Carlos Gavilondo
Senior Counsel II

VIA ELECTRONIC DELIVERY

January 30, 2015

Hon. Kathleen H. Burgess, Secretary
New York State Department of Public Service
3 Empire State Plaza
Albany, New York 12223-1350

Re: Case 12-E-0201, Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Niagara Mohawk Power Corporation d/b/a National Grid for Electric Service;
Five-Year Transmission and Distribution Capital Investment Plan, FY16-FY20

Dear Secretary Burgess:

Pursuant to the Public Service Commission's Order Approving Electric and Gas Rate Plans in Accord with Joint Proposal, issued and effective March 15, 2013 in Case 12-E-0201, Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid" or "Company") hereby submits its annual Transmission and Distribution Capital Investment Plan ("Plan"). The Plan sets forth the Company's projected capital spending on the electric transmission and distribution system for the 5-year period from April 1, 2015 through March 31, 2020 (fiscal years 2016 -2020).

A copy of this filing is also being provided directly to Christian Bonvin and William Lysogorski of Department of Public Service Staff. Please contact me if you have any questions regarding this filing.

Thank you for your attention to this matter.

Respectfully submitted,

/s/ Carlos Gavilondo

Carlos Gavilondo

Enc.

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nationalgrid

TRANSMISSION AND DISTRIBUTION CAPITAL INVESTMENT PLAN

Electric Transmission & Distribution System

CASE 12-E-0201

JANUARY 31, 2015

PREPARED FOR:

THE STATE OF NEW YORK PUBLIC SERVICE COMMISSION

THREE EMPIRE STATE PLAZA

ALBANY, NY 12223

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Chapter 1. Executive Summary

Niagara Mohawk Power Corporation d/b/a National Grid ("Niagara Mohawk" or the "Company") submits its Five Year Capital Investment Plan (the "Plan") in compliance with the New York Public Service Commission ("PSC" or the "Commission") Order issued March 15, 2013, in Case 12-E-0201.[1] The Plan submitted here relates to fiscal years 2016 to 2020 (FY16 to FY20).[2] The investment levels in the Plan are summarized by system in Table 1-1, below. The Plan reflects total investment levels agreed in the Company's most recent electric rate case (12-E-0201) through FY16 and the Company's present estimate of investment levels needed in FY17 – FY20 to meet its obligation to provide safe and adequate service at reasonable cost to customers.[3]

Table 1-1
Capital Investment Plan by System ($millions)

System	FY16	FY17	FY18	FY19	FY20	Total
Transmission	166.8	172.0	189.0	206.0	210.0	943.8
Sub-transmission	27.3	29.0	39.1	42.5	44.0	181.9
Distribution	253.6	251.8	285.1	288.5	295.0	1374.0
Total	447.7	452.8	513.2	537.0	549.0	2499.7

National Grid's commitment to safety, reliability and efficiency is paramount, and is the foundation for all we do. The five-year investment plan presented here balances the need to constrain infrastructure cost while simultaneously mitigating some of the significant risks on the system. The Company continuously reviews the Plan relative to current risks and information and will revise the Plan as required to meet emergent needs and provide safe and adequate service at reasonable cost to customers.

[1] Case 12-E-0201, *Proceeding on the Motion of the Commission as to the Rates, Charges, Rules and Regulations of Niagara Mohawk Power Corporation for Electric Service*, Order Approving Electric and Gas Rate Plans in Accord with Joint Proposal, issued and effective March 15, 2013 ("Rate Case Order"). Under Section 12.6.1(b) of the December 7, 2012 Joint Proposal adopted by the Rate Case Order, the Company agreed to continue to submit periodic reports as provided in Case 06-M-0878, *Joint Petition of National Grid PLC and KeySpan Corporation for Approval of Stock Acquisition and Other Regulatory Authorizations,* including the annual five-year investment plan.

[2] The period FY16 to FY20 covers April 1, 2015 - March 31, 2020.

[3] Differences between FY15-FY16 system level sub-totals in this Plan and corresponding system level sub-totals in the Joint Proposal are primarily due to changes in investment timing during the period governed by the Joint Proposal and shifts in investment amounts between systems.

1. A. Capital Investment Plan Summary

The Company's capital investment plan is presented by system and by spending rationale. A view of planned investments segmented by system is presented in Table 1-1 above, while a view of planned investments segmented by spending rationale is summarized below.

Investment by Spending Rationale

The Company classifies capital projects into five spending rationales based on their primary investment driver: (A) Customer Requests/Public Requirements; (B) Damage/Failure; (C) System Capacity and Performance; (D) Asset Condition; and (E) Non-infrastructure.

Customer Requests/Public Requirements
Customer Requests/Public Requirements projects are required to respond to, or comply with Customer Requests/Public Requirements mandates. This work includes capital expenditures required to ensure the contractual obligations of the Company adhere to customer and public requirements. These items include new business residential, new business commercial, outdoor lighting, third party attachments, land rights and public requirements including municipal, customer interconnections and wind farms.

Damage/Failure
Damage/Failure projects are required to replace failed or damaged equipment and to restore the electric system to its original configuration and capability following equipment damage or failure. Damage may be caused by storms, vehicle accidents, vandalism or other unplanned events. The Damage/Failure spending rationale is typically non-discretionary in terms of scope and timing. The Damage/Failure budget may also include the cost of purchasing strategic spares to respond to equipment failures.

System Capacity and Performance
System Capacity and Performance projects are required to ensure the electric network has sufficient capacity to meet the growing and/or shifting demands of our customers, as well as changes in the generation landscape. Projects in this category are intended to reduce degradation of equipment service lives due to thermal stress and to provide appropriate degrees of system configuration flexibility to limit adverse reliability impacts of large contingencies. In addition to accommodating load growth, the expenditures in this category are used to install new equipment such as capacitor banks to maintain the requisite power quality, and also include investments to adhere to NERC, NPCC and similar standards.

Asset Condition
Asset Condition projects are required to reduce the likelihood and consequences of failures of transmission and distribution assets. Replacing system elements such as overhead lines, underground cable or substation equipment are examples of such

projects. Investments in the Asset Condition category reflect the targeted replacement of assets based on condition rather than wholesale replacement based on "end of useful life" criteria, especially for transmission line refurbishment projects.

Non-Infrastructure

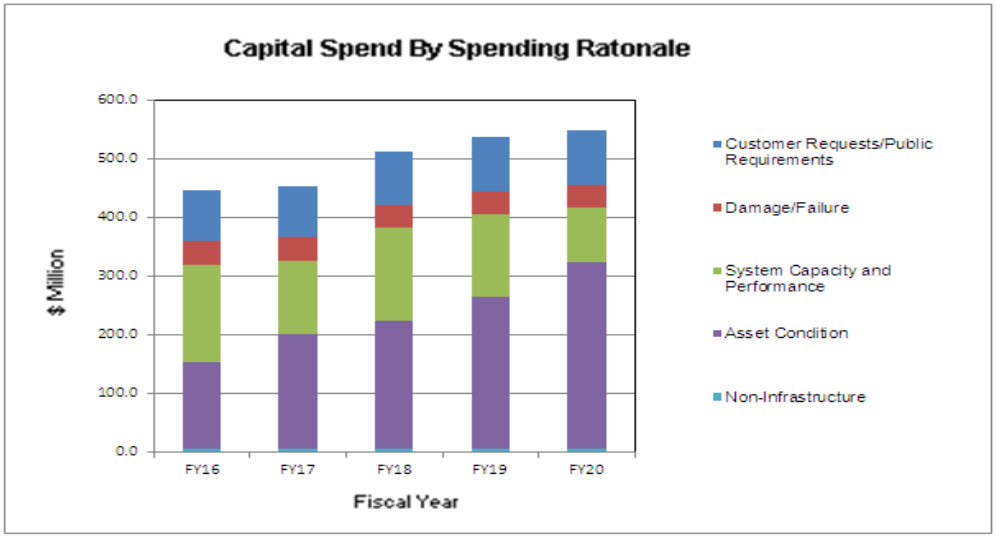
Non-Infrastructure projects are ones that do not fit into one of the foregoing categories, but which are necessary to run the electric system. Examples in this rationale include substation physical security, radio system upgrades and the purchase of test equipment.

Investment by spending rationale for fiscal years FY16 to FY20 is provided in Table 1-2, and Figure 1-1.

Table 1-2
Investment by Spending Rationale ($ millions)

Spend Rationale	FY16	FY17	FY18	FY19	FY20	Total
Customer Requests/Public Requirements	87.6	86.4	91.7	93.4	94.1	453.1
Damage/Failure	40.2	40.1	38.1	38.6	38.4	195.4
System Capacity and Performance	166.8	125.2	159.4	140.0	93.2	684.7
Asset Condition	147.5	195.0	218.0	259.0	317.2	1136.7
Non-Infrastructure	5.5	6.2	6.0	6.0	6.1	29.9
Total	447.7	452.8	513.2	537.0	549.0	2499.7

Figure 1-1
Investment by Spending Rationale by Year FY16-FY20



Spending Rationale Totals

Twenty six percent ($648.5 million) of the planned infrastructure investment is in the Customer Requests/Public Requirements and Damage/Failure spending rationales. This work is required to address items that are mandatory and non-discretionary in terms of timing. Examples of such work include new business requests, municipal interconnections, capital work done to repair a portion of a distribution feeder damaged in a storm event, and facility relocations to accommodate municipal public works projects.

The System Capacity and Performance spending rationale accounts for approximately 27 percent ($684.7 million) of the total investment in the Plan, and includes investments to ensure substations and feeders can reliably supply customer load within system design criteria. Examples of investments in this rationale include investments to bring substations into NPCC design, protection and operation standards, to address reliability issues identified as a result of system studies, and planned expansions and network upgrades to accommodate load growth associated with the Luther Forest industrial park expansion.

The Asset Condition portion of the Plan represents nearly 45 percent ($1136.7 million) of total planned investment. Programs in this rationale aim to mitigate future risks and consequences of potential failures caused by deteriorated assets. An example of a program in this spending rationale is the rebuild of the Gardenville Station, which is a 230/115kV complex south of the Buffalo area.

1. B. Investment by System

Following is a summary of planned investment by system. Chapters 2, 3 and 4 detail the transmission, sub-transmission and distribution system spending, respectively.

Transmission System Summary

The transmission system consists of approximately 6,000 miles of transmission line, 313 transmission substations, more than 500 large power transformers and over 700 circuit breakers at operating voltages above 69kV. To serve the needs of customers over the five year period covered by this Plan, the Company expects to invest approximately $944 million on the transmission system, as shown in Table 1-3 below. The majority of planned transmission system investment is in the System Capacity and Performance and Asset Condition spending rationales. The System Capacity and Performance category includes spending to address generator retirements, NERC/NPCC standards and transmission owner led system studies. Substantial portions of the planned investment in the Asset Condition category relate to conductor clearance, substation rebuild and overhead line refurbishment programs.

Table 1-3
Transmission System Capital Expenditure by Spending Rationale ($millions)

Spend Rationale	FY16	FY17	FY18	FY19	FY20	Total
Customer Requests/Public Requirements	0.5	0.0	0.0	0.0	0.0	0.5
Damage/ Failure	9.0	8.5	6.0	6.0	6.0	35.4
Non-Infrastructure	2.6	3.2	3.0	3.0	3.0	14.8
System Capacity /Performance	93.3	58.6	76.7	57.7	11.9	298.2
Asset Condition	61.3	101.6	103.3	139.4	189.1	594.7
Total	**166.8**	**172.0**	**189.0**	**206.0**	**210.0**	**943.8**

Sub-Transmission System Summary

The sub-transmission system includes approximately 4,240 miles of lines including: 290 miles of 69kV, 365 miles of 46kV, 2,332 miles of 34.5kV, 1,050 miles of 23kV and 200 miles of lines below 23kV. To serve the needs of customers over the five year period covered by this Plan, the Company expects to invest approximately $182 million on the sub-transmission system, as shown in Table 1-4 below.

Table 1-4
Sub-Transmission System Capital Expenditure by Spending Rationale ($millions)

Spend Rationale	FY16	FY17	FY18	FY19	FY20	Total
Customer Requests/Public Requirements	1.6	1.5	2.3	3.7	3.2	12.3
Damage/Failure	3.4	3.5	3.5	3.6	3.0	16.9
System Capacity & Performance	3.3	3.6	1.2	2.0	2.9	12.9
Asset Condition	19.0	20.5	32.1	33.3	34.9	139.8
Total	**27.3**	**29.0**	**39.1**	**42.5**	**44.0**	**181.9**

This five year Plan envisions significant expenditures on the sub-transmission system in the areas of asset condition and system capacity and performance. Projects previously classified as sub-transmission station projects have now been redirected into transmission or distribution budgets.

Distribution System Summary

The Company's distribution system consists of lines and substations typically operating at 15kV and below. There are nearly 36,000 circuit miles of overhead primary wire and nearly 7,500 circuit miles of underground primary cable on the system supplying approximately 400,000 overhead, padmount and underground distribution transformers. Additionally, there are 421 substations providing service to the Company's 1.6 million electric customers.[4] The current five year plan for distribution is presented in Table 1-5.

Table 1-5
Distribution System Capital Expenditure by Spending Rationale ($millions)

Spend Rationale	FY16	FY17	FY18	FY19	FY20	Total
Customer Requests/Public Requirements	85.5	84.9	89.3	90.9	89.7	440.3
Damage/Failure	27.7	28.1	28.6	29.5	29.1	143.0
System Capacity & Performance	70.1	63.0	81.5	78.4	80.3	373.4
Asset Condition	67.3	72.9	82.6	93.2	86.3	402.2
Non-Infrastructure	3.0	3.0	3.0	3.1	3.0	15.1
Total	**253.6**	**251.8**	**285.1**	**295.0**	**288.5**	**1374.0**

This Plan envisions the majority of investment in the distribution system will be in the Customer Requests/Public Requirements, System Capacity and Performance, and Asset Condition spending rationales.

[4] The distribution system data was taken January 24, 2015 from National Grid Asset Information Website located at http://usinfonet2/OurOrganization/NetworkStrategyUS/AssetManagement/Pages/AssetDetails.aspx.

1. C. Opportunities and Challenges

Among the opportunities and challenges facing the Company and its customers over the period covered by this five year Plan are:

- Changing regulatory or compliance requirements requiring increased or different investments (e.g., changes in the definition of Bulk Electric System that will result in increased investment requirements, or accelerated remediation requirements resulting from NERC actions).
- Implementation of initiatives to accommodate increased deployment of distributed energy resources and electric vehicles, increase penetration of large-scale renewable resources and the infrastructure needs to accommodate those resources.
- Expansion of advanced grid applications.
- Investments in transmission upgrades to increase upstate to downstate transfer capacity.[5]
- Changes in the existing generation supply portfolio in the region, such as the potential closure of large generation units that may require electric delivery infrastructure solutions, the development of processes to evaluate and accommodate generation closures and repowering and potential growth in distributed generation including renewables.
- Challenges related to targeted replacement of assets whose overall condition is becoming degraded and that are well beyond typical asset lives, including increased operations and maintenance spending and service reliability issues.
- Introduction of large spot loads on the system that may require significant system reinforcements in relatively short timeframes.
- Investments to improve storm resilience (See discussion below).
- Investments to bring forward the goals and opportunities envisioned in the Commission's proceeding on Reforming the Energy Visions (See discussion below).

The Company will continue to monitor and evaluate developments in these and other areas and adjust its investment plans as appropriate to meet changing needs and maximize opportunities for greater efficiency consistent with providing safe and adequate service to customers.

[5] The Company has been engaged in developing transmission project alternatives in connection with Case 13-E-0488 (the "AC Proceeding") and related proceedings. Capital investments associated with those project alternatives are not included in this Plan.

Storm Resilience Investments

The June 22, 2013 Report of the Moreland Commission on Utility Storm Preparation and Response ("Report") reviewed the responses of the State's utilities to several recent major weather events, including Superstorm Sandy, Tropical Storm Lee and Hurricane Irene. The Moreland Commission report included several recommendations regarding capital investment and utility operations intended to make utility systems more resilient to future storm events and mitigate the impacts of such events on customers. Recommendations to make the system more resilient include:

- Revised design standards
- Targeted response to flood potential
- Critical equipment location review
- Changes in material types and sizes
- Use of underground cables in specific areas or conditions

The Report recommended developing new standards for future replacement projects and the use of asset health assessments in determining the initial priority of capital investments. National Grid currently prepares and files with the PSC an annual Asset Condition Report and information developed for that report guides the Company's capital investment plan. Increased resilience and infrastructure hardening have been consistent elements of past work plans. Such work includes:

- Additional line fusing
- Small wire replacement
- Tree wire installation
- Select feeder hardening
- Circuit automation
- EMS/communications
- Recloser installations
- Station flood mitigation

As resilience-related investments increase, future capital plans will likely reflect increased spending levels due to greater material and equipment costs. For example the Company may use underground cable in specific locations to avoid overhead damage risk where pole and overhead conductor may have ordinarily been used in the past. Undergrounding such facilities may provide greater storm resilience but also results in greater initial capital investment than an overhead installation.

Similarly, the Company has standardized the use of class 3 poles. Class 3 poles are larger diameter, stronger poles than the class 5 poles previously used by the Company in many standard applications. The Company is also looking at extending the locations that should be hardened by the use of grade B construction. Grade B construction is typically used in situations where a failure could cause significant impact, such as highway or waterway crossings. The Moreland Commission report recommended targeting critical infrastructure in communities and hardening those locations to reduce

outage risk. The Company has revised its standards to provide guidance on the use of grade B construction for different situations such as to reduce risk of service loss to critical community infrastructure. Such revisions include use of stronger H1 class poles for new recloser and loadbreak installations, the use of fiberglass crossarms for deadends rather than use of wood crossarm assemblies, and the use of grade B construction for all new double circuit construction.

The Company has standardized the use of tree wire and spacer cable construction for treed and heavily treed areas, respectively. Tree wire has more insulation than covered wires used in the past, providing improved performance in treed areas. Spacer cable construction uses a grounded messenger above conductors and a compact bundle construction to improved line performance in heavily treed areas.

In the fiscal year 2016 plan the following projects explicitly address storm hardening and resiliency efforts.

- Side Tap Fusing
- Blue Ridge Rd Storm Hardening
- Hoffman Rd Storm Hardening
- Chestertown 51 Storm Hardening
- Chestertown 52 Storm Hardening
- Battenkill 57 Storm Hardening
- Front St Flood Mitigation
- St. Johnsville Flood Mitigation
- Whiteboro Flood Mitigation
- Union Falls Flood Mitigation
- Lowville 77354 Storm Hardening
- East Pulaski 32451 Storm Hardening
- Alder Creek 70152 Storm hardening

Although some investments in the Plan explicitly address storm hardening and preparation for severe weather events, storm hardening-related costs are also reflected in other projects and programs in the form of enhanced standards or equipment costs. A hardened system will reduce reliability impacts caused by storm events, but will take many years to implement.

Reforming the Energy Vision ("REV")

The Commission is undertaking a comprehensive examination of the State's energy system with the aim of developing regulatory policies to promote more efficient use of energy, greater penetration of solar and wind resources, broader deployment of distributed energy resources, and greater use of advanced energy management products, among other things. Investments in this Plan are consistent with advancing the goals of REV. For example, the Company has identified a number of sub-transmission automation project candidates and a series of energy management system ("EMS") projects that will add foundational capabilities to support REV objectives. In addition, all new substations will be incorporated into the Company's SCADA

(supervisory control and data acquisition) system, and several substation projects provide for retirement of antiquated facilities to which our control centers currently have no visibility or control. As the REV process advances and new technologies and systems emerge, the Company will revise its investment plan as necessary to achieve an outcome that promotes the REV objectives and the interests of customers.

Non-Wires Alternatives

As part of its 2010 electric rate case (Case 10-E-0050), National Grid committed to developing a process to evaluate non-wires alternatives (NWAs) to traditional infrastructure investments. The Company has established a set of planning guidelines and criteria for the review and consideration of NWAs. These guidelines include two stages of review: one by transmission and distribution planners as they review potential capital investment needs; and another by the Product & Energy Services group project managers in the Company's customer organization. A further discussion of the NWA process is provided in Exhibit 5.

Bill Impacts

The Company prepared a simplified analysis to estimate the revenue requirement effects in fiscal years 2016, 2017 and 2018 associated with the proposed capital investment levels included here, as well as an estimate of the associated per kWh impact of the resulting revenue requirement on a residential SC1 customer. For a typical residential SC1 customer, the allocated per kWh cost resulting from the investment levels included in the Plan would be $0.00271/kWh in FY2016; $0.00433/kWh in FY2017; and $0.00607/kWh in FY2018. Details of the simplified analysis are included in Exhibit 4 of this filing.

1. D. Developing the Capital Investment Plan

The Capital Investment Plan is based on the Company's current assessment of the needs of the electric delivery system over the Plan period. The investments described in this Plan are needed to provide customers with safe and adequate electric service, meet regulatory requirements, address load growth/migration, and replace equipment that is damaged or that fails. The investment levels in the Plan do not reflect costs of investments that may be needed to implement or accommodate new public policy initiatives, new regulatory requirements, technological developments, or the integration of renewable technologies that are not explicitly covered in the Plan.

Mandatory programs and projects (i.e., those under Customer Requests/Public Requirements and Damage/Failure spending rationales) known at this time are included in the Plan. Such programs and projects include new customer and generator connections, regulatory commitments, public requirements that necessitate relocation or removal of facilities, safety and environmental compliance, and system integrity projects such as response to damage/failure and storms.

Programs and projects in the other categories (i.e., System Capacity and Performance and Asset Condition spending categories) are developed based on system studies and evaluation of existing assets by subject matter experts for inclusion into the Plan. Inclusion/exclusion for any given project is based on several different factors including, but not limited to: project in-progress status, risk score, scalability, and resource availability. In addition, when it can be accomplished, the bundling of work and/or projects is analyzed to optimize the total cost and outage planning. The Company's objective is to arrive at a five year capital budget that is the optimal balance in terms of making the investments necessary to maintain the performance of the system for customers, while also ensuring cost-effective use of available resources.

The Plan budget is developed in a manner that is consistent with, and influenced by, the programs and initiatives being implemented as a result of the management audit in Case 08-E-0827. Those programs and initiatives will continue to mature and improve with time, resulting in further improvements in the capital planning and delivery processes for the benefit of customers. In addition, because of the time horizon over which the Company must budget its infrastructure investments, there are inevitable changes in budgets and project estimates over time. Such changes may be due to changes in project scope, changing material or resource costs, changing customer needs, or a more refined estimate based on where the project is in its development. External factors, such as generation retirement announcements or new regulatory or legislative requirements, also drive changes in the Plan budget.

Cost estimates for projects that are already in-process, or are soon to be in-process, generally have +/- 10% cost estimates. Other projects at earlier stages in the project

evolution process, and the budgets for those projects are accordingly less refined and are more susceptible to changes in scope and budget. The projects in the Company's portfolio are continuously reviewed for changes in assumptions, constraints, as well as project delays, accelerations, weather impacts, outage coordination, permitting/licensing/agency approvals, and system operations, performance, safety, and customer driven needs that arise; and is updated accordingly throughout the year.

The Company includes certain Reserve line items in its Capital Investment Plan to allow flexibility to accommodate contingencies not known at the time the plan is developed and to allocate funds for projects in future years whose scope and timing have not yet been determined. Reserve funds for budget years 1 and 2 are typically negative values and are established to acknowledge the risk associated with projects that may arise in response to unforeseen concerns such as the replacement of damaged or failed equipment, customer or generator requirements, regulatory mandates, or delays in licensing and permitting of larger projects. For future year budgets, typically years 3 through 5, historical trends are used to develop the appropriate reserve levels and are typically a positive value. As specific project details become available, emergent projects are added to the Plan with funding drawn from the reserve funds or individual projects in the plan are re-prioritized. The Company tracks and manages budgetary reserves and emergent work as part of its investment planning and current-year spending management processes, and reports that information quarterly to Staff.

The Company uses different approaches to deliver the investment Plan based on the differences in scope and character of Transmission and Distribution construction. With respect to the Transmission portion of the Company's investment plan, the Company will supplement its internal workforce with competitively procured contractor resources. On the Distribution side, the Company's internal workforce will continue to be primarily supplemented by the Company's Distribution Alliance contractor and competitively procured contractor resources.

The Company's risk-based approach to selecting projects and programs for inclusion in the Plan, coupled with its efforts to improve cost estimating and implement performance metrics that include substantial financial consequences, results in a capital investment budget that meets the needs of customers at reasonable cost.

1. E. Organization of this Filing

The remainder of this Plan provides detail on the programs and projects that comprise the Five Year Capital Investment Plan. The document is segmented into the following chapters:

Chapter 2 - Transmission System

Chapter 3 - Sub-Transmission System

Chapter 4 - Distribution System

Chapter 5 - Investment by Transmission Study Area

Chapter 6 – Exhibits

Chapter 2. Transmission System

The transmission system consists of approximately 6,000 miles of transmission line, 313 transmission substations, more than 500 large power transformers, and over 700 circuit breakers at operating voltages above 69kV. The Company expects to invest approximately $944 million on the transmission system over the next five years as shown in Table 2-1 below.

Table 2-1
Transmission System Capital Investment by Spending Rationale ($millions)

Spend Rationale	FY16	FY17	FY18	FY19	FY20	Total
Customer Requests/Public Requirements	0.5	0.0	0.0	0.0	0.0	0.5
Damage/ Failure	9.0	8.5	6.0	6.0	6.0	35.4
Non-Infrastructure	2.6	3.2	3.0	3.0	3.0	14.8
System Capacity /Performance	93.3	58.6	76.7	57.7	11.9	298.2
Asset Condition	61.3	101.6	103.3	139.4	189.1	594.7
Total	**166.8**	**172.0**	**189.0**	**206.0**	**210.0**	**943.8**

The $943.8 million 5-year transmission system investment level in this Plan is $7.4 million more in total than the 5-year investment level of the 2014 Plan. The remainder of the chapter briefly describes major capital investment programs that comprise a significant portion of the Company's overall five-year transmission capital investment Plan. A complete list of all Transmission projects in the capital plan can be found in Exhibit 1.

The sections below describe the investment drivers and customer benefits along with a description of significant changes from last year's Plan. Specific asset condition and performance issues are described in further detail in the annual Report on the Condition of Physical Elements of Transmission and Distribution Systems filing to the PSC, most recently filed October 1, 2014.

2. A. Customer Requests/Public Requirements

Transmission investments in this spending rationale can include land rights and public requirements including municipal, customer interconnections and wind farms. Because customer interconnection projects are typically reimbursable (i.e., costs incurred by the Company are paid for by the customer), there is no net effect to the capital plan from such projects. The Company does not anticipate any significant non-reimbursable Customer Requests/Public Requirements transmission system projects over the 5-year period of this Plan.

The New York Power Authority (NYPA) is working with New York State Electric & Gas (NYSEG) to install the "Marcy South Series Compensation" project on the 345kV transmission system as part of the Transmission Owners' Transmission Solutions (TOTS) project in Central NY. During the development of this project, it was determined that protective relays and circuit breakers, located at Company-owned 345kV substations, would need to be modified / upgraded as a consequence of the project. These projects are included in the Customer Requests/Public Requirements spending rationale and expected to be reimbursable to the Company with no net effect on the projected capital investment in this Plan.

2. B. Damage/Failure

The Damage/Failure investment levels for the transmission system are based on historical actual costs. The Company does not forecast any significant specific transmission system projects in the Damage/Failure spending rationale over the 5-year period of this Plan except for the Leeds Static Var Compensator ("SVC") Transformer and North Leroy Transformer replacement projects discussed below.

Leeds SVC B Phase Transformer Replacement

On June 25, 2014 the Leeds Station SVC B phase transformer tripped out on fault pressure due to animal contact on Switch 533. During testing of this transformer, it was determined that the B phase transformer failed internally. The transformer was replaced with a system spare single phase transformer and the SVC was returned to service. This project is to replace the installed system spare transformer at Leeds with a new 345-18kV; 60/80/100 MVA transformer.

Drivers:

The B phase transformer failed and a replacement is needed to replace the system spare.

Customer Benefits:

A re-wind of the failed transformer was investigated; however, the cost savings of the re-wind compared to the cost of a brand new transformer was minimal. A new transformer has a projected long term life span of 45-60 years where a rewound transformer usually has a life span of 25-35 years per industry standards.

2014 to 2015 Variance:

This damage/failure project was not in the 2014 Plan.

Table 2-2
Transmission – Leeds SVC B Phase Transformer Replacement
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	-	-	-	-	-	-	-
2015	-	1.4	-	-	-	-	1.4

North Leroy Transformer #1 Replacement

The North Leroy transformer has been tested through in-service and diagnostic analysis and is showing signs of internal deterioration. This transformer DGA analysis of the oil indicates it has been wet since 2007 due to a warped top lid. The transformer is being replaced with a larger 115-34.5kV;15/20/25 MVA transformer with an LTC and a new pad will be constructed with oil containment to meet current substation engineering specifications. The transformer protection equipment will also be upgraded to current engineering standards.

Drivers:

This transformer has experienced multiple oil spills in recent years and the substation is on the New York State Department of Environmental Conservation's ("NYDEC's") list as requesting a permanent solution. Since 2010, National Grid has reported four non-PCB oil spills to NYDEC associated with noted oil releases from the transformer (March 25, 2010; July 18, 2011; April 14, 2012; and May 18, 2012). The DGA analysis using Duval's triangle suggests the transformer has been subjected to thermal thru faults ranging from 300 to 700 degree C and the high side winding paper has shown significant paper deterioration.

Customer Benefits:

The benefit of this project will be assurance of the availability of the 34.5kV distribution load supplied in the South Genesee network area where North Leroy station is one of six sub-transmission stations serving the area. Otherwise customers would be exposed to radial supply and become susceptible to interruption or unacceptable low voltage after a single contingency.

2014 to 2015 Variance:

This damage/failure project was not in the 2014 Plan.

Table 2-3
Transmission – North Leroy Transformer #1 Replacement
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	-	-	-	-	-	-	-
2015	-	0.4	1.8	0.1	-	-	2.3

2. C. System Capacity and Performance

There are three significant areas of transmission system investment in the System Capacity and Performance spending rationale in the next five years: generator retirements, NERC/NPCC standards, and transmission owner led system studies.

2 C.1 Generator Retirements

Generator retirement related projects are intended to reinforce the transmission system to avoid or mitigate reliance on market generators to maintain system reliability and performance. In this Plan, the Company has included several transmission projects intended to mitigate the impacts of the closure or potential closure of the Dunkirk, Cayuga and Syracuse Energy Project generating facilities.

Dunkirk

On March 14, 2012, NRG announced plans to mothball its coal fired generation located at Dunkirk. An analysis by National Grid (Part 1) identified near-term projects that would mitigate the system impact of the mothballing for all but one 115kV generating unit. These near-term projects were completed by June 1, 2013. A second analysis (Part 2) of a full generation shutdown was later completed that identified more long-term system reinforcements needed.

In January 2013, the Public Service Commission directed a comparative evaluation of generation repowering and transmission alternatives to address the issues that would result from shutdown of the Dunkirk plant. In February 2014, National Grid and Dunkirk reached a 10-year agreement between them whereby Dunkirk would add gas-fired capability to Units 2, 3 and 4 in exchange for payment from National Grid of approximately $20 million per year. The agreement anticipates a target in-service date of September 2015 and would provide reliability benefits in National Grid's western New York service area, as well as promote a variety of economic, environmental, operational, and market benefits. The agreement would also increase the Company's flexibility with respect to the timing of certain transmission investments for western New York. The Commission approved the agreement in June. Nevertheless, the agreement does not eliminate the need for transmission investment in the area, and the following projects are included in the Plan:

- Reconductoring of two 115 kV lines between Five Mile Road and Homer Hill, each 7.4 miles in length. (C047319) - $8.7m.
- Homer Hill Substation 115kV bus upgrade. (C059300) - $0.2m.

Drivers:

A 2013 transmission study of Western New York tested both N-1 and N-1-1 design criteria, compliance with NERC TPL Standards, NPCC Directory #1, NYSRC Reliability

Rules and the Company's Transmission Planning Guide (TGP 28). These standards require the entire transmission system to meet N-0 and N-1 voltage, thermal and stability criteria as well as the bulk power system and long lead time items to meet the same criteria for N-1-1 conditions. The transmission investments identified allow for the potential scenario where the Dunkirk units are unable to return to service as anticipated.

Customer Benefits:

Exposure to service interruptions and performance degradation, including potential load shedding in the event of certain key contingencies, would be reduced significantly. In addition, completing these projects would allow the RSS contract to be terminated before the refueled units are available.

2014 to 2015 Variance:

The difference in spend between the 2014 Plan and this year relates primarily to investment made in FY15 which is not included in this FY16-FY20 forecast. The installation of capacitor banks at Huntley (C047316) and Dunkirk (C047318) totaling $1.4M combined was completed in FY15. The Five Mile - Homer Hill reconductoring project commenced in FY15 as well and will be completed in FY16.

Table 2-4
Transmission - Dunkirk Generation Mothballing
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	11.1	6.4		-	-	-	17.5
2015	-	8.9	-	-	-	-	8.9

Cayuga

To meet existing needs within its Auburn region, NYSEG has proposed construction of a new 115kV line between the National Grid Elbridge substation and the NYSEG State Street substation. This new line would parallel the existing #5/#972 lines between the same two substations on the existing rights-of-way owned by the two companies respectively. The State Street substation predominately supplies load in the Auburn area of NYSEG service territory. The #5 line shares a single double-circuit tower with the #15 line in a right-of-way owned by National Grid. The #15 line serves load in the Geneva area of the NYSEG service territory. The National Grid right-of-way also includes other lines that connect to RG&E and National Grid facilities further to the west in New York State.

In September 2012, the owners of the Cayuga generating plant (within the NYSEG service territory) announced plans to mothball both units. A subsequent joint analysis by the NYISO, NYSEG, and National Grid determined that system performance would not meet regulatory reliability criteria if the two Cayuga generators were no longer available.

The long term solution that was identified by the joint analysis team to mitigate both the existing problems in the Auburn area as well as the reliability problems resulting from mothballing of Cayuga generation comprises the following major components with investment levels greater than $2 million:

- Construct a new 115kV line on the National Grid right-of-way (10.3 miles) between Elbridge and the NYSEG right-of-way to the State Street substation (C047298) - $8.9m (this project is proposed to be built and owned by NYSEG).
- Add a second set of new conductors onto the new double-circuit towers built to hold the new line between the Elbridge substation and the NYSEG right-of-way to State Street; connect this second set of new conductors so as to serve as the #15 line over this 10.3 mile section of right-of-way; bus together on existing towers the old conductor of the #15 line and the existing conductor of the #5 line over the 10.3 mile section of the National Grid right-of-way between the Elbridge substation and the NYSEG right-of-way to State Street (C047297) - $3.6M (this project is to be reimbursed by NYSEG).
- Add two breaker positions in the Elbridge substation for the new 115kV line to State Street and the relocated #15 line (C047299) - $3.1m (this project is to be reimbursed by NYSEG).

Drivers:

The new 115kV line between Elbridge and State Street is driven by NYSEG's needs to serve its customer load in the Auburn area. These needs relate to load growth and to voltage performance and existed prior to the announcement of Cayuga generator mothballing.

Customer Benefits:

These projects are in support of NYSEG to maintain reliable service to its customers.

2014 to 2015 Variance:

The primary variance between the 2014 and 2015 Plans results from a delay in the Article VII approval process and a refinement of cost estimates. The capital forecast in Table 2-4 below includes only those projects that are fully reimbursable by NYSEG. Because such projects are expected to be fully reimbursable, they will not affect National Grid's net capital spending in the long run.

Table 2-5
Transmission - Cayuga Generation Shutdown
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	19.6	3.1	0.3	-			23.0
2015	-	12.0	1.0	2.6	-	-	15.6

Syracuse Energy

In June 2013 GDF SUEZ announced plans to retire its Syracuse Energy Generation facility. A subsequent joint analysis by the NYISO and National Grid determined that system performance would not meet regulatory reliability criteria if this plant were retired.

Performance of portions of the Syracuse area transmission system was shown to be dependent upon the output of local area generation. The major project triggered by the Syracuse Energy facility retirement is reconductoring the Clay – GE #14 115kV line (C045253 - $5.1m).

Drivers:

With Syracuse Energy retired, the Clay – GE #14 line was found to become loaded beyond LTE and STE ratings for certain applicable N-1-1 criteria contingency testing. To bring this line back into compliance with criteria, 4.67 miles of 4/0 copper conductor will need to be replaced with 795 ACSR.

Customer Benefits:

This project will eliminate the exposure to potential service interruptions including load shedding in the event of certain key contingencies.

2014 to 2015 Variance:

Reconductoring the Clay – GE#14 line began in FY15 and will conclude in FY16.

Table 2-6
Transmission – Syracuse Energy Generation Retirement
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	10.1	3.3	-	-	-	-	13.4
2015	-	5.1	-	-	-	-	5.1

The Company does not control, and has limited ability to project, future generator retirements. As a result, investment plans related to unannounced retirements are difficult to develop. The Company participates actively in NYISO working groups that monitor generator retirements, and is working with the NYISO and other transmission owners in an effort to assess impacts of potential generator retirements across the state. To the extent future generator retirement announcements affect the Company's investment needs, the Company's subsequent investment plans will reflect those investment needs.

2 C.2 NERC/NPCC Standards

Projects in this investment area are designed to bring the Company into compliance with applicable regulatory planning standards.

Substation Compliance Upgrades and Critical Infrastructure Protection

Projects to upgrade the Clay 115kV (C028705) and Porter 115kV (C028686) substations to meet recently applicable NPCC criteria have mostly been completed with only $100K forecasted to be spent in FY16 on Porter's 115kV rebuild. Upgrades to 230kV circuit breakers, disconnect switches and potential transformers at Porter are also needed to comply with applicable system standards (C036866 - $16.3m).

NERC's Critical Infrastructure Protection v5 Reliability Standards specify that consistent and sustainable security management controls must be established to protect Bulk Electric System ("BES") cyber systems against compromise that could lead to instability in the BES.

Drivers:

In accordance with NPCC criteria adopted in April 2007, testing of qualifying substations across New York State was performed by the NYISO. The results indicated Clay and Porter 115 kV substations as facilities that were required to be brought into compliance with specific NPCC design, protection and operation requirements. Critical Infrastructure Protection v5 applies to National Grid and has an enforcement date of April 1, 2016.

Customer Benefits:

In addition to compliance with NPCC and NYSRC requirements, the benefits of completing these projects are reductions in system vulnerability to certain severe contingencies identified in system studies. Customers throughout central New York will benefit from reduced vulnerability of the transmission system to such contingencies. Implementing the proper cyber security hardware and software systems protects the BES.

2014 to 2015 Variance:

The current construction sequence has the Clay and Porter 115kV projects completing by FY16. The 230kV breakers, disconnects and potential transformers at Porter are on track to be replaced by FY19. The Critical Infrastructure Protection v5 work is scheduled to be completed in FY16 to meet the April 1, 2016 deadline.

Table 2-7
Transmission – Substation Compliance Upgrades
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	3.4	0.1	0.3	1.0	15.0	-	19.8
2015	-	2.1	0.9	1.0	15.0	-	18.9

2 C.3 Transmission Owner Led System Studies

These projects are the result of studies performed by the Company's Transmission Planning department. Needs and alternative solutions are investigated during periodic area studies to determine whether the system complies with reliability standards. Included in this testing are; compliance with NERC TPL Standards, NPCC Regional Reliability Reference Directory #1, NYSRC Reliability Rules and the Company's Transmission Planning Guide (TGP 28). These standards require the entire transmission system to meet voltage, thermal, and stability criteria.

Eastern NY Division Reinforcements

Reinforcements in the Northeast region are focused on the Saratoga and Glens Falls areas of the Company's eastern division. These reinforcements address thermal and voltage needs that arise from accelerated load growth, particularly at Luther Forest Technology Campus ("LFTC"). The major components in this program include:

- Installation of a new Eastover Road 230/115kV substation near where the existing Rotterdam-Bear Swamp 230kV line crosses the existing Mohican-North Troy #3 line and the Battenkill-North Troy #10 115kV lines. This station would serve as a primary source to 115kV lines serving the east side of the Northeast Region. (C031326 - $3.3m & C031419 - $1.2m)
- Installation of a second 230/115kV transformer in the Eastover Road substation. This second transformer will relieve loading of the Rotterdam 230/115kV transformers. (C060247 - $5.5m)
- Rebuild the Mohican-Battenkill #3 and #15 lines between Mohican and Battenkill substations and reconductor 14.2 miles of the #15. This project requires an Article VII application on which the Company is currently working. (C034528 - $32.8m)
- Installation of the Ballston Tap Switching Station and line tap (C060250 - $9.2m and C060251 - $1.1m respectively) and the Mulberry Tap Switching Station and line tap (C060252 - $9.2m and C060253 -$1.1m respectively). These switching stations are associated with the load growth at LFTC.
- Installation of a cap bank at Ticonderoga. (C060254 - $1.9m)
- Reconfigure the Rotterdam 115kV connections of the TB6 and TB7 transformers on the 99G and 33G buses. This reconfiguration will relieve stress on all the Rotterdam 230/115kV transformer banks. (C060255 - $2.1m)

Other reinforcements in the Company's eastern division are focused in the Capital and Hudson areas. The major components in this program include:

- Installation of reactors in #19 and #20 lines. The reactors will increase the impedance of these lines, thus reducing power flow on them to a level that is within their thermal rating. (C060246 - $1.6m)
- Reconductor twelve miles of the Rotterdam-Menands line (#11/8/10) to relieve potential contingency overloads. (C060243 - $1.2m)

Drivers:

The transmission system serving the Northeast Region is currently exposed to post contingency thermal overloads during summer peak periods, on certain transformers at Rotterdam and the Mohican-Battenkill 115kV Circuit. These conditions present a need to relieve 115kV thermal overloads which affect the transmission supply to the Northeast Region and to add transformation capacity.

Projected load growth at the Global Foundries (GF) chip-manufacturing plant at the Luther Forest Technology Campus (LFTC) site further exacerbates transmission system performance issues within the Northeast Region. This drives the addition of the second Eastover transformer and the addition of the Ballston and Mulberry Tap Switching Stations.

The transmission system serving the Capital/Hudson area is also currently exposed to post contingency thermal overloads during summer peak periods. These overloads affect the #19 and #20 lines, and the #11/8/10 Rotterdam–Menands line.

Customer Benefits:

These improvements will strengthen the transmission network and ensure adherence to reliability standards. They will correct existing asset condition, safety, and environmental concerns, and resolve existing thermal and voltage problems, and allow for accelerated load growth currently projected at LFTC. Significant load shedding would otherwise be necessary to relieve projected overloads without the proposed projects.

In addition, the reinforcements in Eastern NY will reduce dependence on local generation for reliability of service within the region. Without local generation available during the summer periods, the Spier-Rotterdam 115 kV circuits will be exposed to single contingency overloads until the local generation is returned to service. This in turn could require load shedding at or near LFTC for relief. This situation will be resolved with the addition of Eastover Road Substation and the Mohican-Battenkill reconductoring.

2014 to 2015 Variance:

The variance between the 2014 and the 2015 Capital Investment Plans (CIP) results in part from the shift forward of the five year timeframe in this CIP compared to the previous CIP, such that projects nearing completion have less spending left in the

current five year timeframe. Completion of other projects such as the Eastover substation and Mohican-Battenkill #15 has been delayed. This results in a spending shift and in some cases a net increase in project cost.

The variance also results from new projects that were not included in the 2014 CIP. New projects include the second Eastover transformer, the Ballston and Mulberry Tap Switching Stations, the Ticonderoga cap bank, the reconfiguration of the Rotterdam substation, reactors in #19 and #20 lines, and the reconductoring of the Rotterdam-Menands line.

Table 2-8
Transmission – Eastern NY Region Reinforcement
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	27.4	17.5	1.6	4.7	8.8	-	59.9
2015	-	33.7	17.9	16.9	1.6	1.2	71.4

Western NY Region Reinforcements

This program involves significant capital expenditure over the next five years and beyond to construct major reinforcements of the 115kV transmission systems in western New York, including the Southwest and Genesee regions that extend from the Buffalo area east to Mortimer Station and south to the Pennsylvania border. This program will strengthen the transmission network and ensure adherence to reliability standards. It will correct existing asset condition, safety, and environmental concerns resulting in improved reliability of several circuits and reflects a gas addition agreement for the Dunkirk generating plant.

The major components in this program with investment levels greater than $1 million (costs shown are for the period covered by this Plan) include:

- Constructing the new 345/115kV Five Mile Station near the Homer Hill Station tying into the Homer City-Stolle 345kV line #37 and the Gardenville-Homer Hill 115kV lines #151 and #152 to support area voltage (C024015 and C024016 - $17.5m)
- Reconductoring 14 miles of the Erie-Packard 115kV #181 circuit due to loading concerns for loss of the #182 line or the Homer City 345 kV source. (C050744 - $49.1m)
- Constructing a new 115kV substation and ring bus at West Golah that ties together the National Grid #119 and NYSEG # 906 lines (C050695 - $7.3m)

Drivers:

Studies of the 115kV and 230kV transmission systems were conducted for the Frontier, Southwest and Genesee regions of western New York, to determine compliance with

applicable reliability standards. Studies initially performed in 2007 and repeated in 2012, 2013, and 2014 evaluated the system for existing load levels up to a 15 year forecasted load level. Included within each of these evaluations was testing of both N-1 and N-1-1 design criteria, ensuring compliance with NERC TPL Standards, NPCC Directory #1, NYSRC Reliability Rules and the Company's Transmission Planning Guide (TGP 28). These standards require the entire transmission system to meet N-0 and N-1 voltage, thermal and stability criteria as well as the bulk power system and long lead time items to meet the same criteria for N-1-1 conditions. Several reliability criteria issues for the area were discovered under various study conditions. In the Southwest Region, multiple reinforcement projects are required to correct all N-1 conditions.

