



Project 2015A Frequently Asked Questions

When is construction expected to start?

Construction is expected to begin in late 2021 and be completed by late winter-spring 2023.

Health and Safety

What type of fuel is being used?

The primary fuel for the capacity resource is natural gas, with oil as a backup if natural gas is not available during extreme winter weather.

Does the project involve the construction of a new natural gas pipeline?

No, a new natural gas pipeline will not be built as part of Project 2015A.

Does the project include a gas compressor?

Yes. Due to the low pressures that can be experienced in existing pipelines during the winter months when more natural gas is used for home heating, Project 2015A does include a compressor powered by an electric motor. Because the compressor is powered by an electric motor, the compressor will not produce any air emissions. The purpose of the compressor is to provide adequate gas pressure for use in the capacity resource during the winter months and minimize the need to use oil as a backup fuel.

Will there be a smokestack as part of the project?

Yes, in order to better control emissions when operating, a 90-foot exhaust stack including sound attenuation will be part of the capacity resource.

What are the supporting chemicals for energy delivery?

Aside from fuel (natural gas or ultra-low sulfur diesel fuel), urea is being used for energy delivery. Urea will be used as the NOx reduction reagent. It is injected into the Selective Catalytic Reduction (SCR) system which scrubs NOx emissions from the gas turbine exhaust gases before they go up the stack. Aqueous ammonia can also function as a NOx reduction reagent and it was initially proposed for the SCR. However, aqueous ammonia is hazardous, toxic, and an accidental release could result in noxious fumes. To eliminate the potential for an accidental release of ammonia and the resulting noxious fumes, it was recently decided to replace ammonia with urea as the NOx reduction reagent. The SCR must be enhanced to utilize urea instead of ammonia, but the potential for noxious fumes will be eliminated. See DEP Air Permitting Process: Item 5

What are the safety protocols for any chemicals used?

Urea is non-hazardous and non-toxic. The Material Safety Data Sheet for urea lists the NFPA hazards as: Health: 1; Flammability: 0; Instability: 0; where the severity of the hazard is rated from 0 as non-hazardous to 4 as most hazardous. The health hazard for urea is 1 because urea is a mild irritant. Since it is not hazardous per OSHA, no exposure levels have been established by OSHA.

What is the potential for noxious fumes?

The project will use urea instead of ammonia as mentioned in the previous answer. With urea there is no potential for noxious fumes.

What are the wetlands concerns?

Project 2015A is not in a wetland, but is near a wetland and the edge of the wetland-associated 100-foot buffer zone is at the corner of the site. A wetlands analysis was complete and it was determined that the project does not have to file a Notice of Intent because, MA DEP regulation (310 CMR 10.02(2) (b) (1) (k)) states that the “installation of new equipment within an existing electric or gas facilities when such equipment is contained entirely within the developed/disturbed existing fenced yard” is exempt from that requirement.

What do studies say about noise and traffic, and what does the town allow for traffic?

MA DEP air pollution control regulations include sound as an “air containment.” MA DEP required sound modeling for the simultaneous operation of the two existing Peabody units and the new Project 2015A unit. The MA DEP regulations for sound require that the impact from any new source of sound be limited to a sound increase of 10 decibels above the ambient sound level measured during the quietest period of the day. A comprehensive sound analysis was completed that involved measuring background sound and projecting sound increases at eight locations; five locations in Peabody and three locations in Danvers. The modeling resulted in the identification of a method to go above and beyond the sound requirements of the MA DEP sound regulations. With the installation of additional sound attenuation baffles in the existing Peabody Unit 2 (the loudest generator at the site), the largest sound increase at the closest of the eight locations (in Peabody) would be less than 7 decibels above ambient instead of 10 decibels as required by MA DEP regulations. The largest sound increase at the closest residential location in Danvers would be 3 decibels above ambient instead of the required 10 decibel limit. To achieve this, it has been determined that the additional sound attenuations baffles will be installed in the existing Peabody Unit 2. See DEP Air Permitting Process: Items 6, 17

The City of Peabody normally limits construction activities to daytime hours during weekdays and Saturdays. The construction activities associated with the project are planned to stay within those limitations.

What are the protocols for potential water contamination?

Small amounts of waste water will be created on an occasional basis and collected in an on-site holding tank. The tank will be pumped out periodically and the waste water disposed of in accordance with all applicable regulations.

What is being done to monitor the health impacts on the community?

