Impacting Patient Care by Optimizing Operations & Reducing Energy Usage
The Horizon Health Network Experience

September 17, 2018
Energy Consumption

Patient Comfort
Management Commitment
Assess Current Situation
Set Goals & Targets
Implementation & Operation
Checking
Continual Improvement
Review & Evaluate

People
Technology
Information

*ISO 50001
Energy Management Information Systems (EMIS)

Acquire  Analyze  Action
EMIS Example
Whole Building Demand Reduction

Natural gas nearing daily demand limit
Fuel switch to NG
Fuel switch to oil

$2000/month
EMIS Example Infrastructure

Steam Energy

373,710 lb

Consumption for November 2014

10,000-12,000 lbs

20,000+ lbs

Low Usage: 11,143.49 lb or lower
Average Usage: 16,441.15 lb
High Usage: 19,738.87 lb or higher
$150,000/yr
DATA and more data......
Relying on people....
Building Analytics

Existing Building

HVAC Zone, Plant & Auxiliary Equip.

Data

Analytics

Alerts

PC, Email, Mobile

Horizon Health Network

Service New Brunswick
• 30 data points in 1 Air Handling Unit (AHU)

• Each data point has data in 5 minute sample intervals

• Daily, that’s 288 samples per point (12 samples per hour*24)

• On 30 data points (1 AHU) that’s 8,640 samples per day (288*30 points)

• In an average month that’s 259,200 samples (8,640*30 days)

• For 1 year, we’re talking about 3,153,600 samples (8,640 * 365), 150,000,000 samples in Horizon’s 2 hospitals in question – just in AHUs!
**Example: What is a HVAC System Fault?**

AHU Outside Air Damper is Leaking (mechanical system fault)

- Should be re-circulating pre-conditioned air
- No BAS alarms are triggering
- Occupants do not complain: Zones at setpoint
- Operator believes everything is working great
- Energy Waste Built Into Energy Baseline

**Leaking Damper!**
Data: Machines are just better at it

- Mixed Air & Return Air Temperature Sensor **Delta T > 2 degrees**

- Delta T does not track to damper position closely enough

**Delta T > 2 Degrees?**

**Recommended Actions:**

1. Input sensor(s) faulty or mis-calibrated. Verify input sensor(s) operation.
2. Mixed air damper stuck and/or leaking. Verify damper/actuator operation.

**Damper position?**
Typical Results Achieved

From hundreds of projects (many in health care):

- ~18% total building energy reduction average
- ~60% HVAC maintenance labor savings
Results Achieved to date this year

5% Energy Cost Avoidance
18 AHUs optimized.

2% Energy Cost Avoidance
3/32 AHUs optimized
Outcomes & Benefits

Energy Conservation and Efficiency
Increase Reliability
Improve Patient Comfort Levels (Humidity and Thermal)
Reduce Carbon Dioxide
Reduced Maintenance
Prolong Equipment Life
Tackle Deferred Maintenance
M&V Initiatives
Golden Standard Insight Digest Report
Miramichi Regional Hospital
Monday, April 10, 2017

Golden Standard Insight Digest Report
Apr 02, 2017 to Apr 10, 2017

<table>
<thead>
<tr>
<th>Priority</th>
<th>System</th>
<th>Description</th>
<th>Number of Insight Triggers</th>
<th>Date of Last Trigger</th>
<th>Insight Type</th>
<th>Insight ID</th>
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<tbody>
<tr>
<td>-</td>
<td>AHU16 RELIEF DMP is different from Golden Standard</td>
<td>Manual Override Value</td>
<td>5</td>
<td>2017-Apr-08</td>
<td>Golden Standard</td>
<td>701600.BO1102</td>
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<td>-</td>
<td>Lobby Lights is different from Golden Standard</td>
<td>Manual Mode</td>
<td>7</td>
<td>2017-Apr-08</td>
<td>Golden Standard</td>
<td>700600.BV31</td>
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<td>-</td>
<td>VFPisable is different from Golden Standard</td>
<td>Manual Mode</td>
<td>7</td>
<td>2017-Apr-08</td>
<td>Golden Standard</td>
<td>702216.BV16</td>
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<tr>
<td>-</td>
<td>RM 1560 UH RAD VLV OPEN is</td>
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<td></td>
<td></td>
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</table>
## Insights - Schedules

