

5.0 PROJECT BENEFITS

5.1 Economic Benefits

To characterize and evaluate the economic development impacts resulting from the construction and ongoing operation of the 1,000 MW Clear River natural gas-fired combined cycle generation facility, Invenergy retained the services of Professor Edinaldo Tebaldi and PA Consulting Group (“PA”).

Dr. Tebaldi is an associate professor of economics at Bryant University. He also serves as the Rhode Island forecast manager for the New England Economic Partnership (NEEP). He is an applied econometrician with research interests in economic growth, development, and labor market outcomes. Dr. Tebaldi has published several articles in refereed journals and co-authored a number of economic impact assessment studies and reports analyzing economic conditions across New England States.

PA’s Global Energy & Utilities practice regularly performs power market analyses and evaluates the economics of power generating assets across the U.S., including the New England power market. PA understands the economic development considerations associated with power generation investment and utility power procurement, and has used input-output models to evaluate the economic impacts driven by such decisions.

This subsection introduces the methodology and projected impacts on employment, wages, and the overall economy in Rhode Island and the surrounding area.

5.1.1 Overview

As is typically the case with generation facilities, Clear River will drive significant economic impacts in the State of Rhode Island. Economic development impacts associated with the Project will result from the following three areas:

1. Construction of the facility – Equipment, materials, and labor employed during construction as well as state sales tax, permitting fees, and other activities.
2. Ongoing operation of the facility – Fixed and variable costs associated with the materials and labor needed to operate the facility as well as annual property taxes.
3. Power market cost savings to Rhode Island ratepayers – The addition of new efficient generation capacity in Rhode Island will result in lower capacity and power prices in the near term, thereby driving significant savings to Rhode Island ratepayers during the plant’s early years. From 2019-2022, cumulative savings to the Rhode Island customer are projected to be greater than \$280 million, or approximately \$70m annually. PA has evaluated the induced economic effects on the Rhode Island economy associated with these near-term electricity customer cost savings.

5.1.2 Methodology

To estimate the magnitude of the resulting economic impacts, this study uses input-output (I-O) analysis. I-O analysis accounts for inter-industry relationships within a city, state, or expanded area, and employs the resulting economic activity multipliers to estimate how the local economy will be affected by a given investment (in this case the construction and ongoing operation of the 1,000 MW Clear River facility).

Multiplier analysis is based on the notion of feedback through input-output linkages among firms and households who interact in regional markets. Firms buy and sell goods and services to other firms and pay wages to households. In turn, households buy goods from firms within the economic region. Thus, the economic impact of Clear River spreads to other local businesses through direct purchases from them as well as from purchases of locally produced goods and services, which arise from the income derived by the employment that is created. Further impacts occur because of feedback

effects – where other local firms require more labor and inputs to meet rising demand for their output, which has been stimulated by Clear River construction and operation.

The economic impact of Clear River construction and operation can be categorized as follows:

1. Direct Effects – Jobs, income, output and fiscal benefits that are created directly by the construction and ongoing operations of Clear River. The jobs (and other benefits) that are created may be short-term, as in the case of construction jobs, or long-term, such as the operations and maintenance positions that exist throughout the life of the generation facility.
2. Indirect Effects – Jobs, income, output and fiscal benefits that are created throughout the supply chain and that are spawned by the direct investment to build and operate the facility. Indirect jobs include the jobs created to provide the materials, goods, and services required by the construction and operation of Clear River, as well as the jobs created to provide the goods and services paid for with the wages from the direct jobs.
3. Induced Effects – Jobs, earnings, and output and fiscal benefits created by household spending of income earned either directly from Clear River or indirectly from businesses that are impacted by Clear River.

There is significant complexity involved in the calculation of these effects, particularly in the calculation of the indirect and induced effects, but comprehensive estimates of economic impacts require all three. These estimates are also sensitive to the set of assumptions considered in the study, principally assumptions regarding the leakage of economic activity outside the state. In addition, a series of variables, including changes to the price of electricity, will influence the multiplier benefit analysis and therefore have been considered in tandem to assess the true contribution of Clear River to the Rhode Island economy.

