

The Macroeconomic Impacts of the Aroostook Renewable Gateway on the Maine Economy

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Disclaimer

The information and commentary provided in this report rely on information and data provided by the client and/or other consultants, as well as third party proprietary economic models. Estimates made in this analysis are based on our understanding of the current socioeconomic and fiscal conditions of the region, as well as a set of projections and assumptions that we believe are reasonable. Results of this report may differ from those used by other parties in evaluating the economic benefits of the Project. Even if the underlying assumptions are realized, the results of the analysis may vary from the actual realized impacts of the Project. In no way will Wallace Economic Advisers, LLC be held responsible or have any liability or be subject to damages as a result of this analysis or information contained in this report.



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I. Executive Summary

The Aroostook Renewable Gateway (“The Gateway” or “The Project”) is a 345 kilovolt (kv) transmission line extending from southern Aroostook County and interconnecting with the ISO-New England (“ISO-NE”) power grid in Windsor, Kennebec County, Maine. The transmission line was selected by the Maine Public Utilities Commission (“PUC”) as part of the Northern Maine Renewable Energy Development Program (“NMRDP”) and will deliver up to 1,200 megawatts (MW) of renewable energy generated in Northern Maine to customers in the ISO-New England service region. The Gateway is being developed and constructed by LS Power Grid Maine, LLC (LSPGM) and will enable the development and operation of the King Pine Wind Project (“King Pine”) — a planned 1,000 MW wind farm located in Aroostook County developed by King Pine Wind Maine LLC (a subsidiary of Longroad Development Company, LLC) and selected by the PUC under the NMRDP as the generation component of the program. The Gateway will also provide ISO-NE market access for approximately 200MW of additional renewable capacity developed and operated in northern Maine.

The development, construction, and operation of the Gateway will generate economic benefits to the state and host communities in the form of jobs, wages, tax revenues, and overall economic activity. The Gateway will also *enable* a number of other economic benefits to Maine. Those benefits associated with the construction and operation of King Pine, including benefits to ratepayers in Maine, as well as other renewable energy generation in northern Maine, would not be feasible “*but if not for*” the Gateway.

LSPGM retained Wallace Economic Advisers, LLC (“WEA”) to conduct an independent evaluation of the core macroeconomic benefits resulting from the Gateway. Specifically, the quantified economic benefits addressed in this report include:

- Direct spending impacts from the development and construction of the Gateway;
- Direct spending impacts from the operations and maintenance of the Gateway over the 25-year contract period;
- Enabled impacts resulting from ratepayer electricity savings;
- Enabled impacts from construction and operational spending on King Pine; and
- Enabled impacts from the construction and operation of an additional 200MW of renewable generation in northern Maine.

The benefits are estimated using an economic model developed by Regional Economic Modeling Inc. (“REMI”) utilizing data provided by LSPGM and compiled from other credible sources. The economic impacts, interpreted as the economic benefits, are reported across commonly employed measures in Tables 1 and 2. In Table 1 jobs are reported in full-time equivalents (“FTEs”). One FTE is equivalent to a person working full-time for one year (2,080 hours). Table 2 reports values on a current (nominal) dollar as well as net present value (NPV) basis. Impacts are reported cumulative of the direct, indirect, and induced spending impacts in Tables 1 and 2.

Key benefits resulting from spending to build and operate the Gateway will support:



- An average of 660 FTEs per year during development and construction of the Gateway. This equates to nearly 4,000 total FTEs including 2,100 FTEs from direct expenditures with the remaining 1,900 FTEs resulting from indirect and induced spending impacts.
- Over \$240 million in wages and salaries (\$190 million on a net present value basis) resulting in \$20 million in revenues from state and local taxes.
- Almost 580 FTEs and \$116 million in wages and salaries (\$35 million NPV) during operations.
- One-hundred and twenty (\$120) million in municipal property tax revenues over the contract period (Table 2).
- In total, spending to build and operate the Gateway will support over 4,500 FTEs, \$360 million in wages and salaries, and over \$800 million (\$477 million NPV) added to the state's GDP.

In addition, the Gateway will *enable* significant benefits that would otherwise not accrue, which include:

Ratepayer Savings Impacts (2029-53)

- Ratepayers in Maine are assumed to recognize savings of over \$3 billion (\$880 million on an NPV basis) over the contract period, which will help businesses be more competitive and provide households with additional disposable income to spend on other local goods and services.
- Ratepayer savings will help support an additional 12,500 FTEs over the contract period providing \$1.2 billion in additional wages and salaries and \$100 million in state and local tax revenues.
- Ratepayer savings are estimated to support \$6.8 billion towards the state's economic output over the contract period, of which nearly \$4 billion will be in addition to the state's GDP on a nominal basis.

King Pine Wind Impacts

- The development and construction of King Pine will support 3,200 FTEs averaging over 1,000 FTEs per year during development and construction, supporting over \$200 million in wages and salaries (\$151 million NPV), and roughly \$16 million in state and local taxes.
- During operations King Pine is expected to support an average of 30 FTEs per year totaling 600 FTEs over the wind project's operations. These jobs will support nearly \$50 million in wages and salaries (\$18 million NPV) over the operations period and \$4 million in state and local tax revenues.
- King Pine will contribute approximately \$60 million in property taxes to the host communities.

Additional Renewable Capacity Impacts

- In addition to King Pine, the Gateway will enable an additional 200 MW of renewable generation capacity to be constructed and operated in Northern Maine. Although a project(s) has not yet been selected by the PUC in response to a recent RFP, the benefits of an additional 200 MW can be illustrated for a 200 MWac solar installation and a 200 MW wind installation (not shown in Table 1 or 2). The result is a range of between 600 and 1,400 FTEs could be supported from project investment and operations. This would average between 200 and 650 FTEs per year



during construction and between 2 and 6 FTEs per year over a 20-year operations period. Wages and salaries supported could range from \$13 million to \$29 million during construction.

- Total enabled benefits of the Gateway amount to over 16,000 FTEs, over \$1.4 billion in wages and salaries (\$500 million NPV), and approximately \$180 million in new tax revenues to the state and impacted communities. This does not include the potential benefits from an additional 200 MW of renewable capacity that could be enabled by the Gateway.

In summary, the Gateway will contribute and enable economic benefits to the state of Maine supporting well over 20,000 FTEs, \$1.8 billion in wages and salaries (\$733 million NPV), and \$330 million in new tax revenues (over \$104 million NPV). The Project is estimated to support at least \$8 billion (\$2.5 billion NPV) towards state economic output of which at least \$4 billion (\$1.4 billion NPV) will be contributed towards state GDP. The benefits will be distributed across Maine helping to reduce energy burdens and provide substantial benefits to vulnerable communities.

Table 1: Summary of the Direct and Enabled Employment and Wage Benefits to Maine

	Jobs in FTEs		Wages & Salaries (millions)		
	Annual Average	Total	Annual Average	Total (Nominal)	Total NPV 2023 \$
Aroostook Renewable Gateway Project Benefits					
Development and Construction (2023-28)	664	3,986	\$41	\$243	\$188
Operations (2029-53)	23	579	\$5	\$116	\$35
Total Aroostook Renewable Gateway		4,565		\$359	\$223
Enabled Benefits					
Ratepayer Impacts (2029-53)	500	12,500	\$49	\$1,231	\$340
King Pine Wind - Development & Construction	1,066	3,200	\$68	\$204	\$151
King Pine Wind - Operations (2029-53)	30	600	\$2	\$49	\$18
Enabled Benefits Total		16,300		\$1,484	\$510
Grand Total		20,865		\$1,843	\$733

Note: Average impacts reported as average for respective periods, Development & Construction and Operations. Jobs reported as full-time equivalents (FTEs), which equate to one-person working approximately 2,080 hours or a typical one-year full-time job. Currency reported in millions of current (nominal) dollars.



Table 2: Summary of the Direct and Enabled Benefits to Maine on GDP, Output, and Tax Revenues

	GDP		Output		Tax Revenues	
	Total (Nominal)	Total NPV 2023 \$	Total (Nominal)	Total NPV 2023 \$	Total (Nominal)	Total NPV 2023 \$
Aroostook Renewable Gateway Project Benefits						
Development and Construction (2023-28)	\$491	\$378	\$803	\$619	\$20	\$15
Operations (2029-53)	\$331	\$99	\$492	\$147	\$9	\$2.9
Municipal Property Revenues					\$120	\$45
Total Aroostook Renewable Gateway	\$822	\$477	\$1,295	\$765	\$150	\$63
Enabled Benefits						
Ratepayer Impacts (2029-53)	\$3,933	\$994	\$6,811	\$1,714	\$100	\$28
King Pine Wind - Development & Construction					\$16	\$12
King Pine Wind - Operations (2029-53)					\$4	\$1.5
King Pine - Municipal Property Tax Revenues					\$60	*
Enabled Benefits Total	\$3,933	\$994	\$6,811	\$1,714	\$180	\$41
Grand Total	\$4,755	\$1,471	\$8,106	\$2,480	\$330	\$104
<small>Note: Impacts are reported cumulative of the entire project period from development through the operations contract term ending in 2053. Dollars in millions of current (nominal) and on net present value 2023 \$ basis. Data for King Pine Wind GDP and Output is not publicly available. Tax revenues refer to state and local, except for municipal property revenues line which are specific to local property taxes anticipated to be paid by respective project. * No basis for calculating NPV.</small>						

II. Background and Project Overview

A. Background

Northern Maine is home to substantial renewable energy resources, including those derived from terrestrial wind and solar resources. Aside from offshore wind, they are among the most concentrated of renewable resources in New England. Electricity generated from renewable resources in northern Maine has been of interest to the state of Maine and other New England states to satisfy legislative requirements for renewable energy procurement and to achieve goals related to mitigating and adaptation to climate change. Electric power generated from these resources lack direct accessibility to large markets in the Independent System Operator of New England (ISO-NE) regional transmission service area to the south. The resources are instead located in the service area of the Northern Maine Independent System Administrator (NMISA), which is connected to the U.S. power grid by transmission lines running through Canada and lacking direct access to regional markets. As a result, the benefits of renewable resources in northern Maine have not yet been fully realized.

