

Project 2015A

Public Information Session

Peter A. Torigian Community Life Center
75R Central Street
Peabody, MA
6:30 p.m.

June 22, 2021



Project 2015A

Public Information Session

Agenda

- **What Is MMWEC**
 - **What Is Project 2015A**
 - **Facts vs Misconceptions**
- **New England Capacity Market**
- **What Are The Benefits of the Project**
 - **What We Have Done To Date**
 - **Why The “Pause”**
 - **Alternative Technologies**
 - **Commissioners Panel**
 - **Questions & Answers**



What is MMWEC?

- **Created through a special act of the state legislature**
- **Massachusetts cities and towns which have municipal light plants (MLPs) are the Members of MMWEC; serves as the not-for-profit joint action agency for Massachusetts**
- **Has the authority to issue tax-exempt revenue bonds to develop energy projects for the benefit of municipal utilities; has issued approximately \$7 billion in bonds and currently has no project debt outstanding**
- **Provides a variety of services to its Members, including power supply planning, resource development, wholesale market solutions, risk management and regulatory/legislative advocacy**
- **20 Member utilities; 28 Project Participants**



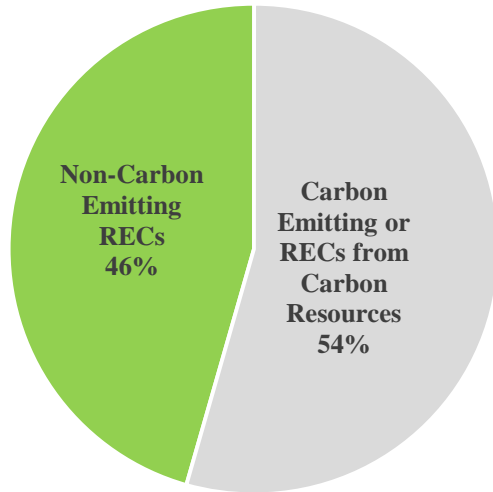
MMWEC's Renewable, Energy Efficiency and Environmental Justice Initiatives

- **MMWEC/MLPs have a long history of incorporating carbon-free resources**
- **Since 1982, with its first hydro deal, MMWEC and its Participants have been ahead of the curve in developing environmental initiatives**
- **In the last ten years, all energy projects have been carbon-free**
- **Developed, financed and/or manages dispatch of five utility-scale battery systems in Member communities in the last six years**
- **Developed Berkshire Wind, the largest land-based wind farm in Massachusetts (2008); expanded Berkshire Wind in 2019**

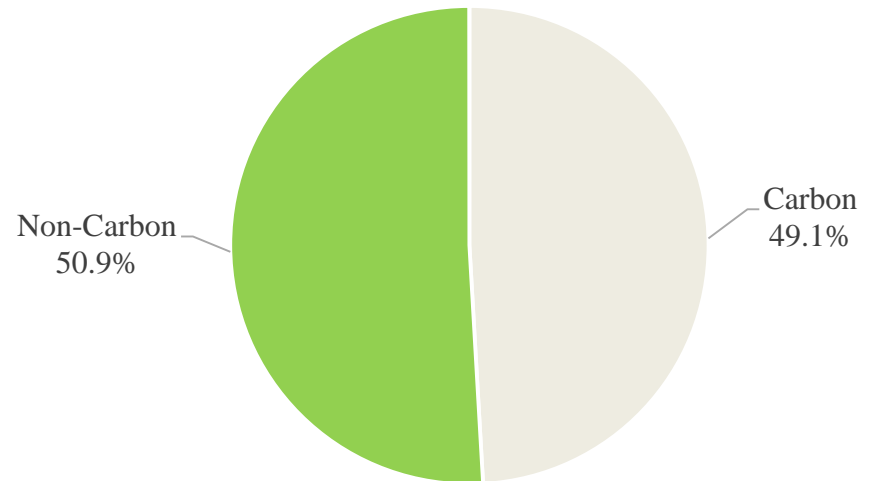


Emissions of MLPs vs Investor-Owned Utilities (IOUs)

IOU RPS APS CPS CES for 2021



2015A Participants Forecasted
2021 Non-Carbon Percentages



MMWEC's Renewable, Energy Efficiency and Environmental Justice Initiatives

- **Currently developing a 7 MW solar project on the MMWEC site**
- **Residential and commercial/industrial energy efficiency programs launched in 1980s; current programs include demand response, EV charging, heat pump promotion and virtual energy audits during COVID**
- **Developing Environmental Justice initiatives for each MMWEC Member**
- **Initiating heat pump/mini-split retrofit program in Environmental Justice/Underserved communities in Peabody, consistent with 2050 Decarbonization Roadmap**
- **Advancing net zero through tree planting programs**



What is Project 2015A?

