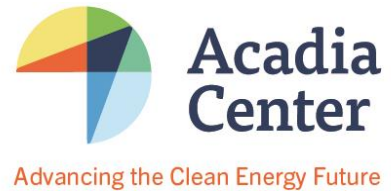


The Future of Brayton Point

Energy Storage, CHP & Clean Energy

August 2015



The Potential of a Clean Energy Future

Somerset has been an energy hub for decades, and as the region transitions off of coal Somerset can be a national model for utilizing existing energy infrastructure to support clean energy innovation, employment and diversification of the tax base. Existing assets and attributes provide a strong foundation on which to build. Connections to the bulk transmission system can allow offshore wind to flow through Brayton Point, and the Brayton Point parcel can host an array of clean energy resources such as solar, anaerobic digestion, large-scale energy storage and combined-heat-and-power (CHP). Offshore wind, solar, and anaerobic digestion have been analyzed through the Somerset Power Plant Reuse studyⁱ and show significant potential. This discussion document focuses on the potential for energy storage projects and CHP to supplement a diversified clean energy portfolio that produces:

- Diversified public and private investment
- New businesses in clean energy and manufacturing
- Jobs for current power plant employees and new workers
- Tax revenue or payment in lieu of taxes for host community

The Opportunity

Somerset could set national precedent by replacing energy, jobs and revenue from a coal-fired power plant with clean energy-fueled development. With coal-fired power plants shuttering across the country, Somerset could benefit from national attention and attract private investment and state and federal funding to demonstrate a coal to clean energy transition.

Technological advancements and recent policy developments create momentum and opportunities for clean energy. Offshore wind development tracts in federal waters were recently leased, and improvements in turbine design have improved the economics and siting of offshore wind. Technology improvements and the need to integrate intermittent renewables have led to increasing interest and investment in energy storage. Massachusetts recently announced \$10 million in project funding through the Energy Storage Initiative.ⁱⁱ The Commonwealth has also become a hub for leading energy storage companies including 24M, Ambri, Aquion Energy, and others, and universities and community colleges are pursuing research on breakthrough energy storage technologies. CHP is increasingly attractive as a means of meeting both electric generation and thermal energy needs, and CHP projects are supported through Massachusetts energy efficiency and alternative energy programs.

Key Considerations & Questions

A number of important considerations need to be addressed relating to the role of energy storage, CHP, and other technologies at Brayton Point (BP).

1) Viability of Storage and CHP

Energy storage – Storage could be deployed at many different points on the electricity system, but BP offers a direct connection to the bulk electrical transmission system, so could help balance energy needs across the ISO-NE grid. Storage could also support the local distribution grid as renewable penetration increases, an approach Eversource is proposing for New Bedford as part of its Grid Modernization Plan.ⁱⁱⁱ If BP serves as the connection point for offshore wind, storage could facilitate integration of intermittent generation by storing offshore generation produced during off-peak periods and feeding power back into the grid during peak demand periods to effectively provide dispatchable clean generation. The industrially zoned BP parcel could also serve as a commercial demonstration site for a range of energy storage applications ranging from fast response to long duration energy storage. The economics of different technologies – including traditional electrochemical batteries, flow batteries, and electromechanical storage (e.g. flywheels) – could be tested for various applications, thus benefitting technology and project developers, utilities, and regulators in understanding the market opportunities and performance of storage in the energy system.

Questions:

- Which energy storage applications make the most sense for BP?
- What energy storage technologies make the most sense for BP?
- What are the possible economic and ratepayer benefits from the application of energy storage to BP?

Combined-heat-and-power (CHP) – CHP is an advanced and efficient approach to generating electricity and thermal energy with one facility. CHP can reduce energy costs for existing facilities and attract new businesses that need heating, cooling, or steam for business operations. With natural gas available at BP, a CHP system could be installed to serve new on-site industrial applications or commercial facilities that need a steady source of heating, cooling, or steam. Steam can also be used by facilities not located directly adjacent to the facility, as evidenced by the 26 miles of steam piping running throughout Cambridge and Boston from a CHP plant in Kendall Square.^{iv}

Questions:

- Are there technical limitations to developing CHP at BP?
- Are there existing industrial, commercial (e.g. hospitals, assisted living centers), or municipal facilities that could be off-takers for thermal output?
- What type of new businesses (e.g. manufacturing, food processing) could be attracted to the BP parcel by available thermal output and other existing infrastructure (e.g. port access, proximity to highway)?

2) Financing

Energy storage – Revenues for supporting the regional grid would provide the primary income for energy storage. The regional energy market can provide a number of revenue streams, including payments for frequency regulation,^v and capacity and energy payments for replacing more expensive “peaking” power plants.^{vi} Energy storage can also earn revenue on the wholesale energy market by storing cheap, off-peak power and feeding power back into the grid during periods of peak demand when energy prices are higher.

