Exhibit No.____ (NMP-6)

July 27, 2012 Review of
Dunkirk Mothball Notice - Part 1
(Public Version)

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THIS DOCUMENT HAS BEEN REDACTED FOR

CRITICAL ENERGY

INFRASTRUCTURE INFORMATION (CEII)

PURSUANT TO 18 C.F.R. § 388.112

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FINAL REPORT

REVIEW OF DUNKIRK MOTHBALL NOTICE – Part 1

Version 0

July 27, 2012

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Table of Contents

List of Tables

Change Control

Version	Date	Modification	Author(s)	Reviews and Approvals by
0	July 27, 2012	Initial Document	J. Maher	C. Sedewitz, Director Transmission Planning

1. Executive Summary

This report reviews the system impact of the shutdown of coal fired generation at the Dunkirk facility in Western NY. Notice was received on March 14 2012 that NRG plans to place the units in protective layup for an unknown amount of time.

The following analysis shows that loss of these units would result in thermal and voltage problems [redacted] in Western NY. Chief among these concerns are low 230kV voltages at Gardenville and Huntley for various N-1 single element, N-1 multiple element and N-1-1 multiple element outages. [redacted] was the identification that many low voltage conditions that have been identified as existing on the 115kV system following an outage would be worse following the loss of support at Dunkirk. Some of these concerns are present even with Dunkirk generation in service, but the hours of exposure and load shedding that would be required to correct the system problems at peak times would both increase.

Once this determination was made, a review was begun to determine if running one or more units at Dunkirk could either correct or significantly reduce the exposure to these problems. This analysis has concluded that during peak periods, [redacted] This level of generation also reduces the exposure to outages on the 115kV system. Based on a review of the study results, it was concluded that for the summer, support of the 230kV voltages was critical and would require use of at least one 230kV connected unit and a second unit at either voltage. For the winter, the more critical issue is supporting the local 115kV voltages, which could be better achieved using two 115kV connected units. Two units would not be necessary during off peak periods.

In additional to these needs identified by this assessment, the risk of unplanned long duration outages of generators [redacted] or the failure of transformers or other major system components has also been considered. To protect against these concerns, it is recommended that a third unit also be available for summer periods. Based on feedback from System Operators, it is recommended that this third unit be the second 115kV connected machine.

System reinforcements will be necessary to restore the system to an acceptable level of service following the retirement of the units. The specific long term upgrades that would be necessary have not been identified. However, this study did examine the impact of completing several short duration projects. These included installation of 115kV capacitor banks at Gardenville, Dunkirk and Homer Hill, installation of 230kV bus tie breakers at Huntley and Packard and changing the transmission line supply for several distribution stations. Studies determined that completing these projects would allow the number of units necessary for system operation to be reduced to one, year round. No additional unit would be required to protect for an unexpected failure. A review of options to correct the thermal and voltage concerns that are present if no units were in service will be the subject of a follow up study and is not discussed here.

As noted in this assessment, loss of these units increases the reliance on the local 115kV connected generators. It is expected that they would need to run more often to support the system. If one or more of these local plants were not available for some reason, [redacted] area voltage problems would develop during contingency conditions. [redacted] The weakened system would also result in an increased exposure (severity and number of hours per year) to these voltage concerns. Again, it would be expected that major system reinforcements, likely with lead times in excess of five years, would be necessary to correct these.

Therefore based on the system analysis presented in this report, it is recommended that at least two Dunkirk units be available to system operators for the winter of 2012-2013. Assuming that the proposed quick upgrades or system reinforcements discussed above are completed by June 1, 2013, the number of units that need to remain in service following June 1 can be reduced to one. Absent any of these projects, the number of units that would have been required would have been three.

Additional upgrades are currently being reviewed to determine what will be necessary to reduce the number of units to zero. It is expected that this will require at least the completion of the Five Mile Road 345/115kV station that is expected to be completed by June 2015 in and possibly other system reinforcements.

2. Introduction

This report examines the impact of the announced closure of the generation at the Dunkirk facility in western NY. This includes the shutdown of all four units. The second phase of this study was a review of the system with one or more of the units remaining in service, to assess the need to run generation until permanent reinforcements could be implemented. The third phase of analysis looked at the impact of completing several short duration projects to determine if the number of units needed to support the system could be reduced.

3. Study Details

This review was done using the summer and winter 2012 cases that were used in the 2011 needs assessment of the area. Information on these cases, including load levels, forecasts and generation dispatch can be found in sections 4 and 5 of the 2011 Needs Assessment report[1]. It is believed that the load magnitude and distribution across the system used in the 2011 study is representative of the peak loads that would be expected for the summer of 2013. The following sections discuss important aspects of or changes to the base cases.

3.1. System Generation

Four system base case conditions were reviewed as shown in the table below. All analysis assumes that the 230kV connected generation at Huntley, the 115kV connected generation at Indeck Yerkes and the 115kV connected generation at Oxbow power (both connected to the system near Huntley) were in service. [redacted]

All wind generation at Arcade and Steel winds was modeled as out of service.

The study was done with cases that included the Warren – Falconer #171 out of service in the base case. Additional information on this circuit can be found in section 4.7 of the 2011 Needs Assessment.

Table 1: Study Base Case Conditions

Huntley Units 67 and 68	Indeck Yerkes	Oxbow Power	Indeck Olean	Line 171	Jamestown Net Load
In Service	In Service	In Service	In Service	Out of Service	~0 MW
In Service	In Service	In Service	In Service	Out of Service	~75-80 MW
In Service	In Service	In Service	Out of Service	Out of Service	~0 MW
In Service	In Service	In Service	Out of Service	Out of Service	~75-80 MW

3.2. Jamestown Generation and Load

As noted in the table above, two Jamestown net load levels were reviewed. One condition assumed that the net load at Jamestown was 75-80 MW. This is consistent with Jamestown's typical net demand seen by the system and is for conditions with Jamestown running at least one generator. Jamestown has three generators, two of which are coal fired (25 MW each), the last being natural gas fired (45 MW).

No testing was done with Jamestown at their full load of about 100 MW, which was the second condition studied in the 2011 needs assessment. Instead testing was done with a Jamestown net load of approximately 0 MW, which represents a case with all

[1] 2011 Western Division Area Review Part 1 – Needs Assessment version 0, dated August 24, 2011

three of the Jamestown generators in service. While it is not Jamestown's typical practice to run this much generation, system operators can call on Jamestown to run generation to support the system. Some preliminary information has been received suggesting that one of the coal units may be retired. If this is the case, then the 0 MW cases will no longer be applicable.

During testing, an N-1 outage of any of the Jamestown generators was reviewed.

3.3. Huntley Capacitor Bank and Use of the Mobile Capacitor Banks

The current schedule for the completion of the installation of a permanent 115kV 75 MVAr capacitor bank at Huntley has the bank in service in the spring of 2013. Associated with this project is the removal of the two 52.5 MVAr mobile capacitor banks at Huntley. These units would then be available for installation at a new location as soon as winter 2012/13.

Due to concerns with low 230kV voltage at Gardenville, the plan has been to install these units at Gardenville. Initially testing for this assessment was done without these mobile units at Gardenville, partially due to uncertainty with the project schedule. This analysis found that one of the most significant issues the system would experience without the Dunkirk generation was low 230kV voltages at Gardenville. To help partially address this, study base cases were revised to include the installation of the mobile capacitors banks at Gardenville. Later phases of this study review the impact of installing permanent capacitor banks at Gardenville and moving the mobiles to another location. This is discussed later in this report.

3.4. Gardenville 230/115kV Transformers

System Operators frequently adjust the LTC settings of the National Grid and NYSEG 230/115kV transformers at Gardenville. This is done to maintain the 115kV voltages at an acceptable level. For nearly all hours between June 2003 and September 2010, the 115kV voltage at Gardenville was above 102% of nominal. The voltages were at 103%-105% of nominal about 96% of the time. In all study base cases, the transformers were adjusted to hold the 115kV voltage to about 104.5%. This did not result in any 230kV pre-contingency voltages being outside acceptable limits, but did contribute to some of the low post-contingency 230kV voltages. If the transformers had not been adjusted, the 230kV voltages would have been better post-contingency, but the 115kV voltages would have been much worse post-contingency.

3.5. Dunkirk 230/115kV Transformers

System Operators almost never adjust the LTC settings of the 230/115kV transformers at Dunkirk. Typically, the generation is used to manage the 115kV and 230kV voltages. Loss of these machines will require that LTC adjustment begin being used. In the first two phases of the analysis (loss of all units and review of the system with one or more units in service) the LTC's were left at their current setting, as this was believed to be the best alternative. When considering the impact of doing the short duration projects, it was found that the system response could be improved by adjusting these settings. For each season, year and dispatch, the voltages in the area were reviewed and a setting chosen to hold the Dunkirk 115kV voltage up around 105%. Today operating procedures allow the voltages to be held higher, up to 107%, but 105% was used to maintain some system margin.

3.6. Beck – Packard #76

The Beck – Packard 230kV line #76 is currently out of service due to the failure of the voltage regulating transformer at Beck. [redacted] A project to replace the regulator is expected to be complete in late 2012 or early 2013. As such, the line was modeled as in service in all study base cases. It is not believed that whether the line is in or out of service would have any material impact on the results of this study.

4. Study Methodology

4.1. Voltage Criteria

The voltage and thermal criteria normally used in planning studies is detailed in section 6 of the 2011 Needs Assessment. However, during initial work on this analysis, it was decided that this study should be performed to mirror the analysis that is done by system operators, thus turning this into more of an operating study instead of a planning study.

There are two main differences between an operating study and a planning study; the types of contingencies tested and the limits used.

When operators are securing the system, the voltages used to determine if action needs to be taken are detailed in Power Control Order 2-1. The voltage thresholds are divided into two limits; the Emergency Low Limit (ELL) and the Load Shed Limit (LSL). The limits are applied as follows:

- If the real time voltages or the predicted post contingency voltages are below the ELL, all possible actions short of load shedding are taken to raise the voltage.
- If the predicted post-contingency voltages are below the LSL and all possible actions short of load shedding have already been taken, a contingency plan is developed that would be implemented if the contingency/low voltages actually occurred. Pre-contingency load shedding would not be performed.
- If the real time voltage fell below the LSL and all possible actions short of load shedding have already been taken, load shedding would be done.

For this study, the LSL was the main voltage threshold used to determine if the system response to a contingency was acceptable. All pre-contingency voltages were monitored to ensure that they remained above the ELL for all hours. Post-contingency results showing voltages below the ELL but above the LSL are discussed, but are provided for information only. It is acknowledged that accepting this analysis will mean that there will be hours where the system voltages would be predicted to fall below the ELL for contingency conditions. However all voltages would be above the LSL for contingency conditions and above the ELL with all lines in service.

The ELL and LSL for each of the 230kV and 115kV buses within National Grid's control in western NY are shown in the table below.

For screening purposes, the voltage limits used for NYSEG buses in the area were 217kV and 207kV for the Stolle and Robinson Rd 230kV buses and 108kV and 100kV for the Stolle, Robinson Rd and Erie 115kV buses. National Grid limits were used for the jointly owned buses at Gardenville.

Table 2: Study Voltage Levels

Station	Voltage	Emergency Low Limit (kV)	Emergency Low Limit (pu)	Load Shed Limit (kV)	Load Shed Limit (pu)
Dunkirk - Gen In Service	230	[redacted]	[redacted]	[redacted]	[redacted]
Huntley - Gen In Service	230	[redacted]	[redacted]	[redacted]	[redacted]
Dunkirk - Gen Out of Service	230	[redacted]	[redacted]	[redacted]	[redacted]
Huntley - Gen Out of Service	230	[redacted]	[redacted]	[redacted]	[redacted]
Packard	230	[redacted]	[redacted]	[redacted]	[redacted]
Gardenville	230	[redacted]	[redacted]	[redacted]	[redacted]
Stolle Rd	230	[redacted]	[redacted]	[redacted]	[redacted]
Robinson Rd	230	[redacted]	[redacted]	[redacted]	[redacted]
Dunkirk - Gen In Service	115	[redacted]	[redacted]	[redacted]	[redacted]
Dunkirk - Gen Out of Service	115	[redacted]	[redacted]	[redacted]	[redacted]
Gardenville	115	[redacted]	[redacted]	[redacted]	[redacted]
Homer Hill	115	[redacted]	[redacted]	[redacted]	[redacted]
Huntley	115	[redacted]	[redacted]	[redacted]	[redacted]
Lockport	115	[redacted]	[redacted]	[redacted]	[redacted]
Walck Rd - Gen In Service	115	[redacted]	[redacted]	[redacted]	[redacted]
Walck Rd - Gen Out of Service	115	[redacted]	[redacted]	[redacted]	[redacted]
Andover	115	[redacted]	[redacted]	[redacted]	[redacted]
Arcade	115	[redacted]	[redacted]	[redacted]	[redacted]
Falconer	115	[redacted]	[redacted]	[redacted]	[redacted]
Packard	115	[redacted]	[redacted]	[redacted]	[redacted]
Packard	115	[redacted]	[redacted]	[redacted]	[redacted]
Stolle Rd	115	[redacted]	[redacted]	[redacted]	[redacted]
Robinson Rd	115	[redacted]	[redacted]	[redacted]	[redacted]
Erie	115	[redacted]	[redacted]	[redacted]	[redacted]

4.2. Thermal Criteria

For this analysis, loadings that were above the elements normal rating pre-contingency or above the elements STE rating post contingency are noted as unacceptable. If the loading was above the elements LTE rating, this is noted but depending on the condition, may be considered acceptable.

4.3. Contingencies Tested

The contingencies secured for depend on the voltage level. NYISO operators will secure the NPCC Bulk Power System (BPS) in Western NY for all required contingencies, including any single line outage, any double circuit tower outage, any bus fault and any fault with a breaker failure.

Operators will also secure the BPS system for an N-1-1 condition if the first outage is a planned outage (such as a maintenance condition) or in real time following an actual unplanned outage. Operators will not secure the system for an N-1-1 condition where the first outage is not planned and has not actually occurred. For example if line Y is planned to be out of service, operators will review the system and secure the system for an outage of line Y followed by any other contingency. A second example could start with line Y unexpectedly tripping. Operators would review how the system would respond following any other contingency and take action if necessary. If this condition were to occur in real time, the system changes that operators could use to solve the problem could be limited. For instance, when the line trips, it is found that the next contingency would create thermal or voltage problems, which could be corrected if a generator were in service. If this generator could not be started in a reasonable amount of time, this would not be an acceptable solution to the real time problem.

For the non-BPS system, operators will secure for any single element outage such as a line, transformer or critical generator tripping. In most cases, the system would not be secured for a double circuit tower outage, bus fault or a fault with a breaker failure. Operators will secure for an N-1-1 outage of a single element followed by another single element only if the first element outage is planned or out of service in real time.

This study considers these various outages conditions by breaking the analysis into several levels. The analysis indicates if the contingency being considered is a single element outage, N-1 multiple element outage with normal clearing (such as a double circuit tower outage or a bus fault), an N-1 multiple element outage with breaker failure (such as a bus fault with a breaker failure which results in an outage to multiple bus sections) or an N-1-1 outage.

5. System Response for Outage of all Dunkirk Generation

The following tables show the results of testing for the system with all Dunkirk units out of service and for comparison purposes the cases with all Dunkirk units in service. The results are presented for a limited number of contingencies that were found to result in the worst system response. Other contingencies may have also resulted in low voltages or overloads. During the analysis, some of the contingencies did not converge; this is indicated by NC in the tables. Only thermal overloads for the summer cases are provided.

For the selected contingencies, values are shown in the tables if the voltages fell below the Operators Emergency Low Limit.

All tables within this report use a short description to indicate the contingency being presented. Space constraints prevent fully describing the contingency. A full description for each outage can be found in Appendix C of the 2011 Needs Assessment. All contingencies listed in Appendix C were tested as part of this assessment.

Note that in some tables within this report, low voltages are noted that may be below 85% and in some instances below 60%. While the system model was able to converge and provide a solution, it should not be expected that the real system would behave in a similar manner. It is difficult to determine how the actual system would respond to contingencies that result in voltages this low.

The results can be summarized as follows:

- For the existing system, the 230kV voltages are above the Emergency Low Limit for all winter cases and contingencies and above the Load Shed Limit for all summer cases and contingencies.
- For the cases with the Dunkirk units out of service, many contingencies resulted in the 230kV voltages falling below the Emergency Low Limit with many falling below the Load Shed Limit.
- There are problems on the 115kV system whether the Dunkirk units are in service or not for both the summer and winter. The issues that exist in the area with the Dunkirk units in service are documented in the 2011 Western Division Area Review Needs Assessment.
- The 115kV problems are much more severe in cases with the Dunkirk units out of service, both in terms of the voltage magnitude and number of contingencies that create

problems. From this it can be assumed that the number of hours of exposure and the amount of load shedding that would be required to address the 115kV issues would be greater with Dunkirk out of service.

- Thermal loadings on some circuits, especially in the Niagara area, do increase. In some instances, the loadings will surpass the LTE ratings. [redacted] An operating exception in the NYSRC rules allows these facilities to be loaded up to their STE rating.
- Only one case resulted in loadings above the facilities STE rating. [redacted]

In all tables within this report, the abbreviations are as follows. As a reminder, descriptions to all contingency abbreviations can be found in the appendix to the 2011 Western Division Area Review Part 1 – Needs Assessment.

AND = Andover

DUN = Dunkirk

FAL = Falconer

GV= Gardenville (National Grid)

GVNY = Gardenville (NYSEG)

HH = Homer Hill

HUN = Huntley

NC = Non-Convergence of power flow contingency case

PK = Packard

STLE = Stolle Road.