- **A 55 megawatt capacity resource**
- **To be installed in Peabody, on site of two existing Peabody Municipal Light Plant capacity resources**
- **To be used for CAPACITY, not ENERGY**
- **Expected to run fewer than 239 hours per year; only when called upon by ISO New England during times of system stress**
- **Site is ideal due to existing infrastructure and location in the import-constrained NEMA zone**
- **Expected to cost \$85 million**



Facts vs Misconceptions

Common Misinformation Regarding Project 2015A

MISCONCEPTION. *The project is inconsistent with the Commonwealth's Decarbonization Roadmap to 2050.*

FACT. The Decarbonization Roadmap references the need for reliability resources and balancing resources as intermittent renewable generating resources become the dominant source of electricity for the region. (pages 29, 55, 60-66)

MISCONCEPTION. *The project will decrease air quality and be harmful to the health of nearby residents.*

FACT. The project would produce fewer emissions than 94 percent of similar peaking resources in the region. Therefore, when it is called upon to run by ISO-New England, it will be displacing emissions, resulting in a net reduction of carbon emissions. Without the capacity resources, grid reliability is at risk.

MISCONCEPTION. *The project will cost \$170 million.*

FACT. The project is expected to cost half that - \$85 million. MMWEC submitted a bonding request to the DPU so that if interest rates become lower, the costs can be refinanced without going through the DPU process again.



Facts vs Misconceptions

Common Misinformation Regarding Project 2015A

MISCONCEPTION. *The project will produce up to 51,000 tons of carbon emissions per year.*

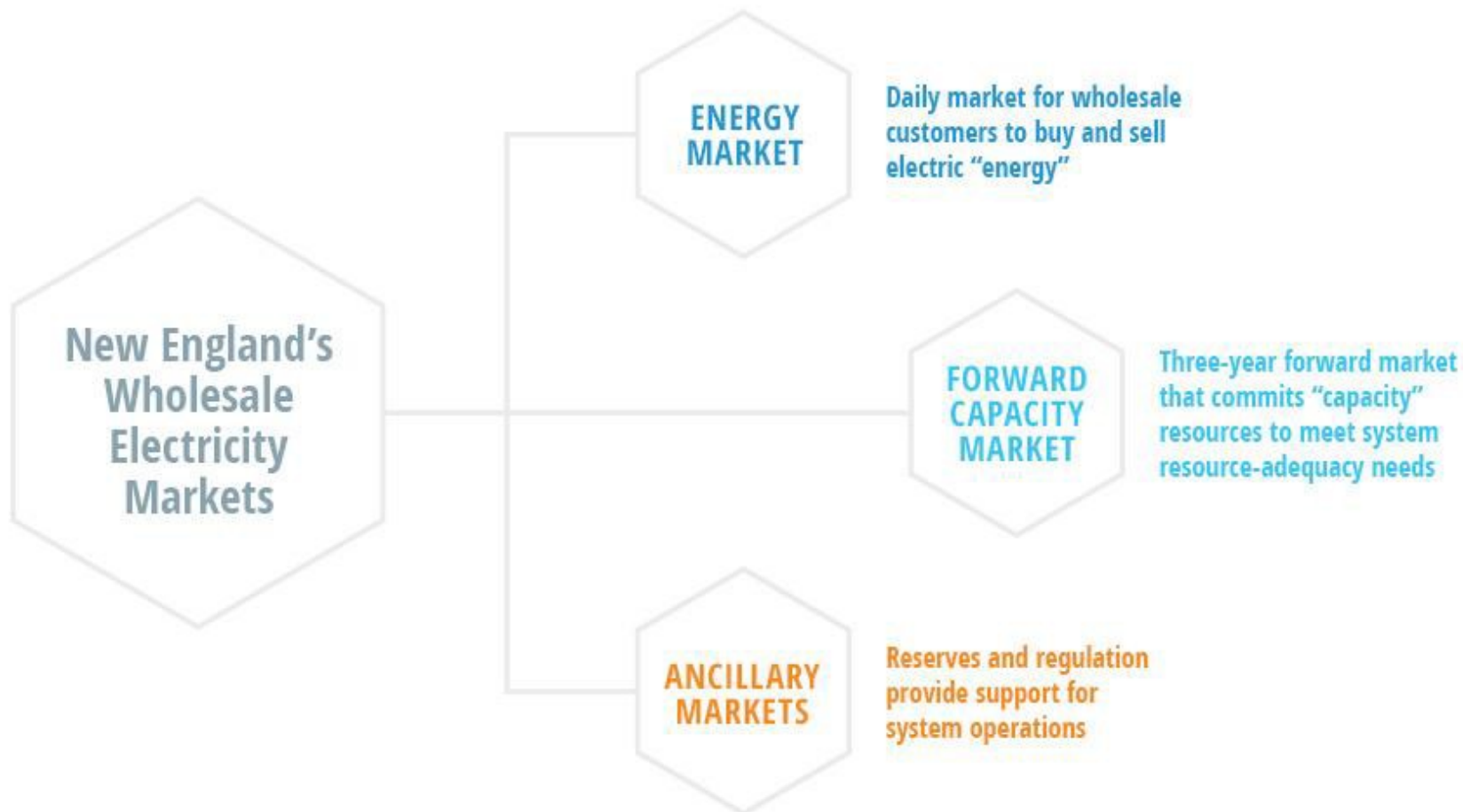
FACT. As a capacity resource, the project is expected to run just 239 hours per year, producing approximately 7,500 tons of carbon emissions per year, less than the city of Boston produces in a single day.