Customer Benefits:

Customers will benefit from this program in several ways, including:

- Exposure to service interruptions, including load shedding, in the event of certain key contingencies would be reduced significantly. The need to dispatch generation out of merit order to ensure voltage support and stability will be reduced or avoided.
- Circuits that are normally open, which provide a backup source to loads in the Homer Hill area will be operated normally closed, reducing the frequency and length of outages for certain contingencies.
- Some capability to accommodate new or expanding load will be added to the system.

2014 to 2015 Variance:

The variance between the 2014 and 2015 Plans is due to shifts in timing of the construction of the projects above. Also the project to add a phase angle regulator (PAR) to the 171 line was removed from the Plan as further studies are being conducted to define the need and any other possible options.

Table 2-9
Transmission – Western NY Region Reinforcements
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	24.3	9.7	24.6	14.1	7.0	-	79.7
2015	-	15.2	4.4	28.7	20.5	5.0	73.9

Central NY Region Reinforcements

Syracuse Area Reinforcements

The Syracuse Area Reinforcements program is focused on system improvements in and around the Syracuse area that resulted from annual studies performed prior to 2014. These reinforcements are necessary to respond to system capacity and performance needs and to avoid thermal overloads during contingency conditions.

The program scope includes:

- Reconductoring two separate parts of the Clay–Teall 115kV Line #10, 6.75 miles and 6.08 miles sections, as well as 10.24 miles of the Clay-Dewitt 115kV #3 line. This project is required for compliance with mandatory NERC standards (C043995 - $37.3m)
- Reconfiguring Transformer connection at Clay Substation (C047275 - $7.9m)

Drivers:

Annual studies of the 115kV and 345kV transmission systems are conducted for the Central region of New York, which extends from Elbridge Substation in the West to Oneida Station in the East, to determine whether the systems comply with reliability standards. Included in this testing are compliance with NERC TPL Standards, NPCC Regional Reliability Reference Directory #1, NYSRC Reliability Rules and the Company's Transmission Planning Guide (TGP 28). These standards require the entire transmission system to meet voltage, thermal, and stability criteria.

Several reliability criteria issues for the area were discovered under study conditions. Issues include thermal overloads on 115kV circuits in the Central Region, and a reinforcement and reconfiguration of the Clay substation 345/115kV transformer capacity.

Customer Benefits:

Customers will benefit from this program in several ways, including:

- Significantly reduced exposure to service interruptions, some resulting from load shedding, in the event that certain key contingencies were to occur.
- Added capability to accommodate new or expanding load to the system.

2014 to 2015 Variance:

The primary variance between the 2014 and 2015 Plans results from spend in FY15 on reconfiguring the transformer connection at the Clay substation which is not included in the timeframe of this Plan and the start of the reconductoring of the Clay-Teall #10 and Clay-Dewitt #3 lines.

Table 2-10
Transmission – Syracuse Area Reinforcements
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	9.5	5.7	22.5	8.5	-	-	46.2
2015	-	13.2	11.1	19.1	1.7	-	45.2

New Bay at Edic 345kV Station (C044674 - $3.1m)

This project will create a new breaker bay by adding two (2) new 345kV circuit breakers. Transformer TB2 will then be reconnected from bus "B" into the new position in the bay.

Drivers:

The reconnection of TB2 into a new breaker bay relieves thermal overloads on the 115kV system that occur as a result of an N-1-1 contingency.

Customer Benefit:

This project will eliminate the potential constraints on Central-East interface transfers when TB3 is out of service. Such relief of interface flow constraints improves security of system operations.

2014 to 2015 Variance:

The installation complexity of the new bay due to the need to change all breaker backup circuits for breaker failure inclusion on both bus A & B and the need to undo some of the old breaker failure scheme in disconnecting transformer TB2 directly from the bus resulted in higher than expected costs.

Table 2-11
Transmission – New Bay at Edic 345kV Station
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	0.9	0.6	-	-	-	-	1.5
2015	-	2.5	0.6	-	-	-	3.1

Porter #3/#7 Reactors (C060241 - $1.2m)

The Porter – Yahnundasis #3 line was found to be overloaded for N-1 conditions and above STE for N-1-1 conditions. In addition, the Oneida – Yahnundasis #7 line was found to be overloaded above LTE for N-1-1 contingencies. To address these overloads, a reactor (8%) should be installed in series with the #3 line, along with a second reactor

(6%) installed on the #7 line. As these lines are in parallel, it is important that any solution for these lines be studied in tandem to prevent the solution for one problem to worsen the other.

Drivers:

Presently, a number of contingencies, including single-element outages, result in thermal overloads on the Oneida – Porter #7 and Porter - Yahnundasis #3 lines.

Customer Benefit:

This project will resolve normal loading and contingency outage exposure and improve reliability of the Oneida 115kV Transmission system.

2014 to 2015 Variance:

This project was not in the 2014 Plan.

Table 2-12
Transmission – Porter #3/#7 Reactors
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	-	-	-	-	-	-	-
2015	-	0.4	0.8	-	-	-	1.2

2C.4 Transmission Projects in Support of Distribution

Riverside-Reynolds Road #4 Forbes Tap (C043592 - $2.6m)

This project provides for a loop-in-and-out supply to the new 115-13.2kV Forbes Ave substation in Rensselaer. The new substation will have two – 20/32/40MVA transformers and four feeders initially.

Drivers:

The Substation and related distribution feeder projects are to provide capacity for load growth in the City of Rensselaer and to address flood risk and asset issues at the existing 34.5-13.2kV portion of the Rensselaer station.

Customer Benefit:

The benefit of this project will be capacity to support load growth in the City of Rensselaer. It was also improve system resiliency by eliminating the flooding risk for the distribution portion of the existing substation.

2014 to 2015 Variance:

The projected investment is shown in the table below and variation year on year is due to the scope and timing of the specific project.

Table 2-13
Transmission – Riverside-Reynolds Road #4 Forbes Tap
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	0.3	1.5	-	-	-	-	1.8
2015	-	0.1	1.5	1.0	-	-	2.6

Randall Road Transmission Line (C043672 - $1.6m)

This project provides for two 115 kV supplies to the new 115-13.2kV Randall Road from the adjacent transmission circuits in Ballston. The new substation will have one – 15/20/25MVA transformer and four feeders initially.

Drivers:

The driver is the deteriorated condition of the 34.5kV Ballston-Randall #9 Line. The line crosses very difficult terrain including wetlands. This project will also improve the outage criteria violations as per the distribution Planning Guidelines at Ballston substation.

Customer Benefit:

The removal of approximately two (2) miles of a deteriorated 34.5kV line from wetlands areas would improve the service reliability of customers served from the existing Randall Road substation.

2014 to 2015 Variance:

The projected investment is shown in the table below and variation year on year is due to the scope and timing of the specific project.

Table 2-14
Transmission – Randall Road Transmission Line
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	0.001	0.1	1.2	0.2	-	-	1.5
2015	-	0.1	0.7	0.7	-	-	1.6

West Ashville Substation (C043833 - $4.7m)

This project provides a 115-34.5kV station with one 15/20/25 MVA transformer and two 34.5kV circuits. The 115kV supply will be looped in-and-out of the new station and require less than 1 mile of new construction. There is a related sub-transmission project to connect the new station to the existing Ashville-Sherman Line 863 (C043832 - $0.2m).

Drivers:

The sub-transmission network in Chautauqua County is supplied by three 115-34.5kV stations. Certain line or transformer outages will result in voltages below 31kV on parts of the system.

Customer Benefit:

These projects will resolve contingency outage and voltage exposure and improve reliability of the Chautauqua South 34.5kV sub-transmission system. The project will also add approximately 14MVA of capacity to the system to provide for future load growth.

2014 to 2015 Variance:

The projected investment is shown in the table below and variation year on year is due to the scope and timing of the specific project.

Table 2-15
Transmission – West Ashville Substation
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	0.5	1.2	0.6	-	-	-	2.3
2015	-	0.6	0.4	0.6	3.1	-	4.7

Mountain Upgrade 115-34.5kV Transformer (C044359 - $3.8m)

This project upgrades Mountain 115-34.5kV station by replacing the existing transformers with two 20/26/33MVA transformers with Load Tap Changers. Associated support equipment will also be upgraded.

Drivers:

Existing loading plus future load growth will overload the existing transformers for normal operation as well as overload the remaining transformer at Mountain station for loss of the other transformer at Mountain station. Mountain station is one of two supplies to the Niagara 34.5kV sub-transmission loop

Customer Benefit:

This project will resolve normal loading and contingency outage and voltage exposure and improve reliability of the Niagara 34.5kV sub-transmission system.

2014 to 2015 Variance:

The projected investment is shown in the table below and variation year on year is due to the scope and timing of the specific project.

Table 2-16
Transmission – Mountain Upgrade 115-34.5kV Transformer
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	1.2	2.6	0.02	-	-	-	3.8
2015	-	3.8	0.05	-	-	-	3.8

Sanborn Upgrade 115-34.5kV Transformer (C044361 - $2.0m)

This project upgrades the Sanborn 115-34.5kV station by replacing the existing transformer with one 15/20/25MVA transformer with Load Tap Changer. Associated support equipment will also be upgraded.

Drivers:

Existing loading plus load growth will overload the existing transformer for normal operation as well as overload the remaining transformer station for loss of one of the transformers at Mountain station. Sanborn station is one of two supplies to the Niagara 34.5kV sub-transmission loop

Customer Benefit:

This project will resolve normal loading and contingency outage and voltage exposure and improve reliability of the Niagara 34.5kV sub-transmission system.

2014 to 2015 Variance:

The projected investment is shown in the table below and variation year on year is due to the scope and timing of the specific project.

Table 2-17
Transmission – Sanborn Upgrade 115-34.5kV Transformer
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	0.5	1.1	0.02	-	-	-	1.6
2015	-	2.0	0.04	-	-	-	2.0

New Harper Substation ("Royal Ave Station") (C044874 - $8.6m)

This project and associated projects relate to a new 115-13.2kV substation with two 24/32/40 MVA transformers and eight 13.2kV feeders will replace the existing Harper station. This substation will become the supply to two industrial customers as well as three new distribution substations to replace three indoor substations.

Drivers:

The project is driven by the deteriorated asset condition of the transformers, breakers, support structure and other items at the existing Harper 115-12kV station located in Niagara Falls. There are no available spares for the present 115-12kV transformers in Niagara Mohawk.

Customer Benefit:

This project will improve reliability by removing deteriorated assets from the system and, by utilizing standard distribution voltages, allow for the use of system spare equipment in the event of a failure.

2014 to 2015 Variance:

The projected investment is shown in the table below and variation year on year is due to the scope and timing of the specific project.

Table 2-18
Transmission – New Harper Substation ("Royal Ave Station")
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	4.1	3.3	0.05	-	-	-	7.4
2015	-	1.2	5.6	1.8	-	-	8.6

Mohawk 69kV Area

Drivers:

The deteriorated condition of several sub-transmission lines, the removal from service of Amsterdam Station due to floods in 2011, and Rotterdam Station asset condition have prompted a study of the Mohawk area 69kV system. The review also involves whether a reconfigured or partially converted to 115kV system could resolve reliability concerns on the 115kV system in the area.
These projects include:

Ephratah Substation Rebuild (C046486 - $2.6m) – Build a new 115-13.2kV substation at Ephratah and eliminate the 69-23kV station.

Schoharie Substation Reconfiguration (C046494 - $1.9m) – Build a new 115-69kV station at Schoharie to connect the converted transmission line from Rotterdam to the existing 69kV from Marshville.

Customer Benefit:

Customers will benefit from improved reliability on the 115kV system and additional capacity for load growth.

2014 to 2015 Variance:

The projected investment is shown in the table below and variation year on year is due to the scope and timing of the specific project.

Table 2-19
Transmission – Ephratah Substation Rebuild
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	-	0.05	1.2	1.3	-	-	2.6
2015	-	-	-	0.05	1.2	1.3	2.6

Table 2-20
Transmission – Schoharie Reconfiguration Rebuild
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	-	-	0.9	0.9	-	-	1.9
2015	-	-	-	-	0.9	0.9	1.8

Elm Street Relief – Add 4th Transformer (C049594 - $8.6m)

This project adds the fourth 230-23kV transformer to Elm Street Station in downtown Buffalo as well as replaces all 23kV breakers with an interrupting rating of less than 40kA.

Drivers:

Elm Street station supplies the Buffalo LVAC network, spot network loads and several distribution stations. The station has three transformers and is designed for double contingency operation due to its supply to the downtown core. However, the existing load is above the summer emergency rating of one transformer in-service.

Customer Benefit:

This project restores the capability of the station to supply the load for two transformers in service and provides for some limited load growth.

2014 to 2015 Variance:

The projected investment is shown in the table below and variation year on year is due to the scope and timing of the specific project.

Table 2-21
Transmission – Elm Street Relief – Add 4th Transformer
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	1.1	3.3	3.0	3.0	-	-	10.4
2015	-	4.3	2.3	2.0	0.05	-	8.6

Sawyer 4th 230-23kV Bank (C053147 - $2.3m)

This project installs a fourth 230-23 100MVA transformer and related equipment at Sawyer Station in the Town of Tonawanda

Drivers:

Presently, several double circuit contingencies will remove two of three transformers from service at Sawyer. The remaining transformer is not sufficient to carry the existing load in that situation.

Customer Benefit:

The benefit is improved reliability of the 23kV system supplying parts of the Town of Tonawanda and approximately one-third of the City of Buffalo,

2014 to 2015 Variance:

The projected investment is shown in the table below and variation year on year is due to the scope and timing of the specific project.

Table 2-22
Transmission – Sawyer 4th 230-23kV Bank
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	-	-	0.1	0.7	0.8	-	1.6
2015	-	-	0.1	0.7	0.8	0.7	2.3

Riverbend Area Reinforcements

These projects reinforce the 34.5kV system in the Ridge-Riverbend-Outer Harbor area. This area has experienced significant development due to New York State investment in certain key projects. The transmission line projects and Ohio Street 115-34.5kV station with two 30/40/50MVA transformers and six (6) 34.5kV feeders will provide a new supply to the existing and future sub-transmission customers and new distribution station in the area. The existing 34.5kV as supplied from Ridge is not capable of supplying the new loads. The existing 34.5kV system also has reliability issues due to trees and animals as it crosses wetlands in a nature preserve near the Lake Erie shore. These projects will provide limited relief to the 23kV system supplied from Seneca Terminal Station.

This suite of projects includes:

- Airco-Buffalo River 147 Adv Metal Tap (C054711 - $1.6m)
- Gardenville-Buffalo River 146 Tap Ohio Station (C054713 - $3.1m)
- Ohio Street New 115-34.5kV Substation (C055263 - $10.7m)

Customer Benefit:

These projects will provide sufficient capacity for the new industrial, commercial and residential customers supplied from the 34.5kV system directly or indirectly through a

new distribution station. These projects will improve the 34.5kV system reliability by completing a new supply on the customer side of the nature preserve.

2014 to 2015 Variance:

These projects were not in last year's Plan.

Table 2-23
Transmission –Riverbend Area Reinforcements
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	-	-	-	-	-	-	-
2015	-	1.0	9.8	4.6	-	-	15.4

Terminal Station Relocation (C059672 - $2.0m)

Build a new 115kV line from the existing circuit to the location of the new 115-13.2kV Terminal station.

Drivers:

This 115kV line relocation coupled with a new Terminal 115-13,2kV station will address asset condition, fault-duty and environmental concerns with existing Terminal Station.

Customer Benefit:

These projects will provide customers with more reliable service and eliminate the fault duty and environmental concerns with the existing station.

2014 to 2015 Variance:

This project was not in last year's Plan.

Table 2-24
Transmission – Terminal Station Line Relocation
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	-	-	-	-	-	-	-
2015	-	-	0.2	1.2	0.6	-	2.0

2. D. Asset Condition

Asset Condition expenditures are those investments required to reduce the likelihood and consequence of the failures of transmission assets, such as replacing elements of overhead lines, underground cable or substation equipment. The Company presents an approach in this Plan that keeps near-term capital costs for asset condition projects in line with spending limits approved in its most recent electric rate case (12-E-0201) while still addressing system needs. The result is greater reliance on the purchase of spare equipment to replace damaged equipment that may fail in service for certain elements of the transmission and distribution system. This approach calls for more targeted replacement of assets based on their condition versus wholesale replacement based on "end of useful life" criteria, especially for transmission line refurbishment projects. Close monitoring of system performance as it relates to asset condition causes will remain necessary.

For overhead lines specifically, this Plan seeks to achieve compliance with National Electrical Safety Code ("NESC") requirements, and will continue to implement the recommendation from Staff's 2010 rate case testimony to refurbish overhead transmission line facilities that are in unacceptably severe deteriorated condition (i.e. Niagara Mohawk's defined Level 1, Level 2 and Level 3 conditions), as opposed to entire lines, unless a compelling justification can be provided for the full refurbishment. Any overhead line proposed for a refurbishment will undergo a field inspection by qualified transmission line engineers and will usually be supported by comprehensive aerial inspection using stabilized video cameras. As part of the conceptual engineering process, refurbishment options will be thoroughly evaluated on a case-by-case basis and the engineering economics of various options such as a complete reconductoring versus a life extension are reviewed in the project sanctioning process. In addition, longer term impacts such as a greater number of visits to the same right-of-way, improved access to right-of-ways with roads, multiple site establishment costs, increased storm hardening, additional permitting and licensing costs, greater levels of environmental impact, and more disturbance to property abutters, among other things will be evaluated to determine if it is the most economical scope of work for the benefit of customers. Further detail on specific asset condition programs and projects is given below.

NY Inspection Repairs - Capital

The goal of this program (C026923 - $22.8m) is to replace those damaged or failed components on the transmission overhead line system identified during field inspections (five-year foot patrols). A 2012 (FY13) foot patrol inspection of the Homer Hill-Bennett #157 115kV line revealed 136 level 3 wood structures requiring replacement. A design package is being prepared for completion of this work by FY16. For construction efficiencies this work will be bundled with the asset condition refurbishment work on the line for project C027429 in this Plan.

Drivers:

These programs assure that both steel tower and wood pole transmission lines meet the governing NESC standards by replacing hardware, wood poles, and structure components that no longer meet the governing code requirements. This follows standard industry practice and the Commission's 2005 Safety Order in Case 04-M-0159.

Customer Benefits:

This program enhances public safety by assuring that damaged or failed transmission overhead line components are replaced and continue to meet the governing NESC under which they were built. Replacement of damaged and failed components discovered during inspection also promotes reliable service performance.

2014 to 2015 Variance:

Future spending levels are expected to remain consistent to the prior plan.

Table 2-25
Transmission – New York Inspection Projects
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	6.2	12.3	4.3	3.0	3.0	-	28.8
2015	-	11.3	4.3	3.0	3.0	1.2	22.8

Wood Pole Management

This program (C011640 - $8.2m) assures that transmission lines meet the governing NESC under which they were constructed by replacing wood poles and wooden structures that no longer meet the governing code requirements due to damage or failure of the pole or structure.

Drivers:

As discussed in the Report on the Condition of Physical Elements of Transmission and Distribution Systems, Case 12-E-0201, October 1, 2014, wood poles that are either priority rejects or reject poles (as classified following a wood pole ground line inspection and treatment performed on behalf of the Company by Osmose Utilities Services Inc, of Buffalo, NY) as well as those damaged by woodpecker or insect activity will be replaced. The ground line inspection and treatment of wood poles is performed approximately every 10 years. These inspections are in addition to the 5 year foot patrol which is required under the Commission's 2005 Safety Order in Case 04-M-0159.

The wood poles targeted through this initiative are deemed to be beyond restoration by either re-treatment or placement of some form of additional pole support, usually at the ground line. Similarly, "reject equivalent" refers to deteriorated wood poles from such things as woodpecker damage, insect damage, or rotting and therefore these poles are included in the Wood Pole Management Program.

Reject and priority reject poles generally do not meet NESC requirements. In a limited number of cases when an extra margin of safety was added into the design, some of this margin may still be available before failing to meet the Code. However, this usually provides only a limited amount of extra time to replace the damaged or deteriorated wood pole(s) or structures before potential failure.

Customer Benefits:

Customers will benefit from the maintenance of the appropriate public safety level by assuring that transmission wood structures continue to meet the governing Code. In addition to the public safety benefit, unplanned failures of wood poles or structures can reduce service reliability, and may reduce overall system integrity making the transmission system vulnerable to widespread disruption.

2014 to 2015 Variance:

Future spending levels are expected to remain consistent to the prior plan.

Table 2-26
Transmission – Wood Pole Management
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	1.0	2.0	2.5	1.5	1.5	-	8.5
2015	-	1.0	2.6	1.6	1.5	1.5	8.2

Conductor Clearance Strategy

The conductor clearance correction program will increase the clearance of certain overhead conductors to address locations that may not meet clearance standards prescribed by the NESC under certain loading conditions. The need for greater clearances has been identified as a result of an ongoing Aerial Laser Survey (ALS), also known as LiDAR for Light Detection and Ranging, being conducted on the transmission system. Clearances are in the process of being measured with aerial surveys providing an accuracy which was previously available by ground inspection only. The project will continue between FY14 and FY22 to address conductor clearance issues for 115kV lines newly classified as BES followed by non-BES 115kV circuits. This timeline assumes there will be no further directives from FERC similar to the October 7, 2010 a NERC Alert (Recommendation to Industry: Consideration of Actual Field Conditions in

Determination of Facility Ratings) that would prescribe a specific correction period for circuits newly classified as BES.

Drivers:

The primary driver for this work is safety of the public and Company personnel as they work and travel under the overhead lines. The NESC sets required conductor clearances of overhead lines from the ground and other ground based objects. This program assures that transmission lines meet the governing NESC under which they were constructed by improving ground to conductor clearances in substandard spans. This follows standard industry practice and a Public Service Commission Order (Case 04-M-0159, effective January 5, 2005) that the Company shall adhere to the NESC.

Customer Benefits:

While safety events caused by substandard clearance conductors are rare, their consequences can be very serious and are difficult to quantify. Application of the NESC criteria provides a reasonable means to manage the issue and mitigate the risk from such events.

2014 and 2015 Variance:

The Browns Falls-Taylorville #3 (C048218) and Browns Falls-Taylorville #4 (C048221) 115kV conductor clearance projects will conclude in FY16 of this Plan. Beyond that, project C048678 will capture all future conductor clearance projects on NY's transmission system with future spend expected to remain consistent with levels in the prior Plan.

Table 2-27
Transmission – Conductor Clearance Strategy
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	7.4	10.7	10.7	10.7	15.0	-	54.6
2015	-	10.3	10.7	10.7	10.0	10.0	51.7

Relay Replacement Strategy

Protective relays are maintained in accordance with Company substation maintenance standards and NERC or NPCC requirements, where applicable. Overall the population of approximately 4,000 relay packages remains adequate, but approximately 6% of the population requires investment based on condition, performance or obsolescence. This program will commence by replacing the worst 6% of the relays over the next eight years. Beyond that, studies and pilot programs will be initiated to explore the most efficient and cost effective approach to addressing the remaining population. The long-term objective is to have an asset management approach that allows a more

commoditized approach to relay replacement. This approach will be necessary for modern microprocessor relays that are expected to have only 15 to 20 year asset lives.

Drivers:

This strategy ensures that reliable protective relay systems are in place to preserve the integrity and stability of the transmission system following a fault. This strategy is needed now because properly functioning protective relays are essential for rapid isolation of faults on the system thus protecting customers from potential outages and protecting equipment from damage.

Customer Benefits:

Properly functioning elements of relay protection schemes limit the extent and duration of outages. Further, the protection system is designed to protect high value assets against failure in the event of system anomalies thereby reducing the potential investment needed to recover from an event. The primary benefit of this strategy will be to maintain the reliability performance of the system and customer satisfaction as known poor performing relay families are replaced with modern microprocessor based relays.

2014 to 2015 Variance:

The Company continues to move forward with its relay replacement program (C034690 - $6m) and is projecting multiple individual relay replacement projects being completed in FY17 and FY18, including a large scale project at Menands Station in FY17 (C049601 - $4.5M).

Table 2-28
Transmission Relay Replacement Strategy
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	4.8	6.8	2.8	4.8	8.0	-	27.2
2015	-	1.5	9.1	5.5	2.0	4.0	22.1

Substation Rebuilds

The majority of the 313 transmission substations are in satisfactory condition, however, investment is recommended to rebuild substations whose overall condition has deteriorated to the point that wholesale refurbishment is required. In these circumstances, a standard substation design layout will typically be utilized to provide greater operational flexibility and increase reliability for customers served in the area. Where substation rebuilds are proposed, creative and innovative solutions and improvements, such as re-configurations of the layout, will be evaluated.

The Gardenville, Lighthouse Hill, Rotterdam, Inghams, Oswego Lockport, and Huntley stations are now proposed to be rebuilt, or engineering started, during the FY16 – FY20 period with most of the spending occurring in the later years of the Plan as the Company continues to study alternatives. At remaining substation sites the Company will only replace those assets that cannot be repaired economically. Although a more coordinated, integrated approach is more consistent with long-term sustainability of the system, the ad hoc "fix on fail" approach results in lower capital costs in the short term.

Drivers:

The substations mentioned above have all been identified as having asset condition or configuration issues that warrant a major station rebuild or upgrade.[1] Included with the station name is the forecasted spend amount within this Plan.

Gardenville (C005156 & C030084) $49.1m

Gardenville is a 230/115kV station south of Buffalo that has two 115kV stations in close proximity that are referred to respectively as New Gardenville and Old Gardenville, and which both serve over 750MW of regional load. New Gardenville was built between 1959 and 1969 and has asset condition issues such as faulty control cables, deteriorated foundations and many disconnects which have deteriorated beyond repair. Old Gardenville, built in the 1930s, feeds regional load via eleven 115kV lines. The station has serious asset condition issues including, but not limited to, control cable, breaker, disconnect and foundation problems. The station has had no major updates since it was built. There have been a number of misoperations that can be directly attributed to control cable issues in the past several years alone.

A new breaker-and-a-half 115kV station is to be built between the two existing stations to replace them. A new 115kV switchyard will be constructed in the western section of the site and there will be rerouting of approximately seventeen 115kV lines for the project to eliminate the current "criss-cross" arrangement outside of the station and eliminate line to ground clearance issues.

Rotterdam (C034850) $27.1m

The Rotterdam substation is a supply source to the surrounding transmission and sub-transmission system. A number of alternative plans for rebuilding the Rotterdam substation are under consideration. One of these plans involved removal of the existing 69kV and 34.5kV yards to make room for building a new 115kV yard while the existing 115kV yard remains in service. Studies of the long term transmission and sub-transmission needs of the areas east and west of Rotterdam are beginning to examine the impact of removing the Rotterdam 69kV and 34.5kV supplies. For example, projects associated with the Ephratah substation (C046486 and C053144) are, in part, related to the expected rebuild of Rotterdam.

[1] "Report on the Condition of Physical Elements of Transmission and Distribution Systems," October 1, 2014, Page 70 through 77.

Given the uncertainty over the 230kV station as it relates to the Energy Highway projects and the possible need to supply large loads in the Luther Forest campus, the Company has postponed both the 230kV and 115kV rebuilds at Rotterdam. Any asset issues that arise will now be managed through the normal damage / failure process.

Engineering analysis with respect to the rebuild itself is expected to begin in FY17.

Lockport (C035464) $12.0m

Lockport is a 115 kV transmission station with thirteen 115 kV transmission lines tying through the East and West bus sections and serving the 115 kV system in Western New York. The overall condition of the station yard and control room is poor. Work is required on control cable duct banks, breaker operators, structure painting and concrete equipment foundations that are significantly deteriorated.

The control room building is also in very poor condition and requires repairs. Existing peeling paint is likely lead contaminated. It is an oversized building with continued maintenance costs for the original roof and the intricate brickwork. It contains a 90 ton overhead crane in the old 25 cycle frequency changer portion of the building which is presently used only to store old cable. The control house roof was repaired in the 1990s and brick pointing was also done to limit deterioration within the last 5 years.

Conceptual engineering to rebuild the station in place was completed in June 2010, but then deferred for further consideration until FY17.

Huntley (C049902) $18.3m

Among the Huntley substation asset condition needs are: permanent capacitor banks at the Huntley 115 kV bus to replace the mobile banks currently there; improved grounding in the switchyard; removal of all National Grid controls, batteries and communications equipment from inside the Huntley Generating Station to a control house in the yard (both 115kV & 230kV); adding a second station service supply; refurbishing the existing oil circuit breakers; replacing the potential transformers; installing new CCVTs for 115 kV and 230 kV relaying; and refurbishing the 230 kV cable pumping plant.

Conceptual engineering was completed in 2011, but the project deferred until FY17 to reduce and manage short-term capital investment.

Inghams Station Re-Vitalization (C050917 and C060240) $6.7m

Inghams station is located in the town of Oppenheim, NY and is a connection between a hydro generating station and the transmission and distribution electric system. The transmission voltages at Inghams are 115kV and 46kV, and the distribution voltage at Inghams is 13.2kV. The Inghams station helps to moderate the electrical system as it has a phase angle regulator (PAR) type transformer.

The transmission planning department is looking to improve the capabilities of the PAR by specifying a replacement unit with a wider adjustment range.

The Inghams station was flooded in 2006 and remains a flood concern. After the station was repaired a new stone wall approximately five (5) feet tall was constructed along the station perimeter that is shared with the river boundary. The stone wall is considered a temporary measure as it will limit the current flow of the river if the river rises to flood heights again, but will not keep the station from being flooded.

The recommendation for the station is that the PAR be replaced and the existing PAR be kept as a spare unit, for emergency use. Also, the station will be relocated outside the current flood zone to be above the 500year flood zone line.

Oswego (C043426) $9.3m

Three substations are located on the generation site owned by NRG which include a large 345kV switchyard (that was recently upgraded and is in overall very good asset condition, except for the control house which is scheduled for future replacement) and 115kV and 34.5kV yards originally designed and integrated when the generating station and substations were owned by the same utility.

The 115kV substation is in poor condition with out-of-service equipment that has not been formally retired. Bus sections have been cut, rerouted, and breakers out of service with yellow hold cards. The disconnect switches to the OCBs are original to the station and are the pin and cap design that has an industry recommendation for replacement. The electro-mechanical relays and batteries for this yard and the 34.5kV yard are still inside the generation plant which limits the Company's control and access to these assets.

The 34.5kV yard is the original to the 1940s plant 1&2 (retired decades ago). All equipment in the yard is of original vintage, is obsolete, and is in poor condition.

Lighthouse Hill (C031662) $21.8m

The Lighthouse Hill facility consists of a switching station with two 115 kV buses and seven transmission lines connecting to the station, allowing power to flow from generation located on Lake Ontario to the Watertown area and Clay Station in Syracuse.

Seven OCBs are located 200 feet from the Salmon River located about 70 feet below the yard elevation. The station is located a mile up-stream of the New York State Wildlife Fish Hatchery. Although the risk is low, any significant oil spill in the station would have a detrimental environmental impact. Even at 70 feet above the river level there is also the risk of a flooding event at the station given its proximity to the river. In addition, the disconnect switches are in a very poor condition.

Another significant issue at Lighthouse Hill is that the land is owned by Brookfield Power and operated as a shared facility under a contractual agreement. The lack of direct access to Brookfield's control room at Lighthouse Hill is not ideal as it limits the Company's control over the housing conditions for the battery and relay systems. The Company has controls on the first floor of the control house which is immediately adjacent and downstream of Brookfield's hydroelectric dam. An uncontrolled release from the dam could flood the control room area. Flooding in the area occurred as recently as October 1, 2010 due to a rain event.

The recommended option of a conceptual engineering analysis is a new substation located about 1.5 miles west adjacent to Tar Hill Road in the clearing on land already owned in fee by the Company. This will eliminate the risks of oil contamination to the Salmon River and greatly reduce the likelihood of station flooding.

Conceptual engineering was originally completed in 2012, and refreshed in 2014 in anticipation of beginning preliminary engineering in FY17.

Customer Benefits:

The planned replacement of these stations reduces the likelihood of an in-service failure which can lead to long-term interruptions of the transmission system as well as significant customer outages.

2014 to 2015 Variance:

Apart from Gardenville, all of the previously recommended station rebuilds were deferred as the Company evaluated additional options for addressing needs at other stations and to manage short term capital investment. The variance between Plans below is now due to station rebuilds becoming more certain to begin spending in the latter half of this Plan.

Table 2-29
Transmission – Substation Rebuilds
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2104	2.9	6.4	20.8	31.9	40.6	-	102.6
2015	-	7.4	25.3	27.2	23.2	61.9	145.0

Overhead Line Refurbishment Program

Over the next five years the Company will refurbish a number of overhead lines based on their condition. During this period we will continue to work towards developing an overhead line refurbishment approach that, to the greatest extent possible, addresses only the most deteriorated condition equipment. This modified approach to SG080 only considers refurbishing an entire line when the conductor requires replacement. In general, as part of conceptual engineering, conductor testing will determine whether or

not the conductor tensile strength fails to meet appropriate NESC heavy loading requirements. There is a risk that a number of the identified lines in our overhead line refurbishment program will fall within this category as conductor testing is pursued over the upcoming year. When possible, shield wire testing will also be performed.

For overhead lines with acceptable conductor strength, this program will assure that transmission lines meet the minimum governing NESC under which they were built. This will be accomplished through the replacement of deteriorating structures and line components that no longer structurally or electrically adhere to the governing NESC.

The costs projected for lines prior to the completion of the conceptual engineering process are preliminary in nature. As part of conceptual engineering process, a line will be field evaluated and refurbishment options more thoroughly evaluated on case-by-case basis. The value of various options (e.g., complete reconductoring versus a life extension) will be reviewed; however, cost estimates may continue to differ due to unforeseen circumstances, such as additional swamp matting needs due to weather conditions or environmental requirements.

To reduce costs during the period of this five-year Plan, the Company is implementing an approach recommended by DPS Staff in the Company's 2010 rate case to refurbish only those overhead transmission line facilities that are in unacceptably deteriorated condition (i.e. Niagara Mohawk's defined Level 1, Level 2 and Level 3 condition). Although this approach allows for reduced investment amounts in the five years covered by this Plan, the approach must be evaluated against longer term issues such as a greater number of visits to the same right-of-way, multiple site establishment costs, increased susceptibility to storm damage, additional permitting and licensing costs, greater levels of environmental impact, and more disturbance to abutters among other things to evaluate the most economical solution for the benefit of customers. Therefore, for certain overhead line condition projects, a larger work scope to replace assets that are deteriorated, yet serviceable, may be more appropriate and cost effective.

This Plan is based on the assumption that issues identified during routine foot patrols (Level 1, 2 or 3 issues) will be addressed through the Damage / Failure program. Where we suspect a systemic problem, an engineering inspection and an aerial comprehensive survey will be initiated. Any issues arising from these condition assessments will be addressed through this overhead line refurbishment program.

The more significant OHL refurbishment projects in this capital plan are listed below. Details are included in Exhibit 6 – Overhead Line Refurbishment Projects.

Alabama-Telegraph 115 (C033014 - $5.1m)
Batavia-Golah 119 (C060217 - $1.3m)
Boonville-Rome 3 & 4 (C047795 - $8.9m)
Boonville-Porter 1 2 (C047818 - $5.2m)
Brockport Tap (C055531 - $1.2m)
Browns Falls-Taylorville 3 & 4 (C024359 - $9.1m)
Colton-Browns Falls 1 & 2 (C036164 - $10.7m)

Dunkirk-Falconer 161 162 (C047831 - $1m)
Gardenville-Dunkirk 141 & 142 (C003389 - $56.1m)
Gardenville 180 & 182 (C027436 - $1.1m)
GE-Geres Lock 8 (C047835 - $14.9m)
Homer Hill-Bennett 157 (C027429 - $7.2m)
Lockport 103 104 (C027432 - $1.7m)
Lockport-Batavia 112 (C003422 - $60.7M)
Mortimer-Pannell 24 25 (C047816 - $5.3m)
Pannell-Geneva 4 4A (C030889 - $5.8m)
Porter-Rotterdam 31 (C030890 - $14.1m)
Spier-Rotterdam 1 2 (C060212 - $1.3m)
Taylorville-Boonville 5 & 6 (C027437 - $9.0m)
Terminal-Schuyler 7 (C047833 - $1.4m)
Ticonderoga 2 & 3 (C039521 - $48.1m)

Drivers:

The Company has over 6,000 circuit miles of transmission overhead lines and many of these overhead line assets are approaching, and some are beyond, the end of their anticipated lives. The program will ensure the Company's transmission lines meet the minimum requirements of the governing code under which they were built as required by the Commission's 2005 Safety Order (Case 04-M-0159).

Customer Benefits:

This program promotes safety and reliability by assuring transmission lines meet the governing NESC under which they were built by replacing deteriorating structures and line components that no longer structurally or electrically conform to the Code.

2014 to 2015 Variance:

The Company re-phased much of the overhead line refurbishment to manage short term capital investment. Overhead line equipment failures will be managed through the Damage / Failure budget and any Level 1, 2 or 3 issues identified during foot patrols will also be addressed through the Damage / Failure budget.

Driving the increase from FY19 to FY20 in the table below is the spend forecasted in FY20 for the Gardenville-Dunkirk 141 142 (C003389 - $25m in FY20) and Ticonderoga 2 3 (C039521 - $28m in FY20) lines which are both large scale projects.

Table 2-30
Transmission – Overhead Line Refurbishment Program
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	14.0	33.3	66.1	92.9	85.4	-	291.8
2015	-	14.6	26.9	43.7	87.7	103.3	276.3

Transformer Replacement Strategy

Power transformers are managed through routine visual inspection, annual dissolved gas analysis ("DGA") and electrical testing where required. Transformers with tap-changers are also maintained in accordance with our substation maintenance standards.

With the previous exceptions, this Plan utilizes a replace on fail approach with failures managed through the use of strategic spares. In this context, failure means either DGA results that suggest an immediate need for replacement or actual physical / electrical failure. Sufficient strategic spares are available to cover the probability of failure for the majority of the fleet.

Drivers:

In the next five years the investment plan is to replace six transformers with anomalous DGA results that have been or are expected to be confirmed as in poor condition through electrical testing.

Teal Ave (C047865 - $5.1m) - Two 115/34.5kV 24/33/40MVA transformers are needed to replace the existing single phase 1930, 1941, & 1945 transformers due to their asset condition and DGA analysis. These transformers are also on the NY transformer watch list.[2] This upgrade would also provide adequate capacity for future load as determined by distribution planning. This is currently in preliminary engineering, and the transformers should be in service by FY18.

Seneca Terminal (C049744 - $2.1m) - The summer emergency rating of the four 115-23kV ; 30 MVA LTC transformers with one transformer out of service matches the SE rating of the 115kV supply for one line out of service. Two of the four transformers are on the NY transformer watch list and the other two are currently under DGA review. The plan is to replace the four 1938/1950 transformers with 115-23kV; 55 MVA LTC units. The transformers should be in service by FY17.

Inghams (C047864 - $3.0m) –The allowable phase shifting transformer angle range is limited during high Central-East transfer conditions with Fairfield wind generation at full output. For design contingencies associated with losing parallel 345kV or 230kV lines in the Central East interface, and if Fairfield generation is at full output, line #3 becomes overloaded and the phase shifting transformer is out of adjusting range. Under an N-1-1 condition, with a long term outage of the phase shifting transformer and when breaker R81 cannot be closed separating the Ingham's 77G and 99G buses, voltages at various 115kV buses east of Ingham's station will be at 0.91~0.92 pu. This is not acceptable if the outage lasts for an extended period.

There is not a spare phase shifting transformer in the New York system and if it were to fail it would take between 18-24 months to replace due to its specialty internal design.

[2] See "Report on the Condition of Physical Elements of Transmission and Distribution Systems," October 1, 2014, Page 61.

This would not be acceptable for system reliability and system stability. Asset Management has purchased a spare phase shifting transformer that will be designed to meet the needs of the Transmission Planning study for future growth of the 115kV system east of Ingham's.

Woodlawn (C051986 - $3.6m) – TB1 has had hotspots and arcing under oil in the past. The oil quality is below the acceptable threshold with inter-facial tension, moisture and dielectric strength being outside expected in-service values. The main tank appears to be taking in moisture at a slow rate. Electrical tests show deterioration of the winding insulation. The tight physical clearances between the low voltage and high voltage structure make an emergency replacement difficult. TB2 A, B and C phase units all have partial discharge problems as indicated by increased Hydrogen in DGA results. All three have high moisture-in-oil levels which can lead to low dielectric strength and contribute to chemical reactions that degrade the oil quality. A three single-phase transformer design makes emergency replacement with a three-phase unit very difficult. TB1 and TB2 replacements are expected to be completed by FY18.

Hoosick (C053132 - $4.1m) and Mohican (C053133 - $4.0m) – both are transformers on the NY watch list; they have hotspots and arcing under their oil and high moisture-in-oil levels. Engineering has started to replace them by FY18 & FY19 respectively.

Customer Benefits:

The failure of an average sized distribution station transformer could lead to a loss of power for approximately 17,000 residential customers. The prolonged time needed for restoration (either through the installation of a spare or a mobile sub) can translate into millions of customer minutes interrupted.

2014 to 2015 Variance:

The Company is, in the short-term, adopting a 'replace on fail' approach for transformers where failure includes DGA results that suggest immediate replacement is necessary or where actual failure takes place. Four transformers were identified for replacement within the term of the 2014 plan and capital spending for their replacements began in FY15 (Teal Ave, Seneca Terminal, Inghams and Woodlawn). Hoosick and Mohican are new to this 2015 Plan.

Table 2-31
Transmission – Transformer Replacement Program
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	6.7	8.2	3.5	3.0	-	-	21.3
2015	-	6.0	7.6	5.2	3.0	-	21.8

Circuit Breaker Replacements

The circuit breaker population is managed through ongoing inspection and maintenance activity along with routine preventative maintenance activities and electrical testing. In general, the circuit breaker population continues to be adequate for our needs; however, there are a number of obsolete circuit breakers that require investment. During the Plan, obsolete oil circuit breakers will be replaced with modern equivalent circuit breakers. Typically, these breakers will be replaced with circuit breakers employing SF6 gas as an arc interrupting medium. SF6 will be employed until a replacement arc interrupting gas with a lower global warming potential is developed.

Drivers:

There are 734 circuit breakers installed on the transmission system. Of these, 350 are large oil volume types. The majority of the circuit breakers addressed in the circuit breaker replacement strategy were installed between 1948 and 1969, are in poor condition or are the last remaining members of problematic families. There is an increasing trend of problems associated with the large volume oil circuit breaker population. Common problems include oil leaks, air leaks, bushing hot spots, high power factors and poor insulation. There have also been failures of pressure valves, hoses, gauges, motors, compressors, pulleys, O-rings, control cables, trip coils, close coils, lift rods and contacts.

Customer Benefits:

The planned replacement of circuit breakers reduces the likelihood of an in-service failure which can lead to long-term interruptions of the transmission system as well as significant customer outages. The circuit breaker replacement strategy promotes reliability of the transmission network in terms of CAIDI and SAIFI performance.

2014 to 2015 Variance:

The Company is committed to planned replacement of oil circuit breakers to maintain the reliability of its transmission system through its NY Oil Circuit Breaker Replacement Program (C037882). Individual projects created from this program and included in this Plan include Battle Hill (C049543 – $1m), Marshville (C049547 - $0.4m), Ticonderoga (C049552 - $0.4m), New Scotland (C049553 - $1.1m), Queensbury (C049554 - $1.1m), Tilden (C049556 - $1.1m), Schuyler (C049562 - $1.1m), Whitehall (C049564 - $1.1m).

Table 2-32
Transmission – Circuit Breaker Replacements
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	0.2	3.6	3.6	-	1.6	-	9.0
2015		3.2	4.8	1.0	1.6	2.0	12.6

Hook Road-Elbridge Polymer Insulator Replacement (C056626 - $1.2m) The Company began installing polymer insulators on its transmission system in the mid-1980s due to their advantages of being lighter weight and easy to handle, lower installation costs, smaller viewing profile and improved resistance to vandalism. Since then, however, the utility industry has noticed some key disadvantages compared to porcelain insulators including susceptibility to aging due to being constructed from organic materials, contamination performance over time, inability to test in an energized state and susceptibility to handling, storage and installation damage. Electric Power Research Institute (EPRI) has recommended to utilities that the specific model of polymer insulators used on this line be removed from service.

Drivers:

The Hook Rd – Elbridge #7 115kV circuit has experienced a number of momentary interruptions due to polymer insulator failures. Momentary outages on the Hook Rd – Elbridge #7 circuit have caused the International Wire Group's (IWG), Jordan, NY facilities operational issues. The IWG facility is supplied by NYSEG via a 34.5kV line from the NYSEG Hamilton Rd Substation which is a Loop-in/Loop-out on the Hook Rd – Elbridge #7 line. IWG have registered a complaint with the NY PSC.

Customer Benefit:

Replacing the polymer insulators on the Hook Road-Elbridge #7 line will address insulator-related momentary outages for IWG.

2014 to 2015 Variance:

This project was not in last year's Plan.

Table 2-33
Transmission – Hook Road-Elbridge Polymer Insulator Replacement
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	-	-	-	-	-	-	-
2015	-	0.05	1.2	-	-	-	1.2

345kV Laminated Cross-Arm Replacement Program (C060365 - $12.6m)

The New Scotland – Alps #2 345kV line has experienced two failures on tangent (D-1501) structures within the past three years. The root cause has been identified to be the ageing laminated cross arms used to support the suspension insulators.

Drivers:

Several D1501 cross arm samples were obtained from structures on the New Scotland-Alps #2 line being replaced due to normal maintenance. These cross arms were destructively examined in the field by forcing a shear failure parallel to their lamination. Once split, the lamination was examined for glue adhesion quality. Concurrently, samples were sent to SUNY-ESF for laboratory analysis. SUNY-ESF performed mechanical testing on large length samples to measure their bending strengths and compare them to their original design specifications. The results were that the in-service cross arms were weaker than what was specified.

Customer Benefit:

This program promotes safety and reliability by assuring transmission lines meet the governing NESC under which they were built by replacing deteriorating laminated cross arms that no longer structurally or electrically conform to their design specifications.

2014 to 2015 Variance:

This project was not in last year's Plan.

