Energy Management Program

Fiscal and Management Control Board
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MBTA’s Energy Portfolio

The MBTA is the largest single consumer of electricity in the Commonwealth.

- **417 million kWh** of electricity consumed in FY19
  - In FY19, the MBTA spent $43.0 million in electricity costs.
  - FY20 anticipated electricity spend will be $41.9 million

- Total utility cost for FY19 was **$48.4 million**
  - Heating oil, natural gas, and steam to heat buildings
  - Water consumption at all buildings and facilities
  - Anticipated utility costs for FY20 will be $47.6 million

(Note: energy costs represent total spend. Energy revenues offset costs in the budget)
Total Electricity Spend (FY15–FY20)
Energy Management Program

Electricity Consumption in kWh (FY15–FY20)

Total Wholesale Electricity Consumption

Fy15  Fy16  FY17  FY18  FY19  FY20

KWh

Electricity  Projected  3yr Rolling

Anticipated Changes to MBTA’s Energy Profile

Major changes in MBTA service and infrastructure will result in increased electricity usage.
• Green Line Extension (GLX) opening in 2021
• New Orange, Red, and Green Line fleets and infrastructure improvements
• Introduction of Battery Electric Buses (BEBs) to replace diesel, hybrid, and CNG buses
• Planned conversion of Commuter Rail from diesel to electric traction power

Policies and mandates to “decarbonize” the electricity supply network and the transportation sector
• The Global Warming Solutions Act set economy-wide greenhouse gas (GHG) emission reduction goals for Massachusetts that will achieve reductions of:
  • Between 10% and 25% below statewide 1990 GHG emission levels by 2020
  • At least 80% below statewide 1990 GHG emission levels by 2050
• To meet these mandates, Governor Baker has pledged:
  • A new goal of net zero carbon emissions by 2050
  • Participation in the Transportation and Climate Initiative (TCI) -- a regional collaboration states designed to and reduce carbon emissions from the transportation sector
Assessment of the MBTA’s Energy Horizon

Engaging with Fletcher School at Tufts University Energy, Climate and Innovation Program at the Center for International Environment and Resource Policy

Development of a policy framework to address:

• Leveraging the value of our unique status as a large consumer of electricity
• Incorporating renewable energy into our energy portfolio
• Managing energy costs resulting from conversion to electric vehicles
• Structuring and financing capital upgrades to the electrical distribution network to ensure the reliable delivery of electricity
• Procuring, financing, and contracting innovative technologies for energy management

First deliverable will be to develop some energy policy that frames the key issues for the MBTA to begin to address.
MBTA’s Utility Status and Procurement Power

The MBTA is defined as a utility for the purposes of buying and selling electricity.

- This unique status provides us with substantial benefits that typical customers do not have:
  - Purchasing electricity directly from the regional grid (known as ISO New England) at wholesale price
    - Provides substantial savings compared to traditional retail pricing
    - Pricing is highly volatile and easily influenced by external forces

Re-assessment of utility status and customer size to determine:

- Is our status as a utility being fully utilized?
- Do we have opportunities to better purchase and sell electricity in a way that we are not currently doing?
- Are we taking advantage of our unique status to the greatest extent possible?
Incorporating Renewable Energy into Portfolio

- Currently, the MBTA’s consumption of renewable energy is limited to what we receive via the regional grid: 42% from non-carbon based sources, of which 9.7% comes from renewable sources.

- Small amount of on-site renewable generation:
  - Two small wind turbines and localized solar arrays
  - Larger scale solar canopy project at parking lots underway.

- Currently investigating opportunities to bring additive levels of renewable energy into the MBTA portfolio:
  - **Short Term**
    - Requiring renewable energy as part of the upcoming electricity procurement; and/or
    - Separately purchasing renewable energy credit
  - **Long Term**
    - Investigating the opportunities to directly purchase off-shore wind as these projects come on line (2026)
Upcoming Electricity Procurement – Fall 2020

• Historically, the MBTA purchases a supply contract for a fixed price for fixed blocks of electricity over a five year period.
  • 70% of power from the supply contract/30% from the spot market
    • Provides budget stability for a highly volatile market while still getting the advantage of the spot market

• Upcoming electricity procurement likely to be a “bridge” strategy procurement
  • Two year procurement window
  • Load following, as opposed to fixed blocks
  • Introduction of renewable energy (either in contract or companion contract)

• Main benefits:
  • Use the two-year window to gather more information on predicted consumption requirements
  • MBTA’s service levels are likely to evolve and change due to COVID-19 recovery.
    • Fixed blocks commit us to specific levels of consumption
    • Load following allows us to increase/decrease consumption without financial impacts
  • Electricity prices are historically low and currently unpredictable
    • Two-year bid price is less risky than locking in for five years
Energy/Power Capital Infrastructure Planning

- Conversion to electric vehicles and increased service levels require significant increases in the amount of power serving MBTA facilities.

- Power supply strategic planning focusing on:
  - Local utilities supplying power when and where we need it
  - Charging strategies that support service levels while keeping an eye on energy costs
  - Regulatory, financial, and capital infrastructure issues associated with that type of increased demand
Innovative Technology

• **Emerging innovative technologies to reduce carbon and/or mitigate demand:**
  • Battery storage (paired with solar generation)
  • Regenerative Breaking and flywheel technologies
  • Micro-grids
  • Demand response
  • Peak period shaving

• **Internet of Things (IoT) technologies:**
  • Automated Building Controls
  • Third Rail Heater Weather Station
  • Data Monitoring for Energy Consumption
Energy Focus on Capital Asset Management and Development

Incorporating sustainable and energy-focused elements into Capital Projects and Asset Management

**Capital Delivery**
- New standards for lighting
- Building control and energy management systems
- High-efficiency systems

**Asset Management**
- Focus on procurement of most efficient asset upgrades:
  - Compressors
  - HVAC Systems