Facilities’ Energy Challenges from an Intelligent Perspective

SATCHENET ELECTRONIC SYSTEMS

Local Systems’ Integration Experts
Who We Are?

A Leading Facility Automation Systems’ Integrators with A Major Vision to Step In & Change the Local Perception of Energy Management Solutions
Complete Facility Solutions For All Phases of your Facility

Single Source Solutions throughout the Facility Life Cycle

<table>
<thead>
<tr>
<th>Power Monitoring &amp; Management</th>
<th>Design</th>
<th>Operations</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metering and Monitoring</td>
<td>&amp;</td>
<td>&amp;</td>
<td>&amp;</td>
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<tr>
<td>Variable Speed Drives</td>
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<td></td>
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<tr>
<td>Power Quality (UPS)</td>
<td></td>
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<table>
<thead>
<tr>
<th>Facility Automation</th>
<th>Installation</th>
<th>Maintenance</th>
<th>Retrofit</th>
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<tbody>
<tr>
<td>HVAC</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Water &amp; Pumping</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy Management</td>
<td></td>
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</tbody>
</table>

| Security | | | |
|----------| | | |
| Digital Video Management | & | & | & |
| Access Control | | | |
| Intrusion Detection | | | |

| Lighting | | | |
|----------| | | |
| Schedule Based Lighting Control | | | |

| Fire and Life Safety | |

| Service & Maintenance (CMMS) | |

SatchNet Electronic Systems
The Challenge

The life cycle cost of a Facility

- **Development Period**
  - 3-5 years
  - Up to 25% of a building’s life cycle cost is financing & construction

- **Operating Period**
  - 25–30 years
  - Up to 75% of a building’s life cycle cost is operational
A Peek at the Solution

- Measure it
- Control It
- Manage it
High Performance Green Facility

Integrated Facility Management System

HVAC Controls  Power Management  Lighting  Water  Fuel Management  Security & Fire  Others...
Fault Detection and Diagnostics (FDD)

Top 10 Fault by Fault Cost
- High condensing temp
- Cooling during Full Econo
- Lack of deadband
- Operation outside of hours
- Not using economizer assisted cooling
- Unnecessary Exhaust Fan Operation
- Leaking Preheat Valves
- Unnecessary Fan Usage
- Condenser approach too high
- System started too early

Top 10 Fault by Total Time
- Unnecessary Fan Usage
- Stuck sensor
- Unnecessary Exhaust Fan Operation
- Operation outside of hours
- Struggling Output
- Cooling during Full Econo
- Lack of deadband
- High condensing temp
- Sensor not tracking NOAA
- Not using economizer assisted cooling

Faults Table

<table>
<thead>
<tr>
<th>Rank</th>
<th>Site</th>
<th>Asset</th>
<th>Status</th>
<th>Full Text</th>
<th>Start</th>
<th>End</th>
<th>#Occ</th>
<th>MinT</th>
<th>MaxT</th>
<th>TotalT</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Boeing</td>
<td>AHJ06</td>
<td>Open</td>
<td>The outdoor enthalpy 8.7 is less than the desired supply enthalpy 18.5, and the cooling coil is on.</td>
<td>01/01/09 1:00 AM</td>
<td>01/31/09 11:30 PM</td>
<td>20</td>
<td>1.50h</td>
<td>5.98d</td>
<td>27.73d</td>
<td>$546.20</td>
</tr>
<tr>
<td>5</td>
<td>Boeing</td>
<td>AHJ07</td>
<td>Open</td>
<td>The outdoor enthalpy 8.9 is less than the desired supply enthalpy 18.5, and the cooling coil is on.</td>
<td>01/01/09 1:00 AM</td>
<td>01/31/09 12:00 PM</td>
<td>291</td>
<td>30.00m</td>
<td>14.50h</td>
<td>17.42d</td>
<td>$311.15</td>
</tr>
</tbody>
</table>
Automated Demand Response (ADR)
Automated Measurement & Verification (M&V)

Energy Use

Baseline Energy

Installation of Higher Efficiency Lighting

Savings, or Avoided Energy

Reporting Period

Year 1

Year 2
Energy Information Systems (EIS)

- Facility Owners, Developers, Occupants, Consultants
- Government Utilities, Policy Makers
- Energy Information Systems
- Facility Managers, Operators, Financial Managers
- Energy Efficiency Service Providers & Suppliers
Intelligent Energy Management Triangle

- **Energy Information Management**
  - Long-term investment driven decisions

- **Intelligent Energy Management**
  - Fault Detection and Diagnostics
    - Short-term, critical performance decisions
  - Measurement and Verification of Savings
    - Validation of project(s) and investment
Visualization
Performance Indicators

Energy Report

The following energy report has been created for your home profile. It includes a list of recommendations, available end of where you spend your energy dollars every year.