5.1.2.1 Input-Output Models Employed

The job creation, earnings, and overall economic impact of Clear River on Rhode Island have been analyzed using project cost specifics and two input-output models: IMPLAN and the National Renewable Energy Lab's Jobs and Economic Development Impact model (JEDI).

IMPLAN is an economic analysis tool that takes data from multiple government sources and employs an estimation method based on industry accounts or Input-Output Matrix that allows using multipliers to make estimations of how changes in income and spending impact the local economy. IMPLAN estimates are generated by interacting the direct economic impact of Clear River with the Regional Input-Output Modeling System (RIMS II) multipliers for Rhode Island. The U.S. Bureau of Economic Analysis (BEA) provides these multipliers.

The Jobs and Economic Development Impact (JEDI) model estimates the economic impact of constructing and operating power generation plants at the state level. The JEDI model also uses an input-output methodology and was built utilizing economic data from IMPLAN. The JEDI model allows estimating of the economic impact of power generation investment in a state including local labor, services, materials, other components, fuel, and other inputs. The model also allows adjusting the portion of project investment that occurs locally.

5.1.2.1 Modeling Assumptions

As discussed above, the JEDI and IMPLAN estimates are sensitive to the set of assumptions utilized in the model, particularly the portion of project investment that occurs locally (local share). Through local share percentages, the model allows accounting for the leakage of economic activity outside the state's border. Table 5.1-1 presents the local shares for the construction phase that were used to estimate the economic impact of Clear River on Rhode Island only. These parameters are consistent with those utilized in other similar studies and were adjusted to match Rhode Island's specific conditions. For instance, 100 percent of the spending with turbines

(power generation) is paid to vendors outside Rhode Island. On the other hand, the model assumes that 87% of the construction labor required to construct the facility will be sourced from within Rhode Island.

**Table 5.1-1:
Local Share – Construction Phase**

Item	Local Share
Facility and Equipment	
Power Generation	0%
General facilities	75%
Plant Equipment	5%
Labor and Management	
Construction Labor	87%
Project management (construction and owner's)	16%
Others	
Engineering/Design	17%
Construction insurance	0%
Land	100%
Permitting Fees	100%
Grid intertie	25%
Spare Parts	5%
Sales Tax (Materials & Equipment Purchases)	100%

Table 5.1-2 provides the local shares utilized to calculate the economic impact of the ongoing operation of the Clear River facility. It is worth noting that 100% of the spending on natural gas fuel (the commodity itself) will be paid to vendors outside Rhode Island. However, it is also worth noting that 100% of the labor and 85% of the services, two major sources of ongoing spending and investment for a generation facility, are assumed to be sourced from State of Rhode Island business.

**Table 5.1-2:
Local Share – Operations and Maintenance Phase**

Item	Local Share
Fixed Costs	
Labor	100%
Materials	25%
Services	85%
Variable Costs	
Water	100%
Catalysts & chemicals	85%
Fuel Cost	0%

The economic impact analysis also incorporates power market cost savings to Rhode Island ratepayers. The addition of new efficient generation capacity in Rhode Island will result in lower

capacity and power prices for Rhode Island ratepayers in the near term, thereby driving significant savings to Rhode Island ratepayers during the plant's early years. These power market cost savings were determined by comparing Rhode Island's portion of energy and capacity market costs under modeling scenarios completed 1) with Clear River at 1,000 MW-net, and 2) without Clear River.

5.1.3 Economic Development Impacts

The construction, ongoing operation, and near-term ratepayer savings resulting from the Project will create jobs and drive significant economic development, both in Rhode Island and throughout the Northeast region.

The estimates in this section include the direct, indirect, and induced impacts of Project construction, ongoing operation, and ratepayer bill savings on Rhode Island's economy.