MISCONCEPTION. *For the same amount of money, municipalities could build the same capacity solar generation and storage.*

FACT. Intermittent resources like solar and wind do not provide the **CAPACITY** benefits this project provides. Those are for **ENERGY**. To produce the same amount of capacity in solar, wind, and storage, the MLPs would have to procure **ENERGY** resources at least 5 to 10 times in excess of their **ENERGY** needs to secure the same amount of **CAPACITY** from those resources. This is impractical and expensive.



New England Electricity Markets

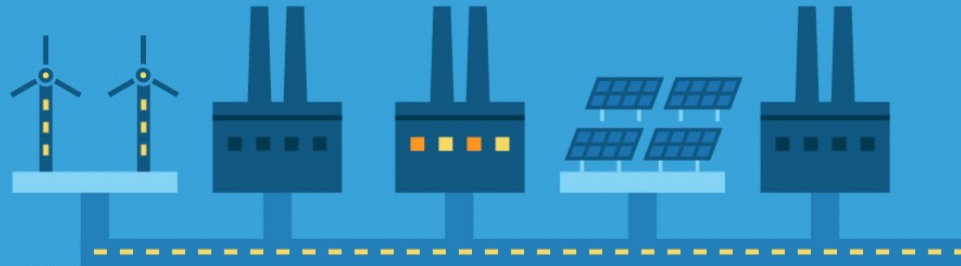


Capacity vs. Energy Markets

Capacity

- ▶ The total capability to produce power
- ▶ Measured in watts — kilowatts (kW), megawatts (MW), gigawatts (GW)
- ▶ 1 MW can serve 750-1,000 homes in New England

ISO new england



Energy

- ▶ The actual energy produced over a period of time
- ▶ Measured in watt hours — kilowatt-hours (kWh), megawatt-hours (MWh), gigawatt-hours (GWh)
- ▶ New England uses roughly 120,00-125,000 GWh of energy per year

Capacity Market's Purpose

The **Forward Capacity Market (FCM)**, the New England region's long-term capacity market, ensures the system has sufficient resources to meet the future demand by contracting to pay resources to be available to meet the projected demand for electricity three years out and operate when needed once the annual capacity commitment period begins.

- Infrequent operation for some generators provide limited opportunities to recover **fully fixed costs**
 - Energy prices may not be high enough for long enough
 - Expenditures not recovered in energy market are often called the “missing money”
- Capacity revenue covers this **missing money problem** facing units that are needed but operate seldomly
- Other markets in the US and across the globe have developed “Capacity” style-markets to address this issue. Alternatively the areas without these market mechanisms allow Energy Market prices to rise to extremely high levels
 - **For instance, ERCOT had prices that were over \$9,000/MWh**

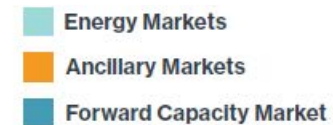


New England Electricity Market

- New England consumers annually spend billions of dollars for capacity but it is very volatile

Energy Market Values Vary with Fuel Prices
While Capacity Market Values Vary with Changes in Supply

Annual Value of Wholesale Electricity Markets



Source: ISO New England
*2019 data are subject to adjustments.



Forward Market – New England

- Forward market - is a way to procure services or goods ahead of time
 - New England market procures 3+ years ahead of time
- What are the goals of this forward market?
 - Assure that system has enough generation to meet expected worst case demand plus reserve
 - Based on a defined requirement of delivery during the same scarcity events that we discussed in energy-only design
- Who is the buyer in this market?
 - ISO New England is responsible for ensuring adequate capacity is procured in this 3+ year timeframe and so they procure, on behalf of New England demand to meet the expected requirements in that future time period.
- What can demand do to shield themselves from the volatile FCM market?
 - Supply generating resources to the ISO market that will meet their share of the peak demand requirements
 - Otherwise they pay the market rate

