Salem and Hope Creek Nuclear Power Plants' Contribution to the New Jersey and Local Economies

PREPARED FOR

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Notice

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Executive Summary

At the request of Public Service Enterprise Group (PSEG), we have estimated the economic impact of the Salem and Hope Creek nuclear plants at the state and selected county level. These counties include Salem, where the plants are located, and several surrounding counties where plant employees reside and the plants purchase substantial goods and services. Similar to our 2017 Study regarding the contribution of these plants to the state economy,[1] we account for the changes in electricity price and generation that would occur if these plants were to close (relying on estimates developed in conjunction with our 2017 Study), and measure associated changes to gross domestic product (GDP) and employment using a well-known macroeconomic model at the state and county level. We measure these changes by comparing the state and local economies with vs. without these nuclear plants.

Our analysis determined that in 2021 through 2030, the Salem and Hope Creek plants would:

- Contribute approximately $1.2 billion annually to the New Jersey state GDP on net, including $1.2 billion in Salem County, $57 million in surrounding counties, and a loss of $38 million in the rest of the state. Contribute another $171 million GDP in Delaware's New Castle County.
- Account for 4,530 in-state jobs (direct and secondary) including 3,990 jobs in Salem County, 490 jobs in surrounding counties, and 1,670 jobs in Delaware.
- Pay $54 million annually in New Jersey state taxes and $9 million annually in Delaware state taxes.

The majority of the GDP and jobs impact of the plants is a direct result of nuclear plant operations. A secondary factor, accounting for 15% to 20% of the overall impact, is the influence these nuclear plants have on electricity prices. By helping to keep electricity prices lower, the plants provide a further economic boost. We estimate that New Jersey consumers would pay $176 million less annually for electricity with these plants operating than if they were to retire, even after

[1] Mark Berkman and Dean Murphy, "Salem and Hope Creek Nuclear Plants' Contribution to the New Jersey Economy," November 2017 (the "2017 Study").

accounting for the cost of the ZEC program, based on the electricity cost analyses from our 2017 study.[2,3]

The modest GDP loss in the rest of New Jersey reflects a projection that some lost nuclear generation would be made up by increased reliance on existing gas-fired power plants in the short run and by the construction of some new natural gas fired capacity in New Jersey in the latter part of the decade. This does not account for barriers that new gas-fired capacity may face from increased environmental regulations and gas pipeline constraints. If no new gas generation were developed in-state to offset the nuclear loss, the nuclear plants' contribution would be slightly higher, at $1.257 billion to GDP ($1.168 billion in Salem County, $25 million in the surrounding counties, and $64 million in the rest of the State), and would account for 4,940 jobs. No region would experience a GDP or employment loss.

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[2] The 2017 Study calculated average annual gross electricity cost savings of about $400 million (for 2018-2027, in 2017 dollars; adjusting for the 2021-2030 study horizon here and 2020 dollars, this is $414 million). The gross savings estimate of the 2017 study did not net out nuclear support costs, since no program to support the nuclear plants had been proposed at the time, though that study did identify the need to subtract support costs to estimate net savings. The present study does net out ZEC costs, using 2019-2020 ZEC payments as a proxy for future years, at $238 million on average over 10 years (we have not analyzed what level of ZEC support may be necessary to retain these plants). The ZEC cost reduces estimated electricity cost savings to a net value averaging $176 million per year over the horizon. Also, it is important to note that while reductions in wholesale electricity prices can benefit consumers, the offsetting impact on producer revenues must also be considered to determine whether they improve total social welfare. Our analysis of economic impacts—GDP, jobs, and tax revenues—accounts for the producer revenue impacts.

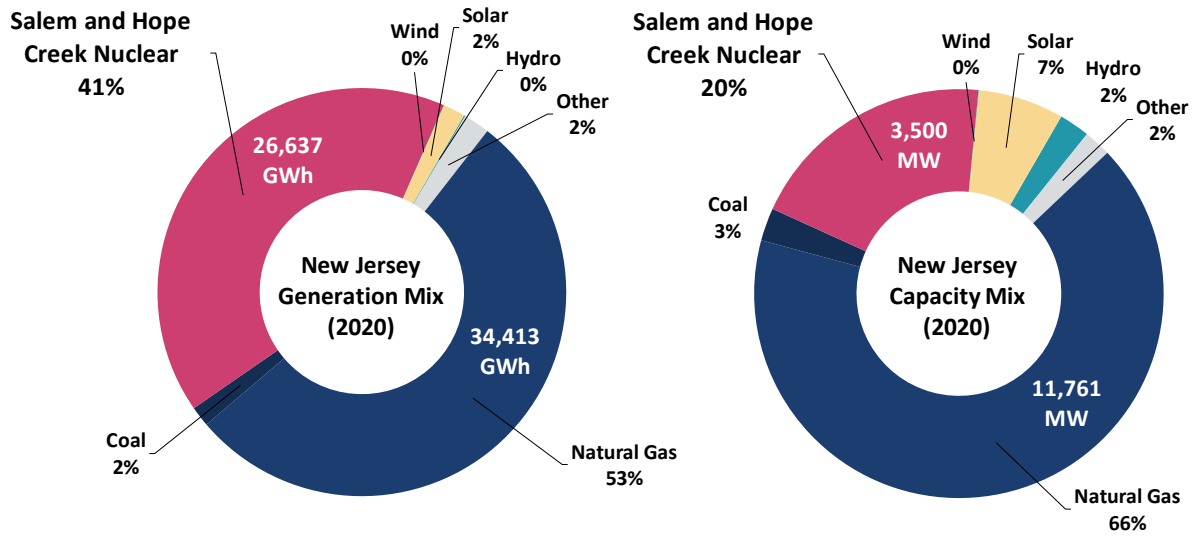
[3] In using the 2017 Study, we implicitly assume that PJM's newly expanded Minimum Offer Price Rule (MOPR) would not prevent the plants from clearing the capacity market. If it did, the electricity cost savings attributable to the plants could be lower or even reversed. We have not analyzed the effect of the MOPR on these plants' participation in the capacity market, nor how that could change with evolving market conditions and ongoing regulatory discussions about MOPR.

Background

Two nuclear power plants, comprising three nuclear reactors, operate in Salem County New Jersey. The Salem Nuclear Power Plant consists of two pressurized water reactors; Units 1 and 2 are licensed to operate until 2036 and 2040, respectively. The Hope Creek Nuclear Generating Station, a single-unit boiling water reactor, is licensed to operate until 2046. The plants are adjacent to one another in Salem County, NJ, about 30 miles south of Wilmington, Delaware. These plants account for 3,500 MW of capacity and almost 27 million MWh of annual generation.

New Jersey is a part of the PJM Interconnection, the electric region operated by the PJM independent system operator. PJM encompasses much more than just New Jersey, both geographically and electrically; New Jersey accounts for about 10% of PJM's total generation and load. Within New Jersey itself, these two nuclear power plants represent a very large share of generation and capacity at 41% and 20%, respectively, as illustrated in Figure 1.

