ArdenACCESS

Creating Intelligent Buildings
Enterprise Building Automation System

October 22, 2009
Establish a unique enterprise building automation platform that will distinguish Arden as the unquestioned sustainability leader amongst property services companies.

To provide Arden a platform to manage and operate buildings more efficiently and economically.

The objectives of the Enterprise Building Automation System (BAS) platform are to:

- Collect property level data from existing Building Automation Systems.
- Perform centralized monitoring, reporting and analysis.
- Execute diagnostics and provide alarming/notification.
- Issue commands for afterhours A/C or demand response.
- Allow for remote access and control of the existing Building Automation Systems.
- Enable rapid, portfolio-wide retro-commissioning program.
Intelligent Buildings

An intelligent building uses automation and integration to reach the perfect balance between superior indoor environment and minimizing energy usage and operational labor.
Why Integrated BAS?

• Create Intelligent Buildings
• Sustainable operations
• Real time data
  • Speeds variance reporting
  • Provides immediate verification of whether an operational change is successful
• Reduced operating costs
• Control “drift”
• Process efficiency
  • Total of more than 2,500 man-hrs eliminated
  • As portfolio grows, this statistic will escalate
• Platform for growth and innovation
What is “Drift”? 

•“In telecommunication, a drift is a comparatively long-term change in an attribute, value, or operational parameter of a system or equipment.”
  - (Wikipedia.org)

•For our purposes, “drift” can be considered to be an increase in energy consumption from the optimal building operation due to staff changes, loss of focus and lack of accountability.
Building 1

Electric Utility Provider

Southern California Edison

2006 Energy Consumption Facts

- kWh Usage: 8,227,958
- Billing Amount: $1,116,158
- $ / kWh: $0.136
- kWh / Sq. Ft.: 19.7
- $ / Sq. Ft.: $3.02
- Square Footage: 417,285
Building 1
Percent (%) Drift

***Figures based on kWh Consumption & Operating Performance***

Total Cost of Drift (2002-2006): $817,893*

Optimized, Fully-commissioned Consumption


*Utilizes SCE Utility Rate for 2001
Building 1
Percent Drift vs. kWh / Sq. Ft. / Year

Optimized, Fully commissioned Consumption

**Figures based on kWh Consumption & Operating Performance**
Building 1
$ / Sq. Ft. / Year

Year

* Figure Normalized to 2001 SCE Utility Rate
Building 2

Electric Utility Provider

Los Angeles Department of Water & Power

2006 Energy Consumption Facts

- kWh Usage: 3,095,486
- Billing Amount: $ 380,949
- $ / kWh: $ 0.123
- kWh / Sq. Ft.: 18.7
- $ / Sq. Ft.: $ 2.10
- Square Footage: 174,718
Building 2
Percent (%) Drift

Year

2002-2006: $220,857*

*Figure Normalized to 2001 Utility Rate

***Figures based on kWh Consumption & Operating Performance***
Building 2
Percent Drift vs. kWh / Sq. Ft. / Year

Optimized, Fully commissioned Consumption

Percent Drift vs. kWh / Sq. Ft. / Year

Year

kWh / Sq. Ft. / Year

Percent Drift


24.5% 19.8 21.3% 19.3 17.3 15.9 16.8 17.4 19.3 18.4 18.7

21.1%

8.9% 5.8% 9.5% 15.7%

Figures based on kWh Consumption & Operating Performance
Building 2
$ / Sq. Ft. / Year

* Figure Normalized to 2001 Average Rate
Building 2
Energy Star Rating vs. Occupancy Rate

*Did not apply for Energy Star Label (1998 & 1999)
Building 3

Electric Utility Provider
Burbank Water & Power

2006 Energy Consumption Facts
- kWh Usage: 3,628,789
- Billing Amount: $ 569,514
- $ / kWh: $ 0.157
- kWh / Sq. Ft.: 20.8
- $ / Sq. Ft.: $ 3.38
- Square Footage: 176,668
Total Cost of Drift (2005-2006): $165,296*

***Figures based on kWh Consumption & Operating Performance***
Building 3
Percent Drift vs. kWh / Sq. Ft. / Year

**Percent Drift vs. kWh / Sq. Ft. / Year**

**Optimized, Fully commissioned Consumption**

**Figures based on kWh Consumption & Operating Performance**
Building 3
$/Sq. Ft. / Year

* Figure Normalized to 2004 Average Rate

Low Occupancy Rate of 45.4% Accounts for Low $/Sq. Ft.
Building 3
Energy Star Rating vs. Occupancy Rate

Average Occupancy (%) - Energy Star Rating

Year

*Did not apply for Energy Star Label (1999 - 2000)
** Occupancy must be 75% or Higher to Qualify for Energy Star Benchmark


Occ.**

99% 97 % 78% 75% 45% 94% 86 100% 100% 87

Energy Star Rating

Occupancy (%)

Building 3

Arden realty,
Building 4

Electric Utility Provider
Southern California Edison

2006 Energy Consumption Facts
- kWh Usage:  1,552,320
- Billing Amount:  $ 202,833
- $ / kWh:  $ 0.162
- kWh / Sq. Ft.:  17.2
- $ / Sq. Ft.:  $ 2.65
- Square Footage: 72,113
Building 4
Percent Drift

***Figures based on kWh Consumption & Operating Performance***

Total Cost of Drift (2004-2006): $120,529*

*Utilizes SCE Utility Rate
Building 4
Percent Drift vs. kWh/Sq. Ft./Year

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**Figures based on kWh consumption & Operating Performance**
Building 4
$/Sq. Ft. / Year

Low $/$Sq. Ft. cost due to lower $/$kWh cost. Building consumed more energy than in 2003 and operated at a higher kWh / Sq. Ft.