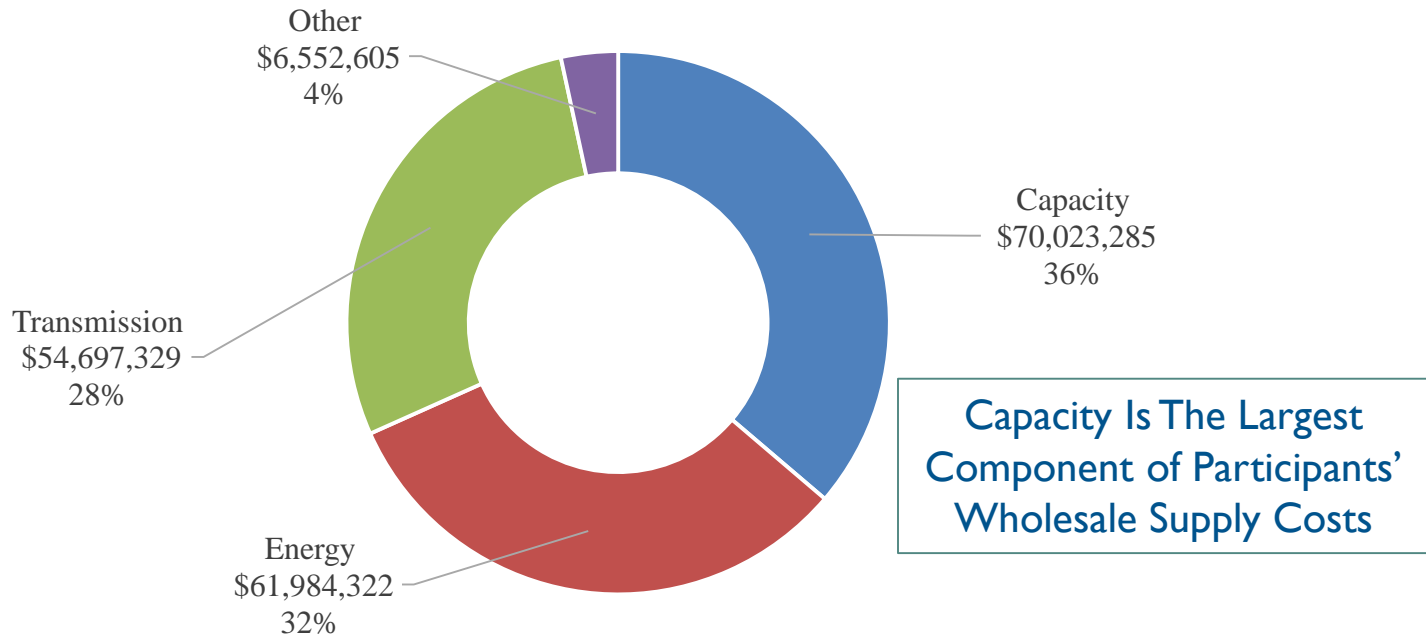


What are the Benefits of the Project?