Figure 1: New Jersey Electricity Generation and Capacity Shares by Fuel

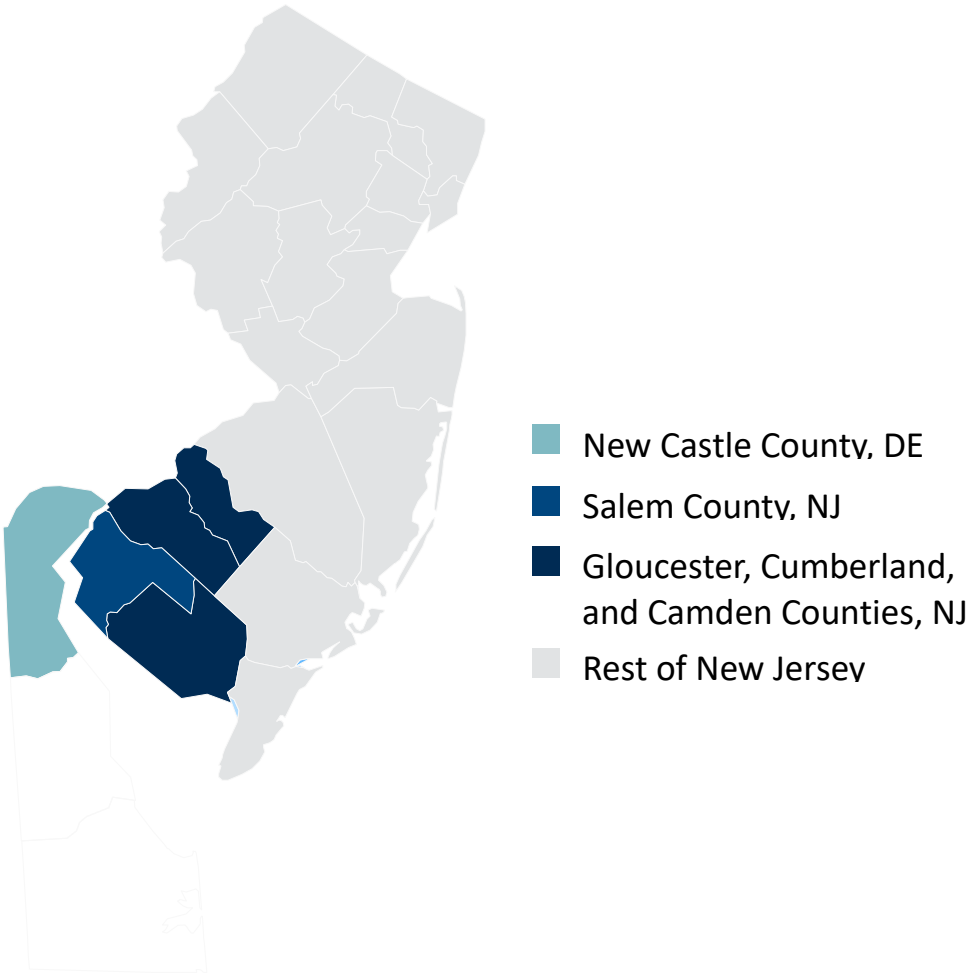


Sources and Notes: EIA Form 923, via Velocity Suite, ABB Inc. Generation is 2019 historical; capacity is as of September 2020.

The Salem and Hope Creek plants are important sources of economic activity in Salem County and the neighboring counties of Gloucester, Cumberland, and Camden, as well as New Castle County in Delaware (see Figure 2 below).

According to PSEG, the plants employ 1,605 workers directly and contracts on average another 500.[4] The contract figure varies depending on whether scheduled outages are underway for maintenance and refueling; it can be as high as 913 in outage months. Thirty six percent of plant workers reside in Salem County, 34 percent live in Gloucester, Cumberland or Camden counties, and another 16 percent live in New Castle County, Delaware. The plants also purchase goods and services totaling over $76 million annually from businesses in these and other New Jersey Counties. About 40 percent of this is spent in Salem, Gloucester, Cumberland, and Camden Counties, with 16 percent spent in New Castle County, Delaware. The remainder is spent in other New Jersey counties and in Pennsylvania.[5]

Figure 2: Study Area



[4] The majority of the plant employees (1,427) reside in New Jersey and Delaware. Most of the others reside in Pennsylvania (133).

[5] Spending does not include other expenditures outside the region including fuel and equipment.

New Jersey's Salem and Hope Creek Nuclear Plants Make a Considerable Contribution to the State and Local Economies

We have estimated the economic value of the Salem and Hope Creek plants to the state of New Jersey and the four smaller regions noted above: 1) Salem County; 2) New Jersey counties of Gloucester, Cumberland and Camden; 3) the rest of New Jersey; as well as 4) New Castle County in Delaware. We utilize REMI, a widely-used regional economic model,[6] and our analysis covers the period 2021–2030. The economic impact of these two plants on New Jersey occurs through two main channels. First, primarily at the local level, there are substantial impacts driven by the plants' contributions to direct and indirect employment in the surrounding region and elsewhere in the state. Salem and Hope Creek employ 1,605 workers annually, plus another 500 on average through contracts for professional services such as engineering and for a wide range of goods and services. These jobs in turn generate additional indirect jobs in the area by increasing the local demand for goods and services and spending by employees.

A second and smaller effect, accounting for only 15-20% of the jobs and GDP benefits, is the impact the nuclear plants have on electricity prices. Electricity costs are lower for New Jersey consumers with the nuclear power plants operating than they would be without them, even after accounting for Zero Emissions Certificate (ZEC) payments to support the plants.[7] The absence of the Salem and Hope Creek plants would increase wholesale prices for energy and capacity in the region, since it would reduce the available supply of both (more costly plants would need to operate, setting higher energy prices; although the nuclear plants' capacity would not need to be replaced immediately, their absence would diminish the current capacity surplus, raising capacity prices). Higher wholesale prices translate directly into higher retail prices and customer costs in a restructured state like New Jersey, and the price increase caused by the loss of the plants is larger than the ZEC cost of maintaining them. That is, even after accounting for the offsetting cost of the ZEC support, power costs for consumers are lower with the nuclear plants operating.

Because the electricity price effect accounts for a relatively small share of the plants' overall GDP and employment impacts (about 15% and 20%, respectively), we judged that it was sufficient to

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6 For more details on the REMI model, see www.remi.com. The version of the model employed here reflects a recent macroeconomic forecast from the University of Michigan's Research Seminar in Quantitative Economics (RSQE), https://lsa.umich.edu/econ/rsqe.

7 The New Jersey legislature established the ZEC program to compensate nuclear generators for their carbon-free generation and prevent their premature closure.

rely on the electricity market analyses that were done in conjunction with the 2017 Study.[8] This approach implicitly assumes that recent expansions of PJM's MOPR would not prevent the plants from clearing in the PJM capacity market, such that capacity prices would be lower with the nuclear plants operating than if they retired. If the plants remained online but failed to clear the capacity market, capacity prices with the nuclear plants operating could be as high as if they were retired, diminishing and possibly even reversing the overall reduction we have estimated for consumer electricity costs. Beyond the MOPR, other factors such as potential future regulatory or legislative actions could affect the treatment of state-subsidized resources, influencing capacity markets and prices. Recognizing the numerous factors that might affect how the nuclear plants influence electricity prices, this study does not attempt to resolve these uncertainties, but adopts the 2017 Study results as a reasonable estimate of the electricity price impacts of these nuclear plants.

The electricity market analysis characterizes the effects of these two nuclear power plants on power prices, power costs to consumers, power plant revenues, and new plant construction activity. These power sector impacts then become part of the inputs to the REMI economic model. This approach allows us to develop an accurate picture of the plants' incremental contribution to the economy, in terms of economic output, employment, and tax revenues.

We analyze the power sector and the economy both with and without the Salem and Hope Creek plants, to determine the economic effects attributable to them. Our analysis indicates that keeping these two plants operating will keep electricity costs lower in New Jersey, even after accounting for ZEC payments that support plant operations in recognition of their contribution to greenhouse gas reduction. The primary contributor to economic impact is the productive economic activity associated with plant operations. Even after netting out the economic contribution of the alternative electric generation that would substitute for them in their absence (some of which may be in New Jersey), these two nuclear power plants are responsible for a positive GDP impact of millions of dollars annually, and accompanying employment and tax revenue effects (they also avoid significant environmental costs, as discussed later).

Our analysis shows that the Salem and Hope Creek plants on net are responsible for $1.2 billion in annual state GDP and 4,530 jobs in New Jersey. Adding New Castle County Delaware increases

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[8] We reviewed the assumptions used in the 2017 analyses and determined that expected natural gas prices are considerably lower now than they were at the time of the 2017 analysis, and gas prices can be a primary driver of electricity prices overall. While the 2017 Study showed that in the range of low gas prices, the particular level of gas price had little effect on how the New Jersey nuclear plants affect regional electricity prices, we have based our current economic analyses on the electricity price impacts found in the 2017 Low Gas Price Case, since current gas prices are more comparable to the Low Gas Price Case of the 2017 Study than to the Base Case. *See* Mark Berkman and Dean Murphy, "Technical Appendix: Salem and Hope Creek Nuclear Power Plants' Contribution to the New Jersey Economy," November 2017. This Technical Appendix, and the 2017 Study itself, give additional detail on the electricity market analysis.

the annual GDP impact to $1.4 billion and jobs impact to 6,200. These job figures represent not only the direct jobs at the plants, which total 1,427 in New Jersey and Delaware, but indirect jobs elsewhere in region.[9] Much of the GDP and jobs effect is indirect, based in part on the demand for goods and services by the plants rather than resulting from economic activity that is directly associated with the plants themselves. Because every sector of the economy depends on electricity, the power price effect is widespread with respect to economic sectors, thus contributing to the substantial overall impact. As found in our 2017 Study, one of the contributors to the gross economic impact of the New Jersey nuclear plants is how they affect electricity costs.[10] Electricity prices are lower with the nuclear plants operating than they would be without the plants, and power prices have further impacts on economic activity throughout the economy.

