Sustainable Design of Building Automation Systems

Presented By
Patrick Winkelman
V.P. Business Development
Distech Controls Inc.
Sustainable Design
Building Management Systems

• **Sustainability** is the capacity to endure (to continue in the same state)

• **REALITY** ! **Sustainability** is the capacity to continue in the same state as long as practical
The Value of Sustainability Building Management Systems

Why?

– Extended life = Greater ROI
– It is the nervous system of the Building
– Creating a better world
The Value of Sustainability Building Management Systems

Why? Less Obvious Reasons

• Reduction in energy cost
  – Poorly maintained, operated and malfunctioning BMS increases energy usage and demand rates

• Incorporate new technology
  – Artificial intelligence analytics
  – Smart curtailment programs
  – Graphical user interface
The Value of Sustainability Building Management Systems

Why? Less Obvious Reasons

• Reduction in Operating cost
  – Poorly operated and malfunctioning BMS increases operating costs

• Improved comfort

• Lower liability
Existing Expectation of a BMS

• **Existing life cycle of BMS is 10 years average**
  – Why
    • Planned obsolesce of manufacturer
    • Proprietary products
    • Lack of repair parts
    • Outdated operating systems
    • Advancing technology
    • Lack of available knowledge
    • Lack of available service

• **Potential life of the BMS should match that of the equipment it is controlling**
  – Mechanical and lighting systems life is 25 – 30 years
Expectations of a Sustainable BMS

- Continuous availability of the majority of system components (hardware and software) compatible with the original system
Expectations of a Sustainable BMS

• Availability of information
  – All information openly
  – Training
  – Leads to multiple sources of support, service and expansion
Expectations of a Sustainable BMS

• Expansion of the BMS
  – Newer BMS components need to be compatible with the older system components
    • Building level controllers
    • Field level controllers
Planning for a Sustainable BMS

• Require Open System Standards
  – Protocols
  – Certifications
  – Protocols in themselves do not always create an open system
Planning for a Sustainable BMS

• Require Open System Standards
  – One standard tool to manage different manufacturers’ devices equally
  – Interchangeable Network Controllers
Planning for a Sustainable BMS

- **Open System Business Practices**
  - By the Manufacturer and Controls System Integrator
  - Multiple Sources of Supply, Service and Support
  - Availability of training from multiple sources
  - Open Access to information

- Without the Manufacturer supporting an Open Solution through their business practices the sustainability of a system is diminished
Planning for a Sustainable BMS

- **Attention to Detail is Critical**
  - A partial Open System = a Less Sustainable System
  - Educate yourself
- **Define your needs and requirements upfront**
  - Create a master plan
- **Prequalify**
  - Consulting Engineer
    - Seek out Consulting Engineers who specialize in Building Automation
    - Building Automation Systems and underlying technology
    - System Integrator
- **Validate**
  - Look at examples of Open & Sustainable Building Automation Systems
  - In-depth review and verification of submittals and completed system
- **Make your own Decision**
  - Have the BAS proposal provided direct to the Owner or GC
    - Do not let the Mechanical Contractor make the decision for you

*AN SUSTAINABLE BUILDING MANAGEMENT SYSTEM IS YOUR RESPONSIBILITY*
St-Vincent Health System
A Sustainable BMS Example
St-Vincent Health System
A Sustainable BMS Example

• Located in the Little Rock Arkansas area
  – 5 Campuses
  – 1 Medical Office Building
  – Region wide network of Clinics
  – Second largest Catholic health system in the United States and the fifth largest US health system overall
The Challenge

- Multitude of Buildings with no centralized monitoring or practices
- Escalating energy and operating cost
- Obsolete HVAC equipment and building automation controls
  - Lack of knowledge
  - Single source for support and expansion
- Building technology decisions were being made by MEP and Mechanical Contractor with no long term Master Plan
- No integration among various systems and buildings
The Solution

• Owner involvement
  – Educated themselves on BAS Open System Solution
  – Worked with MEP firm and Local System Integrator to design new specifications
• Clear standards for BAS
  – LonTalk and LonMark controller, Niagara Framework for network management and Graphics
  – Prequalified System Integrators
  – BAS is provided as a separate quotation in Mechanical numbers.
  – Developed Master Plan for BAS for all facilities
The Implementation