Table 2-34
Transmission – Laminated Cross-Arm Replacement
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	-	-	-	-	-	-	-
2015	-	0.1	3.5	3.0	3.0	3.0	12.6

New Edic Station Control House (C058129 - $2.4m)

Drivers:

A new control house was anticipated for the relay replacement program due to the age and over-crowding of equipment in the existing building. Due to the number of Asset Management, Transmission Planning, and Customer Requirements projects that are currently ongoing, replacement of the control house has been advanced in the current Plan.

Customer Benefit:

This project will help support the future needs of customer requirements, possible expansions from transmission planning, and asset replacements where the internal equipment would have to be upgraded to meet new NPCC and FERC requirements.

2014 to 2015 Variance:

This project was not in last year's Plan.

Table 2-35
Transmission – New Edic Station Control House
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	-	-	-	-	-	-	-
2015	-	2.0	0.4	-	-	-	2.4

Turner Type D Switch Replacements (C052603 - $2.3m)

This project will replace all Turner Electric Company (Turner) Type D sidebreak disconnect switches in the National Grid transmission line system. This switch model suffers from reliability problems due to incomplete closure of the switch blades during operation. The blades on this type of switch are difficult to properly latch within the switch jaw and improper closure cannot be seen from the ground. If not properly latched, over time, the blades of the switch can gradually work free from the jaw, resulting in poor contact and eventual failure.

Drivers:

The primary drivers of this strategy include both reliability and safety. The potential failure of switches during service is a risk to employees. It is not feasible to ensure that all phases of a switch are fully closed after each operation due to the variables of switch design, installation, and operation. Harsh weather, especially during winter months, poses the greatest concern for the safe operation of Turner D switches. High winds and icy conditions put strong mechanical forces on the switch arm. If the jaw is not correctly locked, a build-up of ice can push the blade out of the contact area, resulting in an arc failure.

Customer Benefit:

It has been determined that the Type D switch manufactured by Turner presents a potential safety and reliability risk due to its design and problems inherent in its operation.

2014 to 2015 Variance:

There is no variance projected between the two Plans, the project continues to move forward as planned.

Table 2-36
Transmission – Turner Type D Switch Replacements
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	-	0.1	0.8	0.7	0.7	-	2.3
2015	-	0.1	0.8	0.7	0.7	-	2.3

Problem Identification Worksheets (PIWs) (C031545)

The Company employs a process called "Problem Identification Worksheets" to document faults and defects with in-service substation and overhead line equipment that are identified either through normal maintenance activities (often called 'follow-up' work) or through inspection routines (often called 'trouble' work). Typically, the issues identified through the PIW process cannot be corrected immediately and require investigation, engineering analysis and solution design. These activities and the solutions proposed often lead to low cost capital projects to replace or refurbish items of equipment.

Drivers:

Historically, issues identified during inspection or maintenance were added to the capital plan in outer years to avoid reprioritizing other planned projects. In FY10 a budgetary line for PIWs was introduced to recognize that a number of high priority, low cost, capital projects will inevitably arise during the year and these should be undertaken to address found-on-inspection issues. PIWs typically require some degree of investigation and engineering to identify a solution. PIWs are also used to identify and correct transmission overhead line components that no longer meet minimum NESC requirements. This work is over-and-above that required during normal I&M.

Issues arising from PIWs are prioritized and engineering solutions for the highest priority are developed within year. Utilizing this approach, the Company can make progress on low cost capital investments that might otherwise be lost in the capital plan.

Customer Benefit:

The PIW approach followed by the Company benefits customers and the overall health of the system. PIWs identify important issues and work that are high priority, but the work does not usually fall into the scope of ongoing strategies, and are not yet damage / failures. PIWs help identify trends throughout the system and give the Company feedback on how better to manage the system as a whole.

2014 to 2015 Variance:

The investment levels in FY16 to FY20 have been held the same as the 2014 Plan. PIW driven projects are likely to increase over the Plan period as a result of other capital investment reductions.

Table 2-37
Transmission – Problem Identification Worksheets
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	0.4	1.0	1.0	1.0	1.0	-	4.4
2015	-	0.4	1.0	1.0	1.0	1.0	4.4

5. E. Non-Infrastructure

Non-Infrastructure capital expenditures are for items that are not part of the electric power system, but are required to run the power system such as tools, communications, and other general plant.

Transmission Substation Physical Security (C053136)

This program provides state-of-the-art security measures to deter and/or detect unauthorized access to substations.

Drivers:

This program is driven by the need for additional physical security measures at certain substations to mitigate break-ins and the increasing risk that unauthorized access may lead to potential injury or death of a trespasser who comes in contact with energized equipment. Reducing and detecting unauthorized access also reduces risk of vandalism and damage to electric system equipment.

This project provides physical security measures in compliance with NERC standards.

Customer Benefits:

Deterring and detecting unauthorized access to certain substations would result in:

- Avoided or reduced physical and personal injury to unauthorized third parties as well as Company personnel at the substations.
- Reduced potential for service interruptions or equipment damage/loss from vandalism or theft.
- Protection of transmission stations against physical attack.

2014 to 2015 Variance:

The variance is due to anticipated costs to comply with NERC's CIP-014-1 in FY17.

Table 2-38
Transmission Substation Security
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	-	1.5	1.5	1.5	1.5	-	6.0
2015	-	1.5	3.0	3.0	3.0	3.0	13.5

Chapter 3. Sub-Transmission System

The sub-transmission system comprises approximately 4,237 miles of lines including: 290 miles of 69kV, 365 miles of 46kV, 2332 miles of 34.5kV, 1050 miles of 23kV and 200 miles of lines below 23kV. Over the five-year period covered by this Plan, the Company expects to invest approximately $182 million on the sub-transmission system, as shown in Table 3-1 below. There is a slight overall decrease in Sub-transmission spend between the 2014 CIP and the 2015 CIP due to efforts to reduce negative reserves in the prior plan which were offset by larger project listings. As a result, a better defined portfolio of projects is being presented for Sub-transmission. This has also resulted in some larger variances in a few of the programs.

Table 3-1
Sub-Transmission System Capital Expenditure by Spending Rationale ($millions)
A complete list of all projects in the capital plan can be found in Exhibit 2.

Spend Rationale	FY16	FY17	FY18	FY19	FY20	Total
Customer Requests/Public Requirements	1.6	1.5	2.3	3.7	3.2	12.3
Damage/Failure	3.4	3.5	3.5	3.6	3.0	16.9
System Capacity & Performance	3.3	3.6	1.2	2.0	2.9	12.9
Asset Condition	19.0	20.5	32.1	33.3	34.9	139.8
Total	27.3	29.0	39.1	42.5	44.0	181.9

3. A. Customer Requests/Public Requirements

Customer Request/Public Requirements investment levels are based primarily on forecasted spending on known specific work and a review of historical blanket spending. These estimates reflect consideration given to inflation, estimates of materials, labor, indirect cost, market sector analysis, overall economic conditions and historical activity.

Variances in planned program spending between the 2014 and 2015 Plans are also discussed below.

Table 3-2
Customer Request/Public Requirements Variance Summary ($millions)

	CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
	2014	2.4	1.7	1.6	2.9	1.4	-	9.9
Specific Projects	2015	-	1.2	1.1	1.9	2.7	3.2	10.1
	2014	0.4	0.4	0.4	0.4	0.4	-	2.1
Blankets	2015	-	0.4	0.4	0.4	0.5	0.5	2.2
	2014	2.8	2.1	2.0	3.3	1.8	-	12.0
Total	2015	-	1.6	1.5	2.3	3.2	3.7	12.3

Aside from blanket and program spending described in this section, there are two specific projects identified under this spending rationale that have forecasted spending in excess of $1 million in any single fiscal year:

- Project C034722, DOTR NYS Route 28 White Lake - McKeever Substation (Moose River) Transmission Line: This project provides for the mandatory relocation of 6 miles of 46kV overhead sub-transmission facilities along Route 28 in the towns of Forestport and Webb to facilitate a NYSDOT project
- Project C054665, Extend LN 611 & 612 to Riverbend, provides for the extension of two circuits across a rail yard to the Riverbend Development.

3. B. Damage/Failure

The Damage/Failure investment level for the sub-transmission system is primarily based on historical costs for such work. Where condition renders the asset unable to perform its intended electrical or mechanical function on the delivery system, the Company initiates the timely replacement of such asset under the Damage/Failure spending rationale.

2014 to 2015 Variance:
The variance between the 2014 and 2015 Plans is based on recent historical spending.

Table 3-3
Damage/Failure
Variance Summary ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	2.6	2.1	2.2	2.2	2.3	-	11.4
2015	-	3.4	3.5	3.5	3.6	3.0	16.9

3. C. System Capacity and Performance

The projected investment for sub-transmission work in the system capacity and performance spending rationale over the Plan period is shown in the table below.

2014 to 2015 Variance:
The projected program investment is based on the specific projects discussed in the Load Relief, Reliability and Sub-transmission Automation programs portions of this chapter. As described below, there has been a shift from System Capacity projects towards Asset Condition rationale projects. The overall spend in sub-transmission between the 2014 CIP and 2015 CIP are nearly the same.

Table 3-4
System Capacity and Performance
Variance Summary ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	3.8	5.4	9.9	8.6	6.0	-	33.7
2015	-	3.3	3.6	1.2	2.0	2.9	12.9

There are no specific projects in this category not associated with any of the programs estimated to have spending in excess of $1 million in any fiscal year.

Capacity Planning

Drivers:
An annual review of the sub-transmission system, including substation and circuit loading, is performed to review equipment utilization. The reviews take into account both normal equipment loading and Load at Risk following an N-1 contingency. Forecasted load additions are applied to historical data and the system is analyzed to determine where and when constraints are expected to develop. Recommendations for system reconfiguration or system infrastructure development are created as part of this annual review to ensure load can be served during peak demand periods and is documented in the Annual Capacity Plan.

The normal loading assessment identifies load relief plans for facilities that are projected to exceed 100 percent of normal capability (i.e., maximum peak loading allowed assuming no system contingencies). The projects from these reviews are intended to be in-service during the year the load limit is forecasted to occur. In general, load growth within the service area has averaged 0.7 percent over the past 10 years, and that modest growth rate is expected to continue at a similar level for the next 10 years. However, individual areas within the service area are forecasted to grow at varying rates.

In addition to the normal loading review, the Company has instituted planning criteria for Load at Risk following an N-1 contingency that sets MW and MWh interruption exposure thresholds ("MWh Violations") for various supply and feeder contingencies for the purpose of setting a standard for minimum electrical system performance. These thresholds are applied in conjunction with other criteria—such as maintaining acceptable delivery voltage and observing equipment capacity ratings—to ensure the system operates in a reliable manner while managing risk of customer interruptions to an acceptable level. MWh thresholds have been identified for three specific contingencies. For loss of a single substation supply line, a maximum interruption load limit of 20MW and/or 240MWh is specified, assuming that the line can be returned to service within 12 hours. For loss of a single substation power transformer, a maximum interruption load limit of 10MW and/or 240MWh is specified, assuming that the transformer can either be replaced or a mobile unit installed within 24 hours. Analysis of the interruptions under this criteria assume that any and all practical means are used to return load to service including use of mobile transformers and field switching via other area supply lines and/or area feeder ties. MWh analysis recognizes the approximate times required to install mobile/back-up equipment as well as stepped field switching, i.e. moving load from the adjoining in-service station with feeder ties, that will be used to pick up customers experiencing an interruption, to a second adjoining station to increase the capability of the feeder ties.

Customer Benefits:
The benefit to customers of completing the work identified in capacity planning studies includes less exposure to service interruptions due to overloaded cables and transformers. In addition, the implementation of projects to mitigate MWh Violations will reduce the likelihood that an unacceptable number of customers will be without service for extended periods due to supply, substation equipment or feeder contingencies.

The projects resulting from these studies are now typically classified as Load Relief or Reliability. Other program classifications are possible. Although a project is classified in one program or another, it may have multiple drivers.

2014 to 2015 Variance:
The projected investment in this program is shown below. The variation year on year is due to the scope and timing of specific projects. Several cable replacement projects with load relief drivers have been removed in favor of the sub-transmission cable replacement program. In addition, Station-related sub-transmission capacity improvements are discussed in Chapter 2 Transmission due to their FERC classification. Many of the projects in the Sub-transmission Asset Replacement and Overhead Line programs have multiple drivers and provide load relief and reliability improvements as well. Load Relief and Reliability programs are combined in the table below to provide a comparison between the 2014 and 2015 Plans.

Table 3-5
Capacity Planning
Program Variance ($millions)

	CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
Specific Projects	2014	1.9	3.4	6.4	5.2	0.3	-	17.1
	2015	-	1.9	3.1	0.7	2.4	1.5	9.5
Load Relief Blankets	2014	0.0	0.0	0.0	0.0	0.0	-	0.1
	2015	-	0.0	0.0	0.0	0.0	0.0	0.1
Total	2014	1.9	3.4	6.4	5.2	0.3	-	17.2
	2015	-	2.0	3.1	0.7	2.4	1.5	9.6

The following specific projects are classified as Load Relief and are estimated to have spending in excess of $1 million in any fiscal year:

- Project C028893, Buffalo 23kV Reconductor - Huntley 2. This project will replace cable 11H from Sawyer Station to Buffalo Station 52. This cable has exceeded summer normal ratings in the past and may exceed emergency ratings for the loss of one of the other three supply cables.

There are no specific projects classified as Reliability that are estimated to have spending in excess of $1 million in any fiscal year There are projects in other classifications that have reliability benefits.

Sub-Transmission Automation

In a continuing effort to modernize the grid the Sub-Transmission Automation Strategy includes advanced distribution automation methodologies as well as SCADA for reclosers, fault locators, and switches; and the interface of distribution automation enabled line devices with substation feeder breakers. It also encompasses the communication of these devices with each other and to central operations centers and database warehouses. The Company often refers to such devices and communications technology as Advanced Grid Applications.

Drivers:
The Company recognizes the benefit of identifying projects where the installation of modernized switching schemes will provide increased reliability to the sub-transmission system. The number of Advanced Grid Application switches per circuit or installation will vary depending on the number of substations the circuit supplies, the desired segmentation of the line, and the configuration of the supply system. Many of the automation schemes are unique and are developed considering an analysis of expected costs and benefits.

Customer Benefits:
Distribution lines or substations not equipped with automated sectionalizing or throw over schemes may be subject to extended service interruptions as Operations personnel must travel to the field locations to perform switching. This program provides an opportunity to continue to modernize the grid for the benefit of customers by reducing the number of customer interruptions that result from a given contingency and the time required to reconfigure the system to restore service to as many customers as possible while a faulted section of the system is being repaired.

2014 to 2015 Variance:
The projected investment is shown in the table below. Approximately $5.0M in additional projects have been identified, but funding projects have not yet been created and hence they are not yet placed into the plan. The prioritization of projects and the timing of their implementation will be based on the performance of the various individual circuits.

Table 3-6
Sub-Transmission Automation
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	1.1	0.6	1.2	2.1	2.0	-	7.0
2015	-	1.1	0.0	0.0	0.0	0.0	1.1

The following circuits have been identified for Sub-transmission Automation:

- Lowville-Boonville #22 Line
- Akwesasne-Fort Covington-Malone #26 Line

- Akwesasne-Nicholville #23 Line
- Nicholville-Malone #21 Line
- Gasport-Telegraph Line 312
- Delavan-Machias- Line 801
- Homer Hill – Nile Line 811
- Sherman-Ashville Line 863

Funding projects have not yet been initiated for these lines. Potential spend on these projects is approximately $5.0M.

3. D. Asset Condition

Planned asset condition investment levels for the sub-transmission system are described below.

2014 to 2015 Variance:
It should be noted that the replacement of several deteriorated cable circuits are accounted for in the System Capacity and Performance spending rationale since the replacements also provide needed capacity increases.

Table 3-7
Asset Condition
Variance Summary ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	23.6	23.1	22.5	26.2	31.9	-	127.5
2015	-	19.0	20.5	32.1	33.3	34.9	139.8

The following specific Asset Replacement projects have forecasted spending that exceeds $1 million in any fiscal year:

- Project C046707, Oakfield-Caledonia LN201 Reconductor. Reconductor approximately 11 miles between Churchville and Caledonia including pole replacements.
- Project C046779, Shaleton-Ridge 610, Station 207 tap provides for the refurbishment or replacement of deteriorated steel towers on the Station 207 tap.
- Project C046468, W. Portland-Sherman 867-34.5kV Refurbishment. Refurbish 34.5kV line including pole replacement as needed and replacement of deteriorated small copper conductors.
- Project C046469, Dake Hill-W Salamanca 816-34.5kV Refurbishment. Refurbish 34.5kV line including pole replacement as needed and replacement of deteriorated small copper conductors.
- Project C046465, Phillips-Barker 301-34.5kV Refurbishment. Refurbish 34.5kV line including pole replacement and replacement of deteriorated overhead conductor.
- Project C052209, Hartfield-S.Dow 859-34.5kV Relocation. Relocate 6 miles of 34.kV line due to access and tree trimming constraints. Scope removed from mainline refurbishment Project C033180

Inspection and Maintenance

Under this program, the Company performs visual inspections on all overhead and underground distribution assets once every five years. Each inspection identifies and categorizes all necessary repairs, or asset replacements, against a standard and in terms of criticality to improve customer reliability in compliance with the Commission's Safety Order in Case 04-M-0159.[1]

In addition, the following types of inspections are conducted by the Company:

- Aerial assessments of sub-transmission lines on an annual basis, and
- Infra-red inspection of sub-transmission lines on a three year schedule.

The Company also performs annual elevated voltage testing per the Commission's Safety Order on all facilities capable of conducting electricity that are publicly accessible.

This program has been moved from the Customer Requests/Public Requirements spending rationale to Asset Condition to better reflect its impact on the condition of the Company's electric facilities.

Drivers:
The Company implements the Inspection and Maintenance program in accordance with the Commission's directives in Case 04-M-0159. The Company's annual Asset Condition Report details the application of the Inspection and Maintenance program to sub-transmission assets.[2]

Customer Benefits:
This program is designed to ensure the Company fulfills its obligation to provide safe and adequate service by inspecting it facilities and repairing safety and reliability issues identified in a timely fashion.

2014 to 2015 Variance:
Current investment forecasts are based on actual expenditures incurred under the Inspection and Maintenance program and an expectation that the number of defects found in future year inspections will decrease as the inspection cycle repeats.

Table 3-8
Inspection and Maintenance
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	11.4	9.0	5.7	5.0	5.0	-	33.0
2015	-	6.3	6.3	6.2	6.1	6.1	31.0

[1] Case 04-M-0159, Proceeding on Motion of the Commission to Examine the Safety of Electric Transmission and Distribution Systems, Order Adopting Changes in the Electric Safety Standards (issued and effective Dec. 15, 2008) ("Safety Order").
[2] Report on the Condition of Physical Elements of Transmission and Distribution Systems, Case 12-E-0201, most recently filed on October 1, 2014.

Overhead Line

Various projects are in place to refurbish or replace sub-transmission overhead assets to ensure the system continues to perform in a safe and reliable manner. This includes pole, tower, overhead ground wire and conductor replacement in addition to the work generated via the Inspection and Maintenance program discussed above.

Drivers:
Although spending is categorized by spending rationale, all drivers are considered in determining the optimum project solution. Reliability and condition are the main drivers for these projects. Historically, the number of reliability events that are initiated on the sub-transmission system is low; however these events can result in a significant number of customers being interrupted where the lines are radial.

Physical condition of the sub-transmission system is being assessed through the Inspection and Maintenance program, helicopter surveys and by local engineering reviews and 'walk downs'.

Customer Benefits:
Refurbishment and replacement of sub-transmission system components can have a significant impact on regional CAIDI/SAIFI and Customer Minutes Interrupted (CMI) since they typically supply distribution stations.

2014 to 2015 Variance:
The projected investment is shown in the table below. Existing identified work under this program will be continued. New projects are being identified on lines where work is needed due to significant deterioration.

Table 3-9
Overhead Line
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	6.5	8.5	11.4	14.0	19.5	-	63.3
2015	-	7.2	8.7	11.8	13.4	19.6	60.7

The following specific projects have forecasted spending that exceeds $1 million in any fiscal year:

- Project C033180, Hartfield-South Dow 859 Refurbishment. Refurbish 34.5kV line including pole replacement as needed and replacement of deteriorated conductors.
- Project C033182, Amsterdam-Rotterdam 3/4 Relocation. Relocate ¾ mile of Double Circuit 69kV to avoid wetland.
- Project C046441, Lighthouse Hill-Mallory 22-34.5kV Refurbishment. Refurbish 34.5kV including pole replacements

- Project C046472, Ballston-Mechanicville 6-34.5kV Refurbishment. Refurbish 34.5kV line including pole, tower, and overhead ground wire replacements.
- Project C046681, Mallory-Cicero 33-34.5kV Refurbishment. Refurbish 34.5kV line including pole replacements and a centerline relocations to correct unequal span lengths, reducing the number of structures.
- Project C052511, Barker-Lyndonville 301-34.5kV Refurbishment. Refurbish 34.5kV line including pole replacements as needed and replacement of deteriorated overhead conductor.
- Project C052512, Lyndonville-Medina 301-34.5kV Refurbishment. Refurbish 34.5kV line including pole replacements as needed and replacement of deteriorated overhead conductor.
- Project C046459, Deerfield-Whitesboro 26-46kV Refurbishment. Refurbish 46kV line including pole replacements as needed and deteriorated overhead ground wire.
- Project C050323, Mechanicville-Schuylerville 4-34.5kV Refurbishment. Refurbish 34.5kV line including pole replacements as needed.
- Project C046473, Woodard 29-34.5kV Refurbishment. Refurbish 34.5kV line including pole, tower and overhead conductor replacements.
- Project C050959, Elbridge-Jewitt 31-34.5kV Refurbishment. Refurbish 34.5kV line including pole and Aeromotor tower replacements.
- Project C046641, Callanan Tap – Rebuild Existing 34.5 Line provides for the refurbishment of the Callanan Tap 1 between Bethlehem-Voorheesville Line 1 and the customer.
- Project CD00898, West Milton Tap – 34.5kV new Line, provides of the installation of an approximately 3 mile new supply line to West Milton from Rock City Falls to allow the retirement of approximately 9 miles of line.

The following projects are accomplishing similar work to the Overhead Line projects but have a program code of Asset Replacement. The costs for these projects are not included in Table 3-9; project summaries are included below Table 3-7.

- Project C046468, W. Portland-Sherman 867-34.5kV Refurbishment
- Project C046469, Dake Hill-W Salamanca 816-34.5kV Refurbishment.
- Project C046465, Phillips-Barker 301-34.5kV Refurbishment
- Project C052209, Hartfield-S.Dow 859-34.5kV Relocation
- Project C046779, Shaleton-Ridge 601, Station 207 Tap-34.5kV Refurbishment

Underground Cable

Various projects are completed each year to refurbish or replace sub-transmission underground assets to ensure the system continues to perform in a safe and reliable manner.

Buffalo

A major program has been initiated to replace 23kV cables in the city of Buffalo. The existing distribution system in the City of Buffalo was built starting in 1929 and is supplied by four terminal stations: Sawyer, Seneca, Kensington and Elm Street. The 23kV cable system represents about 433 miles of underground cables and supplies over forty 4.16kV distribution substations. Approximately 385 miles of the original 1-3/C-350kcmil CU PILC (paper in lead covered cable) installed in the late 1930s are still in service. As time progresses, the aging cables experience continued mechanical stress due to annual loading cycles and eventually fail, causing interruptions.

Through analysis of failure records, 83 miles of cables have been identified that are considered high risk. These are cables that have a high rate of failure and have a major impact to our distribution substations and customers in an event of cable failure.

Drivers:

Failures of individual sub-transmission cables do not typically impact customer reliability since the portions of the system where they are utilized are generally networked. However, because these systems are located below ground and are out of sight, failures of underground sub-transmission cables can be difficult to locate and time-consuming to repair leaving the system at risk.

There are approximately 1,100 miles of sub-transmission underground cable. Approximately one-half are more than 48 years old and one-third are more than 60 years old. The sub-transmission underground cable asset replacement program replaces cables that are in poor condition, have had a history of failure or of a type known to have performance issues.

Customer Benefits:

Cable replacement projects reduce the likelihood of in service cable failures, and resulting exposure to the risk of extended outages.

2014 to 2015 Variance:

The projected program investment is shown in the table below. The variation year on year is due to the scope and timing of specific projects.

Table 3-10
Underground Cable
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	1.4	5.2	4.4	3.7	6.2	-	20.8
2015	-	1.6	2.1	4.3	3.0	3.7	14.7

The following specific projects have forecasted spending that exceeds $1 million in any fiscal year:

Project C052483, Buffalo 23kV UG Cable replacement program provides for the replacement of high risk cables.

Project C036273, Partridge-Ave A#5 Cable Replacement provides for the replacement of approximately one-third of a mile of gas filled cable in the City of Albany.

Not represented in the investment forecasts in the table above is the cable replacement project C028893, Buffalo 23kV Reconductor - Huntley2. This planned project is included in the forecasts for spending in the System Capacity and Performance Spending Rationale, in the Capacity Planning program.

Chapter 4. Distribution System

The Company's distribution system consists of lines and substations typically operating at 15kV and below. There are nearly 36,000 circuit miles of overhead primary wire and nearly 7,500 circuit miles of underground primary cable on the system supplying approximately 400,000 overhead, padmount and underground distribution transformers. Additionally, there are 421 substations providing service to the Company's 1.6 million electric customers.[1] The current five-year plan for distribution is represented in Table 4-1.

Table 4-1
Distribution System Capital Expenditure by Spending Rationale ($millions)

Spend Rationale	FY16	FY17	FY18	FY19	FY20	Total
Customer Requests/Public Requirements	85.5	84.9	89.3	90.9	89.7	440.3
Damage/Failure	27.7	28.1	28.6	29.5	29.1	143.0
System Capacity & Performance	70.1	63.0	81.5	78.4	80.3	373.4
Asset Condition	67.3	72.9	82.6	93.2	86.3	402.2
Non-Infrastructure	3.0	3.0	3.0	3.1	3.0	15.1
Total	**253.6**	**251.8**	**285.1**	**295.0**	**288.5**	**1374.0**

[1] The distribution system data was taken January 24, 2015 from National Grid Asset Information Website located at http://usinfonet2/OurOrganization/NetworkStrategyUS/AssetManagement/Pages/AssetDetails.aspx.

4. A. Customer Requests/Public Requirements

Distribution Customer Requests/Public Requirements projects include capital expenditures for new business residential, new business commercial, outdoor lighting, and third party attachments, among other things. Customer Requests/Public Requirements investment levels are based primarily on review of historical blanket spending and forecasted spending on known specific work. These estimates reflect consideration given to inflation, estimates of materials, labor, indirect cost, market sector analysis, overall economic conditions and historical activity.

Little variance between the 2014 and 2015 Plans is forecasted for this category.

Table 4-2
Customer Requests/Public Requirements Spending Rationale
Variance Summary ($millions)

	CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
	2014	67.7	69.4	70.9	72.7	74.5	-	355.3
Blankets	2015	-	68.7	69.3	71.2	73.8	72.6	355.6
	2014	17.8	16.4	16.4	16.6	16.7	-	83.9
Specific Projects	2015	-	16.8	15.6	18.2	17.1	17.1	84.7
	2014	85.5	85.8	87.3	89.2	91.2	-	439.1
Total	2015	-	85.5	84.9	89.3	90.9	89.7	440.3

Blankets

The distribution Customer Requests/Public Requirements blankets include items such as New Business Residential, New Business Commercial, Outdoor Lighting, Public Requirements, Transformer Purchase and Installation, Meter Purchase and Installation, Third Party Attachments, and Land Rights. Exhibit 3 shows the detailed investment for all blankets in this rationale. Blankets are described in more detail below:

New Business Residential
Installation of new overhead or underground services to residential customers, reconnections as well as miscellaneous equipment related to providing or upgrading services based on customer requests. Project spending can also include costs for the extension of distribution feeders directly related to providing service to a new residential customer or development; and actual spending is net of any contribution in aid of construction (CIAC).

New Business Commercial
Installation of new services to commercial customers, reconnections as well as miscellaneous equipment related to providing or upgrading services based on customer requests. Project spending can also include costs for the extension of distribution feeders directly related to providing service to a new commercial or industrial customer or development; and actual spending is net of any CIAC.

Transformer Purchase
Transformers are purchased and are shipped to locations within the Company where these items are put into stores.

Meter Purchase
Meters are purchased and shipped to locations within the Company where these items are put into stores.

Meter Installation
Meters are installed or replaced at customer metering points to maintain equipment compatibility and readout accuracy.

Public Outdoor Lighting
Street lighting or private area lighting and related equipment is installed or replaced.

Public Requirements
Overhead and underground facility relocations resulting from bridge or roadway rebuilds, expansions, or relocations; municipal requests to relocate overhead facilities underground; and other public authorities requesting or performing work that requires equipment or facilities to be relocated.

4. B. Damage/Failure

Damage/Failure projects are required to replace equipment and restore the electric system to its original configuration and capability following equipment damage or failure. Damage may be caused by storms, vehicle accidents, vandalism or other unplanned events, among other causes. The Damage/Failure spending rationale is typically a mandatory spending rationale of work that is non-discretionary in terms of scope and timing.

The Damage/Failure investment level for the distribution system is primarily based on historical actual costs for such work. Where condition renders the asset unable to perform its intended electrical or mechanical function on the delivery system, the Company initiates the timely replacement of such asset under the Damage/Failure spending rationale.

2014 to 2015 Variance:
Spending in the damage failure category is forecasted to increase approximately 20 percent compared to last year's plan. The increase in future spend in this year's Plan compared to last year relates to an increase in actual spending that is projected into future years. Comparison of the distribution Damage/Failure investment levels from the 2014 and 2015 Plans is set forth below.

Table 4-3
Damage/Failure Spending Rationale
Variance Summary ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	22.5	23.1	23.5	23.9	23.7	-	116.7
2015	-	27.7	28.1	28.6	29.5	29.1	143.0

Aside from blanket and program related projects, there are no specific projects identified under this spending rationale that exceed $1 million in any fiscal year.

4. C. System Capacity and Performance

System Capacity and Performance projects are required to ensure the electric network has sufficient capacity, resiliency, or operability to meet the growing and/or shifting demands of the system and our customers. Projects in this spending rationale are intended to reduce degradation of equipment service lives due to thermal stress, to improve performance of facilities where design standards have changed over time, and to provide appropriate degrees of system configuration flexibility to limit adverse reliability impacts of contingencies. In addition to accommodating load growth, the expenditures in this rationale are used to install new equipment such as capacitor banks to maintain the requisite power quality required by customers and reclosers that limit the customer impact associated with an interruption. It also includes investment to improve performance of the network through the reconfiguration of feeders and the installation of feeder ties. The projected distribution investment in the system capacity and performance spending rationale over the Plan period is shown below.

2014 to 2015 Variance:
The forecasted investment levels represent the cash flow of specific projects. The variance between the 2014 and 2015 Plans is based on the scope and timing of the specific projects in this category as discussed following the table below.

Table 4-4
System Capacity and Performance Spending Rationale
Variance Summary ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	67.9	68.0	83.3	93.1	95.7	-	408.1
2015	-	70.1	63.0	81.5	78.4	80.3	373.4

Capacity Planning

Drivers:
An annual review of the distribution system, including substation and feeder loading, is performed to review equipment utilization. The reviews take into account both normal equipment loading and Load at Risk following an N-1 contingency. Forecasted load additions are applied to historical data and the system is analyzed to determine where and when constraints are expected to develop. Recommendations for system reconfiguration or system infrastructure development are created as part of this annual review to ensure load can be served during peak demand periods and is documented in the Annual Capacity Plan.

The normal loading assessment identifies load relief plans for facilities that are projected to exceed 100 percent of normal capability (i.e., maximum peak loading allowed assuming no system contingencies). The projects from these reviews are intended to be in-service during the year the load limit is forecasted to occur. In general, load growth within the service area has averaged 0.7 percent over the past 10 years, and this growth rate is expected to continue for the next 10 years. However, individual areas within the service area are forecasted to grow at varying rates.

In addition to the normal loading review, the Company has instituted planning criteria for Load at Risk following an N-1 contingency that sets MW and MWh interruption exposure thresholds ("MWh Violations") for various supply and feeder contingencies for the purpose of setting a standard for minimum electrical system performance. These thresholds are applied in conjunction with other criteria - such as maintaining acceptable delivery voltage and observing equipment capacity ratings - to ensure the system operates in a reliable manner while managing risk of customer interruptions to an acceptable level. MWh thresholds have been identified for three specific contingencies. For loss of a single substation supply line, a maximum interruption load limit of 20MW and/or 240MWh is specified, assuming that the line can be returned to service within 12 hours. For loss of a single substation power transformer, a maximum interruption load limit of 10MW and/or 240MWh is specified, assuming that the transformer can either be replaced or a mobile unit installed within 24 hours. Finally, for loss of any single distribution feeder element, a maximum interruption of 16MWh is specified. Analysis of the interruptions under this criteria assume that any and all practical means are used to return load to service including use of mobile transformers and field switching via other area supply lines and/or area feeder ties. MWh analysis recognizes the approximate times required to install mobile/back-up equipment as well as stepped field switching, i.e. moving load from the adjoining in-service station with feeder ties, that will be used to pick up customers experiencing an interruption, to a second adjoining station to increase the capability of the feeder ties.

The Annual Capacity plan reviews loading on over 2,000 feeders and more than 400 substations and results in numerous upgrade projects that range in scope from switching load between feeders and/or substations to new lines or substations.

Customer Benefits:
The benefit to customers of completing the work identified in capacity planning studies includes less exposure to service interruptions due to overloaded cables and transformers. In addition, the implementation of projects to mitigate MWh Violations will reduce the likelihood that an unacceptable number of customers will be without service for extended periods due to supply, substation equipment or feeder contingencies.

The projects resulting from these studies are now typically classified as Load Relief or Reliability. Other program classifications are possible. Even though a project is classified in one program or another it may have multiple drivers.

2014 to 2015 Variance:
The projected investment is shown in the table below and variation year on year is due to the scope and timing of specific projects. Projects in this program in prior years have been reclassified to the Load Relief and Reliability programs. The table below consolidates those two programs for the 2015 CIP to provide for a comparison to the 2014 CIP. The variance in spend is due to an increase in identified load relief projects in later years compared to earlier years.

Table 4-5
Capacity Planning
Program Variance ($millions)

	CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
Specific Projects	2014	28.5	30.3	49.7	59.8	55.4	-	223.7
	2015	-	49.9	44.1	54.8	57.7	57.4	263.9
Load Relief Blankets	2014	1.8	1.9	1.9	2.0	2.1	-	9.7
	2015	-	1.8	1.9	1.9	2.0	2.0	9.6
Total	2014	30.3	32.2	51.6	61.8	57.4	-	233.4
	2015	-	51.7	45.9	56.7	59.6	59.5	273.5

The following specific projects are classified as Load Relief and are forecasted with planned spending in excess of $1 million in any fiscal year. Details on the planned spending profiles for these projects are included in Exhibit 3.

- Projects C046609 and C046643, Milton Ave Substation and feeders, respectively. These projects provide for the resolution of normal loading concerns and MWh Violations for contingency loss of the existing substation transformer.
- Projects C046475 and C046476, New Cicero Substation and feeders, respectively. These projects provide for the resolution of normal loading concerns and MWh Violations for contingency loss of an existing substation transformer at Pine Grove Substation.

- Projects C046634 and C046635, New Haven Transformer Upgrade and Feeder, respectively. These projects upgrade the existing transformer at New Haven and extend a new feeder to relieve/retire Mexico Substation and provide a feeder tie to East Pulaski to address loading and contingency concerns.
- Project C032446, Harris 54 Relief with associated projects provides for the upgrade of the existing distribution feeder getaways and two new feeders to resolve loading above summer normal ratings and MWh criteria violations of the Harris Ave. Substation transformer as well as asset condition concerns at adjacent substations.
- Project C046511, Teall Substation Rebuild, provides for replacing the existing metalclad switchgear with higher rated switchgear and installing a second transformer to address loading and asset condition issues.
- Project CD00896, Randall Road New Substation. This portion of the project is for a new 15kV switchgear and capacitor bank at a new 115-13.2 kV station. This and associated projects will resolve loading above summer normal rating of the existing substation transformer, MWh criteria violations and distribution feeder loading issues.
- Project CD00897, Randall Road Distribution Getaways. This project provides for the distribution line work associated with Project CD00896 described above.
- Projects C046798 and C046796, Sodeman Road New Substation and Distribution Getaways, respectively. These projects provide for a new 15kV switchgear and capacitor bank at a new 115-13.2 kV station as well as distribution feeder getaways, feeder reconductoring and other feeder work. These projects will resolve loading above summer normal rating of the existing substation transformer, MWh criteria violations and distribution feeder loading issues.
- Project C046490, Van Dyke Station. This project installs a new 115-13.2kV station to address loading, asset condition and reliability concerns in and adjacent to the Town of Bethlehem.
- Projects C016087, C046487, C046488, C046495 and C052098 Van Dyke Feeders. These projects provide for distribution line work associated with Project C046490 described above.
- Projects C053137 Forbes Ave – New Substation and CD00893, DeLaet's Landing Feeders, respectively. These projects are for a new 115-13.2kV station and feeders to address loading concerns in the City of Rennselaer due to a new development.
- Project C046761, Grooms Rd 24557 provides for the rebuild and conversion of Saratoga Road from 4.8kV to 13.2kV to address loading concerns.
- Project C046790 and C046791, McCrea Substation and feeders, respectively. These projects provide for the resolution of normal loading concerns at Burgoyne and Butler as well as asset condition concerns at the existing McCrea substation.

- Project CD00895, Queensbury, provides for connecting the new station metalclad switchgear to the existing feeders.
- Project C028929 – Frankhauser. This project provides for new distribution feeder construction to be supplied by the Frankhauser Substation to address distribution and sub transmission capacity issues.
- Project C036502, Buffalo Station 56 Upgrade Four Transformers. This project replaces four 23-4.16kV transformers with larger transformers to address loading above summer normal ratings.
- Project C035743, Wilson 93 Load Relief. This project provides for the replacement of the existing Wilson Transformer with a larger transformer to address station loading concerns.
- Project C046538, Eden Switch Structure. This and associated projects provide of the installation of a new 34.5-13.2kV station near the existing Eden Switch Structure as well as the construction of new feeders to address loading and reliability concerns in the area.
- Project CD01128, Buffalo Station 49 – UG Upgrades. This project provides for three (3) new feeders in a new conduit and manhole system to supply customers in the Buffalo Niagara Medical Corridor.
- Project C051585, Sonora Way 115-13.2v Substation. This and associated projects provide for the relief of normal loading concerns at area substations as well as address outage exposure concerns.

The following specific projects are classified as Reliability program and are forecasted with planned spending in excess of $1 million in any fiscal year. Details on the planned spending profiles for these projects are included in Exhibit 3.

- Project C036188, East Malloy Substation Second Transformer Addition. This project provides for the resolution of MWh Violations for contingency loss of the existing substation transformer.
- Project C036189, Fly Road Transformer Addition and C046722 Fly Road Low Side Substation Equipment. These projects provide for the resolution of MWh violations for the contingency loss of the existing transformer and load relief for adjacent feeders.
- Project C046636, Whitaker Substation. This project provides for the resolution of MWh Violations for contingency loss of the existing substation transformer.
- Project C046627 and C046610, Watertown New 115/13.2kV Substation and feeders, respectively. These projects provide for a new 115-13.2kV substation and distribution feeders to address normal and contingency loading issues in the Watertown area.
- Project C054587, Malone Second Transformer. This and associated projects are to resolve MWh violations for contingency loss of the existing substation transformer.

- Project C046613, Terminal Station relocation. This and associated projects provide for the replacement of the existing Terminal Station at a nearby location to address reliability issues.
- Project C049197 – NR 76462-CoRte28-Rebuild. This project constructs new three-phase and single-phase portion of the circuit to upgrade and/or replace existing.
- Project C049727, McGraw-Truxton Feeder Tie. This project creates a feeder tie to resolve the lack of feeder ties on Truxton 73 and provide operational flexibility to improve restoration times for our customers.
- Projects C029186 and C029187, Station 214 - Second Transformer Addition and new feeders respectively. These projects will resolve the existing loading above summer normal rating of the existing transformer and provide relief toe existing stations and adjacent feeders.
- Project C036056, Military Road 210 - Second Transformer Addition. This project provides for the resolution of MWh Violations for contingency loss of the existing substation transformer.
- Project C036059, Shawnee Road 76 - Second Transformer Addition. This project provides for the resolution of MWh Violations for contingency loss of the existing substation transformer.
- Project C036639, Buffalo Station 139 - Replace Transformers. This project provides for the replacement of the two existing Buffalo Station 139 Substation transformers, which are overloaded on contingency loss of one transformer.
- Project CD01089 and CD01090, West Hamlin 82 - Install Transformer #2 and additional feeders respectively. These projects provide for the resolution of MWh Violations for contingency loss of the existing substation transformer.
- Project C046590 and C045589, Mumford – Install Transformer #2 and additional feeder respectively. These projects provide for the resolution of MWh Violations for contingency loss of the existing substation transformer.
- Project C046536, Delameter - Install Two 20/26/33 MVA Transformers. This project and associated projects provide for the resolution of MWh Violations for contingency loss of the existing substation transformer, asset condition issues with the existing transformer and loading issues with neighboring stations.
- Project C051266 and C051265, New Tonawanda Station and Line Work, respectively. These projects provide for the installation of a new 115-13.2kV substation and feeders to supply the Riverview Development in Tonawanda.
- Projects CD00977 and CD99964, Long Road #209 new TB#2 and additional feeder, respectively. These projects install a second transformer at Long Road and extend a new feeder to address contingency loading issues on Grand Island.
- Project C046593 and C046591, West Sweden New Station and Feeders, respectively. These projects provide for the installation of a new 115-13.2kV substation and feeders to address contingency loading concerns.

- Project C036057, Lockport Road 216 Second Transformer. This and associated projects provide for the installation of a second transformer to address contingency overloads in the area.

Heavily Loaded Line Transformer

The distribution line transformer strategy endeavors to mitigate outage/failure risks due to overloading of distribution service transformers. Transformer loading is reviewed annually via reports generated from the customer use information within the Geographical Information System (GIS). Transformers with calculated demands exceeding load limits specified in the applicable Construction Standard are identified and investigated in the field.

Heavily loaded units are to be systematically removed from the system over the next fifteen years. Replacement levels may be adjusted based on changes to loading levels, the condition of the population and budget constraints.

Drivers:
There are approximately 200 transformer failures per year due to overloading which affect approximately 3,000 customers annually. Proactive management of equipment loading through annual review has prevented overloaded transformers from becoming a significant system performance problem.

Customer Benefits:
The main benefit of this strategy is that asset utilization will be maximized by maintaining units in service until such point that replacement is required as identified through recurring loading reviews or visual and operational inspection, recognizing that transformer life expectancy is predominantly affected by loading and environmental factors rather than age. Implementation of this strategy will ensure the sustainability of this asset class over time and maintain its relatively minor impact on overall system reliability and customer satisfaction.

2014 to 2015 Variance:
The planned spend for the Heavily Loaded Line Transformer program, has been reduced to accommodate higher priority projects for the next several years.

Table 4-6
Heavily Loaded Line Transformer
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	3.2	3.2	3.3	3.4	3.4	-	16.5
2015	-	0.8	0.8	0.8	0.8	0.8	3.8

Remote Terminal Unit (RTU)

This strategy covers the addition of Remote Terminal Units (RTUs) and related infrastructure at substations presently lacking remote monitoring and control capabilities. RTUs in substations communicate with the EMS (Energy Management System) and provide the means to leverage substation data that provides operational intelligence and significantly reduces response time to abnormal conditions through real time monitoring and control.

There is an additional investment to replace outdated RTUs based on their asset condition. That investment is documented in the Asset Condition spending rationale section.

Drivers:
RTUs will allow for remote operation and management of the system at stations providing benefits in contingency response and recovery and thus improving performance and reliability. In addition, RTUs are key components of automation and modernization of the Company's infrastructure.

Customer Benefits:
This strategy provides the means to leverage operational intelligence and significantly reduce response time to abnormal conditions through real time monitoring and control. The strategy also enables the distribution automation, sub-transmission automation, and future modernization strategies which will improve service to customers. When used to monitor and control the distribution feeder breakers and associated feeder equipment, RTUs and EMS facilitate the isolation of faulted equipment and the time required to reconfigure the distribution system to re-energize customers in non faulted segments of the distribution system.

2014 to 2015 Variance:
The projected investment is shown in the table below and the Company plans to spend a similar amount year after year.

Table 4-7
Remote Terminal Unit
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	2.5	1.4	1.0	1.5	2.2	-	8.6
2015	-	3.4	0.9	1.5	1.5	1.5	8.8

Engineering Reliability Review

An Engineering Reliability Review (ERR) can be completed for any feeder experiencing reliability problems or any localized pocket of poor performance. ERRs are often performed on those feeders defined as Worst Performing Feeders ("WPF") as described in the Electric Service Reliability Report, filed annually in accordance with Case 90-E-1119. The scope of an ERR is typically a:

- Review of one-year and multi-year historical reliability data for current issues and trends.
- Review of recently completed and/or future planned work which is expected to impact reliability.
- Review the need for the installation of radial and/or loop scheme reclosers.
- Review for additional line fuses to improve the sectionalization of the feeder.
- Comprehensive review of the coordination of protective devices to ensure proper operation.
- Review for equipment in poor condition.
- Review of heavily loaded equipment.
- Review for other feeder improvements such as fault indicators, feeder ties, capacitor banks, load balancing, additional switches and reconductoring (overhead and/or underground).

Drivers:
The ERR recommendations are utilized as a basis to improve the reliability on the circuits experiencing recent poor reliability performance.

Customer Benefits:
The ERR program will improve customer reliability in areas in which performance has been substandard. The ERR work also helps to harden the feeder and make the feeder more resilient.

2014 to 2015 Variance:
Projects associated with the ERR program are reactionary and are identified as reliability concerns arise. As such, specific projects are only identified in the early years of the plan. A future spending plan is created and reviewed annually to target priority projects.