The owners of these two nuclear power plants also pay significant federal and state taxes, as do businesses providing goods and services to the plants and their employees. In addition, the plants' incremental contributions to the state's economy account for additional tax revenues to state and local governments—considerably more than the direct taxes paid by the plants. The effect of these two nuclear power plants on the New Jersey economy leads to about $54 million in incremental state tax revenues and $146 million in federal tax revenues, beyond the tax revenues that would be available in their absence. The plants contribute another $9 million in Delaware state tax revenues.

Below, we provide further detail regarding the impact of the Salem and Hope Creek plants by region on:

- The electricity generation mix
- The price and cost of electricity
- Economic output and GDP
- Employment
- Federal and state tax revenues

A. Impact on Electricity Generation and Price

With the Salem and Hope Creek plants operating, New Jersey is a modest net importer of power, producing slightly less than it consumes. Without these nuclear plants, the state would become a significant net importer of power, relying on out-of-state sources for over a third of its aggregate

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[9] As discussed above, we estimate the contributions of the plants by comparing the economy with and without the plants. In the absence of these nuclear plants, other sources of power will be utilized, and so the additional jobs supported by these other sources of power must be netted against the nuclear plant employment impacts. This is discussed further below.

[10] Mark Berkman and Dean Murphy, "Salem and Hope Creek Nuclear Plants' Contribution to the New Jersey Economy," November, 2017.

electricity needs. The missing nuclear generation would be replaced by increased reliance on natural gas and coal-fired generation.[11] Some of this would come from in-state sources, but the large majority would be imported from other states.[12]

The other mechanism through which the nuclear plants affect the economy is by keeping the price of electricity lower, which leaves residential, commercial, and industrial consumers with more money to spend and invest in other ways; this boosts jobs, output, and the overall economy. Lack of nuclear supply would increase wholesale energy and capacity prices, causing higher electricity prices for customers in New Jersey and across PJM. As shown in Table 1, average power prices in New Jersey are estimated to be about $2.19/MWh higher without these two nuclear power plants, even after netting off the cost of ZEC support for the plants. Because the PJM-East region that includes New Jersey needs its own local generating capacity, the loss of the large amount of capacity from these plants would cause a notable increase in capacity prices within this region.[13] (There is currently a modest capacity surplus in PJM-East; the loss of these two plants would eliminate much of that surplus in the near term, raising capacity prices.) The overall average price effect in PJM as a whole is considerably smaller at $0.99/MWh, again accounting for the impact of ZEC cost (within New Jersey).

This $2.19/MWh price increase in New Jersey translates to about $1.62 per month for a typical residential ratepayer; across all New Jersey consumers, this represents an increase of $176 million per year in electricity costs. Again, these values already account for the cost of the ZEC support for the plants, and so they reflect the full net effect on electricity consumers. While the cost of the ZEC program to support the nuclear plants offsets part of their power price impact, the net effect is still that New Jersey consumers pay less in total for electricity with the plants operating.

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[11] Although the emissions impact of the nuclear plants is not a focus of this study, losing the nuclear plants and replacing their output with fossil generation will of course cause a massive increase in CO_2 emissions, as well as emissions of SO_2, NO_x, and particulates. The value of the emission offsets attributable to the nuclear plants is not included in the economic impacts calculated in this study – it is in addition to these impacts. It is very unlikely that a meaningful share of the lost nuclear power could be replaced by non-emitting renewable generation in the near term, since doing so would require massive additions of new renewable generation, above and beyond New Jersey's already very ambitious renewable goals.

[12] New Jersey is part of the large, multi-state PJM power market, which dispatches generators to serve load without regard to state boundaries. In normal power system operation, the most economic available generation is used to meet load. If the nuclear plants are absent, the next most economical source of generation to replace their output will often be outside New Jersey.

[13] As noted above, the status of capacity markets in PJM and New Jersey, and thus potentially the capacity price impact of these plants, is in flux. Our analysis estimates the capacity price impact of the plants based on the economic value of capacity in the region, implicitly assuming the nuclear plants will continue to participate and clear in the capacity market. If this is not the case, e.g., if PJM's MOPR rule prevents the plants from clearing the capacity market, capacity prices would be higher even with the nuclear plants operating; this of course would reduce the power price impact of their retirement.

Table 1: Salem and Hope Creek Plants Avoid Higher Electricity Prices
(All-in Power Price and Cost Differences Due to Salem and Hope Creek Plants, 2020 Dollars)

		10-Year Average Annual, 2021 to 2030				
	% of Utility Load[1]	Gross Power Price Change without Nuclear ($/MWh)[2]	Wholesale Electric Demand (million MWh)	Gross Electricity Cost Change (2020 $ millions)	ZEC Payments (2020 $ millions)[3]	Net Electricity Cost Change (2020 $ millions)
New Jersey Average		**$5.17**	**80**	**$414**	**$238**	**$176**
Residential	39%		31	$162	$93	$69
Commercial/Industrial	61%		49	$253	$145	$107
PJM Average		**$1.28**	**829**	**$1,060**	**$238**	**$821**
Residential	38%		312	$399	$90	$310
Commercial/Industrial	62%		517	$661	$149	$512

Sources and Notes:

[1] Load share by customer class is based on data from 2018, EIA Form 861.

[2] The reported Gross Power Price Change includes energy and capacity cost effects. It does not include any potential impact on transmission costs, customer costs, etc. Power price effects are assumed to be the same, on an average per-MWh basis, for all customer classes in the class allocation reflected here; differences in load shape and billing determinants are not distinguished.

[3] Total ZEC payments for 2019 were $271 million (2020 dollars). The ZEC payment is assumed to remain constant in nominal dollars through the study period. I.e., unlike most other costs, the ZEC does not increase over time with inflation, meaning that it falls over time in real dollar terms. Adjusting for this inflation effect to put ZEC costs on the same basis as electricity costs results in an equivalent annual average ZEC cost over the study horizon of $238 million. That is, $238 million in constant real dollars has the same present value as $271 million in constant nominal dollars.

B. Impact on Economic Activity

We measure the economic impacts of the plants at several geographic levels – the region of interest overall and its sub regions: the state of New Jersey, Salem County, the surrounding counties, the rest of New Jersey and New Castle County Delaware Impacts are measured in terms of GDP, output, and employment. [14] First we present the overall results for the region followed by the New Jersey State and local results. Next we present the impacts in New Castle County, Delaware. More details regarding whether economic activities can be attributed to plant operations, construction and electricity cost savings are presented in Section C and in the Appendix.

[14] Gross economic output is an aggregate measure of total industry sales, which includes sales to final users and intermediate sales to other industries. It is useful in comparing relative impacts across industries. However, summing output across sectors can lead to a form of double counting when the output of one sector is an input of another. GDP, the most widely-used measure of economic performance, reflects value added, which includes industry sales to other industries and to final users, net of the value of purchases from other industries. It removes this double counting and is thus a better measure of the aggregate economic effect

1. Overall Regional Impacts

The Salem and Hope Creek plants account for $1.4 billion in GDP annually and 6,200 direct and secondary jobs accounting for New Jersey and New Castle County Delaware, as shown in Table 2. Direct jobs include those positions necessary for plant operations such as engineers and technicians as well as security and administration. The overall jobs impact occurs in large part indirectly; not necessarily as employment within the nuclear and electricity sectors, but as enhanced secondary employment in other sectors.

Table 2: Summary of Average Annual Impacts in All Regions (2021–2030)

	Salem, NJ	Gloucester, Cumberland, and Camden, NJ	Rest of New Jersey	New Jersey Total	New Castle, DE	**Total**
	[1]	[2]	[3]	[4]	[5]	**[6]**
Gross Economic Output Impact, Direct and Secondary*	$1,875	$100	-$73	$1,902	$298	**$2,201**
GDP Impact, Direct, and Secondary	$1,168	$57	-$38	$1,187	$171	**$1,358**
Employment	3,990	490	50	4,530	1,670	**6,200**

Sources and Notes:

[4]: [1]+[2]+[3]

[6]: [4]+[5]

REMI. GDP and Output in $2020 millions, adjusted with AEO 2020 GDP Deflators through 2019.