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Table 3: Summer 230kV Analysis: Indeck in Service, Jamestown ~0 MW

Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
Season/year	Summer 2012	Summer 2012
Indeck Olean	In Service	In Service
Line #171	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW
Contingency	Lowest 230kV Voltage	Lowest 230kV Voltage
Pre-contingency	-	[redacted]
68 230	-	[redacted]
37 NYSEG	-	[redacted]
77+78 230	-	[redacted]
77+80 230	-	[redacted]
78+79 230	-	[redacted]
79+80 230	-	[redacted]
68+160	-	[redacted]
37+67	-	[redacted]
DUN 230-2	-	[redacted]
DUN 230-1	-	-
HUN230 BS67/68	-	[redacted]
PK230 2+4	-	[redacted]
HUN 230-1+2	[redacted]	[redacted]

Table 4: Summer 230kV Analysis: Indeck in Service, Jamestown ~70 MW

Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
Season/year	Summer 2012	Summer 2012
Indeck Olean	In Service	In Service
Line #171	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW
Contingency	Lowest 230kV Voltage	Lowest 230kV Voltage
Pre-contingency	-	[redacted]
68 230	-	[redacted]
37 NYSEG	-	[redacted]
77+78 230	-	[redacted]
77+80 230	-	[redacted]
78+79 230	-	[redacted]
79+80 230	-	[redacted]
68+160	-	[redacted]
37+67	-	[redacted]
DUN 230-2	-	[redacted]
DUN 230-1	-	-
HUN230 BS67/68	-	[redacted]
PK230 2+4	-	[redacted]
HUN 230-1+2	[redacted]	[redacted]

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Table 5: Summer 230kV Analysis: Indeck Out of Service, Jamestown ~0 MW

Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
Season/year	Summer 2012	Summer 2012
Indeck Olean	Out of Service	Out of Service
Line #171	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW
Contingency	Lowest 230kV Voltage	Lowest 230kV Voltage
Pre-contingency	-	[redacted]
68 230	-	[redacted]
37 NYSEG	-	[redacted]
77+78 230	-	[redacted]
77+80 230	-	[redacted]
78+79 230	-	[redacted]
79+80 230	-	[redacted]
68+160	-	[redacted]
37+67	-	[redacted]
DUN 230-2	-	[redacted]
DUN 230-1	-	[redacted]
HUN230 BS67/68	-	[redacted]
PK230 2+4	-	[redacted]
HUN 230-1+2	[redacted]	[redacted]

Table 6: Summer 230kV Analysis: Indeck Out of Service, Jamestown ~70 MW

Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
Season/year	Summer 2012	Summer 2012
Indeck Olean	Out of Service	Out of Service
Line #171	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW
Contingency	Lowest 230kV Voltage	Lowest 230kV Voltage
Pre-contingency	-	[redacted]
68 230	-	[redacted]
37 NYSEG	-	[redacted]
77+78 230	-	[redacted]
77+80 230	-	[redacted]
78+79 230	-	[redacted]
79+80 230	-	[redacted]
68+160	-	[redacted]
37+67	-	[redacted]
DUN 230-2	-	[redacted]
DUN 230-1	-	[redacted]
HUN230 BS67/68	-	[redacted]
PK230 2+4	-	[redacted]
HUN 230-1+2	[redacted]	[redacted]

Table 7: Winter 230kV Analysis: Indeck in Service, Jamestown ~0 MW

Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
Season/year	Winter 2012	Winter 2012
Indeck Olean	In Service	In Service
Line #171	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW
Contingency	Lowest 230kV Voltage	Lowest 230kV Voltage
Pre-contingency	-	-
68 230	-	-
37 NYSEG	-	-
77+78 230	-	-
77+80 230	-	-
78+79 230	-	-
79+80 230	-	[redacted]
68+160	-	-
37+67	-	-
DUN 230-2	-	[redacted]
DUN 230-1	-	-
HUN230 BS67/68	-	-
PK230 2+4	-	-
HUN 230-1+2	-	[redacted]

Table 8: Winter 230kV Analysis: Indeck In Service, Jamestown ~70 MW

Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
Season/year	Winter 2012	Winter 2012
Indeck Olean	In Service	In Service
Line #171	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW
Contingency	Lowest 230kV Voltage	Lowest 230kV Voltage
Pre-contingency	-	[redacted]
68 230	-	-
37 NYSEG	-	-
77+78 230	-	-
77+80 230	-	-
78+79 230	-	-
79+80 230	-	[redacted]
68+160	-	-
37+67	-	-
DUN 230-2	-	[redacted]
DUN 230-1	-	-
HUN230 BS67/68	-	-
PK230 2+4	-	[redacted]
HUN 230-1+2	-	-

Table 9: Winter 230kV Analysis: Indeck Out of Service, Jamestown ~0 MW

Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
Season/year	Winter 2012	Winter 2012
Indeck Olean	Out of Service	Out of Service
Line #171	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW
Contingency	Lowest 230kV Voltage	Lowest 230kV Voltage
Pre-contingency	-	[redacted]
68 230	-	[redacted]
37 NYSEG	-	-
77+78 230	-	[redacted]
77+80 230	-	-
78+79 230	-	-
79+80 230	-	[redacted]
68+160	-	-
37+67	-	-
DUN 230-2	-	[redacted]
DUN 230-1	-	-
HUN230 BS67/68	-	-
PK230 2+4	-	[redacted]
HUN 230-1+2	-	[redacted]

Table 10: Winter 230kV Analysis: Indeck Out of Service, Jamestown ~70 MW

Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
Season/year	Winter 2012	Winter 2012
Indeck Olean	Out of Service	Out of Service
Line #171	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW
Contingency	Lowest 230kV Voltage	Lowest 230kV Voltage
Pre-contingency	-	[redacted]
68 230	-	[redacted]
37 NYSEG	-	[redacted]
77+78 230	-	[redacted]
77+80 230	-	[redacted]
78+79 230	-	[redacted]
79+80 230	-	[redacted]
68+160	-	[redacted]
37+67	-	[redacted]
DUN 230-2	-	[redacted]
DUN 230-1	-	[redacted]
HUN230 BS67/68	-	[redacted]
PK230 2+4	-	[redacted]
HUN 230-1+2	-	[redacted]

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Table 11: Summer 115kV Analysis: Indeck in Service, Jamestown ~0 MW

Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
Season/year	Summer 2012	Summer 2012
Indeck Olean	In Service	In Service
Line #171	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW
Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage
Pre-contingency	-	-
68 230	-	-
37 NYSEG	-	-
66 NYSEG	-	-
151	-	[redacted]
152	-	-
167	-	-
HH CAP	-	-
AND CAP	-	-
FAL CAP	-	-
DUN TB31/41	-	-
INDECKO	-	[redacted]
JAMESTOWNU1/3	-	-
151 GV	-	[redacted]
152 GV	-	-
160 DUN	-	-
161 DUN	-	-
162 DUN	-	-
73+74 230	-	-
77+78 230	-	[redacted]
77+80 230	-	-
78+79 230	-	-
79+80 230	-	[redacted]
37+67	-	-
151+152	[redacted]	[redacted]
152+167	-	[redacted]
141+142	-	-
153+154	-	-
161+162	-	-
DUN 230-1	-	-
DUN 230-2	-	[redacted]
DUN 115-1	-	[redacted]
DUN 115-2	-	[redacted]
HUN230 BS67/68	-	-
FAL BUS1	-	[redacted]
FAL BUS2	-	[redacted]
HH BUS1	-	[redacted]
HH BUS2	-	-
GV230 BS1	-	-
GVNY230 BS7	-	-
GV115 BS3	-	-
GV115 BS4	-	[redacted]
STLE 230 BUS	-	-

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Table 12: Summer 115kV Analysis: Indeck in Service, Jamestown ~70 MW

Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
Season/year	Summer 2012	Summer 2012
Indeck Olean	In Service	In Service
Line #171	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW
Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage
Pre-contingency	-	-
68 230	-	[redacted]
37 NYSEG	-	[redacted]
66 NYSEG	-	[redacted]
151	-	[redacted]
152	-	[redacted]
167	-	-
HH CAP	-	[redacted]
AND CAP	-	[redacted]
FAL CAP	-	[redacted]
DUN TB31/41	-	[redacted]
INDECKO	-	[redacted]
JAMESTOWNU1/3	-	[redacted]
151 GV	-	[redacted]
152 GV	-	[redacted]
160 DUN	-	[redacted]
161 DUN	-	[redacted]
162 DUN	-	[redacted]
73+74 230	-	[redacted]
77+78 230	-	[redacted]
77+80 230	-	[redacted]
78+79 230	-	[redacted]
79+80 230	-	[redacted]
37+67	-	[redacted]
151+152	[redacted]	[redacted]
152+167	-	[redacted]
141+142	-	[redacted]
153+154	-	[redacted]
161+162	-	[redacted]
DUN 230-1	-	[redacted]
DUN 230-2	-	[redacted]
DUN 115-1	-	[redacted]
DUN 115-2	[redacted]	[redacted]
HUN230 BS67/68	-	[redacted]
FAL BUS1	-	[redacted]
FAL BUS2	-	[redacted]
HH BUS1	-	[redacted]
HH BUS2	-	[redacted]
GV230 BS1	-	[redacted]
GVNY230 BS7	-	[redacted]
GV115 BS3	-	[redacted]
GV115 BS4	-	[redacted]
STLE 230 BUS	-	[redacted]

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Table 13: Summer 115kV Analysis: Indeck Out of Service, Jamestown ~0 MW

Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
Season/year	Summer 2012	Summer 2012
Indeck Olean	Out of Service	Out of Service
Line #171	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW
Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage
Pre-contingency	-	[redacted]
68 230	-	[redacted]
37 NYSEG	-	[redacted]
66 NYSEG	-	[redacted]
151	[redacted]	[redacted]
152	[redacted]	[redacted]
167	-	[redacted]
HH CAP	-	[redacted]
AND CAP	-	[redacted]
FAL CAP	-	[redacted]
DUN TB31/41	-	[redacted]
INDECKO	-	-
JAMESTOWNU1/3	-	[redacted]
151 GV	[redacted]	[redacted]
152 GV	[redacted]	[redacted]
160 DUN	-	[redacted]
161 DUN	-	[redacted]
162 DUN	-	[redacted]
73+74 230	-	[redacted]
77+78 230	-	[redacted]
77+80 230	-	[redacted]
78+79 230	-	[redacted]
79+80 230	-	[redacted]
37+67	-	[redacted]
151+152	[redacted]	[redacted]
152+167	[redacted]	[redacted]
141+142	-	[redacted]
153+154	[redacted]	[redacted]
161+162	-	[redacted]
DUN 230-1	-	[redacted]
DUN 230-2	-	[redacted]
DUN 115-1	-	[redacted]
DUN 115-2	[redacted]	[redacted]
HUN230 BS67/68	-	[redacted]
FAL BUS1	-	[redacted]
FAL BUS2	-	[redacted]
HH BUS1	-	[redacted]
HH BUS2	-	[redacted]
GV230 BS1	-	[redacted]
GVNY230 BS7	-	[redacted]
GV115 BS3	[redacted]	[redacted]
GV115 BS4	[redacted]	[redacted]
STLE 230 BUS	-	[redacted]

Table 14: Summer 115kV Analysis: Indeck Out of Service, Jamestown ~70 MW

Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
Season/year	Summer 2012	Summer 2012
Indeck Olean	Out of Service	Out of Service
Line #171	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW
Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage
Pre-contingency	-	[redacted]
68 230	-	[redacted]
37 NYSEG	-	[redacted]
66 NYSEG	-	[redacted]
151	[redacted]	[redacted]
152	[redacted]	[redacted]
167	-	[redacted]
HH CAP	[redacted]	[redacted]
AND CAP	[redacted]	[redacted]
FAL CAP	-	[redacted]
DUN TB31/41	-	[redacted]
INDECKO	-	-
JAMESTOWNU1/3	-	[redacted]
151 GV	[redacted]	[redacted]
152 GV	[redacted]	[redacted]
160 DUN	[redacted]	[redacted]
161 DUN	-	[redacted]
162 DUN	-	[redacted]
73+74 230	-	[redacted]
77+78 230	-	[redacted]
77+80 230	-	[redacted]
78+79 230	-	[redacted]
79+80 230	-	[redacted]
37+67	-	[redacted]
151+152	[redacted]	[redacted]
152+167	[redacted]	[redacted]
141+142	-	[redacted]
153+154	[redacted]	[redacted]
161+162	[redacted]	[redacted]
DUN 230-1	-	[redacted]
DUN 230-2	-	[redacted]
DUN 115-1	-	[redacted]
DUN 115-2	[redacted]	[redacted]
HUN230 BS67/68	-	[redacted]
FAL BUS1	[redacted]	[redacted]
FAL BUS2	[redacted]	[redacted]
HH BUS1	-	[redacted]
HH BUS2	[redacted]	[redacted]
GV230 BS1	-	[redacted]
GVNY230 BS7	-	[redacted]
GV115 BS3	[redacted]	[redacted]
GV115 BS4	[redacted]	[redacted]
STLE 230 BUS	-	[redacted]

Table 15: Winter 115kV Analysis: Indeck In Service, Jamestown ~0 MW

Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
Season/year	Winter 2012	Winter 2012
Indeck Olean	In Service	In Service
Line #171	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW
Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage
Pre-contingency	-	-
68 230	-	-
37 NYSEG	-	-
66 NYSEG	-	-
151	-	[redacted]
152	-	-
167	-	-
HH CAP	-	-
AND CAP	-	-
FAL CAP	-	-
DUN TB31/41	-	-
INDECKO	-	[redacted]
JAMESTOWNU1/3	-	-
151 GV	-	[redacted]
152 GV	-	-
160 DUN	-	-
161 DUN	-	-
162 DUN	-	-
73+74 230	-	-
77+78 230	-	-
77+80 230	-	-
78+79 230	-	-
79+80 230	-	-
37+67	-	-
151+152	[redacted]	[redacted]
152+167	-	-
141+142	-	-
153+154	-	-
161+162	-	-
DUN 230-1	-	-
DUN 230-2	-	-
DUN 115-1	-	-
DUN 115-2	-	[redacted]
HUN230 BS67/68	-	-
FAL BUS1	-	-
FAL BUS2	-	-
HH BUS1	-	[redacted]
HH BUS2	-	-
GV230 BS1	-	-
GVNY230 BS7	-	-
GV115 BS3	-	-
GV115 BS4	-	[redacted]
STLE 230 BUS	-	-

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Table 16: Winter 115kV Analysis: Indeck In Service, Jamestown ~70 MW

Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
Season/year	Winter 2012	Winter 2012
Indeck Olean	In Service	In Service
Line #171	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW
Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage
Pre-contingency	-	-
68 230	-	-
37 NYSEG	-	-
66 NYSEG	-	-
151	[redacted]	[redacted]
152	-	-
167	-	-
HH CAP	-	-
AND CAP	-	[redacted]
FAL CAP	-	-
DUN TB31/41	-	-
INDECKO	-	[redacted]
JAMESTOWNU1/3	-	-
151 GV	[redacted]	[redacted]
152 GV	-	[redacted]
160 DUN	-	[redacted]
161 DUN	-	-
162 DUN	-	-
73+74 230	-	[redacted]
77+78 230	-	-
77+80 230	-	-
78+79 230	-	-
79+80 230	-	[redacted]
37+67	-	-
151+152	[redacted]	[redacted]
152+167	-	[redacted]
141+142	-	-
153+154	-	[redacted]
161+162	-	[redacted]
DUN 230-1	-	-
DUN 230-2	-	[redacted]
DUN 115-1	-	[redacted]
DUN 115-2	[redacted]	[redacted]
HUN230 BS67/68	-	-
FAL BUS1	-	[redacted]
FAL BUS2	-	[redacted]
HH BUS1	[redacted]	[redacted]
HH BUS2	-	-
GV230 BS1	-	-
GVNY230 BS7	-	-
GV115 BS3	-	[redacted]
GV115 BS4	-	[redacted]
STLE 230 BUS	-	-

Table 17: Winter 115kV Analysis: Indeck Out of Service, Jamestown ~0 MW

Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
Season/year	Winter 2012	Winter 2012
Indeck Olean	Out of Service	Out of Service
Line #171	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW
Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage
Pre-contingency	-	-
68 230	-	[redacted]
37 NYSEG	-	[redacted]
66 NYSEG	-	[redacted]
151	[redacted]	[redacted]
152	[redacted]	[redacted]
167	-	[redacted]
HH CAP	-	[redacted]
AND CAP	[redacted]	[redacted]
FAL CAP	-	[redacted]
DUN TB31/41	-	[redacted]
INDECKO	-	-
JAMESTOWNNU1/3	-	[redacted]
151 GV	[redacted]	[redacted]
152 GV	[redacted]	[redacted]
160 DUN	[redacted]	[redacted]
161 DUN	-	[redacted]
162 DUN	-	[redacted]
73+74 230	-	[redacted]
77+78 230	-	[redacted]
77+80 230	-	[redacted]
78+79 230	-	[redacted]
79+80 230	-	[redacted]
37+67	-	[redacted]
151+152	[redacted]	[redacted]
152+167	[redacted]	[redacted]
141+142	-	[redacted]
153+154	[redacted]	[redacted]
161+162	-	[redacted]
DUN 230-1	-	[redacted]
DUN 230-2	-	[redacted]
DUN 115-1	-	[redacted]
DUN 115-2	[redacted]	[redacted]
HUN230 BS67/68	-	[redacted]
FAL BUS1	[redacted]	[redacted]
FAL BUS2	[redacted]	[redacted]
HH BUS1	-	[redacted]
HH BUS2	-	[redacted]
GV230 BS1	-	[redacted]
GVNY230 BS7	-	[redacted]
GV115 BS3	[redacted]	[redacted]
GV115 BS4	[redacted]	[redacted]
STLE 230 BUS	-	[redacted]

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Table 18: Winter 115kV Analysis: Indeck Out of Service, Jamestown ~70 MW

Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
Season/year	Winter 2012	Winter 2012
Indeck Olean	Out of Service	Out of Service
Line #171	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW
Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage
Pre-contingency	-	-
68 230	-	[redacted]
37 NYSEG	-	[redacted]
66 NYSEG	-	[redacted]
151	[redacted]	[redacted]
152	[redacted]	[redacted]
167	[redacted]	[redacted]
HH CAP	[redacted]	[redacted]
AND CAP	[redacted]	[redacted]
FAL CAP	-	[redacted]
DUN TB31/41	-	[redacted]
INDECKO	-	-
JAMESTOWNNU1/3	-	[redacted]
151 GV	[redacted]	[redacted]
152 GV	[redacted]	[redacted]
160 DUN	[redacted]	[redacted]
161 DUN	-	[redacted]
162 DUN	-	[redacted]
73+74 230	-	[redacted]
77+78 230	-	[redacted]
77+80 230	-	[redacted]
78+79 230	-	[redacted]
79+80 230	-	[redacted]
37+67	-	[redacted]
151+152	[redacted]	[redacted]
152+167	[redacted]	[redacted]
141+142	[redacted]	[redacted]
153+154	[redacted]	[redacted]
161+162	[redacted]	[redacted]
DUN 230-1	-	[redacted]
DUN 230-2	-	[redacted]
DUN 115-1	[redacted]	[redacted]
DUN 115-2	[redacted]	[redacted]
HUN230 BS67/68	-	[redacted]
FAL BUS1	[redacted]	[redacted]
FAL BUS2	[redacted]	[redacted]
HH BUS1	-	[redacted]
HH BUS2	[redacted]	[redacted]
GV230 BS1	-	[redacted]
GVNY230 BS7	-	[redacted]
GV115 BS3	[redacted]	[redacted]
GV115 BS4	[redacted]	[redacted]
STLE 230 BUS	-	[redacted]

Table 19: Summer Thermal Analysis: Indeck In Service, Jamestown ~0 MW

	Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
	Season/year	Summer 2012	Summer 2012
	Indeck Olean	In Service	In Service
	Line #171	Out of Service	Out of Service
	Jamestown Load	~0 MW	~0 MW
Element	Contingency	% of LTE	% of LTE
Huntley - Gardenville #80	79 230	-	-
Niagara - Packard #62	61+64 230	-	-
Gardenville - Dunkirk #141	73+74 230	-	-
Niagara - Gardenville #180	77+78 230	-	-
Packard - Erie #181	77+78 230	-	[redacted]
Packard - Gardenville #182	77+78 230	-	-
Huntley - Gardenville #80	78+79 230	-	-
Niagara - Gardenville #180	79+80 230	-	[redacted]
Packard - Erie #181	79+80 230	-	[redacted]
Packard - Gardenville #182	79+80 230	-	[redacted]
Packard - Gardenville #182	180+181	-	-
Packard - Erie #181	180+182N	-	[redacted]
Packard - Erie #181	180+182S	-	[redacted]
Dunkirk TB #41/31	DUN TB31/41	-	-
Dunkirk TB #41	DUN 230-1	-	-
Niagara - Packard #192	191	[redacted]	[redacted]
Niagara - Packard #191	192	-	[redacted]
Niagara - Packard #192	61+191	[redacted]	[redacted]
Niagara - Packard #192	101+191	[redacted]	[redacted]
Niagara - Packard #191	192+195	-	[redacted]

Table 20: Summer Thermal Analysis: Indeck In Service, Jamestown ~70 MW

	Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
	Season/year	Summer 2012	Summer 2012
	Indeck Olean	In Service	In Service
	Line #171	Out of Service	Out of Service
	Jamestown Load	~70 MW	~70 MW
Element	Contingency	% of LTE	% of LTE
Huntley - Gardenville #80	79 230	-	[redacted]
Niagara - Packard #62	61+64 230	-	-
Gardenville - Dunkirk #141	73+74 230	-	-
Niagara - Gardenville #180	77+78 230	-	[redacted]
Packard - Erie #181	77+78 230	-	[redacted]
Packard - Gardenville #182	77+78 230	-	-
Huntley - Gardenville #80	78+79 230	-	-
Niagara - Gardenville #180	79+80 230	-	[redacted]
Packard - Erie #181	79+80 230	-	[redacted]
Packard - Gardenville #182	79+80 230	-	[redacted]
Packard - Gardenville #182	180+181	-	-
Packard - Erie #181	180+182N	-	[redacted]
Packard - Erie #181	180+182S	-	[redacted]
Dunkirk TB #41/31	DUN TB31/41	-	-
Dunkirk TB #41	DUN 230-1	-	-
Niagara - Packard #192	191	[redacted]	[redacted]
Niagara - Packard #191	192	-	[redacted]
Niagara - Packard #192	61+191	[redacted]	[redacted]
Niagara - Packard #192	101+191	[redacted]	[redacted]
Niagara - Packard #191	192+195	-	[redacted]

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Table 21: Summer Thermal Analysis: Indeck Out of Service, Jamestown ~0 MW

	Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
	Season/year	Summer 2012	Summer 2012
	Indeck Olean	Out of Service	Out of Service
	Line #171	Out of Service	Out of Service
	Jamestown Load	~0 MW	~0 MW
Element	Units 1-4 IS	Units 1-4 OOS	% of LTE
Huntley - Gardenville #80	79 230	-	[redacted]
Niagara - Packard #62	61+64 230	-	[redacted]
Gardenville - Dunkirk #141	73+74 230	-	-
Niagara - Gardenville #180	77+78 230	-	[redacted]
Packard - Erie #181	77+78 230	-	[redacted]
Packard - Gardenville #182	77+78 230	-	[redacted]
Huntley - Gardenville #80	78+79 230	-	-
	79+80 230	-	[redacted]
	79+80 230	-	[redacted]
	79+80 230	-	[redacted]
Packard - Gardenville #182	180+181	-	[redacted]
Packard - Erie #181	180+182N	-	[redacted]
Packard - Erie #181	180+182S	-	[redacted]
Dunkirk TB #41/31	DUN TB31/41	-	-
Dunkirk TB #41	DUN 230-1	-	-
Niagara - Packard #192	191	[redacted]	[redacted]
Niagara - Packard #191	192	-	[redacted]
Niagara - Packard #192	61+191	[redacted]	[redacted]
Niagara - Packard #192	101+191	[redacted]	[redacted]
Niagara - Packard #191	192+195	-	[redacted]

Table 22: Summer Thermal Analysis: Indeck Out of Service, Jamestown ~70 MW

	Dunkirk Status	Units 1-4 IS	Units 1-4 OOS
	Season/year	Summer 2012	Summer 2012
	Indeck Olean	Out of Service	Out of Service
	Line #171	Out of Service	Out of Service
	Jamestown Load	~70 MW	~70 MW
Element	Units 1-4 IS	Units 1-4 OOS	% of LTE
Huntley - Gardenville #80	79 230	-	[redacted]
Niagara - Packard #62	61+64 230	-	[redacted]
Gardenville - Dunkirk #141	73+74 230	-	[redacted]
	77+78 230	-	[redacted]
	77+78 230	-	[redacted]
Packard - Gardenville #182	77+78 230	-	[redacted]
Huntley - Gardenville #80	78+79 230	-	[redacted]
Niagara - Gardenville #180	79+80 230	-	[redacted]
Packard - Erie #181	79+80 230	-	[redacted]
Packard - Gardenville #182	79+80 230	-	[redacted]
Packard - Gardenville #182	180+181	-	[redacted]
Packard - Erie #181	180+182N	-	[redacted]
Packard - Erie #181	180+182S	-	[redacted]
Dunkirk TB #41/31	DUN TB31/41	-	[redacted]
Dunkirk TB #41	DUN 230-1	-	[redacted]
Niagara - Packard #192	191	[redacted]	[redacted]
Niagara - Packard #191	192	-	[redacted]
Niagara - Packard #192	61+191	[redacted]	[redacted]
Niagara - Packard #192	101+191	[redacted]	[redacted]
Niagara - Packard #191	192+195	-	[redacted]

6. Review of Dunkirk Generation Needs

Analysis similar to the previous section was done for several possible combinations of Dunkirk generation. This was done to determine what combinations would result in acceptable system operation while long term system reinforcements are developed and constructed. As discussed earlier in this document, acceptable voltages are defined as being above the LSL post-contingency and above the ELL pre-contingency.

This analysis was split into three sections. The first discusses what generation would need to be in service to keep the 230kV voltages above their load shed limit for any N-1 contingency, including double circuit tower outages, bus faults and line, transformer or bus faults with a breaker failure. The next section discusses the system issues on the 115kV system. The final section discusses some limited N-1-1 conditions, focusing on their impact on the 230kV system.

In order to simplify this discussion, the tables in the following sections only provide a pass/fail indication. If one contingency resulted in a voltage that was 0.1% below the load shed limit, it resulted in Fail being indicated.

For those tests that resulted in a Fail, an indication is provided of how many hours per summer or winter season the contingency would have resulted in voltages below the load shed limit. This testing was done by scaling all conforming loads in the Western zone down in increments until the voltages reached an acceptable level. A load duration curve, created from four years of Zone A load data, was then used to estimate the number of hours where the load surpassed the capability. This was done using four years of zonal loads, averaged together to represent a typical year. All NYSEG, NYPA, sub-transmission and National Grid conforming load in zone A and B was scaled. The transmission connected customers were not scaled up or down. Some customers have higher loads in off peak periods, which could negatively affect the voltage problems; this was ignored. The scaling included the Arcade and Jamestown load. The Jamestown load noted in the table is the net load in the initial case and was lower as the load was scaled down.

As the load was scaled down, the pre-contingency voltage had to be within acceptable limits. If the voltage was above limits, capacitor banks at Gardenville, Falconer or Homer Hill were adjusted. The tap settings on the Gardenville transformers were also adjusted as appropriate. In many cases, this greatly increased the number of hours that generation was found to be needed to support the local 115kV system.

The testing does not reflect the generation changes that are observed during off peak periods. If one or more units were not in service, the results will change. The testing also does not reflect the fact that on any day, one or more system elements, including lines, transformers, generators or capacitor banks, could be out of service. These results are for N-1 conditions only.

6.1. Use of Dunkirk Generation in Real Time Operation

As discussed above, estimates for the number of hours of exposure are provided below. An indication of the hours of exposure is not the same thing as the number of hours that generation would need to be in service. While this is generally true for all generation, it is especially relevant when discussing use of generation at Dunkirk.

[redacted]

If the operators see one hour in their security analysis where the voltage is anticipated to be below the emergency low limits, generation would be called to run. If they are called, they run for 24 hours. Thus, an estimate of the number of hours does not reflect how many total hours or days generation would operate to support the system, which could be substantially longer. [redacted] The tables below only show the hours of exposure to the problems, not the number of hours that generation may be in service to support the system.

6.2. Review of Dunkirk Generation Needs for 230kV System Operation

The following tables summarize the conditions for which generation at Dunkirk would be needed to support the 230kV voltages under contingency conditions. This can be summarized as follows

- For conditions [redacted] at least one generator at either voltage would be required for 50 hours in the summer and at least two generators would be required for 25 of those hours. The two generators must include at least one 230kV connected unit. No generation was required for the winter.
- For conditions [redacted] at least one generator at either voltage would be required for 100 hours in the summer and at least two generators would be required for 25 of those hours. The two generators must include at least one 230kV connected unit. No generation was required for the winter.
- For conditions [redacted] at least one generator at either voltage would be required for 200 hours in the summer and at least two generators would be required for 50 of those hours. To provide adequate support the two generators should be the two 230kV connected units. One generator at either voltage would be required for 20 hours in the winter.
- For conditions [redacted] at least one generator at either voltage would be required for 200 hours in the summer and at least two generators at either voltage would be required for 100 of those hours. Three generators at either voltage would be required for 25 of those hours. One generator connected to the 115kV system would be required for 20 hours in the winter; one 230kV unit would not be enough.

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Table 23: Generation Needs: Summer, Indeck In Service, Jamestown ~0 MW

Operator Load Shed Limits									
Dunkirk Status	Units 1-4 OOS	Units 1/2/4 OOS	Units 2-4 OOS	Units 3-4 OOS	Units 2+4 OOS	Units 1+2 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	1	0	0	1	2	2	1	2
Dunkirk 115kV Units In Service	0	0	1	2	1	0	1	2	2
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	In Service	In Service	In Service	In Service	In Service	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW
All 230kV voltages above Operating Emergency Low Limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 multiple element outage with breaker failure	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 24: Generation Needs: Summer, Indeck In Service, Jamestown ~70 MW

Operator Load Shed Limits									
Dunkirk Status	Units 1-4 OOS	Units 1/2/4 OOS	Units 2-4 OOS	Units 3-4 OOS	Units 2+4 OOS	Units 1+2 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	1	0	0	1	2	2	1	2
Dunkirk 115kV Units In Service	0	0	1	2	1	0	1	2	2
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	In Service	In Service	In Service	In Service	In Service	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW
All 230kV voltages above Operating Emergency Low Limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 multiple element outage with breaker failure	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 25: Generation Needs: Summer, Indeck Out of Service, Jamestown ~0 MW

Operator Load Shed Limits

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Dunkirk Status	Units 1-4 OOS	Units 1/2/4 OOS	Units 2-4 OOS	Units 3-4 OOS	Units 2+4 OOS	Units 1+2 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	1	0	0	1	2	2	1	2
Dunkirk 115kV Units In Service	0	0	1	2	1	0	1	2	2
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW
All 230kV voltages above Operating Emergency Low Limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 multiple element outage with breaker failure	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 26: Generation Needs: Summer, Indeck Out of Service, Jamestown ~70 MW

Operator Load Shed Limits									
Dunkirk Status	Units 1-	Units 1/2/4	Units 2-	Units 3-	Units 2+4	Units 1+2	Units 2	Units 4	Units 1-4

	4 OOS	OOS	4 OOS	4 OOS	OOS	OOS	OOS	OOS	IS
Dunkirk 230kV Units In Service	0	1	0	0	1	2	2	1	2
Dunkirk 115kV Units In Service	0	0	1	2	1	0	1	2	2
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW
All 230kV voltages above Operating Emergency Low Limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 multiple element outage with breaker failure	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 27: Generation Needs: Winter, Indeck In Service, Jamestown ~0 MW

Operator Load Shed Limits									
Dunkirk Status	Units 1-	Units 1/2/4	Units 2-	Units 3-	Units 2+4	Units 1+2	Units 2	Units 4	Units 1-4

	4 OOS	OOS	4 OOS	4 OOS	OOS	OOS	OOS	OOS	IS
Dunkirk 230kV Units In Service	0	1	0	0	1	2	2	1	2
Dunkirk 115kV Units In Service	0	0	1	2	1	0	1	2	2
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013
Indeck Olean	In Service	In Service	In Service	In Service	In Service	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW
All 230kV voltages above Operating Emergency Low Limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 multiple element outage with breaker failure	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 28: Generation Needs: Winter, Indeck In Service, Jamestown ~70 MW

Operator Load Shed Limits									
Dunkirk Status	Units 1-4 OOS	Units 1/2/4 OOS	Units 2-4 OOS	Units 3-4 OOS	Units 2+4 OOS	Units 1+2 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS

Dunkirk 230kV Units In Service	0	1	0	0	1	2	2	1	2
Dunkirk 115kV Units In Service	0	0	1	2	1	0	1	2	2
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013
Indeck Olean	In Service	In Service	In Service	In Service	In Service	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW
All 230kV voltages above Operating Emergency Low Limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 multiple element outage with breaker failure	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 29: Generation Needs: Winter, Indeck Out of Service, Jamestown ~0 MW

Operator Load Shed Limits									
Dunkirk Status	Units 1-4 OOS	Units 1/2/4 OOS	Units 2-4 OOS	Units 3-4 OOS	Units 2+4 OOS	Units 1+2 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV	0	1	0	0	1	2	2	1	2

Units In Service									
Dunkirk 115kV Units In Service	0	0	1	2	1	0	1	2	2
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW
All 230kV voltages above Operating Emergency Low Limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 multiple element outage with breaker failure	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 30: Generation Needs: Winter, Indeck Out of Service, Jamestown ~70 MW

Operator Load Shed Limits									
Dunkirk Status	Units 1-4 OOS	Units 1/2/4 OOS	Units 2-4 OOS	Units 3-4 OOS	Units 2+4 OOS	Units 1+2 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	1	0	0	1	2	2	1	2

Dunkirk 115kV Units In Service	0	0	1	2	1	0	1	2	2
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW
All 230kV voltages above Operating Emergency Low Limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 230kV voltages within load shed limit for N-1 multiple element outage with breaker failure	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

6.3. Review of Dunkirk Generation Needs for 115kV System Operation

An analysis similar to that discussed in the preceding section was also done for the 115kV system. These results are more complicated as even with all Dunkirk generation in service some problems exist. Depending on the season and status of generation at Jamestown and Indeck Olean, as many as eight different contingencies resulted in voltages below the load shed limit for the system with all generation at Dunkirk in service. [redacted]

Because of the problems that exist with all units in service, it is difficult to use only the Pass/Fail results to recommend how many units would be required. Instead, the review focused on restoring the system to the same level of exposure, using the estimated hours of risk. Based on the hours of risk, the following would be recommended. In the tables that follow, red indicates that the system is performing worse than the existing system with all Dunkirk generation in service. Green indicates that the system performance is similar to the existing system with all Dunkirk generation in service.

When reviewing these results, testing considered an N-1 multiple element outage with normal clearing, such as a double circuit tower outage or a bus fault. However, it should be noted that these contingencies are not normally secured for by system operators on the 115kV system.

- [redacted] at least two generators at either voltage would be required for 20 hours in the winter. One generator at either voltage would be required for 25 hours in the summer. This generation would result in all voltages being above the load shed limits for all hours.
- [redacted], at least two generators at either voltage would be required for 25 hours in the summer. This would result in all voltages being above the load shed limits for the summer. For the winter, at least one generator would be required for 75 hours. For up to 20 hours per winter there would continue to be an exposure to only multiple element contingencies (no single element contingencies) that cannot be corrected even by using all four Dunkirk units. The exposure to these problems would only be marginally reduced by using two Dunkirk units. Even less reduction was observed when going from two units to three or four units. The system performance was observed to be better when using at least one 115kV unit.
- [redacted] at least two generators at either voltage would be required for 25 hours in the summer. This would result in all voltages being above the load shed limits for the summer for any single element outage. For up to 200 hours per summer there would continue to be an exposure to only multiple element contingencies (no single element contingencies) that cannot be corrected even by using all four Dunkirk units. For the winter, at least one generator would be required for 175 hours. For up to 20 hours per winter, there would continue to be an exposure to single element contingencies and over 1000 hours there would be an exposure to multiple element contingencies that cannot be corrected even by using all four Dunkirk units. The exposure to these problems would only be marginally reduced by using two Dunkirk units. Even less reduction was observed when going from two units to three or four units. The system performance was

observed to be better when using at least one 115kV unit.

- [redacted] at least one generator at either voltage would be required for 100 hours in the summer and two would be required for 25 of those hours. This would result in all voltages being above the load shed limits for the summer for any single element outage. For up to 200 hours per summer there would continue to be an exposure to only multiple element contingencies (no single element contingencies) that cannot be corrected even by using all four Dunkirk units. For the winter, at least one generator would be required for 400 hours. For up to 20 hours per winter, there would continue to be an exposure to single element contingencies and over 1000 hours there would be an exposure to multiple element contingencies that cannot be corrected even by using all four Dunkirk units. The exposure to these problems would only be marginally reduced by using two Dunkirk units. Even less reduction was observed when going from two units to three or four units. The system performance was observed to be better when using at least one 115kV unit

Table 31: Local Generation Needs: Summer, Indeck In Service, Jamestown ~0 MW

Operator Load Shed Limits									
Dunkirk Status	Units 1-4 OOS	Units 1/2/4 OOS	Units 2-4 OOS	Units 3-4 OOS	Units 2+4 OOS	Units 1+2 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	1	0	0	1	2	2	1	2
Dunkirk 115kV Units In Service	0	0	1	2	1	0	1	2	2
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	In Service	In Service	In Service	In Service	In Service	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW
All 115kV voltages above Operating Emergency Low Limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within load shed limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within load shed limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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Table 32: Local Generation Needs: Summer, Indeck In Service, Jamestown ~70 MW

Operator Load Shed Limits									
Dunkirk Status	Units 1-4 OOS	Units 1/2/4 OOS	Units 2-4 OOS	Units 3-4 OOS	Units 2+4 OOS	Units 1+2 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	1	0	0	1	2	2	1	2
Dunkirk 115kV Units In Service	0	0	1	2	1	0	1	2	2
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	In Service	In Service	In Service	In Service	In Service	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW
All 115kV voltages above Operating Emergency Low Limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within load shed limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within load shed limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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Table 33: Local Generation Needs: Summer, Indeck Out of Service, Jamestown ~0 MW

Operator Load Shed Limits									
Dunkirk Status	Units 1-4 OOS	Units 1/2/4 OOS	Units 2-4 OOS	Units 3-4 OOS	Units 2+4 OOS	Units 1+2 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	1	0	0	1	2	2	1	2
Dunkirk 115kV Units In Service	0	0	1	2	1	0	1	2	2
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW
All 115kV voltages above Operating Emergency Low Limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within load shed limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within load shed limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 34: Local Generation Needs: Summer, Indeck Out of Service, Jamestown ~70 MW

Operator Load Shed Limits									
Dunkirk Status	Units 1-4 OOS	Units 1/2/4 OOS	Units 2-4 OOS	Units 3-4 OOS	Units 2+4 OOS	Units 1+2 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	1	0	0	1	2	2	1	2
Dunkirk 115kV Units In Service	0	0	1	2	1	0	1	2	2
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW
All 115kV voltages above Operating Emergency Low Limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within load shed limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within load shed limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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Table 35: Local Generation Needs: Winter, Indeck In Service, Jamestown ~0 MW

Operator Load Shed Limits									
Dunkirk Status	Units 1-4 OOS	Units 1/2/4 OOS	Units 2-4 OOS	Units 3-4 OOS	Units 2+4 OOS	Units 1+2 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	1	0	0	1	2	2	1	2
Dunkirk 115kV Units In Service	0	0	1	2	1	0	1	2	2
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013
Indeck Olean	In Service	In Service	In Service	In Service	In Service	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW
All 115kV voltages above Operating Emergency Low Limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within load shed limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within load shed limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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Table 36: Local Generation Needs: Winter, Indeck In Service, Jamestown ~70 MW

Operator Load Shed Limits									
Dunkirk Status	Units 1-4 OOS	Units 1/2/4 OOS	Units 2-4 OOS	Units 3-4 OOS	Units 2+4 OOS	Units 1+2 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	1	0	0	1	2	2	1	2
Dunkirk 115kV Units In Service	0	0	1	2	1	0	1	2	2
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013
Indeck Olean	In Service	In Service	In Service	In Service	In Service	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW
All 115kV voltages above Operating Emergency Low Limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within load shed limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within load shed limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 37: Local Generation Needs: Winter, Indeck Out of Service, Jamestown ~0 MW

Operator Load Shed Limits									
Dunkirk Status	Units 1-4 OOS	Units 1/2/4 OOS	Units 2-4 OOS	Units 3-4 OOS	Units 2+4 OOS	Units 1+2 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	1	0	0	1	2	2	1	2
Dunkirk 115kV Units In Service	0	0	1	2	1	0	1	2	2
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW
All 115kV voltages above Operating Emergency Low Limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within load shed limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within load shed limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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Table 38: Local Generation Needs: Winter, Indeck Out of Service, Jamestown ~70 MW

Operator Load Shed Limits									
Dunkirk Status	Units 1-4 OOS	Units 1/2/4 OOS	Units 2-4 OOS	Units 3-4 OOS	Units 2+4 OOS	Units 1+2 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	1	0	0	1	2	2	1	2
Dunkirk 115kV Units In Service	0	0	1	2	1	0	1	2	2
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW
All 115kV voltages above Operating Emergency Low Limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within load shed limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within load shed limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

6.4. Summary of N-1 System Needs

The key points from the previous sections are summarized here in order to make a recommendation on the minimum number of units that are required to support the system.

- The 230kV problems were found to be much worse in the summer, while the local 115kV problems were generally worse in the winter.
- For most base case conditions, two generators would be enough to correct the 230kV voltages above the load shed limits for the summer. Generally less than two units would be required to correct the winter voltages above the load shed limits.
- For most base case conditions, two generators would be enough to reduce the exposure to 115kV problems to a level similar to that of running all four units. Use of two units corrects nearly all post-contingency voltages above the load shed limits for a single element outage, which is the type of contingency for which the system is secured. Not all voltage problems for multiple element outages can be corrected, even by using all four units.
- The greatest correction to the 230kV voltages was provided by the 230kV connected units. The greatest correction to the 115kV voltages was provided by the 115kV connected units. [redacted]
- A review of thermal results from this testing and operator experience has shown [redacted]

Based on a review of all of these points, the ideal configuration to address the N-1 voltage concerns on the 230kV and 115kV system while also managing the overload concerns is one 230kV connected unit and one 115kV connected unit. This is somewhat of a compromise between the needs of the summer and the needs of the winter. The winter results would be better with two 115kV units, but the summer requires the use of at least one 230kV unit to support the 230kV voltages. Based on a review of bus fault impacts [redacted] This recommendation is revisited in later sections of this report, when the system improvement associated with several interim transmission projects is discussed.

