MECERP: Town of Bucksport

Penobscot River Industrial Site Predevelopment Strategy

April 2025

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Executive Summary

INTRODUCTION

As part of the Maine Community Energy Redevelopment Program (MECERP), the Town of Bucksport received technical assistance to strategize a plan to bring economic activity to a group of industrial parcels along the Penobscot River.

Site Context & Existing Conditions:

The Site, the Penobscot River Industrial Site, was previously the location of the Verso Paper Mill, which closed in 2014. At present, the Site is entirely under private ownership, and parcel owners include JERA Americas, Whole Oceans, the Maine Maritime Academy, and Central Maine Power Company (CMPCO). 87% of the Site is owned by Whole Oceans, an on-land salmon farm startup. Whole Oceans' plans for the site are uncertain, and development is indefinitely stalled.

Scope

HR&A Advisors, Inc. provided the technical assistance for the Town of Bucksport with a three-part scope, culminating in this Site Reuse Predevelopment Strategy:

1. Goal-Setting Exercise
2. Prioritization of Potential Uses
3. Site Reuse Predevelopment Roadmap

SITE REUSE GOALS, ADDITIONAL REQUIREMENTS AND BENEFITS, AND USES

The Town of Bucksport, JERA Americas, and HR&A identified the following goals, additional requirements and benefits, and potential uses for the Site. The topline goal for reactivating the site is to grow the Town's commercial tax base.

Site Reuse Goals

Town of Bucksport and JERA Americas' shared goals for Site redevelopment, in order of importance

1. Grow the Town's **commercial tax base**
2. Deploy additional **clean energy generation**
3. Add **additional power demand** to the grid in areas with excess capacity
4. Stimulate **local job growth**

Additional Requirements and Benefits

Important considerations for increasing activity on the Site, not in ranked order of importance

- Advance **resiliency** and limit negative environmental effects
- Host **different, complementary uses onsite** as opposed to a single use
- Align with **local considerations**
- Maintain **Site security**
- Maintain **connectivity** to the town
- Explore ways to **sell additional power directly** to adjacent tenants

Potential Uses

Industrial uses that could be tenanted on the Site, not in ranked order of importance

- **Clean Energy** Generation
  - Solar
  - Biofuels
  - Hydrogen
- **Battery Energy** Storage Systems
- **Data Center** and Information Uses
- Maritime **Logistics and Distribution**

SITE REUSE EVALUATION FRAMEWORK

Analysis suggests that a mix of clean energy and data center uses could generate substantial value to the Town, and these uses could also generate synergies with each other.

	GOALS	GOAL WEIGHT	Clean Energy Generation	Battery Storage	Data Center/ Information Uses	Maritime Logistics & Distribution
Site Reuse Goals	**Goal 1:** Grow the Town's commercial tax base	50%	**LOW – HIGH**	**MEDIUM**	**HIGH**	**MEDIUM**
	Goal 2: Deploy clean energy generation	20%	**MEDIUM-HIGH**	**MEDIUM**	*N/A**	*N/A*
	Goal 3: Add additional power demand to grid	20%	*N/A* – **HIGH**	**HIGH**	**HIGH**	**MEDIUM**
	Goal 4: Stimulate local job growth	10%	**LOW – HIGH**	**LOW**	**MEDIUM**	**MEDIUM**

Additional Requirements	Advance Community Resiliency	N/A	Any investment onsite should include flood mitigation investment along the southeast shoreline of the site and fortification of the wharf and dock currently used for Maine's Dept. of Environmental Protection's oil barge. **Maritime logistics and distribution might require unique flood-proofing that elevates or safeguards critical equipment without inhibiting continuous ship-to-shore access and allows some assets to get wet.*
	Host different, complementary uses onsite	N/A	Most potential uses would allow for colocation with other uses if enough Site acreage can be consolidated. The largest-scale energy generation or data centers would impede this goal.
	Align with local considerations	N/A	Given the industrial nature of the Site, there are no regulatory barriers to any contemplated uses. However, the public might have concerns regarding minor emissions and traffic associated with active light or heavy industrial uses—namely hydrogen production and storage, biofuel production, and certain maritime uses.
	Maintain Site security	N/A	Given the industrial nature or sensitivity of the uses, all uses will require a minimum level of security including fencing, authorized access, and 24/7 lighting and monitoring.
	Improve connectivity to the town	N/A	Given the industrial nature and sensitivity of the uses, allowing public access to the Site is likely infeasible. However, it is possible to improve wayfinding to the Bucksport Paper Mill Museum.
	Explore ways to sell additional power directly to adjacent tenants	N/A	This is subject to future research and regulatory decision-making by JERA Americas and ISO New England, with options explored further below.

NOTE: Data Centers do not generate major clean energy; however, their power demand can help make the case for bringing online new clean energy generation.

SITE REUSE EVALUATION FRAMEWORK

Given the importance of fiscal returns to the Town, low-impact, high-value clean energy uses—such as solar and battery storage—potentially paired with a moderate-sized data center (if power is made cost-effective) is an ideal site reuse scheme.

	GOALS	GOAL WEIGHT	Clean Energy Generation	Battery Storage	Data Center/ Information Uses	Maritime Logistics & Distribution
Site Reuse Goals	**Goal 1:** Grow the Town's commercial tax base	50%	**LOW – HIGH**	**MEDIUM**	**HIGH**	**MEDIUM**
	Goal 2: Deploy clean energy generation	20%	**MEDIUM-HIGH**	**MEDIUM**	*N/A**	*N/A*
	Goal 3: Add additional power demand to grid	20%	*N/A* – **HIGH**	**HIGH**	**HIGH**	**MEDIUM**
	Goal 4: Stimulate local job growth	10%	**LOW – HIGH**	**LOW**	**MEDIUM**	**MEDIUM**
	Scoring					
	Raw Score		**4 – 12**	**8**	**8**	**6**
	Weighted Score		**1 – 3**	**2.1**	**2.3**	**1.6**

NOTES:

- Battery storage does not generate clean energy per se, but it can increase the economic viability and use case for clean energy.
- Data Centers do not generate major clean energy; however, their power demand can help make the case for bringing online new clean energy generation.
- Scoring does not account for additional requirements and benefits noted in the full, prior framework.

HIGH-LEVEL SITE REUSE FEASIBILITY FRAMEWORK

State leadership and guidance by ISO NE will only continue to increase the viability of solar and battery storage. Biofuel, data center, and maritime uses could be feasible, but only after certain energy supply and predevelopment conditions are met.

HIGH

Solar Photovoltaic

Solar photovoltaic is a flexible use that already exists elsewhere in the town, requires light predevelopment investment, and can easily colocate with (and add value to) other uses.

Battery Storage

Battery storage requires relatively light predevelopment and is flexible in scale. Further guidance, market-building, and procurement by the State and ISO NE will increase the feasibility of this use.

MEDIUM

Biofuel Production

Biofuel would require meaningful predevelopment investment, but a buyer would benefit from rail access (and potentially port access) onsite to connect with feedstock supply and offtakers (buyers).

Data Center

Regional energy costs currently preclude AI data centers, but relatively affordable onsite renewable energy generation could potentially unlock this use.

Maritime Industrial

As an ancillary use to other uses onsite, a light maritime industrial facility would require expansion and fortification of existing port assets and potentially harbor dredging.

LOW

Hydrogen Production

Hydrogen production would require substantial predevelopment investment, and the region might not yet have a clear concentration of potential offtakers to justify investment in facility and pipeline.

SITE REUSE ILLUSTRATIVE SCENARIO

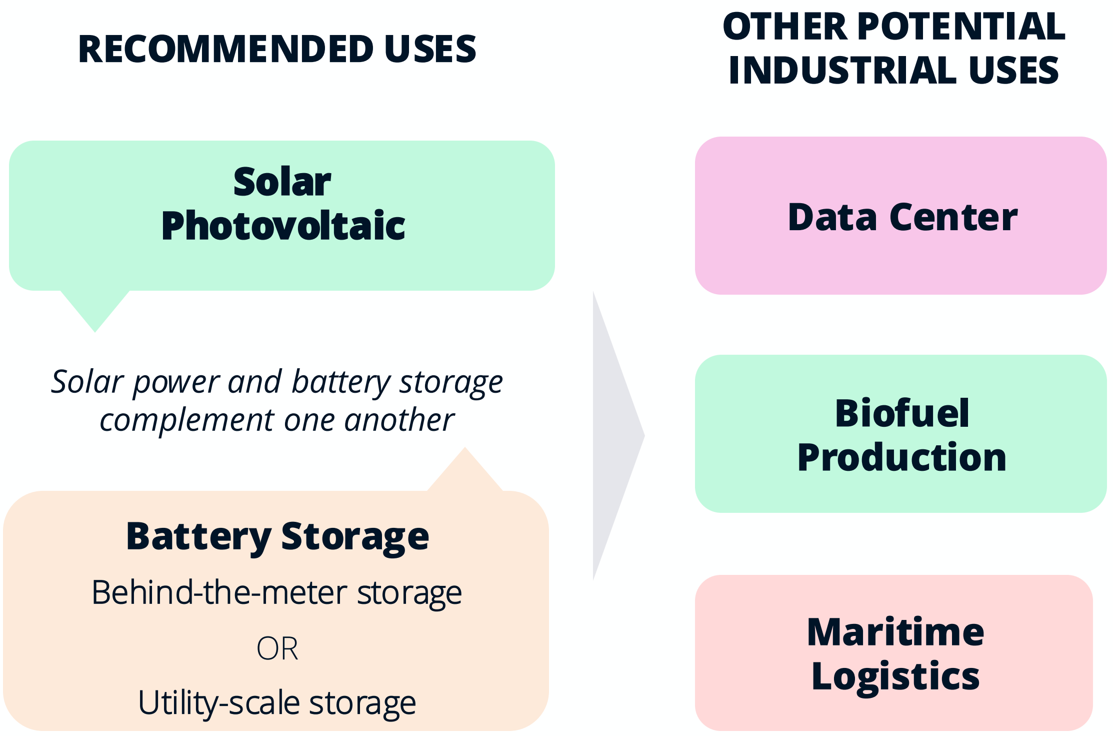
Solar, potentially paired with battery storage, is a recommended use with limited predevelopment needs. It could also increase the value of the Site for uses such as a small-to-medium data center, biofuel production, or maritime logistics.

Description

- Solar and battery storage are worthwhile investments on their own, but they could also unlock additional value on the Site for potential industrial users that need access to affordable, reliable power.