To unlock the investments and benefits of renewable resources in northern Maine and to make progress towards the state’s clean energy and climate goals, the Maine legislature enacted the Northern Maine Renewable Energy Development Program (NMRDP) (P.L. 2021, Chapter 380, codified at 35-A M.R.S. § 3210-I.) in 2021 requiring the state’s Public Utilities Commission (PUC) to conduct a request for proposals (RFP) for *Renewable Energy Generation and Transmission Projects*.¹ The PUC conducted a review and evaluation process of responses to its RFP, and in 2022 selected the Aroostook Renewable Gateway (“The Gateway”) proposed by LS Power Grid Maine LLC (“LSPGM”) as the most efficient and lowest cost option for transmission. The PUC also selected the 1,000 MW King Pine Wind Project

¹ The text of the bill can be found at <https://legislature.maine.gov/statutes/35-A/title35-Asec3210-I.html>.



proposed by King Pine Wind Maine LLC (“King Pine”) a subsidiary of Longroad Energy Development, LLC, to satisfy the generation component of the NMRDP.

LSPGM will make significant capital investments to develop and construct the Gateway. A significant portion of the total capital investment will be sourced from Maine-based vendors and suppliers. Capital spending, in addition to annual operational spending, will result in millions of dollars of investment and new revenues for businesses and workers across the state, supporting jobs, wages, and tax revenue.

The Gateway will *enable* up to 1,200 MW of renewable energy generation in northern Maine to access markets in the ISO-NE grid service area, including the King Pine Wind Farm Project in Aroostook County and an additional 200 MW (approximate) of capacity to be constructed at a later period.² The power from King Pine will be purchased by utilities in Maine and Massachusetts and result in positive net benefits to Maine ratepayers lowering electricity bills for consumers over a 25-year period. In addition to electricity cost savings to Maine ratepayers, King Pine will invest approximately \$2 billion to develop and construct the project in addition to millions of dollars in annual operational spending and municipal tax revenues, among other benefits.

Collectively, the Project represents a major investment in the state of Maine that will directly provide economic benefits to Maine residents and unlock other benefits from renewable power generation in Aroostook County – a region of the state that continues to face socioeconomic headwinds - all while helping to reduce energy burdens across Maine’s vulnerable communities.

Among other regulatory permitting requirements, a transmission line greater than 100 kv must be granted a Certificate of Public Convenience and Necessity (CPCN) by the Maine PUC.³ Through CPCN regulatory proceedings, the PUC must make a determination as to whether the transmission line provides a public benefit or conversely whether there would be public harm from the line being constructed.

In support of its CPCN petition and other permitting and public engagement activities, LSPGM retained Wallace Economic Advisers, LLC (WEA) to conduct an independent evaluation of certain economic benefits resulting from the development and operation of the Gateway and the economic impact in Maine. WEA’s principal has conducted similar independent economic benefits analysis in support of over 20 unique transmission or renewable energy project bids considered by regulatory authorities in Maine and other New England state’s competitive procurements, including the macroeconomic benefits analysis for the New England Clean Energy Connect (“NECEC”) transmission project and CPCN proceedings.⁴ This analysis uses a near identical methodology as that used to evaluate the macroeconomic benefits of the NECEC and ultimately accepted by the PUC and its consultants during those proceedings.

B. Scope of Analysis

² The Maine legislature adopted a secondary bill on June 22, 2023 directing the PUC to conduct a selection for the remaining 200 MW of capacity to full the ARG line. Text of the unofficial chaptered law can be found at https://legislature.maine.gov/legis/bills/display_ps.asp?PID=1456&snum=131&paper=&paperId=1&ld=1943.

³ 35-A M.R.S.A. § 3132 <https://legislature.maine.gov/statutes/35-A/title35-Asec3132-A.html> and Chapter 330 of the PUC’s Rules <https://www.maine.gov/sos/cec/rules/65/407/407c330.doc>

⁴ Case docket number 2017-00232

<https://mpuc-cms.maine.gov/CQM.Public.WebUI/Common/CaseMaster.aspx?CaseNumber=2017-00232>



This study provides an estimate of the primary economic benefits to the state of Maine resulting from the development, construction, and operation of the Gateway, as well as the benefits to Maine the Gateway will *enable*. In determining what constitutes an economic benefit, we consider the economic impacts that would result *but if not for the Gateway*. In other words, we consider certain benefits to the Maine economy and its communities that would not exist if the Gateway is not built. This includes the *enabled* investments and benefits from renewable energy generation in northern Maine. Without efficient access to markets in the ISO-NE grid, King Pine and other large commercial scale projects would not have the market scale to sell the power generated resulting in more limited financial feasibility.

Although spending on King Pine cannot directly be attributed to the Gateway or LSPGM, the benefits of the Gateway and King Pine cannot be disassociated from one another. Because of this, benefits that are enabled by the Gateway should be considered and valued in the assessment of the Gateway total public benefit to Maine. This is a common approach to macroeconomic benefits analysis and similar in scope to the analysis completed for the NECEC in which the PUC considered and evaluated the benefits of the NECEC transmission line that included impacts on Maine ratepayers from energy price suppression resulting from hydroelectric resources in Canada flowing into the ISO-NE grid.

The benefits resulting from the Gateway are characterized as follows:

Direct Benefits of the Gateway

- Economic impacts from direct capital spending on Gateway development and construction (Development and Construction Spending)
- Economic impacts from direct project spending on operations and maintenance (Operations and Maintenance Spending)
- Municipal property tax revenues paid by the Gateway during operations (Municipal Property Tax Revenues)

Enabled Benefits of the Gateway

- Economic impacts from electricity savings for Maine ISO-NE ratepayers
- Economic impacts from the development, construction, and operations of King Pine Wind
- Economic impacts from the development, construction, and operations of an additional 200MW of renewable energy generation in northern Maine.

The analysis also considers other enabled impacts and benefits of the Gateway, including the economic value of greenhouse gas reductions (“GHGs”). The analysis does not quantify the benefits of the insurance value of the transmission line, or the avoided expected economic loss, the impacts of energy price stability, and other benefits or impacts that may accrue as a result of the project, such as increased amenity values. Similarly, quantifying other potential local negative economic impacts is outside the scope of this study, although some are qualitatively addressed in the narrative in Section VI.

C. Project Description



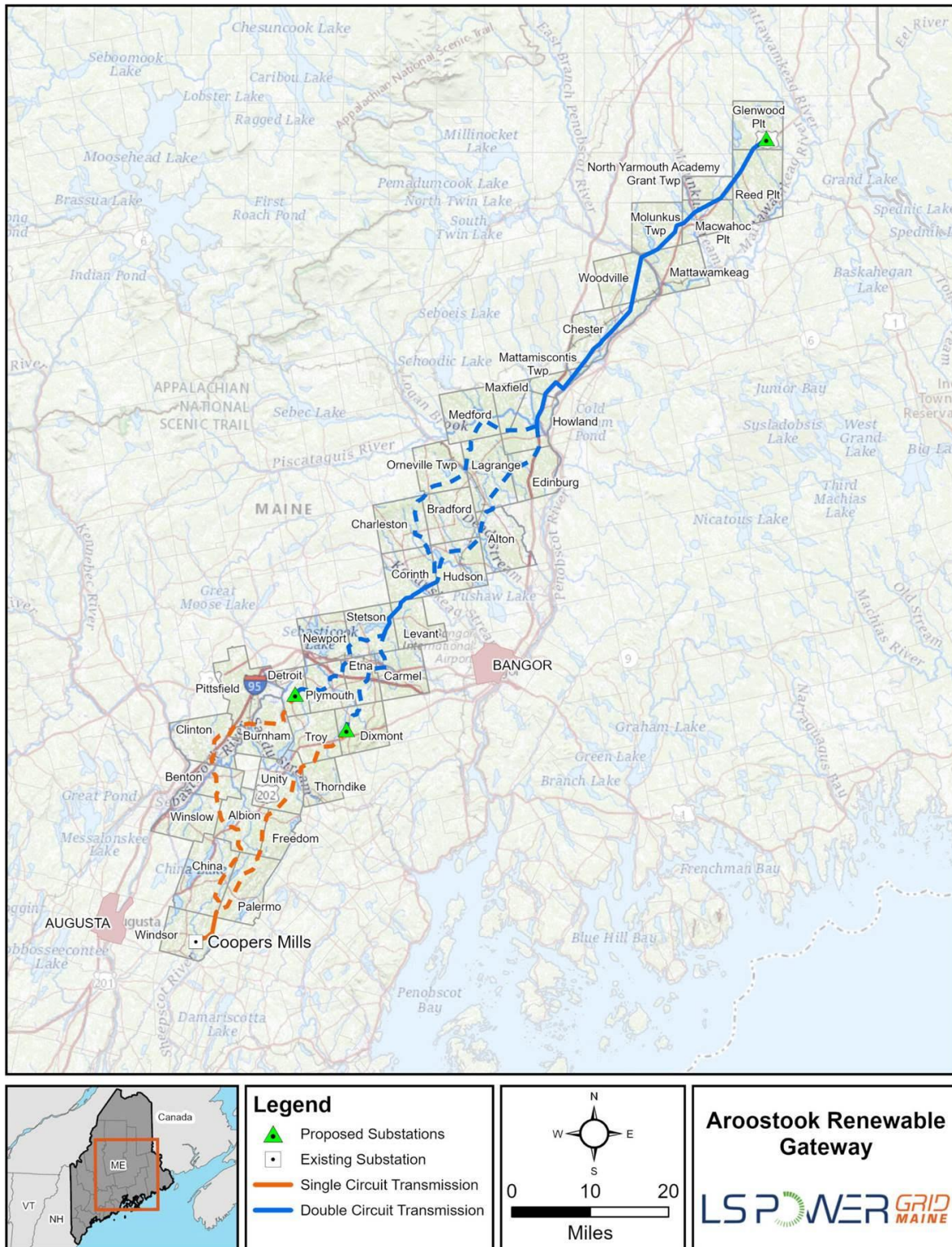
The Gateway is comprised of a 345kV transmission line running approximately 140 to 160 miles from Glenwood Plantation in Aroostook County and terminating at the Coopers Mills Road substation in Windsor, Kennebec County (Figure 1). The Project will have a physical presence in approximately 30 communities⁵ located in Aroostook, Penobscot, Kennebec, and Waldo Counties, including unorganized territories that will host transmission infrastructure.⁶ The Project will include two new substations to be built, one at the origin of the line in Glenwood Plantation and a new substation referred to as the Pittsfield Substation located in either Dixmont (Penobscot County) or Detroit (Somerset County), depending on the final route of the Project. The Gateway is capable of transmitting up to 1,200 MW of power. King Pine, as well any additional NMRDP projects, will connect into the Gateway at the Glenwood Mills substation in Aroostook County where the power will travel south into the ISO-NE grid via the Gateway. An additional substation will be constructed near the Coopers Mills STATCOM station to accommodate additional capacity.