* Gross economic output is an aggregate measure of total industry sales, which includes sales to final users and intermediate sales to other industries. It is useful in comparing relative impacts across industries. However, summing output across sectors can lead to a form of double counting when the output of one sector is an input of another. GDP, the most widely-used measure of economic performance, reflects value added, which includes industry sales to other industries and to final users, net of the value of purchases from other industries. It removes this double counting and is thus a better measure of the aggregate economic effect.

Table 3: GDP and Gross Output Impacts by Sector in All Regions (Annual Average Annual Direct and Secondary Impacts in Millions of 2020 Dollars, 2021–2030)

Category	Total
Utilities	$1,087
Construction	$410
Real estate and rental and leasing	$169
Retail trade	$73
Professional, scientific, and technical services	$64
Manufacturing	$63
Wholesale trade	$58
Health care and social assistance	$42
Administrative, support, waste management, and remediation services	$32
Finance and insurance	$0
Other	$201
Gross Economic Output Impact (All Sectors), Direct and Secondary*	**$2,201**
GDP Impact, Direct and Secondary	**$1,358**

Sources and Notes: REMI. Numbers may not sum due to independent rounding. "Other" includes: Transportation and warehousing; Accommodation and food services; Arts, entertainment, and recreation; Educational services, private; Information; Mining, Forestry, fishing, and hunting.

Table 4: Net Employment Impacts by Category in All Regions (Direct and Secondary Impacts, Number of Jobs, Annual Average, 2021–2030)

Category	Total
Construction	2,080
Utilities	1,100
Retail trade	690
Professional, scientific, and technical services	380
Accommodation and food services	370
Health care and social assistance	310
Administrative, support, waste management, and remediation services	290
Real estate and rental and leasing	270
Transportation and warehousing	150
Mining	110
Other	450
Total	**6,200**

Sources and Notes: REMI; Numbers may not sum due to independent rounding. "Other" includes: Manufacturing; Wholesale trade; Arts, entertainment, and recreation; Educational services, private; Information; Finance and insurance; Forestry, Fishing, and hunting.

2. New Jersey Impacts

Table 5 summarizes the net economic impacts at the state and more local levels within New Jersey, accounting for potential additions of natural gas plant capacity in New Jersey (proportional to New Jersey load) that could result if the nuclear plants closed. (Section 7 reviews the impact if this capacity is not actually added) Overall, the Salem and Hope Creek plants contribute almost $1.2 billion annually to state GDP ($1.9 billion in output) and support 4,530 jobs. Much of this impact occurs in Salem County, but the plants contribute to the economies of the neighboring counties with respect to GDP and employment as well. The effects include both direct and secondary economic activity attributable to these plants, netting out the economic activity associated with alternative generation in their absence, to the extent this replacement generation occurs within New Jersey. The net impacts also reflect the electricity price impacts described above. Electricity price savings account for as substantial share of the net employment impacts attributable to the plants.[15]

Table 5: Summary of Average Annual Impacts in New Jersey (2021—2030)

	Salem, NJ	Gloucester, Cumberland, and Camden, NJ	Rest of New Jersey	**NJ Total**
Gross Economic Output Impact, Direct and Secondary*	$1,875	$100	-$73	**$1,902**
GDP Impact, Direct, and Secondary	$1,168	$57	-$38	**$1,187**
Employment	3,990	490	50	**4,530**

Sources and Notes:

REMI. GDP and Output in $2020 millions, adjusted with AEO 2020 GDP Deflators through 2019.

* Gross economic output is an aggregate measure of total industry sales, which includes sales to final users and intermediate sales to other industries. It is useful in comparing relative impacts across industries. However, summing output across sectors can lead to a form of double counting when the output of one sector is an input of another. GDP, the most widely-used measure of economic performance, reflects value added, which includes industry sales to other industries.

Table 6 shows the sectors with greatest impacts on output by sector at the state level and the overall impact on GDP. The largest effect is found in the utilities sector, as expected, followed by the construction and real estate sectors.

[15] See the Appendix generally for a breakdown of impacts by electricity price savings, nuclear plant operations, and natural gas fired plant constructions and operations.

Table 6: GDP and Gross Output Impacts by Sector in New Jersey
(Annual Average Annual Direct and Secondary Impacts in Millions of 2020 Dollars, 2021–2030)

Category	Output Impact
Utilities	$1,101
Construction	$274
Real estate and rental and leasing	$138
Retail trade	$58
Wholesale trade	$45
Manufacturing	$44
Professional, scientific, and technical services	$32
Health care and social assistance	$25
Administrative, support, waste management, and remediation services	$23
Finance and insurance	$0
Other	$162
Gross Economic Output Impact (All Sectors), Direct and Secondary*	**$1,902**
GDP Impact, Direct and Secondary	**$1,187**

Sources and Notes: REMI. Numbers may not sum due to independent rounding. "Other" includes: Transportation and warehousing; Accommodation and food services; Arts, entertainment, and recreation; Educational services, private; Information; Mining; and Forestry, fishing, and hunting.

* Gross economic output is an aggregate measure of total industry sales, which includes sales to final users and intermediate sales to other industries. It is useful in comparing relative impacts across industries. However, summing output across sectors can lead to a form of double counting when the output of one sector is an input of another. GDP, the most widely-used measure of economic performance, reflects value added, which includes industry sales to other industries.

Table 7 presents the net employment impacts by sector associated with nuclear plant operations. Note that utility sector presents fewer jobs than attributed to the plants. This is the case because these are net figures. Absent the nuclear plants, as discussed above, other electric generation sources in New Jersey would operate supporting employment. The sectors are affected not only by direct and secondary employment at the plants, but by the lower electricity prices provided by nuclear plant operations. Electricity price savings account for 1,220 jobs at the state level, while nuclear plant operations account for 5,340 jobs, net of those that would be supported by substitute energy generation (mostly natural gas) that would be used in their absence. [16]

[16] *See* Appendix, Table 26. The nuclear plants support 5,340 jobs and additional 1,220 jobs are supported by electricity price savings. These jobs, however, are partially offset by the jobs that would have been supported by the substitute plants totaling 2,030 almost exclusively in the construction and utility sector.

Table 7: Net Employment Impacts by Category in New Jersey
(Direct and Secondary Impacts, Number of Jobs, Annual Average, 2021–2030)

Category	Total
Construction	1,340
Utilities	1,120
Retail trade	500
Accommodation and food services	300
Professional, scientific, and technical services	230
Real estate and rental and leasing	210
Administrative, support, waste management, and remediation services	200
Health care and social assistance	190
Transportation and warehousing	100
Wholesale trade	60
Other	280
Total	**4,530**

Sources and Notes: REMI. Numbers may not sum due to independent rounding. "Other" includes: Manufacturing; Arts, entertainment, and recreation; Educational services, private; Information; Mining; and Forestry, fishing, and hunting; Finance and insurance.

3. Salem County Impacts

Here we present the results separately for Salem County, the region comprised of Gloucester, Cumberland, and Camden Counties, the rest of New Jersey, and New Castle County Delaware. Table 8 summarizes the overall GDP impact and the output impact by sector of the nuclear plants in Salem County. Not surprisingly, the utility sector is the most heavily influenced, accounting for almost 71 percent of the plants contribution to output. The plants' annual county GDP contribution of $1.2 billion is 24 percent of the County's annual total GDP.[17]

[17] U.S. Department of Commerce, County Business Patterns 2018 indicated Salem County's annual GDP was $5 billon.

Table 8: GDP and Gross Output Impacts by Sector in Salem, NJ
(Annual Average Annual Direct and Secondary Impacts in Millions of 2020 Dollars, 2021–2030)

Category	Output Impact
Utilities	$1,337
Construction	$278
Real estate and rental and leasing	$79
Retail trade	$35
Professional, scientific, and technical services	$20
Administrative, support, waste management, and remediation services	$12
Wholesale trade	$4
Health care and social assistance	$4
Transportation and warehousing	$0
Manufacturing	$0
Other	$106
Gross Economic Output Impact (All Sectors), Direct and Secondary*	**$1,875**
GDP Impact, Direct and Secondary	**$1,168**

Sources and Notes: REMI. Numbers may not sum due to independent rounding. "Other" includes: Accommodation and food services; Arts, entertainment, and recreation; Educational services, private; Information; Mining; and Forestry, fishing, and hunting; Finance and insurance.