Impacts

- Site reuse could spur a significant increase in property tax revenue for the Town of Bucksport.
- With tenanted industrial uses, after an initial surge in temporary jobs, the Town could experience a meaningful permanent increase in local jobs as well, including high-paying technical jobs.



NOTES: Scenarios are illustrative only and do not reflect analysis or commentary on the relative scale of uses or the financial feasibility of uses as part of a portfolio of uses.

EMERGING NEXT STEPS

Given the ownership situation, next steps are largely dependent on the action of private owners.

Potential Next Steps:

JERA Americas

- JERA engages ISO New England and submits a Surplus Interconnection Service request to increase power generation
- If approved, JERA generates more power onsite and explores ways to decarbonize energy (e.g., solar)
- Given Maine Bill LD1173, JERA could consider the feasibility of direct sale of electricity to other Site tenants
- JERA might consider flood hazard mitigation efforts to protect the current power plant, which is in a flood zone.

Town of Bucksport

- Re-engage Whole Oceans with additional data on Site value and options
- Continue to engage with the State on tenanting opportunities as conversations with Whole Oceans unfold
- If necessary, also engage Eastern Maine Development Corporation as conversations with Whole Oceans unfold

Decision Points:

Whole Oceans

- **Scenario A:** Whole Oceans holds onto its land parcels indefinitely and maintains tax commitment.
- **Scenario B:** Whole Oceans builds 50% of original scoped project and holds onto the remaining land indefinitely.
- **Scenario C:** Whole Oceans sells a portion of land that it no longer needs to a new owner and holds onto remaining land.
- **Scenario D:** Whole Oceans builds on-land salmon farm on portion of land and sells the remaining portion to a new owner.

02

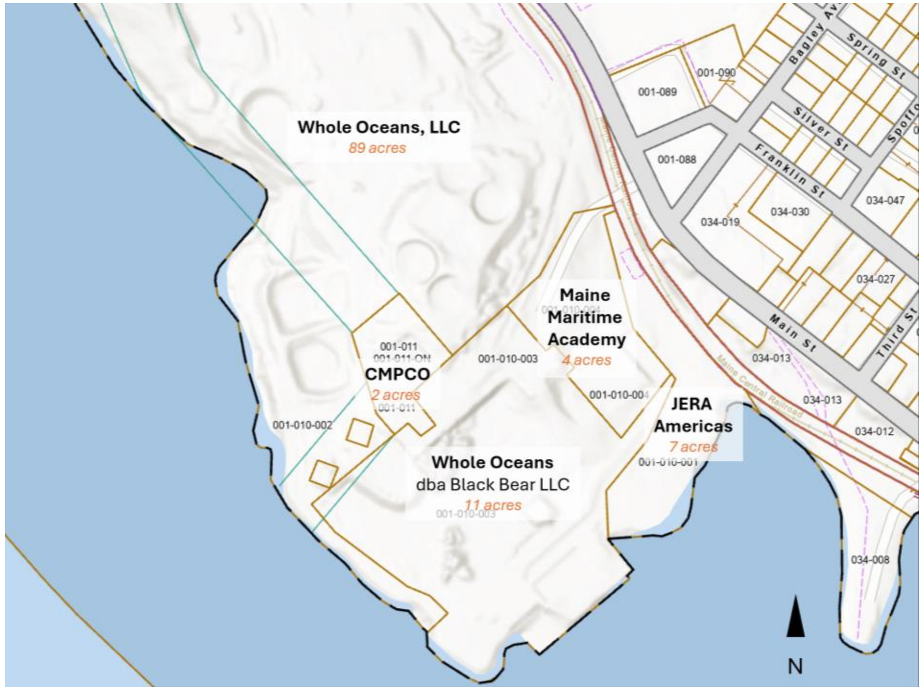
Site Reuse Framework & Analysis

INTRODUCTION | Bucksport Context

The Town of Bucksport is interested in bringing economic activity to a group of industrial parcels along the Penobscot River.

Site Context & Existing Conditions

- The Site was the previous location of the Verso Paper Mill, which closed in 2014. At present, the Site is entirely under private ownership, and parcel owners include JERA Americas, Whole Oceans, the Maine Maritime Academy, and Central Maine Power Company (CMPCO).
- The Site's only active uses are Maine Maritime Academy's workforce training center; CMPCO's substation; and JERA America's 175MW thermal power station, which runs less than 5% of the year but serves as a crucial black-start site for the region.
- 87% of the Site is owned by Whole Oceans, an on-land salmon farm startup. Despite acquiring parcels in 2018 as well as local and state permits, the project is indefinitely stalled. Whole Oceans has expressed it may not need the full scale of the parcels it owns and let local permits expire in Fall 2024. Despite efforts, the Town is not in contact with Whole Oceans' representatives.
- The Site has deep water and rail access as well as established water and sewer connections.




JERA Americas' Power Plant, Portland Press Herald

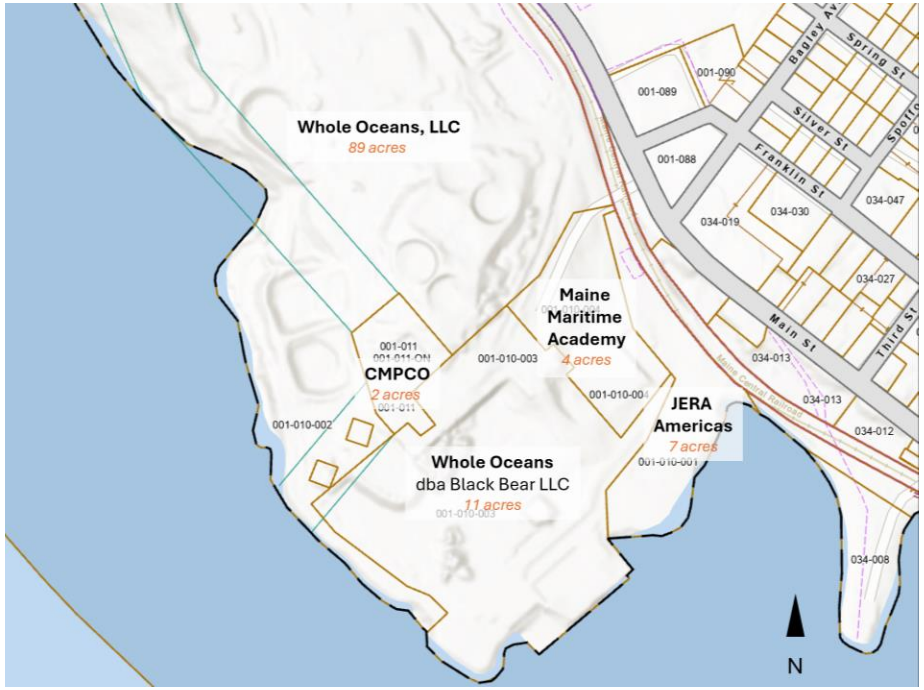
SOURCES: Power Engineering (2022), Bangor Daily News (various articles). Bucksport A.D.A.P.T (2019).

INTRODUCTION | Bucksport Context

The Site, and relatedly the impact of the Verso Paper Mill's closure, has been the focus of multiple prior studies.

Prior & Ongoing Planning Efforts

- Since the mill closure in 2014, the Town of Bucksport has actively supported the re-tenanting of the Site. Whole Oceans purchased several parcels in 2018, and JERA America acquired the thermal power station in 2022 from AIM Development USA.
- The Site was the subject of a 2018 EPA Area-Wide Brownfields Plan, A.D.A.P.T. Bucksport, which recommended several potential uses and infrastructure upgrades.
- The Town of Bucksport has embarked on many other planning efforts, including a comprehensive plan, since the closure of the mill in 2014.




JERA Americas' Power Plant, Portland Press Herald

SOURCES: Power Engineering (2022), Bangor Daily News (various articles). Bucksport A.D.A.P.T (2019), Town of Bucksport.
NOTES: Whole Oceans has recently allowed local permits to expire.

INTRODUCTION | Scope of Analysis

HR&A's scope included a goal setting exercise with the Town and JERA Americas as well as research into the impacts and predevelopment requirements of potential new uses to inform the Site Reuse Predevelopment Strategy.

01 Goal-Setting:

In collaboration with the Town and JERA Americas, HR&A defined goals for the future of the Site based on a review of previous planning materials and analyses. Goals were then ranked by importance during an in-person workshop in November 2024.

02 Prioritization of Potential Uses:

Based on the goals and other additional requirements for the Site, HR&A prioritized six potential uses for the Site including various types of clean energy generation, battery storage, a data center, and maritime logistics.

03 Site Reuse Predevelopment Strategy:

In culmination of the scope, HR&A prepared a Site Reuse Predevelopment Strategy outlining the:

- Prioritization of potential uses
- Economic, fiscal, and environmental impacts of each potential use
- Pre-development requirements that would increase the feasibility of each potential use
- Next steps

This process was conducted with the intention of answering the following questions:

1. *What potential new uses most align with the Town's needs?*
2. *What potential new uses are most feasible onsite?*
3. *What predevelopment investments should the Town and Site owners contemplate to ready the site for desired industrial redevelopment?*
4. *What levers are available to the Town and Site owners to accelerate desired redevelopment?*

SITE REUSE FRAMEWORK | Prioritized Site Reuse Planning Goals

In collaboration with the Town and JERA Americas, HR&A drafted the following goals for Site redevelopment, ranked in order of importance.

1	Grow the Town's **commercial tax base**	Generating more tax revenue at the Site than at present is of highest priority. The 2014 closure of the paper mill reduced the Town's tax base by 40% and the Town is looking for a sustainable use to recoup those losses.
2	Deploy additional **clean energy generation**	Deploying clean energy on the Site aligns with JERA America's decarbonization goals, the Town's resiliency efforts, and the Site's zoning and regulation.
3	Add **additional power demand** to the grid in areas with excess capacity	Re-tenanting the Site may result in introducing new uses that draw on available and potential additional electric grid capacity.
4	Stimulate **local job growth**	Expanding local job opportunities to recoup losses from the mill closure would support the Bucksport community.

SOURCES: Eastern Maine Development Corporation (2021).

SITE REUSE FRAMEWORK | Additional Site Reuse Requirements and Benefits

HR&A, JERA Americas, and the Town of Bucksport also defined additional Site reuse requirements and benefits that would support future redevelopment.