⁵ This will vary depending on final route selection. See Figure 1 for alternative routes being considered.

⁶ See Section IIV for a more details on host and impacted communities of the Project.



Figure 1: Map of Proposed Route Alternatives of the Gateway⁷



⁷ Source: LS Power Grid Maine, LLC accessible at <http://www.lspgridmaine.com/>.



Project development and planning for the final route of the Gateway is underway and construction of the Project following any necessary regulatory permitting approvals is planned to begin in 2026 with construction completed in 2028 followed by a commercial operations date (“COD”) beginning in 2029. The bulk of electricity transmitted on the line will be sourced from King Pine, which as of the time of this analysis have power purchase agreements (“PPA”) and transmission agreements (“TA”) with utilities in Maine (60%) and Massachusetts (40%) to purchase the power from King Pine.

The King Pine Wind Project will be in the proximity of Webbertown Township outside of Houlton in Aroostook County. The Project is rated at 1,000 MW and will be comprised of approximately 170 turbines and cover around 4,500 acres of land.⁸ In addition to King Pine’s 1,000MW, the Gateway is able to carry an additional 200MW of capacity, which is anticipated to be filled through the ongoing procurement process by the Maine PUC.

III. Analytical Methods

The macroeconomic benefits of the Project are estimated as the economic impacts resulting from in-state (Maine-based) capital and operations/maintenance spending to build and operate the Gateway, as well as other impacts resulting from the enabled investments and changes to the economy from the construction and operation of King Pine Wind and other renewable generation of approximately 200 MW.

The analysis uses commonly applied methods to quantify the economic benefits of the Project that include simulating the impact of project spending and the benefits *enabled* by the Gateway on the Maine economy. Data is sourced from estimated planned local expenditures (Maine-sourced) and other project data provided by LSPGM that are consistent with other proposed or constructed transmission projects in Maine. The analysis also utilizes data available through public sources, including publicly available reports, websites, and secondary data that are sourced accordingly in this report. Specific benefit estimation procedures are described below.

A. Economic Model

The primary economic impacts of the Project are estimated using a 23-sector single-region model for the state of Maine developed by Regional Economic Models Inc. (“REMI”).⁹ The REMI PI+ model provides a comprehensive representation of regional economies and is considered among the more sophisticated economic models available for simulating the effects of complex economic changes over time. The REMI model provides a number of advantages over other types of methods that are based primarily on input-output models, such as IMPLAN or the U.S. B.E.A. RIMS II. Most input-output models are static, in that impacts are based on a point in time and the models lack the ability to account for price responses that underpin economic transactions. However, economies are complex and driven by constantly changing factors. The REMI model allows simulations of these interconnected factors to capture impacts

⁸ The final number of turbines has yet to be determined and will likely depend on nameplate capacity of the final turbine selection(s). More detailed on King Pine can be learned on the Project’s website at <https://www.longroadenergy.com/renewable-energy-projects/king-pine-wind/>.

⁹ The model version used in this analysis is REMI PI+ version 3.0.2.



dynamically by incorporating aspects of four modeling approaches that include General Equilibrium, Econometric, Economic Geography and Input-Output frameworks.

To simulate the economic impacts, model inputs are entered in the REMI PI+ model as policy variables (“PVs”) that represent different changes in regional economic spending, such as new spending or sales and revenue in a specific industry or changes in the costs to households or businesses. A simulation of these changes to the economy is compared to a baseline trajectory of the economy, or control forecast.¹⁰ The model then compares the outputs of the simulation to the control forecast. The differences in annual values represent the change in the economy associated with the Project which are interpreted as the economic impacts or benefits.¹¹

B. Estimating the Direct Benefits of the Gateway

1. Estimating Benefits during Development and Construction

LSPGM provided expected capital spending on development and construction of the Gateway, including the expected share of local procurement made on Maine-based contractors, vendors, and suppliers.¹² Spending was included for the development and construction of the transmission lines and structures, substations and components, and a new Operations and Management Support Facility (“O&M Support Facility”). Only the share of local (Maine-based) project expenditures are included in the simulations of economic benefits in Maine. Expenditures during development and construction are simulated in the REMI model as Construction in Power and Communications Equipment Exogenous Industry Sales. Several sensitivity analyses were run utilizing various industries and configurations to test the change in impact levels.¹³

Although project spending will take place in specific regions of the state and communities, labor markets typically cover a wider geographic region and contractors and firms will source labor from wherever there is supply.¹⁴ As is the nature of construction, companies move from one project to the next and, as is the case with large infrastructure projects in rural and more remote areas, labor may be imported into the region where construction is active. These workers, however, may spend some of their incomes in those local areas at restaurants, on lodging and fuel, and other general supply stores that might otherwise not have been impacted if not for the Project’s presence.

¹⁰ No significant changes were made to the baseline control forecasts.

¹¹ For more information about REMI or the PI+ model and supporting documentation, see <https://www.remi.com/model/pi/>.

¹² Spending detail was provided on an annual basis for labor, materials, equipment, taxes, and mitigation payments. Taxes were excluded from the simulation.

¹³ At this stage of the process, selection of contractors and final bidders have not yet been determined which will ultimately determine which specific industries will receive spending. Ultimately without greater detail, there is no basis for allocating spending across other industries or ability to interview specific companies on hiring and labor sourcing practices that may influence the model specifications.

¹⁴ Labor markets have been particularly tight in the construction industry, although most all industries have been experiencing labor market tightness indicated by relatively historic lows of unemployment.



2. Operations and Maintenance Spending

LSPGM provided annual Maine-based spending on operations and maintenance labor, materials, and supplies, as well as expected employment levels for the core O&M Support Facility that will total 5 FTEs per year. FTEs are entered as employment in the Power Generation Exogenous Industry Employment model PV. Core operations employment for the Gateway will earn significantly higher compensation than the average industry compensation. The higher wages are accounted for as an adjustment to the Wage Bill PV for that industry based on the change in wages from an initial simulation of employment. Those differences are extracted from the model and used to calculate the change entered back into the model for the full simulation. Annual maintenance and materials spending was provided for the first (based) year of operations. For each year of the operations period that followed, spending is adjusted using the REMI model's price inflator to calculate nominal spending. These values are entered as Exogenous Industry Sales Nonresidential Maintenance and Repair. Adjustments were also made to nullify investment responses of the model in the Utilities sector. Several sensitivity analyses were run testing alternative industries and model configurations.

3. State and Local Tax Revenue Impacts

The incremental change in total wages and salaries are used to estimate the associated state and local tax revenues using the most recent effective tax incident rates reported by the Maine Department of Revenue.¹⁵ Effective tax incidence rates (8.1%) are applied to total wages and salaries from the simulation outputs. State and local revenue impacts from wages and salaries are estimated for both direct project benefits and for enabled benefits. Effective tax incidence rates may change from year to year and are difficult to forecast over a thirty-year period. For the purposes of this analysis, effective tax incidence rates are held constant throughout the contract period.

4. Municipal Property Tax Revenue Benefits

Capital investment for the Project will provide new valuation to the tax base providing some form of tax benefits to taxpayers in communities along the project right-of-way, including substation locations. Projected municipal property tax revenues were provided by LMPGM and utilize a replacement cost accounting method for valuation.¹⁶ Valuation is applied on a per mileage basis according to the length of the lines and conductor arrangement (single or double) for each impacted municipality. Valuation for substations is added to the respective municipalities to calculate a base cost. For the construction years 2027 and 2028, estimated completion ratios are applied by municipality. The most recently available mill rates (2021) are applied at an escalated rate of 1% per year and applied to each year's assumed valuation to estimate an approximate value of new valuation by municipality.

It is important to recognize that communities themselves will ultimately determine how the benefits of the Project's additional taxable valuation will be realized. There are any number of factors that may

¹⁵ Maine Revenue Services provides effective tax rates for individual income, sales and excise tax on consumers, and owner-occupied property taxes in their most recent Maine Tax Expenditure Report for 2024-25 and are located on page 254. The report can be accessed at <https://www.maine.gov/revenue/sites/maine.gov.revenue/files/inline-files/2023%20Tax%20Expenditure%20Report%20%28PDF%29.pdf>.

¹⁶ The estimates are based on the 140-mile route alternative.



influence those decisions. Communities may choose to take the additional tax revenue by maintaining mill rate levels (or trends) or provide a benefit as relief to taxpayers in the form of reduced mill rates. The value of these benefits will also depend, among other things, changes in municipal commitment levels, other impacts to municipal valuation, and any resulting impact on mill rates. If mill rates are lowered in a municipality, property tax payments from the Project may be lowered relative to previous mill rates. However, mill rates will be lowered for all taxpayers, who will recognize a reduction in tax bills (assuming valuation is held constant or maintains a nominal basis).