Table 4-8
Engineering Reliability Review
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	3.7	6.2	8.0	7.9	7.0	-	32.8
2015	-	1.5	2.6	11.5	6.4	8.8	30.7

Minor Storm Hardening

The Minor Storm Hardening program proposes to increase the resilience of the distribution system in select areas of the service territory that have experienced repeated outages during adverse weather days in an effort to improve reliability performance and customer satisfaction for those customers experiencing multiple interruptions. Work in these projects includes: reconductoring with tree resistant conductors, review of pole size and class as well as the use of Grade B construction at critical poles (junction poles, switch poles and road/rail/water crossings), additional sectionalizing points as appropriate (reclosers, fuses and switches), enhanced lightning protection and enhanced vegetation management.

Drivers:
The Storm hardening recommendations are utilized as a basis to improve the reliability in targeted areas that have experienced recent poor performance during adverse weather events.

Customer Benefits:
The Minor Storm Hardening program will enhance distribution resiliency in targeted areas.

2014 to 2015 Variance:
The projected investment and the variation between the 2014 and 2015 Plans is shown in the table below. A portion of the variance for FY16, FY17 and FY18 is the classification of several projects as Reliability even with "Minor Storm" in the project title, which represents approximately $1.8M total for those years. Additional variance is due to improved project scopes and estimates due to the analysis performed on the circuits identified for the program.

Table 4-9
Storm Hardening
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	3.8	3.1	3.2	3.3	3.4	-	16.8
2015	-	1.3	0.9	2.0	2.0	1.6	7.8

There are no specific projects in this category forecasted with planned spending in excess of $1 million in any fiscal year.

Overhead Distribution Fusing

Various projects are in place which will maintain customer reliability through the installation of fuses on overhead distribution lines. Fuses are installed to isolate permanent faults on the distribution system. Ideally, these fuses are installed at locations which limit the interruption to the fewest number of customers possible. Proper fuse application will limit the duration of the interruption by isolating the fault to a smaller area and reducing the time required to find the fault.

Drivers:
Fuses isolate the faulted area of a feeder and thereby interrupt the smallest practical number of customers.

Customer Benefits:
These projects will result in a reduction in the number of customer interruptions and will help the Company continue to meet its service quality metrics.

2014 to 2015 Variance:
The program consists of two distinct components: fuse identification and fuse installation. The identification of fuse locations will conclude in FY17, and installations are expected to continue into FY19.

Table 4-10
Overhead Distribution Fusing
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	2.4	2.4	2.4	1.2	0.0	-	8.4
2015	-	1.2	0.8	0.4	0.3	0.0	2.7

Arc Flash Mediation - 480 Volt Spot Networks

The installation of 480 volt spot network primary and secondary isolation equipment mitigates the arc flash hazard levels within 480 volt spot network systems.

Drivers:
The primary driver of this strategy is safety. National Grid adheres to the National Electrical Safety Code's Part 4: Work Rules for the Operation of Electric Supply and Communication Lines and Equipment. This strategy addresses the National Electrical Safety Code 2012 revision which requires an arc flash hazard analysis for work assignments within distribution secondary network systems. This strategy will mitigate the calculated incident energy levels by installing engineering controls.

Customer Benefits:
Installation of primary and secondary isolation equipment will facilitate emergency and routine maintenance without interruption of service to the customer. The high side isolation switches will eliminate disruption to customers of the same voltage level by eliminating the need for them to switch to back up sources or take an outage in the event a 480 volt network transformer has an issue that requires it to be de-energized.

2014 to 2015 Variance:
Forecasted spending levels are shown below. Previous materials issues are being resolved and installations increasing. Additional experience with equipment installs also contributes to the increasing number of installations. The project is forecasted for FY19 completion.

Table 4-11
Arc Flash Mediation - 480 Volt Spot Networks Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	4.0	4.0	4.0	2.1	0.0	-	14.1
2015	-	3.1	3.4	3.4	3.4	0.0	13.3

Substation Flood Mitigation

The substation flood mitigation program endeavors to mitigate outage/failure risks due to flooding of distribution substations. Substation flood risk was analyzed to determine which distribution substation were at a high risk. Further analysis was completed to determine mitigating actions for each of the high risk substations. Some actions may be to raise certain equipment or to install a barrier at a particular station. Relocating a station was used in limited applications.

Drivers:
The Substation flood mitigation recommendations are utilized to improve the reliability in targeted areas that have a high probability to experience flooding during extreme rain events.

Customer Benefits:
The Substation Flood Mitigation program will enhance distribution resiliency in targeted areas.

2014 to 2015 Variance:
This is a new program for 2015.

Table 4-12
Substation Flood Mitigation Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	-	-	-	-	-	-	-
2015	-	1.9	1.9	0.0	0.0	0.0	3.9

The following specific project is classified as Flood Mitigation program and is forecasted with planned spending in excess of $1 million in any fiscal year:

- Project C053167, Union Falls – Flood Mitigation. This and associated projects provide for the construction a new substation and feeder getaways at a higher elevation to address the flood risk at the existing substation.

System Capacity and Performance – Other

Projects previously categorized as other in System Capacity and Performance have been re-categorized into the various programs.

4. D. Asset Condition

Planned asset condition investment levels for the distribution system, and comparison to investment levels from last year's Plan, are shown below.

2014 to 2015 Variance:
The variance between the 2014 and 2015 Plans is based on the scope and timing of the specific projects in this category as discussed following the table below.

Table 4-13
Asset Condition Spending Rationale
Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	64.1	67.9	78.7	74.2	75.0	-	359.9
2015	-	67.3	72.9	82.6	93.2	86.3	402.2

Funding levels for the programs and projects included in the Asset Condition rationale are presented below.

The following specific projects are proposed under the Asset Condition and are not associated with any of the programs described later in this chapter and exceed $1 million in any fiscal year:

- Project C046790 and C046791, McCrea Substation and feeders, respectively. These projects provide for the resolution of normal loading concerns at Burgoyne and Butler as well as asset condition concerns at the existing McCrea substation.
- Project C046606, MV-Poland 62258 Route 8 Reconductor. This project reconductors and refurbishes the existing distribution circuit including pole replacements.
- Projects C046854 and C046859, Buffalo Station 42 Rebuild – D Station and feeders respectively. These projects replace the existing outdoor Buffalo Station 42 to address the existing condition issues at the substation.
- Project CD00782, Buffalo Station 122 Rebuild – Substation. This project replaces the existing outdoor Buffalo Station 122 to address the existing asset condition issues at the substation.
- Project C050400, Ohio St – Buffalo River Tunnel/Bore. This project provides for a new casing and duct bank approximately 50 feet under the river to replace the existing flooded tunnel and to connect to two new 20-way duct banks from the Ohio Street rebuild project.

Inspection and Maintenance

The Company performs visual inspections on all overhead and underground distribution line assets once every five years. Each inspection identifies and categorizes all necessary repairs, or asset replacements, against a standard and in terms of criticality to maintain customer safety and reliability in compliance with the Commission's Safety Order in Case 04-M-0159.[2] The Company also performs annual contact voltage testing per the Commission's Safety Order on all facilities that are capable of conducting electricity and are publicly accessible, such as street lights.

2014 to 2015 Variance:
Current investment forecasts are based on actual expenditures being incurred with the on-going Inspection and Maintenance program. The increase in future spend in this year's Plan compared to last year relates to an increase in actual spending that is projected into future years.

Table 4-14
Inspection and Maintenance
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	25.4	21.8	21.8	21.8	18.7	-	109.7
2015	-	34.2	36.8	31.8	31.0	31.4	165.1

Underground Cable

A strategy has been implemented to proactively replace underground cable on the sub-transmission, distribution primary and distribution secondary systems. Available information such as failure history, cable age, inspection program results and cable type were used to identify candidate cable replacements for further engineering evaluation. Sub-transmission and distribution cable replacement projects will be on a circuit basis, with each project justified, engineered, scoped and approved individually. A single program funding number in each Division will be used for secondary cable replacement. Distribution cable replacement opportunities are aligned with other projects such as Buffalo Substation rebuild projects and load relief projects.

[2] Case 04-M-0159, Proceeding on Motion of the Commission to Examine the Safety of Electric Transmission and Distribution Systems, Order Adopting Changes in the Electric Safety Standards (issued and effective Dec. 15, 2008) ("Safety Order").

Drivers:

Recently, there have been a number of cable failures that resulted in manhole cover dislodgements and smoking manholes. These events heightened concerns regarding the safety and reliability of the aged underground systems. Although the consequence of a manhole event can be severe, the likelihood of an event remains low. This strategy is expected to further reduce the likelihood of manhole events by proactively replacing cable based on its condition and past performance.

Customer Benefits:

Cable systems are often designed with greater redundancy than overhead systems, and cable failure often has a limited impact on customer reliability statistics. However, if cable performance deteriorates significantly, the likelihood of concurrent failures increases. Cable failures can result in increased operation and loading on parallel equipment, further increasing the risk of failure on the rest of the system. The consequences of multiple secondary network failures or multiple sub-transmission failures would be significant. Proactive replacement of aged cable in these systems is expected to reduce the risk of concurrent failures and the potential for large scale customer outages in urban areas, including critical loads such as police, fire and hospitals.

2014 to 2015 Variance:

The projected investment is shown in the table below. On-going cable replacement projects will be completed in FY16. New expenditures for the secondary cable replacement program are projected as $3.3M annually. Sub-transmission cable replacement expenditures as identified in the strategy are not shown. For FY18 through FY20 inclusive are $6.0M in unidentified primary cable replacement projects. These will be replaced with specific projects as each project is justified, engineered, scoped and approved individually.

Table 4-15
Primary and Secondary Underground Cable
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	10.3	6.3	5.0	5.0	5.0	-	31.5
2015	-	3.5	3.4	10.6	12.2	9.3	39.0

Buffalo Streetlight Cable Replacement

This program will re-establish safe and reliable underground street light service by replacing faulty street light cables and conduit, and removing temporary overhead conductors.

Drivers:
Fiscal year 2016 is the fourth year of a planned 10 year program to replace deteriorated street light cable in the Buffalo area to address repetitive incidents of elevated voltage (EV) as determined through periodic testing as defined under electric operating procedure NG-EOP G016. The underground street light cable system located in the Buffalo metropolitan area is comprised of a variety of electrical cable types and electrical wiring configurations that have been in service for more than 50 years. Recently, Elevated Voltage Testing has identified stray voltage incident rates that are from 2 to 20 times the rates measured in other areas in the Company's service territory.

Analyses have determined the primary driver for the elevated voltages in this area is the deteriorated physical condition of the street light cable. Spot repairs have only marginally remedied the incidence rates. Current incident rates in many of the 11 Company-defined test zones in Buffalo have experienced inconsistent EV results following each spot repair cycle since 2009. Testing of the new circuitry has resulted in a dramatic reduction of EV incidents associated with street light infrastructure.

Customer Benefits:
This work will provide more reliable street light service and reduce the incidence of elevated voltages in the Buffalo area.

2014 to 2015 Variance:
The Company expects to spend approximately $2.5M annually under this program to replace an estimated 14% of the city's existing street light cable system over the 10 year program period. The projected investment is shown in the table below.

Table 4-17
Buffalo Streetlight Cable Replacement
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	2.4	2.4	2.4	2.4	2.5	-	12.3
2015	-	2.4	2.4	2.4	2.5	2.5	12.3

Substation Asset Condition Programs

Substation assets frequently have long lead times and require significant projects in terms of cost, complexity and project duration for replacement or refurbishment. Consequently, it is often more efficient as well as cost effective to review an entire substation. Further, where there are asset condition issues that indicate replacement as an option, the Company reviews planning and capacity requirements to ensure alternative solutions are evaluated such as system reconfiguration to retire a substation. Hence, the asset strategies coordinate with system planning to develop an integrated system plan.

Substation Power Transformers

Power transformers are large capital items with long lead times. Their performance can have a significant impact on reliability and system capacity. Condition data and condition assessment are the key drivers for identifying replacement candidates. Replacements are prioritized through a risk analysis which includes feedback from operations personnel. The distribution element covers transformers which are identified as replacement candidates through the test and assessment procedure. A 'Watch List' of candidate transformers has been identified and recorded in the Asset Condition Report.[3]

Drivers:
There are approximately 751 power transformers plus 21 spares with primary voltages 69kV and below. Each unit is given a condition code based on individual transformer test and assessment data, manufacture/design and available operating history. Higher codes relate to transformers which may have anomalous condition; units with a higher code are subject to more frequent monitoring and assessment, and are candidates for replacement on the Watch List.

Customer Benefits:
The impact of power transformer failure events on customers is historically substantial. By proactively replacing units in poor condition there will be direct benefits to customers in reduced impact of power transformers on performance.

2014 to 2015 Variance:
The projected program investment is shown below. Through on-going review of the distribution substation transformer fleet, new problems are identified. Replacement costs and related annual investment will vary based upon the size of the transformer to be replaced. In addition, rephasing of projects and their timelines has contributed to the variance.

[3] Report on the Condition of Physical Elements of Transmission and Distribution Systems, Case 12-E-0201, filed most recently October 1, 2014.

Table 4-18
Substation Power Transformers
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	3.7	4.8	6.3	2.9	2.8	-	20.4
2015	-	3.6	1.6	3.5	3.3	4.9	16.8

The capital investment plan in Exhibit 3 shows the current list of transformers expected to be replaced within the next five years. The following specific projects are expected to exceed $1 million in any fiscal year:

- Project C051706, Grooms Road Substation Transformer Replacement. This project provides for the replacement of two transformers.

- Project C046670, Station 124 Transformer Replacement. This project provides for the replacement of two transformers.

- Project C046676, Liberty Street Substation Transformer Replacement. This project provides for the replacement of one transformer.

Indoor Substations

The purpose of this strategy is to replace, retrofit, or retire the twenty-four remaining indoor distribution substations. The indoor substations were built in the 1920s through the 1940s. These substations have inherent safety risks due to design and equipment condition. Sixteen of these indoor substations remain to be rebuilt in the City of Buffalo and five are in Niagara Falls. The remaining three substations are located in Syracuse, Gloversville and Troy. Details of the asset condition issues and key drivers are outlined in the asset condition report.

Drivers:
These indoor substations are obsolete. Their outmoded design does not meet currently accepted safety practices, equipment and protection schemes are becoming unreliable in their function of interrupting faults, and in general the condition of equipment shows signs of deterioration.

Customer Benefits:
Under normal conditions, failure of obsolete indoor substation equipment could result in sustained customer interruptions until some type of replacement is installed. Equipment outages can result in increased operation and loading on parallel equipment. Indoor substations typically supply urban environments, including critical loads such as police, fire and hospitals. This program mitigates the risk for a long-term, sustained, customer interruptions occurring in these urban areas.

2014 to 2015 Variance:
The projected program investment is shown below. The spending has been modified based on a redistribution of projects and further development of the plan for each substation.

Table 4-19
Indoor Substations
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	8.4	5.7	14.5	10.9	11.1	-	50.6
2015	-	4.7	4.8	6.5	7.1	5.8	28.9

- In Buffalo, two indoor projects are in progress and have exceeded $1 million: Buffalo Stations #27 and #29. Four indoor substation projects are expected to exceed $1 million: Buffalo Stations #30, #37, #53 and #59. Additional Buffalo Indoor Stations will still be need rebuilding after the FY16-20 timeframe.

- In Niagara Falls, three indoor substation rebuilds are expected to exceed $1 million: Eighth Street #80, Welch #83, and Stephenson #85.

- In Syracuse, expansion of the Rock Cut #286 substation which will be completed in FY16 will exceed $1 million in total. The Rock Cut #286 substation expansion will allow the retirement of the Brighton Avenue #8 substation.

Metal-Clad Switchgear

Deteriorated metal-clad switchgear can be prone to water and animal ingress which leads to failures. Visual surveys will detect such degradation, but cannot identify surface tracking where hidden behind metal enclosures. Identification of these concerns is more likely with electro-acoustic detection techniques. By using sensors to detect anomalous sound (acoustic) waves or electric signals in the metal-clad switchgear, it is possible to identify equipment condition concerns before failure. An initial review using this technique identified a number of locations for further action as part of this strategy.

For each substation, an analysis will be conducted to determine if direct replacement is the best course of action or if an alternate means of supplying the load will be constructed.

Drivers:
Metal-clad switchgear installed prior to 1970 has several factors that can lead to component failure. Electrical insulation voids were more prevalent in earlier vintage switchgear. Higher temperatures due to poor ventilation systems can degrade lubrication in moving parts such as breaker mechanisms; and, gaskets and caulking deteriorate over time leading to ingress of moisture.

Customer Benefits:
The impact of each metal-clad switchgear event on local customers is usually substantial, with nearly 3,000 customers interrupted for over three hours per event. This program would reduce the risk of such events and provide significant benefit to the affected customers.

2014 to 2015 Variance:
The projected program investment is shown below. The capital forecast reflects new condition assessment data and analyses that helped identify and prioritize replacement candidates. Multiple stations are in progress with a program underway to prioritize additional stations. Lastly, the new Maple Ave Substation was not categorized under the Metal-clad Switchgear Program last year and adds significantly to the variance.

Table 4-20
Metal-Clad Switchgear
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	0.1	1.2	7.7	9.5	8.1	-	26.6
2015	-	2.3	6.2	12.5	14.6	12.4	48.0

The following specific projects are expected to exceed $1 million in any fiscal year:

- Project C046747, Johnson Road Substation Replace Metal-Clad Switchgear. This project provides for the replacement of the existing metal-clad switchgear with new equipment.

- Project C046741, Hopkins 253 Substation Replace Metal-Clad Switchgear. This project provides for the replacement of the existing metal-clad switchgear and transformers with new equipment.
- Project C052706, Station 61 Metal-Clad Switchgear. This project provides for the replacement of the existing metal-clad switchgear with new equipment...
- Project C051707, Station 162 Metal-Clad Switchgear. This project provides for the replacement of the existing metal-clad switchgear with new equipment.
- Project C056616, Station 140 Metal-clad Switchgear. This project provides for the replacement of the existing metal-clad switchgear with new equipment.
- Project C046478, New Maple Ave Substation. This project builds a new 115-13.2kV substation on a new site to replace the existing metal-clad Market Hill 69-4.16kV substation.
- Project C056611, Tuller Hill 246. This project provides for the replacement of the existing unit substation with new equipment.
- Project C036213, Chrisler Metal-clad Switchgear. This project provides for the replacement and conversion of the existing metal-clad switchgear and transformers with new equipment.
- Project C056609, Avenue A 291 Metal-clad Switchgear. This project provides for the replacement of two metal-clad switchgear and two transformers with new equipment.
- Project C056614, Pine Grove Metal-clad Switchgear. This project provides for the replacement of the existing metal-clad switchgear with new equipment.

Substation Circuit Breakers and Reclosers

Certain types, or families, of breakers have been specifically identified for replacement in the next ten years. Breaker families are typically older, obsolete units that are less safe or less reliable. Certain breaker families that are targeted for replacement contain parts that must be custom machined or units that contain asbestos in the interrupting systems and require extra precautions during maintenance, refurbishment and overhaul.

Drivers:
The approach for breaker condition coding was based on engineering judgment and experience which was supported by discussion with local Operations personnel. The units are prioritized for replacement based on the condition coding; units in poorer condition are given a higher score. Many of these breakers are obsolete.

Aged units have been specifically identified for replacement because they are difficult to repair due to the lack of available spare parts. Likewise, unreliable units have been identified for replacement to reduce the number of customer interruptions.

Customer Benefits:
In addition to providing reliability benefits, several of the targeted breaker families present opportunities to reduce hazards associated with safety and the environment (i.e. oil and asbestos).

2014 to 2015 Variance:
The projected program investment is shown below. The overall spend has been modified based on lessons learned regarding scheduling, availability of resources, and a more accurate identification of breakers per station location.

Table 4-21
Circuit Breakers and Reclosers
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	1.6	2.2	2.2	1.4	1.4	-	8.8
2015	-	2.2	1.9	2.2	1.9	1.9	10.1

Substation Batteries and Related

This program mirrors the Transmission Substation Batteries and Chargers program. Battery and charger systems are needed to ensure substation operational capability during both normal and abnormal system conditions. The intent of this program is to replace battery and charger systems that are 20 years old. The 20 year limit is based on industry best practice and experience in managing battery systems. This program work is coordinated with other asset replacement programs where appropriate.

Currently, there are over 200 substation batteries in service. To bring all battery systems to less than twenty years old within ten years would require a replacement rate of approximately nine per year.

Individual battery problems may be identified at any time during Visual and Operational inspections or periodic testing. Problems identified through these methods are addressed under the Damage/Failure spending rationale.

Drivers:
Failure of batteries and charger systems may result in substation protective relays and/or circuit breakers not operating as designed.

Customer Benefits:
Battery and charger system failures can result in additional customers being interrupted as back-up relay schemes at remote substations will have to isolate a fault. It may also result in equipment damage if a fault is not cleared in a timely fashion. Interruptions related to battery incidents are uncommon at this time as the replacement program is working as desired.

2014 to 2015 Variance:
The projected program investment is shown below. The budget has been adjusted to reflect the population of batteries approaching industry best practice replacement age over the next several years.

Table 4-22
Substation Battery and Related
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	0.9	0.9	0.9	0.9	0.9	-	4.5
2015	-	0.9	0.6	0.6	0.6	0.6	3.3

Mobile Substation

Mobile substations are key elements for ensuring continued reliability and supporting the system during serious incidents.

Drivers:
To improve the management of the mobile substation fleet, the Company conducted a review which considered system requirements, the amount of mobile usage, and the uniqueness of individual units to better understand the condition of all members of the fleet and their associated risks. Highly utilized units may present a risk if they are not properly maintained or refurbished. Further, uniquely configured units or very highly utilized units in which there is only one available unit on the system, present some risk since they may not be available for an emergency due to utilization elsewhere. Based on the review, mobile substation protection upgrades, rewinds and replacement units were recommended.

Customer Benefits:
A mobile substation or transformer is the quickest method for restoring service to customers when an outage occurs in a substation, typically occurring within sixteen to twenty-four hours. By refurbishing, upgrading, replacing and purchasing new mobile substations, as necessary, via system reviews and condition assessments, the risk of extended customer outages will be significantly reduced. In addition, properly addressing the needs of the mobile fleet will allow us to schedule maintenance for substation transformers in a timely manner since they are one of the most valuable assets on the system. Lastly, having an adequate number of mobile substations on hand will promote the completion of new construction projects on-time and on-budget.

2014 to 2015 Variance:
The projected investment is shown below. Projects have been redistributed based upon changes in asset condition and the availability of the units so that upgrade work can be performed.

Table 4-23
Mobile Substation
Program Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	0.6	1.8	2.5	2.1	1.0	-	8.0
2015	-	1.3	0.6	0.6	2.3	2.7	7.4

4. E. Non-Infrastructure

This spending rationale includes items that do not fit into the previous four categories but are necessary for the operation of the distribution system. They include capitalized tools such as micro-processor based relay test equipment and SF6 gas handling carts. In addition, radio system expansion and upgrade projects across the system are included in this spending rationale.

Drivers:
Specialized tools are required by Operations personnel to perform equipment maintenance and complete capital projects. Radio communication systems upgrades and replacements are necessary for real time communications while performing switching and for other operational needs.

Customer Benefits:
The proper tools allow Operations personnel to work safely and efficiently thus reducing overall costs. Radio communications promote personnel safety by allowing the control centers to direct Operations personnel during field switching. In addition, timely communications allow a coordinated response to interruptions thereby limiting customer interruption durations.

2014 to 2015 Variance:
The projected investment is shown below. The reduction results from a change in historical trend.

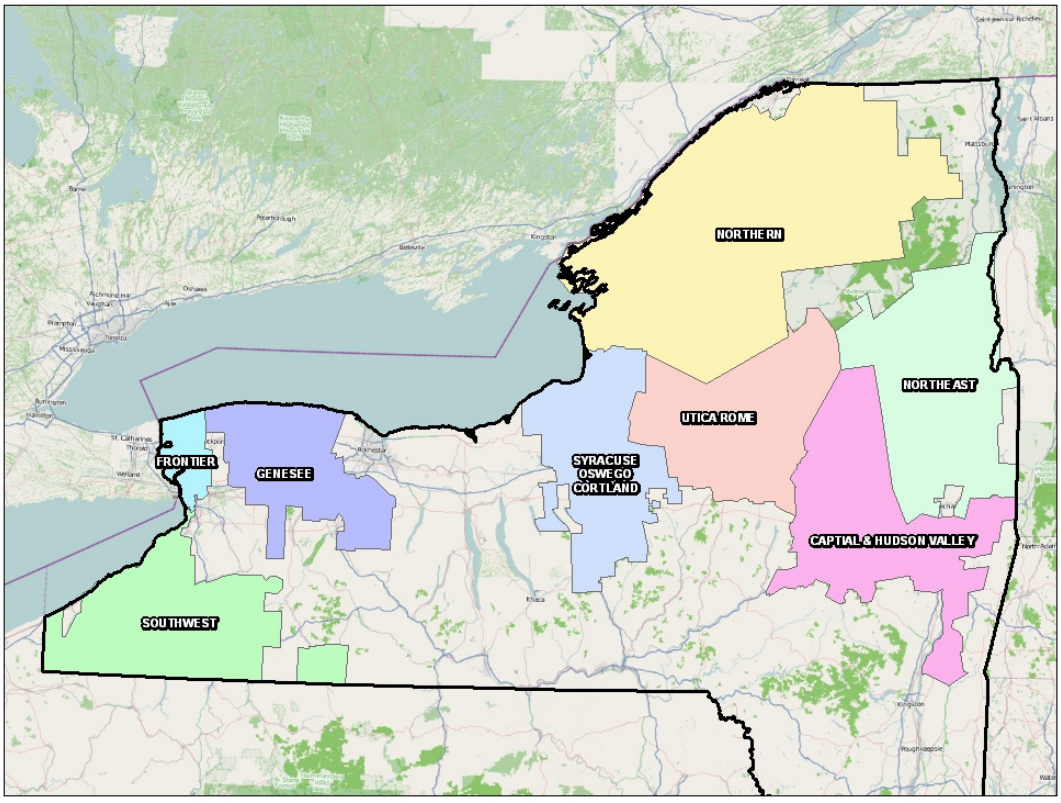
Table 4-27
Non-Infrastructure Spending Rationale
Variance ($millions)

CIP	FY15	FY16	FY17	FY18	FY19	FY20	Total
2014	3.2	3.3	3.3	3.3	3.4	-	16.5
2015	-	3.0	3.0	3.0	3.1	3.0	15.1

Chapter 5. Investment by Transmission Study Area

For regional analysis, the Company's service territory is divided into eight transmission study areas. The transmission study areas are shown in Figure 5-1. Within the eight transmission study areas, the sub-transmission and distribution networks are further subdivided into 43 distribution study areas.

Figure 5-1
Transmission Study Areas



Each of the transmission study areas is described separately below in the following format:

- Area Summary
- Area Description
- Major Project Table

5. A. Northeast Transmission Study Area

Area Summary

The principal driver for the transmission and distribution capacity projects in the Northeast transmission study area is load growth associated with Luther Forest industrial load, specifically Global Foundries, and the general area distribution load growth that is stimulated by the economic impact of the Luther Forest development during the period from 2012-2019. A new 230-115 kV Eastover substation is expected to be placed in service in March 2015. This new station will avoid 115kV line overloads, Rotterdam 230-115 kV transformer overloads, and support adequate system post-contingency voltage levels. New 115-13.2kV substations at Sodeman Road, Randall Road and McCrea are recommended to supply load growth in the area and correct some asset concerns.

Area Description

The Northeast transmission study area serves approximately 133,900 customers. The study area extends approximately 90 miles north along the western border of Vermont, from Cambridge in the south to Westport in the north, and extends approximately 45 miles to the west at its widest point to Indian Lake. The area incorporates the southeastern section of the Adirondack State Park. Much of the area load is concentrated in the southern portion of the study area, along Interstate I-87 and US Route 9, particularly in the Towns of Ballston Spa, Saratoga Springs and Glen Falls. Some of the areas offer summer recreation and see a spike in load during the summer months.

The 115kV system runs primarily in a north-south direction on both sides of Lake George. There is a single radial line, east of Lake George, which runs north from Whitehall substation, which extends to the NYSEG system and also continues north to the Port Henry substation. The western 115kV radial line extends from the Spier Falls substation to the North Creek substation in the Adirondack State Park. There is an extensive 34.5kV system in the study area supplying smaller towns along interstate I-87 and Route 28.

In the Northeast transmission study area there is one distribution study area, also called Northeast. The Northeast distribution study area has a total of 112 distribution feeders that supply customers in this area. There are eighty-eight 13.2kV feeders, with twenty-five being supplied from 34.5-13.2kV transformers, and the rest supplied by 115-13.2kV transformers; thirty-five 34.5kV sub-transmission lines that supply the distribution step down transformers in the area; ten 4.8kV feeders with six supplied by 34.5-4.8kV transformers; and fourteen 4.16kV feeders all supplied by 34.5-4.16kV transformers.

Major Project Table

The following table identifies major projects by spending rationale for this study area.

Table 5-1
Northeast Major Projects

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
Asset Condition	**Asset Replacement**	DIST	**Northeast**	McCrea Station - New station - Inst	C046790
	Component Fatigue/Deterioration	TRAN		Mohican - Replace Bank 1 and Relays	C053133
				Queensbury - replace OCBs	C049554
				Spier-Rotterdam 1 & 2 ACR	C060212
				Ticonderoga 2-3 T5810-T5830 ACR	C039521
				TICONDEROGA 2-3 T5810-T5830 SXR2	C039487
				Whitehall - replace OCBs	C049564
System Capacity & Performance	**Load Relief**	DIST		Queensbury DLine Re-route Getaways	CD00895
				Sodeman Rd - New station - dist get	C046796
				Sodeman Rd Station - new station -	C046798
	TO Led System Studies	TRAN		Ballston Tap Sw. St - Line Taps	C060251
				Ballston Tap Switching Station	C060250
				McCrea Line	C053150
				Mulberry Tap Sw St - Line taps	C060253
				Mulberry Tap Switching Station	C060252
				Queensbury TB3 & TB4 upgrades (sub)	C036822
				Ticonderoga Cap Bank	C060254

5. B. Capital and Hudson Valley Transmission Study Area

Area Summary

Key drivers behind the transmission capacity related projects in this transmission study area include the following:

- Thermal issues observed on the Rotterdam 230-115 kV transformer banks drive the recommended new 230-115 kV Eastover substation in the Northeast Region, which also addresses issues in the Capital & Hudson Valley Region. This substation is expected to be in service in 2016.
- Projected load growth in the area over the next 5 to10 years, and in the adjacent Northeast study area – particularly that associated with Luther Forest, will trigger future projects.

Key sub-transmission and distribution drivers include the following:

- DeLaet's Landing is a proposed Underground Commercial Development (UCD) in the City of Rensselaer. In response, construction of a new substation at Forbes Avenue will be used to supply the area. This new substation will also address flooding concerns at Rensselear substation.
- Van Dyke Road Station is a new 115-13.2kV station that will be used to address load growth at Vista Tech Park and loading and asset concerns at adjacent stations.
- Maple Avenue is a new 115-13.2kV station that will be used to address asset condition issues at Market Hill substation and loading in the Amsterdam area.

Area Description

The Capital and Hudson Valley study area is connected to the Utica Rome study area in the west, the New England system in the east, the Central Hudson Gas and Electric (CHG&E) and Consolidated Edison (ConEd) systems in the south, and the Northeast study are in the north. The transmission system consists primarily of 115kV and 345kV transmission lines. There are also several 230kV lines emanating from Rotterdam Substation. The Capital and Hudson Valley study area is the east end of the Central-East interface, which is a power interface between central NY and eastern NY. Several transmission lines in the area are also important facilities to the UPNY-SENY interface between the eastern NY system and the downstate system.

National Grid has three 345-115kV transformers in the region; two at New Scotland and one at Reynolds Road. There are three existing 230-115kV transformers at Rotterdam. In addition, Con Ed has one 345-115kV transformer at Pleasant Valley and CHG&E has one 345-115kV transformer at Hurley Ave. Station, all of which have impacts on the National Grid system.

Within the Capital and Hudson Valley study area, there are six distribution study areas: Capital-Central, Capital-East, Capital-North, Mohawk, Schenectady and Schoharie.

The Capital-Central study area serves approximately 89,000 customers. The study area encompasses the greater Albany area, including a mixture of commercial customers heavily concentrated in downtown Albany, and industrial and residential customers spread across downtown to the suburban areas. The primary distribution system in Capital-Central is predominantly 13.2kV with pockets of 4.16kV primarily in the City of Albany and 4.8kV south of the City of Albany. Most 4kV distribution substations are supplied from the local 34.5kV sub-transmission system, whereas most 13.2kV distribution substations are supplied from the local 115kV transmission system.

The Capital-East study area serves approximately 84,100 customers. The study area is located east of the Hudson River, with the center approximately adjacent to Albany. This area extends approximately from Valley Falls in the north to Tivoli in the south. The larger load concentrations are in the cities of Rensselaer and Troy and in the towns along US Route 9. There is a 345kV source into the area at Reynolds Road substation and a 115kV corridor running in a north-south direction supplying approximately 90% of the distribution load in the area. There is also a 34.5kV sub-transmission system in the central area with the 115kV sources from Greenbush, North Troy, Hudson and Hoosick substations. In addition, there is scattered generation on the 34.5kV system in the area.

The Capital-North study area serves approximately 86,600 customers. The study area encompasses the suburban area north of the City of Albany, including a mixture of industrial, commercial and residential customers throughout Colonie, Cohoes, Watervliet, Clifton Park, Halfmoon, Waterford, Niskayuna, and Ballston. The primary distribution system in Capital-North is predominantly 13.2kV with a few pockets of 4.16kV in the Newtonville area and 4.8kV in the Town of Ballston. All 4kV distribution substations are supplied from the 34.5kV sub-transmission system, whereas most 13.2kV distribution substations are supplied from the 115kV transmission system. Maplewood and Patroon substations are the main sources for the 34.5kV sub-transmission system in this area, which is operated in loop configuration. Along with these facilities, a group of hydro and cogeneration power plants located along the Mohawk River (School St, Crescent, Vischer Ferry, Colonie Landfill, etc) form the backbone of the local 34.5kV sub-transmission system. In addition to supplying power to all 4kV and a few 13.2kV distribution substations, the 34.5kV sub-transmission system serves several industrial customers such as Mohawk Paper, Honeywell, Norlite, and Cascade Tissue. Major distribution customers in this area include the Albany International Airport, which is supplied by feeders from Forts Ferry, Sand Creek, Wolf Road and Inman Road substations.

The Mohawk study area serves approximately 61,200 customers. The study area includes the City of Amsterdam and the rural areas west of the city. This area is comprised of mostly residential customers and farms with some commercial and industrial customers located in areas such as the City of Amsterdam, Gloversville, Johnstown, Northville, and Canajoharie. The primary distribution system in Mohawk is predominantly 13.2kV with areas of 4.16kV (Gloversville and Johnstown areas) and 4.8kV (Canajoharie). Most 4kV distribution substations are supplied from the 23kV and 69kV sub-transmission system, whereas most 13.2kV distribution substations are supplied from the 115kV transmission system.

The Schenectady study area serves approximately 57,900 customers. The study area is defined by the region that includes the City of Schenectady and the surrounding suburban areas. This area includes a mixture of industrial, commercial and residential customers spread across downtown to suburban areas such as Niskayuna, Glenville, and Rotterdam. The primary distribution system in Schenectady area is predominantly 13.2kV with a few pockets of 4.16kV (Schenectady, Scotia and Rotterdam areas). All 4kV distribution substations are supplied from the local 34.5kV sub-transmission system, whereas most 13.2kV distribution substations are supplied from the local 115kV transmission system. In addition, the downtown areas of Schenectady are served by a general network that is supplied by the Front Street Substation. Rotterdam, Woodlawn and Rosa Rd. are the main sources for the local 34.5kV sub-transmission system, which is operated in loop configuration.

The Schoharie study area serves approximately 20,600 customers. The study area is defined by the region west and south of Schenectady that include towns and villages along the I-88 and Route 20 corridors such as Delanson, Schoharie, Cobleskill, Schenevus, and Sharon Springs. This area is mostly rural comprised mainly of residential customers and farms with few commercial and industrial customers. The primary distribution system in Schoharie is predominantly 13.2kV with areas of 4.8kV (Cobleskill, Worcester, and Schenevus areas). Most distribution substations in this region are supplied from the local 23kV and 69kV sub-transmission system. Marshville and Rotterdam are the main sources for the local 69kV sub-transmission system which is operated in loop configuration. The 69kV sub-transmission system supplies power to both 4kV and 13.2kV distribution substations, besides a few industrial and commercial customers, such as Guilford Mills and SUNY Cobleskill. The existing 23kV sub-transmission system in Schoharie, which supplies power to East Worcester, Worcester, and Schenevus substations, is operated in radial configuration from Summit substation.

Major Project Table

The following table identifies major projects by spending rationale for this study area.

Table 5-2
Capital and Hudson Valley Major Project

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
Asset Condition	**Component Fatigue/Deterioration**	TRAN	**None**	Hoosick - Replace Bank 1 & relays	C053132
				Inghams Phase Shifting Transformer	C047864
				Inghams Station - Assoc Line work	C060240

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
				Inghams Station Re-vitalization	C050917
				Leeds - Replace U Series Relays	C024663
				Menands Station Relay Replacement	C049601
				New Scotland - replace 345kV OCBs	C049553
				Rotterdam 115kV SubRebuild(AIS)	C034850
				Woodlawn Transformer Replacement	C051986
	Sub T Overhead Line	SUBT	**Mohawk**	Amsterdam-Rotterdam3/4 Relocation	C033182
			Capital-North	Mech-Schuylerville 4-34.5kV refurb	C050323
				W. Milton Tap-34.5kV new line	CD00898
			Capital-Central	Callanan Tap - Rebuild exist 34.5ln	C046641
	Sub T Underground Cable Replacement	DIST		Riverside 28855 UG Cable Replacement	C036468
		SUBT		Partridge-Ave A # 5 Cable Replaceme	C036273
	Substation Metal-clad Switchgear	DIST	**Mohawk**	Maple Ave Feeder Getaways	C046479
				New Maple Ave Substation	C046478
			Capital-Central	Avenue A 291 Metalclad Replacement	C056609

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
			Schnecetady	Chrisler Metal Clad Replacement	C036213
	Substation Mobile		**None**	Mobile Substation 2E - Replacement	C046666
	Substation Power Transformer		**Capital-North**	Grooms Rd Transformer Replacement	C051706
	Substation Relay/Protection		**Capital-Central**	Trinity Station Relay Replacement	C049625
Customer Requests/Public Requirements	**New Business**		**Schnecetady**	Mohawk Harbor Development Civil	C055843
Damage/Failure	**Damage/Failure**	TRAN	**None**	Leeds SVC B TRF D/F	C057879
System Capacity & Performance	**ERR**	DIST	**Mohawk**	*Stoner 52 - Stoner Trail Extension	C050437
	Load Relief		**Capital-North**	Grooms Rd 34557 - Saratoga Rd Conve	C046761
				Randall Rd - New station - Dist get	CD00897
				Randall Rd - New station - M/C S/G	CD00896
			Capital-Central	Van Dyke - UG - Civil & Elec work	C052098
				Van Dyke Station - New 115/13.2kV s	C046490
				Van Dyke Station - New 56 Dist Feed	C046487
				Van Dyke Station-New 54 Dist Feed.	C046495

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
				Van Dyke Subst- New 57 Dist Feeder	C046488
				Van Dyke Subst- new feeders	C016087
			Capital-East	DeLaet's Landing DxD	CD00893
				Forbes Ave - New Substation	C053137
	Secondary Network Arcflash Mitigation		**Capital-Central**	Arc Flash NY East Div 480V Spot NW	C047464
	TO Led System Studies	TRAN	**None**	Eastover - Add 2nd Bank	C060247
				Eastover Rd - New 230-115kV Station	C031326
				Eastover Rd- New Line Taps	C031419
				Ephratah Sub Rebuild - Line Portion	C053144
				Ephratah substation rebuild	C046486
				Hudson Valley Reinforcement	C053148
				Mohican Battenkill#15 Rebuild Recon	C034528
				New Scotland - Add Reactors LN19/20	C060246
				Randall Rd Transmission Line	C043672
				Riverside-Reynolds Rd#4 Forbes Tap	C043592

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
				Rotterdam - Menands Recond 12 miles	C060243
				Rotterdam- TB6/7 Reconnect & R86 Bus	C060255
				Schoharie substation reconfiguration	C046494

5. C. Northern Transmission Study Area

Area Summary

Key drivers behind the transmission capacity related projects in this study area include the following:

- The interconnection of several wind generation projects.
- All overloads resulting from contingencies can be mitigated by reducing hydro generation, wind generation, or imports from Hydro Quebec.

Key sub-transmission and distribution drivers include the following:

- New 115-13.2kV substation in the south Watertown area to supply load growth in the area.

A potential major driver for the area is the possible North Country Power Authority (NCPA) takeover of the electrical system in portions of St. Lawrence and Franklin Counties. The Company is not aware of any activity regarding NCPA in the past year.

Area Description

The Northern transmission study area includes the 115kV transmission facilities in the Northern Region and the northeast portion of the Mohawk Valley Region.

The backbone of the 115kV Northern area system runs from National Grid ALCOA substation to Boonville substation. The major substations along the 115kV transmission corridor are Browns Falls, Colton, Dennison and Taylorville.

The Jefferson/Lewis county area is bounded by the #5 – #6 Lighthouse Hill-Black River lines to the west and the #5 – #6 Boonville-Taylorville lines to the east. The Ogdensburg-Gouverneur area is served by the #7 Colton-Battle Hill, #8 Colton-McIntyre and the #13 ALCOA-North Ogdensburg 115kV lines. The #1 – #2 Taylorville-Black River lines and the #3 Black River-Coffeen support the load in the Watertown area. The Thousand Island region is served by the #4 Coffeen-Thousand Island 115kV radial line. The Colton-Malone #3, Malone-Lake Colby #5, and Willis-Malone #1 (NYPA) 115kV lines serves the Tri Lakes region. The Akwesasne #21 115kV Tap served from the Reynolds/GM #1 (NYPA) 115kV line supplies part of the Nicholville-Malone area.

Within the Northern study area, there are four distribution study areas: Nicholville-Malone, St. Lawrence, Tri-Lakes and WLOF (Watertown and Lowville). The Nicholville-Malone study area serves approximately 16,100 customers. There are total of twenty seven feeders (twenty 4.8kV and seven 13.2kV feeders) in the study area. The distribution substations are primarily supplied from the 34.5kV system with exception of Malone 13.2kV and Akwesasne 4.8kV substations that are served by the 115kV system. The main supplies for the 34.5kV sub-transmission system are Akwesasne, Malone, and Nicholville substations. It is operated as a radial system due to loading issues although the system is constructed as a loop

design. There are also two hydroelectric facilities connected to the system (Macomb and Chasm substations).

The St. Lawrence area serves approximately 39,600 customers. There are twenty-six 4.8kV feeders and thirty 13.2kV feeders in the study area. The distribution substations are supplied from 23kV and 34.5kV sub-transmission lines with exception of four substations, Corning, Higley, North Gouverneur and Ogdensburg substations that are served from the 115kV system. The main supplies for the 23kV sub-transmission system are Balmat, Little River, McIntyre, Mine Rd. and Norfolk substations. Browns Falls substation is the main supply for the 34.5kV sub-transmission system.

The Tri-Lakes area serves approximately 8,800 customers. There are twenty nine 4.8kV, two 2.4kV feeders and six 13.2kV feeders in the study area. Most of the distribution substations are supplied from the 46kV sub-transmission system with the exception of Lake Colby and Ray Brook substations that are served from the 115kV system. The supply for 46kV sub-transmission system in the area is Lake Colby substation. There are two municipal electric companies supplied via the 46kV sub-transmission in the Tri-Lakes area, Lake Placid and Tupper Lake.

The WLOF area serves approximately 70,100 customers. There are nine 23-4.8kV substations supplying twenty-seven 4.8kV feeders; and ten 115-13.2kV substations supplying thirty-eight 13.2kV feeders. The 23kV sub-transmission system is supplied from the Boonville, Black River, Coffeen, Indian River, North Carthage and Taylorville substations.

Major Project Table

The following table identifies major projects by spending rationale for this study area.

Table 5-3
Northern Major Projects

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
Asset Condition	**Asset Replacement**	DIST	**St. Lawrence**	State St Feeder Conversion	C050697
		SUBT	**Nicholville-Malone**	Fort Covington-Malone 26-34.5kV	C050197
	Component Fatigue/Deterioration	TRAN	**None**	Br F-Taylorville 3-4 ACR	C024359
				Colton-BF 1-2 T3140-T3150 ACR	C036164

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
				Colton-Replace CBs and Disconnects	C029844
				Mohican - Replace Bank 1 and Relays	C053133
				Taylorville-B 5-6 T3320-T3330 ACR	C027437
	Substation Power Transformer	DIST	**WLOF**	Sewalls Island #2 TRF Replacement	C058406
System Capacity & Performance	**ERR**		**Nicholville-Malone**	NR-85251-NYS Hwy 30-FdrTie	C049760
			St. Lawrence	NR-Brady 95757-CoRt27-FdrTie	C046861
	Reliability		**Nicholville-Malone**	Malone Second 115/13.2kV Bank	C054587
			WLOF	*NR_76462-CoRte28-Rebuild	C049197
				Watertown New 115/13.2 kV Substatio	C046610
					C046627
	Substation Flood Mitigation		**Tri-Lakes**	Union Falls - Flood mitigation	C053167

5. D. Syracuse Oswego Cortland Transmission Area

Area Summary

The drivers behind the transmission capacity related projects in the Syracuse Oswego Cortland (SOC) study area are:

- Area load has, over time, reached levels that result in potential post-contingency overloading of one of the Clay 345-115kV autotransformers, as well as three 115kV circuits in the Syracuse area.
- Recommended projects to address post-contingency overloading include the replacement of the Clay 345-115kV TB1 autotransformer with an existing spare and the replacement of that spare, and the reconductoring of the Clay-DeWitt #3 and Clay-Teall #10 lines.
- The Clay-G.E. #14 line was shown to be overloaded for certain criteria contingencies when the Syracuse Energy facility was no longer in-service and will be reconductored.
- Fault current levels have been identified in excess of the interrupting capability of breakers at four different substations in the area.