* Gross economic output is an aggregate measure of total industry sales, which includes sales to final users and intermediate sales to other industries. It is useful in comparing relative impacts across industries. However, summing output across sectors can lead to a form of double counting when the output of one sector is an input of another. GDP, the most widely-used measure of economic performance, reflects value added, which includes industry sales to other industries.

Table 9 presents the number of jobs supported by the nuclear plants in Salem County. Overall, the plants support 3,990 positions annually. This represents about 24% of total employment in Salem County. The largest number of jobs is in the utility sector followed closely by construction. Taken together these sectors represent 73 percent of the jobs supported by the plants. Another 20 percent are in the retail, professional services, real estate, and accommodation and remediation services. Almost all of the employment impacts in the County can be traced to plant operations. Electricity cost savings have a negligible impact. This is case for two reasons. First, the Salem County has only 62,000 residents who rely on a broader geographic market for the goods and services they purchase. The Counties economic sectors are not particularly electricity price sensitive.

Table 9: Net Employment Impacts by Category in Salem, NJ
(Direct and Secondary Impacts, Number of Jobs, Annual Average, 2021–2030)

Category	Total
Utilities	1,510
Construction	1,420
Retail trade	330
Professional, scientific, and technical services	190
Accommodation and food services	160
Real estate and rental and leasing	120
Administrative, support, waste management, and remediation services	120
Transportation and warehousing	70
Health care and social assistance	40
Mining	0
Other	30
Total	**3,990**

Sources and Notes: REMI. Numbers may not sum due to independent rounding. "Other" includes: Manufacturing; Wholesale Trade; Arts, entertainment, and recreation; Educational services, private; Information; Finance and Insurance; Forestry, Fishing, and hunting.

4. Gloucester, Cumberland and Camden County Impacts

Table 10 shows the breakdown for Gloucester, Cumberland, and Camden Counties with respect to output and GDP. The overall impacts on output and GDP are much smaller and in some different sectors than for Salem County. Almost half of the impact occurs in the manufacturing and real estate followed by wholesale and retail trade.

Table 10: GDP and Gross Output Impacts by Sector in Gloucester, Cumberland, and Camden NJ (Annual Average Annual Direct and Secondary Impacts in Millions of 2020 Dollars, 2021–2030)

Category	Output Impact
Manufacturing	$21
Real estate and rental and leasing	$19
Wholesale trade	$15
Retail trade	$14
Health care and social assistance	$9
Construction	$9
Professional, scientific, and technical services	$9
Administrative, support, waste management, and remediation services	$6
Finance and insurance	$0
Mining	-$1
Other	-$1
Gross Economic Output Impact (All Sectors), Direct and Secondary*	**$100**
GDP Impact, Direct and Secondary	**$57**

Sources and Notes: REMI. Numbers may not sum due to independent rounding. "Other" includes: Utilities; Transportation and warehousing; Accommodation and food services; Arts, entertainment, and recreation; Educational services, private; Information; Forestry, fishing, and hunting.

* Gross economic output is an aggregate measure of total industry sales, which includes sales to final users and intermediate sales to other industries. It is useful in comparing relative impacts across industries. However, summing output across sectors can lead to a form of double counting when the output of one sector is an input of another. GDP, the most widely-used measure of economic performance, reflects value added, which includes industry sales to other industries.

Table 11 presents the nuclear plants' impacts on employment. The plants support 490 net jobs in the surrounding counties across diverse sectors. Retail trade, health care, and construction sectors account for just over 57 percent of these jobs. Another 29 percent are in the wholesale trade, professional services and administrative sectors. Nuclear plant operations account for 690 jobs net of jobs associated with natural gas fired electric generation that would occur absent the plants.[18] The remaining 20 jobs are attributable to electricity price savings.[19]

[18] Absent the nuclear plants there would be approximately 220 jobs associated with natural gas fired electric generation.

[19] *See* Appendix, Table 23.

Table 11: Net Employment Impacts by Category in Gloucester, Cumberland, and Camden, NJ (Direct and Secondary Impacts, Number of Jobs, Annual Average, 2021–2030)

Category	Total
Retail trade	120
Construction	80
Health care and social assistance	80
Professional, scientific, and technical services	50
Administrative, support, waste management, and remediation services	50
Accommodation and food services	40
Wholesale trade	40
Real estate and rental and leasing	30
Transportation and warehousing	20
Manufacturing	0
Other	-20
Total	**490**

Sources and Notes: REMI. Numbers may not sum due to independent rounding. "Other" includes: Utilities; Manufacturing; Arts, entertainment, and recreation; Educational services, private; Information; Finance and insurance; Forestry, fishing, and hunting.

5. Rest of New Jersey Impacts

Table 12 presents the output impacts for the region representing the rest of New Jersey. The impacts are actually negative, because in some sectors, closure of the nuclear plants would result in greater economic activity because of demands created by expected substitute power generation (mostly natural gas).[20] This is the case even accounting for the positive impact of electricity price savings.

[20] Note that since we are calculating the net impacts of the plants, the positive impacts attributable to closure associated with increased electricity production elsewhere in the state are presented as negative values.

Table 12: GDP and Gross Output Impacts by Sector in the Rest of New Jersey (Annual Average Annual Direct and Secondary Impacts in Millions of 2020 Dollars, 2021–2030)

Category	Output Impact
Real estate and rental and leasing	$41
Wholesale trade	$26
Manufacturing	$23
Health care and social assistance	$12
Retail trade	$9
Administrative, support, waste management, and remediation services	$5
Professional, scientific, and technical services	$3
Finance and insurance	$0
Mining	-$7
Transportation and warehousing	-$10
Other	-$175
Gross Economic Output Impact (All Sectors), Direct and Secondary*	**-$73**
GDP Impact, Direct and Secondary	**-$38**

Sources and Notes: REMI. Numbers may not sum due to independent rounding. "Other" includes: Construction; Utilities; Accommodation and Food Services; Arts, entertainment, and recreation; Educational services, private; Information; Forestry, fishing, and hunting.

* Gross economic output is an aggregate measure of total industry sales, which includes sales to final users and intermediate sales to other industries. It is useful in comparing relative impacts across industries. However, summing output across sectors can lead to a form of double counting when the output of one sector is an input of another. GDP, the most widely-used measure of economic performance, reflects value added, which includes industry sales to other industries and to final users, net of the value of purchases from other industries. It removes this double counting and is thus a better measure of the aggregate economic effect.

Table 13 presents net employment impacts in the rest of New Jersey by sector. Consistent with GDP and output results, absent the continued operation of the nuclear plants, additional electricity generation would occur outside of Salem and the surrounding counties. As a result, there would be on net about 50 less jobs in other counties absent the plants even accounting for electricity price savings. As the table shows, there are some jobs supported by these price savings in sectors such as accommodation and food services, health care, manufacturing, and retail. These are mostly sectors where increased discretionary spending would be positive. The manufacturing sector could be aided by cost savings to become more competitive. The utilities and construction sectors would experience the largest job losses in the rest of New Jersey (losing approximately 480).

Table 13: Net Employment Impacts by Category in the Rest of New Jersey (Direct and Secondary Impacts, Number of Jobs, Annual Average, 2021–2030)

Category	Total
Accommodation and food services	100
Health care and social assistance	70
Real estate and rental and leasing	60
Retail trade	50
Manufacturing	50
Administrative, support, waste management, and remediation services	30
Wholesale trade	20
Transportation and warehousing	10
Mining	-10
Professional, scientific, and technical services	-10
Other	-320
Total	**50**

Sources and Notes: REMI. Numbers may not sum due to independent rounding. "Other" includes: Construction; Utilities; Arts, entertainment, and recreation; Educational services, private; Information; Finance and insurance; Forestry, fishing, and hunting.

6. New Castle County Delaware Impacts

New Castle is the only region in Delaware that is included in this analysis. The overall impacts are summarized in Table 14. Overall, the plants contribute $298 million to output and $171 million to GDP over the period 2021–2030. The plants support 1,670 jobs. This reflects 0.6% of jobs in New Castle County.