C. Estimating the Enabled Benefits of the Gateway

1. Energy Price Suppression Benefits to Ratepayers

Electricity generated by King Pine will flow into the ISO-NE electric grid through the Gateway and will be purchased by utilities and sold to customers in Maine (60%) and Massachusetts (40%) under a PPA and TA. Once accounting for the costs of the transmission line and procurement rates of King Pine's power, ratepayers in Maine will stand to benefit through reductions in electricity costs on retail bills. An independent study by Daymark Energy Advisers ("Daymark") evaluated and quantified the costs and benefits to Maine ratepayers from the Gateway and King Pine.¹⁷ The analysis identified benefits to Maine ratepayers would flow through direct benefits of the contract(s)¹⁸, as well as benefits from the suppression of wholesale (LMP) prices¹⁹ in the ISO-NE grid resulting from the addition of King Pine wind power. There will also be more modest benefit to Maine ratepayers from a suppression of renewable energy certificate ("REC") prices resulting from the increased supply of RECs provided by King Pine. Collectively, the ratepayer benefits of the Project amount to over \$880 million on an NPV basis and are shown in Table 3. These benefits will flow to ratepayers in the ISO-NE service region. In addition, Daymark estimates that the average residential customer in the NMISA region will realize \$1.70 savings each month on their electricity bill.²⁰ This equates to approximately \$900 thousand in savings per year.

The economic impacts of ratepayer savings are estimated based on the expected reduction in electricity prices due to the direct contract benefits, reductions in wholesale electricity prices, and from REC revenues. Lower electricity costs leave households with more dollars to spend elsewhere in the local economy, while businesses can be more complete through shifting energy savings into capital and labor investments or expand markets through more competitive pricing.

¹⁷ The study titled Northern Maine Renewable Energy Development Program: Maine Ratepayer Benefits dated June 21, 2023 can be accessed at http://www.lspgridmaine.com/wp-content/uploads/2023/07/Daymark_Maine-Ratepayer-Benefits_2023.pdf.

¹⁸ Direct contract benefits result from the cost of the PPA and TA being below the market value of energy. Utilities in Maine purchase power at these rates and sell back into the ISO-NE grid. Since the cost of the PPA and TA are below the projected market value of energy, there will be a benefit. Utilities will pass along savings in the form of lower distribution rates and show up in retail customer bills.

¹⁹ The wholesale market impact refers the suppression of locational marginal pricing (LMPs) throughout the ISO-NE region as a result of the injection of King Pine's energy into the grid at prices that are lower than the marginal generating units online. These are typically the most inefficient and most expensive units supplying power to the grid at a given time.

²⁰ Refer to the reference in footnote 17.



Table 3: Benefits to Maine Ratepayers, in Millions of \$

Ratepayer Benefit	Nominal Value (2029-2053)	Net Present Value (2023\$)
Direct Contract Impact	\$1,066	\$316
Wholesale Market Impact	\$2,188	\$550
REC Market Impact	\$38	\$22
Total Ratepayer Impact	\$3,293	\$887

Source: Northern Maine Renewable Energy Development Program: Maine Ratepayer Benefits , Daymark Energy Advisers. Note: In millions of \$.

Ratepayer savings are allocated by year and major energy sector for the residential, commercial, and industrial sectors²¹ and entered into the REMI model for each sector's respective PV. Energy cost savings by year are simulated as reductions in electricity production costs for both the commercial and industrial sectors in the REMI model and are entered as nominal amounts. Residential sector savings are entered as reductions in consumer spending on electricity in the residential sector by year and are entered as nominal amounts. Wholesale price reductions are converted to retail (delivered price) savings using a factor of .97 (97% of wholesale).

The reader should note the degree of uncertainty in forecasting far into the future, particularly given volatile fluctuations in underlying prices of natural gas in the Northeast, which is the primary driver of changes in electricity prices at this point in time. A decline of natural gas prices below the forecasted prices in Daymark's analysis would result in a smaller benefit to ratepayers and resulting economic impact reported in this analysis. On the other hand, a rise in natural gas prices or sudden spikes above the forecasted prices would result in under estimated ratepayer benefits and resulting impacts over time reported in this analysis.

2. Development, Construction, and Operations and Maintenance Spending on King Pine Wind

The economic impacts from King Pine are sourced from the Project's website with calculations by WEA. The estimates of impacts from King Pine were prepared using a different economic model than is used in this analysis. While the impact estimates are representative of the magnitude of impacts resulting from King Pine spending and consistent with outputs of the REMI model, they are not necessarily directly comparable to the results from the REMI model prepared for the Gateway largely because of the differences in economic models discussed in Section III.A.

²¹ Allocations are based on a recent state energy profile from the Energy Information Administration (EIA) using 2019. Given the slight shift in electricity consumption during 2020 and into 2021 resulting from the Coronavirus pandemic, 2019 was used to provide a better representation of a typical year. The allocation is held constant over the simulation period. While it is expected that industrial composition may change over the course of the forecast period and as a result sector energy profiles will change, this method is the best approximation over the long term. Ultimately, the changes in sector allocation make only a minimal difference in simulation results.



3. Impacts from an Additional 200 MW of Renewable Generation

The impacts are extrapolated based on a per MW basis from recent studies of the economic impact of commercial solar and the current King Pine Wind Project, as well as other recent studies of the economic impact of wind energy development in Maine.²²

D. Economic Impact Metrics

The economic impacts estimated in the REMI model and elsewhere are measured by common economic indicators that include the incremental change in:

- Employment (direct, indirect, and induced effects)
- Wages and salaries
- Gross state product (GSP)
- Total economic output

Direct employment impacts refer to those resulting from initial rounds of spending on project capital investments and direct operations and maintenance. Indirect employment impacts result from additional rounds of spending that occur by Maine vendor and supplier businesses on purchases of materials, supplies, and services from other businesses that support production and operations activities. Induced employment impacts result from local consumption demand spending by (direct and indirect employment) workers in the local economy on goods and services, such as food, housing, entertainment, and other goods and services, which in turn support jobs and economic activity in the local economy. The employment benefits resulting from reduced electricity rates are assumed to be in the form of induced employment impacts.

Employment is estimated as the number of jobs, both full-time and part-time, and includes wage and salaried employees, sole proprietors, and active partners. A conversion factor is applied to estimated employment and reported as full-time equivalents (“FTEs”) based on national ratios calculated using data from the US Bureau of Labor Statistics (“BLS”).²³

Two measures of the overall contribution to the Maine economy are estimated: total economic output and gross domestic product (“GDP”) or alternatively gross state product (“GSP”). Total economic output is a measure of the total value of all goods and services produced as a result of the Project, inclusive of intermediate inputs or and value-add (GDP). GDP is a comprehensive standard measure of the market value, or value-added component, of all final goods and services and includes total labor income, plus taxes on production and imports and other property income. This analysis estimates the incremental

²² Refer to the recent report titled “Economic Benefits of the Construction and Operation of Nonresidential Solar Photovoltaic Energy Generation in Maine, 2019-2027” prepared for the Maine Renewable Energy Association which can be accessed at <https://www.renewablemaine.org/docs/Economic-Impact-of-Solar-PV-in-Maine.pdf> and the King Pine website at <https://www.longroadenergy.com/renewable-energy-projects/king-pine-wind/>.

²³ FTEs are calculated from the BLS Labor Force Statistics from the Current Population Survey for nonfarm industry sectors. Ratios are calculated based on a national general accounting and may not fully represent regional differences in Maine.



change in total economic output and state GDP as a result of the Project's expenditures and operational benefits.

Total wages and salaries include all wage and salary related income resulting from direct, indirect, and induced employment. Total wages and salaries are not additive to total output or GDP, but rather are accounted for in those measures and can be understood as the associated labor income.

Unless otherwise specified, monetary values that extend over the contract period are expressed in nominal terms in addition to reporting on a net present value basis ("NPV"). NPV calculations use a 7% discount rate and are discounted to the current year (2023).



IV. Macroeconomic Benefits from Development and Construction of the Gateway

A. Economic Impacts from Development and Construction Capital Spending

Capital investments and project development spending at Maine businesses and organizations will result in significant positive economic benefits in Maine during the development and construction of the Project. These benefits are summarized in Table 4.

Employment supported by initial capital and development expenditures is estimated to total almost 4,000 FTEs which includes over 2,100 FTEs resulting from direct spending and additional 1,850 FTEs supported through indirect and induced spending. Total wages and salaries during the period are estimated to reach over \$240 million (\$188 million NPV). Wages and salaries are expected to generate \$20 million (\$15 million NPV) in state and local tax revenues.

In total, Project expenditures during development and construction are estimated to contribute over \$800 million to Maine's total output (\$619 million NPV), of which \$490 million (\$378 million NPV) will be contributed towards Maine's gross state product (GSP).

Table 4: Development and Construction Period Summary Impacts

Measure	Annual Average	Total (Gross Nominal)	NPV (2023\$)
Direct FTEs	355	2,132	
Indirect & Induced FTEs	309	1,854	
Total Employment	664	3,986	
Total Wages and Salaries (in millions)	\$41	\$243	\$188
Gross Domestic Product (in millions)	\$82	\$491	\$378
Output (in millions)	\$134	\$803	\$619
State and Local Tax Revenues (in millions)	\$3.3	\$20	\$15

Note: Benefits reported for the development and construction period of the project. Employment reported as full-time equivalents (FTEs); currency reported in current (nominal) dollars and net present value (NPV) 2023\$.