Pre-commercial operation date air modeling has been conducted in strict accordance with all MA DEP regulations. With all three units running, the modeling indicates that all emissions levels, including those within the Environmental Justice areas, are below the federal and state ambient air quality standards, which are established to ensure public health and welfare. This will be confirmed and monitored after the commercial operation date with an initial compliance stack test which will measure actual emissions.

The stack test will conform to all EPA testing protocols and will be overseen by the MA DEP. Follow up compliance stack tests will be conducted annually thereafter. Additionally, the MA DEP has determined that Project 2015A is a Non-Major Source since the maximum potential emissions from the Project are well below the thresholds that would categorize the Project as a Major Source. See DEP Air Permitting Process: Items 1, 2, 3, 4, 8, and 14

Was an environmental impact report done?

The Massachusetts Environmental Policy Act (MEPA) requires an environmental notification form (ENF) be submitted if the output of an electrical energy facility is 25 megawatts (MW) or greater. In addition to the ENF, a mandatory environmental impact report (EIR) is required if the output of an energy facility is 100 MW or greater, or if the emissions rate for CO₂e is 100,000 tpy or greater. Since the project has a nameplate rating of 60 MW, an ENF was required. An ENF was properly submitted and the ENF process was comprehensive, complete, and included a public site visit / consultation session. Even though the attributes of the Project were under the thresholds that trigger a mandatory EIR, the MA Executive Office of Energy and Environmental Affairs (EEA) could have required an EIR if a need was identified during the ENF review process. From the ENF review process, the EEA determined that an EIR was not required. See MEPA Review Process Requirements

Has a Health Impact Assessment been done?

The Health Impact Assessment process was established by the Federal Centers for Disease Control and Prevention (CDC) and applied to federal actions. Project 2015A is not a federal action but, its health impact was thoroughly assessed through the MA DEP air permitting process. The air modeling conducted during the air permitting process assessed the worst-case scenario; the cumulative air contaminant impact of the Project, all other off-site interactive sources of air emissions, and ambient air contaminant concentrations. The worst-case scenario resulted in all emissions falling below the federal and state air quality standards which were developed to ensure public health and welfare. Additionally, even though the MA DEP categorized Project 2015A as a Non-Major source, it required that all aspects of air contamination be assessed. This would not normally be done for a Non-Major source but, because Project 2015A is an electrical generation unit, the MA DEP required that the air permitting process go above and beyond what would normally be applied to a Non-Major source and all aspects of air contamination be assessed. See DEP Air Permitting Process: Items 1, 2, 3, 4, 6, 7, 8, 12, 13, 14, and 17

How much emissions will result from this project?

It is estimated the capacity resource will emit 7,085 tons of CO₂ per year. As an efficient, new turbine, this level is much lower than the emissions rate of resources with which it will directly compete in New England's wholesale electric markets. The capacity resource's emissions rate is **lower** than **94 percent** of fossil fueled peaking plants in New England. That means when the capacity resource is generating energy, it will be displacing a higher level of emissions (for the number of megawatt hours generated) from more polluting resources.

What thresholds would be different if this was built as an add-on to the two existing stations instead of making it a separate plant?

The emissions limitations on the new unit would still be based on the Best Available Technologies, and

the limitations for the new unit would not change. For air emissions including noise, modeling is based on all three units (two existing and Project 2015A) running simultaneously. Whether Project 2015A was an add-on or separate, cumulative analyses would have been conducted with all three units operating simultaneously. See Air Permitting Process: Items 3, 6, 7, and 17

How would hydrogen safety concerns be addressed?

Hydrogen has been safely used for generator cooling in large power plants in Massachusetts and elsewhere for decades. Fire departments with hydrogen facilities within their jurisdictions have guidelines and procedures for handling hydrogen fires. The MA Department of Fire Services provides guidance to local Fire Department for dealing with hydrogen emergencies. Hydrogen safety protocols and procedures will be established through the involvement of the MA Department of Fire Services, NFPA Codes, the Peabody Fire Department, the hydrogen supplier, and the Insurance carrier.

How will it be guaranteed that hydrogen used is produced in a green way?

Through the procurement process, MMWEC will require the hydrogen supplier to guarantee that the hydrogen is produced without any carbon footprint, and is therefore “green hydrogen.”

Project Operations and Financials

How often will the project run?

As a capacity resource, not an energy resource, it is expected to run approximately 239 hours per year, or 2.72% of the time. It will run only when called upon by ISO New England during times of system stress or high energy usage. When the capacity resource does run, it will run mostly in the summer on natural gas, as New England’s peak days occur during the summer.

How do we know how many hours it will run?