Advance **resiliency** and limit negative environmental effects	Ensuring resilient design and construction of new uses as well as shoreline fortification is crucial for sustainability of the Site and the protection of the Bucksport coastline.
Host **different, complementary uses onsite** as opposed to a single use	Diversifying uses on the Site and hosting multiple uses rather than one is of significant interest to the Town.
Align with **local considerations**	Evaluating the appetite and zoning permissibility for all the potential uses of the Site is crucial to ensure buy-in from the community.
Maintain Site **security**	Evaluating security needs for equipment, inventory, and workers will help ensure the safety of the greater community.
Maintain **connectivity** to the town	Maintaining or improving the connection between the Site and Bucksport's Main Street and waterfront walkway could be beneficial for the greater community.
Explore ways to **sell additional power directly** to adjacent tenants	If permitted, selling JERA's generated power at a lower cost could be a strong selling point for re-tenanting the Site.

SITE REUSE FRAMEWORK | Prioritized Uses

HR&A defined four potential new uses for the site including clean energy generation, battery storage, data centers, and maritime logistics.

Clean Energy Generation

Production of energy with minimal or no greenhouse gas emissions, including:

- solar,
- biofuels, and
- hydrogen

Battery Energy Storage Systems

Facilities that house batteries to store electrical energy for later use.

Data Center and Information Uses

Facilities that house information technology infrastructure to store, process, and manage data and server activity.

Maritime Logistics and Distribution

Logistics and distribution infrastructure for transportation or warehousing of maritime freight.

SITE REUSE FRAMEWORK | Site Reuse Evaluation Framework

HR&A developed the following decision-making framework to evaluate and prioritize new potential uses.

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Additional Requirements	Advance Community Resiliency	N/A				
	Host different, complementary uses onsite	N/A				
	Align with local considerations	N/A				
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	Improve connectivity to the town	N/A				
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SITE REUSE EVALUATION FRAMEWORK

Analysis suggests that a mix of clean energy and data center uses could generate substantial value to the Town, and these uses could also generate synergies with each other.

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	Raw Score		**4 – 12**	**8**	**8**	**6**
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NOTES:
- Battery storage does not generate clean energy per se, but it can increase the economic viability and use case for clean energy.
- Data Centers do not generate major clean energy; however, their power demand can help make the case for bringing online new clean energy generation.
- Scoring does not account for additional requirements and benefits noted in the full, prior framework.

HIGH-LEVEL SITE REUSE FEASIBILITY FRAMEWORK

State leadership and guidance by ISO NE will only continue to increase the viability of solar and battery storage. Biofuel, data center, and maritime uses could be feasible, but only after certain energy supply and predevelopment conditions are met.

HIGH

Solar Photovoltaic

Solar photovoltaic is a flexible use that already exists elsewhere in the town, requires light predevelopment investment, and can easily colocate with (and add value to) other uses.

Battery Storage

Battery storage requires relatively light predevelopment and is flexible in scale. Further guidance, market-building, and procurement by the State and ISO NE will increase the feasibility of this use.

MEDIUM

Biofuel Production

Biofuel would require meaningful predevelopment investment, but a buyer would benefit from rail access (and potentially port access) onsite to connect with feedstock supply and offtakers.

Data Center

Regional energy costs currently preclude AI data centers, but relatively affordable onsite renewable energy generation could potentially unlock this use.

Maritime Logistics

As an ancillary use to other uses onsite, a light maritime industrial facility would require expansion and fortification of existing port assets and potentially harbor dredging.

LOW

Hydrogen Production

Hydrogen production would require substantial predevelopment investment, and the region might not yet have a clear concentration of potential offtakers to justify investment in facility and pipeline.

SITE REUSE ILLUSTRATIVE SCENARIO: RECOMMENDED MOVES

Solar photovoltaic, potentially paired with battery storage, is a recommended, flexible use with limited predevelopment needs. Solar and energy storage could also increase the value of the Site to potential information or industrial tenants.

Scenario Description

Solar and battery storage are worthwhile investments in and of themselves, but they could also unlock additional value on the Site.

- Solar power generation onsite could supplement renewable or nonrenewable power generated by the Bucksport Power Station. Solar could provide affordable operating power or startup power to potential industrial uses onsite via a negotiated Power Purchase Agreement (PPA) or other direct sale arrangement. This arrangement could increase the value of the site for information or industrial tenants.
- Behind-the-meter battery storage could store excess renewable power generated onsite, which would increase the value of the solar project and further increase the value of the Site for potential information or industrial tenants that require reliable power (e.g., data centers). Alternately, utility-scale battery storage could be procured onsite, which would have broader benefits to the grid.
- The southeast dock could remain active to support the delivery of fuel oil to Bucksport Power Station.

Impacts

- The installation of solar and battery storage could spur increased property tax revenue.
- The installation could generate temporary construction jobs and relatively few permanent jobs.

RECOMMENDED USES

Solar Photovoltaic

Solar and battery storage complement one another

Battery Storage

Behind-the-meter battery storage

OR

Utility-scale battery storage

NOTES: Scenarios are illustrative only and do not reflect analysis or commentary on the relative scale of uses or the financial feasibility of uses as part of a portfolio of uses.

SITE REUSE ILLUSTRATIVE SCENARIO: ADDITIONAL USES

A data center, biofuel facility, or maritime industrial logistics hub are potentially feasible onsite if certain conditions are met. In addition, onsite renewable energy or energy storage could increase the marketability of the Site for these uses.

Description

- Information or industrial uses could benefit from the presence of enabling investments in solar and battery storage that provide affordable, reliable operating power.

Impacts

- Site reuse could spur a significant increase in property tax revenue for the Town of Bucksport.
- With tenanted industrial uses, after an initial surge in temporary construction jobs, the Town could experience a meaningful permanent increase in local jobs, including high-paying technical jobs.

RECOMMENDED USES

Solar Photovoltaic

Battery Storage

Behind-the-meter battery storage

OR

Utility-scale battery storage

INFORMATION OR INDUSTRIAL USES

Data Center

A small-to-medium-scale data center could be made feasible by the direct negotiated sale of onsite-generated power, at rates competitive with the Boston Metro Area Market.

Biofuel Production

A biofuel production facility could be made feasible by securing contracts to nearby offtakers and due to existing proximity (and rail access) to Maine's large feedstock supply market. Initial startup would rely on onsite-generated power, and production would primarily run thereafter on syngas created from biomass.

Maritime Logistics

- A light maritime industrial facility, anchored around the southeastern dock, could support maritime logistics infrastructure beyond fuel oil delivery.
- If biofuel production were to occur onsite, vessels that rely on biofuel (which remains emerging technology) could serve as offtakers.

NOTES: Scenarios are illustrative only and do not reflect analysis or commentary on the relative scale of uses or the financial feasibility of uses as part of a portfolio of uses.

03

Emerging Conclusions

CONCLUSIONS | Findings: JERA Americas Site Opportunities

1. **The Town of Bucksport and JERA Americas' goals for the Site are well-aligned.** These shared goals also align with State-level climate and decarbonization goals ("Maine Won't Wait") and the State's broad industrial development goals.

2. JERA Americas has a clear opportunity to generate additional power, including renewable power, but additional generation will require conference with ISO New England.

- Surplus Interconnection Service, if permitted by ISO-NE, offers the potential to fast-track an increase in power generation given the underutilized interconnection capacity for the Bucksport power station.
- As of 2019, direct private sale of electricity to limited, geographically proximate users—if permitted—could potentially allow JERA to further monetize additional renewable power production, and it would be a selling point to other future tenants on the rest of the Site.
- Siting small-scale solar photovoltaic panels or behind-the-meter energy storage might be possible short-term.

3. JERA Americas might consider flood hazard mitigation on its property, which is in a flood zone. JERA could do so in close consultation with the Town of Bucksport, which is completing its Downtown Resiliency Master Planning process. In collaboration with the Town, it could explore opportunities for limited land reclamation along the Penobscot River.

CONCLUSIONS | Findings: General Site Predevelopment and Reuse Opportunity

1. Large-scale Site redevelopment is currently subject to the plans of Whole Oceans, LLC.

- Neither the Town nor the State has legal recourse to bring Whole Oceans to the table. Current tax rates alone are not sufficient to motivate Whole Oceans to sell the land.
- Upon completion of the MECERP scope, the State can continue supporting Bucksport's industrial development goals, once Whole Oceans comes to the table, by supporting tenant attraction and continuing to share information on the State's clean energy and storage deployment programs, policies, and incentives.
- Eastern Maine Development Corporation (EMDC), which supported the ADAPT Plan on the site, could also support the Town's engagement with other potential tenants.

2. The power generation potential of Bucksport Power Station is a strong selling point for any future tenant.

Irrespective of Site control challenges on the Penobscot River Industrial Site, the presence of underutilized capacity at the Bucksport power station, and JERA's interest in decarbonizing this asset over time, represents a substantial selling point for future commercial or industrial tenants, especially if direct sale of onsite-generated electricity is possible.

3. Site developers should generally be expected to accomplish predevelopment requirements like earthwork and expansion to water connections for potable and nonportable water.

However, if the Town (and Whole Oceans) aligned on a desired type of reuse, limited earthwork onsite and resiliency improvements to the southeasternmost corner of the Site could produce additional value for future potential owners.

CONCLUSIONS | Scenarios

The following are plausible scenarios for the Site, dependent on Whole Ocean's plans. To encourage Scenario C and D, the Town could identify ideal tenants and make more intentional contact with Whole Oceans.

Less Ideal → **More Ideal**

Scenario	Scenario A	Scenario B	Scenario C	Scenario D
Description	Whole Oceans holds onto its land parcels indefinitely and maintains its tax commitment.	Whole Oceans finally builds 50% of original scoped project and holds onto the remaining land indefinitely.	Whole Oceans sells the portion of its land that it no longer needs to a different owner; it holds on to the remainder of the land indefinitely.	Whole Oceans builds out the on-land salmon farm on ~50% of its land and sells the remaining portion to a different owner.

If Scenario C and D:
The Town, in partnership with the State and potentially EMDC, could identify ideal site tenant(s).

SOURCES:

Appendix

Site Reuse Analysis

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JERA Americas Site Opportunities | Grid Interconnection

As part of JERA's commitment to decarbonize aspects of the Bucksport generation power station, JERA could work with ISO New England to explore ways to leverage existing, underused grid interconnection capacity on its parcel.

If permitted to do so by ISO New England (ISO-NE), JERA Americas could increase the power generation capacity of its parcel.