Key sub-transmission and distribution drivers include the following:

- Load growth in the Syracuse University and the North Syracuse areas are major drivers of distribution capacity work.
- The addition of second transformers and new feeders at several substations are major drivers of reliability work.

Area Description

The SOC study area includes the 345kV and 115kV transmission facilities in the Central Region and all of the 115kV and above transmission facilities around the Oswego Complex area, including the 345kV Scriba and Volney stations.

The SOC area is bordered by Elbridge substation in the West, Cortland substation in the South, Oneida substation in the East, and Clay substation in the North. The major substations in the area include Clay, South Oswego, Dewitt, and Geres Lock. This area also includes some of the assets stretching between Mortimer and Elbridge.

Within the SOC study area, there are eight distribution study areas: Cazenovia, Cortland, East Syracuse, Manilus-Fayetteville, North Syracuse, Syracuse, Volney and West Syracuse.

The Cazenovia study area serves approximately 5,100 customers. The study area is a very rural region, with the Village of Cazenovia and the Cazenovia Industrial Park being the only

large loads. The distribution system consists of one 34.5-13.2kV, three 34.5kV-4.8kV substations and one 34.5-4.16V substation. The only physical constraint is Cazenovia Lake and the residential load which is spread around Cazenovia Lake.

The Cortland study area serves approximately 26,200 customers. The study area is defined by the region that includes the City of Cortland and the surrounding towns and villages. It is located in central New York between Syracuse and Binghamton. The primary distribution system voltages in Cortland are 13.2kV and 4.8kV. Most of the area is fed from a 34.5kV sub-transmission system supplied out of the Cortland and Labrador substations.

The East Syracuse study area serves approximately 13,000 customers. The study area is an industrial suburb of the City of Syracuse. The distribution system consists of one 115-34.5kV, three 115-13.2kV and three 34.5-4.8kV substations. The transmission supply is adequate and the only physical barriers are Interstate 690 and Interstate 481 going through the area. Customers are served via fifteen 13.2kV feeders and eleven 4.8kV feeders.

The Manlius Fayetteville study area serves approximately 24,300 customers. The study area is a residential suburb of Syracuse. The distribution system consists of one 115-34.5kV, four 115-13.2kV and one 34.5-4.8kV substation. Most new load additions to the area are residential developments.

The North Syracuse study area serves approximately 71,800 customers. The study area is the northern suburb of the City of Syracuse. It has experienced the majority of the new housing which has been built in the Syracuse metropolitan area. The distribution system consists of one 115-34.5kV, nine 115-13.2kV and five 34.5-4.8kV stations. The physical barriers in the North Syracuse area are the two interstates highways, I-81 and I-90.

The Syracuse study area serves approximately 61,400 customers. The study area is made up of the City of Syracuse in central New York as well as the Village of Skaneateles about 20 miles southwest of the city. The primary distribution system voltages in Syracuse are 13.2kV and 4.16kV. There is also a 12kV network fed out of Ash St. substation. Most of the area is fed from a 34.5kV sub transmission system supplied by Ash St, Elbridge, Solvay, Teall Ave., and Tilden substations. There is also some 13.2kV fed directly from the 115kV transmission system.

The Volney study area serves approximately 55,300 customers. The study area includes the cities of Oswego and Fulton. The distribution system consists of four 115-34.5kV, seven 115-13.2kV, five 34.5-13.2kV, eight 34.5-4.8kV and one 34.5-4.16kV substations. A physical barrier in this area is the Oswego River, which is also a canal.

The West Syracuse study area serves approximately 22,700 customers. The study area is a suburb west of the City of Syracuse. The distribution system consists of one 115-34.5kV, two 115-13.2kV, and four 34.5-4.16kV substations.

Major Project Table

The following table identifies major projects by spending rationale for this study area.

Table 5-4
Syracuse Oswego Cortland Major Projects

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
Asset Condition	Asset Replacement	SUBT	West Syracuse	Solvay 26	C046438
	Component Fatigue/Deterioration	TRAN	None	Battle Hill - replace 3 OCBs	C049543
				Curtis Relay /Breaker Replacement	C049584
				GE-Geres Lock 8 T2240 ACR	C047835
				Oswego - 115kV & 34.5kV - Asset Sep	C043426
				Teal Ave. Transformer Replacement	C047865
				Tilden - replace OCBs	C049556
	Sub T Overhead Line	SUBT		Re-furbish Teall 25/Woodard 24-34.5	C046446
			North Syracuse	Mallory-Cicero L33-34.5 kV line Ref	C046681
				Woodard 29-34.5kv	C046473
			Volney	Bristol Hill-Phoenix 23-34.5kv	C046474
				LHH-Mallory 22-34.5kv	C046441
			West Syracuse	Elbridge-Jewitt 31-34.5kV refurb	C050959
				Elbridge-Marcellus 30 Refurbishment	C054927
	Sub T Underground Cable Replacement		Syracuse	Solvay Ash 27 Cable Repl SubT	C032147
				Solvay-Ash #28 34.5kV Replace Cable	C045629
	Substation Metal-clad Switchgear	DIST	Cortland	Tuller Hill 246 Unit Metalclad Repl	C056611
			North Syracuse	Hopkins 253 - Replace Metalclad Gea	C046741

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
				Pine Grove Metalclad Replacement	C056614
Customer Requests/Public Requirements	**Customer Interconnections**	TRAN	**None**	Green Pwr Wind Loop in/out	C058101
Damage/Failure	**Damage Failure Other**	SUBT	**Syracuse**	NY_CD_38kV_FPC/ EEI-Swgr-Part 1	C058959
System Capacity & Performance	**Generator Retirements**	TRAN	**None**	Clay - GE 14 Reconductoring	C045253
				Reconductor #5 Elbridge - State St	C047297
	Load Relief	DIST	**North Syracuse**	New Cicero Substation Dline	C046476
				New Cicero Substation DSub	C046475
			Syracuse	Teal Substation Rebuild-Swgr	C046511
			Volney	Fairdale Dsub	C046640
				New Haven xfmr upgrade-Buswork	C046634
				New Haven xfmr upgrade-Dline	C046635
			West Syracuse	Harris 54 Relief	C032446
				Milton Ave 2nd Switchgear	C046609
				Milton Ave DLine	C046643
		SUBT	**Syracuse**	Mallory-Cicero 33-34.5kV-relocation	C054507
	Reliability	DIST	**Cortland**	*CR - McGraw-Truxton feeder tie	C049727
			Syracuse	East Molloy Second Transformer	C036188
				Fly Rd Feeder Work	C046594
				Fly Rd. Transformer Addition	C036189
				Temple Sub Central Breaker Upgrades	C059519
			Volney	Whitaker Dsub	C046636
	Secondary Network Arcflash Mitigation		**Syracuse**	Arc Flash Mediation - 480V spot net	CD01278
	TO Led System Studies	TRAN	**None**	Central Breaker Upgrades - Ash	C043424
				Clay Substation Reconfiguration	C047275

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
				Clay-Teall#10,Clay-Dewitt#3 Recond	C043995

5. E. Utica Rome Transmission Study Area

Area Summary

The drivers behind the transmission capacity related projects in this study area are:

- The need to address thermal and voltage issues drive projects that will rebuild the Porter, Rome, and Inghams substations. This will include replacement of the Inghams phase shifting transformer with a new one that will have a larger range of variation in angle.
- Other issues found in this area are addressed by operational solutions, given current NERC TPL Planning Criteria and the current BES definition.
- Upon adoption of new NERC TPL Planning Criteria and the new BES definition (>= 100 kV), further study will determine permanent fixes for certain issues for which operational solutions are currently acceptable.

Key sub-transmission and distribution drivers include the following:

- Rebuilding of the Poland 62258 feeder along NYS Route 8 to improved reliability and loading profile.
- Refurbishment of several 46kV sub-transmission circuits to address asset condition concerns.
- Relocation of Terminal Substation to address asset condition, reliability and environmental concerns.

Area Description

The Utica Rome transmission study area includes the 115kV and above transmission system with the northern boundaries at Boonville and Lighthouse Hill substations, west at Oneida, and east at Inghams substation. Within the Utica Rome study area, there are four distribution study areas: Oneida, Rome, Utica and WLOF-MV (Old Forge area).

The Oneida study area serves approximately 18,500 customers. The study area includes the City of Oneida and the Village of Canastota. In the City of Oneida the Oneida Hospital has dual distribution supplies. Across the street from the hospital is the H.P.Hood Dairy Products Inc. facility which represents 4MVA of the load and also has dual distribution supplies. The Village of Canastota which is located in western section of the Oneida area has several large commercial and industrial customers including Canastota Industrial Park, Owl Wire and Cable, Inc and Die Molding Inc. A geographic constraint is the distance to other substations and the lack of feeder ties. There have been improvements to feeder ties between the Oneida and Peterboro substations. Developing these ties was challenging due to the New York State Thruway which has stringent road crossing regulations, which is located between the two substations.

The Rome area serves approximately 26,400 customers. There are thirty 4.8kV feeders and seventeen 13.2kV feeders in the study area. All distribution substations are supplied from the 115kV system. As a result there are no sub-transmission lines in the area.

The Utica study area serves approximately 81,500 customers. The study area includes the City of Utica. The distribution system consists of four 115-46kV, ten 115-13.2kV, four 46-13.2kV and seven 46-5kV substations.

The WLOF-MV study area serves approximately 7,900 customers in Old Forge. There are five 46-4.16kV substations supplying nine 4.8kV feeders and one 13.2kV substation supplied out of Alder Creek substation. The 46kV sub-transmission system is supplied out of the Boonville substation.

Major Project Table

The following table identifies major projects by spending rationale for this study area.

Table 5-5
Utica Rome Major Projects

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
Asset Condition	**Asset Replacement**	DIST	**Utica**	MV- Poland 62258 Route 8 Reconducto	C046606
	Component Fatigue/Deterioration	TRAN	**None**	Boonville-Rome 3-4 T4060-T4040 ACR	C047795
				Boonvill-Portr 1-2 T4020-T4030 ACR	C047818
				Edic - New Control House	C058129
				LightHH 115kV Yard Repl & cntrl hs.	C031662
				Porter-Rotterdam 31 T4210 ACR	C030890
				Schuyler - replace OCBs	C049562
				Terminal-Schuyler 7 T4260 ACR	C047833
	Sub T Overhead Line	SUBT	**Utica**	Deerfield-Schuyler 22-46kV	C050288

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
				Deerfield-Whitesboro 26-46kv	C046459
				Yahnundasis-Clinton 24 - 46kv	C046449
Customer Requests/Public Requirements	**Other**	TRAN	**None**	Edic-LN 1-7 & 24-40,Rpl Cbs-TOTS	C058063
	Public Requirements	SUBT	**WLOF-MV**	DOTR NYSRt28 White Lk-McKeever SubT	C034722
		TRAN	**None**	NYPA's Marcy So Series Compensator	C059802
System Capacity & Performance	**NERC/NPCC Standards**			Porter 230kV-Upgrade Brks/Disc/PT's	C036866
	Reliability	DIST	**Utica**	Terminal Station Sub Relocation	C046613
	TO Led System Studies	TRAN	**None**	New bay at Edic 345kv substation	C044674
				Porter #3 / #7 Install Reactors	C060241
				Terminal Station Relocation TLine	C059672

5. F. Genesee Transmission Study Area

Area Summary

Key transmission projects in the Genesee study area have the following drivers:

- Low post-contingency voltages in the area in general and at Golah in particular, especially for bus faults at Lockport or Mortimer that affect the entire 115kV bus.
- Low post-contingency voltages developing in the 2016 to 2026 time frame in the Batavia and Brockport areas as a result of load growth.
- Heavy post-contingency conductor loadings in the Batavia Station (existing loads), on the Lockport-Batavia #107 line, and the Mortimer-Golah #110 line.
- In addition to the addition of tie breakers at Lockport and Mortimer, other recommended projects include construction of a four breaker ring splitting the National Grid #119 circuit and the RG&E #906 circuit.

Key sub-transmission and distribution drivers include the following:

- Reliability issues are being addressed with the addition of second transformers and new distribution feeders supplied from West Hamlin and Mumford Stations.
- Capacity concerns in the area are being address by a transformer upgrade at Attica and a new distribution substation adjacent to North Lakeville Station.

Area Description

The Genesee transmission study area includes National Grid assets within NYISO Zone B. The area includes assets as far west as Lockport and as far east as Mortimer. The system consists of several 115kV circuits between Lockport and Mortimer stations. Three circuits go directly from Lockport to Mortimer, three circuits go from Lockport to Batavia and several circuits in series connect Batavia and Golah. Today one 115kV line and one 69kV line travel between Mortimer and Golah.

Two 345kV circuits owned by NYPA travel parallel to this area from Niagara to Rochester. At Rochester Station 80, RG&E has four 345-115kV transformers with 115kV connections to Rochester Station 82. Station 82 is the RG&E 115kV station adjacent to National Grid's Mortimer Station.

At Lockport, one circuit connects the station to the NYSEG Hinman Rd. Station. Hinman Rd. is connected by a single circuit to Delphi, a load and generator, and Delphi is connected by a single line to Robinson Rd. Station. At Robinson Rd., a 230-115kV transformer is connected to the Niagara – Robinson #64 and Robinson – Stolle #65 230kV circuits.

This area also includes some of the assets stretching between Mortimer in the Western Region and Elbridge in the Central Region.

Within the Genesee study area, there are three distribution study areas: Genesee North, Genesee South and Livingston.

The Genesee North study area serves approximately 41,200 customers. There are a total of 51 distribution feeders that supply customers in this area. There are twenty 13.2kV feeders, with four being supplied from 34.5-13.2kV transformers, and the rest are fed from 115-13.2kV transformers. The thirty-one 4.8kV feeders are all fed from 34.5-4.8kV transformers. There are ten 34.5kV sub-transmission lines that supply the distribution step down transformers in the area.

The Genesee South study serves approximately 32,300 customers. The study area is defined by the region that includes the City of Batavia and the surrounding towns and villages. It is located east of Buffalo and southwest of the City of Rochester. The primary distribution system voltages in Genesee South are 13.2kV and 4.8kV. Most of the 13.2kV system is fed from the area 115kV transmission system. The rest of the 13.2kV system, as well as the 4.8kV system, are fed from a 34.5kV sub-transmission system supplied out of the North Akron, Batavia, North Leroy, and Oakfield substations. There are several customers supplied directly from the sub-transmission system.

The Livingston study area serves approximately 28,700 customers. The study area is made up of Livingston County which is south of Rochester and east of Batavia. The primary distribution system voltages in Livingston are 13.2kV and 4.8kV. Half of the load is supplied from the 115-13.2kV East Golah substation. The remainder is supplied from 69kV and 34.5kV sub-transmission system supplied out of the Golah and North Lakeville substations. Two customers are supplied directly from 115kV.

Major Project Table

The following table identifies major projects by spending rationale for this study area.

Table 5-6
Genesee Major Projects

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
Asset Condition	**Asset Replacement**	SUBT	**Genesee North**	Phillips-Barker 301-34.5kv	C046465
			Genesee South	Oakfield - Caledonia LN201 reconduc	C046707
			Livingston	N.Lakeville - Ridge LN 218 Refurbis	C046766
	Component Fatigue/Deterioration	TRAN	**None**	Alabama-Telegraph 115 T1040 ACR.	C033014
				Batavia-Golah 119 ACR	C060217

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
				Brockport Tap Refurbishment	C055531
				Hook Rd-Elbridge Polymer Insulators	C056626
				Lockport 103-104 T1620-T1060 STR	C027432
				Lockport-Batavia 112 T1510 ACR	C003422
				Mortmr-Pannll 24-25 T1590-T1600 ACR	C047816
				Pannell-Geneva 4-4A T1860 ACR	C030889
				Rochester UG Pumping Plant	C015988
	Sub T Overhead Line	SUBT	**Genesee North**	Barker-Lyndonville 301-34.5kV	C052511
				Lyndonville-Medina 301-34.5kV	C052512
Damage/Failure	**Damage/Failure**	TRAN	**None**	North LeRoy TRF #1 Replacement	C056083
System Capacity & Performance	**Load Relief**	DIST	**Livingston**	S.Livingston relief: F5 work	C051692
				S.Livingston relief: Fd4 work	C051691
				S.Livingston relief: Dist Fder Work	C051694
				Sonora Way 115 – 13.2kV Substation	C051585
				South Livingston relief - DLine Fd2	C046552
	Reliability		**Genesee North**	West Hamlin #82 - Install Transform	CD01089
				West Hamlin #82 - New TB2 - Install	CD01090

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
				West Sweden - Install New Station	C046593
				West Sweden -New Sta - Install Fdrs	C046591
			Genesee South	Mumford #50 - TB2 - Install New Fdr	C046589
				Mumford #50 - Install Transformer #2	C046590
	TO Led System Studies	TRAN	**None**	TP West Golah Substation	C050695

5. G. Frontier Transmission Study Area

Area Summary

The principal drivers for transmission projects in this area are:

- Low post-contingency voltages at Huntley and Gardenville.
- Fault current levels that result in overdutied breakers at Gardenville.
- High post-contingency autotransformer loadings on the 230-115kV banks at Gardenville.
- High post-contingency 115kV line loadings on lines extending south and east from Niagara, Packard, and Gardenville.
- Recommended major projects that address capacity issues include reconfiguring or reconductoring of the #181, #54, and #195 lines, the addition of a 115 kV capacitor bank and bus tie breaker at Huntley, and some reconfiguration and upgrading of limiting elements at Lockport and Mountain stations.
- The proposed rebuild of Old Gardenville Station to address station configuration issues as well as asset condition issues will also partially address capacity needs.

Key sub-transmission and distribution drivers include the following:

- Load growth in the Tonawanda area. A new 115-13.2kV substation will be used to supply the new commerce/industrial parks.
- Planned development in the City of Buffalo in the outer harbor and Buffalo River areas will require an upgraded substation to supply that area.
- Load growth by at the Buffalo Niagara Medical Campus as well as across downtown will be served by Elm Street substation.
- Area loading requiring the upgrade of multiple Buffalo area substations, including Buffalo Station 56, 59, 122, 214.
- Indoor substations are an asset condition issue and there are several replacement projects in progress in Buffalo.
- The condition of Harper 115-12kV station and several indoor substations in Niagara Falls are driving a new 115-13.2kV substation and other new projects in Niagara Falls.

Area Description

The Frontier transmission study area includes assets within NYISO Zone A. The area includes assets as far east as Lockport, the Niagara and Buffalo areas and the system stretching south to Gardenville. The system consists primarily of 115kV and 230kV double

circuit transmission lines. The major substations are Packard (230 and 115kV), Huntley (230 and 115kV), and Lockport (115kV). There is a joint National Grid and NYSEG substation at Gardenville (230 and 115kV). National Grid has three 230/115kV transformers at Gardenville and two at Packard. NYSEG and NYPA also have their own substations in the area.

Within the Frontier study area there are ten distribution study areas: Amherst, Cheektowaga, Elm, Grand Island, Kensington, Niagara, Niagara Falls, Sawyer, Seneca and Tonawanda.

The Amherst study area serves approximately 65,100 customers. The study area is located east of Tonawanda and Niagara, and north of the City of Buffalo and encompasses the towns of Amherst, Pendleton, Wheatfield, Wilson and Lewiston. The Erie Canal divides the study area and may present challenges in creating new feeder ties and recommended supply expansion. The primary distribution system in Amherst is 13.2kV and 4.16kV, with a few small pockets of 4.8kV. The area substations are supplied by the 115kV transmission system with the exception of Buffalo Station 58 and Buffalo Station 124, which are supplied by 34.5kV sub-transmission lines originating from Youngman Terminal Station and Buffalo Station 67, which is supplied by the 34.5kV sub-transmission lines originating from Walden substation.

The Cheektowaga study area serves approximately 7,900 customers. The area is located east of the City of Buffalo. There are several stations in this area that are supplied by 115kV transmission lines. Walden is the largest and has two transformers that serve the 34.5kV sub-transmission system. Dale Rd. substation is 115-13.2kV, while Buffalo substations 61 and 154 are 115 - 4.16kV. The remaining substations in the area are 34.5-4.16kV. Buffalo Substation 146 has a 34.5-4.8kV and a 34.5-13.2kV transformer.

The Elm study area serves approximately 3,300 customers and is part of the City of Buffalo. It contains the downtown area as well as surrounding urban areas with a mix of residential, commercial and industrial loads. Elm Street Substation is a 230-23kV station that supplies the Buffalo network as well as the sub-transmission supply to several distribution stations. The Buffalo network has approximately 120MW of load. Most of the load is served by a low voltage AC general network which is supplied by multiple paralleled transformers with multiple 23kV supply cables thus providing very high reliability.

The Grand Island study area serves approximately 8,700 customers. The study area is made up of Grand Island which is between the City of Buffalo and Niagara Falls. It is primarily suburban and rural residential with areas of commercial and industrial parks. There are two National Grid substations supplied from 115kV lines with distribution feeders at 13.2kV.

The Kensington study area serves approximately 35,600 customers. There are eighty 4.16kV feeders; all fed from thirty-eight 23-4.16kV transformers and nineteen 23kV sub-transmission lines. The Kensington Substation has four 115-23kV transformers, and provides the supply to the 23kV sub-transmission system. This substation is located in the City of Buffalo and the study area contains significant amounts of underground distribution mainlines and overhead laterals. The Kenmore Terminal Station supplies several smaller commercial customers and the South Campus of the SUNY at Buffalo.

The Niagara study area serves approximately 12,800 customers. The study area

encompasses the towns of Lewiston, Porter, and Wilson. The study area is bordered to the west by Niagara River, to the North by Lake Ontario, and to the south by Power Reservoir. Area distribution is served primarily at 4.8kV and supplied by a 34.5kV sub-transmission network. The 34.5kV sub-transmission network operates in a loop system that is supplied by both Mountain and Sanborn 115-34.5kV substations. Swann Road supplies a significant portion of this area and is 115-13.2kV.

The Niagara Falls study area serves approximately 38,700 customers. The study area is bordered to the north, south, and west by the Niagara River. The Power Reservoir also borders the area to the north, east of the Niagara River. Interstate 190 runs from the north to the south along the eastern section of the study area. The CSX Railroad runs from the east to the west along the northern section of the area. The Niagara Falls International Airport lies east of the city. These boundaries limit feeder ties and distribution supply expansion in the area. The area is supplied primarily by the 115kV transmission system, however, a 12kV sub-transmission system is supplied by Harper and Gibson substations. Distribution load is served by 13.2kV, 4.8kV, and 4.16kV circuits.

The Sawyer study area serves approximately 63,700 customers. The study area contains portions of the City of Buffalo and the Town of Tonawanda. There are 154 4.16kV feeders supplying the area which are supplied by 23kV supply cables and multiple, paralleled transformers.

The Seneca study area serves approximately 44,100 customers. The study area is the southeast section of Buffalo. It is served primarily from the Seneca Terminal Station which has four 115-23kV transformers and serves 25 supply lines at 23kV. Most of the distribution substations are served by four supply cables and have four 23-4.16kV transformers. As throughout the City of Buffalo, almost all distribution load is served at 4.16kV.

The Tonawanda study area serves approximately 27,400 customers. The study area encompasses the City of North Tonawanda as well as a portion of the City and Town of Tonawanda. Bordering the western section of the area is the Niagara River. Ellicott Creek flows parallel to Tonawanda Creek in the northern part of the town of Tonawanda, with a confluence just east of the Niagara River. These creeks flow through the central part of the area from east to west. The eastern section of the area is bordered by the Town of Amherst and forming the southern border is the Village of Kenmore and the City of Buffalo. The area is served primarily by the 115kV transmission system and the 23kV sub-transmission system. Distribution voltage is served primarily by 4.16kV feeders.

Major Project Table

The following table identifies major projects by spending rationale for this study area.

Table 5-7
Frontier Major Projects

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
Asset Condition	**Asset Replacement**	DIST	**Niagara Falls**	New Harper Substation D Line	C046417
			Seneca	Buffalo Station 42 Rebuild - D Line	C046859
				Buffalo Station 42 Rebuild - D Stat	C046854
			Tonawanda	Buffalo Station 122 Rebuild - Sub	CD00782
		SUBT	**Cheektowaga**	Galleria Mall - Switchgear Replmnts	C058985
	Buffalo Street Light Cable Replacement	DIST	**None**	Buffalo Street Light Cable Replacem	CD00851
	Component Fatigue/Deterioration	TRAN		Gard-Dun 141-142 T1260-T1270 ACR	C003389
				Gardenville 180-182 T1660-T1780 ACR	C027436
				Gardenville Rebuild	C005156
				Gardenville-Rebuild Line Relocation	C030084
				LockportSubstationRebuildCo36TxT	C035464
				Packard Relays line 191 to 195	C051423
				Rebuild Huntley Station	C049902
				Seneca Terminal Transformer Replace	C049744
	Sub T Underground Cable Replacement	SUBT		Buffalo 23kV UG Cable replacement	C052483
	Substation Indoor	DIST	**Kensington**	Buffalo Station 53 Rebuild - Line	C046929
				Buffalo Station 53 Rebuild - Sub	C046945
			Niagara Falls	Eighth St 80 - Indoor Substation Re	C046585
				Stephenson 85 - Indoor Substation R	C046580
					C046581
				Welch 83 - Indoor Substation Refurb	C046584

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
				Welch 83 Indoor Substation Refurbis	C046583
			Sawyer	Buffalo Station 37 Rebuild - Sub	C033474
			Seneca	Buffalo Station 59 Rebuild - Sub	C033475
	Substation Metal-clad Switchgear		**Amherst**	Station 140 Metalclad Replacement	C056616
			Cheektowaga	Station 61 - Metalclad Replacement	C051707
			Kensington	Station 162 Metalclad Replacement	C052706
	Substation Power Transformer		**Amherst**	Station 124 - Almeda Ave Transforme	C046670
System Capacity & Performance	**Load Relief**			Frankhauser New Station - Line Work	C028929
			Elm	Buffalo Station 49 - UG Upgrades	CD01128
			Niagara	Wilson 93 Load Relief - Replace TB1	C035743
			Sawyer	Buffalo Sta 56- upgrade 4 Xfmrs	C036502
		SUBT		Buffalo 23kV Reconductor - Huntley2	C028893
	Reliability	DIST	**Grand Island**	Long Rd 209 - New F20955	CD00964
				Long Road 209 - Install TB2	CD00977
			Niagara	Shawnee Road 76	C036059
			Niagara Falls	Lockport Road 216 - Install TB#2	C036057
				Military Road 210 - Install TB#2	C036056
			Tonawanda	New Dist Sub - Tonawanda NYW DSub	C051266
				New Dist Sub -Tonawanda NYW DLine	C051265
				Station 214 - Install TB2	C029186
				Station 214 - New F21467	C029187
	Secondary Network Arcflash Mitigation		**Elm**	NY West Div Arc Flash 480V Spot NW	C047461
	TO Led System Studies	TRAN	**None**	Elm St Relief_Add 4th Xfer	C049594
				Grdvll-Bffl Rvr146 2nd Tap Ohio Sta	C054713

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
				Mountain upgrade 115 - 34.5kV trans	C044359
				New Harper Substation - TxT Sub	C044874
				Sanborn upgrade 115 - 34.5kV transf	C044361
				Sawyer Fourth 230-23kV Bank	C053147
				TP Reconductor line #181	C050744

5. H. Southwest Transmission Study Area

Area Summary

The primary drivers of the transmission capacity related projects in the Southwest study area are:

- A wide range of contingencies that can result in voltages well below criteria at various locations in this study area. The vulnerability of the area to these voltage issues is significantly amplified if certain key generators are not operating.
- Projects to address capacity problems in this area, including the new Five-Mile Road 345/115kV station north of Homer Hill, the addition of a second capacitor bank at Homer Hill, the closing of a normally open breaker at Andover, and the addition of a second bus tie breaker in the Dunkirk substation.
- Projects to address the longer-term reliability considerations, including two 33.3 MVAr capacitor banks at Dunkirk, a second 75 MVAr capacitor bank at the Huntley 115 kV switchyard and reconductoring of two 115kV lines between Five Mile Rd and Homer Hill.

Key sub-transmission and distribution drivers include the following:

- The 34.5kV sub-transmission system, which consists of several very long loops that traverse rugged territory.
- Load growth and reliability concerns in the South Chautauqua portion of the area are driving new station projects.
- Load growth and asset condition issues at Stations in the Eden/Evans area that are being addressed by a new substation and expansion/upgrade of Delameter Road Substation.
- Load growth in the Buffalo Outer Harbor area will require an expansion/upgrade of Buffalo Station 42.

Area Description

The Southwest transmission study area includes the system as far north as Gardenville station, east into Wellsville and the system stretching south into Pennsylvania. The transmission system consists primarily of 115kV and 230kV double circuit transmission lines. The major stations are Gardenville (230 and 115kV), a joint National Grid and NYSEG station, Dunkirk (230 and 115kV), Falconer (115kV) and Homer Hill (115kV). National Grid has 230-115kV transformers at Gardenville (3) and Dunkirk (2). NYSEG also has two 230-115kV transformers at Gardenville.

Within the Southwest study area, there are six distribution study areas: Cattaraugus – North, Chautauqua North, Chautauqua South, Erie South, Olean and Wellsville.

The North Cattaraugus study area serves approximately 15,200 customers. There are seven 13.2kV feeders, five of which are fed via two 115-13.2kV transformers at the Valley substation. The remaining two 13.2kV feeders are fed from 34.5-13.2kV transformers at the

Price Corners and Reservoir substations. There are also twenty 4.8kV feeders, all supplied by 34.5-4.8kV transformers at various area substations. There are seven 34.5kV sub-transmission lines that provide supply for the 34.5-4.8kV transformers and a minimal number of industrial customers that are supplied directly from the 34.5kV system. There are several NYSEG substations and municipal electric departments supplied from the 34.5kV system.

The North Chautauqua study area serves approximately 22,900 customers. There are ten 4.8kV feeders, which are all fed from 34.5-4.8kV transformers. There are also twenty 13.2kV distribution feeders with all but one fed by 115-13.2kV transformers at various substations in the area. One 13.2kV feeder is supplied by a 34.5-13.2kV transformer at the West Portland substation. There are also eight 34.5kV sub-transmission lines which provide the supply to the 34.5-4.8kV step-down transformers in the area.

The Chautauqua South study area serves approximately 17,900. Customers are supplied by twenty 4.8kV delta feeders, which are all fed from 34.5-4.8kV transformers. There are four 13.2kV feeders with three fed by the Baker Street 115-13.2kV transformer and one fed by the French Creek 34.5-13.2kV transformer. There are five 34.5kV sub-transmission lines that are supplied from Hartsfield and South Dow 115kV substations.

The Erie South study area serves approximately 34,100 customers. The study area includes the Buffalo outer harbor area and those areas south of the City of Buffalo with approximately half the feeders served at 13.2kV. The 115kV system supplies the 13.2kV stations. The rest of the feeders operate at 4.8kV or 4.16kV.

The Olean study area serves approximately 18,500 customers. There are twenty distribution feeders that provide service to area customers. There are eight 4.8kV feeders supplied by 34.5-4.8kV transformers at various stations. Eleven of the area's twelve 13.2kV feeders are fed from 115-13.2kV transformers. The remaining single feeder is served from a 34.5-13.2kV transformer at the Vandalia substation.

The Wellsville study area serves approximately 4,400 customers. This study area is a small rural region located near the Pennsylvania border and is supplied by the 115-34.5kV Andover and Nile substations. There are two 34.5kV supply lines in the area. Load is served by five substations serving nine 4.8kV feeders.

Major Project Table

The following table identifies major projects by spending rationale for this study area.

Table 5-8
Southwest Major Projects

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
Asset Condition	Asset Replacement	DIST	Erie South	Ohio St - Buffalo River Tunnel/Bore	C050400
		SUBT	Cattaraugus North	Dake Hill-W. Salamanca 816-34.5kv	C046469
			Chautauqua South	W. Portland-Sherman 867-34.5kv	C046468
			Erie South	Shaleton-Ridge 610, Station 207 Tap	C046779
			Chautauqua North	Hartfield-S. Dow 859-Relocate Part	C052209
	Component Fatigue/Deterioration	TRAN	None	Dunkrk-Falc 161-162 T1090-T1100 ACR	C047831
				Homer Hill-Bennett 157 T1340 ACR	C027429
	Sub T Overhead Line	SUBT	Chautauqua South	Relocate S. Dow-Poland 865-34.5kV	C050177
				West Portland-Sherman 867 Relocatio	C055118
			Chautauqua North	Hartfield-S. Dow 859 Refurbish	C033180
Customer Requests/Public Requirements	New Business		Erie South	Extend LN 611 & 612 to Riverbend	C054665
System Capacity & Performance	Generator Retirements	TRAN	None	Five Mile to Homer Hill reconduct	C047319
	Load Relief	DIST	Erie South	Eden switch structure - install 2-10	C046538

Spending Rationale	Program	System	Distribution Study Area	Project Name	Funding Number
				Eden Switch Structure- New Fdr 1	C048015
				Eden Switch Structure- New fdr# 2	C048016
		SUBT		Ohio St station - SubT lines	C055304
	Reliability	DIST		Bflo Sta 139 - Replace Transformers	C036639
				Delameter Install two 20/26/33MVA	C046536
				Delameter F9356- express& rebuild	C047877
	TO Led System Studies	TRAN	**None**	Airco-Bffl Rvr147 Adv Metal Tap	C054711
				Construct Five Mile Station	C024015
				Ohio Street new 115 - 34.5kV sub	C055263
				W. Ashville substation TxT	C043833

Exhibit 1 - Transmission Capital Investment Plan

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
Asset Condition	Asset Condition I&M	NY Inspection Repairs - Capital	C026923	11,309,200	4,279,229	3,011,547	3,011,820	1,150,000	22,761,796
	Asset Condition I&M Total			11,309,200	4,279,229	3,011,547	3,011,820	1,150,000	22,761,796
	Component Fatigue/Deterioration	345kV Laminated cross-arm program	C060365	100,000	3,500,000	3,000,000	3,000,000	3,000,000	12,600,000
		Alabama-Telegraph 115 T1040 ACR.	C033014	500,000	4,100,000	500,000	0	0	5,100,000
		Alps relay replacement	C049296	0	140,650	0	0	0	140,650
		AMT PIW - NIMO	C031545	415,000	1,000,000	1,000,000	1,000,000	1,000,000	4,415,000
		ASH ST_22325_22329-REACTORS	C054430	20,000	0	0	0	0	20,000
		Batavia Station Relay Replacement	C043506	34,300	0	0	0	0	34,300
		Batavia-Golah 119 ACR	C060217	0	0	0	300,000	1,000,000	1,300,000
		BatteryRplStrategyCo36TxT	C033847	219,453	199,999	159,996	684,000	250,000	1,513,448
		Battle Hill - replace 3 OCBs	C049543	2,000	1,000,000	0	0	0	1,002,000
		Bethlehem Relay Replacem't Strategy	C049583	0	20,000	120,019	0	0	140,019
		Boonville Rebuild	C049903	0	0	0	50,000	100,000	150,000
		Boonville-Rome 3-4 T4060-T4040 ACR	C047795	100,000	200,000	200,000	8,000,000	394,000	8,894,000
		Boonvill-Portr 1-2 T4020-T4030 ACR	C047818	50,000	100,000	170,000	170,000	4,687,000	5,177,000
		Br F-Taylorville 3-4 ACR	C024359	310,400	5,840,000	2,920,000	0	0	9,070,400
		Breaker T Repl Program 4-69kV NYC.	C049258	105,000	739,000	600,000	600,000	600,000	2,644,000
		Breaker T Repl Program 4-69kV NYE	C049257	105,000	931,000	600,000	600,000	600,000	2,836,000
		Breaker T Repl Program 4-69kV NYW	C049260	165,000	1,271,000	600,000	600,000	600,000	3,236,000
		Brockport Tap Refurbishment	C055531	100,000	1,020,000	85,000	0	0	1,205,000
		Browns Falls - OCB replacements	C043043	39,990	0	0	0	0	39,990
		Capital Reserve - Asset Condition	CNYX31AC	-5,570,113	-834,896	-5,982,383	-105,454	-805,605	-13,298,451
		Carr St./E.Syracuse CO-Gen Relays	C049739	0	50,000	426,800	0	0	476,800

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		CIRCUIT BREAKER RECLOSR RPL NYC TXD	C035142	9,000	0	0	0	0	9,000
		Colton-BF 1-2 T3140-T3150 ACR	C036164	20,000	350,000	2,000,000	6,000,000	2,329,000	10,699,000
		Colton-Replace CBs and Disconnects	C029844	1,544,900	135,170	0	0	0	1,680,070
		Curtis Relay /Breaker Replacement	C049584	50,000	688,750	349,000	0	0	1,087,750
		Dunkirk Rebuild	C005155	0	0	0	0	250,000	250,000
		Dunkirk-Falconer 161/162 Shield Wir	C054226	44,000	0	0	0	0	44,000
		Dunkrk-Falc 161-162 T1090-T1100 ACR	C047831	0	0	0	0	1,000,000	1,000,000
		East Syracuse Co-Gen Disconnects	C056726	25,000	0	0	0	0	25,000
		Edic - New Control House	C058129	2,000,000	400,000	0	0	0	2,400,000
		Edic/N Scotland-NG Assoc work-TOTS	C058064	500,000	0	0	0	0	500,000
		Elm St. Replace 67L Relays	CD00728	6,800	0	0	0	0	6,800
		Feura Bush Relay Replacement	C049585	0	90,000	720,115	0	0	810,115
		Frontier Lines 180 181 ACR	C060215	0	0	0	0	300,000	300,000
		Gard-Dun 141-142 T1260-T1270 ACR	C003389	100,000	1,000,000	5,000,000	25,000,000	25,000,000	56,100,000
		Gardenville 180-182 T1660-T1780 ACR	C027436	0	0	50,000	50,000	1,000,000	1,100,000
		Gardenville Rebuild	C005156	4,273,920	14,550,000	15,272,000	4,209,800	0	38,305,720
		Gardenville-Depew 54 ACR	C060213	0	0	0	0	300,000	300,000
		Gardenville-Rebuild Line Relocation	C030084	1,800,000	4,851,800	4,035,980	100,000	0	10,787,780
		Gard-HH 151-152 T1950-T1280 S ACR	C027425	0	0	0	0	200,000	200,000
		GE Butyl Rubber VT Replacement	C049002	528,000	224,000	320,000	0	0	1,072,000
		GE-Geres Lock 8 T2240 ACR	C047835	400,000	4,000,000	10,000,000	500,000	0	14,900,000
		GERES LOCK - RPLC R815 OCB	C049138	200,000	0	0	0	0	200,000
		Geres Lock-Solvay 2 ACR	C060206	0	0	0	0	100,000	100,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Gibson Substation Retirement	C046579	0	0	77,350	0	0	77,350
		Golah Relay & Breaker Strategy Repl	C050920	0	25,000	165,026	0	0	190,026
		Greenbush Relay Replacement	C049587	0	50,000	330,053	0	0	380,053
		Greenbush-Stephentown #993 ACR	C060208	0	0	0	0	300,000	300,000
		Headson - OCB Replacements	C043044	7,000	0	0	0	0	7,000
		Homer Hill - West Olean 156 ACR	C060218	0	0	0	0	200,000	200,000
		Homer Hill Switch Relay Replacement	C043505	45,000	0	0	0	0	45,000
		Homer Hill-Bennett 157 T1340 ACR	C027429	560,000	6,499,500	100,000	0	0	7,159,500
		Hook Rd-Elbridge Polymer Insulators	C056626	50,000	1,200,000	0	0	0	1,250,000
		Hoosick - Replace Bank 1 & relays	C053132	25,000	700,000	3,400,000	0	0	4,125,000
		Hudson Station 087- Animal Fence	C059640	50,000	0	0	0	0	50,000
		Huntley Sub-Rem TB130 & 140 cables	C028089	27,000	0	0	0	0	27,000
		Independence Station relay Replace	C049598	0	80,000	523,800	0	0	603,800
		Inghams Phase Shifting Transformer	C047864	2,240,000	750,000	0	0	0	2,990,000
		Inghams Station - Assoc Line work	C060240	0	0	0	0	1,000,000	1,000,000
		Inghams Station Re-vitalization	C050917	0	110,000	113,000	500,000	5,000,000	5,723,000
		Inghams-E. Springfield #7 ACR	C060209	0	0	0	0	300,000	300,000
		Leeds - Replace U Series Relays	C024663	2,164,448	0	0	0	0	2,164,448
		Leeds Station Service	C049900	956,920	24,000	0	0	0	980,920
		LightHH 115kV Yard Repl & cntrl hs.	C031662	20,000	300,000	1,500,000	5,000,000	15,000,000	21,820,000
		Lockport 103-104 T1620-T1060 STR	C027432	0	50,000	100,000	200,000	1,300,000	1,650,000
		Lockport-Batavia 108 T1500 STR.	C027431	42,500	0	0	0	0	42,500
		Lockport-Batavia 112 T1510 ACR	C003422	100,000	1,000,000	17,000,200	25,600,000	17,000,000	60,700,200

