Economic Impact Analysis of PSE&G's Capital Expenditure Program

Submitted to:

PSE&G

June 2014

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Introduction

This report presents estimates of the aggregate economic impacts of PSE&G's infrastructure investment portfolio for 2011-2021. The portfolio comprises seven programs in New Jersey requiring total estimated expenditures of $8.1 billion for labor, materials, services and equipment. These are large-scale projects designed to add or upgrade transmission capacity for various regions of the PSE&G network. They do not include regular ongoing, annual operating and maintenance expenditures associated with PSE&G's electricity generation and transmission functions.

The economic impacts of four of the projects have been estimated previously by Rutgers:

- Susquehanna-Roseland Project
- North-Central Reliability Project
- Burlington-Camden Reliability Project
- Northeast Grid Project

Those economic impact estimates are included here with appropriate adjustments based on changes in estimated expenditures.[1] New economic impact analyses have been conducted for the three projects that were not previously analyzed:

- Southern Reinforcement Project
- 69 kV Upgrade Portfolio
- Bergen-Linden Corridor Upgrade

The report presents an overview of the total expenditure data, followed by a description of the methodology of the analysis, the economic model used in the analysis, and the allocation of the capital expenditures across the economic sectors represented in the model. The aggregate results of the economic impact analysis are then provided, with descriptions of each indicator. Appendix A contains tables with additional project-level detail.

[1] Detailed reports on the analysis for each of those projects were provided to PSE&G previously. See the bibliography at the end of this report for a full list of references.

Project Expenditure Data

Table 1 lists the seven projects included in the analysis and their respective total expenditures, along with brief descriptions of each project.

Table 1
Projects Included in the Analysis

No.	Project Name	Description	Time Frame	Estimated Cost
1	Susquehanna-Roseland Project	Addition of a new 500 kV transmission line to the existing 250 kV capacity network running from Susquehanna, Pennsylvania to Roseland, New Jersey. Includes erection of 249 towers, as well as construction of two new switching stations.	June 2012 – June 2015 (3 years)	$790 million
2	North-Central Reliability Project	Capacity upgrade of transmission circuits, switching stations and substations in five North-Central New Jersey counties from 138 kV to 230 kV.	June 2012 – June 2014 (2 years)	$390 million
3	Burlington-Camden Reliability Project	Capacity upgrade of overhead and underground transmission circuits and six substations in Burlington and Camden counties from 138 kV to 230 kV, as well as other associated equipment upgrades.	March 2011 – June 2014 (3 years)	$399 million
4	Northeast Grid Project	Capacity upgrade of transmission lines and substations in Essex, Bergen, Hudson and Passaic counties from 138 kV to 230 kV, as well as other associated equipment upgrades.	June 2012 – June 2015 (3 years)	$907 million
5	Southern Reinforcement Project	Addition of new and upgrade of existing overhead and underground transmission circuits and switching stations in Camden and Gloucester counties to 230 kV.	December 2012 – June 2015 (2.5 years)	$435 million
6	PSE&G's portfolio of 69kV upgrades	A series of approximately 56 projects to upgrade or supplement existing networks to 69 kV, including upgrade, replacement, or new construction of switching stations, substations and transmission poles and lines.	January 2012 – June 2021 (9.5 years)	$4.0 billion
7	Bergen-Linden Corridor Upgrade	Capacity upgrade of the Bergen-Linden Corridor to 345 kV. Includes upgrades and replacements of transmission circuits and substations in Union, Bergen, Hudson and Essex counties.	August 2014 – June 2018 (4 years)	$1.2 billion
	Total		**March 2011 - June 2021 (10 years)**	**$8.1 billion**

Project expenditures range from $390 million to nearly $4 billion for an extensive program of 69 kV upgrades comprising 56 individual projects. These outlays – totaling over $8 billion for all seven projects – comprise all expenditures relating to the project, including construction labor, materials and equipment, third-party engineering, design, management and planning services, PSE&G internal functions, permit payments and other costs. These include expenditures made both inside and out of the state. Project durations range from two to nearly 10 years.