5.1.3.1 Economic Impacts – Rhode Island Only

To evaluate the economic impacts of Clear River within Rhode Island, input-output analysis was completed according to the local share percentages introduced in Section 5.1.2.1.

Table 5.1-3 reports the direct annual job creation and earnings of Clear River on the State of Rhode Island. It shows that construction of Clear River is expected to generate 388 jobs in 2017 and 492 jobs in 2018. Facility operations will create 25 onsite (direct) jobs and approximately \$2 million in earnings annually from 2020 through 2034. Note that the figures in Table 5.1-3 do not include the jobs and earnings associated with the contractors and service professionals that will be involved in the regular operation and maintenance of the facility. These indirect impacts of Clear River are included in Table 5.1-4.

**Table 5.1-3:
Economic Development – Direct Impact, Rhode Island, 2016-2034**

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Direct Employment Impact (FTEs per year)																			
Construction Period	26	388	492	129	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Facility Operations	0	0	0	15	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Direct Earnings Impact (\$ - millions)																			
Construction Period	4.5	68.5	88.7	23.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Facility Operations	0.0	0.0	0.0	1.0	1.7	1.7	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.3

Table 5.1-4 reports the total (*direct, indirect, and induced*) annual job creation, earnings, and overall economic impact of Clear River on the State of Rhode Island. It is important to note that the most significant economic impacts will be realized in the early years of the Project: the construction of Clear River facility will bring significant investment and construction activity to Rhode Island from 2016 to 2019, and the first four years of operation will produce substantial energy and capacity cost savings to customers.

**Table 5.1-4:
Economic Development - Results Summary, Rhode Island Only, 2016-2034**

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Employment Impact (FTEs per year)																			
Construction Period	49	734	930	245	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Facility Operations	0	0	0	85	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145
Cost Savings to Customer	0	0	0	498	733	419	159	0	0	0	0	0	0	0	0	0	0	0	0
Total Employment Impact	49	734	930	827	878	564	304	145	145	145	145	145	145	145	145	145	145	145	145
Earnings Impact (\$ - millions)																			
Construction Period	5.9	90.7	117.4	31.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Facility Operations	0.0	0.0	0.0	6.6	11.5	11.8	12.0	12.3	12.6	12.8	13.1	13.4	13.7	14.0	14.3	14.6	14.9	15.3	15.6
Cost Savings to Customer	0.0	0.0	0.0	26.3	39.5	23.5	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Earnings Impact	5.9	90.7	117.4	64.5	51.1	35.3	21.0	12.3	12.6	12.8	13.1	13.4	13.7	14.0	14.3	14.6	14.9	15.3	15.6
Economic Output (\$ - millions)																			
Construction Period	8.9	137.1	177.4	47.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Facility Operations	0.0	0.0	0.0	18.1	31.8	32.5	33.2	33.9	34.7	35.5	36.2	37.0	37.8	38.7	39.5	40.4	41.3	42.2	43.1
Cost Savings to Customer	0.0	0.0	0.0	75.3	113.2	66.1	25.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Economic Output	8.9	137.1	177.4	141.2	145.0	98.6	58.9	33.9	34.7	35.5	36.2	37.0	37.8	38.7	39.5	40.4	41.3	42.2	43.1