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		LockportSubstationRebuild Co36TxT	C035464	0	50,000	498,271	1,500,240	10,000,000	12,048,511
		Long Lane Relay Replacement	C049600	0	100,000	660,106	0	0	760,106
		Maplewood-Norton-Replace Pilot Wire	C036006	265,050	0	0	0	0	265,050
		Marshville - replace R11 OCB	C049547	35,000	315,050	0	0	0	350,050
		McIntyre Relay Replacement	C047860	226,000	34,920	0	0	0	260,920
		Menands Station Relay Replacement	C049601	300,000	4,484,740	498,200	0	0	5,282,940
		Mohican - Replace Bank 1 and Relays	C053133	0	0	996,400	2,989,200	0	3,985,600
		Mortimer-Golah #110 ACR	C060220	0	0	0	0	300,000	300,000
		Mortmr-Pannll 24-25 T1590-T1600 ACR	C047816	25,000	0	100,000	200,000	5,000,000	5,325,000
		Mountain Station Relay Replacement	C049603	0	47,000	481,280	0	0	528,280
		New Scotland - replace 345kV OCBs	C049553	1,067,840	8,800	0	0	0	1,076,640
		New Scotland Relay Replacement	C047861	15,000	634,729	0	0	0	649,729
		Niagara-Lockport 101 & 102 ACR	C060216	0	0	0	0	300,000	300,000
		North Ogdensburg Relay Replacement	C047862	30,070	134,830	0	0	0	164,900
		North Troy Relay Replacement	C049605	0	25,000	165,026	0	0	190,026
		NS-Leeds 93-94 T5480-T5490 SXR	C007918	0	0	0	0	50,000	50,000
		NY Oil Circuit Breaker Replacements	C037882	0	0	0	1,600,256	2,000,000	3,600,256
		Oneida Substation Rebuild	C034443	0	0	0	0	250,000	250,000
		Oswego - 115kV & 34.5kV - Asset Sep	C043426	1,315,579	5,000,000	3,000,000	0	0	9,315,579
		Packard Relays line 191 to 195	C051423	646,990	657,660	0	0	0	1,304,650
		Packard-Walck Road 129 ACR	C060214	0	0	0	0	300,000	300,000
		Pannell-Geneva 4-4A T1860 ACR	C030889	25,000	100,000	200,000	5,000,000	500,000	5,825,000
		Porter-Rotterdam 31 T4210 ACR	C030890	1,771,000	70,000	300,000	2,000,000	10,000,000	14,141,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Porter-Schuyler 13 Removal	C048649	0	21,150	0	0	0	21,150
		Porter-Watkins Rd 5 ACR	C060207	0	0	0	0	300,000	300,000
		Praxair Station Rebuild	C054227	100,000	0	0	0	0	100,000
		Purchase Spare Transformers	C053135	0	0	3,000,000	0	0	3,000,000
		Pyrites New Battery House	C051704	800	0	0	0	0	800
		Quaker-Sleight Road #13 ACR	C060219	0	0	0	0	300,000	300,000
		Queensbury - replace OCBs	C049554	50,000	1,000,160	0	0	0	1,050,160
		Rebuild Huntley Station	C049902	25,000	350,000	2,500,400	5,100,000	10,300,000	18,275,400
		Relay Replacement Program NY-T	C034690	0	0	0	2,000,000	4,000,000	6,000,000
		Repl Pilot Wire-Central Ave-Patroon	C036031	2,550	0	0	0	0	2,550
		Ridge Substation - 34.5kV System Re	C046693	287,914	0	0	0	0	287,914
		Rochester UG Pumping Plant	C015988	101,000	700,000	298,900	0	0	1,099,900
		Rotterdam 115kV SubRebuild(AIS)	C034850	0	50,000	300,000	6,750,000	20,000,000	27,100,000
		Rotterdam-Bear Swamp E205 T5630 ACR	C047832	0	0	0	200,000	200,000	400,000
		Schuyler - replace OCBs	C049562	100,000	1,000,000	0	0	0	1,100,000
		Schuyler Rd Repl 918 928 CirSws	C050799	217,000	0	0	0	0	217,000
		Scriba Relay Replacement	C049611	38,800	780,850	56,260	0	0	875,910
		Seneca Term Relay Replacement	C049613	0	70,000	470,075	0	0	540,075
		Seneca Terminal Transformer Replace	C049744	350,000	1,700,000	0	0	0	2,050,000
		Shield Wire: Gardenville-Depew 54	C028706	246,000	0	0	0	0	246,000
		Spier-Queensbury #17 ACR	C060211	0	0	0	0	300,000	300,000
		Spier-Queensbury #5 115kV ACR	C060210	0	0	0	0	300,000	300,000
		Spier-Rotterdam 1 & 2 ACR	C060212	0	0	0	300,000	1,000,000	1,300,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		System Spare TRF eastern NY	C057026	490,000	0	0	0	0	490,000
		Taylorville-B 5-6 T3320-T3330 ACR	C027437	7,434,180	1,592,000	0	0	0	9,026,180
		Teal Ave. Transformer Replacement	C047865	2,029,600	2,679,000	350,000	0	0	5,058,600
		Terminal-Schuyler 7 T4260 ACR	C047833	0	50,000	85,000	170,000	1,045,000	1,350,000
		Ticonderoga - replace R4 OCB	C049552	50,000	300,000	0	0	0	350,000
		Ticonderoga 2-3 T5810-T5830 ACR	C039521	125,000	1,000,000	5,000,000	14,000,000	28,000,000	48,125,000
		TICONDEROGA 2-3 T5810-T5830 SXR2	C039487	2,992,000	0	0	0	0	2,992,000
		Ticonderoga-Sanford T6410R Removal	C032309	25,000	0	742,500	0	0	767,500
		Tilden - replace OCBs	C049556	0	50,000	1,000,000	0	0	1,050,000
		Turner D Switch Replacements (36)	C052603	100,000	800,000	688,000	688,000	0	2,276,000
		Volney station Relay Replacement	C049626	50,000	650,870	0	0	0	700,870
		Walck RD Relay Replacement	C049628	0	25,000	165,026	0	0	190,026
		Whitehall - replace OCBs	C049564	75,000	975,156	0	0	0	1,050,156
		Wood Pole Mgmt Prgm (Osmose)	C011640	1,030,560	2,553,600	1,621,840	1,500,000	1,500,000	8,206,000
		Woodard Relay Replacement	C047863	100,000	269,660	0	0	0	369,660
		Woodlawn Transformer Replacement	C051986	1,350,000	1,800,000	450,000	0	0	3,600,000
		Yahnundasis Relay replacement	C049629	0	0	370,059	0	0	370,059
	Component Fatigue/Deterioration Total			37,578,451	86,435,149	89,453,300	126,056,042	177,949,395	517,472,337
	Failure Trend	Central Div Sta - Shielded Cable	C058003	34,920	176,400	26,460	308,700	0	546,480
		Higley-Repl Fuses w/Ckt Switcher	C034664	652,735	0	0	0	0	652,735
		New Scotland- Relay Cable Shielding	C056244	133,000	0	0	0	0	133,000
		Osprey Mitigation Sleight-Auburn #3	C049288	43,000	0	0	0	0	43,000
		West Div - Shielded Cables	C058130	79,000	0	79,000	0	0	158,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
	Failure Trend Total			942,655	176,400	105,460	308,700	0	1,533,215
	NERC/NPCC Standards	Br. Falls-Taylorville 4 T3090 CCR	C048221	450,000	0	0	0	0	450,000
		Browns Falls-Taylorville 3 T3080CCR	C048218	600,000	0	0	0	0	600,000
		Conductor Clearance - NY Program	C048678	9,254,520	10,704,280	10,704,280	10,000,000	10,000,000	50,663,080
		NERC CIP - NMPC	C049085	1,150,000	50,000	0	0	0	1,200,000
	NERC/NPCC Standards Total			11,454,520	10,754,280	10,704,280	10,000,000	10,000,000	52,913,080
Asset Condition Total				61,284,826	101,645,058	103,274,588	139,376,562	189,099,395	594,680,428
Customer Requests/Public Requirements	Customer Interconnections	Byrne Dairy Load Expansion	C052843	283,000	200,000	0	0	0	483,000
		Byrne Dairy Load Expansion-Reimb	C052843R	-283,000	-200,000	0	0	0	-483,000
		Everpower Allegany IA-Tap/ Switches	C047385	100,000	910,000	0	0	0	1,010,000
		Everpower Allegany IA-Tap/ Switches Reimb	C047385R	-100,000	-910,000	0	0	0	-1,010,000
		Everpower Wind IA- SUF & AF Work	C047387	100,000	1,420,000	0	0	0	1,520,000
		Everpower Wind IA- SUF & AF Work Reimb	C047387R	-100,000	-1,420,000	0	0	0	-1,520,000
		Green Power Wind Project	C058099	758,000	0	0	0	0	758,000
		Green Power Wind Project-Reimb	C058099R	-758,000	0	0	0	0	-758,000
		Green Pwr Wind Loop in/out	C058101	1,057,000	0	0	0	0	1,057,000
		Green Pwr Wind Loop in/out Reimb	C058101R	-1,057,000	0	0	0	0	-1,057,000
		Line #46 115kV Replace w/ CNP	C053121	158,000	0	0	0	0	158,000
		NYSEG-LF Intercnt.115/34.5kV Sta.	C052588	632,000	0	0	0	0	632,000
		NYSEG-LF Intercnt.115/34.5kV Sta. Reimb	C052588R	-531,000	0	0	0	0	-531,000
		ReEnergy/Fort Drum Interconnect	C058403	155,000	0	0	0	0	155,000
		ReEnergy/Fort Drum Interconnect Reimb	C058403R	-155,000	0	0	0	0	-155,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Roaring Brook Wind-Line #5 Loop T	C055663	620,000	1,455,000	0	0	0	2,075,000
		Roaring Brook Wind-Line #5 Loop T Reimb	C055663R	-620,000	-1,455,000	0	0	0	-2,075,000
		RoaringBrookUpgrade Martinsburg SUB	C055408	250,000	353,000	0	0	0	603,000
		RoaringBrookUpgrade Martinsburg SUB Reimb	C055408R	-250,000	-353,000	0	0	0	-603,000
		Watervliet Arsenal Request Dbl Tap	C053377	50,000	0	0	0	0	50,000
		Watervliet Arsenal Request Dbl Tap Reimb	C053377R	-50,000	0	0	0	0	-50,000
	Customer Interconnections Total			259,000	0	0	0	0	259,000
	Other	Edic-LN 1-7 & 24-40,Rpl Cbs-TOTS	C058063	1,445,000	85,000	0	0	0	1,530,000
		Edic-LN 1-7 & 24-40,Rpl Cbs-TOTS Reimb	C058063R	-1,445,000	-85,000	0	0	0	-1,530,000
		New Scotland - LN1 & 18 Rly - TOTS	C058060	306,000	18,000	0	0	0	324,000
		New Scotland - LN1 & 18 Rly - TOTS Reimb	C058060R	-306,000	-18,000	0	0	0	-324,000
		RG&E--Mortimer Sub 251 Upgrade	C056410	107,241	0	0	0	0	107,241
		RG&E--Mortimer Sub 251 Upgrade Reimb	C056410R	-107,241	0	0	0	0	-107,241
		Scriba - LN 10 Rly - TOTS	C058061	306,000	18,000	0	0	0	324,000
		Scriba - LN 10 Rly - TOTS Reimb	C058061R	-306,000	-18,000	0	0	0	-324,000
		Volney - LN 19 RLY - TOTS	C058062	153,000	9,000	0	0	0	162,000
		Volney - LN 19 RLY - TOTS Reimb	C058062R	-153,000	-9,000	0	0	0	-162,000
	Other Total			0	0	0	0	0	0
	Public Requirements	FAA Obstruction Lighting - West	C027954	270,000	0	0	0	0	270,000
		NYPA's Marcy So Series Compensator	C059802	2,500,000	3,000,000	0	0	0	5,500,000
		NYPA's Marcy So Series Compensator Reimb	C059802R	-2,500,000	-3,000,000	0	0	0	-5,500,000
		TP Relocate Lafarge-Pleasant Vlly#8	C050745	10,000	0	0	0	0	10,000
	Public Requirements Total			280,000	0	0	0	0	280,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
	TO Led System Studies	Solar Cty Tap off 145/146	C053152	200,000	358,000	20,000	0	0	578,000
		Solar Cty Tap off 145/146-Reimb	C053152R	-200,000	-358,000	-20,000	0	0	-578,000
	TO Led System Studies Total			0	0	0	0	0	0
Customer Requests/Public Requirements Total				539,000	0	0	0	0	539,000
Damage/Failure	Damage/Failure	#4&#12 Porter-Valley/Valley-Fairfie	C060139	600,000	0	0	0	0	600,000
		DENNISON-COLTN 4 T3180 SW X4-1 D-F	C047698	2,100	0	0	0	0	2,100
		DENNISON-COLTN 4 T3180 SW X4-3 D-F	C052317	2,100	0	0	0	0	2,100
		EAST CONKLIN LN17 COMM EQUIPMENT	C054843	110,000	0	0	0	0	110,000
		Elm St. Station #4 TRF D/F	C051039	3,400	0	0	0	0	3,400
		G-HH 151-52 T1950-T1280 Str265 D-F	C042184	79,800	0	0	0	0	79,800
		Leeds SVC B TRF D/F	C057879	1,400,000	0	0	0	0	1,400,000
		MCINTYRE CAP BANK RELAY UPGRADE	C055226	182,400	0	0	0	0	182,400
		N Troy-Hoosick #5 Sw 511 & 522 Repl	C058680	438,480	0	0	0	0	438,480
		NEW SCOTLAND	C039722	2,000	0	0	0	0	2,000
		North LeRoy TRF #1 Replacement	C056083	423,808	1,844,869	61,569	0	0	2,330,246
		OHL D-F Disconnect Switch Spares	C048159	450,000	1,000,000	0	0	0	1,450,000
		PACKARD-GARDV 182 T1780 D-F	C042364	10,000	0	0	0	0	10,000
		Seneca D/F #4 TRF Replacement	C058119	896,760	0	0	0	0	896,760
		Stoner-Rotterdam #12 Sw 1222 Replac	C058236	234,880	0	0	0	0	234,880
		Storm Budgetary Reserve - NMPC	C003481	500,000	500,000	500,000	500,000	500,000	2,500,000
		Taylorville OCB R240 D/F	C057500	45,000	0	0	0	0	45,000
		Trans Station Failure Budget Reserv	C003792	3,000,000	4,750,000	5,000,000	5,000,000	5,000,000	22,750,000
		TransLine Damage-Failure Budget Res	C003278	450,000	450,000	450,000	450,000	450,000	2,250,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Yahnudasis T4160-T4300 D-F Struc	C038162	161,000	0	0	0	0	161,000
	Damage/Failure Total			8,991,728	8,544,869	6,011,569	5,950,000	5,950,000	35,448,166
Damage/Failure Total				8,991,728	8,544,869	6,011,569	5,950,000	5,950,000	35,448,166
Non-Infrastructure	Station Control and Monitoring Systems	EDIC SECURITY UPGRADES	C051894	15,000	0	0	0	0	15,000
		IntrMeterInvestmentPrgmCo 36	C035267	156,170	0	0	0	0	156,170
		PORTER SECURITY UPGRADES	C051895	15,000	0	0	0	0	15,000
		Program-Remote Terminal Unit (RTU)	C003772	901,518	194,000	0	0	0	1,095,518
		Substation Security Program	C053136	1,500,000	3,000,000	3,000,000	3,000,000	3,000,000	13,500,000
	Station Control and Monitoring Systems Total			2,587,688	3,194,000	3,000,000	3,000,000	3,000,000	14,781,688
Non-Infrastructure Total				2,587,688	3,194,000	3,000,000	3,000,000	3,000,000	14,781,688
System Capacity & Performance	Generator Retirements	Clay - GE 14 Reconductoring	C045253	5,054,700	0	0	0	0	5,054,700
		Five Mile to Homer Hill reconduct	C047319	8,655,610	0	0	0	0	8,655,610
		New Elbridge - State St Line	C047298	8,904,000	0	0	0	0	8,904,000
		New Elbridge - State St Line Reimb	C047298R	-8,904,000	0	0	0	0	-8,904,000
		Reconductor #5 Elbridge - State St	C047297	0	1,000,000	2,600,000	0	0	3,600,000
		Reconductor #5 Elbridge - State St Reimb	C047297R	0	-1,000,000	-2,600,000	0	0	-3,600,000
		Reconfigure Elbridge Sub	C047299	3,096,000	0	0	0	0	3,096,000
		Reconfigure Elbridge Sub Reimb	C047299R	-3,096,000	0	0	0	0	-3,096,000
	Generator Retirements Total			13,710,310	0	0	0	0	13,710,310
	NERC/NPCC Standards	CIP v5-C&I (NMPC-Low)	C058315	0	610,000	0	0	0	610,000
		CIP v5-US CNI (NMPC-High)	C058313	1,925,000	0	0	0	0	1,925,000
		Porter 115 kV Rebuild	C028686	100,050	0	0	0	0	100,050
		Porter 230kV-Upgrade Brks/Disc/PT's	C036866	25,000	250,000	1,000,160	15,000,000	0	16,275,160

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
	NERC/NPCC Standards Total			2,050,050	860,000	1,000,160	15,000,000	0	18,910,210
	Performance	Mohican St. add Station Service TRF	C055988	146,000	0	0	0	0	146,000
	Performance Total			146,000	0	0	0	0	146,000
	TO Led System Studies	Add Brkr to Mortimer-Elbridge #2	C053139	0	0	50,000	200,000	0	250,000
		Airco-Bffl Rvr147 Adv Metal Tap	C054711	160,000	1,200,000	200,000	0	0	1,560,000
		Ballston Tap Sw. St - Line Taps	C060251	10,000	100,000	800,000	200,000	0	1,110,000
		Ballston Tap Switching Station	C060250	200,000	1,500,000	7,000,000	500,000	0	9,200,000
		BETHLEHEM L10, L14 RELAY UPGRADE	C045624	5,100	0	0	0	0	5,100
		Bethlehem sub relay upgrade line #6	C054267	131,750	63,750	0	0	0	195,500
		Capital Reserve - System Capacity & Performance	CNYX31SCP	-8,818,751	-551,143	-4,767,843	-43,194	-69,712	-14,250,643
		Central Breaker Upgrades - Ash	C043424	1,501,440	0	0	0	0	1,501,440
		CENTRAL BREAKER UPGRADES - TEALL	C043427	247,000	0	0	0	0	247,000
		Clay Substation Reconfiguration	C047275	7,852,000	0	0	0	0	7,852,000
		Clay-Teall#10,Clay-Dewitt#3 Recond	C043995	5,390,000	11,060,000	19,140,000	1,710,000	0	37,300,000
		Clay-Woodard #17 replace 2.66 miles	C060242	50,000	800,000	0	0	0	850,000
		Construct Five Mile Station	C024015	14,100,000	2,649,000	0	0	0	16,749,000
		Construct Five Mile Station - Line	C024016	797,500	0	0	0	0	797,500
		Eastover - Add 2nd Bank	C060247	300,000	4,500,000	700,000	0	0	5,500,000
		Eastover Rd - New 230-115kV Station	C031326	3,250,000	0	0	0	0	3,250,000
		Eastover Rd-New Line Taps	C031419	1,235,000	0	0	0	0	1,235,000
		Elm St Relief_Add 4th Xfer	C049594	4,257,000	2,299,000	1,995,000	47,500	0	8,598,500
		Ephratah Sub Rebuild - Line Portion	C053144	0	0	50,000	749,700	749,700	1,549,400
		Ephratah substation rebuild	C046486	0	0	50,000	1,200,192	1,300,208	2,550,400

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Golah Sub rebuild	C051831	0	0	0	55,000	489,600	544,600
		Grdvll-Bffl Rvr146 2nd Tap Ohio Sta	C054713	300,000	2,600,000	200,000	0	0	3,100,000
		Greenbush-Schodack 13&15 Tline	C052324	916,080	0	0	0	0	916,080
		Greenbush-Schodack/Hudson Sub	C052319	498,000	0	0	0	0	498,000
		Harper sub new 115 kV line taps	C044594	28,200	504,900	257,450	0	0	790,550
		Homer Hill Sub115kV Bus Upgrade	C059300	191,800	5,880	0	0	0	197,680
		Hudson Valley Reinforcement	C053148	0	100,000	400,000	8,001,000	0	8,501,000
		Line 116 tap to new N.Lakeville Sub	C052024	170,000	300,000	0	0	0	470,000
		Lowville Automated 115 kV Switches	C032259	4,200	0	0	0	0	4,200
		Luther Forest/Malta Diff. Scheme	C047897	800	0	0	0	0	800
		Malone 2nd Bank_Tline	C059673	0	40,000	240,000	120,000	0	400,000
		McCrea Line	C053150	0	0	425,000	1,300,000	0	1,725,000
		Mohican Battenkill#15 Rebuild Recon	C034528	26,789,400	5,979,600	0	0	0	32,769,000
		Mortimer line Re-Arrangement	C060248	0	0	0	0	500,000	500,000
		Mountain Station line relocation	C054944	157,402	0	0	0	0	157,402
		Mountain upgrade 115 - 34.5kV trans	C044359	3,800,000	45,535	0	0	0	3,845,535
		Mulberry Tap Sw St - Line taps	C060253	10,000	100,000	800,000	200,000	0	1,110,000
		Mulberry Tap Switching Station	C060252	200,000	1,500,000	7,000,000	500,000	0	9,200,000
		N.Lakeville - Add 34.5kV LN226 bker	C051826	0	0	0	32,000	485,000	517,000
		New bay at Edic 345kv substation	C044674	2,548,000	550,000	0	0	0	3,098,000
		New Harper Substation - TxT Sub	C044874	1,179,900	5,622,320	1,796,440	0	0	8,598,660
		New Scotland - Add Reactors LN19/20	C060246	800,000	800,000	0	0	0	1,600,000
		New Tonawanda Station - Line Taps	C053156	50,000	200,000	260,000	50,000	0	560,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		New Watertown 115-13.2kV T - Line	C053155	0	84,000	112,000	100,000	0	296,000
		New West Sweden Station - Line Work	C053159	0	0	0	25,000	475,000	500,000
		Ohio St Station-access rd easement	C060190	100,000	0	0	0	0	100,000
		Ohio Street new 115 - 34.5kV sub	C055263	500,000	6,000,000	4,156,000	0	0	10,656,000
		Patroon sub relay upgrade line #6	C054269	131,750	63,750	0	0	0	195,500
		Porter #3 / #7 Install Reactors	C060241	400,000	800,000	0	0	0	1,200,000
		Queensbury TB3 & TB4 upgrades (sub)	C036822	1,000,000	0	0	0	0	1,000,000
		Randall Rd Transmission Line	C043672	148,500	716,830	712,500	0	0	1,577,830
		Reactive Comp prog in NE Reg NRRP	C035773	0	0	0	0	200,000	200,000
		Reactor at Unionville Sub for #7&#9	C056065	801,500	0	0	0	0	801,500
		Recond 1/2 Mile of Dewitt-Tilden 19	C053143	0	0	100,000	826,000	0	926,000
		Recond Cortland Clarks Corners	C053141	0	0	25,000	394,400	0	419,400
		Re-route New Scotland #7&#9 Lines	C053223	393,000	0	0	0	0	393,000
		Riverside-Reynolds Rd#4 Forbes Tap	C043592	74,250	1,527,570	990,000	0	0	2,591,820
		Rotterdam - Menands Recond 12 miles	C060243	0	0	0	150,000	1,000,000	1,150,000
		Rotterdam-TB6/7 Reconnect & R86 Bus	C060255	50,000	1,600,000	450,000	0	0	2,100,000
		Sanborn upgrade 115 - 34.5kV transf	C044361	2,000,000	44,279	0	0	0	2,044,279
		Sawyer Fourth 230-23kV Bank	C053147	0	110,000	732,260	750,120	732,260	2,324,640
		Schoharie substation reconfiguratio	C046494	0	0	0	914,747	938,550	1,853,296
		SECOND 115 KV BUS TIE AT LOCKPORT	C031482	60,000	0	0	0	0	60,000
		Sodeman Rd Install New taps	C043755	0	147,000	490,000	0	0	637,000
		Spier Rotterdam NEW Line	C031418	770,000	0	0	0	0	770,000
		Spier-2nd bus tie brkr/upgr #5 bus	C060244	80,000	275,000	0	0	0	355,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Taps to 115 kV new Cicero Sub	C050939	24,000	24,000	426,000	120,000	0	594,000
		Terminal Station Relocation TLine	C059672	0	200,000	1,200,000	600,000	0	2,000,000
		Ticonderoga Cap Bank	C060254	50,000	1,600,000	200,000	0	0	1,850,000
		TP Mortimer Second Bus tie	C050696	563,022	150,400	0	0	0	713,422
		TP Reconductor line #181	C050744	100,000	1,000,000	23,000,000	20,000,000	5,000,000	49,100,000
		TP West Golah Substation	C050695	250,000	800,000	5,730,000	500,000	0	7,280,000
		Trans Study Budgetary Reserve NY	C008376	150,000	150,000	150,000	150,000	150,000	750,000
		Upgrade Niagara - Packard #195	C029945	210,000	0	0	0	0	210,000
		Van Dyke 115-13.2 Sub Taps	C044173	623,000	0	0	0	0	623,000
		W. Ashville sub 115kV ln 160 tap	C043832	7,823	1,914	1,076	206,098	0	216,910
		W. Ashville substation TxT	C043833	641,732	354,089	562,000	3,099,875	0	4,657,696
		West Hamlin 82 TXT Line	C048901	85,000	88,000	0	0	0	173,000
		Youngs St Sta 214 -115kV tap- Tline	C054963	0	50,400	80,800	15,000	0	146,200
	TO Led System Studies Total			77,525,398	57,756,074	75,713,683	42,673,438	11,950,605	265,619,198
System Capacity & Performance Total				93,431,758	58,616,074	76,713,843	57,673,438	11,950,605	298,385,718
Grand Total				166,835,000	172,000,000	189,000,000	206,000,000	210,000,000	943,835,000

Exhibit 2 - Sub-Transmission Capital Investment Plan

pending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
Asset Condition	Asset Replacement	69kV supply to Market Hill retireme	C046368	0	0	0	0	1,000	1,000
		Amsterdam 69 KV reconfig and LB SWs	C049299	200,000	0	0	0	0	200,000
		Beck - Harper L106 Removal	C036196	1,000	0	0	0	0	1,000
		Buffalo Station 122 Rebuild - 23kV	CD00780	15,000	12,000	139,000	83,000	11,000	260,000
		Buffalo Station 42 Rebuild - SubT L	C046853	0	30,000	500,000	0	0	530,000
		Cuyler#24 SubT tap-Sub Replacement	C060019	20,000	100,000	0	0	0	120,000
		Dake Hill-W. Salamanca 816-34.5kv	C046469	0	0	520,000	2,400,000	480,000	3,400,000
		Fort Covington-Malone 26-34.5kV	C050197	0	0	0	565,000	565,000	1,130,000
		Galleria Mall - Switchgear Replmnts	C058985	600,000	600,000	600,000	0	0	1,800,000
		Hartfield-S. Dow 859-Relocate Part	C052209	100,000	0	830,000	1,245,000	0	2,175,000
		Homer Hill-Ceres 809-34.5kv retire	CD00825	1,000	0	0	0	0	1,000
		L226 - Extend line to N LVille Sta	C015766	0	0	0	35,000	623,000	658,000
		LN404 Moutain - Sanborn reconductor	CD01276	0	0	581,000	0	0	581,000
		Lockport - Maple Rd L92E&W Removal	C036200	1,000	0	0	0	0	1,000
		M&T bank Tap 701-34.5kv	C046462	895,000	0	0	0	0	895,000
		N. Ashford-Nuclear Fuel Services 81	C046467	201,000	0	0	0	0	201,000
		N.Lakeville - Ridge LN 218 Refurbis	C046766	0	0	60,000	572,000	531,000	1,163,000
		Nassau-Hudson 9, 34.5kV CIVIL ACR	C060106	450,000	0	0	0	0	450,000
		Oakfield - Caledonia LN201 reconduc	C046707	0	0	0	50,000	2,316,000	2,366,000
		Ohio-Ridge 613-34.5kv	C046453	0	27,000	850,000	9,000	0	886,000
		Phillips-Barker 301-34.5kv	C046465	0	70,000	1,286,000	2,340,000	0	3,696,000
		Phillips-Telegraph 304-34.5kv	C046466	0	0	0	0	83,000	83,000
		Rankine - Adams - 25 Cycle Line Ret	C046620	0	0	5,000	5,000	0	10,000

pending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Refurbish H-Lns 27h,28h,33h pt 1	C046470	550,000	0	0	0	0	550,000
		Shaleton-Ridge 610, Station 207 Tap	C046779	0	0	76,000	1,200,000	0	1,276,000
		Solvay 26	C046438	0	0	119,000	551,000	627,000	1,297,000
		Sta 122 taps 622/623-23kv	C046461	0	26,000	481,000	9,000	0	516,000
		Station 126 taps 33h/34h-23kv	C046450	0	0	0	0	26,000	26,000
		W. Portland-Sherman 867-34.5kv	C046468	0	1,813,000	2,907,000	25,000	0	4,745,000
	Asset Replacement Total			3,034,000	2,678,000	8,954,000	9,089,000	5,263,000	29,018,000
	Blanket	CNY Sub Trans-Line Asset Replace	CNC0075	203,000	206,000	209,000	212,000	215,000	1,045,000
		ENY Sub Trans-Line Asset Replace	CNE0075	213,000	216,000	219,000	222,000	225,000	1,095,000
		WNY Sub Trans-Line Asset Replace	CNW0075	315,000	320,000	325,000	330,000	335,000	1,625,000
	Blanket Total			731,000	742,000	753,000	764,000	775,000	3,765,000
	Denergized T Line Strategy	Lisbon-Heuvelton #25 Removal	C025079	0	1,000	0	0	0	1,000
		Mortimer-Solvay 5-69kV - remove	C049335	1,000	1,000	0	0	0	2,000
		S Niagara Falls Sub-T Line Remove	C053426	0	1,000	1,000	1,000	1,000	4,000
	Denergized T Line Strategy Total			1,000	3,000	1,000	1,000	1,000	7,000
	Sub T Overhead Line	Amsterdam-Rotterdam3/4 Relocation	C033182	720,000	2,223,000	0	0	0	2,943,000
		Bagdad-Dake Hill 815-34.5kV refurb.	C050292	0	0	0	50,000	765,000	815,000
		Ballston-Mechanicville 6-34.5kv	C046472	167,000	1,632,000	1,206,000	0	0	3,005,000
		Ballston-Shore Rd-Rosa Rd 5 and 8-3	C046457	0	0	0	97,000	553,000	650,000
		Barker-Lyndonville 301-34.5kV	C052511	0	0	43,000	808,000	2,040,000	2,891,000
		Bethlehem-Selkirk 5-34.5kV	C048817	390,000	0	0	0	0	390,000
		Bristol Hill-Phoenix 23-34.5kv	C046474	0	0	77,000	620,000	484,000	1,181,000
		Burnett-Headson 34-34.5kV	C050199	0	0	26,000	151,000	449,000	626,000

pending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Callanan Tap - Rebuild exist 34.5ln	C046641	236,000	236,000	2,000,000	0	0	2,472,000
		Carthage-N. Carthage-Deferiet 23kv	C046435	0	0	0	0	45,000	45,000
		Carthage-Taylorville 21/22/26-23kv	C046436	0	0	0	0	55,000	55,000
		Cottrell Paper Tap 11-34.5kv	C046443	0	394,000	0	0	0	394,000
		Deerfield-Schuyler 22-46kV	C050288	350,000	826,000	0	0	0	1,176,000
		Deerfield-whitesboro 26-46kv	C046459	0	0	151,097	1,900,000	0	2,051,097
		Elbridge-Jewitt 31-34.5kV refurb	C050959	0	0	0	129,000	1,097,000	1,226,000
		Elbridge-Marcellus 30 Refurbishment	C054927	0	0	75,000	400,000	575,000	1,050,000
		Epratah-Caroga 2-23kv	C046456	0	0	0	33,000	682,000	715,000
		Hartfield-S. Dow 859 Refurbish	C033180	2,096,000	0	0	0	0	2,096,000
		Homer Hill-Nile 811-34.5kV	C050326	0	0	47,000	839,000	14,000	900,000
		Homer Hill-Nile 811-34.5kv ION	CD01216	174,000	0	0	0	0	174,000
		LHH-Mallory 22-34.5kv	C046441	0	0	0	54,000	1,234,000	1,288,000
		Lyndonville-Medina 301-34.5kV	C052512	0	0	0	68,000	2,635,000	2,703,000
		Mallory-Cicero L33-34.5 kV line Ref	C046681	0	25,000	1,662,000	1,600,000	0	3,287,000
		Maplewood-Latham#9 Mohawk View taps	CD00832	150,000	0	0	0	0	150,000
		Maplewood-Menands 17/18 d/c-34.5kv	C046432	0	0	0	56,000	511,000	567,000
		Mech-Schuylerville 4-34.5kV refurb	C050323	0	0	0	129,000	2,580,000	2,709,000
		Menands-Liberty 9 Relocation	C033172	402,000	151,000	0	0	0	553,000
		MV-Trenton-Deerfield 21/27-46kv	C046464	789,000	0	0	0	0	789,000
		N. Angola-Bagdad 857-34.5kV Catt.	C050289	0	0	0	23,000	558,000	581,000
		Nassau-Hudson #9, 34.5kV Refurb	C058581	0	50,000	850,000	0	0	900,000
		Nile-S. Wellsville 812-	C051765	0	0	0	0	50,000	50,000

pending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		34.5kV refur							
		Queensbury-Henry Street 14-34.5kv	C046442	0	0	0	28,000	398,000	426,000
		Refurbish H lines 26H, 33H, 34H	C048911	0	0	0	0	28,000	28,000
		Refurbish H Lns 26H, 34H	C048910	28,000	0	850,000	9,000	0	887,000
		Refurbish H-Lns 27h,25h,33h,36h	C048909	28,000	542,000	7,000	0	0	577,000
		Re-furbish Teall 25/Woodard 24-34.5	C046446	50,000	50,000	623,000	496,000	0	1,219,000
		Relocate S. Dow-Poland 865-34.5kV	C050177	200,000	0	856,625	856,625	0	1,913,250
		Remove Woodard 24/Teall 25 partial	C052065	0	0	1,000	0	0	1,000
		Rotterdam-Scotia-Rosa Road 32/6 -	C046455	0	65,000	554,000	9,000	0	628,000
		S2830 Lewiston-Mountain 405, 34.5kV	C056427	0	0	50,000	100,000	0	150,000
		Scotia-Rosa Rd 6, 34.5kV Refurb	C055164	0	50,000	425,000	150,000	0	625,000
		Solvay 35, 34.5kV Refurb	C056385	0	0	50,000	300,000	0	350,000
		Solvay/Woodard-Ash st 27&27&28- 34.	C046439	0	0	0	73,000	538,000	611,000
		Tap to H&V Greenwich-34.5kv	C046477	0	10,000	610,000	0	0	620,000
		Taylorville-Effley 24-23kv	C046437	0	0	36,708	222,804	0	259,512
		Teall-Headson L31-L29-34.5 kV line	C046686	0	0	0	850,000	0	850,000
		Tonawanda Lines 601-604-23kv	C046451	0	0	38,000	350,000	10,000	398,000
		Tonawanda Lines 622-624-23kv	C046452	0	0	24,000	121,000	350,000	495,000
		Trenton-Prospect 23-46kv	C046448	0	0	36,708	457,559	0	494,267
		Trenton-Whitesboro 25, 34.5kV	C058579	50,000	875,000	0	0	0	925,000
		Union-Ausable Forks 36-46kV ref	C050320	0	0	0	0	97,000	97,000
		Union-Franklin 34-46kV refurb.	C052510	300,000	0	0	0	0	300,000
		Union-Lake Clear 35-46kV refurb	C050324	0	0	0	0	129,000	129,000

pending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Varick-Bristol Hill 202-34.5kv	C046460	0	0	0	52,000	748,000	800,000
		W. Milton Tap-34.5kV new line	CD00898	713,000	1,236,000	466,000	0	0	2,415,000
		W. Salamanca-Homer Hill 805-34.5kV	C050293	0	0	0	0	47,000	47,000
		Waterport tap 301-34.5kV	C052515	0	0	0	0	68,000	68,000
		West Portland-Sherman 867 Relocatio	C055118	100,000	0	906,000	250,000	0	1,256,000
		Woodard 24/Teall 25 Refurb N. -190	c060445	0	50,000	0	0	500,000	550,000
		Woodard 24/Teall 25-34.5kv	C046447	100,000	0	0	0	0	100,000
		Woodard 28-34.5kv	C046440	0	0	48,659	448,169	13,658	510,486
		Woodard 29-34.5kv	C046473	150,000	0	75,000	751,000	1,425,000	2,401,000
		Woodard-Teall 32-34.5kV refurbish	C050322	0	0	0	0	129,000	129,000
		Yahnundasis-Clinton 24 - 46kv	C046449	40,000	250,000	0	374,000	618,000	1,282,000
		Yahnundasis-Clinton 27, 46kV	C055143	0	0	50,000	500,000	150,000	700,000
	Sub T Overhead Line Total			7,233,000	8,665,000	11,844,797	13,355,157	19,575,658	60,673,612
	Substation Indoor	Buffalo Station 29 Rebuild - 23 kV	C006724	40,000	0	0	0	0	40,000
		Buffalo Station 30 - Rebuild - 23kV	C015755	0	0	0	0	10,000	10,000
		Buffalo Station 37 Rebuild - 23 kV	C033471	0	2,000	81,000	54,000	0	137,000
		Buffalo Station 53 Rebuild - 23 kV	C046928	0	0	0	30,000	150,000	180,000
		Buffalo Station 59 Rebuild - 23 kV	C033472	0	0	10,000	93,000	62,000	165,000
	Substation Indoor Total			40,000	2,000	91,000	177,000	222,000	532,000
	Sub T Underground Cable Replacement	701 Line - Kensington Expwy UG	C053243	255,000	0	0	0	0	255,000
		Buffalo 23kV UG Cable replacement	C052483	0	150,000	3,000,000	3,000,000	3,000,000	9,150,000
		Partridge-Ave A # 5 Cable Replaceme	C036273	1,324,000	452,000	0	0	0	1,776,000
		Solvay Ash 27 Cable Repl SubT	C032147	0	657,000	617,000	733,000	0	2,007,000

pending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Solvay-Ash #28 34.5kV Replace Cable	C045629	0	830,000	639,000	0	0	1,469,000
	Sub T Underground Cable Replacement Total			1,579,000	2,089,000	4,256,000	3,733,000	3,000,000	14,657,000
	De-energized T-Line Strategy	Balstn-Randall-W. Milton 34.5kV rem	C048968	0	0	0	1,000	0	1,000
		Bennett Bridge-Solvay 6-69kV-remove	C048824	0	30,000	30,000	0	0	60,000
		Castleton Greenbush Line 5	C036365	1,000	0	0	0	0	1,000
		Harper-Sta 104 32-12kv	C046615	1,000	0	0	0	0	1,000
		Jeliff Tap 34.5kV -remove	C049097	1,000	0	0	0	0	1,000
		New Gardenville Substation-SubT Lin	CD00636	30,000	0	0	0	0	30,000
		Rankine-Harper 16/17 and Adams -Har	C046514	1,000	0	0	0	0	1,000
		Remove Atlantic Ref Tap 23-34.5kV	C049338	1,000	0	0	0	0	1,000
		Remove School St. - Watervliet 3/4	C046512	1,000	0	0	0	0	1,000
		Station 150 Tap 701-34.5kV remove	C049499	1,000	0	0	0	0	1,000
		Terminal Sta B - R48, R46, R25 Rem.	C036204	0	2,000	2,000	0	0	4,000
		Terminal Sta C - C12 & C14 Removal	C036203	3,000	0	0	0	0	3,000
		Terminal-Cornelia 43 13.2kV-remove	C049037	1,000	0	0	0	0	1,000
	De-energized T-Line Strategy Total			41,000	32,000	32,000	1,000	0	106,000
	Inspection & Maintenance	I&M - NC Sub-T Line Work From Insp	C026166	2,323,821	2,300,583	2,277,577	2,254,801	2,232,253	11,389,035
		I&M - NE Sub-T Line Work From Insp	C026165	1,632,377	1,616,053	1,599,893	1,583,894	1,568,055	8,000,272
		I&M - NW Sub-T Line Work From Insp	C026167	2,375,265	2,351,512	2,327,997	2,304,717	2,281,670	11,641,161
	Inspection & Maintenance Total			6,331,463	6,268,148	6,205,467	6,143,412	6,081,978	31,030,468
Asset Condition Total				18,990,463	20,479,148	32,137,264	33,263,569	34,918,636	139,789,080
Customer Requests/Public Requirements	Blanket	CNY Sub Trans-Line New Business	CNC0071	51,000	52,000	53,000	54,000	55,000	265,000
		CNY Sub Trans-Line Public Require	CNC0072	76,000	77,000	78,000	79,000	80,000	390,000

pending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		ENY Sub Trans-Line New Business	CNE0071	82,000	84,000	86,000	88,000	90,000	430,000
		ENY Sub Trans-Line Public Require	CNE0072	10,000	10,000	10,000	10,000	10,000	50,000
		NY Central Sub T Line Third Party	CNC0078	51,000	52,000	53,000	54,000	55,000	265,000
		NY East Sub T Line Third Party	CNE0078	15,000	15,000	15,000	15,000	15,000	75,000
		NY West Sub T Line Third Party	CNW0078	10,000	10,000	10,000	10,000	10,000	50,000
		WNY Sub Trans-Line New Business	CNW0071	63,000	66,000	69,000	72,000	75,000	345,000
		WNY Sub Trans-Line Public Require	CNW0072	63,000	66,000	69,000	72,000	75,000	345,000
	Blanket Total			421,000	432,000	443,000	454,000	465,000	2,215,000
	New Business	34.5kV tap to Intergrow Greenhouse	C052513	10,000	0	0	0	0	10,000
		East - West Medical Corridor Cable	CD00823	15,000	0	0	0	0	15,000
		Extend LN 611 & 612 to Riverbend	C054665	0	21,000	85,000	2,027,000	0	2,133,000
		Samaritan Hospital Sub-T Service	C053783	1,000	0	0	0	0	1,000
		TxD RESERVE for New Business Commer	C046913	1,049,055	1,049,055	1,099,010	1,149,450	1,149,450	5,496,020
	New Business Total			1,075,055	1,070,055	1,184,010	3,176,450	1,149,450	7,655,020
	Public Requirements	Cortland 20,34.5kV Suite-Kote Reloc	C057780	1,000	0	0	0	0	1,000
		DOTR NYSRt28 White Lk-McKeever SubT	C034722	0	0	0	50,000	1,598,000	1,648,000
		UG 404 Line Cable Replacement	C053704	0	0	680,000	0	0	680,000
	Public Requirements Total			1,000	0	680,000	50,000	1,598,000	2,329,000
	T_Customer Interconnections	Skaneateles 34.5kV Tap frm NYSEG508	C058559	100,000	0	0	0	0	100,000
	T_Customer Interconnections Total			100,000	0	0	0	0	100,000
Customer Requests/Public Requirements Total				1,597,055	1,502,055	2,307,010	3,680,450	3,212,450	12,299,020
Damage/Failure	Blanket	CNY Sub Trans-Line Damage Failure	CNC0073	406,000	412,000	418,000	424,000	430,000	2,090,000
		ENY Sub Trans-Line	CNE0073	386,000	392,000	398,000	404,000	410,000	1,990,000

pending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Damage Failure							
		WNY Sub Trans-Line Damage Failure	CNW0073	2,030,000	2,060,000	2,091,000	2,122,000	2,154,000	10,457,000
	Blanket Total			2,822,000	2,864,000	2,907,000	2,950,000	2,994,000	14,537,000
	Damage Failure Other	NY_CD_38kV_FPC/EEI-Swgr-Part 1	C058959	600,000	600,000	600,000	600,000	0	2,400,000
	Damage Failure Other Total			600,000	600,000	600,000	600,000	0	2,400,000
Damage/Failure Total				3,422,000	3,464,000	3,507,000	3,550,000	2,994,000	16,937,000
System Capacity & Performance	Blanket	CNY Sub Trans-Line Load Relief	CNC0077	10,000	10,000	10,000	10,000	10,000	50,000
		CNY Sub Trans-Line Reliability	CNC0076	102,000	104,000	106,000	108,000	110,000	530,000
		ENY Sub Trans-Line Load Relief	CNE0077	1,000	1,000	1,000	1,000	1,000	5,000
		ENY Sub Trans-Line Reliability	CNE0076	51,000	52,000	53,000	54,000	55,000	265,000
		WNY Sub Trans-Line Load Relief	CNW0077	10,000	10,000	10,000	10,000	10,000	50,000
		WNY Sub Trans-Line Reliability	CNW0076	100,000	310,000	315,000	320,000	325,000	1,370,000
	Blanket Total			274,000	487,000	495,000	503,000	511,000	2,270,000
	Load Relief	Buffalo 23kV Rec.-Sen. 1,2,3,19,31S	C048826	918,000	0	0	0	0	918,000
		Buffalo 23kV Reconductor - Huntley2	C028893	59,000	1,247,000	0	0	0	1,306,000
		Eden Switch Structure - SubT	C052023	15,000	75,000	300,000	60,000	0	450,000
		Extend of line 612 to STA42	C055350	341,000	0	0	0	0	341,000
		Golah Avon 217 line reconductoring	C036054	0	0	50,000	676,000	187,000	913,000
		Install parallel cable of Newark-Ma	CD01121	0	0	0	64,000	800,000	864,000
		Mallory-Cicero 33-34.5kV-relocation	C054507	150,000	850,000	0	0	0	1,000,000
		Ohio St station - SubT lines	C055304	85,000	856,000	270,000	0	0	1,211,000
		Station 74 23kV supply to MITS	C055269	12,000	33,000	0	0	0	45,000
		Two Mile Creek Rd Sta-SubT	C052509	192,000	0	0	0	0	192,000

pending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		TxD RESERVE for Load Relief Unident	C046912	0	0	0	0	745,000	745,000
		Van Dyke Station - Beth-Delmar #6 l	C046482	0	0	0	10,000	0	10,000
		Van Dyke-DelmarBypass exten rebuilt	C053683	162,000	0	0	0	0	162,000
	Load Relief Total			1,934,000	3,061,000	620,000	810,000	1,732,000	8,157,000
	Reliability	Beck - Harper L105 Removal	C036195	1,000	0	0	0	0	1,000
		Gardenville-Blasdell L131/L132 Rem.	C036201	1,000	0	0	0	0	1,000
		Kenmore-Winspear 630/631-ref	C050318	0	0	37,000	350,000	0	387,000
		Line 216 Reconductoring	C051583	0	0	0	0	50,000	50,000
		LN863 Findley Lake - French Creek e	C046510	0	0	0	291,000	582,000	873,000
		W.Ashville substation TxD LN863 tap	C048152	0	19,000	0	50,000	0	69,000
	Reliability Total			2,000	19,000	37,000	691,000	632,000	1,381,000
	Sub T Automation	223 Line Replace Sectionalizer	C054077	63,000	0	0	0	0	63,000
		227 Line Replace Sectionalizer	C054078	63,000	0	0	0	0	63,000
		312 Line Replace Sectionalizer	C054081	63,000	0	0	0	0	63,000
		811 Line Replace Sectionalizer	C054083	63,000	0	0	0	0	63,000
		857 Line Replace Sectionalizers	C054082	133,000	0	0	0	0	133,000
		MV- Trenton-Whitesboro 25 Switch	C058309	125,000	0	0	0	0	125,000
		Nassau-Hudson #9 - Reclosers	C057881	150,000	0	0	0	0	150,000
		WD - Install ScadaMates on the 301	CD00474	124,000	0	0	0	0	124,000
		WD - Install ScadaMates on the 803	CD00514	289,000	0	0	0	0	289,000
	Sub T Automation Total			1,073,000	0	0	0	0	1,073,000
System Capacity & Performance Total				3,283,000	3,567,000	1,152,000	2,004,000	2,875,000	12,881,000
Grand Total				27,292,518	29,012,203	39,103,274	42,498,019	44,000,086	181,906,100