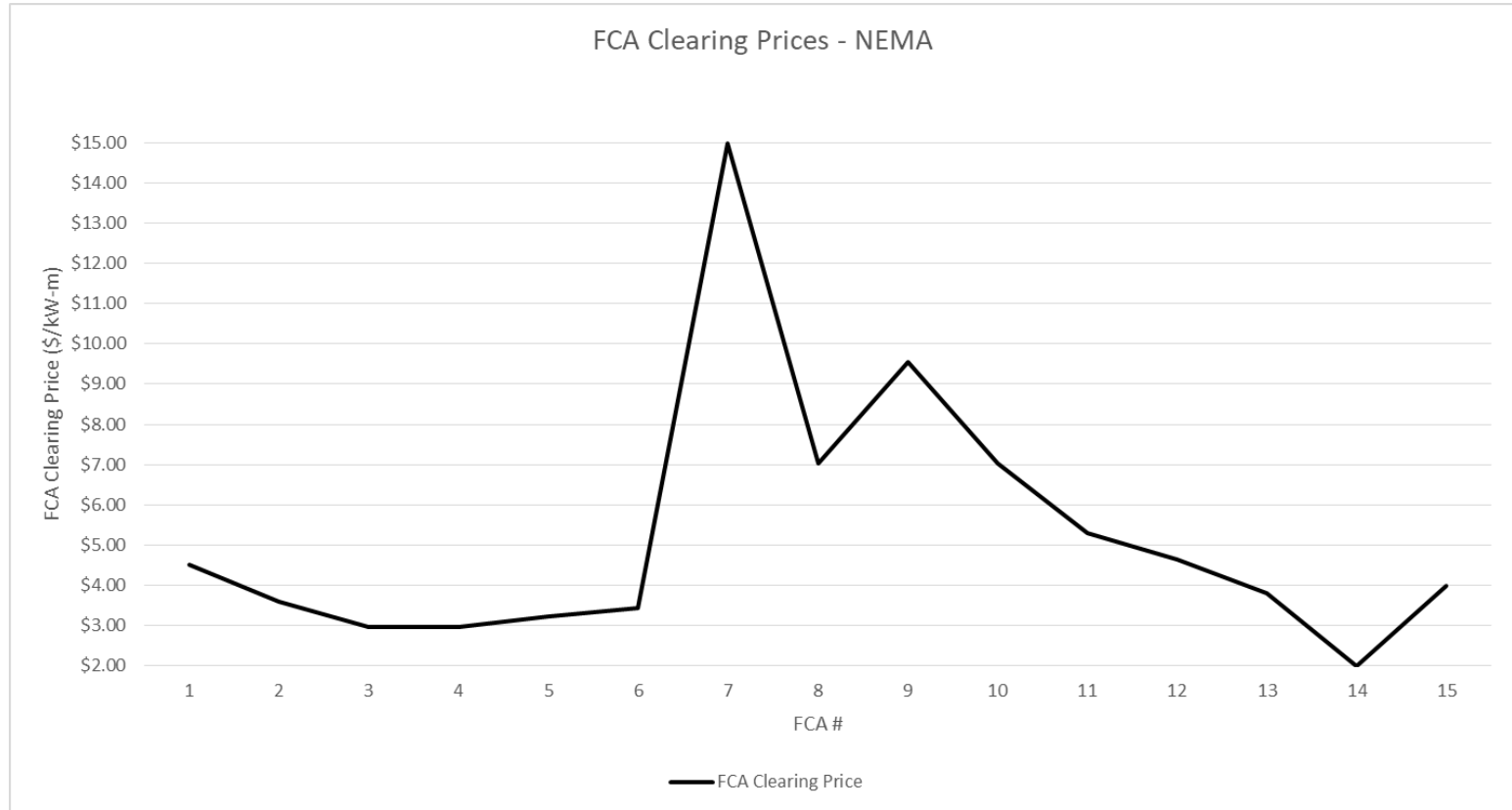
Provides Stable Capacity Prices

- MLPs must purchase **ENERGY, CAPACITY** and **TRANSMISSION** from the **New England** wholesale market for their power supply