The following tables show the voltage issues that would remain for conditions with two, three or four units in Service at Dunkirk. The information is provided for three or four units in service to show that additional generation does not provide significant benefits. These tables show the voltages that fall below the Emergency Low Limits, not just the Load Shed Limits. If the voltage was below the Load Shed Limit, or the case did not converge, this is indicated by red type.

Table 39: Remaining System Issues: Summer, Indeck In Service, Jamestown ~0 MW

Dunkirk Status	Units 2+4 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	1	2	1	2
Dunkirk 115kV Units In Service	1	1	2	2
Season/year	Summer 2012	Summer 2012	Summer 2012	Summer 2012
Indeck Olean	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown	~0 MW	~0 MW	~0 MW	~0 MW
Contingency	Lowest 230kV Voltage	Lowest 230kV Voltage	Lowest 230kV Voltage	Lowest 230kV Voltage
77+78 230	-	-	-	-
79+80 230	[redacted]	-	[redacted]	-
PK230 2+4	-	-	-	-
HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]

Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage
151	-	-	-	-
152	-	-	-	-
167	-	-	-	-
HH CAP	-	-	-	-
AND CAP	-	-	-	-
151 GV	-	-	-	-
152 GV	-	-	-	-
160 DUN	-	-	-	-
161 DUN	-	-	-	-
77+78 230	-	-	-	-
79+80 230	-	-	-	-
37+67	-	-	-	-
151+152	[redacted]	[redacted]	[redacted]	[redacted]
152+167	-	-	-	-
141+142	-	-	-	-
153+154	-	-	-	-
161+162	-	-	-	-
DUN 230-1	-	-	-	-
DUN 115-1	-	-	-	-
DUN 115-2	-	-	-	-
FAL BUS1	-	-	-	-
FAL BUS2	-	-	-	-
HH BUS1	-	-	-	-
HH BUS2	-	-	-	-
GV115 BS3	-	-	-	-
GV115 BS4	-	-	-	-

Table 40: Remaining System Issues: Summer, Indeck In Service, Jamestown ~70 MW

Dunkirk Status	Units 2+4 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	1	2	1	2
Dunkirk 115kV Units In Service	1	1	2	2
Season/year	Summer 2012	Summer 2012	Summer 2012	Summer 2012
Indeck Olean	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown	~70 MW	~70 MW	~70 MW	~70 MW
Contingency	Lowest 230kV Voltage	Lowest 230kV Voltage	Lowest 230kV Voltage	Lowest 230kV Voltage
77+78 230	-	-	-	-
79+80 230	[redacted]	-	[redacted]	-
PK230 2+4	-	-	-	-
HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]

Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage
151	-	-	-	-
152	-	-	-	-
167	-	-	-	-
HH CAP	-	-	-	-
AND CAP	-	-	-	-
151 GV	-	-	-	-
152 GV	-	-	-	-
160 DUN	-	-	-	-
161 DUN	-	-	-	-
77+78 230	-	-	-	-
79+80 230	-	-	-	-
37+67	-	-	-	-
151+152	[redacted]	[redacted]	[redacted]	[redacted]
152+167	-	-	-	-
141+142	-	-	-	-
153+154	-	-	-	-
161+162	-	-	-	-
DUN 230-1	-	-	-	-
DUN 115-1	-	-	-	-
DUN 115-2	[redacted]	[redacted]	[redacted]	[redacted]
FAL BUS1	-	-	-	-
FAL BUS2	-	-	-	-
HH BUS1	-	-	-	-
HH BUS2	-	-	-	-
GV115 BS3	-	-	-	-
GV115 BS4	-	-	-	-

Table 41: Remaining System Issues: Summer, Indeck Out of Service, Jamestown ~0 MW

Dunkirk Status	Units 2+4 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	1	2	1	2
Dunkirk 115kV Units In Service	1	1	2	2
Season/year	Summer 2012	Summer 2012	Summer 2012	Summer 2012
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown	~0 MW	~0 MW	~0 MW	~0 MW
Contingency	Lowest 230kV Voltage	Lowest 230kV Voltage	Lowest 230kV Voltage	Lowest 230kV Voltage
77+78 230	[redacted]	-	-	-
79+80 230	[redacted]	-	[redacted]	-
PK230 2+4	[redacted]	-	[redacted]	-
HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]

Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage
151	[redacted]	[redacted]	[redacted]	[redacted]
152	-	-	-	[redacted]
167	-	-	-	-
HH CAP	-	-	-	-
AND CAP	-	-	-	-
151 GV	[redacted]	[redacted]	[redacted]	[redacted]
152 GV	[redacted]	[redacted]	[redacted]	[redacted]
160 DUN	-	-	-	-
161 DUN	-	-	-	-
77+78 230	-	-	-	-
79+80 230	[redacted]	-	-	-
37+67	-	-	-	-
151+152	[redacted]	[redacted]	[redacted]	[redacted]
152+167	[redacted]	[redacted]	[redacted]	[redacted]
141+142	-	-	-	-
153+154	[redacted]	[redacted]	[redacted]	[redacted]
161+162	-	-	-	-
DUN 230-1	-	-	-	-
DUN 115-1	[redacted]	-	-	-
DUN 115-2	[redacted]	[redacted]	[redacted]	[redacted]
FAL BUS1	-	-	-	-
FAL BUS2	-	-	-	-
HH BUS1	-	-	-	-
HH BUS2	-	-	-	-
GV115 BS3	[redacted]	[redacted]	[redacted]	[redacted]
GV115 BS4	[redacted]	[redacted]	[redacted]	[redacted]

Table 42: Remaining System Issues: Summer, Indeck Out of Service, Jamestown ~70 MW

Dunkirk Status	Units 2+4 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	1	2	1	2
Dunkirk 115kV Units In Service	1	1	2	2
Season/year	Summer 2012	Summer 2012	Summer 2012	Summer 2012
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown	~70 MW	~70 MW	~70 MW	~70 MW
Contingency	Lowest 230kV Voltage	Lowest 230kV Voltage	Lowest 230kV Voltage	Lowest 230kV Voltage
77+78 230	[redacted]	-	[redacted]	-
79+80 230	[redacted]	[redacted]	[redacted]	-
PK230 2+4	[redacted]	-	[redacted]	-
HUN 230-1+2	[redacted]	[redacted]	[redacted]	-

Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage
151	[redacted]	[redacted]	[redacted]	[redacted]
152	[redacted]	[redacted]	[redacted]	[redacted]
167	-	-	-	-
HH CAP	[redacted]	[redacted]	-	[redacted]
AND CAP	[redacted]	[redacted]	[redacted]	[redacted]
151 GV	[redacted]	[redacted]	[redacted]	[redacted]
152 GV	[redacted]	[redacted]	[redacted]	[redacted]
160 DUN	-	[redacted]	[redacted]	[redacted]
161 DUN	-	-	-	-
77+78 230	[redacted]	-	-	-
79+80 230	[redacted]	-	-	-
37+67	[redacted]	-	-	-
151+152	[redacted]	[redacted]	[redacted]	[redacted]
152+167	[redacted]	[redacted]	[redacted]	[redacted]
141+142	-	-	-	-
153+154	[redacted]	[redacted]	[redacted]	[redacted]
161+162	[redacted]	[redacted]	[redacted]	[redacted]
DUN 230-1	[redacted]	-	-	-
DUN 115-1	[redacted]	[redacted]	[redacted]	
DUN 115-2	[redacted]	[redacted]	[redacted]	[redacted]
FAL BUS1	[redacted]	[redacted]	[redacted]	[redacted]
FAL BUS2	[redacted]	[redacted]	[redacted]	[redacted]
HH BUS1	-	-	-	-
HH BUS2	[redacted]	[redacted]	[redacted]	[redacted]
GV115 BS3	[redacted]	[redacted]	[redacted]	[redacted]
GV115 BS4	[redacted]	[redacted]	[redacted]	[redacted]

Table 43: Remaining System Issues: Winter, Indeck In Service, Jamestown ~0 MW

Dunkirk Status	Units 2+4 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	1	2	1	2
Dunkirk 115kV Units In Service	1	1	2	2
Season/year	Winter 2012	Winter 2012	Winter 2012	Winter 2012
Indeck Olean	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown	~0 MW	~0 MW	~0 MW	~0 MW
Contingency	Lowest 230kV Voltage	Lowest 230kV Voltage	Lowest 230kV Voltage	Lowest 230kV Voltage
77+78 230	-	-	-	-
79+80 230	-	-	-	-
PK230 2+4	-	-	-	-
HUN 230-1+2	-	-	-	-

Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage
151	-	-	-	-
152	-	-	-	-
167	-	-	-	-
HH CAP	-	-	-	-
AND CAP	-	-	-	-
151 GV	-	-	-	-
152 GV	-	-	-	-
160 DUN	-	-	-	-
161 DUN	-	-	-	-
77+78 230	-	-	-	-
79+80 230	-	-	-	-
37+67	-	-	-	-
151+152	[redacted]	[redacted]	[redacted]	[redacted]
152+167	-	-	-	-
141+142	-	-	-	-
153+154	-	-	-	-
161+162	-	-	-	-
DUN 230-1	-	-	-	-
DUN 115-1	-	-	-	-
DUN 115-2	-	-	-	-
FAL BUS1	-	-	-	-
FAL BUS2	-	-	-	-
HH BUS1	-	-	-	-
HH BUS2	-	-	-	-
GV115 BS3	-	-	-	-
GV115 BS4	-	-	-	-

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Table 44: Remaining System Issues: Winter, Indeck In Service, Jamestown ~70 MW

Dunkirk Status	Units 2+4 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	1	2	1	2
Dunkirk 115kV Units In Service	1	1	2	2
Season/year	Winter 2012	Winter 2012	Winter 2012	Winter 2012
Indeck Olean	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown	~70 MW	~70 MW	~70 MW	~70 MW
Contingency	Lowest 230kV Voltage	Lowest 230kV Voltage	Lowest 230kV Voltage	Lowest 230kV Voltage
77+78 230	-	-	-	-
79+80 230	-	-	-	-
PK230 2+4	-	-	-	-
HUN 230-1+2	-	-	-	-

Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage
151	[redacted]	[redacted]	[redacted]	[redacted]
152	-	-	-	-
167	-	-	-	-
HH CAP	-	-	-	-
AND CAP	-	-	-	-
151 GV	-	-	-	[redacted]
152 GV	-	-	-	-
160 DUN	-	-	-	-
161 DUN	-	-	-	-
77+78 230	-	-	-	-
79+80 230	-	-	-	-
37+67	-	-	-	-
151+152	[redacted]	[redacted]	[redacted]	[redacted]
152+167	-	-	-	-
141+142	-	-	-	-
153+154	-	-	-	-
161+162	-	-	-	-
DUN 230-1	-	-	-	-
DUN 115-1	-	-	-	-
DUN 115-2	[redacted]	[redacted]	[redacted]	[redacted]
FAL BUS1	-	-	-	-
FAL BUS2	-	-	-	-
HH BUS1	[redacted]	[redacted]	[redacted]	[redacted]
HH BUS2	-	-	-	-
GV115 BS3	-	-	-	-
GV115 BS4	-	-	-	-

Table 45: Remaining System Issues: Winter, Indeck Out of Service, Jamestown ~0 MW

Dunkirk Status	Units 2+4 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	1	2	1	2
Dunkirk 115kV Units In Service	1	1	2	2
Season/year	Winter 2012	Winter 2012	Winter 2012	Winter 2012
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown	~0 MW	~0 MW	~0 MW	~0 MW
Contingency	Lowest 230kV Voltage	Lowest 230kV Voltage	Lowest 230kV Voltage	Lowest 230kV Voltage
77+78 230	-	-	-	-
79+80 230	-	-	-	-
PK230 2+4	-	-	-	-
HUN 230-1+2	-	-	-	-

Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage
151	[redacted]	[redacted]	[redacted]	[redacted]
152	[redacted]	[redacted]	[redacted]	[redacted]
167	-	-	-	-
HH CAP	-	-	-	-
AND CAP	[redacted]	[redacted]	[redacted]	[redacted]
151 GV	[redacted]	[redacted]	[redacted]	[redacted]
152 GV	[redacted]	[redacted]	[redacted]	[redacted]
160 DUN	[redacted]	[redacted]	[redacted]	[redacted]
161 DUN	-	-	-	-
77+78 230	-	-	-	-
79+80 230	-	-	-	-
37+67	-	-	-	-
151+152	[redacted]	[redacted]	[redacted]	[redacted]
152+167	[redacted]	[redacted]	[redacted]	[redacted]
141+142	-	-	-	-
153+154	[redacted]	[redacted]	[redacted]	[redacted]
161+162	[redacted]	[redacted]	[redacted]	
DUN 230-1	-	-	-	-
DUN 115-1	[redacted]	[redacted]	-	-
DUN 115-2	[redacted]	[redacted]	[redacted]	[redacted]
FAL BUS1	[redacted]	[redacted]	[redacted]	[redacted]
FAL BUS2	[redacted]	[redacted]	[redacted]	[redacted]
HH BUS1	-	-	-	-
HH BUS2	-	-	-	-
GV115 BS3	[redacted]	[redacted]	[redacted]	[redacted]
GV115 BS4	[redacted]	[redacted]	[redacted]	[redacted]

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Table 46: Remaining System Issues: Winter, Indeck Out of Service, Jamestown ~70 MW

Dunkirk Status	Units 2+4 OOS	Units 2 OOS	Units 4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	1	2	1	2
Dunkirk 115kV Units In Service	1	1	2	2
Season/year	Winter 2012	Winter 2012	Winter 2012	Winter 2012
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown	~70 MW	~70 MW	~70 MW	~70 MW
Contingency	Lowest 230kV Voltage	Lowest 230kV Voltage	Lowest 230kV Voltage	Lowest 230kV Voltage
77+78 230	-	-	-	-
79+80 230	-	-	-	-
PK230 2+4	-	-	-	-
HUN 230-1+2	-	-	-	-

Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage
151	[redacted]	[redacted]	[redacted]	[redacted]
152	[redacted]	[redacted]	[redacted]	[redacted]
167	[redacted]	[redacted]	[redacted]	[redacted]
HH CAP	[redacted]	[redacted]	[redacted]	[redacted]
AND CAP	[redacted]	[redacted]	[redacted]	[redacted]
151 GV	[redacted]	[redacted]	[redacted]	[redacted]
152 GV	[redacted]	[redacted]	[redacted]	[redacted]
160 DUN	[redacted]	[redacted]	[redacted]	[redacted]
161 DUN	[redacted]	[redacted]	[redacted]	[redacted]
77+78 230	-	-	-	-
79+80 230	[redacted]	-	-	-
37+67	-	-	-	-
151+152	[redacted]	[redacted]	[redacted]	[redacted]
152+167	[redacted]	[redacted]	[redacted]	[redacted]
141+142	[redacted]	[redacted]	[redacted]	[redacted]
153+154	[redacted]	[redacted]	[redacted]	[redacted]
161+162	[redacted]	[redacted]	[redacted]	[redacted]
DUN 230-1	[redacted]	-	-	-
DUN 115-1	[redacted]	[redacted]	[redacted]	[redacted]
DUN 115-2	[redacted]	[redacted]	[redacted]	[redacted]
FAL BUS1	[redacted]	[redacted]	[redacted]	[redacted]
FAL BUS2	[redacted]	[redacted]	[redacted]	[redacted]
HH BUS1	[redacted]	-	[redacted]	-
HH BUS2	[redacted]	[redacted]	[redacted]	[redacted]
GV115 BS3	[redacted]	[redacted]	[redacted]	[redacted]
GV115 BS4	[redacted]	[redacted]	[redacted]	[redacted]

6.5. Review of Selected N-1-1 Conditions

Some selected N-1-1 contingencies were reviewed as part of this analysis. From previous studies, it is known that a few combinations are critical. For the first contingency, [redacted] For the second contingency, four were tested. [redacted] The two first contingencies with the four second contingencies resulted in eight possibilities.

For nearly all summer cases, these contingencies resulted in voltages below the load shed limit. Only the case [redacted] resulted in voltages above the load shed limit for all eight contingencies. [redacted] In fact, many of the cases failed to converge. The voltages were below the Emergency Low Limit for all combinations reviewed. The following tables show the results for these N-1-1 combinations with three or four units at Dunkirk, results for one or two units in service are not provided as they all failed or did not converge. Winter results were much better than the summer though many still failed to pass the testing.

Table 47: Results of N-1-1 Testing: Summer, Indeck In Service, Jamestown ~0 MW

Operator Load Shed Limits			
Dunkirk Status	Units 4 OOS	Units 2 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	1	2	2
Dunkirk 115kV Units In Service	2	1	2
Season/year	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW
37+HUN 230-1+2	[redacted]	[redacted]	[redacted]
66+HUN 230-1+2	[redacted]	[redacted]	[redacted]
37+79+80	[redacted]	[redacted]	[redacted]
66+79+80	[redacted]	[redacted]	[redacted]
37+77+78	[redacted]	[redacted]	[redacted]
66+77+78	[redacted]	[redacted]	[redacted]
37+PK230 2+4	[redacted]	[redacted]	[redacted]
66+PK230 2+4	[redacted]	[redacted]	[redacted]

Table 48: Results of N-1-1 Testing: Summer, Indeck In Service, Jamestown ~70 MW

Operator Load Shed Limits			
Dunkirk Status	Units 4 OOS	Units 2 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	1	2	2
Dunkirk 115kV Units In Service	2	1	2
Season/year	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW
37+HUN 230-1+2	[redacted]	[redacted]	[redacted]
66+HUN 230-1+2	[redacted]	[redacted]	[redacted]
37+79+80	[redacted]	[redacted]	[redacted]
66+79+80	[redacted]	[redacted]	[redacted]
37+77+78	[redacted]	[redacted]	[redacted]
66+77+78	[redacted]	[redacted]	[redacted]
37+PK230 2+4	[redacted]	[redacted]	[redacted]
66+PK230 2+4	[redacted]	[redacted]	[redacted]

Table 49: Results of N-1-1 Testing: Summer, Indeck Out of Service, Jamestown ~0 MW

Operator Load Shed Limits			
Dunkirk Status	Units 4 OOS	Units 2 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	1	2	2
Dunkirk 115kV Units In Service	2	1	2
Season/year	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW
37+HUN 230-1+2	[redacted]	[redacted]	[redacted]
66+HUN 230-1+2	[redacted]	[redacted]	[redacted]
37+79+80	[redacted]	[redacted]	[redacted]
66+79+80	[redacted]	[redacted]	[redacted]
37+77+78	[redacted]	[redacted]	[redacted]
66+77+78	[redacted]	[redacted]	[redacted]
37+PK230 2+4	[redacted]	[redacted]	[redacted]
66+PK230 2+4	[redacted]	[redacted]	[redacted]

Table 50: Results of N-1-1 Testing: Summer, Indeck Out of Service, Jamestown ~70 MW

Operator Load Shed Limits			
Dunkirk Status	Units 4 OOS	Units 2 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	1	2	2
Dunkirk 115kV Units In Service	2	1	2
Season/year	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW
37+HUN 230-1+2	[redacted]	[redacted]	[redacted]
66+HUN 230-1+2	[redacted]	[redacted]	[redacted]
37+79+80	[redacted]	[redacted]	[redacted]
66+79+80	[redacted]	[redacted]	[redacted]
37+77+78	[redacted]	[redacted]	[redacted]
66+77+78	[redacted]	[redacted]	[redacted]
37+PK230 2+4	[redacted]	[redacted]	[redacted]
66+PK230 2+4	[redacted]	[redacted]	[redacted]

6.6. Additional Considerations

The previous sections recommended that at least two units be available to system operators to support the system for N-1 outages. The fact that the system would still be vulnerable to several N-1-1 contingencies is also discussed. However other system failures could create concerns that justify having additional generators available.

The biggest concern is that one of the Dunkirk units selected to be available fails. Alternatively, a critical component such as a GSU or breaker at Dunkirk could fail resulting in the generation being unavailable. For these conditions, the system would be vulnerable to voltages below the load shed limit for N-1 contingencies.