The forecast of 239 annual operating hours was based on the actual historical annual operating hours of the existing Peabody generating units. The historical annual operating hours have been significantly decreasing with a total of 74 actual operating hours occurring during the 2020 calendar year. Two-hundred-thirty-nine hours is the average over the last six years. It is conservatively anticipated that the actual hours will increase over the 74 actual hours that occurred in 2020 and approach the annual average of 239 over time.

If the project will only run 239 hours per year, why is the permit for 1,250 hours?

When applying for an air permit, it is typical to conservatively apply for the maximum number of hours the MA DEP will allow. The MA DEP permitted a maximum annual operating limit of 1250 hours; limited to 1000 hours on natural gas and 250 hours on ultra-low sulfur diesel fuel. However, with the MA DEP greenhouse gas initiatives, all Massachusetts electrical units will be ratcheted down annually due to MA DEP regulation 310 CMR 7.74, which reduces the aggregate greenhouse gas emissions from all Massachusetts electrical units on an annual basis. The aggregate CO₂e emissions from all Massachusetts electrical units will be lowered each year; from the year 2020 to the year 2050 with a total reduction of 80% of the 2020 emissions level.

How many hours will it run in the future as time goes on?

While it is difficult to predict actual hour amounts of dispatch in future years, especially decades into the future, trends can be identified. The expectation is that Project 2015A's annual hours of dispatch will be in the range of the current forecast of 239 hours with market forces expected to put downward pressure on the Project 2015A's dispatch by ISO New England over the next two decades. MMWEC expects two primary drivers in the market will limit the Project 2015A's dispatch hours especially in the second half of the Project 2015A's expected useful life of 30 years. The first driver is current Massachusetts emission allotments under 310 CMR 7.74. This is a mechanism that caps emissions from power plants in Massachusetts. 310 CMR 7.74 established an auction system where power plants can purchase emission allowances. By design, the law reduces the amount of allowances that can be purchased in the auction. This will increase the price of the allowances which will raise the Project 2015A's cost to operate limiting its dispatch by ISO New England to material reliability events. The second driver of expected long term lower dispatch by ISO New England is the growth of utility scale battery storage resources which will be used as a short term balancing resource to accommodate intermittent renewable energy resources. With more utility scale batteries providing short term balancing services it reserves Project 2015A to provide for the longer but less frequent system reliability needs that the batteries can't provide. The result is that these two market drivers are expected to reduce the Project 2015A's dispatch hours over the long term.

What is the output of this project? 55 MW or 60?

All gas turbine electrical outputs vary with ambient temperatures – lower during hot summer temperatures and higher during cold winter temperatures. This is due to the colder air being denser than warmer air thus increasing the mass flow through the gas turbine and increasing its power output during colder temperatures. The unit's nameplate capacity is 60 MW, which is based on standard conditions with an ambient temperature of 59 degrees Fahrenheit. Gas turbine units are always bid less than their nameplate rating in the capacity market because a unit's capacity supply obligation is based on its summer rating. Project 2015A will not be able to generate 60 MW on a hot 90+ degree summer day when a peak is likely to occur. It will be closer to 55 MW. On a 59 degree day, however, it will be able to meet its nameplate rating and generate 60 MW.

Who will be operating this plant day to day?

This is a peaking reserve unit and will not operate on a day-to-day basis. The unit will be managed by MMWEC and dispatched by the ISO-NE. It will be dispatched as a reserve unit, only during a system emergency. Upon dispatch, MMWEC will remotely start the unit from its Ludlow, MA location.

Why don't we just build more renewable resources?

Due to the intermittent nature of renewable energy resources, capacity resources such as 2015A will be necessary to meet Participant capacity requirements and to be available for New England system reliability. In order to incorporate more renewable energy resources such as wind and solar, there will be a need for efficient capacity resources such as 2015A. Renewable energy resources provide very little capacity values, with capacity values of wind and solar between 0-34% of their nameplate energy ratings. In contrast, the Project 2015A capacity resource will be rated for 100% of its megawatts (MWs). Therefore, in order to achieve the equivalent capacity value as Project 2015A through renewable energy resources, renewable energy resources with MW ratings of several hundreds to thousands of megawatts

would need to be procured. On the other hand, the Project 2015A capacity resource helps the light departments maintain and expand a power portfolio with a diversified mix of energy resources including additional renewable energy resources that together will help get us to net zero emissions by 2050.

Will this type of project be needed years from now?

As more and more renewable energy sources come into the market, there will be a need for capacity resources such as Project 2015A (see answer to previous question). The Commonwealth's Interim Climate Plan for 2030 and Decarbonization Roadmap, released in December 2020, both make several references to the need for "reliability resources" and "gas fired thermal resources."