Exhibit 3 – Distribution Capital Investment Plan

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
Asset Condition	Asset Replacement	*NR-81452-Jolly Island Grp-Upgrade	C049780	240,000	0	0	0	0	240,000
		*NR-81452-Lake of the Isles-Upgrade	C049782	0	0	0	400,000	0	400,000
		*NR-N Gouverneur 98352-Lead Mine Rd	C049635	170,000	0	0	0	0	170,000
		*NR-Westville 88561-Donovan Rd	C010695	255,000	0	0	0	0	255,000
		Blue Stores 30351 - Pleasant Vale	C051985	0	0	0	85,000	0	85,000
		Broadway Network Retirement	C046712	0	8,000	120,000	0	0	128,000
		Bufalo Station 17 - 25 Cycle Feeder	C046617	3,000	0	0	0	0	3,000
		Buffalo Station 12 - 25 Cycle Retir	CD00969	0	15,000	0	0	0	15,000
		Buffalo Station 122 Rebuild - Line	CD00779	0	39,000	470,000	278,000	39,000	826,000
		Buffalo Station 122 Rebuild - Sub	CD00782	904,000	64,000	454,000	3,265,000	824,000	5,511,000
		Buffalo Station 14 - 25 Cycle Feede	C046616	3,000	0	0	0	0	3,000
		Buffalo Station 14 - 25 Cycle Retir	CD00974	0	2,000	0	0	0	2,000
		Buffalo Station 20 - 25 Cycle Feede	C046618	0	0	1,000	1,000	0	2,000
		Buffalo Station 42 Rebuild - D Line	C046859	0	50,000	1,112,000	427,000	0	1,589,000
		Buffalo Station 42 Rebuild - D Stat	C046854	20,000	676,000	6,000,000	0	0	6,696,000
		Buffalo Station 72 - 25 Cycle Feede	C046619	3,000	0	0	0	0	3,000
		Burgoyne 51 - Rebuild Durkeetown Rd	CD00222	0	0	240,000	0	0	240,000
		Caledonia sub 44 - Line Relay Rep	C052444	0	32,495	56,988	0	0	89,483
		Canajoharie 03122 - Rebuild Rt 162	C000329	0	0	4,000	451,000	0	455,000
		Church St 53 - West Line Rd Relocat	C054923	0	0	10,000	140,000	0	150,000
		CR_Syracuse_West St_MH 2-5_U_051_Co	CD00489	0	80,000	0	0	0	80,000
		Crown Pt. 51 - Creek Rd Gap Closing	C048906	0	0	85,000	0	0	85,000
		Cuyler DLine - pole	C055354	290,000	122,000	0	0	0	412,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		mounted equip							
		Delanson 51 - Route 7 Rebuild/Conve	C046424	723,000	0	0	0	0	723,000
		Delevan F1162 Steel Wire PIW	C056734	10,000	0	186,000	0	0	196,000
		F2761 Steel Wire PIW	C056621	10,000	0	300,000	0	0	310,000
		Grand St. 51 - Route 7 Gap Closing	CD00374	0	0	136,000	0	0	136,000
		Henry St 36 - River Crossing	C029432	0	0	421,000	0	0	421,000
		Karner - Patroon Reconducting 477	C052303	0	0	24,000	119,000	132,000	275,000
		Karner - Patroon UG Getaways	C052307	0	0	24,000	292,000	381,000	697,000
		Karner - Ruth RD UG getaways	C052305	0	0	24,000	298,000	384,000	706,000
		Karner - Sand Creek Reconducting477	C052304	0	0	24,000	204,000	242,000	470,000
		Karner - Sand Creek UG Getaways	C052306	0	0	24,000	111,000	150,000	285,000
		Karner 31707 Feeder Conversion	C049958	0	0	24,000	81,000	97,000	202,000
		Karner 31715 Feeder Conversion	C049964	0	0	24,000	122,000	130,000	276,000
		Karner 31716 Feeder Conversion	C049979	0	0	24,000	113,000	146,000	283,000
		Karner 31717 Feeder Conversion	C049980	0	0	24,000	117,000	120,000	261,000
		Karner 31718 Feeder Conversion	C049984	0	0	24,000	105,000	130,000	259,000
		Karner 31719 Feeder Conversion	C049982	0	0	24,000	81,000	97,000	202,000
		Karner- Ruth RD Reconducting 477	C049989	0	0	24,000	235,000	304,000	563,000
		Karner-Pinebush Conversion	C052308	0	0	24,000	120,000	117,000	261,000
		Little River 4.8kV Sub Retirement	CD01311	1,000	0	0	0	0	1,000
		Machias F1362 Replace Steel Wire	C056619	10,000	150,000	0	0	0	160,000
		McCrea Station - New station - Geta	C046791	0	0	0	221,972	391,716	613,688
		McCrea Station - New station - Inst	C046790	0	55,000	409,000	1,921,000	2,282,000	4,667,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Middleburgh 51 - Route 145 Extend/C	CD01010	0	0	756,000	0	0	756,000
		Minoa Upgrade Station Regulator	C046806	73,000	0	0	0	0	73,000
		MOD Switch "Whip Design" ARP	C051948	137,000	0	0	0	0	137,000
		MV- Poland 62258 Route 8 Reconducto	C046606	0	43,000	1,429,000	659,000	0	2,131,000
			CD00883	19,000	0	0	0	0	19,000
		MV-Poland 62258 Route 8 Reconducto	CD00885	661,000	0	0	0	0	661,000
		MV-Poland 62258 Route 8 Reconductor	C046605	0	990,000	0	0	0	990,000
		MV-Rome 76254-HWY 49 Reconductor	C050005	0	0	400,000	0	0	400,000
		New Harper Substation D Line	C046417	0	0	108,000	544,000	584,000	1,236,000
		Niagara Falls Network Retirement	C046502	0	0	8,000	120,000	0	128,000
		Norton Street UG Civil Rebuild	C050138	0	451,000	0	0	0	451,000
		NR-E Watertown 81758-Spring ValleyD	CD01300	0	0	0	457,000	0	457,000
		NR-Fine 97866-NYS Hwy 3-Rolcation	C049754	0	0	0	170,000	0	170,000
		NR-T.I.81452-County Route 100-Overl	CD01132	0	70,000	0	0	0	70,000
		NY GE Butyl Rubber PT Replacement	C051745	100,000	100,000	100,000	100,000	100,000	500,000
		Ohio St - Buffalo River Tunnel/Bore	C050400	50,000	2,150,000	0	0	0	2,200,000
		Reserve for Asset Replacement Unide	C046917	0	0	-1,833,000	0	6,440,000	4,607,000
			C046947	0	0	-8,231,000	-7,890,000	0	-16,121,000
		Shore Rd 28185 - Saratoga Rd Conver	C054836	0	0	20,000	574,000	0	594,000
		State St Feeder Convension	C050697	0	50,000	525,000	625,000	0	1,200,000
		Station 01 - Remove 25 Cycle Feeder	C046624	1,800	340	0	0	0	2,140
		Station 05 - 25 Cycle Feeder 0528 R	C046623	1,800	290	0	0	0	2,090
		Station 06 - 25 Cycle Feeder Remova	C046622	1,800	230	0	0	0	2,030

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Station 08 - 25 Cycle Feeder Remova	C046625	0	0	1,000	1,000	0	2,000
		Station 36 Voltage Reduction Replac	C049677	4,000	0	0	0	0	4,000
		Station 66 (Union Rd) Rebuild - DLi	CD00685	10,000	80,000	0	0	0	90,000
		Tonawanda - F7128 Removal	C036206	0	0	3,000	3,000	0	6,000
		Unionville Reactors - Fiber Install	C058519	250,000	0	0	0	0	250,000
		Western New York - Metering Upgrade	C046515	0	9,000	109,000	109,000	0	227,000
	Asset Replacement Total			3,951,400	5,237,355	3,711,988	4,659,972	13,090,716	30,651,431
	Blanket	Cent NY-Dist-Asset Replace Blanket	CNC0017	2,030,000	2,060,000	2,091,000	2,122,000	2,154,000	10,457,000
		East NY-Dist-Asset Replace Blanket	CNE0017	2,132,000	2,164,000	2,196,000	2,229,000	2,262,000	10,983,000
		West NY-Dist-Asset Replace Blanket	CNW0017	2,842,000	2,885,000	2,928,000	2,972,000	3,017,000	14,644,000
	Blanket Total			7,004,000	7,109,000	7,215,000	7,323,000	7,433,000	36,084,000
	Sub T Overhead Line	Dist Transfers-Ln#859 Hartfield-Dow	C047977	214,000	0	0	0	0	214,000
		L867 Underbuilt distribution	C057047	0	117,250	117,250	0	0	234,500
		M&T L701 - Transfer Dist Underbuild	C054366	105,000	0	0	0	0	105,000
		Oakfield-Caledonia LN201 Dist Under	C047684	0	0	0	0	20,000	20,000
		Olean FDR 0461 Underbuilt Sub-T	C053382	50,000	0	0	0	0	50,000
	Sub T Overhead Line Total			369,000	117,250	117,250	0	20,000	623,500
	Substation Circuit Switcher	Circuit Switcher Strategy Co:36	C051845	60,000	0	0	0	0	60,000
	Substation Circuit Switcher Total			60,000	0	0	0	0	60,000
	Substation Indoor	Beech St 81 - Indoor Substation Ref	C046577	0	0	0	0	55,000	55,000
		Buffalo Indoor Sub. #29 Refurb.	C006722	622,000	0	0	0	0	622,000
		Buffalo Station 27 Rebuild - Sta	C033473	213,000	0	0	0	0	213,000
		Buffalo Station 29 Rebuild - Fdrs	C006723	36,000	0	0	0	0	36,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Buffalo Station 30 - Rebuild - Fdrs	C015754	0	0	0	86,000	600,000	686,000
		Buffalo Station 30 Rebuild - Sta	C046519	0	0	0	0	93,000	93,000
		Buffalo Station 34 Rebuild - Line	C046932	0	0	0	0	86,000	86,000
		Buffalo Station 37 Rebuild - Line	C033477	0	0	600,000	220,000	0	820,000
		Buffalo Station 37 Rebuild - Sub	C033474	2,397,000	2,426,000	817,000	0	0	5,640,000
		Buffalo Station 53 Rebuild - Line	C046929	0	0	86,000	600,000	600,000	1,286,000
		Buffalo Station 53 Rebuild - Sub	C046945	0	0	0	93,000	1,754,000	1,847,000
		Buffalo Station 59 Rebuild - Line	C033478	0	0	86,000	112,000	8,000	206,000
		Buffalo Station 59 Rebuild - Sub	C033475	0	0	61,000	1,754,000	3,880,000	5,695,000
		Eighth St 80 - Indoor Substation Re	C046585	29,000	250,000	810,000	750,000	0	1,839,000
			C046586	16,000	275,000	441,000	220,000	0	952,000
		Eleventh St 82 - Indoor Substation	C046582	0	0	0	0	65,000	65,000
		Removal of Brighton Ave 4 kV Sub	CD00886	1,000	0	0	0	0	1,000
		Rock Cut #286 2nd Tranf and Metalc	CD00882	970,000	0	0	0	0	970,000
		Stephenson 85 - Indoor Substation R	C046580	95,000	650,000	720,000	0	0	1,465,000
			C046581	265,000	1,172,000	1,187,000	0	0	2,624,000
		Welch 83 - Indoor Substation Refurb	C046584	0	68,000	410,000	594,000	0	1,072,000
		Welch 83 Indoor Substation Refurbis	C046583	54,000	0	1,239,660	1,326,960	0	2,620,620
	Substation Indoor Total			4,698,000	4,841,000	6,457,660	5,755,960	7,141,000	28,893,620
	Substation Metal-clad Switchgear	Avenue A 291 Metalclad Replacement	C056609	0	0	490,000	1,600,000	2,725,000	4,815,000
		Chrisler Metal Clad Replacement	C036213	500,000	1,020,000	2,425,000	297,000	0	4,242,000
		Delmar Distribution Removal	C050241	0	0	0	3,000	0	3,000
		Delmar Station Retirement	C049692	0	0	1,000	0	0	1,000
		Emmet St - Repl TB1 and mclad	C017952	0	0	0	2,000	0	2,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Hopkins 253 - Replace Metalclad Gea	C046741	1,178,000	2,790,000	788,000	0	0	4,756,000
		Hopkins Rd Metalclad Replacement	C054383	10,000	160,000	178,000	0	0	348,000
		Johnson Rd - Replace Metalclad Gear	C046747	0	0	0	0	327,000	327,000
		Maple Ave Feeder Getaways	C046479	0	0	25,000	1,215,000	3,145,000	4,385,000
		Market Hill substation retirement	C046367	0	0	0	0	1,000	1,000
		New Maple Ave Substation	C046478	250,000	714,000	1,559,000	1,245,000	0	3,768,000
		NY Metalclad Switchgear Replacement	C051713	0	0	1,000,000	4,000,000	5,500,000	10,500,000
		Pine Grove Metalclad Replacement	C056614	0	150,000	2,380,000	128,000	0	2,658,000
		Station 140 Metalclad Replacement	C056616	0	240,000	2,800,000	1,316,000	0	4,356,000
		Station 162 Metalclad Replacement	C052706	0	0	0	233,000	2,716,000	2,949,000
		Station 61 - Metalclad Replacement	C051707	0	0	150,000	2,380,000	150,000	2,680,000
		Tuller Hill 246 Unit Metalclad Repl	C056611	375,000	1,135,000	672,000	0	0	2,182,000
		Whitesboro 632 - Retirement	C046742	0	0	0	0	10,000	10,000
	Substation Metal-clad Switchgear Total			2,313,000	6,209,000	12,468,000	12,419,000	14,574,000	47,983,000
	Substation Mobile	Mobile 8C Upgrade	C051743	233,000	0	0	0	0	233,000
		Mobile Substation 2E - Replacement	C046666	0	0	10,000	695,000	669,000	1,374,000
		Mobile Substation 4E - Refurbish an	C046667	0	0	0	448,000	0	448,000
		Mobile Substation 6E - Rewind	C046668	1,020,000	200,000	0	0	0	1,220,000
		Mobile Substation 7C - Refurbish an	C046673	0	400,000	0	0	0	400,000
		NY Mobile Substation Program	C051744	0	0	560,000	1,600,000	1,600,000	3,760,000
	Substation Mobile Total			1,253,000	600,000	570,000	2,743,000	2,269,000	7,435,000
	Substation Power Transformer	Collins Station - Replace Transform	C046602	493,000	0	0	0	0	493,000
		Cuyler#24 DSub Station Removal	C036102	0	100,000	0	0	0	100,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		French Mountain Transformer Replac	C059139	250,000	0	0	0	0	250,000
		Galeville 71,72&73 fdrs conversion	C050749	0	0	0	63,000	902,000	965,000
		Galeville Station Rebuild	C050746	0	0	50,000	357,000	510,000	917,000
		Grooms Rd Transformer Replacememt	C051706	397,000	864,000	850,000	0	0	2,111,000
		Hancock 13773 and 13772 Conversion	C050606	0	10,000	560,000	0	0	570,000
		IE - NY ARP Transformers	C025801	0	0	600,000	900,000	900,000	2,400,000
		Liberty Street Station 94-Replace T	C046676	455,000	0	0	0	0	455,000
		NY ARP Spare Substation Transformer	C026055	600,000	600,000	600,000	600,000	600,000	3,000,000
		Rock City Station 623 - Transformer	C046671	0	0	330,000	360,000	0	690,000
		Sewalls Island #2 TRF Replacement	C058406	1,450,000	0	0	0	0	1,450,000
		State St 954 Station Retirement	C050640	0	0	0	1,000	4,000	5,000
		Station 124 - Almeda Ave Transforme	C046670	0	0	464,000	2,583,000	354,000	3,401,000
	Substation Power Transformer Total			3,645,000	1,574,000	3,454,000	4,864,000	3,270,000	16,807,000
	Sub T Underground Cable Replacement	Ballston 53 - Colonial Hills Cable	C055486	165,000	0	0	0	0	165,000
		Primary Dist Cable Replacements NY	C058308	0	0	6,000,000	6,000,000	6,000,000	18,000,000
		Riverside 28855 UG Cable Replacemen	C036468	0	9,000	1,203,000	2,297,000	0	3,509,000
	Sub T Underground Cable Replacement Total			165,000	9,000	7,203,000	8,297,000	6,000,000	21,674,000
	Primary Underground Cable Replacement	Hague Rd 53 - Submarine Cable.	C050522	0	0	50,000	600,000	0	650,000
		Schroon 51 - Submarine Cable Repair	C050333	0	0	72,000	0	0	72,000
	Primary Underground Cable Replacement Total			0	0	122,000	600,000	0	722,000
	Network Secondary Underground Cable Replacement	Network Secondary Cable Replacement	C052903	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	7,500,000
			C052923	400,000	400,000	400,000	400,000	400,000	2,000,000
			C052924	1,400,000	1,400,000	1,400,000	1,400,000	1,400,000	7,000,000
		Troy LVAC Network - William St	CD00628	0	112,000	0	0	0	112,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
	Network Secondary Underground Cable Replacement Total			3,300,000	3,412,000	3,300,000	3,300,000	3,300,000	16,612,000
	Substation Battery and Related	Batts/Charg- NY Central	C032013	300,000	200,000	200,000	200,000	200,000	1,100,000
		Batts/Charg- NY West	C032014	300,000	200,000	200,000	200,000	200,000	1,100,000
		Batts/Charg--NY East	C032012	300,000	200,000	200,000	200,000	200,000	1,100,000
	Substation Battery and Related Total			900,000	600,000	600,000	600,000	600,000	3,300,000
	Pilot Wire	Partridge St.-Riverside-Repl PW	C036007	3,000	0	0	0	0	3,000
		Weaver St. - Emmet -Repl Pilot Wire	C036009	4,000	0	0	0	0	4,000
	Pilot Wire Total			7,000	0	0	0	0	7,000
	Substation Breaker	NC ARP Breakers & Reclosers	C032253	865,000	612,000	624,000	636,000	648,000	3,385,000
		NE ARP Breakers & Reclosers	C032252	737,000	612,000	624,000	636,000	648,000	3,257,000
		NW ARP Breakers & Reclosers	C032261	600,000	612,000	624,000	636,000	648,000	3,120,000
		Peat St - replace R825 OCB	C049550	0	35,000	314,000	0	0	349,000
	Substation Breaker Total			2,202,000	1,871,000	2,186,000	1,908,000	1,944,000	10,111,000
	Substation Relay/Protection	Altamont Relay Replacement Strategy	C049581	0	51,000	51,000	0	0	102,000
		Grooms Rd. Relay Replacement	C049597	1,000	51,000	51,000	0	0	103,000
		Riverside Relay Replacement	C049606	60,000	412,000	286,000	0	0	758,000
		Temple Relay repl for Ash St line	C055184	400,000	0	0	0	0	400,000
		Temple Station Relay Replacement	C049616	0	80,000	595,000	0	0	675,000
		Trinity Station Relay Replacement	C049625	194,000	1,465,000	0	0	0	1,659,000
	Substation Relay/Protection Total			655,000	2,059,000	983,000	0	0	3,697,000
	Outdoor Lighting - Discretionary	Woodcrest Blvd	C057494	150,000	0	0	0	0	150,000
	Outdoor Lighting - Discretionary Total			150,000	0	0	0	0	150,000
	Buffalo Street Light Cable Replacement	Buffalo Street Light Cable Replacem	CD00851	2,434,000	2,434,000	2,434,000	2,494,000	2,494,000	12,290,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
	Buffalo Street Light Cable Replacement Total			2,434,000	2,434,000	2,434,000	2,494,000	2,494,000	12,290,000
	Inspection & Maintenance	I&M - NC D-Line OH Work From Insp	C026160	7,000,000	9,901,269	5,066,909	5,016,240	4,966,078	31,950,496
		I&M - NC D-Line UG Work From Insp	C026163	159,142	157,551	155,975	154,415	152,871	779,954
		I&M - NE D-Line OH Work From Insp	C026159	14,571,279	14,425,566	14,281,311	14,138,497	13,997,112	71,413,765
		I&M - NE D-Line UG Work From Insp	C026162	494,572	489,626	484,730	479,883	475,084	2,423,895
		I&M - NW D-Line OH Work From Insp	C026161	11,374,779	11,261,031	11,148,421	11,036,937	10,926,567	55,747,735
		I&M - NW D-Line UG Work From Insp	C026164	550,986	545,476	540,021	534,621	529,275	2,700,379
		Otten 41213- Crusher Hill Rd	C053629	0	0	85,000	0	0	85,000
	Inspection & Maintenance Total			34,150,758	36,780,519	31,762,367	31,360,593	31,046,987	165,101,224
Asset Condition Total				67,257,158	72,853,124	82,584,265	86,324,525	93,182,703	402,201,775
Customer Requests/Public Requirements	Blanket	Cent NY-Dist-3rd Party Attch Blankt	CNC0022	294,000	298,000	302,000	307,000	312,000	1,513,000
		Cent NY-Dist-Land/Rights Blanket	CNC0009	1,218,000	1,236,000	1,255,000	1,274,000	1,293,000	6,276,000
		Cent NY-Dist-Meter Blanket	CNC0004	812,000	824,000	836,000	849,000	862,000	4,183,000
		Cent NY-Dist-New Bus-Comm Blanket	CNC0011	4,060,000	4,121,000	4,183,000	4,246,000	4,310,000	20,920,000
		Cent NY-Dist-New Bus-Resid Blanket	CNC0010	6,598,000	6,697,000	6,797,000	6,899,000	7,002,000	33,993,000
		Cent NY-Dist-Public Require Blanket	CNC0013	1,218,000	1,236,000	1,255,000	1,274,000	1,293,000	6,276,000
		Cent NY-Dist-St Light Blanket	CNC0012	2,436,000	2,473,000	2,510,000	2,548,000	2,586,000	12,553,000
		East NY-Dist-3rd Party Attch Blankt	CNE0022	81,000	82,000	83,000	84,000	85,000	415,000
		East NY-Dist-Land/Rights Blanket	CNE0009	1,000	1,000	1,000	1,000	1,000	5,000
		East NY-Dist-Meter Blanket	CNE0004	820,000	841,000	862,000	884,000	906,000	4,313,000
		East NY-Dist-New Bus-Comm Blanket	CNE0011	3,756,000	3,812,000	3,869,000	3,927,000	3,986,000	19,350,000
		East NY-Dist-New Bus-Resid Blanket	CNE0010	6,598,000	6,697,000	6,797,000	6,899,000	7,002,000	33,993,000
		East NY-Dist-Public Require Blanket	CNE0013	1,128,000	1,156,000	1,185,000	1,215,000	1,245,000	5,929,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		East NY-Dist-St Light Blanket	CNE0012	1,320,000	1,340,000	1,360,000	1,380,000	1,401,000	6,801,000
		NiMo Meter Purchases	CN03604	3,655,000	3,662,000	3,670,000	3,763,600	3,763,600	18,514,200
		NiMo Transformer Purchases	CN03620	21,950,000	21,900,000	22,950,000	23,550,000	23,950,000	114,300,000
		West NY-Dist-3rd Party Attch Blankt	CNW0022	242,000	246,000	250,000	254,000	258,000	1,250,000
		West NY-Dist-Land/Rights Blanket	CNW0009	579,000	588,000	597,000	606,000	615,000	2,985,000
		West NY-Dist-Meter Blanket	CNW0004	836,000	874,000	913,000	954,000	997,000	4,574,000
		West NY-Dist-New Bus-Comm Blanket	CNW0011	3,162,000	3,225,000	3,290,000	3,356,000	3,423,000	16,456,000
		West NY-Dist-New Bus-Resid Blanket	CNW0010	3,774,000	3,849,000	3,926,000	4,005,000	4,085,000	19,639,000
		West NY-Dist-Public Require Blanket	CNW0013	871,000	893,000	915,000	938,000	961,000	4,578,000
		West NY-Dist-St Light Blanket	CNW0012	3,248,000	3,297,000	3,346,000	3,396,000	3,447,000	16,734,000
	Blanket Total			68,657,000	69,348,000	71,152,000	72,609,600	73,783,600	355,550,200
	Distributed Generation	NO_State St 95462 Convert to 3Ph	C048519	13,000	0	0	0	0	13,000
		Tuly Cntr 27852 convert New Hope DG	C056651	85,000	0	0	0	0	85,000
	Distributed Generation Total			98,000	0	0	0	0	98,000
	New Business	250 Delaware Ave - New Spot Network	C058128	400,000	0	0	0	0	400,000
		3ph Upgd-79 Lakewood Rd,Williamstwn	C049759	0	10,000	670,000	0	0	680,000
		520 Seneca St, Utica	C057406	85,000	0	0	0	0	85,000
		Birch Ave 51 - Route 9N Conversion	C053127	0	0	94,000	0	0	94,000
		Brookside Crossing Phase 1, Oneida	C052928	43,000	0	0	0	0	43,000
		BUTTERVILLE FARMS, Adams NY	C055346	153,000	0	0	0	0	153,000
		Camillus Apartments URD, Camillus	C055165	68,000	0	0	0	0	68,000
		CR-Ash Street-13.2kV Feeder 22352	CD01217	264,000	0	0	0	0	264,000
		East Batavia Substation - DLine Upg	CD00587	0	0	199,000	0	0	199,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		F5961 Extend to 500 Seneca St	C055398	308,000	0	0	0	0	308,000
		Gen County Econ Dev Corp	C057505	150,000	0	0	0	0	150,000
		Inner Harbor Project, Syracuse NY	C057287	85,000	0	0	0	0	85,000
		Maxon Alco - Mix use Devlpmnt	C052327	500,000	0	0	0	0	500,000
		Minoa Farms Part 2 Phs 5, Minoa NY	C050159	55,000	0	0	0	0	55,000
		Mohawk Harbor Development Civil	C055843	1,352,000	0	0	0	0	1,352,000
		MOOSE RIVER COMMONS URD, Old Forge	C056407	43,000	0	0	0	0	43,000
		Partridge Road Complex, Malone, NY	C054863	43,000	0	0	0	0	43,000
		Reserve for New Business Commercial	C046920	2,000,000	3,000,000	3,148,740	3,198,720	3,198,720	14,546,180
		Reserve for New Business Residentia	C046921	3,006,000	5,820,000	6,227,280	6,277,500	6,277,500	27,608,280
		South Meadows Phase 1 - CAZENOVIA NY	C053485	43,000	0	0	0	0	43,000
		Sports field, Judd Rd, Whitesboro	C057408	85,000	0	0	0	0	85,000
		Sta 59 - 13.2kV Ratio Banks	C056986	420,000	0	0	0	0	420,000
		The Common at Flemings Farm URD	C055416	234,000	0	0	0	0	234,000
		The Preserves at Clifton Park URD	C050113	0	0	85,000	0	0	85,000
		UCD-Park South -Myrtle Ave, Albany	C053091	200,000	0	0	0	0	200,000
	New Business Total			9,537,000	8,830,000	10,424,020	9,476,220	9,476,220	47,743,460
	Public Requirements	3806.28 Rt 49 @ Depot Rd (Site E)	C054585	68,000	0	0	0	0	68,000
		DESTINY USA HOTEL, Syracuse NY	C054463	0	255,000	0	0	0	255,000
		DOT - 3028.11 Rt 281 Cortland	C053128	510,000	0	0	0	0	510,000
		DOT City of Watertown Harrison St	C054703	85,000	0	0	0	0	85,000
		DOT Cleveland Dr Bridge	C048677	1,000	0	0	0	0	1,000
		DOT Factory St	C051963	128,000	0	0	0	0	128,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Watertown NY							
		DOT Jefferson Co DPW CR69	C052123	102,000	0	0	0	0	102,000
		Island Rd, Ausable Forks	C054790	70,000	0	0	0	0	70,000
		MV-DOT Herkimer Co. Newport Rd. DOT	C054926	140,000	0	0	0	0	140,000
		Nestle Substation Demo	CD01051	1,000	0	0	0	0	1,000
		Oswego - Trolley Light Pole Replace	CD00810	464,000	0	0	0	0	464,000
		PIN 1085.42 Rt 146 / Mohawk	C057859	213,000	0	0	0	0	213,000
		PIN 1085.42 RT 146 over Mohawk R	C055355	168,000	0	0	0	0	168,000
		PIN 1460.32 Rt 32 over Mohawk River	C054068	0	518,000	0	0	0	518,000
		PIN 2056.79	C055418	98,000	0	0	0	0	98,000
		PIN 5757.18 Kenmore Ave	C054523	140,000	0	0	0	0	140,000
		Reserve for Public Requirements Uni	C046922	4,180,000	5,947,000	7,600,000	7,600,000	7,600,000	32,927,000
		Rotterdam 13852 & 13853 Relocation	C046422	400,000	0	0	0	0	400,000
		Village of Clayton Downtown - OH-UG	C053443	85,000	0	0	0	0	85,000
		Wilbur Road Relocation	C048178	0	0	170,000	0	0	170,000
	Public Requirements Total			6,853,000	6,720,000	7,770,000	7,600,000	7,600,000	36,543,000
	Outdoor Lighting - Discretionary	WoodstreamFarms-UG-Lighting	C055111	343,000	0	0	0	0	343,000
	Outdoor Lighting - Discretionary Total			343,000	0	0	0	0	343,000
Customer Requests/Public Requirements Total				85,488,000	84,898,000	89,346,020	89,685,820	90,859,820	440,277,660
Damage/Failure	Blanket	Cent NY-Dist-Damage/Failure Blanket	CNC0014	7,511,000	7,624,000	7,738,000	7,854,000	7,972,000	38,699,000
		Cent NY-Dist-Subs Blanket	CNC0002	508,000	516,000	524,000	532,000	540,000	2,620,000
		East NY-Dist-Damage/Failure Blanket	CNE0014	7,105,000	7,212,000	7,320,000	7,430,000	7,541,000	36,608,000
		East NY-Dist-Subs Blanket	CNE0002	711,000	722,000	733,000	744,000	755,000	3,665,000
		West NY-Dist-Damage/Failure Blanket	CNW0014	6,293,000	6,387,000	6,483,000	6,580,000	6,679,000	32,422,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		West NY-Dist-Subs Blanket	CNW0002	711,000	722,000	733,000	744,000	755,000	3,665,000
	Blanket Total			22,839,000	23,183,000	23,531,000	23,884,000	24,242,000	117,679,000
	Damage Failure Other	Delta Lake Estates Primary Cable Re	C056449	128,000	0	0	0	0	128,000
		Genesee Substation Retirement	C051871	0	0	0	1,000	0	1,000
		Reserve for Damage/Failure Unidenti	C046918	2,014,800	2,115,540	2,216,280	2,317,020	2,317,020	10,980,660
			C046948	2,756,754	2,802,800	2,852,850	2,902,900	2,902,900	14,218,204
	Damage Failure Other Total			4,899,554	4,918,340	5,069,130	5,220,920	5,219,920	25,327,864
Damage/Failure Total				27,738,554	28,101,340	28,600,130	29,104,920	29,461,920	143,006,864
Non-Infrastructure	Blanket	Cent NY-Dist-Telecomm Blanket	CNC0021	1,000	1,000	1,000	1,000	1,000	5,000
		Cent NY-General-Genl Equip Blanket	CNC0070	639,000	649,000	659,000	669,000	679,000	3,295,000
		East NY-Dist-Telecomm Blanket	CNE0021	1,000	1,000	1,000	1,000	1,000	5,000
		East NY-Genl Equip Budgetary Reserv	CNE0070	609,000	618,000	627,000	636,000	646,000	3,136,000
		West NY-Dist-Telecomm Blanket	CNW0021	1,000	1,000	1,000	1,000	1,000	5,000
		West NY-General-Genl Equip Blanket	CNW0070	711,000	722,000	733,000	744,000	755,000	3,665,000
	Blanket Total			1,962,000	1,992,000	2,022,000	2,052,000	2,083,000	10,111,000
	Telcom	Telecom and Radio Equipment	C004157	995,000	995,000	995,000	995,000	995,000	4,975,000
	Telcom Total			995,000	995,000	995,000	995,000	995,000	4,975,000
Non-Infrastructure Total				2,957,000	2,987,000	3,017,000	3,047,000	3,078,000	15,086,000
System Capacity & Performance	Blanket	Cent NY-Dist-Load Relief Blanket	CNC0016	558,000	566,000	574,000	583,000	592,000	2,873,000
		Cent NY-Dist-Reliability Blanket	CNC0015	1,218,000	1,236,000	1,255,000	1,274,000	1,293,000	6,276,000
		East NY-Dist-Load Relief Blanket	CNE0016	615,000	630,000	646,000	662,000	679,000	3,232,000
		East NY-Dist-Reliability Blanket	CNE0015	1,218,000	1,236,000	1,255,000	1,274,000	1,293,000	6,276,000
		West NY-Dist-Load Relief Blanket	CNW0016	637,000	666,000	696,000	727,000	760,000	3,486,000
		West NY-Dist-Reliability Blanket	CNW0015	2,030,000	2,060,000	2,091,000	2,122,000	2,154,000	10,457,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
	Blanket Total			6,276,000	6,394,000	6,517,000	6,642,000	6,771,000	32,600,000
	Load Relief	*Cedar 51 - Buttermilk Falls Rd	C049764	0	0	251,000	0	0	251,000
		*Firehouse 44953 - Dunsbach Rd Conv	C049864	0	0	106,000	0	0	106,000
		*Firehouse Rd Station - New Feeder	C050081	0	0	467,000	0	0	467,000
		*Hague Rd 52 - Convert Route 22	C050717	0	0	10,000	0	787,000	797,000
		*Hudson Falls 51 - Convert Broadway	C050023	0	10,000	201,650	0	0	211,650
		*Pawling Ave Conv (29252/37253)	C050103	0	0	210,000	280,000	0	490,000
		*Vail Mills 51 - County Hwy 107	C049793	0	0	0	354,000	0	354,000
		*Wilton 52 - Rt 32 3 Phase Ext.	C019570	0	10,000	593,000	0	0	603,000
		`N Syracuse Sub Getaways	C030506	488,000	0	0	0	0	488,000
		37062 Route 3 Hammond - Rebuild	C052312	0	0	0	159,000	0	159,000
		73353 County RTE 125 - Rebuild	C052216	0	0	10,000	0	713,000	723,000
		73353 State HWY 12E - Rebuild	C052208	0	0	0	286,000	0	286,000
		81452 Westminster Park Rd - Rebuild	C052344	0	0	340,000	0	0	340,000
		81456 Route 15 - Rebuild	C052343	0	0	0	468,000	0	468,000
		81458 Kring Point Road - Rebuild	C052335	0	0	0	255,000	0	255,000
		81653 Alexandria Street - Rebuild	C052334	0	0	0	340,000	0	340,000
		81757 RTE 156 - Rebuild	C052205	0	0	340,000	0	0	340,000
		87553 Green Settlement Rd - Rebuild	C052323	0	0	0	465,000	0	465,000
		87554 County RTE 189 & 95 - Rebuild	C052367	0	10,000	500,000	204,000	0	714,000
		89552 Crooks Road - Rebuild	C052443	0	0	280,000	213,000	0	493,000
		8th St Conversion Niagara Falls	C046841	37,000	0	0	0	0	37,000
		93854 Jefferson Ave - Rebuild	C052186	0	0	255,000	0	0	255,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		95554 HWY 11 - Rebuild	C052371	0	0	0	10,000	415,000	425,000
		95556 Miner Street - Rebuild	C052372	0	0	0	10,000	415,000	425,000
		95756 HWY 37 - Rebuild	C052347	0	0	315,000	0	0	315,000
		95756 Linden Street - Rebuild	C052369	0	0	531,000	0	0	531,000
		97654 Skinnerville Road - Rebuild	C052370	0	0	0	10,000	371,000	381,000
		98455 Degrasse-Russell rd - Rebuild	C052103	0	0	0	595,000	0	595,000
		Attica Station transformer upgrade	C046611	570,000	0	0	0	0	570,000
		Battenkill 57-North Rd Ratio Relief	C057410	0	208,000	0	0	0	208,000
		Beech Ave Conversion Niagara Falls	C032751	0	431,000	0	0	0	431,000
		Brook Road 55 - Barney Rd. Rebuild	C047978	0	0	128,000	0	0	128,000
		Buffalo Sta 56- upgrade 4 Xfmrs	C036502	1,668,200	1,181,800	0	0	0	2,850,000
		Buffalo Station 129 - F12974 Recond	C046558	0	434,000	0	0	0	434,000
		Buffalo Station 49 - UG Upgrades	CD01128	1,107,000	0	0	0	0	1,107,000
		Buffalo Station 56 - New F5664	C046530	0	57,000	815,000	0	0	872,000
		Burdeck 26552 - Burnett St Conversi	C046632	0	0	0	592,000	0	592,000
		Butler 53 - Add breaker for 53 ckt	C047481	3,000	0	0	0	0	3,000
		Butler 53 - Build 36253 feeder - OH	C047455	224,000	0	0	0	0	224,000
		Butler 53 - Build 36253 feeder - UG	C028878	676,000	0	0	0	0	676,000
		Center St 52 - Route 5 Rebuild/Conv	C048833	0	0	0	440,000	0	440,000
		Clinton 54 - E Main St Conversion	C055366	0	0	0	168,000	0	168,000
		Coffeen 76053 Holcomb St - Rebuild	C052188	0	0	0	213,000	0	213,000
		Coffeen 76056 White Rd - Rebuild	C052203	0	0	10,000	0	466,000	476,000
		CR Brewton Retire	C010751	0	0	0	0	3,000	3,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		CR- Convert 26554 Brooklea Dr	C052226	0	412,000	0	0	0	412,000
		CR- Convert 29351 north of station	C049397	0	510,000	0	0	0	510,000
		CR- Paloma 55 convert NYS 48	C051832	0	10,000	476,000	0	0	486,000
		CR- Pebble Hill Burke Rd Ratio	C051710	0	179,000	0	0	0	179,000
		CR- Pine Grove 56 NYS Hwy 31 conver	CD00608	300,000	0	0	0	0	300,000
		Curry Rd 36552 UG Getaway Replace	C056406	0	160,000	0	0	0	160,000
		Dekalb 98455 Town Line rd - Rebuild	C052106	0	0	0	595,000	0	595,000
		DeLaet's Landing DxD	CD00893	61,000	458,000	1,608,000	0	0	2,127,000
		Eden switch structure - install 2-10	C046538	200,000	800,000	1,210,000	1,600,000	0	3,810,000
		Eden Switch Structure- New Fdr 1	C048015	590,000	590,000	0	0	0	1,180,000
		Eden Switch Structure- New fdr# 2	C048016	0	642,000	643,000	0	0	1,285,000
		F21555 Replace 4/0 PLAC Getaways	C057293	10,000	140,000	0	0	0	150,000
		Fairdale DLine	C046633	0	0	198,000	474,000	119,000	791,000
		Fairdale Dsub	C046640	0	53,000	843,000	523,000	0	1,419,000
		Forbes Ave - New Substation	C053137	143,000	1,000,000	3,488,000	500,000	0	5,131,000
		Frankhauser New Station - Line Work	C028929	6,290,000	0	0	0	0	6,290,000
		Gilbert Mills Xfmr Upgrade-Xfmr	C046563	369,000	0	0	0	0	369,000
		Grooms Rd 34557 - Saratoga Rd Conve	C046761	0	0	0	0	1,040,000	1,040,000
		Harris 54 Relief	C032446	1,000,000	907,000	907,000	0	0	2,814,000
		Juniper Distribution Removal Work	C050245	0	0	0	4,000	0	4,000
		Lakeville substation retirement	C046588	0	0	0	8,000	39,000	47,000
		Lyme 73353 RTE 59 - Rebuild	C052206	0	0	298,000	298,000	0	596,000
		Malone new 89554 feeder (Line work	C046626	0	0	638,000	0	0	638,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Mayfield 51 - Paradise Point Rd	C050069	0	0	0	0	287,000	287,000
		Mexico Substation Demo	C046629	0	0	13,000	0	0	13,000
		Military Rd New F21052 - N Falls	C054046	0	760,000	133,000	0	0	893,000
		Milton Ave 2nd Switchgear	C046609	3,529,000	1,805,000	0	0	0	5,334,000
		Milton Ave DLine	C046643	1,000,000	100,000	2,900,000	6,000,000	0	10,000,000
		N.Gouverneur 98352 HWY58 - Rebuild	C052108	0	0	0	425,000	0	425,000
		New Cicero Substation Dline	C046476	50,000	156,000	1,000,000	41,000	0	1,247,000
		New Cicero Substation DSub	C046475	500,000	1,000,000	3,900,000	1,832,000	0	7,232,000
		New Haven xfmr upgrade-Buswork	C046634	0	0	0	400,000	2,180,000	2,580,000
		New Haven xfmr upgrade-Dline	C046635	0	0	200,000	2,800,000	0	3,000,000
		New Krumkill 42153 - UG Getaway Rep	C046648	0	170,000	0	0	0	170,000
		NR_Port Leyden 75563-Moose River Rd	CD01197	0	0	0	550,000	0	550,000
		OAK RUN ESTATES URD F10551 CONVSN	C055125	269,000	0	0	0	0	269,000
		Ogdensburg 93852 HWY 37 - Rebuild	C052143	0	0	0	153,000	0	153,000
		Ohio Street - North	C050405	5,000	0	0	0	0	5,000
		Ohio Street Conduit Bank - South	C050404	5,000	0	0	0	0	5,000
		Paloma Feeder Getaway	C032498	200,000	0	0	0	0	200,000
		Paloma new switchgear	CD01190	744,000	0	0	0	0	744,000
		Paloma Second Transformer	C032495	240,000	0	0	0	0	240,000
		Panama Rebuild	C046509	0	0	6,000	196,000	133,000	335,000
		Queensbury DLine Re-route Getaways	CD00895	3,000,000	200,000	0	0	0	3,200,000
		Randall Rd - New station - Dist get	CD00897	75,000	405,000	1,004,000	5,000	0	1,489,000
		Randall Rd - New station - M/C S/G	CD00896	250,000	750,000	2,000,000	1,700,000	0	4,700,000
		Raquette Lake Transformer Upgrade	CD01139	0	300,000	400,000	0	0	700,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Reserve for Load Relief Unidentifie	C046919	0	0	-1,833,000	0	8,934,000	7,101,000
			C046949	0	0	-8,231,000	-7,890,000	0	-16,121,000
		Retirement of Juniper sub #500	C049685	0	0	1,000	0	0	1,000
		RR-Menands 10157-Getaway Replacemen	C053966	0	10,000	377,000	0	0	387,000
		S.Livingston relief: F5 work	C051692	1,100,000	0	0	0	0	1,100,000
		S.Livingston relief: Fd3 work	C051690	0	0	0	0	50,000	50,000
		S.Livingston relief: Fd4 work	C051691	60,000	640,000	640,000	0	0	1,340,000
		S.Livingston rSlief: Dist Fder Work	C051694	0	60,000	310,000	468,000	361,000	1,199,000
		S.Philadelphia Transformer Upgrade	CD01293	350,000	373,000	0	0	0	723,000
		Sodeman Rd - New station - dist get	C046796	100,000	405,000	1,215,000	0	0	1,720,000
		Sodeman Rd Station - new station -	C046798	750,000	1,000,000	3,150,000	500,000	0	5,400,000
		Sonora Way 115 – 13.2kV Substation	C051585	1,100,000	2,000,000	1,332,000	0	0	4,432,000
		South Livingston relief - DLine Fd1	C046759	140,000	0	0	0	0	140,000
		South Livingston relief - DLine Fd2	C046552	0	0	50,000	890,000	550,000	1,490,000
		Spragueville Road - Rebuild	C051891	0	0	757,000	0	0	757,000
		Sta 129 Repl Cable Exits-Summ Prep	C056448	267,000	0	0	0	0	267,000
		Station 42 34.5-13.2kV Dline Work	C055352	750,000	30,000	0	0	0	780,000
		Station 42 rebuild: 34.5-13.2kV TB1	C055353	750,000	30,000	0	0	0	780,000
		Station 56 New Feeders Getaway	C057826	150,000	150,000	0	0	0	300,000
		Station 74 23-4.16kV MITS	C055267	40,000	0	0	0	0	40,000
		Stoner 52 - Mohawk Dr Conversion	C050421	0	428,000	0	0	0	428,000
		Swiss Road - Rebuild	C052076	0	0	638,000	0	0	638,000
		Teal Substation Rebuild-Feeders	C046505	0	0	0	20,000	748,000	768,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Teal Substation Rebuild-Swgr	C046511	0	0	271,000	2,831,000	1,554,000	4,656,000
		Tibbets 29254 - 15th Ave Conversion	C046425	0	0	212,000	0	0	212,000
		Two Mile Creek Rd - Dline	C052028	436,000	0	0	0	0	436,000
		Union St 52 - County Hwy 59	C056632	0	0	0	25,000	800,000	825,000
		Union St 54- Turnpike Rd Conversion	C055735	0	20,000	537,000	0	0	557,000
		Van Dyke - UG - Civil & Elec work	C052098	0	3,659,000	0	0	0	3,659,000
		Van Dyke Station - New 115/13.2kV s	C046490	4,868,000	0	0	0	0	4,868,000
		Van Dyke Station - New 53 Dist Feed	C046493	485,000	0	0	0	0	485,000
		Van Dyke Station - New 55 Dist Feed	C046489	164,000	0	0	0	0	164,000
		Van Dyke Station - New 56 Dist Feed	C046487	10,000	1,823,000	0	0	0	1,833,000
		Van Dyke Station-New 54 Dist Feed.	C046495	0	1,490,000	1,224,000	0	0	2,714,000
		Van Dyke Subst- New 57 Dist Feeder	C046488	1,354,000	969,000	0	0	0	2,323,000
		Van Dyke Subst- new feeders	C016087	0	1,068,000	0	0	0	1,068,000
		W.Chautauqua Dline work	C055265	0	0	6,000	230,000	200,000	436,000
		W.Chautauqua new 34.5-4.8kV sub	C055264	0	0	5,000	366,000	0	371,000
		Warrensburg 51 - County Home Bridge	CD01133	0	0	94,000	0	0	94,000
		Wilson 93 Load Relief - Replace TB1	C035743	1,516,000	0	0	0	0	1,516,000
	Load Relief Total			37,993,200	28,003,800	27,982,650	20,606,000	20,165,000	134,750,650
	Reliability	*Bethlehem 02155 Glenmont Rd Conv	C049990	0	0	201,000	0	0	201,000
		*Blue Stores 30352 - Conversion	C050107	0	0	428,000	0	0	428,000
		*Byron F1863 - Rebuild /Reconductor	C049762	0	0	0	555,000	0	555,000
		*CR - McGraw-Truxton feeder tie	C049727	0	0	0	1,000,000	0	1,000,000
		*Create Full Tie F15351 to F15352	C049720	0	0	0	15,000	525,000	540,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		*Create Full tie F18251 to F18254	C049882	0	0	16,000	400,000	0	416,000
		*Create Full Tie F9354 to F9353	C049783	0	0	380,000	0	0	380,000
		*E.Golah 5157 Tie w/Lakeville 19752	C049880	10,000	568,000	0	0	0	578,000
		*Eagle Harbor F9263 Tie with F7951	C049688	0	0	0	204,800	0	204,800
		*Hoosick 31451 - Conversion	C050082	0	0	237,000	0	0	237,000
		*Hoosick 31452 Conversion- High St.	C050083	0	0	400,000	0	0	400,000
		*Hudson 08753 - Rte 9G Conversion	C050108	0	0	296,000	0	0	296,000
		*Menands 10151 / 52 Relocations	C049998	411,000	0	0	0	0	411,000
		*Middleport F7765 Tie w/Shelby 7656	C049711	0	0	16,000	426,000	0	442,000
		*NR_76462-CoRte28-Rebuild	C049197	0	0	0	1,200,000	0	1,200,000
		*NR-Hammond 37061-Calaboga Rd	C010688	0	0	400,000	300,000	0	700,000
		*Rbld/Conv F15352 to full tie F6353	C049878	0	0	550,000	0	0	550,000
		*Rbld/Conv to Create tie F7652-7651	C049802	0	16,000	309,000	0	0	325,000
		*Rebuild Darien F1662 Limited Tie	C049634	0	20,000	0	375,000	0	395,000
		*Rebuild portion of E.Otto F2861	C049718	0	0	16,000	224,000	0	240,000
		*Rebuild portions of Catt. F1562	C049686	5,000	365,000	0	0	0	370,000
		*Selkirk 14951 - Thatcher/River Conv	C049985	0	10,000	505,000	0	0	515,000
		*Selkirk 52/ Beth 58-Creble Rd Conv	C050001	0	0	243,000	0	0	243,000
		*Trinity 16458 - McCarty Ave Conv	C050000	0	10,000	314,000	0	0	324,000
		*Trinity 52- Delaware/Park Ave Conv	C049999	0	0	162,000	0	0	162,000
		*Weibel 56 - Wall Street Rebuild	C051325	0	0	0	10,000	840,000	850,000
		81453-Ellis Road Rebuild&Relocation	C054930	0	0	120,000	0	0	120,000
		81458 Dingman Point	C054533	0	0	0	96,000	0	96,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Road Rebuild_RR							
		84661-Tower Road Relocation	C055344	0	0	229,000	0	0	229,000
		91453 Rte 11 Relocation	C057007	0	0	0	240,000	0	240,000
		92451 Sterling Pond Road Relocation	C056730	0	0	0	240,000	0	240,000
		93663 Adams Road Relocation	C053286	0	0	0	85,000	0	85,000
		97655 Raquette River Crossing	C057487	150,000	0	0	0	0	150,000
		BaileySettlement-Gore Rd_Rebuild	C054583	0	0	0	480,000	0	480,000
		Battenkill 57 - Sullivan Rd	C056323	0	0	60,000	0	0	60,000
		Battenkill 58 - Cambridge Rd	C053182	0	0	118,000	0	0	118,000
		Bflo Sta 139 - Replace Transformers	C036639	0	0	1,104,000	472,000	1,288,000	2,864,000
		Bolton 51 - Trout Lake Rd 3 Phase	C049560	315,000	0	0	0	0	315,000
		Brook Road 55 - Corinth 51 Tie	C050690	416,000	0	0	0	0	416,000
		Brook Road 55 - Lake Desolation Rd	C050691	0	0	10,000	411,000	0	421,000
		Caledonia Sub 44 - Add a 34.5 Bker	C052446	0	0	268,000	269,000	0	537,000
		Camillus Dsub	C046637	0	0	0	13,000	0	13,000
		Church St 56 - Convert Vrooman Ave	C048241	0	91,000	0	0	0	91,000
		Clinton 53 - Baum & Burrell Roads	C050684	0	0	0	194,000	0	194,000
		Cortland_LVAC Network_Disassemble	C054442	0	0	0	640,000	0	640,000
		CR- 23553 Cedarvale ratio relief	C051803	0	310,000	0	0	0	310,000
		CR- LHH 44 2012 NYS PSC Action item	CD00953	0	240,000	0	0	0	240,000
		CR- LHH44-N Osceola Rd	C055443	0	0	240,000	0	0	240,000
		CR- Lords Hill 66 Reconductoring	C054563	0	0	280,000	0	0	280,000
		CR- Niles 51 Dolphin Point QRS	C053106	255,000	0	0	0	0	255,000
		CR- Reconductor 12861	C048591	92,000	0	0	0	0	92,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		CR- Sandy Creek 51 rebuild CR 17	C050681	0	10,000	0	500,000	0	510,000
		CR- Sandy Creek 51 Wart Rd rebuild	C050679	0	10,000	177,000	0	0	187,000
		CR- Teall-Hpkins Tie	C052064	0	298,000	0	0	0	298,000
		CR- Wine Creek 53 tie	C055690	0	0	102,000	0	0	102,000
		Delameter - 115kV circuit switchers	C051492	0	0	0	90,000	180,000	270,000
		Delameter Install two 20/26/33MVA	C046536	0	50,000	1,830,000	2,680,000	890,000	5,450,000
		Delameter F9352 reconfigured layout	C047886	0	0	0	1,100	420,000	421,100
		Delameter F9356-express& rebuild	C047877	0	0	0	992,000	184,000	1,176,000
		Delameter new F9355 - express	C047885	0	0	680,000	300,000	0	980,000
		DLine -To expand Rock Cut Sub Retir	CD00881	490,000	0	0	0	0	490,000
		East Malloy- feeders and getaways	CD01279	0	0	380,000	380,000	0	760,000
		East Molloy Second Transformer	C036188	0	0	0	1,502,000	383,000	1,885,000
		F0153 - Walker Rd PIW	C048179	0	0	105,000	0	0	105,000
		F0456/0457 Build feeder tie	C049540	0	0	360,000	0	0	360,000
		F22652 Knapp Rd - Storm Hardening	C052066	0	553,000	0	0	0	553,000
		F4361 PIW - Littleville Road	C047870	0	0	106,000	0	0	106,000
		F7863 Carmen Rd PIW	C048146	0	0	113,000	0	0	113,000
		F9263 - Phipps Road PIW	C049079	0	0	296,000	0	0	296,000
		F9263 - Route 31 PIW	C049084	0	0	172,000	0	0	172,000
		F9354 new tie	C056867	0	10,000	100,000	0	0	110,000
		Fly Rd Feeder Work	C046594	0	0	340,000	700,000	0	1,040,000
		Fly Rd Low side substation equipmen	C046722	0	814,000	0	0	0	814,000
		Fly Rd. Transformer Addition	C036189	0	140,000	1,000,000	121,000	0	1,261,000
		Fort Gage 54 - Route 9L Rebuild	C050680	0	0	0	587,000	0	587,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Hanson Aggregate Regulators	C046508	9,000	0	0	0	0	9,000
		Harris Road Substation Expansion	CD01088	500,000	0	0	0	0	500,000
		Hinsdale Dsub	C046638	0	0	0	13,000	0	13,000
		Knapp Rd 22651 Feeder Tie	C028716	0	663,000	0	0	0	663,000
		Little River new 95555 feeder	C050922	0	50,000	450,000	0	0	500,000
		Lockport Road 216 - Install TB#2	C036057	0	0	0	700,000	5,000,000	5,700,000
		Lockport Road 216 - Install TB#2 -	CD01252	0	0	0	100,000	162,000	262,000
		Long Rd 209 - New F20955	CD00964	0	0	50,000	1,382,000	0	1,432,000
		Long Road 209 - Install TB2	CD00977	0	0	500,000	3,600,000	0	4,100,000
		Malone Second 115/13.2kV Bank	C054587	0	0	135,000	2,620,000	2,410,000	5,165,000
		Middleburgh 51/Schoharie 51 LS	C050764	0	10,000	126,000	0	0	136,000
		Midler Station Retirement	C046702	0	0	242,000	0	0	242,000
		Military Rd New Feeder 21055	C036566	0	175,000	123,000	0	0	298,000
		Military Road 210 - Install TB#2	C036056	1,700,000	500,000	0	0	0	2,200,000
		Mill St_LVAC_2014 Upgrades-N-2	C053903	0	0	510,000	0	0	510,000
		Mill ST_LVAC_2014 Upgrades-Newell	C054438	0	0	0	160,000	0	160,000
		Mill St_LVAC_2014_Upgrades -N-1	C054385	200,000	0	0	0	0	200,000
		Minor Storm Hardening - 32451	C056486	100,000	435,000	0	0	0	535,000
		Mumford #50 - TB2 - Install New Fdr	C046589	0	0	0	843,000	2,961,000	3,804,000
		Mumford #50 -Install Transformer #2	C046590	0	0	0	468,000	2,137,000	2,605,000
		MV-89552 Dyke Road - Rebuild	C052447	0	0	0	298,000	0	298,000
		MV-Lehigh 51 & 54 Tie Creation	C050004	0	10,000	0	440,000	0	450,000
		MV-Lehigh 66954	C050003	0	500,000	0	0	0	500,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Reconductoring							
		MV-Minor Storm Hardening-33351	C056560	0	195,000	0	0	0	195,000
		MV-Minor Storm Hardening-38361	C056728	0	0	450,000	0	0	450,000
		MV-Minor Storm Hardening-70152	C056733	65,000	0	0	0	0	65,000
		MV-Rome 54 -Hogsback Rd Reconductor	C050097	0	0	0	192,000	0	192,000
		MV-Rome 54-Lauther Rd - Reconductor	C050086	0	0	320,000	0	0	320,000
		MV-Salisbury 57/Middleville 71 Tie	C049966	0	10,000	0	940,000	0	950,000
		MV-Turin 65355 & 56 Tie creation	C050002	0	0	0	160,000	0	160,000
		MV-Whitesboro64 Feeder Tie	C058226	0	85,000	0	0	0	85,000
		N Leroy F0455 - Linwood Road PIW	C056629	0	0	50,000	800,000	0	850,000
		New Dist Sub - Tonawanda NYW DSub	C051266	750,000	1,906,000	3,470,000	241,000	0	6,367,000
		New Dist Sub -Tonawanda NYW DLine	C051265	75,000	532,530	855,000	27,200	0	1,489,730
		North Bangor Conversion (D-Line)	C046418	0	10,000	670,000	0	0	680,000
		North Bangor new 34.5/13.2kV Statio	C046423	0	0	0	60,000	424,000	484,000
		North Creek 52 - Edwards Hill Road	C050688	0	58,000	0	0	0	58,000
		North Creek 52 - Peaceful Valley Rd	C049622	0	430,000	0	0	0	430,000
		North Troy 12353 - MSH - Relocation	C058224	200,000	0	0	0	0	200,000
		NR-81452-Head Island Rd-Upgrade	C053190	0	0	0	0	204,000	204,000
		NR-Lowville-SW528 Replacement	CD00959	34,000	0	0	0	0	34,000
		NR-Riverview 84762-French Rd-Rbld	C050183	0	0	0	136,000	0	136,000
		NY - East_1 ph cutout mounted Rclrs	C053928	51,000	127,000	127,000	102,000	102,000	509,000
		NY_Central_1ph_Cutout_Mnt_Reclosers	C059620	51,000	127,000	127,000	102,000	102,000	509,000
		NY_West_1 PH Cutout Mnted Reclosers	C059607	51,000	128,000	128,000	102,000	102,000	511,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		OgdenBrook 51-Convert Aviation Road	C053381	0	361,000	0	0	0	361,000
		Old Hawkeye Road Relocation-84561	C055464	0	0	119,000	0	0	119,000
		OswegatchieRiverCrossing Relocation	C057008	0	0	0	240,000	0	240,000
		Pine Grove 5956/Bartell 32555 Feede	CD00475	0	0	0	263,000	0	263,000
		Port Henry 52 - Dalton Hill Rd	C054284	0	0	81,000	0	0	81,000
		Pottersville 51 - East Shore Dr	C050682	0	0	10,000	250,000	0	260,000
		Queensbury 57 - Dream Lake Rd	C055592	0	0	56,000	0	0	56,000
		Reconductor 5552 tie to 5262	C048837	0	0	325,000	0	0	325,000
		Reserve for Reliability Unidentifie	C046923	0	0	-1,833,000	0	8,934,000	7,101,000
			C046950	0	0	-6,891,000	-7,888,000	0	-14,779,000
		Reynolds Rd 33455 - 3-Phase Line Ex	C046646	0	0	196,000	0	0	196,000
		Schuylerville 11 - Casey Rd Rebuild	C048066	0	0	110,000	0	0	110,000
		Shawnee Road 76	C036059	3,000,000	0	0	0	0	3,000,000
		Shawnee Road 76 (DLine)	CD00967	5,000	215,000	0	0	0	220,000
		Starr Rd Second Xfrm-13kv Bus Exten	C032368	8,000	0	0	0	0	8,000
		Starr Rd. Second Xfrm	C032503	8,000	0	0	0	0	8,000
		Starr Road Feeder Work	C046363	3,000	0	0	0	0	3,000
		Station 214 - Install TB2	C029186	0	180,000	2,059,000	155,000	0	2,394,000
		Station 214 - New F21467	C029187	0	0	605,000	900,000	0	1,505,000
		Temple Sub Central Breaker Upgrades	C059519	305,000	915,000	0	0	0	1,220,000
		Terminal Station Sub Relocation	C046613	0	0	800,000	4,004,000	2,548,000	7,352,000
		Union St 52 - Greene/King Rd Conver	C056649	0	0	0	0	20,000	20,000
		Union St 53 - Kenyon Hill Road	C050779	0	72,000	0	0	0	72,000
		Union St. 53 - County Hwy 67	C050777	0	0	250,000	0	0	250,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Vail Mills 51 - Noonan Rd Convert	C051412	0	0	158,000	0	0	158,000
		VO_Herkimer_Net_UG Primary Upgrade	C054844	0	0	0	0	400,000	400,000
		Watertown New 115/13.2 kV Substatio	C046610	0	402,000	4,845,000	719,000	0	5,966,000
			C046627	0	385,000	2,718,000	3,345,000	0	6,448,000
		West Hamlin #82 - Install Transform	CD01089	2,273,000	2,427,000	0	0	0	4,700,000
		West Hamlin #82 - New TB2 - Install	CD01090	400,000	1,530,000	1,401,000	0	0	3,331,000
		West Sweden - Install New Station	C046593	0	0	600,000	3,200,000	3,200,000	7,000,000
		West Sweden -New Sta - Install Fdrs	C046591	0	0	120,000	1,550,000	1,457,000	3,127,000
		Whitaker Dsub	C046636	0	0	100,000	916,000	2,198,000	3,214,000
		Whitesboro 64, 65 and 66 Retirement	C050878	0	0	0	0	420,000	420,000
		Whitesville F10161 move to road	C056851	10,000	120,000	0	0	0	130,000
	Reliability Total			11,942,000	16,073,530	26,825,000	36,843,100	37,491,000	129,174,630
	Storm Hardening	42951-Blue Ridge Rd Storm Hardening	C052248	411,000	0	0	0	0	411,000
		42951-Hoffman Road Storm Hardening	C052252	220,000	0	0	0	0	220,000
		Battenkill 57-FY17 Storm Hardening	C057386	20,000	252,000	0	0	0	272,000
		Chestertown 51-FY16 Storm Hardening	C057306	196,000	0	0	0	0	196,000
		Chestertown 52-FY17 Storm Hardening	C057366	20,000	178,000	0	0	0	198,000
		Columbian Road Rebuild	C052072	0	64,000	0	0	0	64,000
		F10451 Storm Hardening Part 1	C057431	10,000	0	0	180,000	0	190,000
		F10451 Storm Hardening Part 2	C057432	10,000	0	0	180,000	0	190,000
		F2861 East Otto Storm Hardening	C052044	0	300,000	0	0	0	300,000
		F2862 Storm Hardening	C057428	10,000	0	466,000	0	0	476,000
		North Shore Road - Rebuild	C052073	0	64,000	0	0	0	64,000
		Scofield 53 - FY16 Storm Hardening	C057289	240,000	0	0	0	0	240,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Sheppard Rd 2951 - Storm Hardening	C057429	7,000	0	210,000	210,000	0	427,000
		Storm Hardening - Lowville 77354 fe	C046396	150,000	0	0	0	0	150,000
		Storm Hardening - Placeholder for N	C046390	0	0	500,000	500,000	500,000	1,500,000
			C046391	0	0	500,000	500,000	500,000	1,500,000
			C046392	0	0	0	0	1,000,000	1,000,000
		Wethersfield 2361 - Storm Hardening	C057411	7,000	0	361,000	0	0	368,000
	Storm Hardening Total			1,301,000	858,000	2,037,000	1,570,000	2,000,000	7,766,000
	Substation Flood Mitigation	Front Street - Flood Mitigation	C053165	382,000	0	0	0	0	382,000
		Indian Creek Rd Substation	C056566	910,000	0	0	0	0	910,000
		St Johnsville - Flood mitigation	C053166	6,000	0	0	0	0	6,000
		Union Falls - Flood mitigation	C053167	350,000	1,926,000	0	0	0	2,276,000
		Whitesboro Flood Mitigation	C053164	283,000	0	0	0	0	283,000
	Substation Flood Mitigation Total			1,931,000	1,926,000	0	0	0	3,857,000
	Substation Mobile	NY New Mobile Substation 23 kV - 13	C046402	0	623,000	714,000	0	0	1,337,000
		NY New Mobile Substation 34.5 kV -	C046410	719,000	690,000	0	0	0	1,409,000
	Substation Mobile Total			719,000	1,313,000	714,000	0	0	2,746,000
	Substation RTU	Bremen - EMS Expansion/RTU Installa	CD01301	185,000	0	0	0	0	185,000
		Buckley Corners #454 - EMS Expansio	C053047	157,000	0	0	0	0	157,000
		Corinth Station 285 - EMS Expansion	C053084	258,000	0	0	0	0	258,000
		Nassau Station #113 - EMS Expansion	C053046	230,000	0	0	0	0	230,000
		Port Henry #385 - EMS Expansion	C053048	258,000	0	0	0	0	258,000
		REP - Dist Subs Without RTUs	C019851	900,000	900,000	1,500,000	1,500,000	1,500,000	6,300,000
		Station 126 - EMS Expansion/RTU Ins	CD01299	77,000	0	0	0	0	77,000
		Station 129 Brompton Rd - EMS Expan	C053086	372,000	0	0	0	0	372,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Station 139 Martin Rd - EMS Expan	C053088	295,000	0	0	0	0	295,000
		Station 154 George Urban-EMS Expans	C053085	225,000	0	0	0	0	225,000
		Station 63 - EMS Expansion/RTU Inst	CD01303	10,000	0	0	0	0	10,000
		Station 74 - EMS Expansion/RTU Inst	CD01294	180,000	0	0	0	0	180,000
		Wilton Station 329 - EMS Expansion	C053083	260,000	0	0	0	0	260,000
	Substation RTU Total			3,407,000	900,000	1,500,000	1,500,000	1,500,000	8,807,000
	ERR	*Ashley 51 - Baldwin Corners Rd Ph4	C056711	0	0	400,000	0	0	400,000
		*Brook Rd 52 - Lewis Rd Conversion	C049761	0	0	273,000	0	0	273,000
		*Burdeck 53 - Ratio & Recloser Repl	C057067	0	77,000	0	0	0	77,000
		*Burgoyne 51 - County Hwy 41	C049790	0	0	95,000	0	0	95,000
		*Church St 53 - Cnty Hwy 132 Convrt	C049652	0	0	0	653,000	0	653,000
		*Crown Pt. 51 - Breed Hill Rd	C049750	96,000	0	0	0	0	96,000
		*Farnan Rd 51 - Bluebird Road	C029431	0	0	238,000	0	0	238,000
		*Florida-Stoner Feeder Tie	C050438	0	0	20,000	650,400	0	670,400
		*Grooms Rd 34556 - Rte 146 Reconduc	C050105	0	0	0	0	190,000	190,000
		*McClellan 51 - Union ST Conversion	C050085	0	800,000	0	0	0	800,000
		*Mumford 5052 - Reconductor/Convert	C049885	0	0	399,000	0	0	399,000
		*NR_Hammond 37061_Pleasant Val Rd	C049725	0	10,000	590,000	0	0	600,000
		*NR_Hammond 37061-Oak Point Rd	C049723	0	0	480,000	0	0	480,000
		*NR-Bremen 81556-Beech Hill Rd	C049789	0	10,000	590,000	0	0	600,000
		*NR-Chasm Falls 85251-Duane Rd-Tie	C049757	0	10,000	590,000	280,000	0	880,000
		*NR-Chasm Falls 85251-Pond Rd-Rbld	C049777	0	10,000	550,000	0	0	560,000
		*NR-Higley 92451-Joe Indian Area	C049745	0	0	400,000	0	0	400,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		*NR-Higley 92451-NYS Hwy 56-FdrTie	C046864	0	680,000	0	0	0	680,000
		*NR-Higley 92451-NYSHwy56_Number9	C046865	170,000	0	0	0	0	170,000
		*NR-Parishville 93961-Relocate Fdr	C049751	0	0	0	128,000	0	128,000
		*Rosa Rd 57-Balltown Rd Conversion	C050084	0	0	0	600,000	0	600,000
		*Sharon 52 - State Route 145	C049792	0	0	10,000	160,000	0	170,000
		*St Johnsville 51-Bellinger Rd	C050381	0	0	0	255,000	0	255,000
		*Stoner 52 - Stoner Trail Extension	C050437	0	0	0	20,000	1,000,000	1,020,000
		*Union St 54-Lincoln Hill Rd Ph 2	C056627	0	0	10,000	250,000	0	260,000
		*Union St. 53/54 - Route 22 Tie	C056620	15,000	0	170,000	0	0	185,000
		*Vail Mills 52/53 - Fish House Rd	C019351	0	0	0	0	51,000	51,000
		*Vail Mills 53 - Union Mills Rd.	C019352	0	0	0	0	708,000	708,000
		Amsterdam 51/53 Widow Susan area	C028835	0	0	114,000	0	0	114,000
		Ashley 51 - Baldwin Corners Rd Ph3	CD01117	0	0	90,000	0	0	90,000
		Blue Stores 30353 - MSH-Bells Pond	C058019	200,000	0	0	0	0	200,000
		Bolton 51/Warrensburg 51 Feeder Tie	CD00606	0	10,000	540,000	0	0	550,000
		Bolton 52 Reconfiguration	C046782	65,000	0	0	0	0	65,000
		Boyntonvil 33351-John Snyder Rd Ext	C051268	0	0	320,000	0	0	320,000
		Brook Rd 54 - Route 50 Conversion	C048584	0	416,000	0	0	0	416,000
		Burdeck 26552 - Westcott / Curry Rd	CD01226	0	104,000	0	0	0	104,000
		Burdeck 54 - Duanesburg Rd Convert	C056558	0	0	20,000	320,000	0	340,000
		Burgoyne 51 - Close Gaps on County	CD00208	57,000	0	0	0	0	57,000
		Center St 52 - Hickory Hill Rd Conv	C056808	0	0	193,000	0	0	193,000
		Center St 54 - Hyney Hill Road Rebu	CD00357	0	0	154,000	0	0	154,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Chrisler Ave 25735 Conversion	C057133	0	0	20,000	0	0	20,000
		Chrisler Ave 25737 Conversion	C057132	0	0	20,000	0	0	20,000
		Clinton 36653-54 Conversion Tie	C053628	0	0	298,000	0	0	298,000
		CR- 6651, Relocte Ballou Rd	C049353	0	0	200,000	0	0	200,000
		Curry Rd 52 - Altamont 55 Tie	C057249	0	53,000	0	0	0	53,000
		Ephratah 31 - Mud Rd Relocation	C056866	0	125,000	0	0	0	125,000
		ERR Program Placeholder	C046684	0	0	2,000,000	2,000,000	2,000,000	6,000,000
		Florida 51 - Fort Hunter Road	C050693	0	0	0	133,000	0	133,000
		Florida 51 - Mead Road	C050692	0	0	0	120,000	0	120,000
		Front St 52 - Schermerhorn St Recon	C056746	20,000	0	290,000	0	0	310,000
		Inghams 51-Salisbury 56 Convrt/Tie	C056606	0	0	0	0	30,000	30,000
		Lynn 55 - Weaver St 51 Tie Convrt	C055708	0	0	238,000	0	0	238,000
		McClellan 52 - Strong Street Conver	C057130	0	0	20,000	0	0	20,000
		Middleburg 51 - Schoharie Creek Rem	C056970	0	0	0	46,000	0	46,000
		Middleburgh 51 - Spur Rd Relocate	C056987	0	0	53,000	0	0	53,000
		NR_Lyme 73351_T.I. 81455-NYSHwy12E_	CD01295	0	0	0	320,000	0	320,000
		NR_N Carthage_81652_NYSHwy3_Interna	C046835	0	0	0	510,000	480,000	990,000
		NR-85251-NYS Hwy 30-FdrTie	C049760	0	0	577,000	577,000	577,000	1,731,000
		NR-92759-Mt Pisgah Rd-Relocation	C050201	0	0	0	0	141,000	141,000
		NR-98454-95554-Co Rt 25-FdrTie	C050518	300,000	0	0	0	0	300,000
		NR-Brady 95757-CoRt27-FdrTie	C046861	0	0	0	595,000	560,000	1,155,000
		NR-Brady 95757-Riverside Dr-FdrTie	CD01191	0	0	0	458,000	0	458,000
		NR-Lowville 77354-Pine	C046866	300,000	300,000	0	0	0	600,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
		Grove Road-F							
		NR-Sunday Creek 87651-StillwaterRd-	CD01084	240,000	0	0	0	0	240,000
		NR-T.I.81452-Grandview Park Rd-Rebu	CD01188	0	0	0	238,000	0	238,000
		NR-T.I.81458-County Route 1-FdrTie	CD01187	0	0	0	230,000	0	230,000
		Ogdenbrook 51 - Cottage Hill Rd	C054983	0	0	100,000	0	0	100,000
		Port Henry 51 - Rebuild Route 9N fr	CD00326	0	0	117,000	0	0	117,000
		Port Henry 52 - Moriah Road	C019070	0	0	235,000	0	0	235,000
		Reynolds Rd 33455 Conversion	C046683	0	0	0	134,000	0	134,000
		Schoharie 52 - State Route 443 Rebu	CD00424	0	0	298,000	0	0	298,000
		St Johnsville - Sanders Road (ERR)	C029439	0	0	95,000	0	0	95,000
		St. Johnsville 51 - Paris Rd ERR	C055323	0	0	0	63,000	0	63,000
		Union St 52 - Brownell Rd. Rebuild	C056657	0	0	80,000	0	0	80,000
		Union St 52 - Content Farm Rd.	C056710	0	0	105,000	0	0	105,000
		Union St 54 - Lincoln Hill Rd Ph 1	C056625	0	0	106,000	0	0	106,000
		Vail Mills 52 - County Hwy 16 Convt	C055530	0	0	0	20,000	301,000	321,000
		Vail Mills 52 - Honeywell Corners	C055707	0	0	0	0	351,000	351,000
		Weaver 51 - Crane & Francis Convers	C057129	0	0	20,000	0	0	20,000
		Weaver 51 - Pleasant St Conversion	C057110	0	20,000	335,000	0	0	355,000
	ERR Total			1,463,000	2,625,000	11,453,000	8,760,400	6,389,000	30,690,400
	Secondary Network Arcflash Mitigation	Arc Flash Mediation - 480V spot net	CD01278	1,122,000	1,333,000	1,333,000	1,333,000	1,333,000	6,454,000
		Arc Flash NY East Div 480V Spot NW	C047464	765,000	774,000	774,000	774,000	774,000	3,861,000
		NY West Div Arc Flash 480V Spot NW	C047461	1,244,000	1,244,000	1,244,000	1,244,000	1,244,000	6,220,000
	Secondary Network Arcflash Mitigation Total			3,131,000	3,351,000	3,351,000	3,351,000	3,351,000	16,535,000

