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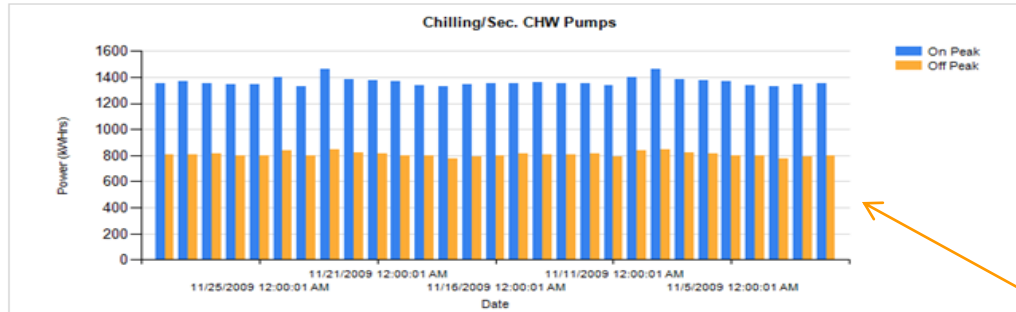
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Chilling/Sec. CHW Pumps



Meter	Total	On-Peak	Off-Peak	Date
Sec Ch. Water Pumps				
	2159.37	1353.51	805.86	11/29/2009 12:00:01 AM
	2174.63	1366.65	807.98	11/28/2009 12:00:01 AM
	2169.57	1353.42	816.15	11/27/2009 12:00:01 AM
	2139.45	1341.92	797.53	11/26/2009 12:00:01 AM
	2148.93	1347.92	801.01	11/25/2009 12:00:01 AM
	2241.32	1401.42	839.90	11/24/2009 3:06:34 PM
	2127.62	1328.57	799.05	11/24/2009 12:00:01 AM
	2303.75	1458.01	845.74	11/23/2009 3:55:02 PM
	2210.41	1385.99	824.42	11/22/2009 12:00:01 AM
	2192.15	1374.56	817.59	11/21/2009 12:00:01 AM
	2166.01	1366.32	799.69	11/20/2009 12:00:01 AM
	2131.73	1334.75	796.98	11/19/2009 12:00:01 AM
	2099.54	1326.77	772.77	11/18/2009 12:00:01 AM
	2133.03	1340.54	792.49	11/17/2009 12:00:01 AM
	2154.04	1351.83	802.21	11/16/2009 12:00:01 AM
	2161.23	1350.66	810.57	11/15/2009 12:00:01 AM
	2165.86	1357.22	808.64	11/14/2009 12:00:01 AM
	2161.82	1352.21	809.61	11/13/2009 12:00:01 AM
	2166.24	1355.81	810.43	11/12/2009 12:00:01 AM
	2127.70	1335.06	792.64	11/11/2009 12:00:01 AM
	2241.32	1401.42	839.90	11/9/2009 3:06:34 PM
	2303.75	1458.01	845.74	11/8/2009 3:55:02 PM
	2210.41	1385.99	824.42	11/7/2009 12:00:01 AM
	2192.15	1374.56	817.59	11/6/2009 12:00:01 AM
	2154.04	1351.83	802.21	11/1/2009 12:00:01 AM
Totals:	62966.38	39523.33	23443.05	

Ad-hoc and Standard Reporting with SQL Reporting Services empowers you to build dynamic reporting such as:

- Consumption
- Costing
- Trending

And much more.

Customer Examples

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Item	Description
Solution	ICIS Plant Energy OSI-PI, Schneider Powersoft and Honeywell Plantscape connections
Return on investment	3-6 Months
Identified Areas of Savings	<ul style="list-style-type: none"> • Sterilisation Processes Running On-Peak • Excessive water usage in CIP • Reuse projects of Rinse Water • Process modification • HVAC control • Warehouse Light Controls • VSD replacement DOL drives (Fans/Pumps) • Increased Condensate recovery • Steam Trap repair • CHP Installation • Chiller rebalancing

Item	Description
Solution	ICIS Plant Energy Wonderware Historian Connection
Return on investment	6 Months
Identified Areas of Savings	<ul style="list-style-type: none"> • VSD replacement DOL drives (Pumps) • Water valve and mains replacement • Pump House control system re-design • Energy market pricing

Item	Description
Solution	ICIS Plant Energy Schneider TACBMS, Wireless and Modbus metering connection
Return on investment	3-6 Months
Identified Areas of Savings	<ul style="list-style-type: none"> • HVAC control • Production cell scheduling • Batch Costing

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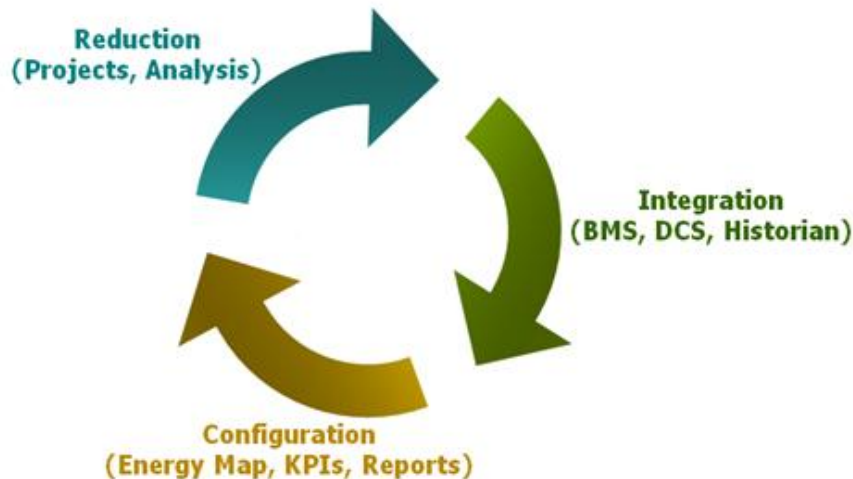
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- The ICIS Sustainability Platform provides unrivalled flexibility to support your organisation from a Pilot Program to a complete organisation solution
- Integrate your Energy usage and Emissions into your organisations Business Management review and reap the benefits of opening your consumption and costs to the people who make the decisions for change
- Realise savings of 5 to 15 percent on your Annual Energy Costs with a successful installation of Plant Energy used within your Energy Management program.
- Leverage Traditional and Virtual metering technologies to identify your Cost Centres and Emissions
- ICIS provides you with the necessary tools required to drive change and implement your savings and reduction projects



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