Innovative financing mechanisms (described below) could be supplemented with grants from the Commonwealth or the Federal Government. Massachusetts has already announced a \$10 million energy storage deployment program as part of the Energy Storage Initiative, which includes additional studies of mechanisms to promote energy storage. If a project improves resiliency and is able to operate when the grid is down it could also qualify for the \$40 million Community Clean Energy Resiliency Initiative.^{vii} Additional grants or loans could potentially be provided by the Department of Energy.^{viii}

CHP – Wholesale electricity market revenue and or direct sales of electricity and thermal energy would provide the majority of revenue for a new CHP facility, with additional incentives provided through existing Massachusetts programs. Specifically, Massachusetts’ nation-leading energy efficiency programs provide tailored incentives for CHP projects,^{ix} which deliver electricity savings. CHP facilities are also provided financial incentives through Massachusetts’ Alternative Energy Portfolio Standard, which requires each electrical utility to source a minimum portion of energy from qualified sources including CHP.^x In practice this translates into incentive payments for each unit of generation from a CHP facility.

Additional funding for CHP, energy storage, or an integrated project could be provided through the federal government’s proposed \$55 million Power Plus program to help communities experiencing coal plant closures.^{xi} The Power Plus program includes incentives for work retraining, creating the potential for current coal plant employees to gain new skills and employment.

General Project Development Financing - Creative financing tools could also be utilized to support project development and third party investment. The New Markets Tax Credit Program supports up to 39% of investment costs for projects that support economic development in distressed communities, and has provided \$43.5 billion in credits since 2000.^{xii} Massachusetts’ Infrastructure Investment Incentive Program (or I-Cubed) is authorized to provide up to \$250 million in bonds to be paid back with increased tax revenue,^{xiii} and the Local Infrastructure Development Program provides assessment-backed bonds placed on development parcels.^{xiv}

Questions:

- *What share of project financing could be provided by energy market revenue and power-purchase agreements?*
- *What criteria would projects need to fulfill to qualify for development financing?*
- *What type and scale of funding could be supported with state and federal grants?*

3) Economic Impacts

A diversified clean energy portfolio for Brayton Point could provide wide-ranging benefits, including:

- Employment and local spending during site remediation and construction of new clean energy facilities.
- Ongoing employment for operation of CHP, energy storage, and other facilities.
- Potential employment at new facilities attracted by CHP plant and existing transportation infrastructure.
- Tax revenue or payment in lieu of taxes for new facilities.
 - Offshore wind – potential agreement for use of transmission substation
 - CHP – agreement similar to power plant
 - Solar – facilities pay an estimated \$6,500/MW DC per year in Massachusetts.^{xv}
 - Anaerobic digestion – to-be-determined payment based on capacity or revenue from installations.
 - Energy storage – to-be-determined payment based on capacity or revenue from installations.

Questions:

- 4) *What scale of employment benefits would each type of project deliver?*
- 5) *What type and scale of municipal payments could different projects deliver?*

For more information:

Peter Shattuck, Massachusetts Director, pshattuck@acadiacenter.org, 617.742.0054 x103

Endnotes:

ⁱ Report and related documents available at: <http://www.cbuilding.org/project/cec-somerset>

ⁱⁱ See: <http://www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/energy-storage-initiative/>

ⁱⁱⁱ Eversource is proposing a \$7 million storage pilot to streamline integration of solar generation at the utility substation level. See p. 74 of Eversource Grid Modernization Plan, DPU docket 15-122/15-123, at: <http://web1.env.state.ma.us/DPU/FileRoom>

^{iv} For additional detail see: <http://www.sourceone-energy.com/news/sourceone-news/bid/148340/Veolia-Energy-North-America-CEO-Bill-DiCroce-Discusses-Green-Steam-in-Boston-and-Cambridge-at-the-EESI-IDEA-U-S-Congressional-Briefing>

^v ISO-NE has completed its five year Alternative Technology Regulation (ATR) Pilot, which was widely viewed as a successful demonstration of the ability of flywheels and batteries (among other technologies) to provide frequency regulation. See:

http://www1.eere.energy.gov/analysis/pdfs/iso_ne_3_results_of_ancillary_service_pilots_programs_jon_lowell_and_henry_yoshimura.pdf

^{vi} Project developer AES has developed a modular lithium-ion system to substitute for simple-cycle natural gas peaking plants, and estimates the market at \$30 billion. See: <http://www.greentechmedia.com/articles/read/aes-energy-storage-targets-30-billion-peak-power-substitution-market>

^{vii} For more information see: <http://www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/resiliency/resiliency-initiative.html>

^{viii} See: <http://energy.gov/oe/services/technology-development/energy-storage>

^{ix} See: <http://www.mass.gov/eea/energy-utilities-clean-tech/energy-efficiency/ee-for-business-institutions/combined-heat-power/assessments-and-audits-energy-savings-start-here.html>

^x The APS requires that utilities meet 3.5% of load with APS credits. See: <http://www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/rps-aps/rps-and-aps-program-summaries.html>

^{xi} For more information see:

https://www.whitehouse.gov/sites/default/files/omb/budget/fy2016/assets/fact_sheets/investing-in-coal-communities-workers-and-technology-the-power-plan.pdf

^{xii} For additional information, see: http://www.cdfifund.gov/what_we_do/programs_id.asp?programID=5

^{xiii} For additional information, see: <http://www.mass.gov/anf/budget-taxes-and-procurement/cap-finance/i-cubed/overview-of-i-cubed.html>

^{xiv} For additional information see: http://www.massdevelopment.com/assets/what-we-offer/wwo-pdfs/local_infrastructure_brochure_2014.pdf

^{xv} See: <http://www.seia.org/research-resources/massachusetts-pilots>