Methodology

Input-Output Analysis and the R/ECON™ Input-Output Model

The R/ECON Input-Output model developed and maintained by the Center for Urban Policy Research at Rutgers University's Edward J. Bloustein School of Planning and Public Policy is used to estimate the economic impacts of various types of expenditures or investments, in terms of employment, gross domestic product, compensation (i.e., income) and tax revenues. The model consists of 463 individual sectors of the New Jersey economy and measures the effect of changes in expenditures in one industry on economic activity in all other industries.[2] Thus, the expenditures made on labor, materials, legal and design services, and other inputs for building and/or upgrading electrical utility infrastructure have both **direct economic effects** as those expenditures become incomes and revenues for workers and businesses, and subsequent **indirect effects** as those workers and businesses, in turn, spend those dollars on other goods and services. These expenditures on consumer goods, business investment expenditures, and other items in turn become income for other workers and businesses. This income gets further spent, and so on.

The R/ECON Input-Output model estimates both the **direct** economic effects of the initial expenditures (in terms of jobs and income) and the **indirect** (or **multiplier**) effects (in additional jobs and income) of the subsequent economic activity that occurs following the initial expenditures. The model also estimates the gross domestic product for New Jersey and the tax revenues generated by the combined direct and indirect new economic activity caused by the initial spending.

In addition, embodied in the model are estimates – known as regional purchase coefficients, or RPCs – of the share of local (i.e., in-state) demand for labor and material that can be met by in-state supply. That is, based on historical inter-industry relationships, the model can estimate the portion of the project expenditures that are made on labor, material and services produced *in New Jersey*. Similarly, these inter-industry relationships also capture the portion of *indirect* expenditures (i.e., spending of the business revenues and personal incomes initially generated by the project expenditures) that remain in the state. Those initial expenditures and indirect impacts that spill out of the state are referred to as economic "leakage." Estimates of "leakage" associated with project expenditures can be further refined based on specific project information regarding the expected sourcing of labor, materials or other services. **More specifically, in the case of the electrical infrastructure projects considered here, many of the major electrical components, such as transformers breakers, etc., are known to be purchased from out-of-state vendors and/or manufacturers. These out-of-state purchases are explicitly accounted for prior to running the model, and thus these expenditures are excluded from the analysis.**

[2] The model has undergone recent modifications and updates. At the time of the four impact analyses conducted previously, the model comprised 517 economic sectors. The recent revisions included the consolidation of some of those sectors and updates to the relationships among industries and the disposition of industry revenues.

Construction expenditures are one-time outlays that generate one-time economic impacts. That is, the economic ripple effects – or "multiplier" effects – that result from the initial construction expenditures occur only once, as or shortly after the initial outlays are made. These impacts, in terms of employment, income, output (GDP), and tax revenues, do not continue once the capital construction project expenditures cease.

Expenditure Allocation

The R/ECON Input-Output Model estimates the economic impact of expenditures and investments by tracking their path as they ripple through the economy. As such, the division of the initial expenditures between labor, services (including PSE&G's internals costs) and construction material, the exclusion of materials purchased only out-of-state, and the careful allocation of in-state labor and material outlays to the sectors of the R/ECON Model, are the key drivers of the estimated impacts. Table 2 provides the breakdown of expenditures for each project across key expenditure categories.

Table 2
Distribution of Project Expenditures

			Share of Expenditures in NJ			
Project	**Total Expenditures ($ mlns)**	**NJ Total (Share of Total)**	**Labor**	**Material and Equipment**	**Services (incl. Direct Govt. Payments)***	**Share of Expenditures Outside NJ**
Susquehanna-Roseland	$790.0	62.8%	78.1%	8.6%	13.2%	37.2%
North-Central Reliability	$390.0	77.8%	35.3%	11.9%	52.8%	22.2%
Burlington-Camden	$399.0	73.1%	38.0%	23.7%	38.3%	26.9%
Northeast Grid	$907.0	88.3%	28.9%	17.0%	54.1%	11.7%
Southern Reinforcement	$435.0	65.8%	39.4%	30.0%	30.6%	34.2%
Bergen-Linden	$1,180.3	75.2%	35.9%	27.4%	36.7%	24.8%
69 kV Upgrade Portfolio	$3,972.0	70.3%	73.6%	18.0%	8.4%	29.7%
Total	**$8,073.3**	**72.6%**	**56.7%**	**19.0%**	**24.2%**	**27.4%**

*Services include program and project management, engineering and design, PSE&G internal project support, and other internal and external soft-costs.

Of the $8.1 billion in total expenditures, 72.6%, or nearly $5.9 billion are estimated to be made in New Jersey. Of these, approximately 56.7%, or $3.3 billion – are allocated to construction labor, with 19% ($1.1 billion) allocated to construction material and equipment, as well as electrical equipment and components. The remaining 24.2% ($1.4 billion) is allocated to various construction-related services, including planning, program management, engineering, PSE&G internal functions, and government permitting costs.