2021 Forecasted Power Supply Costs
For the 14 Project Participants Totals \$193,257,541

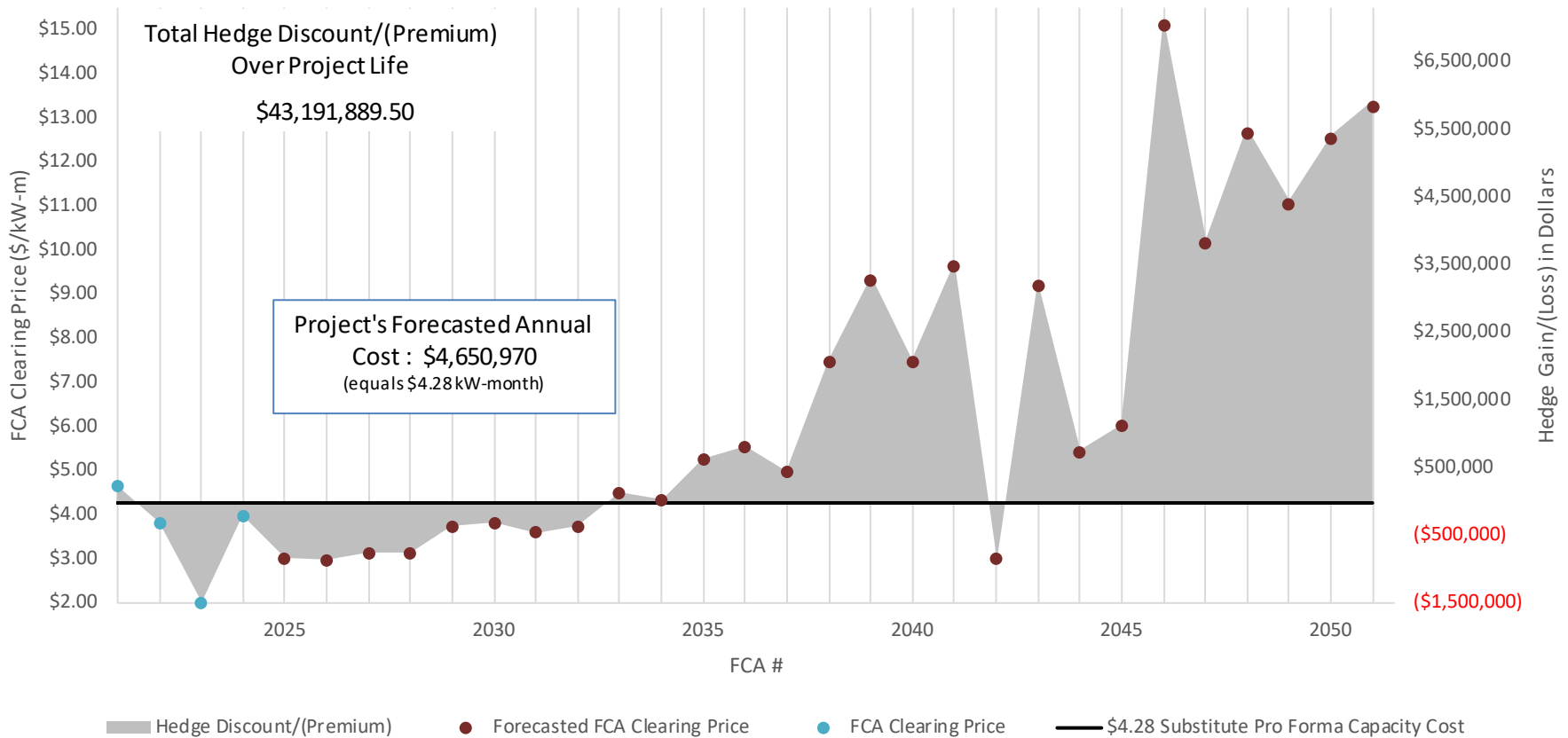


Capacity Prices Are Volatile



- **Capacity prices are determined by auctions in each capacity zone and vary each year**
- **NEMA (Northeast Massachusetts) capacity zone is most expensive due to import constraints**

FCA Capacity Clearing Prices & Forecasted Hedge Discount/(Premium) For Project 2015A Capacity Hedge



Project 2015A Provides Price Stability

- **Owning a capacity resource located in NEMA increases zonal capacity supply, while stabilizing Participants' capacity costs**
- **Its location means the resource is especially valuable to ISO New England and helps improve grid reliability because NEMA is a constrained capacity zone**
- **The light departments' ability to own assets allows Participants to lock in a price and hedge against the volatile capacity prices**
- **The locked in price means MLPs can stabilize rates for their customers and plan for the future**



What are the Benefits of the Project?

Project 2015A Fills Capacity Obligation As MMWEC's Non-Carbon Emitting Power Portfolio Advances

Facility	Location	Power Type	ISO Market	Operating License
Berkshire Wind Phase 1	Hancock, MA	Wind	Energy	2011-open
Eagle Creek Hydro	NH – 6 sites	Hydro	Energy	2014-2033
Hancock Wind	Ellsworth, ME	Wind	Energy	2016-2041
Berkshire Wind Phase 2	Hancock, MA	Wind	Energy	2019-open
Wyman # 4	Yarmouth, ME	Oil	Capacity	(sold in 2019)
Hydro-Quebec	Quebec, CAN	Hydro	Energy	2020-2025
Project 2015A	Peabody, MA	Natural Gas/Oil	Capacity	2022-
Project 2020A	Ludlow, MA	Solar	Energy	2022-



What are the Benefits of the Project?

Supports Climate Change Targets

- Renewables like solar, wind and energy storage do not provide the needed **CAPACITY**; their low capacity factors mean the MLPs would have to over-procure renewable energy by hundreds to thousands of megawatts to fulfill their **CAPACITY** needs
- By supporting the Participants' **CAPACITY** requirements, the project allows participants to pursue additional carbon-free **ENERGY** resources
- The intermittency of renewables means balancing, reliability resources will continue to be needed as more renewables come onto the grid
- This need is recognized by both EEA (2050 Decarbonization Roadmap) and ISO New England (2019 Regional System Plan)
- All Participants have customized plans to achieve roadmap targets; 7 of the 14 participants have **ALREADY MET** their 2030 climate goals (50% carbon-free energy sales)



