

# **Enterprise Energy Management as a Risk Mitigation Strategy**

**Michael Donaghy**

**MBTA**

**Manager of Energy Efficiency**

**Boston, MA**

# Enterprise Energy Management as a Risk Mitigation Strategy

- **Agenda**
  - Background
  - The Challenges
  - The Solution
  - The Implementation
  - Early Results, Lessons Learned & Next Steps



# Enterprise Energy Management as a Risk Mitigation Strategy

- **Background - Service**
  - 400 Million Trips Annually
  - 2,000 Revenue Vehicles
  - 275 Stations
  - 27 Maintenance Facilities
  - 48 Traction Power Substations



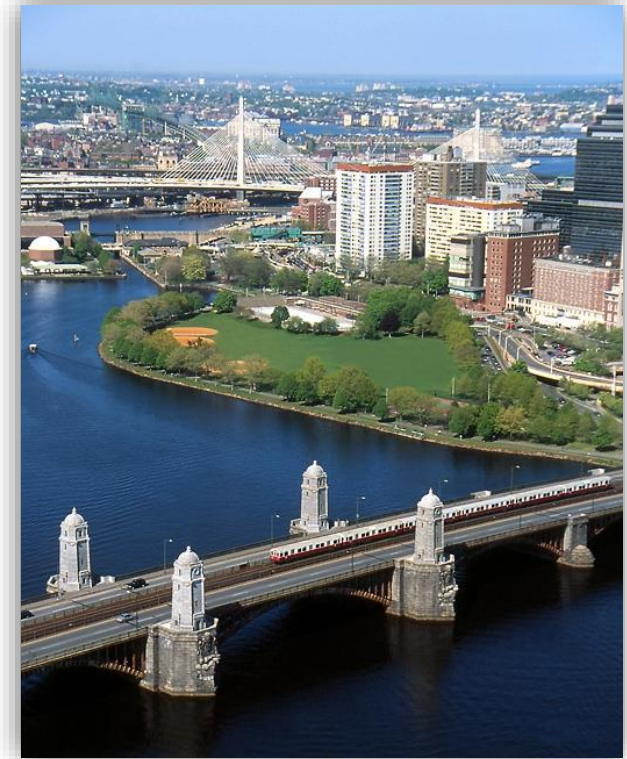
# Enterprise Energy Management as a Risk Mitigation Strategy

- Background – Utility Consumption (CY 16)
  - Electricity: 418,000,000 kWh
  - Natural Gas: 1,808,000 therms
  - Water: 91,000,000 gal
  - Annual Spend: \$36.0M



# Enterprise Energy Management as a Risk Mitigation Strategy

- The Challenges
  - Power Distribution Network
  - Price of Electricity
  - Pay and File Management System
  - Centralized Utility Budget