Assumptions

The allocation of project expenditures into the sectors of the R/ECON Input-Output Model varies from project to project based on the level of expenditure detail available at the time of the analysis, the composition of the project inputs, and specifics regarding the composition of out-of-state expenditures. These determinations are made based on detailed cost estimates provided by PSE&G, as well as guidance from PSE&G staff and past project experience. Reports for the four previously analyzed projects provide detailed descriptions of the allocation process. Similar approaches were used to allocate expenditures for the three newly analyzed projects. There are several assumptions and approaches common to all the analyses:

1) Generally, all direct construction work and the accompanying compensation occurs on-site. Thus, construction labor compensation and employment are allocated in-state, though some of the direct income may "leak" out of state based on model assumptions regarding worker residency.

2) Expenditures supporting PSE&G internal functions are sited in-state.

3) Major transmission components such as transformers that are known to be acquired from outside the state are excluded from the analysis. Electrical equipment that might be manufactured or distributed by wholesalers in the state is subject to the R/ECON model's allocation based on the aforementioned regional purchase coefficients (RPCs). In the case of wholesaling, a wholesale margin (only) is assigned to New Jersey sources.

4) Contingency, risk, and escalation amounts in the expenditure distribution for each project were included in the analysis. These unallocated amounts – specified by PSE&G as a percentage of direct costs for each project – were reallocated across the project expenditure items (i.e., labor, different types of material and services, permit costs, etc.) in proportion to each expenditure item's share of the project's base costs.

Results of the Analysis

Aggregate Impacts

Table 3 provides the aggregate economic impacts of PSE&G's portfolio of major capital investment projects from 2011 through 2021 (table A-1 in Appendix A provides the impacts for each project).

Table 3
Aggregate Economic Impacts in New Jersey of PSE&G's Capital Investment Portfolio

	Direct	Indirect	Total
Employment (job-years)	26,511	32,410	**58,921**
Gross Domestic Product ($ million)	$3,388.7	$3,233.2	**$6,622.0**
Compensation ($ million)	$2,443.5	$1,879.7	**$4,323.3**
State Tax Revenues ($ million)			**$262.6**
Local Tax Revenues ($ million)			**$275.3**
Permits/Other Fees ($ million)			**$104.3**

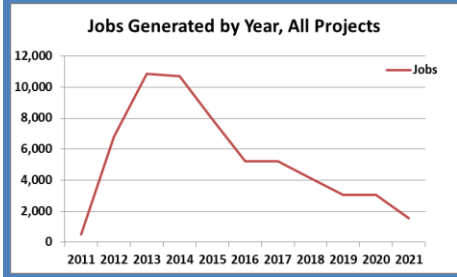
In aggregate, these projects and their multiplier effects are estimated to generate:

- **Employment**
  58,921 job-years (a job-year represents one worker employed for one year) are estimated to be generated by the nearly $6 billion in planned expenditures in New Jersey. ***In the aggregate, this is equivalent to nearly 6,000 jobs supported each year of the 10-year duration of the projects' expenditures.*** For comparison, in 2013, New Jersey gained a total of 19,800 private-sector jobs.

  The equivalent of ***6,000 jobs in New Jersey,*** *supported for 10 years*

  As noted above, one job-year is equivalent to one job lasting one year. In the case of capital investments, the direct and indirect employment generated by the expenditures occurs as the expenditures are made, and lasts approximately as long as the expenditures continue. Thus, in aggregate, if the $5.9 billion of in-state

Because employment generated by the capital expenditures occurs as the expenditures are made, the number of jobs supported by the expenditures will vary from year to year.



Assuming that the expenditures for each project are distributed evenly over the term of the project, and applying the average number of jobs supported per $1 million dollars of expenditures across all seven projects, jobs supported by the project expenditures peak at near 11,000 in 2013 and 2014 when all or nearly all the projects are at some stage of implementation. Subsequently, jobs supported each year decline as projects are completed and expenditures cease.

expenditures were spread evenly across the ten years from the beginning of the first project in 2011 through the completion of the 69 kV upgrades in 2021, approximately 5,890 jobs would be created, each lasting the duration of that period (see sidebar).