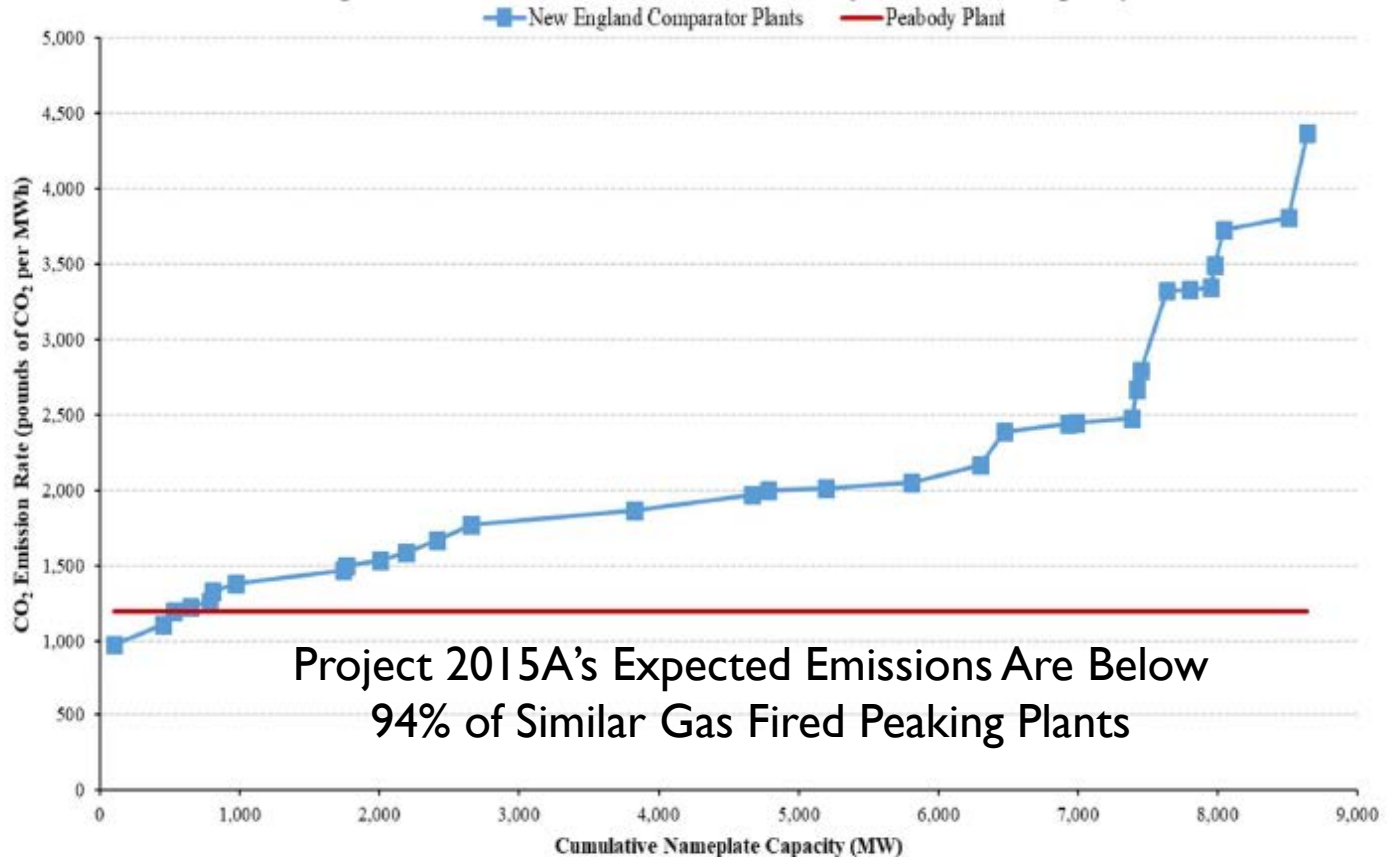
What are the Benefits of the Project? **Reduces Generating Fleet's Emissions**

- **Project will run approximately 2.72% of the time, producing approximately 7,500 tons of CO₂e**
- **As a flexible, fast start unit featuring the newest technology, Project 2015A produces fewer emissions than 94% of similar electrical generating plants in the region**
- **When it does get called on to run by ISO-NE, it will displace less efficient resources, resulting in a reduction in emissions to the region**



Project Emissions

Attachment 3
New England Fossil Generator Emission Rates, by Cumulative Capacity



Project 2015A's Expected Emissions Are Below
94% of Similar Gas Fired Peaking Plants

Notes:

- [1] The emission rate for the Peabody Plant is based on full load (100% load) ISO corrected (59°F, 14.7 psia, 60% humidity) heat rate of 10.058 MMBtu/MW-hr, HHV gross electrical power output for natural gas firing, with inlet air fogging, wet compression, and burner water injection in service, and a CO₂e emission factor of 119.0 lb/MMBtu.
- [2] The New England comparator plants include all fossil generators in New England (where emissions data are available) with the exception of combined cycle gas plants. The emission rates for these plants represent a three year (2016-2018) weighted average emission rate (annual CO₂ emissions over annual net generation), weighted by net generation for operating plants.

Sources:

- [1] Table 2, Peabody Final Air Quality Plan Approval, MA Department of Environmental Protection, Approval No.: NE-17-001, September 30, 2020.
- [2] Source Energy and Emissions Analysis Tool, available at eatcalc.gastechology.org.
- [3] S&P Global Market Intelligence.



Project Emissions

GHG Emissions from selected Mass stationary sources		
2019 Total Reported Direct Emissions - US EPA		
Location	1,000 Metric Tons CO2e	
Fore River Energy Center - Weymouth	1,769	(highest in Mass)
Mystic - Charlestown/Everett	908	
Medical Area Total Energy Plant (MATEP) - Brookline Ave, Boston	257	
Salem Harbor Station	215	
MIT Central Plant - Cambridge	123	
UMass Amherst	110	
GE - Lynn Plant	93	
UMass Medical - Worcester	85	
Harvard University - Cambridge	83	
Pfizer- Andover	45	
Boston University	44	
Rousselot - Peabody	43	
Northeastern University - Boston	30	
Logan Airport - East Boston	29	
Stony Brook - Ludlow	26	
Wellesley College	21	
Mass General Hospital- Charlestown Navy Yard*	7.9	
Project 2015A - Peabody	7	
* Data provided by Mass DEP		

7 metric tons converts to 7.5 short tons



Lower Grid Reliability Ahead?