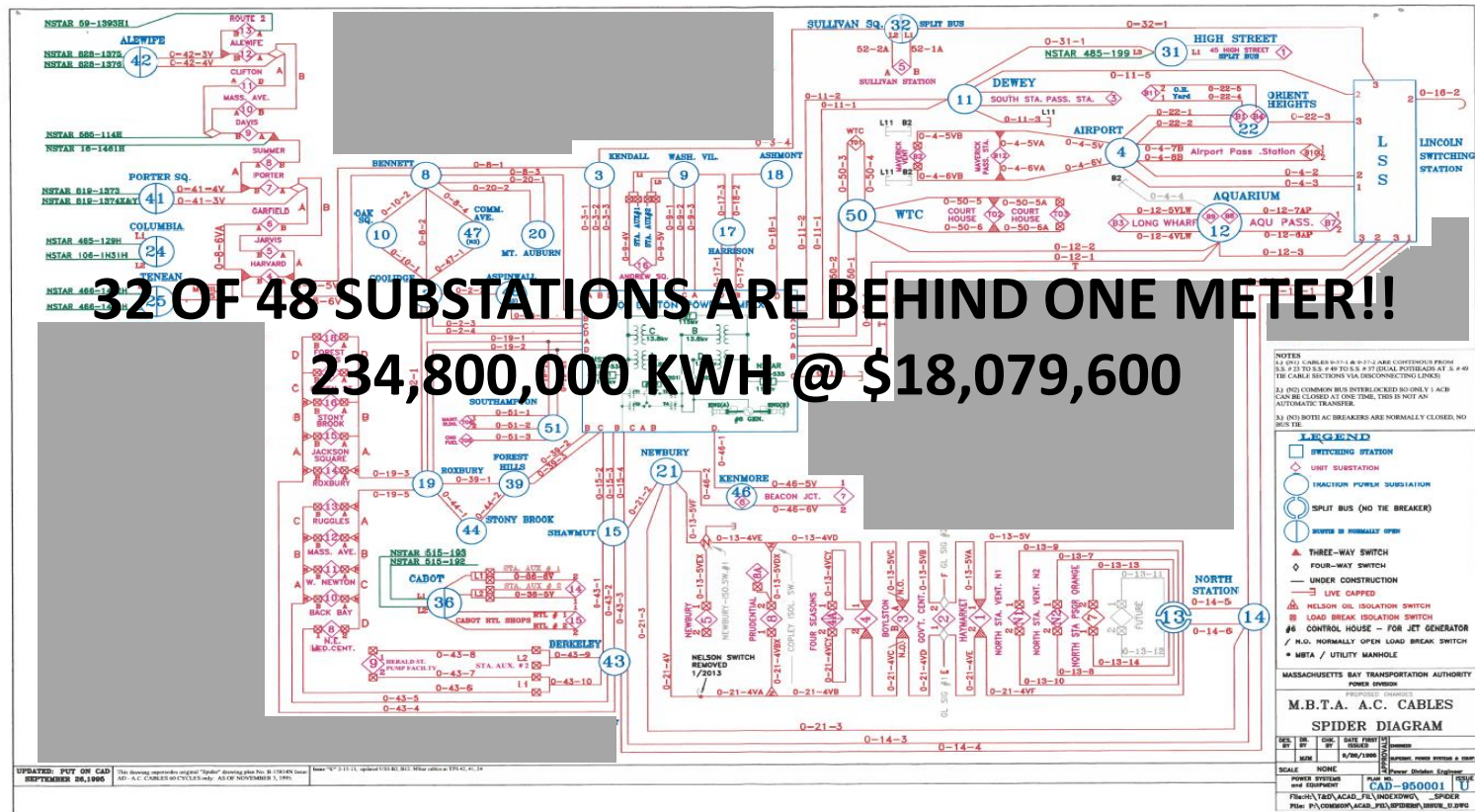






# Enterprise Energy Management as a Risk Mitigation Strategy

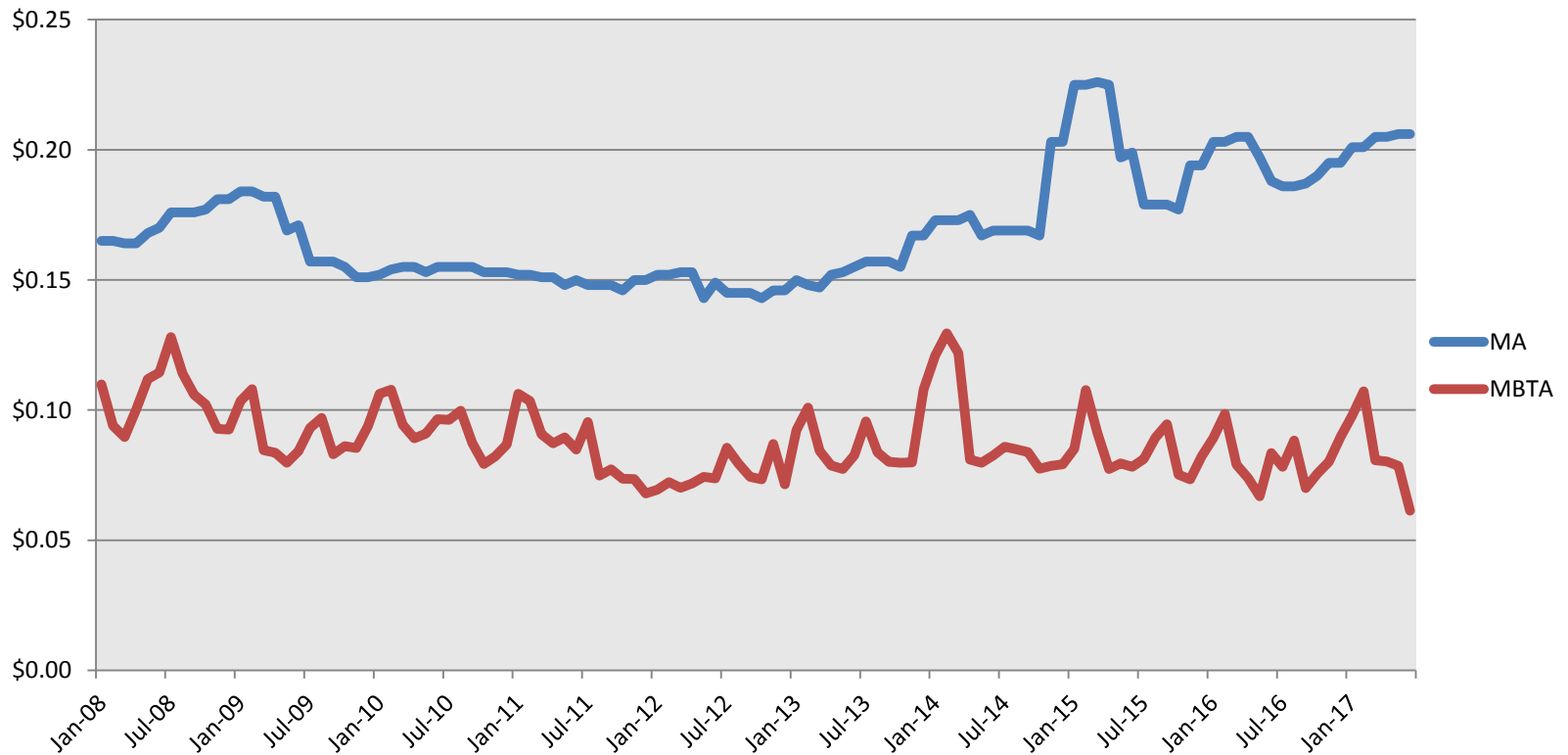
- The Distribution Network



# Enterprise Energy Management as a Risk Mitigation Strategy

- The Price of Electricity

Comparison of MBTA Electricity Rate vs. MA Retail Rate Jan 08 - Present





# Enterprise Energy Management as a Risk Mitigation Strategy

- *The Pay and File Management System*
  - Receive the invoice, pay it and file it
  - Little or no analysis
  - No follow up to address consumption issues
  - How much energy is being wasted?



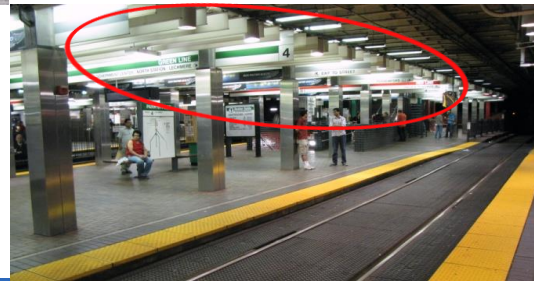