Table 14: Summary of Average Annual Impacts in New Castle, Delaware (2021–2030)

	New Castle, DE
Gross Economic Output Impact, Direct and Secondary*	$298
GDP Impact, Direct, and Secondary	$171
Employment	1,670

Sources and Notes: REMI. GDP and Output in $2020 millions, adjusted with AEO 2020 GDP Deflators through 2019.

* Gross economic output is an aggregate measure of total industry sales, which includes sales to final users and intermediate sales to other industries. It is useful in comparing relative impacts across industries. However, summing output across sectors can lead to a form of double counting when the output of one sector is an input of another. GDP, the most widely-used measure of economic performance, reflects value added, which includes industry sales to other industries and to final users, net of the value of purchases from other industries. It removes this double counting and is thus a better measure of the aggregate economic effect.

Table 15 presents the employment impact breakdown in New Castle County. The largest impact, 740 positions, accounting for 44% of the total annual jobs supported by the nuclear plants, is in the construction sector. Four sectors - retail trade, professional, scientific, and technical services, health care and social services, and mining – each support 100 or more positions. The remaining jobs represent increases in six additional sectors ranging from administrative services to wholesale trade.

Table 15: Net Employment Impacts by Category in New Castle, DE (Direct and Secondary Impacts, Number of Jobs, Annual Average, 2021–2030)

Category	Total
Construction	740
Retail trade	190
Professional, scientific, and technical services	150
Mining	120
Health care and social assistance	120
Administrative, support, waste management, and remediation services	90
Accommodation and food services	70
Real estate and rental and leasing	60
Transportation and warehousing	50
Wholesale trade	30
Other	50
Total	**1,670**

Sources and Notes: REMI. Numbers may not sum due to independent rounding. "Other" includes": Utilities; Manufacturing, Arts, entertainment, and recreation, educational services, private; Information; Finance and insurance; Forestry, fishing, and hunting.

7. New Jersey Impacts – Without Natural Gas Plant Additions

Because the partial replacement of the nuclear capacity with in-state natural gas plants is uncertain, we have also estimated the economic impacts assuming gas additions do not occur within New Jersey. The net impacts (contribution of the nuclear plants) are larger if new gas plants are not constructed. As shown in Table 16, absent the natural gas plant additions, the net impacts of the nuclear plants are higher. The State GDP contribution increases from $1.2 billion to $1.3 billion. Employment contribution in New Jersey from the nuclear plants increases from 4,530 to 4,940. Importantly, absent the construction of natural gas plants, economic impacts in the rest of New Jersey region would be positive rather than negative. Instead of a GDP loss of 38 million and a job gain of only 50, GDP would increase by $25 million and jobs would increase by 420. This reflects the removal of the positive impact of new plant construction and at the same time increased economic activity because of lower electricity costs attributed to the nuclear plants. The impacts in the rest of New Jersey sub region at the sector level are presented in Table 17 and Table 18.

Table 16: Summary of Average Annual Impacts in New Jersey – No NJ Natural Gas Plant Additions (2021—2030)

	Salem, NJ	Gloucester, Cumberland, and Camden, NJ	Rest of New Jersey	**NJ Total**
Gross Economic Output Impact, Direct and Secondary*	$1,876	$113	$36	**$2,025**
GDP Impact, Direct, and Secondary	$1,168	$64	$25	**$1,257**
Employment	3,990	530	420	**4,940**

Sources and Notes: REMI. GDP and Output in $2020 millions, adjusted with AEO 2020 GDP Deflators through 2019.

* Gross economic output is an aggregate measure of total industry sales, which includes sales to final users and intermediate sales to other industries. It is useful in comparing relative impacts across industries. However, summing output across sectors can lead to a form of double counting when the output of one sector is an input of another. GDP, the most widely-used measure of economic performance, reflects value added, which includes industry sales to other industries and to final users, net of the value of purchases from other industries. It removes this double counting and is thus a better measure of the aggregate economic effect.

Table 17 presents the impacts for the sub region regarding GDP and output measured as gains or losses in economic activity attributable to the nuclear plants operations compared to an economy absent the plants. In the analysis presented in the previous section, losses arose in this sub region because, absent the nuclear plants, new natural gas plants were assumed to be developed here, and the increased economic activity of this development offset the losses from higher electricity costs. In this sensitivity analysis we no longer anticipate natural gas plant construction. Consequently, there is no offset to the nuclear plant benefits from this new construction. Thus, overall economic activity attributable to the nuclear plants increase relative to analysis discussed above. Greater reliance on existing natural gas plants absent the nuclear plants in the sub region, however, still reduces the benefits of the nuclear plants in some sectors with respect to GDP and output. These sectors include accommodations, food services, entertainment, and educational services. As shown in Table 18, there are corresponding impacts in terms of employment.

Table 17: GDP and Gross Output Impacts by Sector in Rest of New Jersey – No NJ Natural Gas Plant Additions
(Annual Average Annual Direct and Secondary Impacts in Millions of 2020 Dollars, 2021–2030)

Category	Output Impact - With Natural Gas Construction	Output Impact - No Natural Gas Construction
Real estate and rental and leasing	$41	$47
Wholesale trade	$26	$29
Manufacturing	$23	$27
Health care and social assistance	$12	$14
Retail trade	$9	$13
Administrative, support, waste management, and remediation services	$5	$8
Professional, scientific, and technical services	$3	$9
Finance and insurance	$0	$0
Mining	-$7	-$7
Transportation and warehousing	-$10	-$8
Other	-$175	-$96
Gross Economic Output Impact (All Sectors), Direct and Secondary*	**-$73**	**$36**
GDP Impact, Direct and Secondary	**-$38**	**$25**

Sources and Notes: REMI. Numbers may not sum due to independent rounding. "Other" includes: Transportation and warehousing; Accommodation and food services; Arts, entertainment, and recreation; Educational services, private; Information; Mining, Forestry, fishing, and hunting; and Utilities.

* Gross economic output is an aggregate measure of total industry sales, which includes sales to final users and intermediate sales to other industries. It is useful in comparing relative impacts across industries. However, summing output across sectors can lead to a form of double counting when the output of one sector is an input of another. GDP, the most widely-used measure of economic performance, reflects value added, which includes industry sales to other industries

Table 18: Employment Impacts by Sector in Rest of New Jersey – No NJ Natural Gas Plant Additions (Annual Average Annual Direct and Secondary Impacts in Millions of 2020 Dollars, 2021–2030)

Category	Total - With Natural Gas Construction	Total - No Natural Gas Construction
Accommodation and food services	100	110
Health care and social assistance	70	90
Real estate and rental and leasing	60	80
Retail trade	50	80
Manufacturing	50	50
Administrative, support, waste management, and remediation services	30	50
Wholesale trade	20	30
Transportation and warehousing	10	30
Mining	-10	-10
Professional, scientific, and technical services	-10	30
Other	-320	-120
Total	**50**	**420**

Sources and Notes: REMI. Numbers may not sum due to independent rounding. "Other" includes: Transportation and warehousing; Accommodation and food services; Arts, entertainment, and recreation; Educational services, private; Information; Mining, Forestry, fishing, and hunting; and Utilities.

C. Impact on Federal and State Tax Revenues

The Salem and Hope Creek plants and the businesses providing goods and services to these plants pay substantial state and federal taxes. In addition, since these plants keep electricity prices lower and keep productive activity within the state, they create incremental economic output and associated tax revenues throughout the economy. We used the recent historical relationship between New Jersey GDP and tax payments at both the state and federal levels to estimate the tax revenue impact of the plants. Using this approach, average incremental annual state tax payments attributable to these plants are estimated at $63 million, and average annual federal tax payments at $171 million ($54 million and $146 million annual state and federal tax payments in New Jersey alone) as shown in Table 19.

Table 19: Annual Federal and State Tax Payments Attributable to Economic Activity Related to the Salem and Hope Creek Plants (Annual Average Annual Impacts, in Millions of 2020 Dollars, 2021–2030)

	New Castle, DE	New Jersey	**Total**
Direct and Secondary State Tax Revenues	$9	$54	$63
Direct and Secondary Federal Tax Revenues	$25	$146	$171
Total Federal and State Tax Revenues	**$33**	**$201**	**$234**

Sources and Notes: REMI. Taxes based off of Tax Revenue as % of State and Federal GDP.