Are operations of PMLP's existing units trending up or down?

The operation of the existing Peabody units is trending down. The US Energy Information Administration website posts annual operations and emissions data for Massachusetts (and all US generators) generators.

How much funding is necessary for the project?

In accordance with the requirements of MMWEC's statute, MMWEC has filed a petition with the Department of Public Utilities seeking authority to finance and refinance the cost of the project. The petition seeks a total of \$170 million in authority comprised of: - \$85 million, (including contingencies), in authority as the Initial Issuance, the proceeds of which will be used to fund the project; and \$85 million in authority to refund and refinance the Initial Issuance when interest rates warrant refunding so as to lower the cost to the light department.

For how many years will the light department make payments on the project?

Currently, it is estimated that the light department will be making debt service payments on the project through 2050. However, that may change with Refunding Bonds.

Does the cost still make sense with current market pricing? Will the revenue the light department receives offset the cost?

Project 2015A is a capacity resource designed to provide a stable cost of capacity for the light department's capacity needs and purchases in ISO New England. Because it will have a fixed price, the capacity resource is a hedge against volatile capacity prices in the New England markets. In addition, current forecasts of capacity prices indicate the project's stable capacity price will reduce capacity costs over the expected 30-year life of the debt. During the very limited times when the project generates electricity for system reliability needs, the light department's cost of electricity will be reduced as a result of participating in Project 2015A.

Permitting and Notifications

Who was notified, and when?

The following offices/agencies were notified of the filing of the Environmental Notification Form (ENF) for "MMWEC Simple Cycle Gas Turbine Project" and its publication in the Environmental Monitor. They were notified no more than 30 days prior to and before its publication on September 7, 2016. A public site visit and consultation session for the project was held September 21, 2016. A final decision from the

MA Executive Office of Energy and Environmental Affairs that the ENF satisfies all state environmental requirements and does not require an Environmental Impact Report (EIR) was issued on October 7, 2016.

The Environmental Notification Form was sent to: Secretary of Energy and Environmental Affairs, MassDEP Commissioner, MassDEP Northeast Regional Office MEPA Coordinator, MassDEP Northeast Regional Office Division of Air Quality Control, MA Department of Transportation Public/Private Development Unit and District 4 Office MEPA Coordinator, MA Historical Commission, Coastal Zone Management Project Review Coordinator, Division of Marine Fisheries (North Shore) Environmental Reviewer, MA Department of Safety/State Fire Marshal, MA Water Resources Authority MEPA Coordinator, Metropolitan Area Planning Council North Shore Task Force.

Also: City of Peabody Mayor; City of Peabody City Council; City of Peabody Department of Community Development and Planning; City of Peabody Conservation Commission; City of Peabody Health Department.

A public notice that the ENF was filed was also included in the Weekly News newspaper on September 1, 2016. The notice referenced the "MMWEC Simple Cycle Gas Turbine Project," explained the process and provided information on how to submit comments or be notified about further information about the project, a site visit, or consultation session.

See notice below:

Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
MEPA Office

PUBLIC NOTICE OF ENVIRONMENTAL REVIEW

PROJECT: MMWC Simple Cycle Gas Turbine Project
LOCATION: 56-R Pulaski Road, Peabody, Massachusetts 01960
PROPOSER: Massachusetts Municipal Wholesale Electric Company (MMWEC)

The undersigned is submitting an Environmental Notification Form ("ENF") to the Secretary of Energy and Environmental Affairs on or before August 31, 2016.

This will initiate review of the above project pursuant to the Massachusetts Environmental Policy Act ("MEPA", M.G.L. c. 30, s.s. 61-621). Copies of the ENF may be obtained from:

Tetra Tech, Inc. Jackie Bruce
2 Lan Drive, Suite 210, Westford, Massachusetts 01886
(978) 212-3284

Copies of the ENF are also being sent to the Conservation Commission and Planning Board of the City of Peabody where they can be inspected.

The Secretary of Energy and Environmental Affairs will publish notice of the ENF in the Environmental Monitor, will receive public comments on the project for 20 days, and will then decide, within ten days, if an Environmental Impact Report is needed. A Site visit and consultation session on the project may also be scheduled. All persons wishing to comment on the project, or to be notified of a site visit or consultation session, should write to the Secretary of Energy and Environmental Affairs, 100 Cambridge St., Suite 900, Boston, Massachusetts 02114, Attention: MEPA Office, referencing the above project.

