



**Massachusetts Bay  
Transportation Authority**

# Energy Management Program

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Fiscal and Management Control Board

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# MBTA's Energy Portfolio

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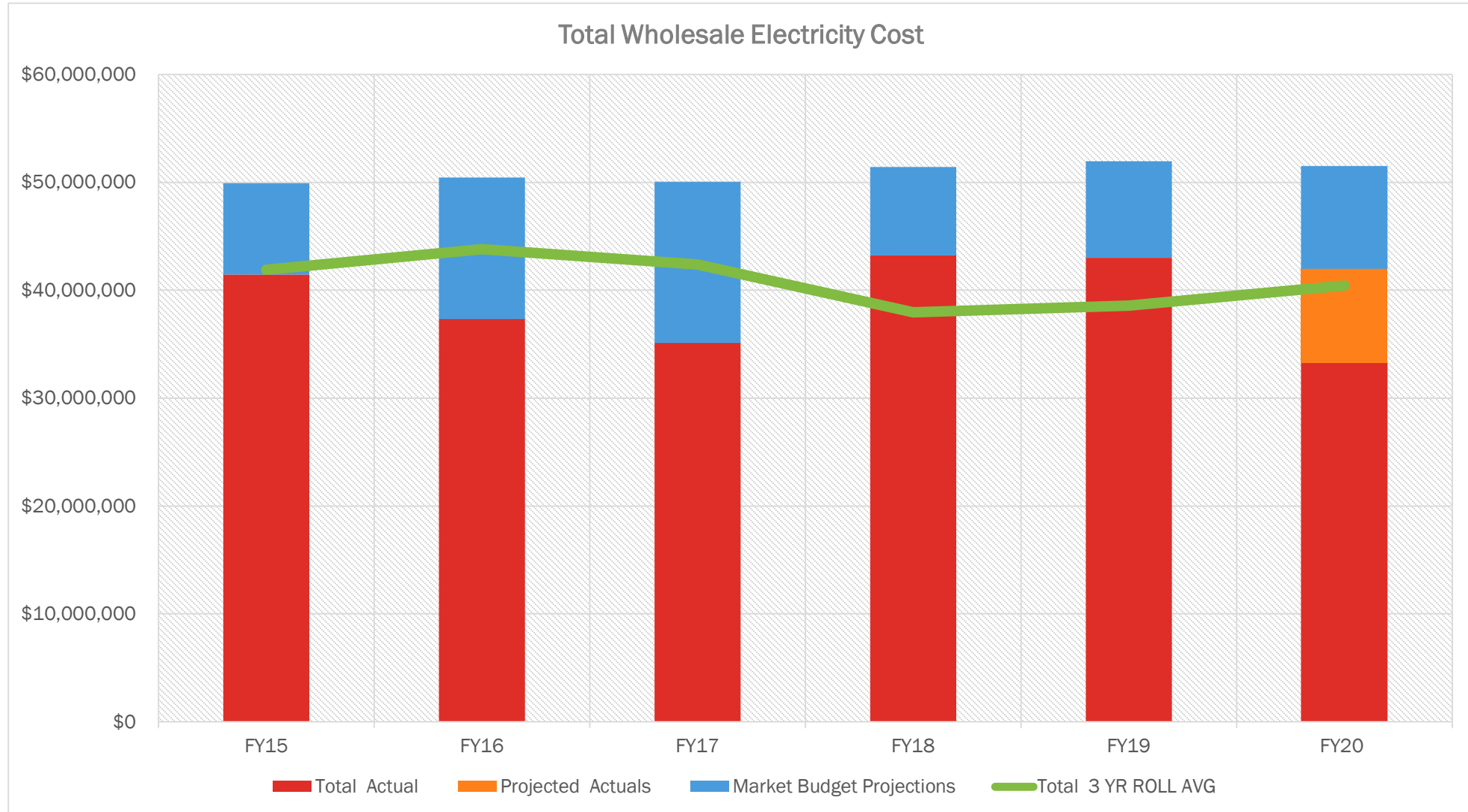
**The MBTA is the largest single consumer of electricity in the Commonwealth.**