Appendix: The Relative Impact of Plant Operations and Lower Electricity Prices

As discussed in the body of the report, the Salem and Hope Creek plants support economic activity through their operations and by keeping electricity prices low. In this appendix, we provide a breakdown of these impacts and account for the impacts of plants that would operate in the absence of these plants.

Table 20 and Table 21 provide this information for the region overall. Tables 22–26 provide the breakdown by region with respect to employment. Tables 27–31 provide the breakdown by region with respect to GDP and output.

Table 20 presents net output, GDP, and employment impacts attributable to nuclear plant operations and electricity price savings for all regions under study. On all three metrics, plant operations account for well over half of the impact. Price impacts account for approximately 15 percent with respect to output and GDP and 20 percent with respect to employment.

Table 20: Average Annual Net Nuclear Energy Sales and Energy Price Impact for All Regions (2021–2030)

	Net Nuclear Energy Sales Impact	Price Impact	**Total**
Gross Economic Output Impact, Direct and Secondary*	$1,862	$338	**$2,201**
GDP Impact, Direct, and Secondary	$1,158	$200	**$1,358**
Employment	4,950	1,250	**6,200**

Notes: Net Nuclear Energy Sales Impact is calculated by subtracting Coal and Natural Gas Impacts from the Nuclear Energy Sales Impact. GDP and Output in $2020 millions, adjusted with AEO 2020 GDP Deflators through 2019.

* Gross economic output is an aggregate measure of total industry sales, which includes sales to final users and intermediate sales to other industries. It is useful in comparing relative impacts across industries. However, summing output across sectors can lead to a form of double counting when the output of one sector is an input of another. GDP, the most widely-used measure of economic performance, reflects value added, which includes industry sales to other industries and to final users, net of the value of purchases from other industries. It removes this double counting and is thus a better measure of the aggregate economic effect.

Table 21 summarizes the calculation of net impacts accounting for economic activities that would be attributable to the alternative (mostly natural gas-fired) power plants that would operate absent the nuclear plants. These plants offset about 25% of output, 24% of GDP, and 28% of employment activities attributable to the nuclear plants, setting aside the impacts of lower electricity costs.[21]

[21] From Table 21: ([1]+[2])/[3]

Table 21: Net Nuclear Energy Sales Impact Calculation

	Coal Effect	Natural Gas Effect	Nuclear Sales Effect	Net Nuclear Energy Sales Impact
	[1]	[2]	[3]	[4]
Gross Economic Output Impact, Direct and Secondary*	-$5	-$627	$2,494	$1,862
GDP Impact, Direct, and Secondary	-$3	-$367	$1,528	$1,158
Employment	150	-2,120	6,920	4,950

[4] = [1]+[2]+[3].

Sources and Notes: REMI. GDP and Output in $2020 millions, adjusted with AEO 2020 GDP Deflators through 2019. Taxes based off of Tax Revenue as % of State and Federal GDP.

* Gross economic output is an aggregate measure of total industry sales, which includes sales to final users and intermediate sales to other industries. It is useful in comparing relative impacts across industries. However, summing output across sectors can lead to a form of double counting when the output of one sector is an input of another. GDP, the most widely-used measure of economic performance, reflects value added, which includes industry sales to other industries and to final users, net of the value of purchases from other industries. It removes this double counting and is thus a better measure of the aggregate economic effect.

Table 22: Salem, NJ Average Annual Employment Impact by Sector for Top Occupations (2021–2030)

Category	Coal Impact	Natural Gas Impact	Nuclear Sales Impact	Price Effect Impact	**Total**
Utilities	0	0	1510	0	**1510**
Construction	0	0	1420	0	**1420**
Retail trade	0	0	330	0	**330**
Professional, scientific, and technical services	0	0	190	0	**190**
Accommodation and food services	0	0	160	0	**160**
Real estate and rental and leasing	0	0	120	0	**120**
Administrative, support, waste management, and remediation services	0	0	120	0	**120**
Transportation and warehousing	0	0	70	0	**70**
Health care and social assistance	0	0	40	0	**40**
Wholesale trade	0	0	0	0	**0**
Manufacturing	0	0	0	0	**0**
Mining	0	0	0	0	**0**
Other	0	0	30	0	**30**
Total	0	0	3990	0	**3990**

Table 23: Gloucester, Cumberland, and Camden, NJ Average Annual Employment Impact by Sector for Top Occupations (2021–2030)

Category	Coal Impact	Natural Gas Impact	Nuclear Sales Impact	Price Effect Impact	**Total**
Retail trade	0	-10	130	0	**120**
Construction	0	-40	100	20	**80**
Health care and social assistance	0	-10	90	0	**80**
Professional, scientific, and technical services	0	-20	70	0	**50**
Administrative, support, waste management, and remediation services	0	-20	70	0	**50**
Accommodation and food services	0	-10	50	0	**40**
Wholesale trade	0	-10	50	0	**40**
Real estate and rental and leasing	0	-10	40	0	**30**
Transportation and warehousing	0	-10	30	0	**20**
Manufacturing	0	0	0	0	**0**
Mining	0	0	0	0	**0**
Utilities	0	-70	0	0	**-70**
Other	0	-10	60	0	**50**
Total	0	-220	690	20	**490**

Table 24: Rest of New Jersey Average Annual Employment Impact by Sector for Top Occupations (2021–2030)

Category	Coal Impact	Natural Gas Impact	Nuclear Sales Impact	Price Effect Impact	**Total**
Accommodation and food services	0	-70	70	100	**100**
Health care and social assistance	0	-90	60	100	**70**
Real estate and rental and leasing	0	-90	30	120	**60**
Retail trade	0	-170	70	150	**50**
Manufacturing	0	0	0	50	**50**
Administrative, support, waste management, and remediation services	0	-100	70	60	**30**
Wholesale trade	0	-40	60	0	**20**
Transportation and warehousing	0	-80	40	50	**10**
Professional, scientific, and technical services	0	-190	110	70	**-10**
Mining	-10	0	0	0	**-10**
Construction	-10	-550	50	350	**-160**
Utilities	0	-320	0	0	**-320**
Other	0	-90	100	150	**160**
Total	-20	-1790	660	1200	**50**

Table 25: New Castle, Delaware Average Annual Employment Impact by Sector for Top Occupations (2021–2030)

Category	Coal Impact	Natural Gas Impact	Nuclear Sales Impact	Price Effect Impact	**Total**
Construction	30	-40	730	20	**740**
Retail trade	10	-10	180	10	**190**
Professional, scientific, and technical services	10	-10	150	0	**150**
Health care and social assistance	0	-10	130	0	**120**
Mining	120	0	0	0	**120**
Administrative, support, waste management, and remediation services	0	-10	100	0	**90**
Accommodation and food services	0	-10	80	0	**70**
Real estate and rental and leasing	0	0	60	0	**60**
Transportation and warehousing	0	0	50	0	**50**
Wholesale trade	0	0	30	0	**30**
Manufacturing	0	0	0	0	**0**
Utilities	0	-20	0	0	**-20**
Other	0	0	70	0	**70**
Total	170	-110	1580	30	**1670**

Table 26: All of New Jersey Average Annual Employment Impact by Sector for Top Occupations (2021–2030)

Category	Coal Impact	Natural Gas Impact	Nuclear Sales Impact	Price Effect Impact	**Total**
Construction	-10	-590	1570	370	**1340**
Utilities	0	-390	1510	0	**1120**
Retail trade	0	-180	530	150	**500**
Accommodation and food services	0	-80	280	100	**300**
Professional, scientific, and technical services	0	-210	370	70	**230**
Real estate and rental and leasing	0	-100	190	120	**210**
Administrative, support, waste management, and remediation services	0	-120	260	60	**200**
Health care and social assistance	0	-100	190	100	**190**
Transportation and warehousing	0	-90	140	50	**100**
Wholesale trade	0	-50	110	0	**60**
Manufacturing	0	0	0	50	**50**
Mining	-10	0	0	0	**-10**
Other	0	-100	190	150	**240**
Total	-20	-2010	5340	1220	**4530**

Table 27: Salem, NJ Average Annual Output and GDP Impact by Top Sectors (2021–2030, $2020 Millions)