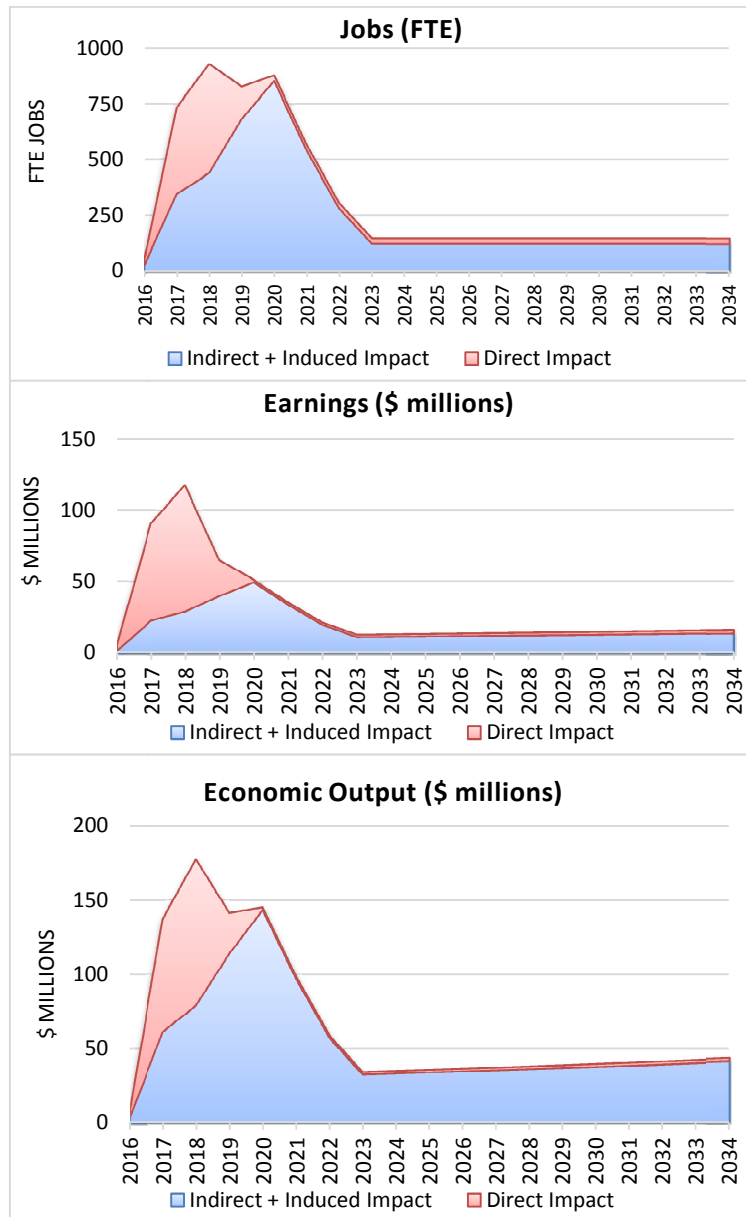
In summary, the job creation, earnings, and overall economic impact of the Project on the State of Rhode Island are projected as follows:

- **Rhode Island jobs** – From 2017-2021, which includes the most intense two years of construction and the first years of operation, Clear River will support the creation of just under 800 full-time jobs per year. The construction and operation of Clear River alone – i.e. not including the electricity cost savings to the customer – will create an average of more than 660 full-time jobs per year from 2017-2019 and 145 full-time jobs per year from 2020 to 2034 in Rhode Island.
- **Rhode Island earnings** – From 2017-2021, Clear River will support the creation of approximately \$360 million in earnings to Rhode Island workers, or more than \$70 million per year. Earnings to Rhode Island employees as a result of Clear River will total more than \$550 million from 2016-2034.
- **Rhode Island economic output** – From 2017-2021, the total economic impact on Rhode Island is projected to be \$700 million, or approximately \$140 million per year. The overall impact of Clear River on the Rhode Island economy will total more than \$1.2 billion from 2016-2034, or an average of \$65 million annually.

Figure 5.1-1 provides a breakdown of the direct impacts versus the indirect and induced impacts of Clear River construction and ongoing operations.

The direct economic impacts themselves will be significant, realized in the form of jobs, income, output and benefits created directly by the construction and ongoing operations of Clear River. In addition, Clear River will generate significant economic activity in Rhode Island through input-output linkages among firms and households who are affected by its construction and operations. From 2016-2034, the indirect and induced economic impact of Clear River on the Rhode Island economy will total \$990 million, approximately 80% of the total output creation.