- **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

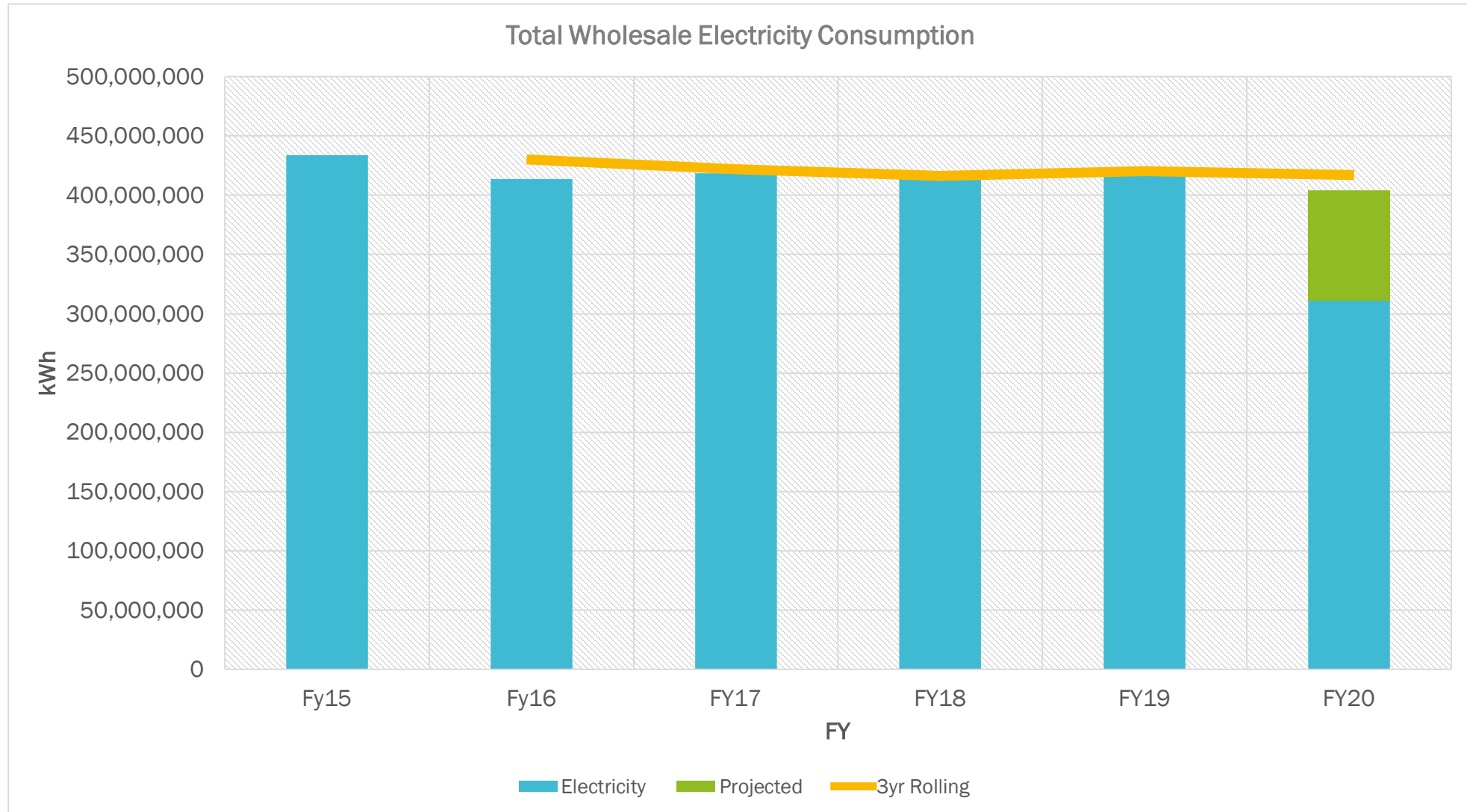
(Note: energy costs represent total spend. Energy revenues offset costs in the budget)



# Total Electricity Spend (FY15–FY20)



# Electricity Consumption in kWh (FY15–FY20)



# Anticipated Changes to MBTA's Energy Profile

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**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

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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

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**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

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- 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

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- **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

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- **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