Capacity Details

Existing Conditions:

- The Thermal Power Plant operated by JERA Americas has a capacity of 175 megawatts (MW).
- According to the Current Interconnection Agreement for the JERA-owned parcel, there is 218 megawatts of interconnection capacity at the site, suggesting room for additional generation.

*SOURCES: JERA Americas: Public Comment Nov 20, 2023

JERA Americas Site Opportunities | Grid Interconnection

State statute could also allow JERA to generate and sell additional clean or renewable power locally, although there are few examples of this being done in Maine.

In 2019, the State of Maine passed Bill LD1173, which approved the private sale of electricity from a generator to a limited number of local commercial or industrial customers within a bounded geography.

Given relatively high electricity costs in the northeast compared to the rest of the United States, the negotiated direct sale of electricity to nearby uses that require significant energy—e.g., biofuel and hydrogen production, data centers—could be an extremely attractive selling point to potential industrial project owners.

This Act has been used in the Town of Millinocket at the One North industrial campus to enable the sale of 50MW of hydroelectric power generated onsite to industrial tenants within the 2,000-acre emerging industrial park, including a salmon aquaculture development and biofuel production facility.

Bill LD1173 Details

Summary text from **Bill LD1173: An Act To Allow the Direct Sale of Electricity:**

*"This bill directs the Public Utilities Commission to approve a petition to sell electricity directly to commercial or industrial customers if the commission finds the electric service meets specified requirements. The bill specifies that the petitioner does not become a public utility as a result of its furnishing electric service to participating customers. The bill also provides that a person that has been approved to sell electricity directly to customers may construct and maintain its lines in, upon, along, over, across or under the roads and streets."**

Requirements:

- Generator and customers are located within 5 miles of each other
- Sale is limited to 5 customers

NOTES: A similar bill was brought forward in 1999 but failed to pass.
*SOURCES: State of Maine 129th Legislature; One North

JERA Americas Site Opportunities | Flood Resiliency

JERA, in close consultation with the Town's Downtown Resiliency Master Planning process, might consider flood mitigation investment along the southeast shoreline of the site.

The southeastern coastline of the Penobscot River Industrial Site, including a portion of the Bucksport generation power station, lies within in **a high-risk flood zone** (Zone AE) with a 1% chance of an annual flood (100-year flood). FEMA flood zones do not yet account for expected sea level rise due to climate change, and local flood insurance rate maps have not been updated since 2016.

JERA Americas could consider flood mitigation investments to protect the power plant through dry flood-proofing and selective elevation of equipment.

Any flood mitigation onsite would ideally align with shoreline modifications emerging from the ongoing Bucksport Downtown Flood Resiliency Master Plan.

Although more evaluation would be required, initial conversations with Maine DEP have suggested it would be acceptable to fill in portion of the Penobscot River between the power station and Maine Street as part of a broader hazard mitigation investment.

FEMA Flood Insurance Rate Map

SOURCES: FEMA, U.S. Topographic Map

General Site Predevelopment and Reuse Requirements | Flood Resiliency

Fortification of the wharf and dock currently used for the Maine Department of Environmental Protection's oil barge would be important, especially if other future tenants expect to rely on shipping for fuel or other goods.

Most of the Site is in a minimal flood hazard area (Zone X), with less than a 0.2% chance of an annual flood (500-year flood). However, the southeastern coastline of the Site, including the dock and the wharf, is in **a high-risk flood zone** (Zone AE) with a 1% chance of an annual flood (100-year flood). FEMA flood zones do not yet account for expected sea level rise due to climate change, and local flood insurance rate maps have not been updated since 2016.

Predevelopment Considerations:

- Any new investment onsite should include flood mitigation along the southeast shoreline, ideally aligning with shoreline modifications emerging from the ongoing Bucksport Downtown Flood Resiliency Master Plan.
- Maine's Dept. of Environmental Protection should encourage Black Bear LLC, or a potential new owner, to fortify the wharf and dock that is currently used by the Maine Department of Environmental Protection's oil barge.

FEMA Flood Insurance Rate Map

SOURCES: FEMA, U.S. Topographic Map

General Site Predevelopment and Reuse Requirements | Site Landscaping

Any investment onsite will require substantial earthwork to create one or more flat grades onsite.

Any redevelopment will entail significant earthwork to create a buildable site or sites. Although the extent of earthwork will depend on the design of the project, a 2019 State permit application by Whole Oceans, LLC provides information about soil conditions onsite and provides a proxy for the type and cost of earthwork that could be required. Consultants retained by Whole Oceans assembled an earthwork scope that would affect 22 acres of the site and create a buildable area at an elevation of 41 feet. The process was estimated to take 6 months and cost **$6.5M** in 2019 dollars.

Predevelopment Considerations:

Any redevelopment project or projects on the larger Site would likely entail the following earthwork investments prior to construction:

- Installation of temporary erosion control
- Demolition of existing underground foundations and piping
- Excavation, limited blasting of bedrock, and site grading
- Installation of permanent erosion control for construction phase

Depiction of geotechnical explorations relative to existing conditions and proposed construction, S.W. Cole Engineering, Inc., Whole Oceans, LLC SLODA (2019)

NOTE: the Maine Natural Areas Program database does not document the existence of rare or unique botanical features on the project site
SOURCES: Whole Oceans, LLC SLODA (2019)

General Site Predevelopment and Reuse Requirements | Site Security

Given the industrial nature or sensitivity of potential new uses, all uses will require a minimum level of security including fencing, authorized access, and 24/7 lighting and monitoring.

The Site is already well-positioned from a security perspective, with fencing and gated access. Depending on what is developed in the future, additional lighting and fencing to secure entry and egress could be required. This equipment would be delivered during the construction phase of a project rather than the predevelopment phase.

Predevelopment Considerations: N/A

Verso Paper Mill Site, Bangor Daily News

SOURCES: Bangor Daily News (2024).

General Site Predevelopment and Reuse Requirements | Permitting

Any new construction on the Site would be subject to multiple local and state permits, but given the Site's industrial history, permits are not expected to be a challenging regulatory hurdle.

Any new construction is expected to trigger multiple local and state permits. The existing presence of Whole Ocean's Site Location of Development Permit and Maine Pollutant Discharge Elimination Permit applications are valuable: they include pre-development requirements specific to the site.

It is unlikely that a new owner would be able to use Whole Ocean's State permits. The owner would need to prepare new applications.

Predevelopment Considerations: N/A

Potential Applicable Permits

Administrator	Permit	Description
Town of Bucksport	Building/Land Use	For new or expanded structures
	Internal Plumbing	For improvements to plumbing infrastructure
	Subsurface Wastewater Disposal	For a new or a placement septic system
	Sewer	For new connections to the public system
	Entrance	For new or expanded driveway entrances
	Flood	For new construction in a flood zone
	Harbor Mooring	For placing moorings in the harbor
	Demolition	For demolition of existing structures
State of Maine	Site Location of Development	For new construction occupying 20+ acres
	Water Discharge Permits	For management discharge into waterways

SOURCES: Town of Bucksport, State of Maine

General Site Predevelopment and Reuse Requirements | Connectivity

While the public will likely have limited access to the Site and its waterfront, the Town can encourage current owners to improve wayfinding between Main Street and the entrance to the Site.

The security requirements of potential new uses limit the ability for the public to access the waterfront and the Site, however, wayfinding improvements can be made to the Site entrance and the in-progress Bucksport Paper Mill Museum.

Bucksport Paper Mill 10-Year Anniversary Event, Bucksport Paper Mill Museum

Predevelopment Considerations:

The Town of Bucksport can work with current owners to improve wayfinding around the Site, including measures to:

- Increase easy, public access to the Bucksport Paper Mill Museum
- Add signage for tenants, akin to the Maine Maritime Academy's entrance sign

SOURCES: Bangor Daily News (2024), Bucksport Paper Mill Museum.

Clean Energy: Solar Farm | Description and General Site Readiness

One of the cleanest renewable energy sources, solar photovoltaic allows for flexible installation on current assets or on the ground.

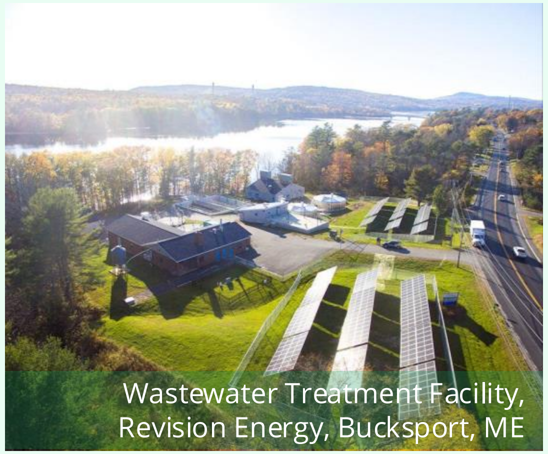
Solar power is the conversion of energy from sunlight into electricity. Solar photovoltaic (also known as solar panels) absorbs light, creating electric currents that can then be used to power anything from households to industrial machinery.

Site Readiness

- ✓ **Scale.** A 1 MW solar farm requires at least 5 acres of land, but solar photovoltaic is flexible and can also be installed on existing buildings.
- ✓ **Environmental.** Environmental Site Assessment Phase 1 (and 2 if necessary) is complete.
- ✓ **Grading.** Installation of a utility-scale solar farm at a consistent grade is ideal; however, a farm could be constructed on multiple grades.

Emissions

Solar photovoltaic is one of the cleanest renewable energy sources with limited environmental impacts beyond the solar panel manufacturing process.



Wastewater Treatment Facility, Revision Energy, Bucksport, ME

Public Works Department, Revision Energy, Bucksport, ME

Sanford Airport Solar Project (NextEra Energy), Sanford, ME

SOURCES: Natural Resources Defense Council (2022), Next Era Energy (2019), ReVision Energy, Sanford Regional Economic Growth Council

Clean Energy: Solar Farm | Detailed Goal Alignment, Benefits, & Readiness

Solar photovoltaic is the most flexible use contemplated on Site and could colocate with other energy or industrial uses. However, it will generate relatively lower fiscal and economic returns to the Town.

Site Reuse Goals	Assessment	Notes
1. Fiscal Impact	LOW	**~$12,500 / 1MW annually**, based on potential equipment value of $1M / 1MW.
2. Clean Energy Impact	HIGH	Solar is one of the cleanest renewable energy sources with limited environmental impacts beyond the panel manufacturing process.
3. Power Demand Impact	N/A	N/A – *Solar power will not draw power from the grid*
4. Job Growth Impact	LOW	**2-2.5** temporary construction jobs per 1MW. **Minimal** full-time operations jobs per 1MW.