# Enterprise Energy Management as a Risk Mitigation Strategy

- Centralized Budget Results In...



← Building Systems  
On 24/7

Over Engineering  
& Legacy  
Installations →



← Quick Fix Over  
Qualitative  
Approach



# Enterprise Energy Management as a Risk Mitigation Strategy

- The Solution - Enterprise Energy Management System (EEMS)
  - Centralized, Accurate & Transparent Data
  - New EE Opportunities, Verify Savings, Reduce GHG
  - Benchmarking and Load Shaping
  - Analyze Work Processes and Scheduling
  - Assign GHG Impacts of Operations
  - Identify Issues or Reward Efficient Use



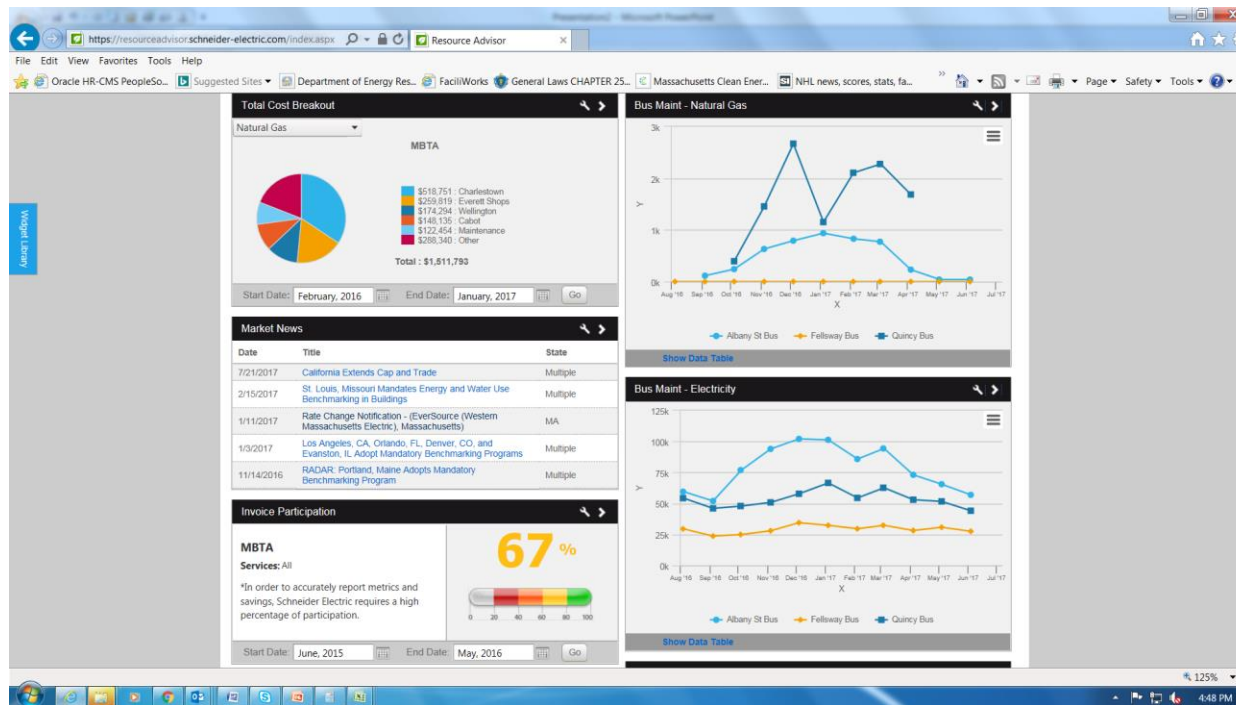
# Enterprise Energy Management as a Risk Mitigation Strategy

