Presentation to
WAC and WSCAC

“Going Green, Staying Green”
MWRA’s Energy Initiatives

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• Energy Usage Overview
• Examples of Energy Conservation Projects Implemented by MWRA
• Renewable Energy Projects at MWRA Facilities
Water And Sewer Is An Energy Intensive Business

• MWRA’s total annual energy use (as of FY13) – 205.5 MWh and 450,725 therms (electricity and natural gas only). Equivalent to 18,500 homes.
  – MWRA’s total electricity cost accounts for nearly 81% of all utilities (not including water)

• MWRA’s costs for natural gas, electricity and diesel fuel
  – $15 M (8.4% of total direct expenses) in FY02
  – $21.0 million (10.1% of direct budget) in FY13

• Deer Island Treatment Plant accounts for 60 % of MWRA’s energy budget
MWRA Approach to Energy Conservation

• Conduct energy audits through utility sponsored programs
• Identify “low-hanging fruit” first
• Specify Standard Premium Efficiency Motors
• Modifications to HVAC Systems, where possible
• Use VFDs where applicable
• Use Standard Specifications in RFPs
• Coordinate with Capital Improvements Program
• Optimize Utility Rebate Program
Facility Energy Efficiency Audits

Completed Projects

Project Currently Underway

Facilities Audited, Project Being Evaluated
Examples of Operational/Energy Conservation Measures Taken

• Turned off soda ash mixers at the Carroll Water Treatment Plant - resulting in 1.8 million kWh/yr savings
• Adjusted main pump station shaft height resulting in 4.4 million kWh/yr savings
• Set-back ventilation at one headworks resulting in 43,000 gal. fuel savings and 66,000 kWh savings, annually.
• Installed exterior LED lights at Chelsea HQ facility, reducing kWh by 60% over previous metal halide lights.
• Installed an EMS in Chelsea Headquarter buildings resulting in a 33% reduction in natural gas usage during the winter.
• Installed VFDs on pumps at a water pump station, reducing kWh per million gallons pumped by 55%.

Total Monthly kWh Usage at the Chelsea Admin. Facility Over 6 Year Period

- **Month**:
  - Jan-08 to Jul-13
- **kWh**:
  - 0 to 300000
- **Graph Annotations**:
  - Red line: Total kWh
  - Black line: Linear (Total kWh)
Lighting at Deer Island

- **DITP Interior Lighting**
  - Phases 1, 2, 4 - complete
    - Total savings ~ 3M kWh/yr
    - MWRA Paybacks approx 2-3 yrs
  - Phase 5 - ongoing
    - Savings ~ 100,000 kWh/yr
    - MWRA Payback approx 7 yrs
  - Phase 3 Lighting controls - future
    - Savings ~ 300,000 kWh/yr

- **DITP Exterior Lighting**
  - Phases 1, 2 – complete
    - Total savings ~ 174,000 kWh/yr
    - Paybacks approx 3-6 yrs
Capital Projects

- VFDs are being installed on the pumps at Gillis Pump Station in 2014, as part of larger rehabilitation.
  - 927,000 kWh/year savings
  - $178,000 incentive payment
Capital Projects

- **Secondary Optimization - Installation VFD’s Stages 5 & 6**
  - $2.24M total cost
  - 3.1 million kWh/yr savings
  - $930,000 incentive payment
  - Payback 5 yrs

- **DITP NMPS VFD/motor**
  (project for asset protection)
  - 730,000 kWh/yr savings
  - $219,000 incentive payment
Capital Projects

- Sludge Pump Replacement
  - Replace positive displacement pumps with centrifugal pumps
  - 200 hp overall reduction
  - 790,000 kWh/yr savings
MOU Highlights

- Includes preliminary list of energy efficiency projects for implementation CY14-16. List will be updated periodically.

- Goal is to reduce electrical demand from NSTAR by 15% - almost 18,000,000 kWh.

- NSTAR/NU to pay MWRA a minimum of $0.30 per kWh saved.

- Predominantly, stand-alone energy efficiency projects include:
  - Lighting improvements
  - Pump/Motor efficiency improvements
  - HVAC

- Helps funds projects that MWRA would implement anyway (e.g. asset protection and replacement needs, other incentives and directives).
Energy From Renewables

- Of MWRA’s total energy profile (in $), over 45% is derived from renewable sources

MWRA Energy in $
Deer Island is one of the largest electricity users in the Northeast.

Deer Island currently self-generates 26% of its electricity needs.

More than half of the plant’s energy demand is provided by on-site, renewable generation.
Hydroelectric Power

- Cosgrove, Oakdale, Loring Rd, Deer Island
- Over 8MW Capacity
- Approximately 23 MWh/yr electricity production
- Over $1.8M/yr savings and revenue
Wind Power

- Deer Island, Charlestown (Delauri Pump Station)
- 2.8 MW Capacity
- Over 5 MWh/yr electricity production
- Approximately $575,000/yr savings and revenue
Solar Power

- Deer Island, CWTP
- Over 1.2 MW Capacity
- Over 1.4 MWh/yr electricity production
- Approximately $242,000/yr savings and revenue
Maximizing Grants and Rebates

• When the American Reinvestment and Recovery Act was announced, MWRA had a number projects “shovel ready”

• MWRA received $33M in ARRA funds for water and sewer projects of which nearly $10M for renewable energy projects

• Over $2.5M various state grants

• Approximately $680,000 energy efficiency project rebates to date
• Energy Savings and revenue total approximately $177M during FY02 – FY11

• Increase annual energy savings and revenue from $6M in FY02 to $24M in FY11

• Aggressive pursuit of rebates and grants

• About 45% of MWRA’s total energy cost profile derived from renewable sources

• Process optimization and implementation of energy audit recommendations projected to save almost $2M annually
MWRA Future Energy Initiatives

- DI Co-Digestion pilot program
- Hydro – Continue to explore hydropower development potential
- Solar – Comprehensive solar assessment ongoing
- Demand Side Management – Continue energy audits, process control optimization, demand response, EMS installation
- Grants/Rebates – Seek funding assistance opportunities
- Other Sustainable Efforts – alternative fuel vehicles, green power purchase, energy efficient computing, recycling.
- Metrics
Co-digestion Pilot – starting in CY14

- Receive Pre-processed Source Separated Organics via sealed tanker trucks to “co-digest” with sludge

- Operate as a pilot program for up to 3 years*

- Expected benefits in CY14 based upon bench-scale testing:
  - 4.2% - 8.5% increase in gas production
  - 480,000 kWh increase in energy production

- Expected benefits for years 2-3 will be re-projected based upon actual experience

*October Board approved project for Year 1 only, Years 2-3 pending future board approval.