Other Benefits	
Community Resiliency	**No concerns.** Site-level resiliency requirements are outlined above. Relatively high elevation of the majority of the Site suggests solar deployment will not encounter flood hazards related to sea level rise or storm surge even after site grading.
Parcel Sizing	**Flexible sizing.** Solar farms can scale flexibly (A 1MW solar farm requires at least 5 acres of land). Installation of a farm at a consistent grade is ideal. However, a farm could be constructed on multiple grades (unlike other energy generation uses profiled in this analysis).
Coexistence w/ other Uses	**Flexible colocation.** A solar panel's flexible installation (on land, on building roofs, or on building canopies) coupled with its lack of emissions makes it the most compatible, flexible use for colocation with other active uses onsite.
Local Considerations	**Strong alignment.** The Town of Bucksport has approved several solar projects within the town, indicating support for the use. Furthermore, the Town's 2019 Economic Development Action Plan Research includes a recommendation to "take advantage of more solar opportunities." The Site will not require any zoning changes to accommodate solar photovoltaic. Solar will not generate negative externalities—emissions, freight—associated with other energy generation technology.

SOURCES: See subsequent slides for detailed sources and assumptions.

Clean Energy: Solar Farm | Fiscal Implications

A 1MW solar farm has the potential to generate close to $12,500 annually for the Town of Bucksport from assessed equipment value.

1MW ~ $945K
assessed equipment value

Sources and Assumptions

- According to the Solar Energy Industries Association, building a utility-scale solar power plant requires capital costs between $0.89 and $1.01 per watt. Therefore, a 1MW solar farm can cost between $890,000 and $1.01 million, not including the cost of land.
- The NextEra 50MW solar project at the Sanford Airport generates $500,000 for the City of Sanford annually, which is $10,000 per 1MW.

$945,000
equipment value / 1MW

x

0.01325
millage rate

=

~$12,520
potential tax revenue / 1MW

NOTE: High-level analysis does not account for depreciation of asset value over time—i.e., following Modified Accelerated Cost Recovery System (MACRS) depreciation.
SOURCES: Town of Bucksport Property Tax Records, Solar Energy Industries Association (2024), NextEra Energy (2019).

Clean Energy: Solar Farm | Job Implications

Solar photovoltaic would create minimal permanent jobs.

Construction / Installation Jobs

2.0-2.5

jobs / MW

Sources and Assumptions

- According to the Solar Foundation National Solar Job Census and Solar Energy Industries Association installation data, utility solar installations create an average 2.1 jobs per 1 MW.
- The NextEra 50MW solar project at the Sanford Airport created 120 temporary construction jobs, or 2.4 jobs per 1 MW.

+ O&M

Variable Jobs

- Solar projects result in relatively few long-term operation and maintenance jobs on a per-MW basis. For example, on average a 30-50 MW utility-scale solar farm will employ 1-2 full-time technicians.
- O&M solar workers might divide their time across multiple projects in an area.

SOURCES: Solar Foundation National Solar Job Census (2022), Solar Energy Industries Association (2020), NextEra Energy (2019), New York Times (2021), Electric Power Research Institute (2015).

Clean Energy: Biofuel Production | Description and General Site Readiness

Biofuel is created by processing organic biomass (“woody waste” or oils and fats) into fuel for heating or transportation.

Biofuel is an environmentally friendly alternative to fossil fuels. Production methods depend on the type of fuel, but commercial scale plants commonly employ thermochemical methods, a process in which organic material is heated until it turns into a fuel product. Along with fuel itself, thermochemical methods can also create biochar (a carbon-rich soil amendment material) and syngas (a hydrogen and carbon monoxide mixture that can be used for power generation).

Site Readiness

- ✓ **Scale.** At least 10 acres of land required.
- ✓ **Environmental.** Environmental Site Assessment Phase 1 (and 2 if necessary) is complete.
- ✓ **Grading.** The Site would need to be graded to a flat surface.
- ✓ **Rail access.** The Site has access to rail access to support delivery of feedstock or “woody waste.”
- ✓ **Water availability.** The Site likely has enough water access for machine cooling.

Emissions

Biofuels are known to be “carbon-neutral” or “carbon-negative” as the feedstock used in production once absorbed carbon, but production plants can still emit greenhouse gases and potentially hazardous air pollutants.*

Site of a Future Biofuel Production Plant in Lincoln, ME

Maine Standard Biofuels

University of Maine Forest Bioproducts Research Institute

SOURCES: U.S. Department of Energy, MIT Climate Portal, Environmental Integrity Association (2024), University of Maine (2024), News Center Maine (2020), Maine Standard Biofuels.

*Including particulate matter, carbon monoxide, and nitrogen oxides.

Clean Energy: Biofuel Production | Detailed Goal Alignment & Readiness

Biofuel production could colocate with the other energy or industrial uses explored, and it will generate relatively high fiscal and economic returns to the Town.

Site Reuse Goals	Assessment	Notes
1. Fiscal Impact	HIGH	**~$364,375 / 1M** gallons annually, based on potential equipment value of $20M / 1M gallons
2. Clean Energy Impact	MEDIUM	Biofuel is a more environmentally friendly alternative to fossil fuels, but it does emit limited amounts of carbon and other hazardous pollutants.
3. Power Demand Impact	LOW	While production can run on the syngas created from biomass, biofuel production facilities need access to power for initial startup.
4. Job Growth Impact	HIGH	**10-20** temporary construction jobs per 1M gallons. **2-4** full-time operations jobs per 1M gallons.

Other Benefits	
Community Resiliency	**No concerns.** Site-level resiliency requirements are outlined above. Relatively high elevation of the majority of the Site suggests biofuel production will not encounter flood hazards related to sea level rise or storm surge even after site grading.
Parcel Sizing	**Requires significant acreage**. Commercial production plants typically require 10-50 acres and significant infrastructure (e.g., logistics, storage, and production space). Consistent grading of the site for infrastructure is required.
Coexistence w/ other Uses	**Possible colocation**. A commercial biofuel production plant can be tenanted near other heavy industrial uses, if emissions are determined to not be an issue.
Local Considerations	**Probable alignment.** There is no evidence indicating that the Bucksport community would oppose a biofuel production facility; however, community engagement activities by the Town have not discussed biofuel activity specifically. Biofuel production could generate negative externalities—including minor emissions and increased freight traffic in and out of the facility—that could cause concern to community members. The Site will not require any zoning changes to accommodate biofuel production.

SOURCES: See subsequent slides for detailed sources and assumptions.

Clean Energy: Biofuel Production | Fiscal Implications

A 1M gallon biofuel production plant has the potential to generate over $300,000 annually for the Town of Bucksport from assessed building and equipment value.

1M gallons ~ $27.5 million
assessed building & equipment value

Sources and Assumptions

- Based on comparable build-out costs, an ethanol or sustainable aviation fuel plant can cost between $20-$35 per 1 gallon produced annually.
  - A $100M plant in Lincoln, ME will produce 3M gallons of ethanol annually.
  - A $300M plant in Redrock, OR will produce 15M gallons of sustainable aviation fuel annually.
  - A $4B plant in Louisiana will produce 135M gallons of sustainable aviation fuel annually.

$27,500,000
building & equipment value / 1M gal

x

0.01325
millage rate

=

~$364,375
potential tax revenue / 1M gal

NOTE: High-level analysis does not account for depreciation of asset value over time—i.e., following Modified Accelerated Cost Recovery System (MACRS) depreciation.
SOURCES: Town of Bucksport Property Tax Records, GreenAir News (2024), News Center Maine (2023), Red Rock Biofuels (2019).

Clean Energy: Biofuel Production | Job Implications

Biofuel production is projected to create more jobs than solar.

Construction / Installation Jobs

10-20

jobs / 1M gallons

Sources and Assumptions

- Based on comparable plants, an ethanol or sustainable aviation employs 10-20 temporary construction workers per 1M gallons.
  - An incoming 20M/gallon plant in rural Maine anticipates hiring 200 construction workers.
  - A 15M/gallon plant in Redrock, OR anticipated hiring 300 construction workers.
  - An incoming 175M/gallon plant in Aroostock County anticipates hiring 2.3K construction workers.

Operating Jobs

2-4

jobs / 1M gallons

Sources and Assumptions

- Based on comparable plants, an ethanol or sustainable aviation employs 2-50 full-time workers per 1M gallons.
  - An incoming 20M/gallon plant in rural Maine anticipates hiring 80 full-time workers.
  - An incoming 175M/gallon plant in Aroostock County anticipates hiring 650 full-time workers .
  - A 15M/gallon plant in Redrock, OR anticipated hiring 31 full-time workers.

SOURCES: GreenAir News (2024), News Center Maine (2023), Red Rock Biofuels (2019).

Clean Energy: Hydrogen Fuel Generation | Description and General Site Readiness

Hydrogen serves as an input to various industrial applications, and it has the potential to serve as a clean fuel source.

Hydrogen production has a variety of **industrial applications:**

- Petroleum refining,
- Ammonia production for fertilizer and other chemicals,
- Metal processing and treatment,
- Food processing, including oil hydrogenation.

And as an emerging source of **clean fuel,** Hydrogen serves as:

- Transportation fuel for bus and truck fleets, aviation, maritime freight adapted to use hydrogen fuel cells.
- Fuel blended with other gas, such as renewable natural gas.

Liquefied hydrogen transported via pipeline is generally preferred by most end users. However, long-distance transportation of hydrogen (e.g., beyond 10km) or without the use of a pipeline requires gasification before distribution.

The GHG emission profile of Hydrogen depends on the method of production. Clean hydrogen involves the use of carbon capture and storage to mitigate emissions or the use of renewable power; high production costs have limited the market penetration of clean hydrogen. Under the Biden-Harris administration, the U.S. aimed to scale clean hydrogen production via DOE investments and the Clean Hydrogen Production Tax Credit (45V).