The previous analysis shows how [redacted] It would be possible for equipment failures at one of these locations to occur, increasing the exposure to low voltages. [redacted] This is also supported by the study results, which show the voltages to be worse for outages [redacted]

It would also be possible for a failure of a major piece of equipment to result in system concern that would necessitate having additional units available. Primary among the concerns [redacted]. However, other transformer failures [redacted] could also be a concern. Failures of other types of equipment, such as tower collapses or breaker failures may also result in problems. Some of these transformer failures could take up to several months to address.

Because of these additional concerns, it is recommended that a third unit be available. Based on operator feedback, focusing on the risk to the area load, especially for some of these potential failures, [redacted]

7. Review of Short Duration Projects

Based on the analysis discussed above, several projects were identified that may reduce the exposure to the problems created by the Dunkirk shutdown and may reduce the number of units required for system operation. Each of the sections below describes the project and then the final section reviews the system impact of the all the combined projects.

7.1. Winter 2012-2013

As discussed in the following sections, several projects can be implemented that will reduce the generation at Dunkirk necessary to mitigate area voltage and thermal problems. None of these projects can be completed prior to the winter of 2012-2013. Thus, the recommendations made in the previous sections are unaffected. For the winter of 2012-2013, at least two units will need to remain in service.

7.2. Gardenville Capacitor Banks

The 2011 study of the area discussed the same low 230kV voltage issues discussed within this report. That study concluded that in order to bring the 230kV voltages back within criteria, three 75 MVAr capacitor banks needed to be installed at Gardenville. These were planned to be added as part of the Gardenville rebuild project.

The shutdown of the Dunkirk generation has accelerated this need and increased it to four capacitor banks. Engineering review has concluded that four capacitor banks can be added to each of the four bus sections at the existing Old and New Gardenville stations. Each capacitor bank will be 75 MVAr, the same as the long term planned size. It is expected that all four will be in service June 1, 2013.

The long term plan will also be modified so that the rebuild project includes all four capacitor banks. The plan originally just included the space for a future fourth bank.

7.3. Homer Hill Capacitor Bank

The 2011 study of the area also discussed the need to reinforce the 115kV system in the Homer Hill area. One of the recommended projects to achieve this is installation of a second 115kV capacitor bank at Homer Hill. Initially this new capacitor bank will be operated at 25.6 MVAr. The installation of this second capacitor bank triggers the need to add a breaker and reactor to the existing bank. The original plan was to have the new capacitor in service in the spring of 2013, and then the existing capacitor bank immediately coming out of service until the fall of 2013. The shutdown of Dunkirk has resulted in a revision to this plan. Both the installation of the new capacitor bank and the upgrades to the existing one will be completed by June 1, 2013.

7.4. Dunkirk Capacitor Banks

With projects to add capacitor banks to Huntley, Gardenville and Homer Hill completed, the 52.5 MVAr mobile capacitor banks can be installed at a new location. The only available National Grid stations in western NY where these capacitors could be installed are Huntley, Dunkirk and Lockport. Of these options, the best location by far to mitigate the shutdown of Dunkirk is at Dunkirk. Engineering review has concluded that both 52.5 MVAr capacitor banks can be installed at Dunkirk, one on each of the 115kV buses. It is expected that this can be completed by June 1, 2013.

7.5. Huntley Bus Tie Breaker

One of the most significant contingencies, especially as a second outage in an N-1-1 combination is [redacted]

[redacted] It is expected that this can be completed by June 1, 2013.

7.6. Packard Bus Tie Breaker

Packard is a straight bus, similar to Huntley [redacted] To prevent this outage, a rearrangement of the equipment at Packard will be done. The existing station is three bus sections. [redacted] It is expected that this can be completed by June 1, 2013.

7.7. Distribution Station Supply Changes

One of the real time concerns that system operates deal with in this area is overloads [redacted] This overload is the result of both the load connected to the lines and the through flow on the lines. To help reduce the overloads it was identified that [redacted] reducing the amount of load connected to these circuits.

[redacted] It is expected that all of these changes can be completed by June 1, 2013.

7.8. Thermal Rating Changes

In addition to the loading [redacted] system operators are often concerned with [redacted] This connection will be replaced increasing the capability of the bank by a small amount.

The change to the [redacted] These will be replaced to increase the capability of the lines.

7.9. System Impact of Changes

This section includes a large number of tables summarizing the voltage and thermal results for N-1 conditions and a Pass/Fail summary of N-1-1 conditions following the completion of the above projects. The Pass/Fail summaries are also provided for the N-1 analysis.

Due to the complexity and volume of analysis provided, the key points are summarized here in order to make a recommendation on the minimum number of units that are required to support the system.

- Following completion of the proposed reinforcements, all 230kV voltages will be above the Emergency Low Limits for any N-1 contingency, including multiple element outages even with no Dunkirk units in service.
- For nearly all N-1 conditions, including multiple element outages, the reinforced system with one 115kV unit running performed better than the existing system with all four units running.
- For all N-1-1 conditions the reinforced system with one 115kV unit running performed equal to or better than the existing system with all four units running.
- Comparing the reinforced system with no Dunkirk units to the existing system with all four units in service produced mixed results for N-1 contingencies. For some N-1 conditions, including N-1 multiple element outages, the reinforced system with no Dunkirk generation running performed worse than the existing system with all four units running. For some N-1 contingencies, the reinforced system with no Dunkirk generation running performed better than the existing system with all four units running.
- For most N-1-1 conditions, the reinforced system with no Dunkirk generation running performed worse than the existing system with all four units running.
- From a thermal perspective, the reinforced system with zero units running performed similar to the reinforced system with one unit running. However these cases did perform slightly worse than the existing system with all four units running. No loadings were above the STE ratings, but some elements were loaded above their LTE ratings.

Based on a review of all of these points, the ideal configuration to address the N-1 and N-1-1 voltage concerns on the 230kV and 115kV system while also managing the overload [redacted]. [redacted]

Additional risk, above what is present for the existing system with all units running would be experienced if no generation were in service. This would include additional risk of an unplanned or long term failure of a generator or transformer.

The following tables show the voltage issues that would remain following the above system reinforcements for conditions with zero or one unit in service at Dunkirk. For comparison purposes, the right most columns in each table show the response of the existing system with all four units in service. Only contingencies that resulted in low voltages in one of the reinforced cases are discussed in the table. Other contingencies could have resulted in low voltages in the cases representing the existing system.

These tables show the voltages that fall below the Emergency Low Limits, not just the

Load Shed Limits. If the voltage was below the Load Shed Limit, or the case did not converge, this is indicated by red type.

Note that for all cases, all 230kV voltages have been corrected above the Emergency Low Limit by these projects. Only 115kV low voltage issues were identified.

In the tables showing thermal overloads, the loading on the Niagara – Packard 115kV circuits are indicated. As indicated previously in this report, an operating exception in the NYSRC rules allows these facilities to be loaded up to their STE rating. The overloads can be corrected by generation dispatch adjustments at Niagara. However, the limiting equipment on the line is terminal equipment at Niagara, owned by NYPA, which could be replaced to reduce the overload below the STE rating.

Table 51: Remaining System Issues: Summer, Indeck In Service, Jamestown ~0 MW

Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2
System	Reinforced	Reinforced	Reinforced	Existing
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2012
Indeck Olean	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown	~0 MW	~0 MW	~0 MW	~0 MW
Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage
151	-	-	-	-
152	-	-	-	-
151 GV	-	-	-	-
152 GV	-	-	-	-
160 DUN	-	-	-	-
79+80 230	-	-	-	-
151+152	[redacted]	-	-	[redacted]
152+167	-	-	-	-
153+154	-	-	-	-
161+162	-	-	-	-
DUN 230-2	-	-	-	-
DUN 115-1	-	-	-	-
DUN 115-2	[redacted]	-	-	-
FAL BUS1	-	-	-	-
FAL BUS2	-	-	-	-
GV115 BS3	-	-	-	-
GV115 BS4	-	-	-	-
HH BUS1	[redacted]	-	-	-

Table 52: Remaining System Issues: Summer, Indeck In Service, Jamestown ~70 MW

Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2
System	Reinforced	Reinforced	Reinforced	Existing
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2012
Indeck Olean	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown	~70 MW	~70 MW	~70 MW	~70 MW
Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage
151	-	-	-	-
152	-	-	-	-
151 GV	-	-	-	-
152 GV	-	-	-	-
160 DUN	-	-	-	-
79+80 230	-	-	-	-
151+152	[redacted]	-	[redacted]	[redacted]
152+167	-	-	-	-
153+154	-	-	-	-
161+162	-	-	-	-
DUN 230-2	-	-	-	-
DUN 115-1	-	-	-	-
DUN 115-2	[redacted]	[redacted]	[redacted]	[redacted]
FAL BUS1	-	-	-	-
FAL BUS2	-	-	-	-
GV115 BS3	-	-	-	-
GV115 BS4	-	-	-	-
HH BUS1	[redacted]	-	[redacted]	-

REDACTED FOR CRITICAL ENERGY INFRASTRUCTURE INFORMATION PURSUANT TO 18 C.F.R. 388.112

Table 53: Remaining System Issues: Summer, Indeck Out of Service, Jamestown ~0 MW

Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2
System	Reinforced	Reinforced	Reinforced	Existing
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2012
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown	~0 MW	~0 MW	~0 MW	~0 MW
Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage
151	[redacted]	-	-	[redacted]
152	-	-	-	[redacted]
151 GV	-	-	-	[redacted]
152 GV	-	-	-	[redacted]
160 DUN	-	-	-	[redacted]
79+80 230	-	-	-	-
151+152	[redacted]	[redacted]	[redacted]	[redacted]
152+167	[redacted]	-	-	[redacted]
153+154	-	-	-	[redacted]
161+162	-	-	-	[redacted]
DUN 230-2	-	-	-	-
DUN 115-1	-	-	-	-
DUN 115-2	[redacted]	-	[redacted]	[redacted]
FAL BUS1	-	-	-	[redacted]
FAL BUS2	-	-	-	[redacted]
GV115 BS3	-	-	-	[redacted]
GV115 BS4	-	-	-	[redacted]
HH BUS1	-	-	-	-

Table 54: Remaining System Issues: Summer, Indeck Out of Service, Jamestown ~70 MW

Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2
System	Reinforced	Reinforced	Reinforced	Existing
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2012
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown	~70 MW	~70 MW	~70 MW	~70 MW
Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage
151	[redacted]	[redacted]	[redacted]	[redacted]
152	-	-	-	[redacted]
151 GV	[redacted]	-	[redacted]	[redacted]
152 GV	[redacted]	-	-	[redacted]
160 DUN	-	-	-	[redacted]
79+80 230	[redacted]	-	-	[redacted]
151+152	[redacted]	[redacted]	[redacted]	[redacted]
152+167	[redacted]	[redacted]	[redacted]	[redacted]
153+154	-	-	-	[redacted]
161+162	-	-	-	-
DUN 230-2	-	-	-	[redacted]
DUN 115-1	[redacted]	[redacted]	[redacted]	[redacted]
DUN 115-2	[redacted]	[redacted]	[redacted]	[redacted]
FAL BUS1	-	-	-	[redacted]
FAL BUS2	[redacted]	-	-	[redacted]
GV115 BS3	[redacted]	-	-	[redacted]
GV115 BS4	[redacted]	-	-	[redacted]
HH BUS1	[redacted]	-	-	[redacted]

Table 55: Remaining System Issues: Winter, Indeck In Service, Jamestown ~0 MW

Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2
System	Reinforced	Reinforced	Reinforced	Existing
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2012
Indeck Olean	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown	~0 MW	~0 MW	~0 MW	~0 MW
Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage
151	-	-	-	-
152	-	-	-	-
151 GV	-	-	-	-
152 GV	-	-	-	-
160 DUN	-	-	-	-
79+80 230	-	-	-	-
151+152	[redacted]	[redacted]	[redacted]	[redacted]
152+167	-	-	-	-
153+154	-	-	-	-
161+162	-	-	-	-
DUN 230-2	-	-	-	-
DUN 115-1	-	-	-	-
DUN 115-2	[redacted]	-	-	-
FAL BUS1	-	-	-	-
FAL BUS2	-	-	-	-
GV115 BS3	-	-	-	-
GV115 BS4	-	-	-	-
HH BUS1	[redacted]	-	[redacted]	-

Table 56: Remaining System Issues: Winter, Indeck In Service, Jamestown ~70 MW

Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2
System	Reinforced	Reinforced	Reinforced	Existing
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2012
Indeck Olean	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown	~70 MW	~70 MW	~70 MW	~70 MW
Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage
151	-	-	-	[redacted]
152	-	-	-	-
151 GV	-	-	-	-
152 GV	-	-	-	-
160 DUN	-	-	-	-
79+80 230	-	-	-	-
151+152	[redacted]	[redacted]	[redacted]	[redacted]
152+167	-	-	-	-
153+154	-	-	-	-
161+162	-	-	-	-
DUN 230-2	-	-	-	-
DUN 115-1	-	-	-	-
DUN 115-2	[redacted]	[redacted]	[redacted]	[redacted]
FAL BUS1	-	-	-	-
FAL BUS2	-	-	-	-
GV115 BS3	-	-	-	-
GV115 BS4	-	-	-	[redacted]
HH BUS1	[redacted]	[redacted]	[redacted]	[redacted]

Table 57: Remaining System Issues: Winter, Indeck Out of Service, Jamestown ~0 MW

Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2
System	Reinforced	Reinforced	Reinforced	Existing
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2012
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown	~0 MW	~0 MW	~0 MW	~0 MW
Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage
151	[redacted]	[redacted]	[redacted]	[redacted]
152	[redacted]	-	-	[redacted]
151 GV	[redacted]	[redacted]	[redacted]	[redacted]
152 GV	[redacted]	-	[redacted]	[redacted]
160 DUN	-	-	-	[redacted]
79+80 230	-	-	-	-
151+152	[redacted]	[redacted]	[redacted]	[redacted]
152+167	[redacted]	-	[redacted]	[redacted]
153+154	[redacted]	-	[redacted]	[redacted]
161+162	-	-	-	[redacted]
DUN 230-2	-	-	-	-
DUN 115-1	[redacted]	[redacted]	-	-
DUN 115-2	[redacted]	[redacted]	[redacted]	[redacted]
FAL BUS1	-	-	-	[redacted]
FAL BUS2	-	-	-	[redacted]
GV115 BS3	[redacted]	-	[redacted]	[redacted]
GV115 BS4	[redacted]	[redacted]	[redacted]	[redacted]
HH BUS1	[redacted]	-	-	-

Table 58: Remaining System Issues: Winter, Indeck Out of Service, Jamestown ~70 MW

Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2
System	Reinforced	Reinforced	Reinforced	Existing
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2012
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown	~70 MW	~70 MW	~70 MW	~70 MW
Contingency	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage	Lowest 115kV Voltage
151	[redacted]	[redacted]	[redacted]	[redacted]
152	[redacted]	-	[redacted]	[redacted]
151 GV	[redacted]	[redacted]	[redacted]	[redacted]
152 GV	[redacted]	[redacted]	[redacted]	[redacted]
160 DUN	[redacted]	[redacted]	[redacted]	[redacted]
79+80 230	[redacted]	-	-	[redacted]
151+152	[redacted]	[redacted]	[redacted]	[redacted]
152+167	[redacted]	[redacted]	[redacted]	[redacted]
153+154	[redacted]	-	-	[redacted]
161+162	[redacted]	[redacted]	[redacted]	[redacted]
DUN 230-2	[redacted]	-	-	-
DUN 115-1	[redacted]	[redacted]	[redacted]	[redacted]
DUN 115-2	[redacted]	[redacted]	[redacted]	[redacted]
FAL BUS1	[redacted]	-	-	[redacted]
FAL BUS2	[redacted]	[redacted]	[redacted]	[redacted]
GV115 BS3	[redacted]	[redacted]	[redacted]	[redacted]
GV115 BS4	[redacted]	[redacted]	[redacted]	[redacted]
HH BUS1	[redacted]	[redacted]	[redacted]	[redacted]

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Table 59: Summer Thermal Analysis: Indeck In Service, Jamestown ~0 MW

Dunkirk Status		Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service		0	0	1	2
Dunkirk 115kV Units In Service		0	1	0	2
System		Reinforced	Reinforced	Reinforced	Existing
Season/year		Summer 2013	Summer 2013	Summer 2013	Summer 2012
Indeck Olean		In Service	In Service	In Service	In Service
Line #171		Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load		~0 MW	~0 MW	~0 MW	~0 MW
Element	Contingency	% of LTE	% of LTE	% of LTE	% of LTE
Niagara - Gardenville #180	77+78 230	-	-	-	-
Niagara - Gardenville #180	79+80 230	[redacted]	-	-	-
Packard - Erie #181	79+80 230	[redacted]	-	-	-
Packard - Gardenville #182	79+80 230	-	-	-	-
Packard - Erie #181	180+182N	[redacted]	[redacted]	[redacted]	-
Packard - Erie #181	180+182S	[redacted]	[redacted]	[redacted]	-
Dunkirk TB #41/31	DUN TB31/41	-	-	-	-
Dunkirk TB #31	DUN 115-1	-	-	-	
Dunkirk TB #41	DUN 230-1	-	-	-	-
Niagara - Packard #192	191	[redacted]	[redacted]	[redacted]	[redacted]
Niagara - Packard #191	192	[redacted]	-	-	-
Niagara - Packard #192	61+191	[redacted]	[redacted]	[redacted]	[redacted]
Niagara - Packard #192	101+191	[redacted]	[redacted]	[redacted]	[redacted]
Niagara - Packard #191	192+195	[redacted]	-	-	-

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Table 60: Summer Thermal Analysis: Indeck In Service, Jamestown ~70 MW

Dunkirk Status		Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service		0	0	1	2
Dunkirk 115kV Units In Service		0	1	0	2
System		Reinforced	Reinforced	Reinforced	Existing
Season/year		Summer 2013	Summer 2013	Summer 2013	Summer 2012
Indeck Olean		In Service	In Service	In Service	In Service
Line #171		Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load		~70 MW	~70 MW	~70 MW	~70 MW
Element	Contingency	% of LTE	% of LTE	% of LTE	% of LTE
Niagara - Gardenville #180	77+78 230	-	-	-	-
Niagara - Gardenville #180	79+80 230	[redacted]	[redacted]	-	-
Packard - Erie #181	79+80 230	[redacted]	-	-	-
Packard - Gardenville #182	79+80 230	-	-	-	-
Packard - Erie #181	180+182N	[redacted]	[redacted]	[redacted]	-
Packard - Erie #181	180+182S	[redacted]	[redacted]	[redacted]	-
Dunkirk TB #41/31	DUN TB31/41	-	-	-	-
Dunkirk TB #31	DUN 115-1	-	-	-	
Dunkirk TB #41	DUN 230-1	-	-	-	-
Niagara - Packard #192	191	[redacted]	[redacted]	[redacted]	[redacted]
Niagara - Packard #191	192	[redacted]	-	-	-
Niagara - Packard #192	61+191	[redacted]	[redacted]	[redacted]	[redacted]
Niagara - Packard #192	101+191	[redacted]	[redacted]	[redacted]	[redacted]
Niagara - Packard #191	192+195	[redacted]	-	-	-

Table 61: Summer Thermal Analysis: Indeck Out of Service, Jamestown ~0 MW

	Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
	Dunkirk 230kV Units In Service	0	0	1	2
	Dunkirk 115kV Units In Service	0	1	0	2
	System	Reinforced	Reinforced	Reinforced	Existing
	Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2012
	Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service
	Line #171	Out of Service	Out of Service	Out of Service	Out of Service
	Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW
Element	Contingency	% of LTE	% of LTE	% of LTE	% of LTE
Niagara - Gardenville #180	77+78 230	-	-	-	-
Niagara - Gardenville #180	79+80 230	[redacted]	[redacted]	-	-
Packard - Erie #181	79+80 230	[redacted]	[redacted]	-	-
Packard - Gardenville #182	79+80 230	-	-	-	-
Packard - Erie #181	180+182N	[redacted]	[redacted]	[redacted]	-
Packard - Erie #181	180+182S	[redacted]	[redacted]	[redacted]	-
Dunkirk TB #41/31	DUN TB31/41	-	-	-	-
Dunkirk TB #31	DUN 115-1	-	-	-	
Dunkirk TB #41	DUN 230-1	-	-	-	-
Niagara - Packard #192	191	[redacted]	[redacted]	[redacted]	[redacted]
Niagara - Packard #191	192	[redacted]	[redacted]	-	-
Niagara - Packard #192	61+191	[redacted]	[redacted]	[redacted]	[redacted]
Niagara - Packard #192	101+191	[redacted]	[redacted]	[redacted]	[redacted]
Niagara - Packard #191	192+195	[redacted]	[redacted]	-	-

Table 62: Summer Thermal Analysis: Indeck Out of Service, Jamestown ~70 MW

	Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
	Dunkirk 230kV Units In Service	0	0	1	2
	Dunkirk 115kV Units In Service	0	1	0	2
	System	Reinforced	Reinforced	Reinforced	Existing
	Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2012
	Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service
	Line #171	Out of Service	Out of Service	Out of Service	Out of Service
	Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW
Element	Contingency	% of LTE	% of LTE	% of LTE	% of LTE
Niagara - Gardenville #180	77+78 230	[redacted]	-	-	-
Niagara - Gardenville #180	79+80 230	[redacted]	[redacted]	-	-
Packard - Erie #181	79+80 230	[redacted]	[redacted]	-	-
Packard - Gardenville #182	79+80 230	[redacted]	-	-	-
Packard - Erie #181	180+182N	[redacted]	[redacted]	[redacted]	-
Packard - Erie #181	180+182S	[redacted]	[redacted]	[redacted]	-
Dunkirk TB #41/31	DUN TB31/41	-	-	[redacted]	-
Dunkirk TB #31	DUN 115-1	[redacted]	-	[redacted]	
Dunkirk TB #41	DUN 230-1	-	-	[redacted]	-
Niagara - Packard #192	191	[redacted]	[redacted]	[redacted]	[redacted]
Niagara - Packard #191	192	[redacted]	[redacted]	[redacted]	-
Niagara - Packard #192	61+191	[redacted]	[redacted]	[redacted]	[redacted]
Niagara - Packard #192	101+191	[redacted]	[redacted]	[redacted]	[redacted]
Niagara - Packard #191	192+195	[redacted]	[redacted]	-	-

In the following tables, NA indicates that the contingency is “Not Applicable” as the addition of bus tie breakers at Huntley and Packard has eliminated this contingency.