- **The Implementation**
  - What Does EEMS Look Like?
    - Business As Usual
    - Comprehensive (Software & Hardware)
    - Pilot Project
    - Finding a Happy Medium
      - Business Value, Scope & Budget



# Enterprise Energy Management as a Risk Mitigation Strategy

- Early Results
  - Dashboard Format Allows for Ease of Access





# Enterprise Energy Management as a Risk Mitigation Strategy

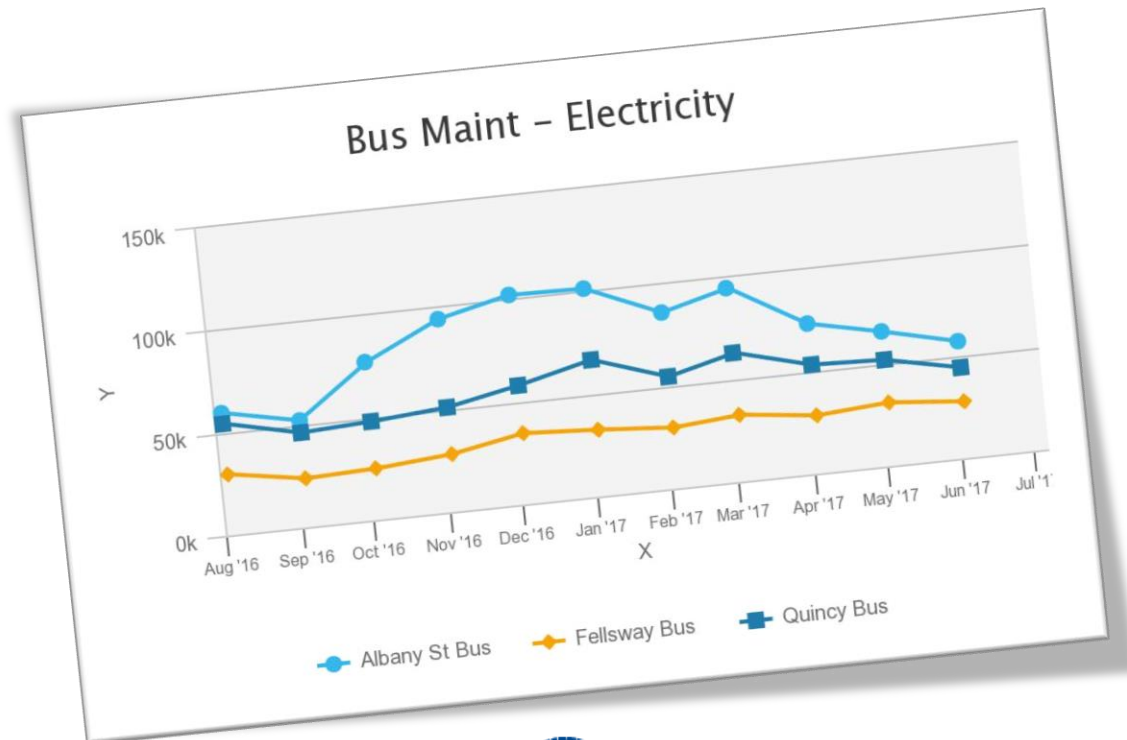
- Early Results
  - Energy Efficiency Project Planning