The bulk of these benefits will be realized between 2026 and 2028, with annual impacts peaking in 2028, when construction spending is anticipated to climax resulting in over 1,600 FTEs and \$96 million in total wages and salaries (Figures 2 and 3). Total output and state GDP will follow a similar pattern. Jobs and wages and salaries will be concentrated in construction and related industries, which will account for nearly 3 out of every 5 jobs during the period.²⁴

By its nature, construction and related employment for a particular project are temporary and transient as businesses and workers move from one job to the next filling periodic demand and in the

²⁴ A distribution of employment and wage and salary impacts by industry sector during development and construction is located in Table 9 of the Appendix.



case of large infrastructure projects, such as a transmission line or wind energy project, different geographic areas. So while the location of construction and capital investment may be in one place, the benefits from local spending of worker wages will likely be realized in the communities closer to where workers reside. To be sure, it is likely workers will spend at least a portion of their wages in the vicinity of construction activity at food stores, restaurants, fuel stations, accommodations, and other supply stores. Details on specific contractors are not yet known, which would enable understand specific labor sourcing and hiring practices of those firms. It is plausible, however, that some workers may be sourced from outside of the state to complete work on the project, particularly for aspects that require more specialized labor that may not exist or be available in Maine.

There is another large transmission project currently under construction in Maine, the NECEC that is expected to have construction completed in 2024 or 2025. Such large sequential investments and demand for specialized construction also provide opportunities for small or new businesses to be supported and invested in providing a prolonged source of jobs and economic impact that may stem beyond the capital investments of the Project.²⁵

Figure 2: Impacts on Employment in Full-time Equivalents by Year during Development and Construction

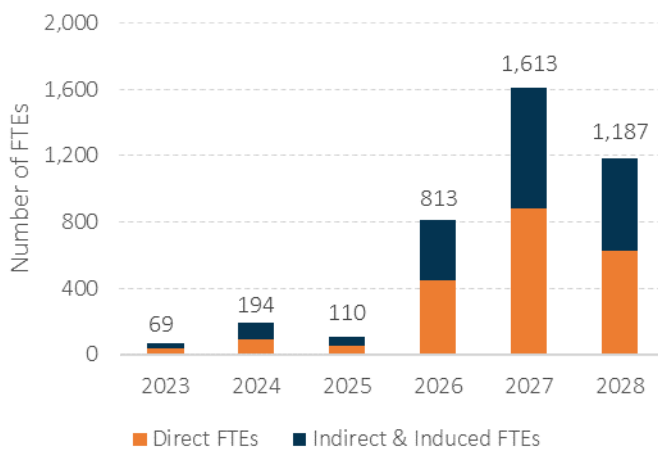
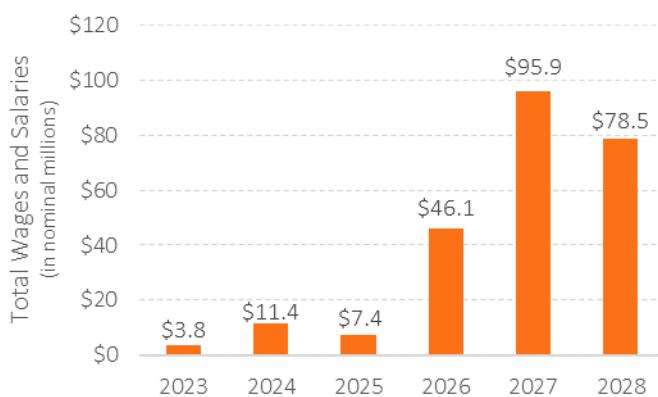


Figure 3: Impacts on Wage and Salaries by Year during Development and Construction



²⁵ For example, see <https://www.pressherald.com/2011/06/05/cmp-upgrade-boosts-little-known-industry-2011-06-05/>.



V. Macroeconomic Benefits from Operations of the Gateway

A. Economic Impacts from Operations and Maintenance Spending

The economic benefits resulting from the Project's operations and maintenance spending is shown in Table 5. During the Project's operations and maintenance, an average of 23 FTEs will be supported annually, totaling 580 FTEs in Maine over the 25-year operations period. These jobs will support an estimated \$116 million (\$35 million NPV) over the period and average \$4.6 million per year. State and local tax revenue is estimated to total over \$9 million (\$3 million NPV) from operations and maintenance spending over the period.

The incremental increase to the state's economic output totals over \$490 million (\$146 million NPV) over the contract period averaging \$19.7 million per year (nominal). The portion of total output attributed to GSP is estimated to total \$330 million (\$99 million NPV), and average just \$13 million per year.

Table 5: Operations and Maintenance Summary Impacts

Measure	Annual Average	Total (Gross)	NPV (2023\$)
Direct FTEs	5	118	
Indirect & Induced FTEs	18	461	
Total FTEs	23	579	
Total Wages and Salaries (in millions)	\$4.6	\$116.0	\$35.2
Gross Domestic Product (in millions)	\$13.2	\$331.2	\$99.1
Output (in millions)	\$19.7	\$491.6	\$146.8
State and Local Tax Revenues (in millions)	\$0.4	\$9.4	\$2.9

Note: Benefits reported cumulative of the 25-year project operations period. Employment reported as full-time equivalents (FTEs); currency reported in current (nominal) dollars and net present value (NPV) 2023\$.

As the operation and maintenance of the Gateway spans a much longer time frame, the annual impacts are assumed to be more "permanent" in nature. Similar to construction jobs to build the transmission line, maintenance labor will likely draw from a wider labor market area and work along the transmission corridor itself, while the O&M Support Facility and operations labor will be located in a static location at a to be determined location. The impacts during operations will be concentrated in the direct employment industries of Utilities and Construction (Maintenance) and several local market servings industries, such as health care and retail trade.²⁶

²⁶ See Table 11 in the Appendix for a summary of employment by industry.



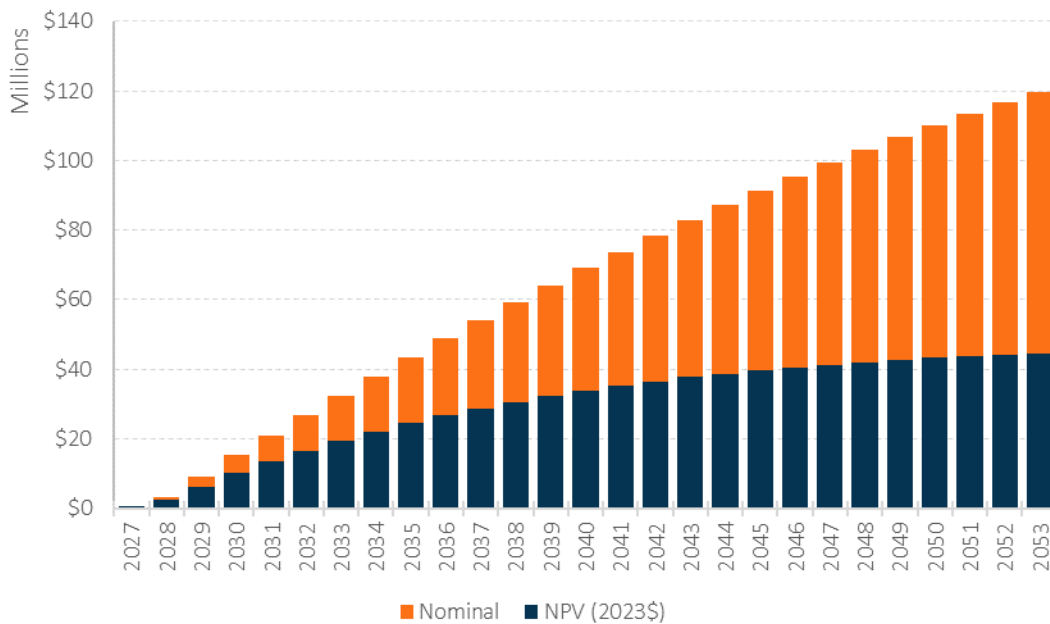
B. Benefits from Municipal Property Tax Revenues

The additional municipal property valuation is estimated to contribute \$4.7 million (nominal) per year on average over the 20-year contract period, totaling \$120 million (\$44.5 million NPV) (Table 6). Whether this value is received by communities as additional tax revenue or provided as relief to taxpayers in the form of reduced mill rates, will depend on the communities themselves. The value of these benefits will also depend, among other things, on changes in municipal commitment levels, changes to millage rates, and other impacts to municipal valuation. The estimates provided here are solely to represent the potential value of the municipal property tax payments made by the project.

Table 6: Municipal Property Tax Revenues, 2027-53

Municipal Property Estimated Tax Revenue Value	
Annual Average (during operations)	\$4.7
Cumulative Gross Total (2027-53)	\$120.4
Net Present Value (2023\$)	\$44.5

Figure 4: Cumulative Municipal Property Tax Revenue Estimates, 2027-53 (in nominal and NPV 2023\$)





VI. Economic Benefits Enabled by the Gateway

A. Economic Impacts from Maine Ratepayer Savings

Ratepayer savings will result from the injection of renewable energy generated by King Pine into the ISO-NE grid and purchased and resold by utilities in Maine and Massachusetts. According to the study by Daymark on the ratepayer benefits of King Pine and the Gateway, Maine ratepayers in the ISO-NE service region would stand to see benefits of up to \$3.3 billion (\$887 million on an NPV basis) over the contract period. This includes impacts of \$1 billion (\$316 million NPV) from direct contract benefits, \$2.1 billion (\$550 million NPV) from wholesale market benefits, and \$38 million (\$22 million NPV) from REC market benefits. The benefits will all flow directly to Maine ratepayers and show up in retail electricity bills. The reduced cost of electricity to households and businesses will support economic impacts in the Maine economy which are summarized in Table 7.

Ratepayer savings during operations is estimated to support a total of 12,500 FTEs over the contract period. Employment impacts will average 500 FTEs per year above the baseline forecast, but will vary from year to year (Figure 5). A small net loss of jobs in the first year will be followed by a quick ramping of employment benefits in the first five years before steadily increasing to a peak of 800 FTEs per year followed by a reduction in the total impacts through the contract period.