Illustrative Hydrogen Storage Tanks

H2 Production Levelized Cost Ranges
(dollars per kilogram H2) ($2022)

Method	Cost Range
Black/Brown	$3.10 - $3.6/kg
Grey	$1.00 - 1.60/kg
Green	$5.00 - $7.00/kg

Prevailing H2 Prices
(dollars per kilogram H2, $2022)

Sample User	Price Range
Transportation	$4-$5/kg
Metal	$3/kg
Other industry	$2-2.50/kg

SOURCES: Focus Green Solutions Interview (2025), Hydrogen Energy Center Interview (2025), DOE (2024), IEA (2023), Congressional Research Service R48196 (2024). PHOTO: Raymond Spekking (2023)

Clean Energy: Hydrogen Fuel Generation | Description and General Site Readiness

The GHG emission profile of Hydrogen depends on the method, or "color," of production.

Emissions

The GHG emission profile of Hydrogen depends on the method, or "color," of production. Grey hydrogen produced via natural gas reforming—which results in moderate GHG emissions—accounted for 95% of hydrogen production in the U.S. in 2023. Green hydrogen uses renewably powered electrolysis that that results in virtually zero emissions.

Method	Description	GHG Production *(kg CO2e/kg H2)*	U.S. Market Penetration (2023)
Black	**Black or Brown Hydrogen** involves the heating of bituminous or lignite coal to create a gas that can be used to create hydrogen. This process results in heavy emissions of carbon and other greenhouse gasses.	**22 - 26**	**4%**
Grey	**Grey Hydrogen** is produced via **steam methane reforming** by catalyzing a reaction between natural gas and high-pressure, high-temperature steam to separate natural gas into hydrogen and CO2 components.	**9**	**95%**
Blue	**Blue Hydrogen** is produced through steam methane reforming or other fossil-fueled sources, plus the use of **carbon capture, utilization, and storage (CCUS)** systems to remove over 90% of emissions.	**2.6 - 6.3**	(not available)
Green	**Green hydrogen** uses an **electrolyzer** that applies renewably produced electricity to break water into pure hydrogen and pure water, resulting in virtually zero emissions.	**Negligible**	**1%**

SOURCES: DOE (2020), Congressional Research Service R48196 (2024)
NOTE: GHG production expressed as the production of kg of CO2-equivalents (CO2e) per kg Hydrogen (abbreviated as kg CO2e/kg H2). Other emerging H2 production methods include red or pink (nuclear) and turqoise (methane pyrolysis).

Clean Energy: Hydrogen Fuel Generation | Description and General Site Readiness

Hydrogen production requires significant capital and operating investment, even more so for green hydrogen. The presence of local end users—e.g., local heavy industry, transportation users—can derisk hydrogen deployment.

To effectively derisk and affordably finance hydrogen production facilities—especially green hydrogen facilities—the local market must be able to satisfy the following requirements:

- **End user availability.** Customers with sufficient demand for hydrogen are colocated with or proximate to the production facility, and offtake agreements guarantee pricing that exceeds the levelized cost of energy (the average cost of energy production over the life of the facility, including initial capital costs and financing).
- **Feedstock availability.** Power inputs for hydrogen production (e.g., natural gas, renewable power) must be available and sufficiently affordable, either via the grid or via an affordable power purchase agreement (PPA).

Plug Power hydrogen production facility, Woodbine, Georgia

The importance of securing proximate end users and offtakers and minimizing the costs of shared connective infrastructure (e.g., pipelines) has informed the DOE's approach to creating deploying clean hydrogen more cheaply in the United States in the form of regional clean hydrogen hubs—the H2Hubs program. Canada, China, India, and other countries are also pursuing a hubs strategy.

SOURCES: Focus Green Solutions Interview (2025), Hydrogen Energy Center Interview (2025), DOE (2024),; PHOTO: Canary Media, Plug Power (2024)

Clean Energy: Hydrogen Fuel Generation | Description and General Site Readiness

Hydrogen production might require a significant expansion of water access onsite and significant investment in distribution infrastructure onsite to serve offtakers.

Site Readiness

- ✓ **Scale.** At least 10+ acres of land is required.
- ✓ **Environmental.** Environmental Site Assessment Phase 1 (and 2 if necessary) is complete.
- ❑ **Grading.** 10+ acres must be graded flat to host production. To support distribution, additional graded acreage (and possibly harbor dredging and dock expansion for maritime distribution of gasified hydrogen) would be needed.
- ❑ **Water availability.** Local water service must be able to provide at least 1,000 gallons per day (36 m^3/day) of water.

  Water requirements for black/brown, grey and green hydrogen vary from 25 L/kg H2 to 39 L/kg H2, with overall daily water volume depending on the scale of production. (The planned Advanced Clean Energy Storage (ACES) project in Utah, which will include 220 megawatts of electrolyzers, is estimated to require 2,000 U.S. gallons of water per day.
- ❑ **Distribution infrastructure.** If local demand is sufficient, build distribution pipelines (~$1M+ USD / km). If fuel needs to be transported long-distance (>10 km or so), additional acreage and capital expenditure is required for gasification and freight via truck or train (the site does have rail access).

NOTE: Utah's planned Advanced Clean Energy Storage (ACES) project, with 220 megawatts of electrolyzers. will produce 100 tons per day of clean hydrogen that requires an estimated 730,000 cubic meters of water per year.
SOURCES: Focus Green Solutions Canada Interview (2025), RMI (2023)

Clean Energy: Hydrogen Fuel Generation | Detailed Goal Alignment & Readiness

Hydrogen production could yield substantial fiscal returns to the Town and has the potential to advance shared clean energy deployment goals. It would entail numerous temporary and permanent jobs as well as ongoing industrial freight.

Site Reuse Goals	Assessment	Notes
1. Fiscal Impact	MEDIUM – HIGH	**~$13,250 - $33,125 / 1MW** annually, based on a range of potential equipment values based on the selected production method.
2. Clean Energy Impact	MEDIUM – HIGH	**0 kg CO2e / kg H2** assuming green hydrogen. **Up to ~9 kg CO2e / kg** H2 assuming grey hydrogen.
3. Power Demand Impact	HIGH	Energy demand for grey steam methane reforming (SMR), blue CCUS hydrogen, and electrolyzer for green hydrogen would entail significant power demand.
4. Job Growth Impact	MEDIUM	**1.5-3** temporary construction jobs per 1 MW **0.25-0.5** operations and maintenance jobs per 1MW.

Other Benefits	
Community Resiliency	**No concerns.** Site-level resiliency requirements are outlined above. Relatively high elevation of the majority of the Site suggests hydrogen production deployment will not encounter flood hazards related to sea level rise or storm surge even after site grading.
Parcel Sizing	**Requires significant acreage.** Commercial hydrogen production plants typically require at least 10 acres, and more acreage to accommodate distribution infrastructure.
Coexistence w/ other Uses	**Possible colocation**. Commercial hydrogen production can be tenanted near other offtakers (e.g., transportation fueling station, heavy industry that uses H2 as an input).
Local Considerations	**Uncertain alignment.** There is no evidence indicating that the Bucksport community would oppose a hydrogen production facility; however, community engagement activities by the Town have not discussed hydrogen specifically. Hydrogen production or storage could generate negative externalities—including minor emissions (depending on the production method) and increased freight traffic in and out of the facility—that could cause concern to community members. The Site will not require any zoning changes to accommodate this use.

SOURCES: See subsequent slides for detailed sources and assumptions.

Clean Energy: Hydrogen Fuel Generation | Fiscal Implications

Hydrogen production entails significant capital expenditure on equipment, and the use of carbon capture, utilization, and storage (CCUS) equipment and electrolyzers further increases equipment value. Electrolyzers alone exceed $2 million in cost.

1MW ~ $1M - $2.5M

assessed equipment value

Sources and Assumptions

The type of hydrogen production method significantly influences the cost of equipment.

- **Steam Methane Reforming (SMR):** $900 to $1,600 per kW/hr. ($2019)
- **Electrolysis:** Estimates range from $1,500 to $2,500 per kW/hr. ($2022)

$1M - $2.5M

building & equipment value / 1MW

x

0.01325

millage rate

=

~$13,250 - $33,125

potential tax revenue / 1MW

SOURCES: International Council on Clean Transportation (2024), DOE Hydrogen Program Record 24005 (2024), IEA (2020)

Clean Energy: Hydrogen Fuel Generation | Job Implications

Hydrogen facility construction or retrofits entail significant construction jobs and meaningful long-term operations and maintenance jobs.

Construction / Installation Jobs

1.5 – 3
jobs / MW

Sources and Assumptions

- Rhodium Group estimates an average, 100MW commercial-scale electrolytic hydrogen facility creates 330 construction jobs during a 2-year construction period.
- The 840/MW Intermountain Power Project in Utah is estimated to create 800-1,200 construction jobs 2022-2025, resulting in a 100% clean hydrogen-powered plant by 2045.

Operating Jobs

0.25 - 0.5
jobs / MW

Sources and Assumptions

- Rhodium Group estimates an average, 100MW commercial-scale electrolytic hydrogen facility creates 45 operations and maintenance jobs.
- The 840/MW Intermountain Power Project in Utah is estimated to create 180 operations and maintenance jobs.

SOURCES: Rhodium Group and Breakthrough Energy (2023), Intermountain Power Agency (2023), Utility Dive (2025)

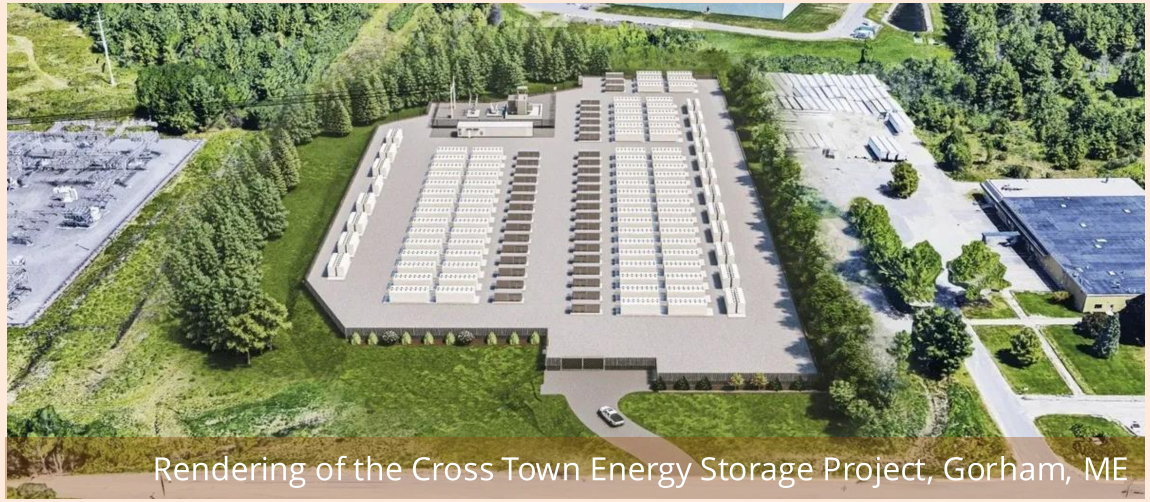
Clean Energy: Battery Storage | **Description and General Site Readiness**

Battery energy storage systems store and then deploy energy to the grid in response to demand, and behind-the-meter storage can increase the value of industrial assets onsite.