• Phased replacement of the existing BAS with
  – Distech Controls EC-Net AX BAS and LonMark Certified controllers:
    • 600 + Controllers
    • 7,000 + points
    • Multiple Web user interfaces
    • Continued expansion to all facilities
  – Integration to existing systems where practical using LonTalk, BACnet and Modbus
  – Centralized management of all facilities
    • Scheduling
    • Alarm management
    • Service scheduling
    • Energy management
Customer Benefits

• Reduced cost of Operations
  – Energy savings of over $1 million annually since the start-up of the retrofit (2002)
  – Multiple and Competitive sources for expansion and service
  – More efficient workforce
  – Improved maintenance
  – Consistent improved performance of systems
  – Continuous optimization

• Consistent delivery of high standards of BAS

• Level of quality, convenience and comfort benefits all who work in or visit the facilities

• Improved sustainability of their operations
Innovative Solutions for Greener Buildings

Booth N4862
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LONMARK assembles the pieces.
AHR Expo | January 31-February 2, 2011 | Las Vegas, Nevada
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Energy, Efficiency, Sustainability: Best Practices

LONMARK assembles the pieces.

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Savings That Are Not on the Spreadsheet

Asset protection

- worth 5% of real asset value
  - Real estate
  - Equipment

Indoor environmental quality and employee productivity

- worth 7% of labor cost
  - Ventilation
  - Conditioning
  - Lighting levels
  - Noise levels
Savings That Are Not on the Spreadsheet

Future-proof systems benefits

- Adaptability to the unplanned
- Business requirements response time
- Regulatory requirements/opportunities
- New conservation opportunities
- New technologies

Corporate cultural benefits

- Productivity and profit
Energy, Efficiency, Sustainability - Best Practices

Three Keys to Successful Real World LonWorks Implementations

LONMARK assembles the pieces.

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Three Keys to Successful Real World LonWorks Implementations

• Understanding Customer Needs

• Designing a Solution to Match Those Needs

• Implementation
Understanding Customer Needs

- As proposed by the project sponsor.
- As specified in the project request.
- As designed by the senior architect.
- As produced by the engineers.
- As installed at the user's site.
- What the customer really wanted.
How Does Energy Impact Their Business?
How Does Energy Impact Their Business?

C-Store Energy Consumption

Quick Serve Restaurant Energy Consumption
What is Their Current Energy Strategy?

Mains Panel w/manual RTU controls & labels

All lighting is manually controlled by store personnel and is color coded.
What is Their Current Energy Strategy?
Designing a Solution to Fit Their Needs
Designing a Solution to Fit Their Needs

- HVAC
- Lighting
- Power Line Router
- LonWorks Server
- Kitchen Equipment
- Store Computer
- Corporate
- Remote Users, Service Agents, etc.
- Alert/Maintenance
- Equipment Stats
- Internal
- Interface
- LonMark Americas
Designing a Solution to Fit Their Needs
Designing a Solution to Fit Their Needs

<table>
<thead>
<tr>
<th>Zone</th>
<th>Current Temperature</th>
<th>Current Humidity</th>
<th>Temperature Setpoint</th>
<th>Supply Air Temperature</th>
<th>Heat / Cool Stages</th>
<th>Fan Status</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTU-A Basement</td>
<td>70 °F</td>
<td>51 %</td>
<td>62 °F</td>
<td>73 °F</td>
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<tr>
<td>RTU-B Kitchen S.</td>
<td>75 °F</td>
<td>50 %</td>
<td>75 °F</td>
<td>58 °F</td>
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<td>50 %</td>
<td>65 °F</td>
<td>60 °F</td>
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<tr>
<td>RTU-F Dining Room</td>
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<td>55 %</td>
<td>75 °F</td>
<td>76 °F</td>
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</tbody>
</table>
Implementation Strategy

- **Site Survey**
  Designing a survey process that is simple to follow
  Captures all critical information

- **Product Kitting**
  Bringing all product to a central location
  Powering up and testing before shipment to the site

- **Centralized Commissioning**
  Assembly line methodologies
  Use/Design automated tool sets
Implementation Strategy

- **Post check out**
  
  Process to test system after installation
  Ownership sign off

- **Training**
  
  Site training for all Owners/Managers
Value-Added Energy Solution Advisors

“We envision a world where everything electrical is interconnected into a single communicating network.”