Golden Standard Insights Digest  
Saint John Regional Hospital  
Tuesday, May 15, 2018

### Golden Standard Insights Digest

May 06, 2018 to May 15, 2018

<table>
<thead>
<tr>
<th>Priority</th>
<th>System</th>
<th>Description</th>
<th>Number of Insight Triggers</th>
<th>Date of Last Trigger</th>
<th>Insight Type</th>
<th>Insight ID</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td><strong>SPD AC-2 SCH</strong> is different from Golden Standard: Schedule</td>
<td>2</td>
<td>2018-May-07</td>
<td>Golden Standard</td>
<td>50002.SCH1</td>
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<td></td>
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<td><strong>SJRH DAL MED OCC SCH</strong> is different from Golden Standard: Schedule</td>
<td>2</td>
<td>2018-May-07</td>
<td>Golden Standard</td>
<td>56200.SCH1</td>
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<td><strong>AHU2 OCC SCH</strong> is different from Schedule</td>
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</table>
Insights – Equipment cycling

Digital:

- CHWP5 PST BV TL
- CHWP6 PST BV TL
- CHWP7 PST BV TL

Left Axis:

- CHWP5 KW TL
- CHWP6 KW TL
- CHWP7 KW TL

Digital:

- CHWP5 PST BV TL
- CHWP6 PST BV TL
- CHWP7 PST BV TL

24 Mar  26 Mar  28 Mar  30 Mar  01 Apr  03 Apr  05 Apr  07 Apr  09 Apr  11 Apr  13 Apr
Energy and Building Analytics
Static Pressure Reset

$40,000/annually
Dashboards
Cost Avoidances / Customization
Energy and Building Analytics
Outside air to reduce mechanical cooling

Cooling coil operating
OAT 0-12C
MAD set at constant 30%
Energy and Building Analytics
Outside air to reduce mechanical cooling

- Modulating MAD
- OAT 4-19C
- $5000/month (shoulder seasons)
- No mechanical cooling
Challenges

- Network
- Infrastructure
- Funding
- Time
- People
- System Limits
- Staff Engagement
- Management Support
- Collaboration
Challenges – Networking Issues, Funding, Collaboration

<table>
<thead>
<tr>
<th>Priority</th>
<th>System</th>
<th>Message</th>
<th>Type</th>
<th>Weekday</th>
<th>Occurred</th>
</tr>
</thead>
</table>
| Medium   | N/A    | Detected 1 problem in DEV702400  
1 Schedule Out-Of-Service (SCH1) | Wednesday | Aug 08, 2018 12:33 am |
| N/A      | N/A    | Detected 1 problem in DEV700500  
1 Input Out-of-Service (BI2002) | Wednesday | Aug 08, 2018 12:33 am |
| N/A      | N/A    | Detected 1 problem in DEV701600  
1 Input Uncommissioned (AI1304) | Wednesday | Aug 08, 2018 12:33 am |
| N/A      | N/A    | Detected 2 problems in DEV701603  
1 Program In-Fault (PFB)  
1 Input In-Fault (A1101) | Wednesday | Aug 08, 2018 12:33 am |
| N/A      | N/A    | Detected 3 problems in DEV703201  
3 Input Uncommissioned (P12, P13, P14) | Wednesday | Aug 08, 2018 12:33 am |
| N/A      | N/A    | Detected 1 problem in DEV701100  
1 Input Uncommissioned (Au2001) | Wednesday | Aug 08, 2018 12:33 am |
| RM 1566  | N/A    | Detected 1 problem in DEV703164  
1 Trend Log In-Fault (TL3) | Wednesday | Aug 08, 2018 12:33 am |
Challenges – Staff Engagement

- Shiftwork
- Training
- Management
- Collaboration
- Workload and Priorities

People
Technology
Information
Challenges – Manual Override

SJRH S2-6 MAD is different from Golden Standard:
- Manual Override Value

Meter data shows negative or null values.