These jobs will be supported by wages and salaries of \$1.2 billion (\$337 million NPV) and will average approximately \$50 million per year on a nominal basis over the contract period. The Cumulative impacts on wages and salaries are represented in Figures 6 (A & B). Wages and salaries will support \$100 million (\$27 million NPV) in state and local tax revenues averaging \$4 million per year on a nominal basis.

Total output is valued at over \$6.7 billion (\$1.7 billion NPV), a portion of which includes the contribution to state GDP of \$3.8 billion (\$980 million NPV) over the contract period.

The majority of the impacts from ratepayer savings are supported by wholesale market benefits, which alone are estimated to support over 9,700 FTEs, upwards of 400 FTEs per year on average. Direct contract benefits are estimated to supported a net of almost 2,600 FTEs that will average approximately 100 FTEs per year. Wholesale market benefits may induce nearly \$1 billion in additions to wages and salaries across the contract period (\$255 million NPV).

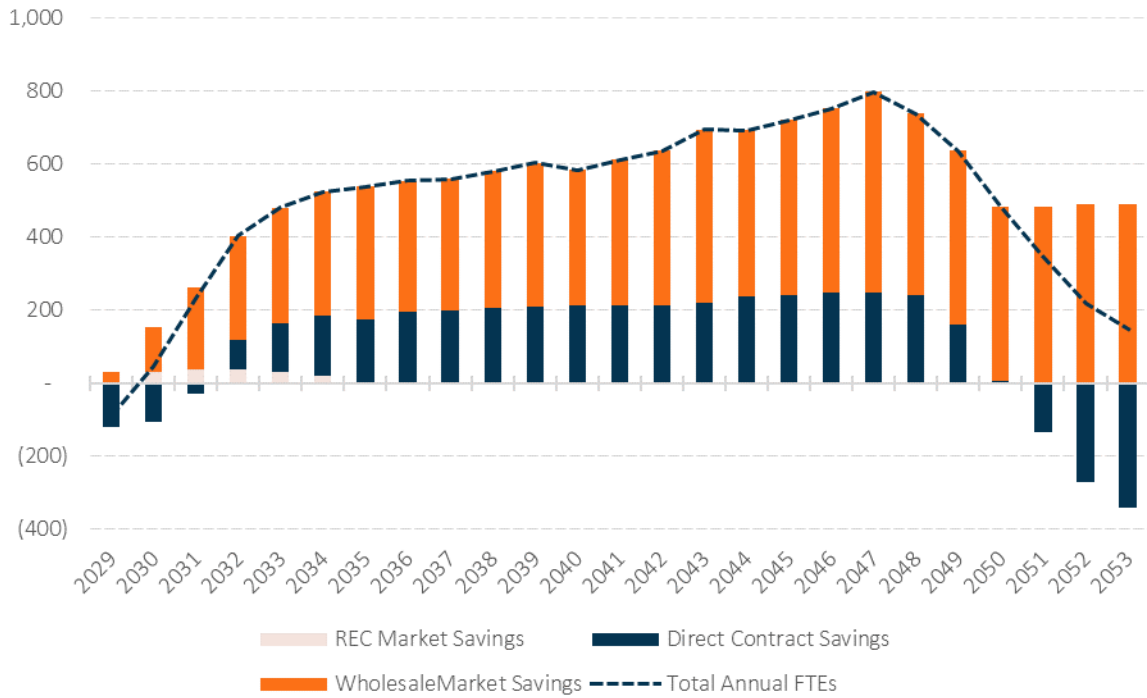


Table 7: Summary Impacts of Ratepayer Benefits, (2029-53)

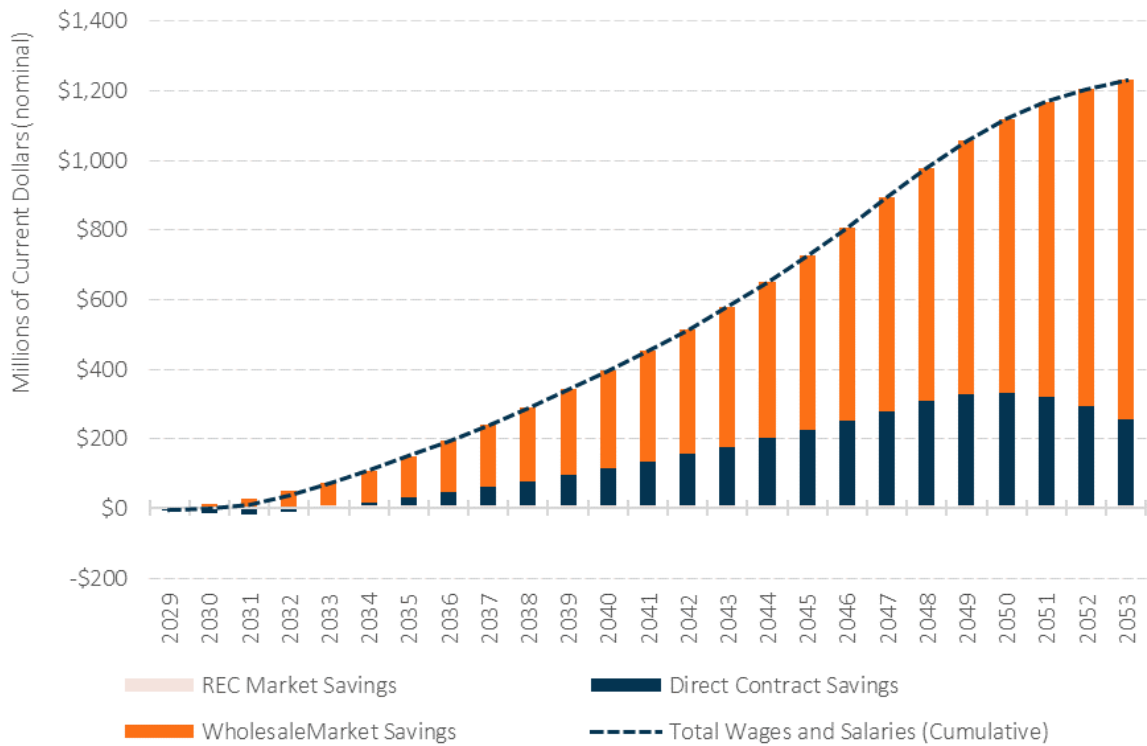
Measure	Annual Average	Total (Gross)	NPV (2023\$)
Direct Contract Benefits			
Total FTEs	104	2,592	
Total Wages and Salaries (in millions)	\$10	\$245	\$76
Gross Domestic Product (in millions)	\$35	\$886	\$231
Output (in millions)	\$65	\$1,627	\$421
State and Local Tax Revenues (in millions)	\$0.8	\$20	\$6.2
Wholesale Market Benefits			
Total FTEs	390	9,758	
Total Wages and Salaries (in millions)	\$39	\$976	\$255
Gross Domestic Product (in millions)	\$119	\$2,974	\$737
Output (in millions)	\$202	\$5,052	\$1,246
State and Local Tax Revenues (in millions)	\$3.2	\$79	\$21
REC Market Benefits			
Total FTEs	6	152	
Total Wages and Salaries (in millions)	\$0	\$10	\$6
Gross Domestic Product (in millions)	\$1	\$21	\$12
Output (in millions)	\$2	\$39	\$21
State and Local Tax Revenues (in millions)	\$0.0	\$0.8	\$0.4
Total Impacts from Ratepayer Benefits			
Total FTEs	500	12,503	
Total Wages and Salaries (in millions)	\$49	\$1,231	\$337
Gross Domestic Product (in millions)	\$155	\$3,882	\$980
Output (in millions)	\$269	\$6,718	\$1,688
State and Local Tax Revenues (in millions)	\$4.0	\$100	\$27
<p>Note: Benefits reported cumulative of the 25-year project operations period. Employment reported as full-time equivalents (FTEs); currency reported in current (nominal) dollars and net present value (NPV) 2023\$. Numbers may not sum due to rounding. Ratepayer benefits from REC Market price suppression are estimated in the Daymark study to accrue between 2030-2034, but are averaged over the contract period for consistency.</p>			

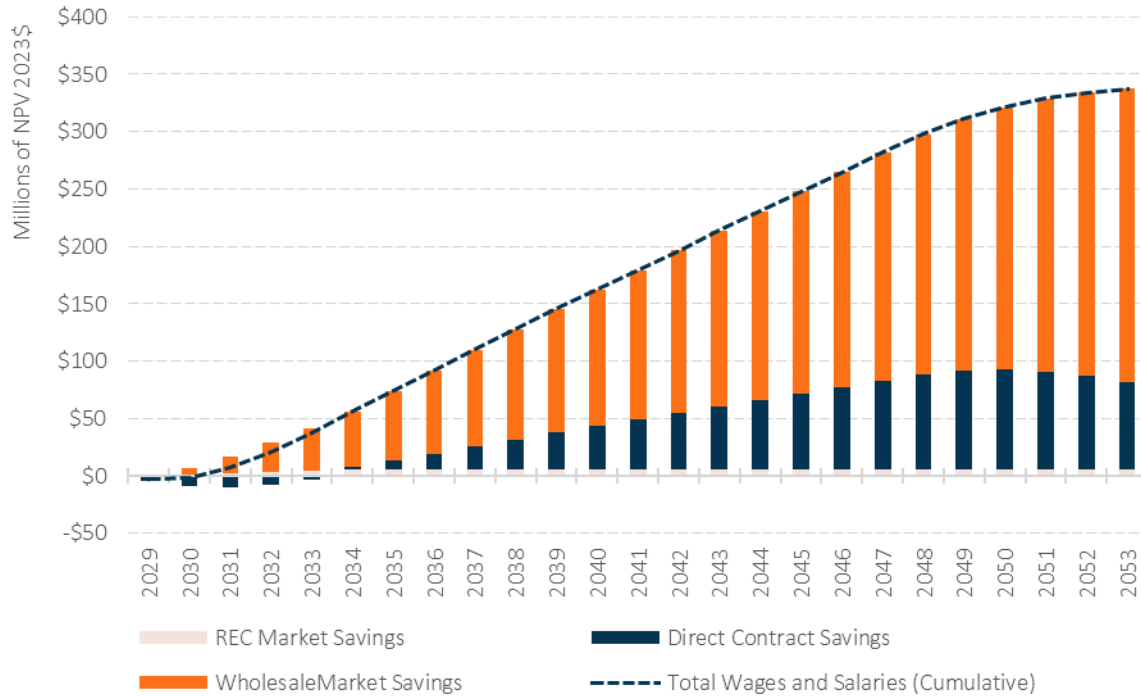


Figure 5: Annual Employment Impacts in FTEs by Ratepayer Benefit, 2029-53



Figures 6 A & B: Cumulative Impact on Wages and Salaries by Ratepayer Benefit, 2029-53 (in nominal \$ and NPV)