**Figure 5.1-1:
Direct vs Indirect/Induced Economic Impacts – Rhode Island Only**



Similarly, approximately 61% of the \$550 million in earnings that Clear River will generate in the state from 2016 to 2024 will be indirect and induced earnings, and the jobs chart demonstrates that 76 percent of the jobs supported by Clear River will be induced and indirect jobs. Overall, the impact estimates suggest that Clear River operation and demand for local services and materials will have a significant multiplier effect on the state economy. This multiplier effect will be particularly strong for output creation.

5.1.3.2 Economic Impacts - Rhode Island and Surrounding Region

Significant economic impacts will accrue outside of Rhode Island as well. Project needs that cannot be met within Rhode Island – most notably generation equipment that is not currently

manufactured within the state – will drive job creation and economic development in surrounding states. To evaluate the economic impacts of Clear River on Rhode Island and the surrounding region, input-output analysis was completed with all local share percentages introduced in Section 5.1.2.1 set to 100% except for fuel, which was kept at 0%. In other words, this scenario is designed to evaluate the approximate the economic impact of the construction and ongoing operation of Clear River on Rhode Island and the surrounding region, but excludes the U.S. impact associated with ongoing natural gas procurement.

Table 5.1-5 presents the impact estimates of the plant on the economy as a whole.

**Table 5.1-5:
Economic Development Results Summary, RI and Surrounding Region, 2016-2034**

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Employment Impact (FTEs per year)																			
Construction Period	154	2306	2921	769	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Facility Operations	0	0	0	253	433	433	433	433	433	433	433	433	433	433	433	433	433	433	433
Cost Savings to Customer	0	0	0	498	733	419	159	0	0	0	0	0	0	0	0	0	0	0	0
Total Employment Impact	154	2306	2921	1519	1166	852	592	433	433	433	433	433	433	433	433	433	433	433	433
Earnings Impact (\$ - millions)																			
Construction Period	32.7	501.0	648.6	174.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Facility Operations	0.0	0.0	0.0	16.6	29.2	29.8	30.5	31.1	31.8	32.5	33.2	34.0	34.7	35.5	36.2	37.0	37.9	38.7	39.5
Cost Savings to Customer	0.0	0.0	0.0	26.3	39.5	23.5	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Earnings Impact	32.7	501.0	648.6	217.4	68.7	53.3	39.4	31.1	31.8	32.5	33.2	34.0	34.7	35.5	36.2	37.0	37.9	38.7	39.5
Economic Output (\$ - millions)																			
Construction Period	33.6	515.2	667.0	179.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Facility Operations	0.0	0.0	0.0	69.8	122.3	125.0	127.7	130.5	133.4	136.3	139.3	142.4	145.5	148.7	152.0	155.4	158.8	162.3	165.8
Cost Savings to Customer	0.0	0.0	0.0	75.3	113.2	66.1	25.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Economic Output	33.6	515.2	667.0	324.5	235.4	191.0	153.4	130.5	133.4	136.3	139.3	142.4	145.5	148.7	152.0	155.4	158.8	162.3	165.8

Excluding the significant U.S. jobs impact associated with ongoing natural gas procurement, the economic impact of the plant on the economy as a whole (this time not limited to Rhode Island) is projected as follows:

- **Jobs:** The Project will support an average of approximately 770 full-time jobs per year from 2016-2034, with an average of approximately 1,750 full-time jobs created annually from 2017-2021, the most intense two years of construction and the first years of operation.
- **Earnings:** The Project will create nearly \$2 billion in total earnings from 2016-2034.
- **Economic Output:** The Project will generate approximately \$3.9 billion in total economic output from 2016-2034.

Figure 5.1-2 provides a breakdown of the direct impacts versus the indirect and induced impacts of Clear River construction and ongoing operations. The direct impacts are fairly similar in magnitude to those in the Rhode Island only analysis because most direct economic effects from the facility are realized within the state, but the total output is approximately three times as large and the indirect and induced impacts account for a much larger percentage of the economic impacts in this case.

**Figure 5.1-2:
Direct vs Indirect/Induced Economic Impacts – Rhode Island and Surrounding Region**