The United States is the second-largest battery storage market, behind China. There are two types of battery systems: Utility-Scale (also known as Front-of-the-Meter) and Behind-the-Meter (BTM). Utility-Scale Battery storage is installed for utilities, often at substations or power plants, whereas BTM is installed for a single-customer, adjacent to the customer's assets.

Utility-Scale Battery Storage increases grid reliability and can help stabilize energy rates for consumers by absorbing energy when demand is low, releasing energy when demand is high, and reducing the need for expensive peak power generation. At the level of the grid, batteries can smooth the inconsistency introduced by renewable power sources (e.g., seasonal and weather-dependent wind and solar), and they can allow the deferral of costly investments in transmission and distribution.

Behind-the-Meter Battery Storage provides industrial customers more reliable, affordable power or backup power and can allow deferral of grid upgrades to serve specific customers. When aggregated or combined into virtual power plants, BTM storage can potentially offer grid-level benefits as well.



Rendering of the Cross Town Energy Storage Project, Gorham, ME

16 GW

Utility-scale storage accounts for the majority of U.S. battery storage (16GW at the end of 2023). Both types of storage are growing steadily in the U.S.

SOURCES: Maine Energy Storage Program (2024), Cross Town Energy Storage, NYS Public Service Commission (2021), Bangor Daily News (2024), Maine Public (2022), , IEA (2023), IEA (2024).
NOTES: Electrical capacity of Penobscot River Industrial Site parcels beyond JERA site currently unknown.

Clean Energy: Battery Storage | Description and General Site Readiness

The State of Maine has set ambitious battery storage targets for the near future, with the goal of reaching 400MW of battery storage by 2030. To reach that goal, GEO offered a procurement pathway including upfront incentives.

Lithium-ion batteries are the most mature and widespread commercialized technology for large-scale battery storage. Capital costs associated with lithium-ion batteries dropped 20% 2023-2024 and are expected to continue to decline. Other emerging battery technologies include lithium iron phosphate and iron-air batteries

Tesla Battery Storage in Millinocket, ME


Agiltas Energy Storage in Madison, ME

Market-Building and Procurement Pathway

Maine currently operates 63 MW utility-scale energy storage (as of Dec 2024) with more projects in pipeline. Maine intends to reach 400MW of energy storage by 2030.

As part of the Maine Governor's Energy Office's December 2024 Energy Storage Program recommendations to the Public Utilities Commission, GEO outlined potential, cost-effective procurement pathways to procure 200MW of transmission-level and distribution-level energy storage by using an upfront incentive with a pay-for-performance procurement method:

- **Incentive Design**: The upfront incentive helps partially derisk capital costs and reduce financing costs; the pay-for-performance component ensures projects meet performance metrics.
- **Storage Goals:** GEO recommended **160MW** of competitively procured transmission-connected storage (long-distance, high-voltage) and **40MW** of competitively procured distribution-connected (short-distance, low-voltage) storage. Distribution storage will be based on study of where storage could manage winter peak load, increase winter resiliency, or defer alternative grid investments.
- **Other Details**: Recommendations did not find a meaningful difference between procuring standalone energy storage or energy storage colocated with energy generation.

SOURCES: BloombergNEF (2024), Maine Energy Storage Program (2024), Maine Public (2022), Agilitas Energy.
NOTES: Non-battery energy storage technology—beyond the scope of analysis—includes pumped hydro, compressed air, solar thermal storage, hydrogen storage, and other technologies.

Clean Energy: Battery Storage | Description and General Site Readiness

The site generally meets the basic physical and predevelopment requirements for small-scale behind the meter solar, but large-scale solar will require earthwork.

Site Readiness

- ✓ **Scale**. At least 5 acres of land is required.
- ✓ **Environmental.** Environmental site assessment Phase I (and 2 if necessary) is complete.
- ✓ **Grading.** The Site can likely accommodate a small BTM facility as is, but a large utility-scale facility will require grading to a flat surface.

Emissions

While the manufacturing and end-of-life recycling processes do generate greenhouse emissions, battery storage produces minimal carbon emissions during operation. Further, increased battery storage capacity will enable greater levels of renewable energy, which will also result in a significant decrease of carbon emissions at the level of a site or grid.

Rendering of the Form Energy Iron Air Battery Storage, Lincoln, ME

SOURCES: Maine Energy Storage Program (2024), Cross Town Energy Storage, NYS Public Service Commission (2021), Bangor Daily News (2024), Maine Public (2022), , IEA (2023), IEA (2024).
NOTES: Electrical capacity of Penobscot River Industrial Site parcels beyond JERA site currently unknown.

Clean Energy: Battery Storage | Detailed Goal Alignment & Readiness

Battery storage is a relatively flexible use and could accrue to the value of colocated uses. The equipment value of batteries could generate greater fiscal returns than solar equipment, yet battery storage generates few permanent jobs.

Site Reuse Goals	Assessment	Notes
1. Fiscal Impact	MEDIUM	**~$23,850 / 1MW annually**, based on potential equipment value of $1.9M / 1MW.
2. Clean Energy Impact	MEDIUM	Battery storage can be deployed for both fossil fuels and renewable energy generators. Behind-the-meter batteries are an ideal use to pair with renewable energy generated onsite.
3. Power Demand Impact	HIGH	Battery storage could draw down on excess energy during periods of low demand in order to store power and sell it during periods of high demand (e.g., arbitrage).
4. Job Growth Impact	LOW	**0.5-2** operations and maintenance jobs per 1MW of storage. **Minimal** long-term maintenance and operations jobs per 1MW of storage.

Other Benefits

Community Resiliency	**No concerns.** Site-level resiliency requirements are outlined above. Relatively high elevation of the majority of the Site suggests battery storage will not encounter flood hazards related to sea level rise or storm surge even after site grading.
Parcel Sizing	**Flexible sizing**. Depending on its capacity, a battery storage facility can range in size from a few containers to 5-100+ acres of multiple containers.
Coexistence w/ other Uses	**Benefits from colocation**. Utility-scale or behind-the-meter battery storage is ideally sited near energy generation, but colocation is not necessary. Battery storage would potentially make both onsite energy generation and onsite industrial uses more economically valuable because of the ability to store energy when the grid is not in demand and deploy when the grid is at peak.
Local Considerations	**Probable alignment.** There is no evidence indicating that the Bucksport community would oppose battery storage; however, community engagement activities by the Town have not discussed battery storage. (Battery storage does complement and support solar, which has been approved by the town.) Battery storage will not generate negative externalities—emissions, freight—associated with other potential uses. The Site will not require any zoning changes to accommodate battery storage.

SOURCES: See subsequent slides for detailed sources and assumptions.

Clean Energy: Battery Storage | Fiscal Implications

A 1MW battery storage system has the potential to generate ~$24,000 annually for the Town of Bucksport from assessed building and equipment value.

1MW ~ $1.8M
assessed building & equipment value

Sources and Assumptions

- *Note: capital costs can widely differ by battery storage technology and kilowatt/megawatt hour capacity. The capacity of a battery storage is defined by 1. power capacity in MW (i.e., maximum instantaneous power) and 2. energy capacity in MWh (i.e., total amount that can be stored).*
- National Renewable Energy Labs reports that a 4-hour utility-scale stand-alone battery lithium-ion batteries (LIBs)—primarily those with nickel manganese cobalt (NMC) and lithium iron phosphate (LFP) chemistries)—cost $1,700-$1,900 per kilowatt.

$1,800,000
building & equipment value / 1MW

x

0.01325
millage rate

=

~$23,850
potential tax revenue / 1MW

NOTE: High-level analysis does not account for depreciation of asset value over time—i.e., following Modified Accelerated Cost Recovery System (MACRS) depreciation.
SOURCES: National Renewable Energy Labs.

Clean Energy: Battery Storage | Job Implications

Battery storage would create minimal construction and operations jobs.

Construction / Installation Jobs

0.5-2

jobs / MW

Sources and Assumptions

- A 100MW East River Energy Storage System battery storage facility in New York City hired 70 construction workers.
- The 80MW Tilbury Battery Storage project in Ontario, Canada is expected to create 150 construction jobs
- A 200MW Tern Energy Storage Battery Energy Storage System (BESS) in Green Bay, WI expected to create 75 jobs.
- The 85MW Form Energy Iron-Air long-term energy storage project is expected to create up to 100 construction jobs and a few O&M jobs.

+ O&M

Variable Jobs

- Utility-scale and behind-the-meter battery storage projects result in relatively few long-term operation and maintenance jobs on a per-MW basis.
- O&M energy storage workers might divide their time across multiple projects spanning industries: e.g., a worker that splits time across a portfolio of solar and battery storage projects same job.

SOURCES: NYS Public Service Commission (2011), CBC (2024), Renewable Energy World (2024), Bangor Daily News (2024), IREC (2024).

Data Centers | Description and General Site Readiness

Data centers are in increasingly high demand, and the Trump Administration recently announced a commitment to expanding data center infrastructure by leveraging private capital.

Data centers are facilities that house information technology infrastructure to store, process, and manage data and server activity. In Jan 2024, the Trump Administration endorsed Project Stargate, a partnership with several private Artificial Intelligence companies, that will prioritize the construction of data centers all over the county to increase Artificial Intelligence (AI) capacity.

There is a significant variation in the type, equipment quality, and physical scale of data centers:

- **Service Types.** Cloud services data centers are generally located in proximity to commercial areas to minimize latency. AI and machine learning data centers can be located anywhere.
- **Tier.** Data centers are ranked by Tiers—by the quality of equipment—ranging from I-IV.
- **Enterprise.** “Enterprise” data centers are large, single-tenant centers, which represent 97% of the U.S. market for data centers.
- **Colocation.** “Colocation” centers, in which multiple tenants share access to servers, are smaller; Maine already hosts scattered colocation centers.
- **Size, Power Usage.** Data centers can range widely in size: small colocation (5-20K SF, 1-5MW); small (20K SF, 5-20 MW); medium (20-100K SF, 20-100MW), and large or “hyperscale” (100K-1M SF, 100-500MW).