Your Hohm Energy Report

Home Profile: 33% complete
Energy Data: There is no energy usage data available energy usage page, or connect up to a provider in your
Report Generated on: Tuesday, November 24, 2009
Address: WA, 98116

Summary of Potential Savings
Thank you for using our beta service. You can use the energy upgrades and repairs. You may want to consult with any recommendations products.
Your average annual costs are $2,382. This includes auxiliary energy usage such as propane tanks and

Energy Cost Breakdown and Usage
Your Estimated Energy Costs

Your Savings Recommendations
The following recommendations have been customized for your home based on the information you provided.
These recommendations are available in an interactive list on the Hohm Energy website where you can

Compare Your Electric Energy Usage

In 2010, Missouri experienced the hottest summer in 30 years! Understanding your usage can help you control your costs year-round.

Your 2010 Electric Energy Charges*

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Daily Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAN</td>
<td>$64.81</td>
<td>$1.91</td>
</tr>
<tr>
<td>FEB</td>
<td>$49.72</td>
<td>$1.71</td>
</tr>
<tr>
<td>MAR</td>
<td>$46.17</td>
<td>$1.59</td>
</tr>
<tr>
<td>APR</td>
<td>$43.48</td>
<td>$1.50</td>
</tr>
<tr>
<td>MAY</td>
<td>$36.63</td>
<td>$1.26</td>
</tr>
<tr>
<td>JUN</td>
<td>$74.13</td>
<td>$2.32</td>
</tr>
<tr>
<td>JUL</td>
<td>$145.43</td>
<td>$4.85</td>
</tr>
<tr>
<td>AUG</td>
<td>$168.94</td>
<td>$5.83</td>
</tr>
<tr>
<td>SEP</td>
<td>$175.61</td>
<td>$5.49</td>
</tr>
<tr>
<td>OCT</td>
<td>$61.50</td>
<td>$2.12</td>
</tr>
<tr>
<td>NOV</td>
<td>$46.71</td>
<td>$1.61</td>
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<tr>
<td>DEC</td>
<td>$58.87</td>
<td>$1.78</td>
</tr>
<tr>
<td>ANNUAL</td>
<td>$972.00</td>
<td>$2.67</td>
</tr>
</tbody>
</table>

*This report includes actual electric usage and service charges as shown on the first line of your monthly bill, not your budget bill amount.
Energy Saving Through BMS

ECM # 1: Occupancy Time Scheduling

10-20%
Case Study: Packaging Industrial Company (PIC)

Operations & Actual Energy Savings
Boiler Stop after 1000 second

Pump Stop after 1800 second

Shut down timers are user adjustable
Chiller plant will start if only one film machine is working.

System will start the most energy efficient chiller first.

Petra chiller starts when water temperature is more than 16 (14+2) and stops when water temperature is less than 12 (14-2).

All these values are user adjustable.

Only when needed, Hiross chiller (less efficient chiller) will start, as the Petra chiller cannot keep cold enough water temperature.
### Weekly Schedule

**Current Value:** Inactive  
**Active Schedule:** Weekly Schedule - Saturday  
**Next Value:** Inactive @ 13:12 04-Apr-2013
This time schedule start at Saturday at 09:00 AM

And stop at Thursday 11:00 PM
Special event configured for next Thursday. Since it will be labor day holiday.
Weekly schedule remain as it is except May 2, 2013 it will be stop
List of trend logs
One or more value can be displayed at once. Depending on the purpose of the report, there are several types of output reports.
Set the report title

Set the period of the data
The data can be saved.