$1.35
$1.98
$1.73
$1.83
$1.63
$2.02
$2.65

2000 2001 2002 2003 2004 2005 2006

* Figure Normalized to 2004 SCE Utility Rate
Building 4
Energy Star Rating vs. Occupancy Rate

*Did not apply for Energy Star Label (1999)
**Did not qualify for Energy Star Label – Minimum Score of 75 Required
Building 5

Electric Utility Provider
Southern California Edison

2006 Energy Consumption Facts
- kWh Usage: 1,446,858
- Billing Amount: $ 240,948
- $ / kWh: $ 0.167
- kWh / Sq. Ft.: 16.9
- $ / Sq. Ft.: $ 2.53
- Square Footage: 87,647
Building 5
Percent (%) Drift

***Figures based on kWh Consumption & Operating Performance***

Total Cost of Drift (2002-2006): $149,543*

*Utilizes SCE Utility Rate

Optimized, Fully-commissioned Consumption
Building 5
Percent Drift vs. kWh / Sq. Ft. / Year

**Figures based on kWh consumption & Operating Performance**
Building 5
$ / Sq. Ft. / Year

* Figures based on SCE Utility Rates
Building 5
Energy Star Rating vs. Occupancy Rate

Occupancy (%)

Energy Star Rating

Year

*Did not apply for Energy Star Label (1998 & 1999)
**Did not qualify for Energy Star Label – Minimum Score of 75 Required
## Avoided Drift

### EXAMPLE FACILITIES

<table>
<thead>
<tr>
<th>Facility</th>
<th>$ / SF / Yr Min</th>
<th>$ / SF / Yr Max</th>
<th>Difference</th>
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<tbody>
<tr>
<td>Building 1</td>
<td>$2.10</td>
<td>$3.02</td>
<td>$0.92</td>
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<tr>
<td>Building 2</td>
<td>$1.85</td>
<td>$2.12</td>
<td>$0.27</td>
</tr>
<tr>
<td>Building 3</td>
<td>$2.57</td>
<td>$3.38</td>
<td>$0.81</td>
</tr>
<tr>
<td>Building 4</td>
<td>$1.83</td>
<td>$2.65</td>
<td>$0.82</td>
</tr>
<tr>
<td>Building 5</td>
<td>$2.05</td>
<td>$2.53</td>
<td>$0.48</td>
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**Average Difference:** $0.66

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**Square Feet:** 6,000,000

<table>
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<th>Use $.30 per s.f. (conservative):</th>
<th>X</th>
<th>$0.30</th>
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**Total projected annual savings:** $1,800,000.00
Introducing

Arden Access
Enterprise BAS Offerings

The key capabilities of the Enterprise BAS platform are outlined below.

- Remote Access/Property Troubleshooting
- Staff Optimization/Enhanced Training
- Review Real-Time Equipment Status

- Standardized Tenant After Hours A/C
- Tenant Participation in Lowering Consumption
- Increased Revenue
- Perform Load Shedding
- Enhanced Programming (Resets/Schedules)
- Ability to Engage in Demand Response

- Tiered Reporting Specific to Arden
- Property Benchmarking
- View Energy Consumption, Costs
- Examine HVAC Performance/Operation
- Evaluate Carbon Footprint
- Review LEED-EBOM Opportunities

- Improved Retrocommissioning
- Compare Equipment to Pre-defined Conditions
- Identify Energy Inefficiencies & their Financial Impacts
- Perform Equipment Lifecycle Analysis

- Enhanced Fault Detection (automatically identify issues Outside of Pre-Defined Conditions)
- Reduce ‘Drift’
- Improved Response to Alarms
Note: This diagram is intended to depict the future integration options with the ArdenACCESS project. Not all integration depicted is included in the pilot phase of work. Enterprise BAS pilot includes integration with property BAS and, if needed, with InfoCentre.
Roadmap Overview

**ANALYZE**
- Project Impacts
- Benchmarking
- Performance Goals

**ACT**
- Identify Projects
- Define Project Value
- Select Project
- Execute Project
- Project Completed

**COLLECT & REPORT**
- Extract
- Transform
- Load
- Generate Reports

**Enterprise BAS**

**Roadmap Process**
1. **Executive Mgmt**
2. **Business Unit**
3. **Operations**
Enterprise Reporting Framework

Reporting Hierarchy
To address Arden’s reporting needs, we have chosen a three-tiered approach recognizing different roles and levels require different details of information—levels include executive, manager, and team staff. All levels may desire drill down capabilities at different levels, rates, and interests in the outlined performance metrics.
Key in the proposed reporting framework is the need to present information at a corporate, business unit, and property level.
Enterprise Dashboard
92.85 BTU/hr
15,219,510.02 kWhr

ACME Total Load

Outside Temperature

6,371.05 kW

78.5 °F

ACME Corporation-Electrical Power (kW)

Arden realty