<input type="checkbox"/>	Project Title	Participants	Start Date	End Date	Project Returns (ROF, ROR, IRR) %	Cost	Savings	Service/Metric	Status	Project Level
<input type="checkbox"/>	Red Line Track Heater Control	45 High St	Feb 17	Aug 17		\$700,000	\$84,295	Electric Power	Proposed	Division
<input type="checkbox"/>	Orange Line Track Heater Control	Malden Center Station	Mar 17	Sep 17		\$3,950,000	\$475,607	Electric Power	Proposed	Division
<input type="checkbox"/>	Reservoir Yard	Reservoir	Apr 17	Oct 17		\$10,230	\$4,697	Electric Power	Proposed	Division
<input type="checkbox"/>	Oak Grove Parking Lot	Oak Grove Station	May 17	Nov 17		\$12,220	\$12,488	Electric Power	Proposed	Division
<input type="checkbox"/>	Wollaston Parking Lot	Wollaston Station	Jun 17	Dec 17		\$14,040	\$4,464	Electric Power	Proposed	Division
<input type="checkbox"/>	Cabot Rail PITS	Cabot	Jul 17	Jan 18		\$93,000	\$18,790	Electric Power	Proposed	Division
<input type="checkbox"/>	Lake Street Rail PITS	Lake St Maintenance	Aug 17	Feb 18		\$7,800	\$922	Electric Power	Proposed	Division
<input type="checkbox"/>	Courthouse DCR Recessed Cans	Courthouse Station	Sep 17	Mar 18		\$1,650	\$6,559	Electric Power	Proposed	Division
<input type="checkbox"/>	45 High DCR Recessed Cans	45 High St	Oct 17	Apr 18		\$2,392	\$6,420	Electric Power	Proposed	Division
<input type="checkbox"/>	Everett Main Shop	Everett Shops	Nov 17	May 18		\$203,220	\$64,138	Electric Power	Proposed	Division
<input type="checkbox"/>	Green Line Pendant Project	Cooks Junction	Dec 17	Jun 18		\$274,540	\$50,904	Electric Power	Proposed	Division
<input type="checkbox"/>	Davis Station	Davis Station	Jan 18	Jul 18		\$272,267	\$11,463	Electric Power	Proposed	Division
<input type="checkbox"/>	Porter Station	Porter Station	Feb 18	Aug 18		\$341,761	\$14,827	Electric Power	Proposed	Division
<input type="checkbox"/>	Harvard Station	Harvard Station	Mar 18	Sep 18		\$1,039,279	\$77,471	Electric Power	Proposed	Division
<input type="checkbox"/>	Cabot RTL WASHBAY	Cabot	Apr 18	Oct 18		\$77,625	\$14,297	Electric Power	Proposed	Division
<input type="checkbox"/>	Southwest Corridor	Ruggles Station	May 18	Nov 18		\$419,640	\$18,998	Electric Power	Proposed	Division
<input type="checkbox"/>	Central Station	Central Station	Jun 18	Dec 18		\$298,960	\$12,444	Electric Power	Proposed	Division
<input type="checkbox"/>	Kendall Station	Kendall Station	Jul 18	Jan 19		\$255,792	\$11,263	Electric Power	Proposed	Division
<input type="checkbox"/>	Charles MGH Station	Charles/AMGH Station	Aug 18	Feb 19		\$209,601	\$16,705	Electric Power	Proposed	Division
<input type="checkbox"/>	Park St Station	Park St Station	Sep 18	Mar 19		\$277,353	\$30,317	Electric Power	Proposed	Division
Total						\$8,461,370	\$937,089			



# Enterprise Energy Management as a Risk Mitigation Strategy

- **Early Results**
  - Deploy System Wide Energy Data to End Users



# Enterprise Energy Management as a Risk Mitigation Strategy

- **Lessons Learned**
  - Make Sure Your Bid Spec is Detailed!
  - Set Short and Long Term Expectations at the Outset
  - Meet Frequently to Address QA/QC from Both Sides
  - Data Integrity Requires Constant Oversight



# Enterprise Energy Management as a Risk Mitigation Strategy

- Next Steps
  - Continue to Develop Data Sets
    - To Improve GHG Reporting
    - Include Fuel Consumption and Recycling
  - Begin Employee Training
  - System-wide Assessment for Sub-Metering Implementation



# THANK YOU!

Michael Donaghy  
MBTA

Manager of Energy Efficiency  
[mdonaghy@mbta.com](mailto:mdonaghy@mbta.com)  
617-222-1684

APTA Sustainability & Multimodal Workshop 2017

Maximizing the Value of Sustainable Projects