Priority: High  System: N/A  Message:

Type:  Weekday: Tuesday  Occurred: Aug 14, 2018 02:42 am  State: Active
Challenges – Resources and Insights

Saint John Regional Hospital: Dashboard

![Building Profile](image)

CopperCube Status:
- Online

Building Address:
- 400 University Ave

Location:

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<th>Type</th>
<th>Weekday</th>
<th>Occurred</th>
<th>State</th>
</tr>
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<tbody>
<tr>
<td>High</td>
<td>34</td>
<td>41-64 RHC is different from Golden Standard: Direct/Reverse Acting</td>
<td>🔴</td>
<td>Tuesday</td>
<td>Aug 21, 2018 02:44 pm</td>
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<td>High</td>
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<td>SJRH 51-6 MAD is different from Golden Standard: Manual Override Value</td>
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<td>Wednesday</td>
<td>Aug 22, 2018 02:19 am</td>
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<tr>
<td>High</td>
<td>53</td>
<td>SJRH 52-7 MAD is different from Golden Standard: Manual Override Value</td>
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<td>Wednesday</td>
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<td>High</td>
<td>27</td>
<td>SJRH 52-4 MAD is different from Golden Standard: Manual Override Value</td>
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<td>Wednesday</td>
<td>Aug 22, 2018 02:38 am</td>
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<td>High</td>
<td>34</td>
<td>SJRH 50-6 MAD is different from Golden Standard: Manual Override Value</td>
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<td>Aug 22, 2018 02:36 am</td>
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<td>High</td>
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<td>Oncology CT AC-1 CWP Speed is different from Golden Standard: Manual Override Value</td>
<td>🔴</td>
<td>Tuesday</td>
<td>Aug 21, 2018 02:37 am</td>
<td>Active</td>
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<tr>
<td>High</td>
<td>34</td>
<td>$4.4 Cig Vv Delta Mgr Status is different from Golden Standard: Manual Mode</td>
<td>🔴</td>
<td>Tuesday</td>
<td>Aug 21, 2018 01:41 pm</td>
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<td>High</td>
<td>34</td>
<td>N-SJRH CHILLER #1 ALARM EV is different from Golden Standard: Manual Mode</td>
<td>🔴</td>
<td>Tuesday</td>
<td>Aug 21, 2018 12:15 pm</td>
<td>Active</td>
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</table>
Delegate ownership and engage

Manage the workload / Follow the Process

Communicate / Celebrate

Find the champions
Lessons Learned
Engage, Delegate and Follow the Process

Pilot Site/Measure
- Keep Manageable (ONE Measure on ONE System)
- Benchmark
  - Implement and Operate
  - Track
- M&V
  - Document Lessons Learned
  - Report Results
  - Engage Staff and Support
- Apply Lessons and Communicate Success
  - Role Out Measure on Additional Systems
  - Continuous Improvement Process
  - Role out new Measures
- Additional Sites
  - Engage Other sites
  - Repeat Process
  - Apply Results and Lessons Learned
  - Collaborate Resources
  - Continue

Engage Staff and Support
- Apply Lessons and Communicate Success
- Role out new Measures
- Collaborate Resources

Lessons Learned
Engage, Delegate and Follow the Process
Lessons Learned
Celebrate and Communicate

on hospitals benefit from using Energy Dashboards

2014, the Horizon Energy dashboard tool was installed at the Miramichi Regional Hospital. The tool helps to track energy consumption and identify areas for improvement. The dashboard tool has been successful in reducing energy consumption by 10% and improving overall operational efficiency. The dashboard tool has been well-received by the hospital staff, leading to increased awareness of energy conservation.

Brian Gallant @BrianGallantNB
Making schools & hospitals more energy efficient, will reduce operating costs, provide energy savings.

Lessons Learned:
- Celebrate and communicate successes and improvements.
- Use dashboard tools to track energy consumption and identify areas for improvement.
- Increase awareness of energy conservation practices.

So proud of the great work of our Facilities and Engineering team. They are truly stewards of our environment!
Thank you!

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