Exported data can be viewed and formatted in common programs.
### All data in one page
Make it easy to monitor the operation

### Cerutti 1
- **Cerutti 1 Status**: Running
- **Ext. Fan Status**: Running
- **Chiller Status**: Running
- **Chiller HOA**: Auto
- **Ch. Pump Status**: Running
- **Ch. Pump Speed**: 83.00%
- **Boiler Status**: Running
- **Hot Pump HOA**: Auto
- **Hot Pump Status**: Running
- **Hot Pump Speed**: 100.00%
- **Chilled Water Temp**: 19.67°C
- **Hot Oil Temp**: 86.40°C

### Cerutti 2
- **Cerutti 2 Status**: Stopped
- **Ext. Fan Status**: Stopped
- **Chiller Status**: Stopped
- **Chiller HOA**: Auto
- **Ch. Pump Status**: Stopped
- **Ch. Pump Speed**: 0.00%
- **Boiler Status**: Stopped
- **Hot Pump HOA**: Auto
- **Hot Pump Status**: Stopped
- **Hot Pump Speed**: 0.00%
- **Chilled Water Temp**: 20.73°C
- **Hot Oil Temp**: 28.00°C

### Extract Fans
- **Cerutti 1 Fan Status**: Running
- **Cerutti 2 Fan Status**: Stopped
- **Central 1 Fan Status**: Stopped
- **Central 2 Fan Status**: Stopped

### Chiller Plant (Petra & Hiross)
- **Petra Pump Status**: Running
- **Petra Pump Speed**: 0.00%
- **Hiross Pump Status**: Running
- **Hiross Pump Speed**: 0.00%
- **Chilled Water Temp**: 15.90°C

### Film Machines Heaters
- **Bandera 1 Status**: Running
- **Bandera 2 Status**: Running
- **Alpin 1 Status**: Running
- **Alpin 2 Status**: Running
- **Queen 1 Status**: Stopped
- **Blow Pump Status**: Running

### Machines Pumps
- **CLF Pump Status**: Running
- **CLF190 Temp**: 29.50°C
- **CLF_280 Temp**: 29.30°C
- **Film Pump Status**: Running
- **Film Temp**: 26.76°C
- **Blowing Temp**: 16.66°C

### Film Extract Fans
- **Extract Fan 1 Status**: Running
- **Extract Fan 2 Status**: Running
- **Extract Fan 3 Status**: Running
- **Extract Fan 4 Status**: Running
- **Grinder Fan Status**: Stopped

### Factories Status
- **Logging**:
- **Grinder Pumps Status**: Stopped
- **Grinder Temp**: 20.19°C
## Energy Saving Report

### Electricity for PIC

<table>
<thead>
<tr>
<th>Year</th>
<th>Cost Before BMS</th>
<th>Cost</th>
<th>Saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>JOD 260,261.00</td>
<td>JOD 257,897.31</td>
<td>JOD 2,363.70</td>
</tr>
<tr>
<td>2012</td>
<td>JOD 315,921.16</td>
<td>JOD 297,897.31</td>
<td>JOD 18,023.85</td>
</tr>
</tbody>
</table>

**SAVING = 32,555.6 = 27%**

### Simple Payback (ROI)

- **Simple Payback (ROI) = 6.2 Months**
- **Saving = 58,113.85 JOD = 18.4%**

<table>
<thead>
<tr>
<th>Cost</th>
<th>Production TON</th>
<th>KWH/Ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOD 300,000.00</td>
<td>2,856.72</td>
<td>474.26</td>
</tr>
<tr>
<td>JOD 200,000.00</td>
<td>2,500.00</td>
<td>349.03</td>
</tr>
<tr>
<td>JOD 100,000.00</td>
<td>2,143.72</td>
<td>324.26</td>
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<tr>
<td>JOD 50,000.00</td>
<td>1,786.45</td>
<td>299.03</td>
</tr>
<tr>
<td>JOD -</td>
<td>1,429.22</td>
<td>274.03</td>
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</tbody>
</table>
Intelligence Out of the Data

Variables Analysis

<table>
<thead>
<tr>
<th></th>
<th>Sum of KWH</th>
<th>Sum of KG</th>
<th>Sum of Average Temp (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar-12</td>
<td>-367</td>
<td>1978</td>
<td>4521</td>
</tr>
<tr>
<td>Apr-12</td>
<td>1878</td>
<td>2052</td>
<td>3089</td>
</tr>
<tr>
<td>May-12</td>
<td>3507</td>
<td>4428</td>
<td>5691</td>
</tr>
<tr>
<td>Jun-12</td>
<td>5778</td>
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<tr>
<td>Jul-12</td>
<td>223</td>
<td>327</td>
<td></td>
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<tr>
<td>Aug-12</td>
<td>2052</td>
<td>3089</td>
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<td>Sep-12</td>
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<td>Nov-12</td>
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<td>Dec-12</td>
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<td>2052</td>
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</table>
Thank You
Firas Obeido
Questions??