Employment would be generated across a wide range of sectors, as the initial direct expenditures supporting jobs and business revenues in the construction, engineering, management, manufacturing and wholesale sectors "ripple" through the broader economy, generating indirect employment in other industries such as retail, services, transportation, etc.[3] Table 4 provides the estimated sector distribution (job categories are from the U.S. Bureau of Labor Statistics) of the total employment generated by the $5.9 billion of in-state expenditures.

Table 4
Distribution of Employment Impacts by Sector

Sector	Employment (job-years)	Employment (10-year jobs)
Natural Resources & Mining	589	59
Construction	17,237	1,724
Manufacturing	6,981	698
Transportation & Public Utilities	1,960	196
Wholesale Trade	1,753	175
Retail Trade	6,404	640
Financial Activities	2,326	233
Services†	21,659	2,166
Government*	11	1
Total	**58,920**	**5,892**

* Government employment is estimated for publicly operated enterprises such as local transit agencies and hospitals. This employment was not estimated for the Southern Reinforcement Project, the Bergen-Linden project, or the 69 kV upgrade projects due to changes in the modeling process. Government enterprise employment impacts are not significant relative to the total expenditures and impacts of the projects.

† Note that internal PSE&G functions supported by the capital expenditures (e.g., program management, construction supervision, project design and engineering, etc.) do not appear in the utilities sector, but are distributed primarily across the service sectors. This is a result of the modeling process, as these functions are aligned with the capital project design and construction process rather than the energy production process.

[3] The broadly defined service sector includes professional and business services (e.g., engineering, architecture, accounting, legal services, etc.), education and health services, leisure and hospitality services, the information sector, and other service industries.

- **Compensation**

  Labor compensation represents the total wages, salaries and wage supplements (i.e., employer contributions to government and private pension funds) paid for all direct *and* indirect jobs generated in New Jersey as a result of the expenditures made *in New Jersey*. PSE&G's capital expenditures of $5.9 billion in the state are estimated to generate $4.3 billion in compensation.

  $4.3 billion in compensation

- **Gross Domestic Product**

  Total gross domestic product (GDP), a measure of the value of the new economic output generated in the state as a result of the construction expenditures, is estimated at $6.6 billion.

  $6.6 billion in GDP

- **State Tax Revenues**

  Estimated state tax revenues generated by the project comprise the income taxes associated with the salaries paid to the workers in the direct and indirect jobs generated by the construction activity, as well as the sales taxes associated with the economic output generated by those expenditures. In total, PSE&G's in-state expenditures are estimated to generate approximately $262.6 million in state tax revenues. In addition, the expenditures include approximately $104.3 million in state permitting and other fees.

  $367 million in state taxes and fees

- **Local Tax Revenues**

  The estimated local tax revenues for the state represent property tax revenues that accrue, over time, as a result of improvements to existing or construction of new property afforded by the personal and business incomes generated directly and indirectly by the construction expenditures. These local tax revenues are estimated at $275.3 million. Unlike the other impacts, the increase in property tax revenues occurs over a considerably longer period (see Appendix B for additional detail).

  $275 million in local tax revenues

Per-Million-Dollar Impacts

Table 5 presents the estimated impacts of the capital outlays per $1 million of expenditure. In accordance with industry practice, these impacts are calculated on the base of the *total project expenditures of $8.1 billion* (rather than the in-state expenditures of $5.9 billion).

Table 5
Per-Million Dollar Economic Impacts of PSE&G's Capital Expenditure Portfolio ($8.1 billion)

Indicator	Impact
Employment (annual)	**7.3 jobs**
Gross Domestic Product	**$820,230**
Compensation	**$535,499**
State Tax Revenues	**$32,524**
Local Tax Revenues	**$34,105**
Permits/Other Fees	**$12,924**

Each $1 million in *total* (i.e., including out-of-state) capital expenditures made by PSE&G is estimated to generate *in New Jersey*[4]:

- 7.3 annual jobs;
- $820,230 in GDP;
- $536,000 in compensation;
- $32,524 in state tax revenues and $12,924 in other state fees; and
- $34,105 in local tax revenues.

[4] Table A-2 in Appendix A provides the per-million-dollar impacts for each project.

Appendix A

Table A-1 provides the total economic impacts of each of the seven projects included in the analysis.