Spending Rationale	Program	Project Name	Project #	FY16	FY17	FY18	FY19	FY20	Total
	Side Tap Fusing	IE - NC Side Tap Fusing	C015511	400,000	400,000	400,000	75,000	0	1,275,000
		IE - NE Side Tap Fusing	C015510	400,000	0	0	0	0	400,000
		IE - NW Side Tap Fusing	C015509	400,000	400,000	0	0	0	800,000
		Weaver 51 - Guilderland Ave Recon	C057032	0	0	20,000	242,000	0	262,000
	Side Tap Fusing Total			1,200,000	800,000	420,000	317,000	0	2,737,000
	Distribution Transformer Replacement	IE - NC Dist Transformer Upgrades	C014846	250,000	250,000	250,000	250,000	250,000	1,250,000
		IE - NE Dist Transformer Upgrades	C015828	250,000	250,000	250,000	250,000	250,000	1,250,000
		IE - NW Dist Transformer Upgrades	C010967	250,000	250,000	250,000	250,000	250,000	1,250,000
	Distribution Transformer Replacement Total			750,000	750,000	750,000	750,000	750,000	3,750,000
System Capacity & Performance Total				70,113,200	62,994,330	81,549,650	80,339,500	78,417,000	373,413,680
Grand Total				253,553,912	251,833,794	285,097,065	288,501,765	294,999,443	1,373,985,979

Exhibit 4 – Revenue Requirement and Rate Impact

Exhibit 4

NIAGARA MOHAWK POWER CORPORATION
Summary of Bill Impact Associated with FY15 - FY18 T & D Capex Only
For Fiscal Years 2016, 2017 & 2018
($000's)

	FY 2016	FY 2017	FY 2018
Depreciation Expense	8,823	16,361	24,287
Rate Base:			
Net Utility Plant	587,957	1,055,922	1,557,040
Accumulated Deferred Taxes	-51,543	-93,513	-145,025
Total Rate Base	536,414	962,409	1,412,016
ROR	9.79%	9.79%	9.79%
Return on Rate Base	52,515	94,220	138,236
Total Revenue Requirement Impact of FY15 - FY18 Capex Only	61,338	110,581	162,523
Rate Base Impact of Depreciation on 3/31/14 Embedded Plant	-85,236	-255,709	-426,182
ROR	9.79%	9.79%	9.79%

Total Revenue Requirement Impact of 3/31/14 Embedded Plant	-8,345	-25,034	-41,723
Total Revenue Requirement Impact of Capex less impact of Embedded Plant	**$52,993**	**$85,547**	**$120,800**
Allocation of Revenue Requirement to SC1 Residential Customers	31,372	50,644	71,515
SC1 Residential Customers Cumulative Bill Impact per kWh	**$0.00271**	**$0.00433**	**$0.00607**

Assumptions:

1) FY15 per Company 8&4 forecast, FY16 - FY18 capex per the 1/31/2015 CIP filing (Transmission, Distribution & Sub-Transmission only)
2) NYS PSC Staff's Depreciation Rates per - Case 12-E-0201
3) ROR based on 9.3% ROE per file Joint Proposal - Case 12-E-0201, utilized FY16 ROR for all years.
4) Embedded historic plant generates depreciation expense that will reduce rate base (increase to depreciation reserve). Reduced the revenue requirement to include the inherent reduction to ratebase from depreciating embedded plant determined as follows:

March 31, 2014 Electric Depreciable Plant	##
Composite Electric Depreciation Rate	##
Total Annual Electric Depreciation based on embedded plant	##

Ratebase impact determined by using a half year average of annual depreciation per year

5) Accumulated Deferred Taxes were calculated incorporating the new tangible property regulations Reg. §1.263(a)-3(g).
6) Allocated revenue requirement to SC1 customers based on FY2016 T&D Revenue at Proposed Rates per Appendix 2, Schedule 3, page 3 filed in the Joint Proposal in Case No. 12-E-0201. Used FY2016 allocation for FY2017 and FY2018.
7) Determined bill impact based on FY2016 through FY2018 sales forecast in Company's current business plan.

Exhibit 5: Non-Wires Alternatives Update

National Grid has guidelines for the review and consideration of non-wires-alternatives ("NWAs") in its planning processes. The guidelines outline two stages of review: one to identify potential areas of need in which NWAs may be feasible, and one to determine NWA feasibility and design, if applicable, for each area of need. The first stage is completed by transmission and distribution planners as they review potential capital investment needs and the second is completed by project managers in the Customer organization.

Initial NWA Feasibility Review

The initial review for projects with NWA potential takes place after the Company's transmission and distribution planning groups conduct their annual capital needs assessment. This review is used to screen projects in those plans against specific criteria to identify any that have potential for a feasible NWA. The specific criteria are:

1. Cost. The traditional infrastructure solution, based on engineering judgment, must be estimated to cost more than $1Million.
2. Load Reduction Needed. The necessary load reduction must be less than twenty percent of the total load in the area of the defined need.
3. Timing. The start of construction on the traditional infrastructure solution must be at least thirty-six months in the future.
4. Asset Condition. The investment need must not be based on asset condition.

These factors are important in determining appropriate compensation levels for NWA solutions and the time within which NWAs must be implemented to address the identified system needs. Projects that satisfy the initial criteria progress to the secondary NWA review.

Secondary NWA Review

The secondary NWA review determines whether a viable NWA solution exists. Typically, this review involves compiling historical electric load data for the area of the defined need and customer information, including usage, for all affected accounts. The information is used to estimate the time of year and time of day of peak loads, as well as the drivers of those loads. To the extent they are available, energy efficiency measure installations, distributed energy resources, regional appliance saturation survey data, town assessment data and other applicable studies or databases are considered.

Once the circumstances and load drivers are determined, options for real-time load reduction, load shifting and conservation are considered as best fits each situation. The

Company considers energy efficiency products, distributed generation, demand response and other direct and indirect load control and conservation measures in developing components for an NWA project. To be viable, an NWA must be cost competitive with the wires alternative counterpart.

Projects Reviewed

To date the Company has considered over 1,600 capital projects for potential NWA solutions. Many of the projects considered did not pass the initial NWA screen because they were driven by asset condition issues, had need dates that were too immediate, had cost estimates that did not meet the criteria, or were unrelated to electric load (*e.g.*, involved equipment retirements or non-infrastructure projects). Several projects passed the initial feasibility screen, but did not clear the secondary review because a viable NWA solution could not be identified. Additionally, one project that did pass the secondary NWA review—the West Sweden/Brockport load relief project—was being actively developed, however, during development, loads in the West Sweden/Brockport area increased faster than originally anticipated such that the need date and necessary load relief made an NWA project no longer feasible.

The Company continues to seek NWA opportunities, and has identified a potential project in a load-stressed area north of Buffalo. The Kenmore area is undergoing the secondary NWA review to determine the potential for customers to provide the load relief. If viable, the area also would become a primary candidate to demonstrate demand-side resource capability in response to the Commission's order on Dynamic Load Management in the REV proceeding (Case 14-M-0101).

In addition to work the Company is doing regarding potential micro-grids in the Potsdam/Clarkson University and Buffalo/Buffalo Niagara Medical Campus areas, the Company identified and submitted to NYSERDA nine areas in upstate NY to be evaluated and considered for distributed generation/micro-grid projects in connection with NYSERDA's NY Prize competition. These areas were initially chosen based on outage exposure criteria. Further evaluation would be needed to assess the feasibility and viability of distributed generation/micro-grid projects in these areas. In addition to potential distributed generation/micro-grid projects, other non-traditional solutions, such as DER, direct load control, energy storage (batteries, flywheels, compressed air energy storage and thermal storage), targeted energy efficiency and demand response, and other measures, will also be evaluated.

The Company is currently reviewing its NWA criteria in light of the experience gained since 2011 in an effort to improve its NWA guidelines, criteria and processes.

Exhibit 6: Overhead Line Refurbishment Projects

Alabama-Telegraph (C033014 - $5.1m)

The overhead line details:

Total length: Approximately 4 miles
Conductor: 4/0 ACSR 6/1 “Penguin”
Number of steel structure units: 0
Number of wood structure units: 44 H-Frame
Typical Installation date: 1940s (some Q-sheets indicate line may be as early as 1931)

Conductor test results were marginal and the Step 0 team concluded the conductor should be replaced due to falling Zinc levels which means ductility will further decrease over time. It is estimated that 5-10 years of conductor life expectancy remains. Revised conceptual engineering was completed in April 2014.

Project scope is to reconductor with 477 kcmil ACSR 26/7 Hawk, install shieldwire on entire length of line and replace all structures with H-Frame or 3-pole dead-end pulloff structures on concrete foundations.

Boonville-Rome 3 & 4 (C047795 - $8.9M)

This project involves the Boonville-Rome 3 T4060 and the Boonville-Rome 4 T4040-T4040 115 kV transmission circuits. These are doubled circuited.

The overhead line details:

Total length: Approximately 26 miles (main line only)
Conductor: 4/0 Copper and 336.4 ACSR
Number of steel structure units: 233
Number of wood structure units: 27
Steel: 206 (steel lattice type structures)
Typical Installation date: 1930s

The project scope is a life extension project involving the targeted replacement of deteriorated structures, insulators and fittings, replacement of conductor splices, replacement of shield wire, tower painting, and footer repairs.

Brockport Tap (C055531 - $1.2m)

This project involves a 3 mile portion of the 7.5 mile tap between Sweden – Brockport Stations, a taps off the Lockport-Mortimer 111 and 113 lines.

The overhead line details:

Total length: Approximately 7.5 miles
Conductor: 795 kcmil, 4/0 and 336.4 ACSR
Number of steel structure units: 1 (steel lattice switch structure)
Number of wood structure units: 39
Typical Installation Date: 1940s for the #111 tap, 1955 for the #113 tap

The project scope is a life extension project involving the targeted replacement of deteriorated structures, damaged insulators and fittings, replacement of conductor splices, and add shield wire. The conductor was installed in 1983 and not being replaced at this time.

Browns Falls-Taylorville 3 & 4 (C024359 - $9.1m)

This project involves the double circuit Browns Falls-Taylorville 3 T3080 and the Browns-Taylorville 4 T3090 lines.

The overhead line details:

Total length: Approximately 27 miles
Conductor: 4/0 Copper
Total number of structures: 227
Number of wood structure units: 5
Number of steel structure units: 222
Type(s) of structures: Flex towers, lattice towers, and wood pole
Typical Installation date: 1920s

The project scope involves the replacement of approximately 20% of the structures, shield wire, insulators and hardware, guys, and grounding improvements which are deteriorated. The project is in preliminary engineering.

Colton-Browns Falls 1 & 2 (C036164 - $10.7m)

This project involves the Colton-Browns Falls 1 & 2 T3140 and T3150 115 kV transmission lines. These are doubled circuited.

The overhead line details:

Total length: Approximately 30.5 miles

Conductor: 336.4 ACSR Linnet
Number of steel structure units: 273
Number of wood structure units: 13
Typical Installation date: 1920s

The scope is a life extension project involving the targeted replacement of deteriorated structures, cross-arm hangers and conductor attachment plates on reused suspension flex towers. Replace original conductor hardware, nonstandard shieldwire, guys and anchors in poor condition. Improve structure grounding and install signage.

Gardenville-Dunkirk 141 & 142 (C003389 - $56.1m)

This project involves the Gardenville-Dunkirk 141 (T1260) and the Gardenville-Dunkirk 142 (T1270) 115 kV transmission circuits.

The overhead line details:

Total length: Approximately 45 miles (main line, including the Seneca Nation)
Conductor : Varies – 250 kcm CU, 400 CU, 4/0 CU, 336 kcm ACSR, and 636 kcm AAC, and 795 ACSR.
Total number of structures: 586 structures
Number of wood structures: 39 structures
Number of steel structures: 547 structures (of which are 310 Ritter-Conley Flexible Towers with Z cross members)
Types of structures: Double circuit, primarily steel (Z type flex), structures
Typical Installation date: 1930s vintage

After climbing steel towers to perform conductor clearance work in advance of the line refurbishment, it was revealed that many towers were in worse condition than originally thought. Further climbing inspections and aerial photography were ordered and the results drove a decision to change the scope from a life extension project involving the targeted replacement of deteriorated structures, insulators and fittings, conductor splices, shield wire, tower painting, and footer repairs to a full line rebuild.

Gardenville 180 & 182 (C027436 - $1.1m)

This covers the Packard-Gardenville 182 T1780 (in its entirety) and the Niagara-Gardenville 180 T1660 (from Packard to Ellicott Junction, Tonawanda).

The overhead line details:

Total length: Packard to Gardenville (Lines 180/182, 182/62, 182/54), approx. 29 miles
Conductor :
Packard-Tonawanda 180/182; varies - 795 ACSR “Drake”, 795 ACSR “Coot”, and 500 CU

Packard-Tonawanda 180/105; 795 ACSR “Coot”
Packard-Tonawanda 182/92; 500 CU
Tonawanda-Urban 182/92; varies - 636 ACSR “Kingbird”, 795 ACSR “Coot”, and 400 CU
Urban-Gardenville 182/54; varies - 636 ACSR “Kingbird”, 795 ACSR “Coot”, and 400 CU
Total number of structures: 417 (count includes 180 section north of Packard in CNAS118, about 10% of the line on a mileage basis)
Number of wood structures: 20
Number of steel pole/structures: 397
Types of structures: Lattice towers, flex towers, wood poles, and steel poles.
Typical Installation date: 1930s

The project scope is a life extension involving the targeted replacement of deteriorated structures (estimated around 5-10%), insulators and fittings, replacement of conductor splices, replacement of shield wire, and coordination of tower painting and footer repairs. This project is currently in conceptual engineering. The final scope will be based upon an engineering field assessment, input from Transmission Planning, conductor testing, and shield wire testing.

Homer Hill-Bennett 157 (C027429 - $7.2m)

This project involves the Homer Hill-Bennett Road 157 T1340 115 kV transmission line.

The overhead line details:

Total length: 52.5 miles (includes taps)
Conductor: Varies – 4/0 CU, 4/0 ACSR, 336 kcm ACSR, 795 kcm ACSR, 1192 kcm ACSR
Total number of structures: 471
Number of wood structure units: 463
Number of steel structure units: 7
Types of structures: Single circuit, primarily wood structures
Typical Installation date: 1950s (taps are 1970s vintage)

This project is in Step 0 (conceptual engineering) and undergoing scope development based upon an engineering field assessment, input from Transmission Planning, conductor testing, and shield wire testing. The project scope is the targeted replacement of deteriorated structures, insulators and fittings, and conductor splices and will be bundled with Level 3 wood pole replacements identified in the NY Capital Inspection & Maintenance program to gain construction efficiencies.

Lockport-Batavia 112 (C003422 - $60.7m)

This project involves the Lockport-Mortimer 112 T1510 115 kV transmission circuit.

The overhead line details:

Total length: Approximately 34 miles
Conductor: Varies - 250 Copper 19-Strand, 795 ACSR “Coot” 36/1, 336.4 ACSR “Linnet” 26/7, 428 AAC 19-Strand, and 636 AAC “Orchid”
Total number of structures: 369
Number of wood structure units: 156
Number of steel structure units: 213
Types of structures: Steel towers (178 of which are tri-leg towers) and wood pole structures (111 of which are single pole with davit arms).
Typical Installation date: 1930-1940s

About 3.5 miles of the Lockport-Batavia 112 shares a double circuit with the Lockport-Batavia 108. In addition, for roughly the first third of these lines, both lines run parallel with and share the Lockport-Mortimer 111 right-of-way. Combining the 112 and 108 lines to the same structures where possible is being considered to relieve congestion in the corridor and open up access to it.

This project is in Step 0 (conceptual engineering) and undergoing scope development based upon an engineering field assessment, input from Transmission Planning, conductor testing, and shield wire testing. The project scope is a life extension involving the targeted replacement of deteriorated structures, insulators and fittings, replacement of conductor splices, replacement of shield wire, tower painting, and footer repairs.

Mortimer – Pannell 24 25 (C047816 - $5.3m)

This project involves the Mortimer-Pannell 24 25 T1600 T1590 115kV Transmission lines.
The overhead line details:

Total length: Approximately 16 miles
Conductor: 795 ACSR “Coot”, 336.4 ACSR “Oriole”, 336.4 AL “Tulip” and 336.4 ACSR Merlin
Total number of structures: 175 structures
Number of wood structure units: 7
Number of steel structure units: 168
Typical Installation date: parts originally built in 1920s, upgraded to current 115kV in 1948

Life extension project involving the targeted replacement of deteriorated structures, insulators and fittings, conductor splices and shield wire. Tower painting and footer repairs. Conductor testing has been initiated, project in conceptual engineering.

Pannell – Geneva 4 4A (C030889 - $5.8m)

This project involves the Pannell-Geneva 4-4A T1860 115kV transmission line.

The overhead line details:

Total length: Approximately 25 miles
Conductor: 795 ACSR “Coot” and 336.4 ACSR “Oriole”
Total number of structures: 269 structures
Number of wood structure units: 3
Number of steel structure units: 266 (including 1 steel pole)
Types of structures: predominantly the original 1906 Aermoter towers except at angle points which were replaced with dead-end towers
Typical Installation date: parts originally built in 1906, upgraded to current 115kV in 1948

A conceptual engineering report (CER) was completed in November 2009 which studied four options. Since it is five years old, the CER will be freshened. Life extension project involving the targeted replacement of deteriorated structures, insulators and fittings, conductor splices and shield wire. Tower painting and footer repairs. Conductor testing has been initiated, project in conceptual engineering.

Porter-Rotterdam 31 (C030890 - $14.1m)

This project involves the Porter-Rotterdam 31 T4210 230 kV transmission line.

The overhead line details:

Total length: 72 miles, Steel structures (dual circuit with NYPA) 12 miles, wood structures (single circuit) 60 miles
Conductor: 1,431 kcm ACSR and 795 kcm ACSR
Total number of structures: 698 structures
Number of wood structure units: 610
Number of steel structure units: 88
Types of structures: Steel pole (double circuit) and wood H-frame (single circuit)
Typical Installation date: 1940s – 1950

The project scope is the targeted replacement of extremely deteriorated wood structures. The scope of this project may be affected by the Energy Highway Project selection.

Taylorville-Boonville 5 & 6 (C027437 - $9.0m)

This project involves the Taylorville-Boonville 5 T3320 and the Taylorville-Boonville 6 T3330 115 kV transmission circuit.

The overhead line details:

Total length: Approx. 31 miles (main line)
Taps Included In Stats: No
Conductor: 4/0 copper

Total number of structures: 310
Number of wood structure units: 181
Number of steel structure units: 129
Types of structures: Primarily steel lattice towers (127) and double circuit wood pole structures (174 2-pole structures).
Typical Installation date (mainline): Late 1920s to early 1930s; most of the wood structures from the 1990s.

The project scope is life extension with the targeted replacement of deteriorated structures, insulators and fittings replacements on the older steel structures, replacement of shield wire, tower painting, and footer repairs. Project in preliminary engineering and expected to be in service by FY17.

Ticonderoga 2 & 3 (C039521 - $48.1m)

This project targets the Ticonderoga-Republic 2 T5810 and the Ticonderoga-Whitehall 3 T5830 115 kV transmission circuits.

The overhead line details:

Total length: Approximately 46 miles total with about 23 miles on the T5810 and 23 miles on the T5830
Conductor: Ticonderoga-Republic 2 - 336.4 kcmil ACSR 30/7 “Oriole” and 4/0 Copper conductors. Ticonderoga-Whitehall 3 - 336.4 kcmil ACSR 30/7 “Oriole” conductor.
Total number of structures: 350
Number of wood structure units: 343
Number of steel structure units: 7
Types of structures: Single circuit, primarily consisting of wood pole H-frame structures and steel lattice towers
Typical Installation date: 1920-1930s

The project scope is the targeted replacement of deteriorated structures (not previously replaced during the safety refurbishment project C039487 in this Plan which is being done in advance of this project), insulator and fittings replacement, replacement of shield wire and conductor splices. This project is about to enter Step 0 (conceptual engineering) and undergo scope development based upon the engineering field assessment performed, input from Transmission Planning, conductor testing, and shield wire testing.