Table 63: Results of N-1-1 Testing: Summer, Indeck In Service, Jamestown ~0 MW

Operator Load Shed Limits				
Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2
System	Reinforced	Reinforced	Reinforced	Existing
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2012
Indeck Olean	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW
37+HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]
66+HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]
37+79+80	[redacted]	[redacted]	[redacted]	[redacted]
66+79+80	[redacted]	[redacted]	[redacted]	[redacted]
37+77+78	[redacted]	[redacted]	[redacted]	[redacted]
66+77+78	[redacted]	[redacted]	[redacted]	[redacted]
37+PK230 2+4	[redacted]	[redacted]	[redacted]	[redacted]
66+PK230 2+4	[redacted]	[redacted]	[redacted]	[redacted]

Table 64: Results of N-1-1 Testing: Summer, Indeck In Service, Jamestown ~70 MW

Operator Load Shed Limits				
Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2
System	Reinforced	Reinforced	Reinforced	Existing
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2012
Indeck Olean	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW
37+HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]
66+HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]
37+79+80	[redacted]	[redacted]	[redacted]	[redacted]
66+79+80	[redacted]	[redacted]	[redacted]	[redacted]
37+77+78	[redacted]	[redacted]	[redacted]	[redacted]
66+77+78	[redacted]	[redacted]	[redacted]	[redacted]
37+PK230 2+4	[redacted]	[redacted]	[redacted]	[redacted]
66+PK230 2+4	[redacted]	[redacted]	[redacted]	[redacted]

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Table 65: Results of N-1-1 Testing: Summer, Indeck Out of Service, Jamestown ~0 MW

Operator Load Shed Limits				
Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2
System	Reinforced	Reinforced	Reinforced	Existing
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2012
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW
37+HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]
66+HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]
37+79+80	[redacted]	[redacted]	[redacted]	[redacted]
66+79+80	[redacted]	[redacted]	[redacted]	[redacted]
37+77+78	[redacted]	[redacted]	[redacted]	[redacted]
66+77+78	[redacted]	[redacted]	[redacted]	[redacted]
37+PK230 2+4	[redacted]	[redacted]	[redacted]	[redacted]
66+PK230 2+4	[redacted]	[redacted]	[redacted]	[redacted]

Table 66: Results of N-1-1 Testing: Summer, Indeck Out of Service, Jamestown ~70 MW

Operator Load Shed Limits				
Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2
System	Reinforced	Reinforced	Reinforced	Existing
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2012
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW
37+HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]
66+HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]
37+79+80	[redacted]	[redacted]	[redacted]	[redacted]
66+79+80	[redacted]	[redacted]	[redacted]	[redacted]
37+77+78	[redacted]	[redacted]	[redacted]	[redacted]
66+77+78	[redacted]	[redacted]	[redacted]	[redacted]
37+PK230 2+4	[redacted]	[redacted]	[redacted]	[redacted]
66+PK230 2+4	[redacted]	[redacted]	[redacted]	[redacted]

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Table 67: Results of N-1-1 Testing: Summer, Indeck In Service, Jamestown ~0 MW

Operator Load Shed Limits				
Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2
System	Reinforced	Reinforced	Reinforced	Existing
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2012
Indeck Olean	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW
37+HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]
66+HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]
37+79+80	[redacted]	[redacted]	[redacted]	[redacted]
66+79+80	[redacted]	[redacted]	[redacted]	[redacted]
37+77+78	[redacted]	[redacted]	[redacted]	[redacted]
66+77+78	[redacted]	[redacted]	[redacted]	[redacted]
37+PK230 2+4	[redacted]	[redacted]	[redacted]	[redacted]
66+PK230 2+4	[redacted]	[redacted]	[redacted]	[redacted]

Table 68: Results of N-1-1 Testing: Summer, Indeck In Service, Jamestown ~70 MW

Operator Load Shed Limits				
Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2
System	Reinforced	Reinforced	Reinforced	Existing
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2012
Indeck Olean	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW
37+HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]
66+HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]
37+79+80	[redacted]	[redacted]	[redacted]	[redacted]
66+79+80	[redacted]	[redacted]	[redacted]	[redacted]
37+77+78	[redacted]	[redacted]	[redacted]	[redacted]
66+77+78	[redacted]	[redacted]	[redacted]	[redacted]
37+PK230 2+4	[redacted]	[redacted]	[redacted]	[redacted]
66+PK230 2+4	[redacted]	[redacted]	[redacted]	[redacted]

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Table 69: Results of N-1-1 Testing: Summer, Indeck Out of Service, Jamestown ~0 MW

Operator Load Shed Limits				
Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2
System	Reinforced	Reinforced	Reinforced	Existing
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2012
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW
37+HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]
66+HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]
37+79+80	[redacted]	[redacted]	[redacted]	[redacted]
66+79+80	[redacted]	[redacted]	[redacted]	[redacted]
37+77+78	[redacted]	[redacted]	[redacted]	[redacted]
66+77+78	[redacted]	[redacted]	[redacted]	[redacted]
37+PK230 2+4	[redacted]	[redacted]	[redacted]	[redacted]
66+PK230 2+4	[redacted]	[redacted]	[redacted]	[redacted]

Table 70: Results of N-1-1 Testing: Summer, Indeck Out of Service, Jamestown ~70 MW

Operator Load Shed Limits				
Dunkirk Status	Units 1-4 OOS	Units 2-4 OOS	Units 1+2+4 OOS	Units 1-4 IS
Dunkirk 230kV Units In Service	0	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2
System	Reinforced	Reinforced	Reinforced	Existing
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2012
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW
37+HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]
66+HUN 230-1+2	[redacted]	[redacted]	[redacted]	[redacted]
37+79+80	[redacted]	[redacted]	[redacted]	[redacted]
66+79+80	[redacted]	[redacted]	[redacted]	[redacted]
37+77+78	[redacted]	[redacted]	[redacted]	[redacted]
66+77+78	[redacted]	[redacted]	[redacted]	[redacted]
37+PK230 2+4	[redacted]	[redacted]	[redacted]	[redacted]
66+PK230 2+4	[redacted]	[redacted]	[redacted]	[redacted]

Table 71: Pass/Fail Summary: Summer, Indeck In Service, Jamestown ~0 MW, Emergency Low Limits

Operator Emergency Low Limits						
Dunkirk 230kV Units In Service	0	0	1	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2	1	2
System	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced	Existing
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	In Service	In Service	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW
All 230kV and 115kV voltages within applicable Operating low limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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Table 72: Pass/Fail Summary: Summer, Indeck In Service, Jamestown ~0 MW, Load Shed Limits

Operator Load Shed Limits						
Dunkirk 230kV Units In Service	0	0	1	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2	1	2
System	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced	Existing
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	In Service	In Service	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW
All 230kV and 115kV voltages within applicable Operating low limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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Table 73: Pass/Fail Summary: Summer, Indeck In Service, Jamestown ~70 MW, Emergency Low Limits

Operator Emergency Low Limits						
Dunkirk 230kV Units In Service	0	0	1	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2	1	2
System	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced	Existing
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	In Service	In Service	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW
All 230kV and 115kV voltages within applicable Operating low limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 74: Pass/Fail Summary: Summer, Indeck In Service, Jamestown ~70 MW, Load Shed Limits

Operator Load Shed Limits						
Dunkirk 230kV Units In Service	0	0	1	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2	1	2
System	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced	Existing
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	In Service	In Service	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW
All 230kV and 115kV voltages within applicable Operating low limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 75: Pass/Fail Summary: Summer, Indeck Out of Service, Jamestown ~0 MW, Emergency Low Limits

Operator Emergency Low Limits						
Dunkirk 230kV Units In Service	0	0	1	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2	1	2
System	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced	Existing
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW
All 230kV and 115kV voltages within applicable Operating low limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 76: Pass/Fail Summary: Summer, Indeck Out of Service, Jamestown ~0 MW, Load Shed Limits

Operator Load Shed Limits						
Dunkirk 230kV Units In Service	0	0	1	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2	1	2
System	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced	Existing
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW
All 230kV and 115kV voltages within applicable Operating low limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 77: Pass/Fail Summary: Summer, Indeck Out of Service, Jamestown ~70 MW, Emergency Low Limits

Operator Emergency Low Limits						
Dunkirk 230kV Units In Service	0	0	1	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2	1	2
System	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced	Existing
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW
All 230kV and 115kV voltages within applicable Operating low limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 78: Pass/Fail Summary: Summer, Indeck Out of Service, Jamestown ~70 MW, Load Shed Limits

Operator Load Shed Limits						
Dunkirk 230kV Units In Service	0	0	1	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2	1	2
System	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced	Existing
Season/year	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013	Summer 2013
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW
All 230kV and 115kV voltages within applicable Operating low limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 79: Pass/Fail Summary: Winter, Indeck In Service, Jamestown ~0 MW, Emergency Low Limits

Operator Emergency Low Limits						
Dunkirk 230kV Units In Service	0	0	1	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2	1	2
System	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced	Existing
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013
Indeck Olean	In Service	In Service	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW
All 230kV and 115kV voltages within applicable Operating low limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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Table 80: Pass/Fail Summary: Winter, Indeck In Service, Jamestown ~0 MW, Load Shed Limits

Operator Load Shed Limits						
Dunkirk 230kV Units In Service	0	0	1	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2	1	2
System	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced	Existing
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013
Indeck Olean	In Service	In Service	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW
All 230kV and 115kV voltages within applicable Operating low limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 81: Pass/Fail Summary: Winter, Indeck In Service, Jamestown ~70 MW, Emergency Low Limits

Operator Emergency Low Limits						
Dunkirk 230kV Units In Service	0	0	1	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2	1	2
System	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced	Existing
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013
Indeck Olean	In Service	In Service	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW
All 230kV and 115kV voltages within applicable Operating low limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 82: Pass/Fail Summary: Winter, Indeck In Service, Jamestown ~70 MW, Load Shed Limits

Operator Load Shed Limits						
Dunkirk 230kV Units In Service	0	0	1	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2	1	2
System	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced	Existing
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013
Indeck Olean	In Service	In Service	In Service	In Service	In Service	In Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW
All 230kV and 115kV voltages within applicable Operating low limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 83: Pass/Fail Summary: Winter, Indeck Out of Service, Jamestown ~0 MW, Emergency Low Limits

Operator Emergency Low Limits						
Dunkirk 230kV Units In Service	0	0	1	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2	1	2
System	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced	Existing
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW
All 230kV and 115kV voltages within applicable Operating low limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 84: Pass/Fail Summary: Winter, Indeck Out of Service, Jamestown ~0 MW, Load Shed Limits

Operator Load Shed Limits						
Dunkirk 230kV Units In Service	0	0	1	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2	1	2
System	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced	Existing
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW	~0 MW
All 230kV and 115kV voltages within applicable Operating low limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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Table 85: Pass/Fail Summary: Winter, Indeck Out of Service, Jamestown ~70 MW, Emergency Low Limits

Operator Emergency Low Limits						
Dunkirk 230kV Units In Service	0	0	1	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2	1	2
System	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced	Existing
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW
All 230kV and 115kV voltages within applicable Operating low limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 86: Pass/Fail Summary: Winter, Indeck Out of Service, Jamestown ~70 MW, Load shed Limits

Operator Load Shed Limits						
Dunkirk 230kV Units In Service	0	0	1	0	1	2
Dunkirk 115kV Units In Service	0	1	0	2	1	2
System	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced	Existing
Season/year	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013	Winter 2013
Indeck Olean	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Line #171	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service	Out of Service
Jamestown Load	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW	~70 MW
All 230kV and 115kV voltages within applicable Operating low limit pre-contingency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 single element outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
All 115kV voltages within applicable Operating low limit for N-1 multiple element outage with normal clearing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

8. Summary

Based on the system analysis, it is recommended that at least two Dunkirk units be available to system operators for the winter of 2012-2013. Assuming that the proposed quick upgrades are completed by June 1, 2013, the number of units that need to remain in service following June 1 can be reduced to one. Absent any of these projects, the number of units that would have been required would have been three.

Additional upgrades are currently being reviewed to determine what will be necessary to reduce the number of units to zero. It is expected that this will require at least the completion of the Five Mile Road 345/115kV station that is expected to be completed by June 2015. However, additional reinforcements may also be required.

Exhibit No.____ (NMP-7)

July 27, 2012 Review of
Dunkirk Mothball Notice - Part 1
(CONFIDENTIAL)

****

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CONTAINS CRITICAL ENERGY INFRASTRUCTURE INFORMATION (CEII) PURSUANT TO 18 C.F.R. § 388.112

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Exhibit No.____ (NMP-8)

September 26, 2012 Review of
Dunkirk Mothball Notice - Part 2
(Public Version)

****

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****

REVIEW OF DUNKIRK MOTHBALL NOTICE – Part 2

REVIEW OF ADDITIONAL SOLUTIONS ASSOCIATED WITH DUNKIRK MOTHBALL NOTICE

Version 0

September 26, 2012

Principal Contributor:
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National Grid
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nationalgrid

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Table of Contents

List of Tables

Change Control

Version	Date	Modification	Author(s)	Reviews and Approvals by
0	9/26/12	Initial Document	J. Maher	J. Hipius & C. Sedewitz

1. Executive Summary

This study is the second part of the assessment of the impact of the shutdown of coal fired generation at the Dunkirk facility. It reviews the recommended system upgrades necessary to completely mitigate the impact. Notice was received on March 14, 2012 that NRG plans to place the units in protective layup (mothball) for an unknown amount of time.

Before NRG;s announcement, National Grid performed a study of Western NY in 2011; the study reviewed the weaknesses of the existing system and made recommendations to address these needs. The 2011 study determined that severe post-contingency low voltages exist today and will get worse though time. The 2011 study was done with all generation at Dunkirk in service. The 2011 Western Division Solution Study, which had assumed all Dunkirk generation was in-service, recommended system upgrades to address concerns in western NY including a new 345/115kV substation near Homer Hill, reconductoring of line #171, a second Homer Hill capacitor bank and a second bus tie at Dunkirk.

After the NRG announcement, National Grid immediately began its analysis of the impact of the plant mothball or shutdown. This analysis was document in two parts to aid in the decision making process. The analysis documented in the first part of this study showed that the shutdown of the generation at Dunkirk would have an immediate negative impact on the system. It was originally found that three Dunkirk units would need to be in service to support the area in the summer and that two would be required in the winter. The Part I Study then concluded that several projects could be completed prior to June 2013 that would reduce the dependency to one Dunkirk 115kV connected generator. The projects, referred to as the interim solutions, included addition of 230kV breakers at Huntley and Packard, installation of National Grid's mobile capacitor banks at Dunkirk and moving three distribution stations served from Gardenville – Dunkirk lines #141 and #142 to other circuits. The interim solutions and running generation did not fix all area issues, merely restored the system to a state similar to the existing system with all four Dunkirk units running in year 2013. Thus, these interim projects do not eliminate the need to complete the upgrades recommended in the 2011 area study.

This second part of the assessment of the impact the Dunkirk shutdown will have on the system looks at the area following all upgrades recommended in Part 1 Study and the 2011 Western NY Area Study. These previously identified projects were included in the base cases, as the 2011 area study determined that they are the most effective options to address the existing area problems. The short duration projects recommended in the first part of this study were also included in study base cases, as it is expected that they will be complete by spring 2013. No mobile capacitor banks at Dunkirk were included in study base cases to determine if there is a continued need for reactive support.

This analysis found that the shutdown results in low voltages for several contingencies in the Dunkirk and Falconer areas and overloads in three locations. One overload was between Five Mile Rd and Homer Hill (both lines) and the other two were between the Niagara/Packard area and the Gardenville/Erie [redacted]

The method of identifying recommended reinforcements was broken into three levels, similar to the 2011 study of the area. However, the level names are not the same as was used in the previous 2011 study as these were found to be overly complicated. The first level plan (called plan A1) was to address the N-1 low voltages and overloads with Indeck Olean in service. The second level plan (called plan A2) was to address the N-1 low voltages and overloads with Indeck Olean out of service. The fifth level plan (called A5) was to address the N-1-1 low voltages and overloads with Indeck Olean out of service. All of these levels assumed that Jamestown was at a 75-80 MW load level. Plans were not developed solely for the third, fourth or sixth levels. Though plans were developed for the fourth and sixth levels in the 2011 area study, they were not the recommended solutions. As will be seen, the first level recommendations addressed all of the concerns in the third level cases.

Through the course of the study, it was determined that though the first level plan (A1) addressed all N-1 events, it left the system exposed to N-1-1 overloads that surpassed the STE rating. The case started with all generation at Indeck Olean and Jamestown in service, [redacted] following adoption of the expected BES definition and the revised TPL standards. Therefore, while a plan for this level is discussed in this report, it is not the recommended solution. It was also found that the difference between the second level (A2) recommendation and the fifth level recommendation (A5) would be minimal and thus it is recommended to eliminate the exposure to the N-1-1 low voltages by proceeding with the fifth level plan (A5). The recommendation to proceed with this plan (A5) will leave the system in a state similar to the state it would have been in after completion of the projects recommended in the 2011 area study, had Dunkirk not shutdown.