B. Impacts from the Development, Construction, and Operation of King Pine Wind

As the largest terrestrial wind project in the eastern US, King Pine Wind Project will result in one of the most significant investments in Northern Maine and Aroostook County in generations totaling \$2 billion.²⁷ An estimated \$300 million of this total is assumed to provide revenues to Maine vendors supporting an estimated 3,200 FTEs during development and construction. King Pine will contribute \$125 million of spending in-state for operations and maintenance of the wind farm supporting approximately 30 FTEs per year. Based on the average wage in Maine in 2022, this amounts to approximately \$200 million (\$150 million NPV) in wages and salaries during development and construction and over \$49 million (\$18 million NPV) during the operations period.

King Pine will contribute approximately \$60 million in value to local property tax revenues or municipal commitments during the contract. The estimated impacts of the King Pine Wind Project are summarized in Table 8.

These benefits, especially during project operations, will be concentrated in communities in northern Maine and Aroostook County – a region that continues to face a number of economic headwinds.²⁸ Across the state, more than 700 businesses have benefited from revenue from wind energy development

²⁷ See <https://www.longroadenergy.com/renewable-energy-projects/king-pine-wind/> for publicly cited benefits.

²⁸ A discussion of these challenges can be found in a recent report titled Caring for the Crown prepared for the Aroostook Partnership https://www.nmdc.org/wp-content/uploads/2019/09/Caring_for_the_Crown.pdf.



in recent years, many of which will likely benefit directly and indirectly from King Pine given its significant economic footprint.²⁹

Table 8: Summary of Impacts from the King Pine Wind Project

Benefit	Construction	Operations
Project Spending (Maine-based)	\$300 million	\$125 million
Total FTEs	3,200 FTEs	600 FTEs (30 / year)
Total Wages and Salaries (in millions)	\$204 million (\$150 million NPV)	\$49 million (\$18 million NPV)
State and Local Tax Revenues (in millions)	\$16 million (\$12 million NPV)	\$4 million (\$1.5 million NPV)
Local Property Tax Revenues		\$60 million

Source: <https://www.longroadenergy.com/renewable-energy-projects/king-pine-wind/> and author's calculations. Dollars in nominal unless stated on NPV basis (2023\$).

C. Economic Impacts from 200 MW of Additional Renewable Generation Capacity

The Gateway will enable the development and operations of an additional 200 MW of renewable generation capacity in northern Maine supported by recent legislation directing the PUC to initiative procurement for the remaining 200 MW of renewable capacity on the Gateway.³⁰ This study makes no assumption about whether the projects selected by the PUC under LD 1943 is for solar, wind, biomass or some other combination of resources. In an attempt to highlight the expected benefits of an additional 200 MW of renewable capacity enabled by the Gateway, the study considers the development of the addition of utility-scale solar and the case of an additional 200MW of wind generation.

Based on a recent analysis of the core economic benefits of commercial-scale solar projects, the impacts of an additional 200 MWac of solar capacity are extrapolated and summarized in Table 9.³¹ An additional 200 MWac of utility-scale photovoltaic generation³² would result in approximately \$83 million in Maine-based spending supporting 1,300 FTEs and approximately \$58 million in wages and salaries

²⁹ According to an industry group advocating for Wind Energy development in Maine, 760 businesses have earned revenue from the development of Wind Energy https://www.windforme.com/docs/Wind_Vendor_List.pdf. These claims have not been directly verified by WEA.

³⁰ On June 22, 2023 the Maine Legislature passed An Act Regarding Future Energy Procurements for Renewable Energy Development in Northern Maine (L.D. 1943). Refer to https://legislature.maine.gov/legis/bills/display_ps.asp?PID=1456&snum=131&paper=&paperId=l&ld=1943.

³¹ The estimates are from the author's calculations from a per Mvac basis with data drawn from a recent report titled "Economic Benefits of the Construction and Operation of Nonresidential Solar Photovoltaic Energy Generation in Maine, 2019-2027" prepared for the Maine Renewable Energy Association which can be accessed at <https://www.renewablemaine.org/docs/Economic-Impact-of-Solar-PV-in-Maine.pdf>.

³² The level of solar nameplate capacity could actually be greater than 200MW given the temporal correlation levels between resource availability. For the purposes of this analysis, the amount is limited to 200 MW.



during development and construction.³³ Operational impacts are estimated to support approximately 50 FTEs, \$4 million in wages and salaries, and \$20 million in local property tax revenues over the operations period.

Table 9: Summary of Potential Impacts from 200 MW of Additional Solar Generation Capacity

Benefit	Construction	Operations
Project Spending (Maine-based)	\$85 million	\$ 4 million
Total FTEs	1,300 FTEs	50 FTEs
Total Wages and Salaries (in millions)	\$58 million	\$4 million
State and Local Tax Revenues (in millions)	\$4 million	\$.5 million
Local Property Tax Revenues		\$20 million

Source: Author calculations based on estimates from the report "Economic Benefits of the Construction and Operation of Nonresidential Solar Photovoltaic Energy Generation in Maine, 2019-2027" on proportional per MW basis. Dollars reported in fixed 2023.

Alternatively, the impacts of 200 MW of new terrestrial wind energy would be similar in scale and magnitude. Based on the impacts of King Pine’s 1,000 MW, the impacts will likely be approximately one-fifth of the impacts of the 1,000 MW King Pine (Table 10). The impacts of an additional 200MW of wind generation capacity would result in approximately \$60 million in Maine-based spending supporting 640 FTEs and approximately \$41 million in wages and salaries during development and construction. Operational impacts are estimated to support approximately 120 FTEs, \$10 million in wages and salaries, and \$12 million in local property tax revenues over the operations period. These impacts are approximate and conservative representative of the benefits of an additional 200 MW of wind generation capacity and assumes a similar local spending share as King Pine’s.

Table 10: Summary of Potential Impacts from 200 MW of Additional Wind Generation Capacity

Benefit	Construction	Operations
Project Spending (Maine-based)	\$60 million	\$ 25 million
Total FTEs	640 FTEs	120 FTEs
Total Wages and Salaries (in millions)	\$41 million	\$9.8 million
State and Local Tax Revenues (in millions)	\$3 million	\$1 million
Local Property Tax Revenues		\$12 million

Source: Author calculations based on per MW basis relative to of King Pine impacts. Estimates are intended to serve as an approximation of potential impacts of an additional 200MW of wind generation. Dollars in millions on nominal basis.

These benefits could be realized under the assumption the PUC selects projects to utilize the additional 200 MW of capacity on Gateway and those selected projects, whether solar or wind, have

³³ This calculation assumes 6.5 FTEs, \$43,000 per FTE in wages, and \$415,000 in Maine vendor spending per installed MWac during development and construction. These assumptions are based on the report by this author titled “Economic Benefits of the Construction and Operation of Nonresidential Solar Photovoltaic Energy Generation in Maine,2019-2027”.



similar spending compositions and local procurement as past projects and industry reported spending data. If local procurement is smaller or overall project spending is lower, the resulting economic impact will be proportionally lower, and vice versa. It is also assumed the PUC will select projects that will be the lowest cost and provide a positive benefit to Maine ratepayers. Under this assumption, there may be additional economic benefits realized from the additional 200 MWs of renewable generation to ratepayers in Maine.³⁴

D. Economic Value from Greenhouse Gas Reductions

The King Pine Wind project is estimated to displace 1.3 million metric tons of carbon dioxide (“CO₂”) per year.³⁵ An annual estimate of the avoided social cost of carbon emissions is based on the Interagency Working Group (“IWG”) on the Social Cost of Greenhouse Gases estimate of \$51 per metric ton of CO₂.³⁶ Additionally, recent proposed rulemaking by the IWG is considered which would establish a federal metric for the social cost of carbon at \$190 /MTCO₂.

This equates to \$66 million in value each year to society for avoided CO₂ emissions and up to \$247 million per year under the proposed IWG value. An additional 180 thousand metric tons of CO₂ emissions avoidance per year resulting from the additional 200 MW of renewable power generation in Maine with a social value of \$9 million annually. These are not necessarily monetary benefits society would receive, but rather the value of the benefits of reduced emissions in economic terms. The reduction in emissions can be considered to enhance the amenity values of the region as a result of better air quality, reduced carbon emission, or other factors which may draw migrants into the region.

³⁴ While the impacts from project spending are much more consistent, attempting to quantify ratepayer benefits or costs to ratepayers and the ensuing macroeconomic impacts would be largely speculative without project specific details.

³⁵ Refer to King Pine’s website at <https://www.longroadenergy.com/renewable-energy-projects/king-pine-wind/>.

³⁶ Refer to Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances. September 2022. National Center for Environmental Economics, U.S. Environmental Protection Agency. <https://subscriber.politicopro.com/eenews/f/eenews/?id=00000184-77c6-d07e-a5fd-f7df41f80000>. Dollars are on a 2020 basis.