Sector	Coal Impact	Natural Gas Impact	Nuclear Sales Impact	Price Effect Impact	**Total**
Utilities	$0.0	-$2.3	$1,334.9	$4.0	**$1,337**
Construction	$0.0	-$0.5	$278.2	$0.4	**$278**
Real estate and rental and leasing	$0.0	-$0.1	$78.7	$0.2	**$79**
Retail trade	$0.0	-$0.1	$34.8	$0.1	**$35**
Professional, scientific, and technical services	$0.0	-$0.2	$20.2	$0.0	**$20**
Administrative, support, waste management, and remediation services	$0.0	$0.0	$11.7	$0.0	**$12**
Wholesale trade	$0.0	$0.0	$4.3	$0.0	**$4**
Health care and social assistance	$0.0	$0.0	$4.0	$0.0	**$4**
Transportation and warehousing	$0.0	$0.0	$0.0	$0.0	**$0**
Manufacturing	$0.0	$0.0	$0.0	$0.0	**$0**
Finance and insurance	$0.0	$0.0	$0.0	$0.0	**$0**
Mining	$0.0	$0.0	$0.0	$0.0	**$0**
Other	-$0.1	-$0.2	$87.8	$0.2	**$88**
Gross Economic Output Impact (All Sectors), Direct and Secondary*	**$0.0**	**-$3.5**	**$1,873.3**	**$5.0**	**$1,875**
GDP Impact, Direct and Secondary	**$0.0**	**-$1.9**	**$1,166.8**	**$3.0**	**$1,168**

Table 28: Gloucester, Cumberland, and Camden, NJ Average Annual Output and GDP Impact by Top Sectors (2021–2030, $2020 Millions)

Sector	Coal Impact	Natural Gas Impact	Nuclear Sales Impact	Price Effect Impact	**Total**
Manufacturing	$0.0	-$2.1	$22.4	$1.1	**$21**
Real estate and rental and leasing	$0.0	-$3.6	$20.9	$1.3	**$19**
Wholesale trade	$0.0	-$1.5	$16.0	$0.3	**$15**
Retail trade	$0.0	-$2.0	$15.3	$0.3	**$14**
Health care and social assistance	$0.0	-$1.0	$10.0	$0.3	**$9**
Construction	-$0.1	-$10.9	$17.2	$2.7	**$9**
Professional, scientific, and technical services	$0.0	-$3.0	$11.4	$0.3	**$9**
Administrative, support, waste management, and remediation services	$0.0	-$1.1	$7.1	$0.2	**$6**
Finance and insurance	$0.0	$0.0	$0.0	$0.0	**$0**
Mining	-$0.6	$0.0	$0.0	$0.0	**-$1**
Transportation and warehousing	$0.0	-$0.7	$0.0	$0.2	**-$1**
Utilities	$0.0	-$30.6	$5.8	$2.0	**-$23**
Other	-$0.3	-$5.4	$27.3	$1.1	**$23**
Gross Economic Output Impact (All Sectors), Direct and Secondary*	**-$1.1**	**-$61.8**	**$153.3**	**$9.9**	**$100**
GDP Impact, Direct and Secondary	**-$0.6**	**-$35.9**	**$87.9**	**$5.7**	**$57**

Table 29: Rest of New Jersey Average Annual Output and GDP Impact by Top Sectors (2021–2030, $2020 Millions)

Sector	Coal Impact	Natural Gas Impact	Nuclear Sales Impact	Price Effect Impact	**Total**
Real estate and rental and leasing	-$0.8	-$30.1	$13.0	$58.5	**$41**
Wholesale trade	-$0.4	-$16.5	$24.5	$18.3	**$26**
Manufacturing	-$0.5	-$16.0	$11.5	$28.0	**$23**
Health care and social assistance	-$0.4	-$10.0	$8.0	$14.4	**$12**
Retail trade	-$0.5	-$19.6	$8.5	$20.8	**$9**
Administrative, support, waste management, and remediation services	-$0.2	-$11.1	$8.1	$8.6	**$5**
Professional, scientific, and technical services	-$0.5	-$35.0	$22.9	$15.4	**$3**
Finance and insurance	$0.0	$0.0	$0.0	$0.0	**$0**
Mining	-$6.9	$0.0	$0.0	$0.0	**-$7**
Transportation and warehousing	-$0.2	-$9.7	$0.0	$0.0	**-$10**
Construction	-$1.4	-$89.1	$8.9	$68.9	**-$13**
Utilities	$0.0	-$244.6	$9.7	$22.1	**-$213**
Other	-$1.1	-$43.3	$39.6	$55.7	**$51**
Gross Economic Output Impact (All Sectors), Direct and Secondary*	**-$12.8**	**-$525.1**	**$154.4**	**$310.6**	**-$73**
GDP Impact, Direct and Secondary	**-$7.4**	**-$307.7**	**$93.3**	**$184.0**	**-$38**

Table 30: New Castle, DE Average Annual Output and GDP Impact by Top Sectors (2021–2030, $2020 Millions)

Sector	Coal Impact	Natural Gas Impact	Nuclear Sales Impact	Price Effect Impact	**Total**
Construction	$5.2	-$6.6	$133.9	$3.3	**$136**
Professional, scientific, and technical services	$1.3	-$2.6	$33.5	$0.6	**$33**
Real estate and rental and leasing	$0.9	-$2.2	$31.3	$1.5	**$31**
Manufacturing	$0.3	-$1.0	$19.4	$0.5	**$19**
Health care and social assistance	$0.3	-$0.7	$16.3	$0.5	**$16**
Retail trade	$0.6	-$1.1	$15.6	$0.5	**$16**
Wholesale trade	$0.3	-$0.7	$13.2	$0.3	**$13**
Administrative, support, waste management, and remediation services	$0.1	-$0.6	$9.3	$0.3	**$9**
Finance and insurance	$0.0	$0.0	$0.0	$0.0	**$0**
Mining	$0.0	$0.0	$0.0	$0.0	**$0**
Transportation and warehousing	$0.0	-$0.3	$0.0	$0.0	**$0**
Utilities	$0.0	-$17.8	$0.0	$3.6	**-$14**
Other	-$0.2	-$2.5	$35.1	$1.6	**$34**
Gross Economic Output Impact (All Sectors), Direct and Secondary*	**$8.8**	**-$36.2**	**$312.9**	**$12.7**	**$298**
GDP Impact, Direct and Secondary	**$5.1**	**-$21.2**	**$179.8**	**$7.6**	**$171**

Table 31: All of New Jersey Average Annual Output and GDP Impact by Top Sectors (2021–2030, $2020 Millions)

Sector	Coal Impact	Natural Gas Impact	Nuclear Sales Impact	Price Effect Impact	**Total**
Utilities	$0.0	-$277.5	$1,350.3	$28.2	**$1,101**
Construction	-$1.5	-$100.5	$304.3	$72.0	**$274**
Real estate and rental and leasing	-$0.8	-$33.8	$112.5	$59.9	**$138**
Retail trade	-$0.5	-$21.7	$58.6	$21.2	**$58**
Wholesale trade	-$0.4	-$18.1	$44.8	$18.7	**$45**
Manufacturing	-$0.5	-$18.2	$33.8	$29.1	**$44**
Professional, scientific, and technical services	-$0.5	-$38.2	$54.5	$15.8	**$32**
Health care and social assistance	-$0.4	-$11.0	$22.0	$14.7	**$25**
Administrative, support, waste management, and remediation services	-$0.2	-$12.2	$26.9	$8.9	**$23**
Finance and insurance	$0.0	$0.0	$0.0	$0.0	**$0**
Mining	-$7.6	$0.0	$0.0	$0.0	**-$8**
Transportation and warehousing	-$0.2	-$10.5	$0.0	$0.2	**-$10**
Other	-$1.5	-$48.9	$154.7	$57.0	**$161**
Gross Economic Output Impact (All Sectors), Direct and Secondary*	**-$14.0**	**-$590.4**	**$2,181.1**	**$325.5**	**$1,902**
GDP Impact, Direct and Secondary	**-$8.1**	**-$345.6**	**$1,348.0**	**$192.7**	**$1,187**

* Gross economic output is an aggregate measure of total industry sales, which includes sales to final users and intermediate sales to other industries. It is useful in comparing relative impacts across industries. However, summing output across sectors can lead to a form of double counting when the output of one sector is an input of another. GDP, the most widely-used measure of economic performance, reflects value added, which includes industry sales to other industries and to final users, net of the value of purchases from other industries. It removes this double counting and is thus a better measure of the aggregate economic effect.

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