By, Jaqueline G. Bruce (Proponent)

Weekly News September 1, 2016

Who owns the land/permitting required?

The land on which the generating unit is to be located is owned by the City of Peabody, pursuant to the exercise of the City's eminent domain authority in 1971. Pursuant to the City's Order of Taking, the site is to be used for the purposes of constructing, maintaining and operating electrical generating power facilities with control over the land vested in the Peabody Municipal Light Plant. Pursuant to various federal, Commonwealth and City of Peabody rules and regulations and the national standards required to be applied to the construction of the unit, MMWEC does not believe any additional permits are required. There would have been permits required to remove an oil tank and erect a new oil tank, but MMWEC and the PMLP agreed to share existing facilities thereby negating the need for a new 200,000 gallon oil tank and related permits.

Alternative Technologies Considered

Are batteries a viable alternative to this project?

MMWEC has reached out to five utility scale battery manufacturers and developers to review updated battery technologies and their applicability to the Peabody site in delivering the desired capacity hedge that Project 2015A is designed to provide. A battery producing similar capacity will not fit on the Peabody site. MMWEC continued with an analysis to compare a battery installation to Project 2015A

assuming the site was large enough to accommodate a similar sized utility scale battery. The analysis concludes that Project 2015A would provide capacity at a cost of \$4.28 per kw-month for a 30 year period. A similar sized battery would produce capacity at a cost of \$9.24 per kw-month for a 15 year period. While battery costs have declined over the past few years ,the degradation characteristics of batteries lead to a shorter useful life and output reduction compared to a simple cycled turbine. In addition, the shorter maximum dispatch periods of the battery prevents this asset from prudently participating in the Forward Reserve Market, eliminating an important revenue stream. This engineering difference between the two technologies is the key determining factor that drives the comparison outcome. The summary results are presented below:

MMWEC Project 2015A - A Long Term Capacity Hedge

Order of Magnitude Comparison of Gas Turbine v Battery Delivering Substitute Capacity Cost

Capacity Hedge Analysis	
Revised Pro Forma	Per Kw month
Fixed Costs	\$ 7.05
Forward Reserve Revenue	\$ (2.08)
Shortage Event Revenue	\$ (0.63)
Ancillary Services (VAR)	\$ (0.05)
Substitute Capacity Cost	\$ 4.28
Energy Margin	\$ (1.55)
Net Break-Even	\$ 2.73

Battery	
Pro Forma	Per Kw month
Fixed Costs	\$ 9.93
Forward Reserve Revenue	n/a
Shortage Event Revenue	\$ (0.63)
Ancillary Services (VAR)	\$ (0.05)
Substitute Capacity Cost	\$ 9.24
Energy Margin	\$ (1.55)
Net Break-Even	\$ 7.69

Revised Pro Forma 2021	Life of Project*		Battery	Life of Project*	
Operating Expenses	139,529,107	7.05 per kw month	Operating Expenses	99,958,701	9.93 per kw month
Forward Reserve Revenue	41,156,570	2.08 per kw month	Forward Reserve Revenue	n/a	0.00 per kw month
Ancillary Services (VAR)	982,184	0.05 per kw month	Ancillary Services (VAR)	499,557	0.05 per kw month
Shortage Event Revenue	12,549,706	0.63 per kw month	Shortage Event Revenue	6,383,009	0.63 per kw month
Energy Margin (net)	30,690,101	1.55 per kw month	Energy Margin (net)	15,609,543	1.55 per kw month

An Order of Magnitude Comparison of an Equivalently Sized Battery to Current 2015A Configuration.

This Comparison is based on Incorrect Assumptions as the current 2015A Site Cannot Host A Battery Due To Size of Property Shortage Event Revenue, VAR and Energy Margin Have Been Kept The Same For Comparison Purposes

Key Assumptions:

*Construction Costs:	\$ 75,000,000.00
Interest:	\$ 12,559,191.00
Operating Expenses:	\$ 12,399,510.00
	\$ 99,958,701.00

*does not include utility infrastructure upgrades

Is it possible for MMWEC to purchase capacity from the Salem plant?

The Salem cleared the capacity market in FCA #7 in 2013 and was paid \$14.99 per kW-month for Capacity. This capacity payment was locked in for 7 years. While MMWEC doesn't have in depth insight into the Salem Plant's strategy, capacity from the Salem Plant wouldn't be eligible to be sold until 2024. While it is theoretically conceivable MMWEC could purchase capacity from the Salem Plant in the future, the price would be determined at market prices and for shorter durations defeating the purpose that Project 2015A delivers as a long term capacity hedge.

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