Three Factors are converging...cause for concern

1. **The Mass 2050 Pathways to renewable energy (wind & solar) is a shift to *intermittent* power sources, dependent on our unpredictable New England weather.**
2. **The Mass 2050 Pathway to Electrify transportation and heating will significantly increase demand...double, triple, or higher? vs. today's load**
3. **The North Shore is in a “transmission constrained” ISO-NEMA Load zone. Delivering adequate transmission of electricity today into NEMA during peaks & outages is a known issue.**



Lower Grid Reliability Ahead?

Most at risk: Our most vulnerable residents during extreme winter cold conditions:

- **The elderly and individuals needing at-home medical devices.**
- **Will we see rolling brown outs (as in California)?**
- **Or experience an unplanned outage during extreme cold conditions (Texas)?**



What Have We Done To Date?

Project 2015A Process

- **MMWEC followed all required procedures during this process including posting notices, placing newspaper notices, Environmental Monitor, DEP website**
- **Notified 10 state agencies and 5 City of Peabody departments**
- **MMWEC and participating MLPs had open public meetings to vote on joining the project**
- **Additionally, several participating MLPs have discussed the project at numerous meetings of their boards over the past several months**



What Have We Done To Date?

Project 2015A Process

- **MMWEC staff have attended light board meetings to discuss the project and answer questions**
- **State permitting and DPU processes have been public as required**
- **MMWEC has had regular meetings with the administration**
- **MMWEC has developed a website dedicated to the project; there is a link to the website on MMWEC's website**



What Have We Done to Date?

Project 2015A Timeline

- **Project conceived, research and development commenced in 2015**
- **Presented to each of the 14 participating MLP boards in 2015; each MLP board voted in favor of participating in the project**
- **Project's power sales agreements signed by each MLP in 2017**
- **Project cleared ISO New England Forward Capacity Auction in 2018, establishing the 55MW Capacity Supply Obligation**
- **Air and acid rain permits secured in September 2020**
- **Project has been bid; engineer, procure and construct (EPC) contract has been executed**
- **DPU process to bond for the project is underway**



Why The Pause?

Project 2015A Pause

- **On May 11, 2021 MMWEC's Board of Directors authorized a Pause in development activities for Project 2015A.**
- **Purpose of the Pause:**
 - **Address Concerns Raised to the Board**
 - **Consider Available Options to Fulfill Participant's Capacity Obligations**



Alternative Technologies

Alternative Technology Requirements

- **In performing due diligence regarding alternative technologies for the Peabody Project 2015A site, certain design criteria had to be satisfied**
 - **Alternative technology must provide qualified capacity of 55MW to ISO-NE market**
 - **Alternative technology must be capable of 10 minute fast start and participation in Forward Reserve market**
 - **Alternative technology must produce energy of a minimum dispatch of 7 hours (385MWH) for the duration of the project**



Alternative Technologies

Battery Storage Technology

- **MMWEC** performed due diligence regarding installation of a battery resource in the **NEMA** zone that would provide an equivalent amount of capacity
- **MMWEC** had discussions with five battery manufacturers/developers regarding the feasibility of constructing a **55 MW** battery facility on the site
- The footprint for a **55 MW** battery storage facility requires a site six times the size of the **Peabody** project site
- Assuming the site could accommodate the battery facility, analysis found the substitute capacity cost for **Project 2015A** is less than half that of a battery located in **NEMA**



Alternative Technologies

Battery Storage Technology

- **The high cost of the battery increases the probability it would not clear the FCA, thus not contributing to Project Participants' capacity obligations; Project Participants would have to pay for battery AND substitute capacity**
- **Batteries degrade over time; their life is approximately half that of Project 2015A**
- **Batteries discharge and produce energy for a maximum of four hours, insufficient to cover historical dispatch requirements for capacity resources in NEMA**



Alternative Technologies

Hydrogen Technology

- **Project’s existing turbine generator technology likely can operate with a fuel mix consisting of up to 25% hydrogen, significantly reducing carbon emissions**
- **Using “green” hydrogen as the fuel source in the future, Project 2015A would be non-carbon emitting**
- **Project 2015A’s transition to a “green” hydrogen fuel mix is incorporated in the Commonwealth’s Decarbonization Road Map (pages 50-51)**

Alternative Technologies

Hydrogen Technology

- **MMWEC is in discussions with turbine manufacturer for developing the ability to increase the fuel mix to 100% “green” hydrogen**
- **MMWEC is positioning 2015A to become a demonstration project in line with the US Department of Energy’s goals and objectives related to “green” hydrogen**
- **Development to “green” hydrogen fuel is a longer term post construction alternative**



Commissioners Panel



Questions & Answers