The projects recommended to address the needs discussed within this report are:

- Addition of two 33.3 MVAr capacitor banks on the two Dunkirk 115kV bus sections. This project should be implemented as soon as possible. ($2.5M)
- Addition of a second 75 MVAr capacitor bank at the Huntley 115kV switchyard. This project should be implemented as soon as possible. ($1.4M)
- Reconductoring of the two 115kV lines between Five Mile Rd and Homer Hill, each approximately 7.4 miles in length. This project is recommended to be executed such that it is complete when Five Mile Rd comes into service. If the project cannot be completed by the time Five Mile Rd is completed, a review of the risk associated with the outage/overload and the cost of continued operation of generation at Dunkirk will have to be undertaken to determine when the shutdown of the generation can occur. ($17M-$19M)
- Reconductoring of one mile of the Niagara – Gardenville #180 line. To facilitate the retirement of the generation as soon as possible, this project is recommended to be implemented such that it is complete at or before Five Mile Rd coming into service. If the project cannot be completed by the time Five Mile Rd is completed, a review of the risk associated with the outage/overload and the cost of continued operation of generation will have to be undertaken to determine when the shutdown of the generation can occur. ($3.7M)
- Reconductoring of 14 miles of the Packard – Erie #181 line. To facilitate the retirement of the generation as soon as possible, this project is recommended to be implemented such that it is complete at or before Five Mile Rd coming into service. If the project cannot be completed by the time Five Mile Rd is completed, a review of the risk associated with the outage/overload and the cost of continued operation of generation at Dunkirk will have to be undertaken to determine when the shutdown of the generation can occur. ($35M-$40M)

The expected cost of this set of projects is in the range of **$60M-$67M** based on investment grade estimates with a range of -50% - +200%.

Following the addition of these projects to the study base cases, no N-1 thermal or voltage problems will be present. N-1-1 testing was then performed. This testing determined that while N-1-1 problems do exist, they are for combinations of single element outages followed by a multiple element outage; tested per the NPCC requirements. These overloads or low voltages were on non-BPS elements and thus correction of these issues is not mandatory. Further review of these issues will be done in the next area study to confirm that there will be sufficient time for operators to take corrective actions following the second event. Some minor N-1-1 problems were also found in cases with all generation at the City of Jamestown and Indeck Olean out of service. This is considered a sixth level case, and the low voltages or overloads are not recommended for correction.

2. Introduction

This study examines the impact of the announced closure of the generation at the Dunkirk facility in western NY. It summarizes the third and fourth phases of this study, which is a determination of what projects would be necessary to address all required N-1 and N-1-1 conditions with all Dunkirk generation out of service. The first two phases were documented in part 1 of this study.

3. Study Details

This review was done using the summer and winter 2016 and 2021 cases that were used in the 2011 needs assessment of the area. Information on these cases, including load levels, forecasts and generation dispatch can be found in sections 4 and 5 of the 2011 Needs Assessment report. It is believed that the load magnitude and distribution across the system used in the 2011 study is representative of the peak loads that would be expected for the summer of 2013.

The starting point of this assessment was the system with the recommended reinforcements, as shown in the executive summary of the 2011 Western NY Solution Report in service. These upgrades include:

- Construction of a new 345/115kV station north of Homer Hill station connecting to the Homer City – Stolle 345kV line #37 and the Gardenville – Homer Hill #151 and #167 circuits. This station, referred to as Five Mile Rd, includes a single 345/115 standard size 448 MVA transformer and a single 25 MVAr capacitor bank
- Installation of a second 33.3 MVAr capacitor bank at Homer Hill station and reinstallation of the previously removed capacitor cans to increase the size of the existing capacitor bank from 27 MVAr to its designed size of 32 MVAr
- Reconductoring the Warren – Falconer #171 line
- Closure of the Normally Open switch at Andover station and reinstallation of the previously removed capacitor cans to increase the size of the Andover capacitor bank from 10 MVAr back to its designed size of 15 MVAr
- Installation of a second breaker in series with the existing Dunkirk 115kV bus tie breaker [redacted]

The 2011 needs study also noted that the following projects are being implemented for capacity or condition reasons and were thus included in the study base cases:

- Addition of a single 75 MVAr capacitor bank at Huntley
- Reconductoring on 0.3 miles of Gardenville – Erie #54
- A complete rebuild of the Gardenville 115kV station including replacement of TB #3 and #4 with larger units and installation of four 75 MVAr capacitor banks

In addition to these system upgrades, the following system changes or upgrades were recommended in the July 27, 2012 report titled "Review of Dunkirk Mothball Notice-Part 1" and are associated with the shutdown of the Dunkirk generation. Note that the installation of the mobile capacitor banks at any station is not included in the base cases to determine if the need exists for permanent reinforcements.

- Addition of a 230kV breaker at Huntley, which creates a new bus section. Bus section 68 (left side of station) will be lines #78, #79 and generator 68. The middle bus section will be cable #70. Bus section 67 (right side of station) will be lines #77, #80 and generator 67. [redacted]

- Addition of a 230kV breaker at Packard, which creates a new bus section. Bus section 4 (left side of station) will be lines #62, #77 and TB #4. Bus section 3 (the middle bus section) will be line #76. Bus section 2 (right side of station) will be lines #61, #78 and TB#2. [redacted]
- Moving three distribution stations served from Gardenville – Dunkirk #141 and #142 to other circuits. The three changes are moving Bennett Rd station from line #142 to line #161, moving Station #139 from circuits #141 and #142 to circuits #149 and #150 and moving Station 55 from circuits #141 and #142 to circuits #145 and #146

3.1. Discussion of Case Levels

As a reminder, the 2011 Solution Study for the area broke the analysis into six levels to help quantify risk. These same levels are used within this study and are shown in the table below. To clarify the discussion, the second level plus was renamed to the fifth level and the fourth level plus was renamed to the sixth level.

To simplify the analysis, plans were only developed for three conditions (not all six). Plans were developed for the first, second and fifth levels, but not the third, fourth and sixth levels.

One plan will be developed to address the First level needs, which essentially corrects all concerns that exist for N-1 conditions with Indeck Olean in service. Within this report, this plan will be referred to as the A1 plan.

The second plan to be developed will address all Second level needs. Within this report, this plan will be referred to as the A2 plan.

A third plan will be developed to address all fifth level needs. Within this report, this plan will be referred to as the A5 plan.

A third, fourth and sixth level plan will not be developed at this time. This is consistent with the recommendation of the 2011 area study. These levels were the cases with Jamestown's load at ~100 MW. As will be seen, the plans developed happen to address most of the concerns with Jamestown at ~100 MW. This was not by design, but rather due to the lumpiness of transmission solutions. The analysis of the recommended plans will demonstrate what risks will remain following the completion of the upgrades. The 2012 study of the region will further review potential solutions to the fourth and sixth level if necessary.

Table 1: Summary of Plans Developed

Case Level	Indeck Olean	Line 171	Jamestown Net Load	All Lines in Service	Single Element Outage (N-1)	Multiple Element Outage (N-1)	Multiple Element Outage (N-1-1)
Level 1	In	In	~75-80 MW	First Level	First Level	First Level	Fifth Level
Level 2	Out	In	~75-80 MW	First Level	First Level	Second Level	Fifth Level
Level 3	In	In	~100-105 MW	First Level	Third Level	Third Level	Sixth Level
Level 4	Out	In	~100-105 MW	Fourth Level	Fourth Level	Fourth Level	Sixth Level

3.2. System Generation

Four system base case conditions were reviewed as shown in the table below. All analysis assumes that the 230kV connected generation at Huntley, the 115kV connected generation at Indeck Yerkes and the 115kV connected generation at Oxbow power (both connected to the system near Huntley) were in service. [redacted] This is consistent with what was done in the 2011 Western Division Solution Study.

All wind generation at Arcade and Steel winds was modeled as out of service due to wind generations uncertain nature, especially as its typical output during system peak conditions is very low.

Table 2: Study Base Case Conditions

Huntley Units 67 and 68	Indeck Yerkes	Oxbow Power	Indeck Olean	Line 171	Jamestown Net Load
In Service	In Service	In Service	In Service	Reconductored	~75-80 MW
In Service	In Service	In Service	In Service	Reconductored	~100-105 MW
In Service	In Service	In Service	Out of Service	Reconductored	~75-80 MW
In Service	In Service	In Service	Out of Service	Reconductored	~100-105 MW

3.3. Gardenville 230/115kV Transformers

System Operators frequently adjust the LTC settings of the National Grid and NYSEG 230/115kV transformers at Gardenville. [redacted] For nearly all hours between June 2003 and September 2010, the 115kV voltage at Gardenville was above 102% of nominal. The voltages were at 103%-105% of nominal about 96% of the time. In all study base cases, the transformers were adjusted to hold the 115kV voltage to about 104.5%. The LTC setting was also chosen so that voltages at all major buses in the system were kept below 105%. This did not result in any 230kV pre-contingency voltages being outside acceptable limits.

3.4. Dunkirk 230/115kV Transformers

Historically, System Operators have almost never adjusted the LTC settings of the 230/115kV transformers at Dunkirk. Typically, the generation is used to manage the 115kV and 230kV voltages. Loss of these machines will require that LTC adjustment begin being used. For each season, year and dispatch, the voltages in the area were reviewed and a setting chosen to hold the Dunkirk 115kV voltage up around 104%. Today, per the Power Control Procedures, operators actually hold the voltage higher, up to 107%, but 104% was used to maintain some system margin. The LTC setting was also chosen so that voltages at all other major buses in the system were kept below 105%.

3.5. Five Mile Rd 345/115kV Transformer

For each season, year and dispatch, the voltages in the area were reviewed and a LTC setting chosen to hold the Five Mile Rd 115kV voltage up around 104%. The LTC setting was also chosen so that voltages at all major buses in the system were kept below 105%.

Prior to beginning this review, impedance calculations were reviewed and updated based on the planned location for the new station. This has resulted in some changes from the analysis shown in the 2011 area study report.

4. Study Methodology

The study methodology is similar to that used in the 2011 area Needs Assessment and Solution Study and is documented in sections 3, 4, 5 and 6 of the 2011 Western Division Area Review Part 1 – Needs Assessment Study. These descriptions are not repeated here. In addition to this methodology, when running N-1-1 analysis, the operator emergency low limits and load shed limits, as discussed in the first part of this study, were used.

5. System Response for Outage of all Dunkirk Generation

5.1. N-1 System Conditions

The following tables show the results of N-1 testing for the system with all Dunkirk units out of service and the planned area upgrades completed.

All tables within this report use a short description to indicate the contingency being presented. Space constraints prevent fully describing the contingency. A full description for each outage can be found in Appendix C of the 2011 Needs Assessment. All contingencies listed in Appendix C were tested as part of this assessment.

Table 3: Summary of N-1 Voltage Needs Identified with Dunkirk Out of Service

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 4: Summary of N-1 Thermal Needs Identified with Dunkirk Out of Service

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-

Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

5.2. N-1-1 System Conditions

In addition to the N-1 needs identified, several N-1-1 conditions were reviewed. N-1-1 analysis can be very burdensome to run and review. To reduce the time to run the analysis and to limit the results that needed to be reviewed and presented here, the full N-1-1 analysis was initially only run on two cases, a summer 2021 and a winter 2021 case. Both initial cases assumed that Indeck Olean was out of service and that the Jamestown load was approximately 100 MW. This analysis identified the contingencies that resulted in system problems. A reduced number of N-1-1 combinations were then run on all other cases.

When presenting results, only voltages that were below the operators load shed limit (see discussion in the first part of the Dunkirk Mothball Study) and overloads that surpassed the element's STE rating are shown. No overloads that are on facilities shown in the tables above in section 5.1 for N-1 conditions are repeated in this section [redacted]

[redacted] From the N-1 analysis for the second level cases, it can also be observed that if the case had assumed Indeck Olean was in service [redacted] It is expected that correction of the overload on these lines will be mandatory when considering the expected definition of BES and the proposed revisions to the TPL standards (TPL-001-2).

Finally only applicable N-1-1 combinations and impacts are described here. As discussed in the 2011 Western NY Needs and Solutions studies, the applicable contingencies are as follows:

1. Loss of any single transmission circuit, transformer, generator or DC line operated at any voltage, followed by any other single transmission circuit, transformer, generator or DC line operated at any voltage. The system response at all 100kV and above elements is considered.
2. Loss of any BPS element, followed by any design contingency at any voltage. The system response on all BPS elements is considered. The impact of this combination on non-BPS elements is not addressed in this study and typically not considered. However, if system impacts are considered severe then a business case to review and address them would be performed on a case by case basis.
3. Loss of any long lead time item operated at any voltage, followed by any design contingency at any voltage. Long lead time items include generators, equipment at gas insulated substations, underground cables, and large power transformers. The system response at all 100kV and above elements is considered.

As can be inferred by #1 and #2 above, correction of the impact of a single element outage, followed by a multiple element outage on a non-BPS facility is not mandatory and is not discussed in the following tables. Note that the Dunkirk 230kV bus is not BPS.

Table 5: Summary of N-1-1 Voltage Needs Identified with Dunkirk Out of Service

Indeck Olean	Line 171	Jamestown Net Load	First Outage	Second Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 6: Summary of N-1-1 Thermal Needs Identified with Dunkirk Out of Service

Indeck Olean	Line 171	Jamestown Net Load	First Outage	Second Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

5.3. Sensitivity to Interim Conditions

To assess the need for continued operation of the Dunkirk generation and to provide some insight to the risk associated with the low voltages and overloads identified, two sensitivity cases were tested. These cases included the two 52.5 MVAr mobile capacitor banks installed at Dunkirk and Dunkirk 115kV unit #1 in service.

The sensitivity testing only reviewed the summer 2016 peak load cases. One case had Indeck Olean in service, the other had Indeck Olean out of service. Both cases tested had one Jamestown generator in service, for a net load of about 80 MW.

It was found that there were no N-1 voltages outside of planning criteria.

The table below shows all N-1 thermal overloads found.

No voltages were below the load shed limit for any applicable N-1-1 contingency and none of the tested N-1-1 outages resulted in loading over STE on the applicable facilities. N-1-1 testing with Dunkirk Unit #1 as the first contingency was not competed.

Only a desktop review of the winter performance was completed. It is expected that there would be no unacceptable N-1 or N-1-1 thermal overloads or low voltages in the same winter cases. Additional testing would be necessary to confirm this.

Table 7: Summary of N-1 Thermal Needs Identified with Dunkirk Unit 1 In Service

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Summer Peak 2016
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]

5.4. Niagara – Packard Overloads

[redacted] These overloads are not discussed in this report. This is because a NYSRC operating exception exists that allows these lines to be operated up to their STE rating as generation adjustment can occur very quickly that will correct the overloads.

As described in the 2011 Western NY Needs Assessment, N-1-1 overloads in the Niagara/Packard area can all be mitigated [redacted] These concerns are not discussed here.

[redacted]

Some contingencies did not result in National Grid equipment surpassing its LTE rating. No National Grid equipment surpassed its STE rating. [redacted]

6. Solutions to Additional First Level (A1) Needs

As a reminder, the following tables show the additional N-1 low voltages and overloads that were determined to be first level (A1) needs. Notice that the thermal overloads only develop in the summer and that the voltage problems tended to be worse in the summer.

Table 8: Summary of Voltage Needs Identified In First Level Cases

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 9: Summary of Thermal Needs Identified In First Level Cases

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

6.1. Dunkirk Area Low Voltages

[redacted] The simplest solution to correct these issues is to add a capacitor bank to the 115kV bus at Dunkirk. Area power factor correction was reviewed and it was determined that it would not fully address the low 230kV voltages.

The recommended capacitor bank size is 33.3 MVAr, the same as the unit planned for Homer Hill. It was found that using a 54 MVAr unit, the same size as the bank recently installed at Clay, would be oversized for this location; up to 45 MVAr could be installed. Based on a review of other levels, including N-1-1 conditions, the recommended location for the capacitor is on bus section 1. However, either bus section would be acceptable. [redacted] This may suggest that the ideal configuration would be the installation of two capacitor banks; this will be discussed later in the report.

This project may help mitigate the need to run generation at Dunkirk while the other permanent solutions are put into place. For this reason, this project should be completed as soon as possible.

Following addition of this project, all 230kV voltages were above 95%.

The expected cost of this project is **$1.3M** and is expected to take **1-2 years** to implement.

6.2. Packard – Erie and Niagara – Gardenville Overloads

The loss of generation resulted in two overloads in the Frontier region. [redacted] The overloads were found in all four levels and for both summer 2016 and 2021. The magnitude of the overload was found to decline in future years, likely due to dispatch and transfer level changes between 2016 and 2021. This suggests that the overload could be more or less severe for other dispatches then the one reviewed in this study. For N-1 conditions, none of the overloads surpassed the STE rating of either line.

[redacted]

Screening of several options, such as reconnecting load taps to other lines, installation of reactors, power factor correction and changing line terminals at each end of the line did not result in any acceptable alternatives, beyond reconductoring the lines or using retired in place circuits as discussed below. Many of these options would reduce the loading on line #181 but increase it on other lines like #180, #182 or even some of the lines connecting to Huntley. As these lines can be heavily loaded during contingency conditions, these increases would not eliminate the need to reconductor circuits, just change which circuits would require the reconductoring. [redacted]

[redacted] With Dunkirk in service, the reduced flow into Stolle from Homer City is made up by subsequent flow increases on the lines from the north (#180, #181, #182). However, the line loading increase is not enough to cause overloads during contingency conditions. With the shutdown of Dunkirk, more power will be flowing across the system from the sources in the north to the loads in the south. In addition, more power will be supplied to the Southwest area from Five Mile. [redacted] The preferred timing for the reconductoring the #181 line is therefore tied to both the full shutdown of Dunkirk generation and the installation of Five Mile Road substation. Therefore, reconductoring is recommended to be completed concurrently with the completion of Five Mile Rd.

The overload [redacted] s related to increased north to south flow associated with the generation shutdown. To facilitate the retirement of the generation as soon as possible, this project will need to be executed as soon as possible. However, since it was not apparent in the 2013 case in the Dunkirk Mothball Part 1 study, it is recommended that the reconductoring be done by June 2015, consistent with the target date for other major system reinforcements in the area.

6.2.1. Niagara – Gardenville Overloads

The overload on line #180 was found to be on a one mile section of 350 copper conductor located just south of the Ellicott junction. Replacement of this conductor will reduce the loading [redacted] rating, addressing the immediate overload concerns on this line. Additional work may be required in the future to reduce the loading further. The next most limiting element is over 11 miles of 400 copper conductor. Other system changes, including the project to address the #181 overload may help mitigate this overload further [redacted] The recommended size of the replacement wire is at least 636 ACSR, but to insure adequate future capacity and to align with the National Grid standard sizes, 795 ACSR is preferred.

An alternative to this could be utilizing the retired in place 69kV circuit #92. This line shares double circuit towers with the #182 circuit and is 400 Copper (up from the 350 Copper on line #180) in this section. Lines #180 and #182 are on the same double circuit towers from the Packard area until the lines cross Grand Island. At this point, they separate onto different double circuit towers, each sharing a tower with a retired in place 69kV line. It would be possible to keep the lines on the same towers from the Grand Island crossing, all the way to the point in the right of way that line #181 turns and heads toward Erie Station. There is no 350 Copper conductor used on this path. Utilizing this alternate path would correct all loadings [redacted]

Due to the expected concerns with utilizing retired in place assets that are believed to be past their useful life, and the fact that this would only reduce the loading [redacted] this option is not recommended. This leaves only the reconductoring option to be a viable alternative.

The expected cost of reconductoring is **$3.7M** and is expected to take **3-5 years** to implement.

6.2.2. Packard – Erie Overloads

The overload on line #181 was found to be on a 14 mile section of 350 copper and 636 aluminum conductor located between Packard and Station 130, which is just south of the Ellicott junction. Replacement of this conductor will address the overloads. The recommended size of the replacement wire is at least 795 ACSR.

An alternative to this could be utilizing the retired in place 69kV circuit #105. The #181 and #105 circuits share double circuit towers from Packard until Ellicott Junction. Bussing these two lines together would correct most of the overloads. Some reconductoring would be required on the 1.1 mile section between Ellicott junction and Station #130. Reconductoring leaves the circuits impedance relatively unchanged. However, bussing the lines greatly reduces the impedance of the circuit (cuts it in half). Because the impedance is cut in half, the loading on the line increases, to the point that it would trigger the need to do additional reconductoring of a 1.2 mile section between Station #130 and the ECWA Ball Pumping station. At this station, the loading reduces to a point that further reconductoring would not immediately be required. However, additional work on the 1.2 mile section between the pump station and Youngmann station might be needed in the future.

Due to the expected concerns with utilizing retired in place assets that are believed to be past their useful life, the bussing option is not recommended. This leaves only the reconductoring option to be a viable alternative.

The expected cost of reconductoring is **\$35M-\$40M** and is expected to take **5-7 years** to implement.