E. Other Distributional Considerations of Project Impacts

1. Distribution of Jobs, Wages, and Tax Revenues

The Project will generate significant number of FTEs and wage income, especially during construction of both the Gateway as well as King Pine. Given the dynamics of labor markets, especially in construction, discussed previously it is not easily discernable whether vulnerable populations will reap more or less of these impacts. It is presumable, given tight labor market conditions, that these populations may benefit from higher-paying labor opportunities for those able and seeking. Furthermore, a substantial amount of new tax revenues to state and local regions is also estimated to stem from the Project, which can provide greater funding for social assistance programs, such as housing, that has risen to a crisis issue in many areas of the state.

While sales, income, excise, and other taxes collected by state and regional bodies, additional municipal property valuation provided by Gateway and King Pine will go to host communities enabling them to realize additional revenue or maintain or reduce mill rates from present levels. The additional revenue could again be realized and fund housing and energy assistance programs or provide other necessary services and social assistance that benefit vulnerable populations. On the other hand, a reduction or not having to raise mill rates reduces the housing burden of residents, particularly vulnerable populations.

2. Enables significant investments in Northern Maine region

A central goal of the NMRDP is to catalyze increased investment and access in Aroostook County and northern Maine – a region that has long struggled with population out-migration and decline, lower wages, and underinvestment. The Gateway will enable the \$2 billion investment in King Pine – nearly two-thirds of Aroostook’s current annual gross regional product.³⁷ The Gateway will also enable the additional investment of at least 200 MW of renewable capacity. Although the Gateway does not directly link to the NMISA service area, it does increase the feasibility of connecting the service areas in the future and enabling additional investment in renewable energy or other infrastructure in the future. The investments would generate additional economic impacts and benefits for Aroostook County. In addition, the Daymark analysis estimates the average residential ratepayer in the NMISA region will recognize \$1.70 in savings on their monthly electricity bill. The savings to ratepayers will have benefits to the region as consumers shift their electricity savings to demand on other local goods and services, in turn supporting additional jobs, wages, and economic activity.³⁸

3. Adverse Impacts

Concerns of adverse impacts of a project the scale of the Gateway or King Pine are often directed at environmental disruptions, tourism, and home prices. Although attempting to quantify any costs from adverse impacts such as these are challenging and are outside of the scope of this study, it is appropriate

³⁷ U.S. Bureau of Economic Analysis, Regional Accounts, Gross Domestic Product by County.

³⁸ Data and modeling constraints limited estimation of the economic impacts of electricity savings in the NMISA region. However, the impacts can be assumed to be roughly proportional to the energy savings impacts estimated for the rest of the state in the ISO-NE service region.



to acknowledge to address these potential concerns and consider the likelihood these impacts could occur and the extent of economic cost born on vulnerable populations.

A project on the scale of Gateway will likely have some environmental impact on animal species and vegetation, primarily from disruptions caused during construction. The expected impacts and necessary remedies will be thoroughly evaluated during those permitting processes. Environmental impacts are often difficult to quantify using market-based pricing measures. The Gateway will make planned mitigation payments to the Maine In Lieu Fee (ILF) Conservation Program supporting the Maine Natural Resource Conservation Fund (NRCF) estimated at \$30 million during project construction. This would be one of the largest contributions to the fund in its history.

As the largest economic sector and revenue generator in the state, the impacts on tourism is an important consideration. While the Gateway transmission line will run be more buffered from visual impacts by its nature, the large King Pine wind farm will have a greater visual impact. Whether this results in a loss of economic spending remains to be seen. Based on recent research of the impacts of wind farms on tourism, the expectation would be minimal impacts and in fact could result in additional tourism spending.³⁹ The King Pine project will be the largest terrestrial wind farm on the east coast, both in terms of capacity and number of turbines. This may be a significant attraction to the region for business tourism and renewable energy enthusiasts.

Several studies have used hedonic methodologies to assess the impact of transmission lines and wind farms on home prices.⁴⁰ These studies have found no conclusive evidence that home values are affected by proximity to projects. Although there may likely be local parcels proximate to the transmission line and residents that are impacted, determining whether that amounts to economic harm or burden are less likely, withstanding the event of eminent domain. There is anecdotal evidence that adverse impacts of wind projects have been experienced in Maine (see the Mars Hill Wind Project), however, new regulations coupled with the remote location of the King Pine project will likely mitigate the audible effects of turbine operations.

³⁹ See a recent study in neighboring New Hampshire Polecon Research, 2013. *The Impact of Wind Farms on Tourism in New Hampshire*. Accessed at https://www.nhsec.nh.gov/projects/2013-02/documents/131212appendix_31.pdf. See also Parsons, G. Firestone, J. 2018. *Atlantic Offshore Wind Energy Development: Values and Implications for Recreation and Tourism*. Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2018-013. Accessed at <https://espis.boem.gov/final%20reports/5662.pdf>.

⁴⁰ For example, see Hoen, B., Wiser, R., Cappers, P., Thayer, M., & Sethi, G. (2009). The impact of wind power projects on residential property values in the United States: A multi-site hedonic analysis (No. LBNL-2829E). Lawrence Berkeley National Lab. (LBNL), Berkeley, CA (United States). <https://www.osti.gov/servlets/purl/978870>.



VII. Conclusion

The economic benefits provided and enabled by the Aroostook Renewable Gateway are significant. Cumulatively, the Gateway and enabled benefits stemming from the development renewable energy projects in northern Maine represent one of the largest investments in the region's history that will have a direct, positive impact on the region and state and shorten the path to future investments in northern Maine. The Project will provide relief to electricity ratepayers across the state, leaving more money in the pockets of households to spend in other areas of the economy supporting jobs, and to reduce the costs of business that will help enhance their competitiveness. The Project will make significant progress towards state climate policy goals that require 80 percent of the state's retail electricity be provided by renewable resources and reducing greenhouse gas emissions by 45 percent – within the next decade (2030). The Project also directly responds to the NMRDP Act's stated objectives, including expanding and providing opportunities for the state's clean energy workforce, advancing economic development, and promoting energy equity. The benefits discussed in this analysis are contained to the life of the project contract period. Yet, the benefits resulting from Gateway will likely extend far beyond.



VIII. Appendix

A. About the Author

The principal investigator and primary author of this report is Dr. Ryan Wallace, Principal of Wallace Economic Advisers, LLC. Dr. Wallace provides specialized economic consulting services in the energy and electric sectors to private sector stakeholders and policymakers. He has provided independent economic analysis and modeling for dozens of renewable energy and/or transmission related projects in Maine in support of permitting, regulatory, or legislative proceedings and is trusted by industry leaders as a subject matter expert. Dr. Wallace was lead author of the Economic and Employment Contributions of the New England Clean Energy Connect in Maine (as well as an analogous study for New England) and provided expert witness testimony in Maine Public Utilities Commission regulatory proceedings for this project (case docket 2017-00232). Until December 2022, Dr. Wallace served as the director of the Maine Center for Business and Economic Research (CBER) at the University of Southern Maine (USM), as an appointed member of the Maine State Revenue Forecasting Committee, and on the advisory board of the Federal Reserve Bank of Boston's New England Public Policy Center. He earned a PhD in Regional Planning from the University of Massachusetts Amherst where he was a National Science Foundation Offshore Wind Energy IGERT Fellow and Associate, and holds a baccalaureate degree in finance from Bentley University.



B. Detailed Tables

Table 11: Employment and Wage and Salary Impacts by Industry during Development and Construction

Industry Sector	Employment		Wages and Salaries	
	Annual Average	Total	Annual Average	Total
Forestry, fishing, and hunting	0	2	\$0.01	\$0.05
Mining	0	1	\$0.01	\$0.03
Utilities	1	4	\$0.09	\$0.52
Construction	404	2,421	\$17.94	\$107.64
Manufacturing	18	106	\$1.44	\$8.64
Wholesale trade	8	50	\$0.91	\$5.43
Retail trade	37	220	\$1.76	\$10.58
Transportation and warehousing	10	58	\$0.49	\$2.96
Information	1	7	\$0.11	\$0.66
Finance and insurance	2	11	\$0.24	\$1.43
Real estate and rental and leasing	17	101	\$0.24	\$1.42
Professional, scientific, and technical services	51	304	\$3.08	\$18.48
Management of companies and enterprises	(0)	(1)	\$0.04	\$0.22
Administrative, support, waste management, and remediation services	18	105	\$0.76	\$4.58
Educational services; private	2	14	\$0.12	\$0.69
Health care and social assistance	45	267	\$3.27	\$19.59
Arts, entertainment, and recreation	10	63	\$0.26	\$1.58
Accommodation and food services	20	122	\$0.82	\$4.91
Other services (except public administration)	22	131	\$0.74	\$4.43
Total Private Non-Farm	664	3,986	\$32.3	\$193.8
State and Local Government	38	226	\$2.3	\$14.0
All Industries	686	4,115	\$34.7	\$208.1

Note: Employment reported as full-time equivalents (FTEs). Includes induced employment in state and local government. Currency reported in millions of fixed local 2023 dollars.



Table 12: Employment Impacts by Industry during Operations and Maintenance

Industry Sector	Annual Average	Total
Forestry, fishing, and hunting	(0)	(0)
Mining	0	0
Utilities	5	120
Construction	3	82
Manufacturing	1	22
Wholesale trade	1	14
Retail trade	2	53
Transportation and warehousing	1	28
Information	0	2
Finance and insurance	0	1
Real estate and rental and leasing	1	25
Professional, scientific, and technical services	1	31
Management of companies and enterprises	(0)	(1)
Administrative, support, waste management, and remediation services	2	48
Educational services; private	0	4
Health care and social assistance	3	68
Arts, entertainment, and recreation	1	16
Accommodation and food services	2	38
Other services (except public administration)	1	28
State and Local Government	4	110
All Industries	23	579

Note: Employment reported as full-time equivalents (FTEs). Includes induced employment in state and local government.