Emissions

While emissions are dependent on scale, data centers do generate some carbon emissions. However, data center emissions will ultimately depend on the quality of electricity used from the grid or from onsite generation.

SOURCES: Dglt Infra (2023), The Guardian (2024), New England States Committee on Electricity (2024), FirstLight, Enables IT (2014), CBRE
NOTES: Electrical capacity of Penobscot River Industrial Site parcels beyond JERA site currently unknown.

Enables IT Colocation Data Center, Brunswick ME

FirstLight Colocation Data Center, Brunswick ME

Data Centers | Description and General Site Readiness

Data centers are in increasingly high demand. Data center operators prefer to site in areas with low electricity costs.

Site Readiness

The most important siting variable for data centers is low cost of power. It has been hard for the Northeast, with its relatively high regional electricity costs, to compete with regions that offer electricity at .05-.06 per kWh. These costs have prevented the development of a data center market in New England outside a limited market in Boston, MA (and Montreal, in Canada).

However, onsite power generation could enable cost-effective data center operations, especially relative to electricity costs in Boston. Generous tax incentives (e.g., the State of Maine Business Equipment Tax Exemption ("BETE") Program) could help further. Other siting and predevelopment considerations include:

ImgIX Data Center Interior

- ✓ **Scale and Setbacks.** Data centers can range in size (see above). They generally require significant setbacks (150 feet) from roads and other uses and greater setbacks (300 feet) from potentially flammable uses.
- ✓ **Environmental.** Environmental site assessment Phase I (and 2 if necessary) is complete.
- ✓ **Zoning.** Local land use regulations should ideally give the owner broad development latitude with respect to building height (up to 85′) and noise level (up to 80 decibels).
- ❑ **Grading.** The Site would need to be graded to flat surface and consolidated into at least 0.5-5-acre parcels.
- ❑ **Water.** The Site would potentially an expansion to its connection to non-potable water for a larger-scale center, for cooling.

SOURCES: Dglt Infra (2023), The Guardian (2024), New England States Committee on Electricity (2024), CBRE
NOTES: Electrical capacity of Penobscot River Industrial Site parcels beyond JERA site currently unknown.

Data Centers | Detailed Goal Alignment & Readiness

Data centers would produce considerable fiscal impact for the Town while drawing significant power from the grid.

Site Reuse Goals	Assessment	Notes
1. Fiscal Impact	HIGH	**~$100,000+ / 1MW** annually, based on potential building and equipment value of $7.6M / 1MW + Operation typically recycle servers every 3-4 years, which moderates the impact of asset depreciation and creates sustainably high fiscal returns.
2. Clean Energy Impact	N/A	Data centers do not generate energy (outside of onsite installed distributed energy resources). However, they can make the economic case for bringing online new large-scale energy generation.
3. Power Demand Impact	HIGH	A data center will draw down on significant power. Power required depends on center size and equipment: small (1- 20 MW), medium (20-100MW), and large (100 MW – 500 MW)
4. Job Growth Impact	MEDIUM	**1-5** temporary construction jobs per 1MW **0.5-1** full-time operations jobs per 1MW, including mostly high-paying jobs

Other Benefits	
Community Resiliency	**No concerns.** Site-level resiliency requirements are outlined above. Relatively high elevation of the majority of the Site suggests a data center will not encounter flood hazards related to sea level rise or storm surge even after site grading.
Parcel Sizing	**Requires significant acreage.** A small-to-medium data center is typically 5-100K SF, therefore occupying anywhere between 0.5-5 acres at minimum. Consistent grading of the site for infrastructure is required. Significant setbacks of at least 150 FT are typically required.
Coexistence w/ other Uses	**Flexible colocation**. If the data center is properly secured with fencing and lighting and other security measures, there is little concern regarding colocation with other industrial uses as long as there is limited, managed fire risk.
Local Considerations	**Uncertain alignment.** There is no evidence indicating that the Bucksport community would oppose a data center; however, community engagement activities by the Town have not discussed data centers specifically. The Site will not require any zoning changes to accommodate a data center. Zoning should ideally give the owner broad latitude with respect to building height (up to 85') and noise level (up to 80 decibels), which is allowable onsite.

SOURCES: See subsequent slides for detailed sources and assumptions.

Data Centers | Fiscal Implications

A 1MW data center has the potential to generate over $100,000 annually for the Town of Bucksport from assessed building and equipment value, and these returns would be durable due to ongoing capital reinvestment in servers.

1MW ~ $7.6 million
assessed building & equipment value

Sources and Assumptions

- It costs between $600 to $1,100 per gross square foot or $7 million to $12 million per megawatt of commissioned IT load to build a data center.
  - 20% of those costs are allocated for purchasing land while 80% are for the building shell, electrical, mechanic, and building fit-out.

$7,600,000
building & equipment value / 1MW

x

0.01325
millage rate

=

~$100,700
potential tax revenue / 1MW

NOTE: High-level analysis does not account for depreciation of asset value over time—i.e., following Modified Accelerated Cost Recovery System (MACRS) depreciation.
SOURCES: Town of Bucksport Property Tax Records, Dglt Infra (2023),

Data Centers | Job Implications

Compared to other potential uses, data centers could produce a relatively large number of construction jobs and a moderate number of full-time permanent jobs.

Construction / Installation Jobs

1-5
jobs / MW

Sources and Assumptions

- Small-to-medium data centers (1MW-100MW) typically hire 200-300 construction workers
- A proposed 200MW project in Springfield, MA estimates creating 200 construction jobs.
- A proposed 300MW hyperscale data center in Connecticut anticipates creating 1,500 construction jobs.

Operating Jobs

0.5-1
jobs / MW

Sources and Assumptions

- Small-to-medium data centers (1MW-100MW), without call centers, employ between 10-30 people, paid at relatively high wages.
- A proposed 200MW project in Springfield, MA estimates creating 100 permanent jobs.
- A proposed 300MW hyperscale data center in Connecticut anticipates creating 190 permanent jobs.

SOURCES: NESCOE (2024), Springfield News-Sun (2024), U.S. Chamber of Commerce Technology Engagement Center (2027), Microsoft, Good Jobs First (2016), Investigative Post. (2019).

Maritime Logistics and Distribution | Description and General Site Readiness

Due to the Site's access to deep water in the Penobscot River, the Site can accommodate heavy maritime shipping with improvements, like dock reinforcement and dredging.

Maritime logistics and distribution involves the management of the movement of goods across seas as well as ship berthing and maintenance.

Site Readiness

- ✓ **Scale**. At least 5 acres of land is required.
- ✓ **Environmental.** Environmental site assessment Phase I is complete.
- ❑ **Grading.** The site will likely require grading of land adjacent to the southeast shore to house distribution infrastructure.
- ❑ **Water and dock access.** To enable heavy short-sea shipping, the Site's dock will need reinforcement, and the harbor will require dredging to allow for larger transportation ships.

Emissions

Maritime logistics could potentially contribute to carbon emissions through the use of diesel-powered infrastructure (e.g., cranes) and the use of non-renewable power for berthing vessels and shore-side facilities.

However, investments in clean fuels could dramatically reduce the port's emissions profile. Given that certain biofuels serve as a "drop-in fuel" option for ships that does not require major retrofitting or modifications to ships, U.S. and Canadian ports—e.g., Great Lakes ports—have increasingly offered biofuel refueling as an option for small and large vessels. And decarbonizing port infrastructure on land could further reduce emissions.

International Marine Terminal, Portland, ME

International Marine Terminal, Portland, ME


Webber Dock Fuel Delivery, Bucksport, ME

SOURCES: U.S. Department of Transportation, Bucksport A.D.A.P.T., Portland Press Herald, Maine Public (2023), The Globe and Mail (2024), 4 Rotor Filming, IEA Bioenergy (2017)

Maritime Logistics and Distribution | Detailed Goal Alignment & Readiness

Maritime logistics and distribution will likely result in relatively lower fiscal impacts for the Town. However, maritime tenants could be valuable customers for clean fuel and facilitate the supply chain for any onsite use.

Site Reuse Goals	Assessment	Notes
1. Fiscal Impact	**MEDIUM**	Maritime logistics could result in an increase of equipment value, especially if specialized freight movement equipment is required. Related storage uses, on the other hand, might not entail significant increase to the Town's tax base.
2. Clean Energy Impact	N/A	Maritime uses do not generate energy. However, tenants could make ideal customers for clean fuel generated onsite or electricity produced onsite while at port.
3. Power Demand Impact	**MEDIUM**	Maritime logistics are expected to draw down on power, but power needs will vary substantially depending on the type of tenant, the volume of freight, and the degree to which vessels are partially electrified and seek to recharge at port.
4. Job Growth Impact	**MEDIUM**	Temporary construction jobs are difficult to estimate and will depend on the type of tenant. **20-75** full-time employees for maritime distribution logistics. **5-50** full-time employees for ship berthing.

Other Benefits

Community Resiliency	**Intervention required.** While the relatively high elevation of the Site does not pose flooding concerns, the Site's dock would require reinforcement and is in a high-risk flood zone. The Penobscot River would likely need dredging for ingress and egress.
Parcel Sizing	**Requires water access**. The scale of distribution and logistics can be scaled to available parcels, but parcels must have direct access to water and a dock.
Coexistence w/ other Uses	**Possible colocation.** If the distribution facilities are properly secured, there is little concern regarding colocation. The presence of short-sea shipping and storage uses could increase the value of the Site to other heavy energy generation/industrial uses that require shipping of inputs (e.g., energy feedstock) or outputs (e.g., hydrogen fuel).
Local Considerations	**Uncertain alignment.** There is no evidence indicating that the Bucksport community would oppose maritime logistics, and past community engagement has elevated Bucksport's maritime history as worth at least preserving. A maritime hub could generate minor negative externalities—including minor emissions (depending on shipping fuel) and increased freight traffic in and out of the facility—that could cause concern to community members. The Site will not require any zoning changes to accommodate maritime logistics.

SOURCES: Bucksport A.D.A.P.T., HR&A Analysis of Lightcast jobs per business data at similar northeastern ports, Providence Business News (2018).

MECERP: Town of Bucksport

Penobscot River Industrial Site Predevelopment Strategy

April 2025