Table A-1: Aggregate Economic Impacts in New Jersey of PSE&G's Capital Investment Portfolio

	Job-years			Compensation ($ mlns)			GDP ($ mlns)			Govt. Revenue ($ mlns)		
Project	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	State Taxes	Local Taxes	Fees
Susquehanna-Roseland	2,803	1,395	4,197	$306.8	$59.7	$366.5	$382.0	$89.1	$471.1	$9.7	$10.1	0
North-Central Reliability	1,277	628	1,905	$130.5	$29.3	$159.7	$168.9	$43.5	$212.4	$11.1	$6.2	$7.4
Burlington-Camden	1,428	482	1,910	$139.4	$20.3	$159.7	$181.7	$30.3	$211.9	$11.2	$4.8	$7.9
Northeast Grid	3,307	3,441	6,747	$376.4	$150.8	$527.2	$445.7	$224.7	$670.4	$30.1	$46.7	$37.7
Southern Reinforcement	2,092	2,990	5,082	$186.1	$184.7	$370.8	$257.7	$326.2	$583.9	$28.7	$24.1	$2.3
Bergen-Linden	4,138	6,079	10,217	$373.5	$368.9	$742.5	$582.7	$653.4	$1,236.1	$57.1	$50.4	$1.2
69 kV Upgrade Portfolio	11,467	17,396	28,863	$930.9	$1,066.0	$1,997.0	$1,370.0	$1,866.1	$3,236.2	$114.7	$132.9	$47.8
Total	**26,511**	**32,410**	**58,921**	**$2,443.5**	**$1,879.7**	**$4,323.3**	**$3,388.7**	**$3,233.2**	**$6,622.0**	**$262.6**	**$275.3**	**$104.3**

Table A-2 provides the per-million-dollar economic impacts *in New Jersey* for each of the seven projects included in the analysis based on their *total expenditures* (i.e., including amounts spent outside the state).

Table A-2: Per-Million-Dollar Economic Impacts in New Jersey of PSE&G's Capital Investment Portfolio

	Job-years			Compensation			GDP			Govt. Revenue		
Project	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	State Taxes	Local Taxes	Fees
Susquehanna-Roseland	3.5	1.8	5.3	$388,329	$75,595	$463,924	$483,571	$112,772	$596,343	$12,278	$12,825	-
North-Central Reliability	3.3	1.6	4.9	$334,524	$75,000	$409,524	$433,036	$111,607	$544,643	$28,571	$15,774	$19,048
Burlington-Camden	3.6	1.2	4.8	$349,302	$50,913	$400,215	$455,326	$75,844	$531,170	$28,081	$12,072	$19,683
Northeast Grid	3.6	3.8	7.4	$414,972	$166,257	$581,229	$491,397	$247,709	$739,106	$33,184	$51,508	$41,564
Southern Reinforcement	4.8	6.9	11.7	$427,786	$424,584	$852,370	$592,489	$749,871	$1,342,360	$65,943	$55,501	$5,374
Bergen-Linden	3.5	5.2	8.7	$316,472	$312,565	$629,038	$493,704	$553,547	$1,047,252	$48,349	$42,735	$1,054
69 kV Upgrade Portfolio	2.9	4.4	7.3	$234,370	$268,384	$502,753	$344,916	$469,821	$814,737	$28,872	$33,469	$12,029
Total	**3.3**	**4.0**	**7.3**	**$302,668**	**$232,831**	**$535,499**	**$419,746**	**$400,484**	**$820,230**	**$32,524**	**$34,105**	**$12,924**

Appendix B

The estimated local tax revenues for the state estimated in this analysis represent property tax revenues that accrue, over time, as a result of improvements to existing or construction of new property. This activity is afforded by the personal and business incomes generated directly and indirectly by the construction expenditures.

Local tax revenues result from the expenditures generated from the income for workers and revenues for business.[5] The personal incomes and in business revenues are, in part, used to pay property taxes and to improve properties (both residential and commercial). Thus, households and businesses that benefit from the construction expenditures acquire and/or improve residential and commercial properties or alternatively are able to pay rents that include associated property taxes.

Historical New Jersey fiscal and economic data are used to measure the relationship between business revenues and the amount of commercial property tax revenues collected, and between household incomes and the amount of residential property tax revenues collected.[6] Given both household income and business revenues associated with PSE&G's construction expenditures, the R/ECON™ Input-Output Model invokes the known statistical relation of local property tax revenues to both household income and business revenues in order to estimate the addition to local tax revenues attributable to the expenditures.

[5] For businesses, the revenue increase is measured in terms of value-added, and it is the change in value added in the business sector that is the basis for the estimated change in property tax revenues.

[6] For the entire state, approximately 76% of total local property tax revenues are attributable to residential property; with approximately 21% derived primarily from commercial and industrial property.

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