6.2.3. Packard – Erie and Niagara – Gardenville Overloads

In an attempt to address both of the overloads between Packard and Erie and between Niagara and Gardenville, an option to utilize the retired in place elements discussed above to create a new line from Packard to Gardenville was reviewed. This option merely energizes the retired in place wire, while doing minimal replacement of structures or conductor. This option would require a new breaker position at Packard and Gardenville. It was found that while it addressed the #181 line overloads and one of the two #180 line overloads [redacted]

As discussed, there are concerns with using retired in place assets that are believed to be past their useful life. Because of the remaining overload, the concern with the condition of the existing equipment and the need to add new terminal equipment, this option is not recommended.

6.3. N-1 and N-1-1 System Results for First Level Plan (A1)

The tables below summarize the N-1 and N-1-1 issues that remain following completion of the recommended projects. The recommended projects to address the First Level, N-1, needs include:

- Addition of 33.3 MVAr capacitor bank on the Dunkirk 115kV bus. ($1.3M)
- Reconductoring of one mile of the Niagara – Gardenville #180 line. ($3.7M)
- Reconductoring of 14 miles of the Packard – Erie #181 line. ($35M-$40M)

Note that many of the N-1 issues in the third and fourth level cases have also been addressed by these upgrades.

As N-1 overloads exist on the Five Mile Rd – Homer Hill circuits, N-1-1 overloads on these same lines are not indicated. [redacted]

When considering the as drafted definition of BES and the as drafted revisions to the TPL standards (TPL-001-2), it is expected that because the overloads on the Five Mile – Homer Hill lines surpasses STE for multiple N-1-1 conditions, that correction of this overload will be required in the future to address the minimum reliability standards. Thus, the A1 plan does not adequately address the N-1-1 reliability issues and is not the preferred plan.

Table 10: Summary of Remaining N-1 Voltage Needs Identified Following Plan A1

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	None					
Out of Service	Reconductored	~75-80 MW	None					
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 11: Summary of Remaining N-1 Thermal Needs Identified Following Plan A1

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	None					
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	None					
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	SW[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 12: Summary of Remaining N-1-1 Voltage Needs Identified Following Plan A1

Indeck Olean	Line 171	Jamestown Net Load	First Outage	Second Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	-

Table 13: Summary of Remaining N-1-1 Thermal Needs Identified Following Plan A1

Indeck Olean	Line 171	Jamestown Net Load	First Outage	Second Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	None						
Out of Service	Reconductored	~75-80 MW	None						
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-

7. Solutions to Additional Second Level (A2) Needs

As a reminder, the following shows the N-1 low voltages and overloads that were determined to be additional second level needs or A2 needs. A review of the solutions for this level did not initially include the projects discussed in the previous section. As discussed above, the First Level plan (A1) is not adequate to address the future minimum reliability requirements as an N-1-1 loading over STE would still exist following completion of that plan.

Table 14: Summary of Voltage Needs Identified in Second Level Cases

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 15: Summary of Thermal Needs Identified in Second Level Cases

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

7.1. Dunkirk Area Low Voltages and Frontier Overloads

The previous section described the recommended correction for low voltages in the Dunkirk area and overloads on the #181 and #180 circuits. Only one substantial difference exists between the First level needs and the Second Level needs. This is an overload on the lines between Five Mile Rd and Homer Hill.

As the other needs are relatively the same, the recommendations to correct these problems has not changed and are:

- Addition of 33.3 MVAr capacitor bank on the Dunkirk 115kV bus. ($1.3M)
- Reconductoring of one mile of the Niagara – Gardenville #180 line. ($3.7M)
- Reconductoring of 14 miles of the Packard – Erie #181 line. ($35M-$40M)

7.2. Homer Hill Area Overloads

The only difference between the first level needs and the second level needs is the overloads between Five Mile Rd and Homer Hill. In the cases with Indeck Olean out of service, the lines between Five Mile Rd and Homer Hill (in this study numbered #163 and #164) were overloaded for an outage of the parallel line or a stuck breaker at Five Mile Rd. This overload surpassed STE in many of the cases and was present in both 2016 and 2021. While the loading was more severe in the summer, it was still found to be over LTE in the winter. As the problem is found for a single element outage in a level two case, correction is recommended.

For an N-1-1 outage of the 345kV line between Five Mile Rd and Stolle, followed by an outage of one of the 115kV lines between Five Mile and Homer Hill, the remaining line between Five Mile and Homer Hill would overload [redacted] N-1-1 outages of line #171, #67 and #996 instead of line #37 also caused loading on lines #163 or #164 [redacted] It was also found that in cases with Indeck Olean in service, an N-1-1 outage of Indeck Olean followed by an outage of line #163 would result in line #164 being above its STE rating.

These lines are on the same double circuit structures for the entire 7.4 miles between Five Mile and Homer Hill. They are currently 336 ACSR conductor. Screening several options only resulted in one acceptable alternative, reconductoring of the lines.

Testing showed that reconductoring with a 556 ACSR conductor would only reduce the overload to about 85% of LTE, thus not providing for the future capability that would likely be needed over the 40 or 80 year life of the line. At least a 636 ACSR conductor is recommended, but to insure adequate future capacity and to align with the National Grid standard sizes, 795 ACSR is preferred.

It was also noted that this project would result in some improvement to the area voltages and that the larger the conductor size, the greater this improvement.

The expected cost of this project, based on using a 795 ACSR conductor, is **$17M-$19M, depending on the conductor used** and is expected to take **5-6 years** to implement. Opportunities to separate the lines onto separate structures will be reviewed, but it is expected that the alternative will be cost prohibitive and would need additional, difficult to obtain right of way. The cost for this variation is $27M.

Because the overload would develop immediately upon completing Five Mile Rd, this reconductoring should be completed concurrently with Five Mile.

7.3. N-1 and N-1-1 System Results for Second Level Plan (A2)

The tables below summarize the N-1 and N-1-1 issues that remain following completion of the recommended projects. The recommended projects to address the Second Level needs include:

- Addition of 33.3 MVAr capacitor bank on the Dunkirk 115kV bus. ($1.3M)
- Reconductoring of one mile of the Niagara – Gardenville #180 line. ($3.7M)
- Reconductoring of 14 miles of the Packard – Erie #181 line. ($35M-$40M)
- Reconductoring of the two 115kV lines between Five Mile Rd and Homer Hill, approximately 7.4 miles in length. ($17M-$19M)

Table 16: Summary of Remaining N-1 Voltage Needs Identified Following Plan A2

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	None					
Out of Service	Reconductored	~75-80 MW	None					
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 17: Summary of Remaining N-1 Thermal Needs Identified Following Plan A2

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	None					
Out of Service	Reconductored	~75-80 MW	None					
In Service	Reconductored	~100-105 MW	None					
Out of Service	Reconductored	~100-105 MW	None					

Table 18: Summary of Remaining N-1-1 Voltage Needs Identified Following Plan A2

Indeck Olean	Line 171	Jamestown Net Load	First Outage	Second Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	-

Table 19: Summary of Remaining N-1-1 Thermal Needs Identified Following Plan A2

Indeck Olean	Line 171	Jamestown Net Load	First Outage	Second Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	None						
Out of Service	Reconductored	~75-80 MW	None						
In Service	Reconductored	~100-105 MW	None						
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	-

8. Solutions to Additional Fifth Level (A5) Needs

As discussed in section 3.1, plans are developed within this report for the First Level, Second Level and Fifth Level needs. This section examines the options for the Fifth level. This level plan will need to address all N-1 and N-1-1 issues found in the first and second level cases, with the N-1-1 issues driving many of the recommendations. The issues requiring correction are shown in the following tables. The results in these tables do not include any of the upgrades discussed in previous sections. From a desktop review of the needs that require correction, four separate solution sets were developed.

From the analysis for the two sets of N-1 plans discussed in earlier sections of this report (A1 and A2 plans), it can be seen that nearly all of the N-1-1 issues have been addressed; only a few N-1-1 low voltage issues remain. The A2 plan was used as the starting point for one of the fifth Level solutions, with additional projects added to address the remaining issues; this new option is referred to as the A5-1 plan.

[redacted] The second solution set reviewed for this level attempted to address this by starting with a new 230kV path from Packard to Gardenville and then adding in additional projects to address the remaining issues; this option is referred to as the A5-2 plan.

The earlier analysis also showed that many of the overloads and low voltages could be traced back [redacted] this option is referred to as the A5-3 plan. The fourth option reviewed the addition of a new 345kV line from a point called Dysinger to Stolle; this option is referred to as the A5-4 plan.

Table 20: Summary of Voltage Needs Identified in First and Second Level Cases

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 21: Summary of Thermal Needs Identified in First and Second Level Cases

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 22: Summary of N-1-1 Voltage Needs Identified in First and Second Level Cases

Indeck Olean	Line 171	Jamestown Net Load	First Outage	Second Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 23: Summary of N-1-1 Thermal Needs Identified in First and Second Level Cases

Indeck Olean	Line 171	Jamestown Net Load	First Outage	Second Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-

8.1. Second Level Solution to Fifth Level Needs (A5-1)

Earlier in this study, a set of upgrades was recommended to address the second level N-1 problems (A2). This option for a fifth level solution (A5-1) started with these upgrades and added additional projects to address the remaining N-1-1 issues. The remaining N-1-1 issues were low Gardenville and Huntley 230kV voltages for N-1-1 outages [redacted] The recommended projects to address the Second Level needs and the stating point for this fifth Level solution includes:

- Addition of 33.3 MVAr capacitor bank on the Dunkirk 115kV bus. ($1.3M)
- Reconductoring of one mile of the Niagara – Gardenville #180 line. ($3.7M)
- Reconductoring of 14 miles of the Packard – Erie #181 line. ($35M-$40M)
- Reconductoring of the two 115kV lines between Five Mile Rd and Homer Hill, approximately 7.4 miles in length. ($17M-$19M)

Review of the remaining issues started using a 2021 summer peak case with Indeck Olean out of service. It was found that the remaining issues are low voltages. An attempt was made to address them with the addition of capacitor banks. Very few locations are left to add blocks of reactive compensation to the transmission system, as it is unwise to add more than one capacitor bank to any single bus section. The first two proposed additions were at the Huntley 115kV bus and the Dunkirk 115kV bus. With these additions, all voltages and thermal overloads for N-1-1 conditions in the second level cases have been mitigated to an acceptable point. The few remaining N-1-1 low voltages are in fourth level cases, which do not require correction. The complete summary of area performance is in the following tables. Thus the complete option for the Fifth Level Needs is:

- Addition of two 33.3 MVAr capacitor banks on the Dunkirk 115kV bus. ($2.5M)
- Reconductoring of one mile of the Niagara – Gardenville #180 line. ($3.7M)
- Reconductoring of 14 miles of the Packard – Erie #181 line. ($35M-$40M)
- Reconductoring of the two 115kV lines between Five Mile Rd and Homer Hill, approximately 7.4 miles in length. ($17M-$19M)
- Addition of a second 75 MVAr capacitor bank on the Huntley 115kV bus ($1.4M)

The expected cost of this set of projects is **$60M-$67M**.

Table 24: Summary of Remaining N-1 Voltage Needs Identified Following Solution A5-1

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	None					
Out of Service	Reconductored	~75-80 MW	None					
In Service	Reconductored	~100-105 MW	None					
Out of Service	Reconductored	~100-105 MW	None					

Table 25: Summary of Remaining N-1 Thermal Needs Identified Following Solution A5-1

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	None					
Out of Service	Reconductored	~75-80 MW	None					
In Service	Reconductored	~100-105 MW	None					
Out of Service	Reconductored	~100-105 MW	None					

Table 26: Summary of Remaining N-1-1 Voltage Needs Identified Following Solution A5-1

Indeck Olean	Line 171	Jamestown Net Load	First Outage	Second Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	None						
Out of Service	Reconductored	~75-80 MW	None						
In Service	Reconductored	~100-105 MW	None						
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 27: Summary of Remaining N-1-1 Thermal Needs Identified Following Solution A5-1

Indeck Olean	Line 171	Jamestown Net Load	First Outage	Second Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	None						
Out of Service	Reconductored	~75-80 MW	None						
In Service	Reconductored	~100-105 MW	None						
Out of Service	Reconductored	~100-105 MW	None						

8.2. New 230kV Line Solution (A5-2)

This option examined the impact of adding a new 230kV line to the area. It is expected that obtaining the necessary right of way to construct a new line between Niagara or Packard and Gardenville would be very difficult. So a plan was developed that would utilize existing right of way in a new way.

Today three 115kV lines travel between the Niagara/Packard area and either Gardenville or Erie, lines #180, #181 and #182. Each of these lines is on double circuit towers. The fourth line sharing the double circuit towers with these three is a de-energized retired in place circuit. The proposed plan to construct a new 230kV line is to remove one of the two double circuit tower lines and replace it with a new single circuit 230kV line. This will result in the removal of the retired in place circuit and elimination of one of the three energized 115kV lines.

All analysis on this option was done assuming no more than three of the four capacitor banks at Gardenville were in service. From this, it can be concluded that selection of this option would allow a reduction in the number of Gardenville capacitor banks.

8.2.1. 115kV Line Impacts

This plan will require the reconnection of the existing 115kV lines in a new configuration. Two configurations are available, either a Packard – Gardenville circuit and a Niagara – Erie circuit or a Packard – Erie circuit and a Niagara – Gardenville circuit. For purposes of this study, the option for a Niagara – Erie and a Packard – Gardenville circuit was studied. If an engineering or commercial reason exists to consider the other alternative, further study work would be required to confirm that it would be acceptable.

8.2.2. Niagara – Packard 230kV Line Impacts

[redacted]

An operating exception exists on all lines connected to Niagara that allows their post-contingency loading to be up to the STE limit, as generation reduction at Niagara can be done to reduce the loading. Therefore, this overload is noted in the tables below, but is considered acceptable. It is expected that this option would make the predicted overload more common in real time system operation.

If it is decided that this overload is not acceptable, a desktop review has suggested three alternatives. The first is to reconductor the line, it is currently limited by 3.4 miles of 1431 ACSR conductor. This option would also likely require the replacement of terminal equipment at Niagara. The second is to separate lines #61 and #64 onto separate towers. They are on the same towers for about 1.4 miles. The third is to extend the new 230kV line to Niagara instead of Packard. It is expected that the third option will be most difficult and the first option would be the least impactful, however engineering review of all three would be necessary.

8.2.3. Five Mile – Homer Hill Overloads

During initial testing of this option, it was confirmed that the new 230kV line would have no impact on the post-contingency overloads on the Five Mile – Homer Hill circuits. With Indeck Olean out of service, an outage of one of the lines or a stuck breaker contingency at Five Mile Rd would result in the other line surpassing STE. To address this, the option to reconductor these lines was include in this solution set.

8.2.4. Remaining Voltage Problems

Initial testing of this option also determined that following the addition of the 230kV line and the Five Mile – Homer Hill reconductoring, one additional low voltage concern still exists. [redacted] These low voltages are similar to those discussed earlier in this report and are corrected by the addition of a single 115kV capacitor bank at Dunkirk.

8.2.5. Results

The following tables show the result of testing with the proposed solution applied. The solution includes the following.

- Addition of 33.3 MVAr capacitor bank on the Dunkirk 115kV bus. ($1.3M)
- Reconductoring of the two 115kV lines between Five Mile Rd and Homer Hill, approximately 7.4 miles in length. ($17M-$19M)
- Reconfiguration of the existing right of way between Packard and Gardenville such that one 115kV line and one de-energized line are removed, the remaining two 115kV lines are reconfigured and a new 230kV line is added. ($75M)

The expected cost of this set of projects is **$93M-$95M.**

Recall that because of the operating exception that exists at Niagara, the loading over LTE but less than STE on the lines connected to Niagara shown in the table below is acceptable.

Most of the low voltages shown in the tables could be addressed by the addition of a second 115kV capacitor bank at Dunkirk. However, addressing these was not required as they are for N-1-1 conditions with Jamestown at ~100 MW, which would be addressed by a sixth level plan. The loading over STE for N-1-1 conditions on #141 and #142 also does not require correction as it would only need to be addressed in a sixth level plan.

Table 28: Summary of Remaining N-1 Voltage Needs Identified Following Solution A5-2

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	None					
Out of Service	Reconductored	~75-80 MW	None					
In Service	Reconductored	~100-105 MW	None					
Out of Service	Reconductored	~100-105 MW	None					

Table 29: Summary of Remaining N-1 Thermal Needs Identified Following Solution A5-2

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-

Table 30: Summary of Remaining N-1-1 Voltage Needs Identified Following Solution A5-2

Indeck Olean	Line 171	Jamestown Net Load	First Outage	Second Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	None						
Out of Service	Reconductored	~75-80 MW	None						
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	-
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	-

Table 31: Summary of Remaining N-1-1 Thermal Needs Identified Following Solution A5-2

Indeck Olean	Line 171	Jamestown Net Load	First Outage	Second Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	None						
Out of Service	Reconductored	~75-80 MW	None						
In Service	Reconductored	~100-105 MW	None						
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-

8.3. Addition of Transformation at Stolle Rd (A5-3)

A review of the N-1 and N-1-1 issues found within this study indicated that many of the concerns started with outages in the Stolle area, resulted in low voltages in the Stolle area or were related to reduced flow into Stolle. This option attempts to address these concerns by reinforcing the Stolle area with new transformation. Initially, this option started with a single 345/230kV transformer, which was in addition to the two 345/115kV transformers that exist today. Then testing was done with various combinations of one or two 345/230kV transformers and/or one or two 230/115kV transformers. There are eight possible combinations of one or two transformers. For each combination, LTC settings were adjusted to hold all voltages to an acceptable level and to control reactive power flows.

To determine if this option would be effective to correct the area concerns, two N-1-1 contingencies were tested using the summer 2021 case with Indeck Olean out of service and Jamestown's net load at ~75 MW. The N-1-1 contingencies tested were an outage of either line #37 or line #66 followed by the 79/80 double circuit tower outage. [redacted] Therefore, for this testing, the #37 line outage is an outage of the Homer City – Five Mile Rd section or the Five Mile Rd – Stolle section of the line only.

For the transformers, a size similar to the new National Grid 230/115kV transformers at Gardenville [redacted] and the existing Niagara 345/230kV transformers was selected [redacted] These results would be affected by variations on these sizes.

As each variation seemed to result in an acceptable response, the next test performed was an N-1 double circuit tower outage of lines #180 and #182. [redacted] Because of this, this option will need to include reconductoring of that line.

Table 32: Remaining Concerns for Indicated Contingency

345/230kV Transformers	230/115kV Transformers	#37+ 79+80 DCT	#66+ 79+80 DCT	180+182S
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Testing was also done to review the impact that the addition of Stolle transformation would have on the overloads between Five Mile Rd and Homer Hill. The new transformation does not reduce the overload and may result in some increases in the overload for some of the N-1 and N-1-1 conditions.

Next testing was done on the case with a 345/230kV transformer, the Five Mile – Homer Hill lines reconductored and line #181 reconductored. It was found that for a [redacted] This was still not acceptable so a Dunkirk capacitor bank would need to be added.

Based on the results of this screening, this option would need to consist of the following projects. The addition of a single 345/230kV transformer could be replaced by a 230/115kV transformer.

- Addition of a 345/230kV transformer at Stolle
- Addition of 33.3 MVAr capacitor bank on the Dunkirk 115kV bus.
- Reconductoring of the two 115kV lines between Five Mile Rd and Homer Hill, approximately 7.4 miles in length
- Reconductoring of 14 miles of the Packard – Erie #181 line

This option is basically the same as the option discussed in section 8.1, only in place of the simple addition of capacitor banks at Dunkirk and Huntley, a complicated project to add a 345/230kV transformer to Stolle is added. The addition of the Stolle transformer does not mitigate the need for any of the other projects, except the minor reconductoring of line #180. Because of this, this option will be much more expensive and complicated than the option in section 8.1. For this reason, this option is not considered further. As National Grid does not own Stolle Rd, it was not possible to complete investment grade cost estimates for this option, it was only assumed that the cost of the two capacitor banks would be less than the transformer addition.

8.4. Addition of a Dysinger – Stolle 345kV Line (A5-4)

This option examines the impact of adding a 345kV circuit from Stolle Rd north to a point referred to as Dysinger. This is a point on the Niagara – Rochester 345kV lines where the Robinson – Stolle 230kV line #66 crosses the right of way and where one of the 345kV lines from Niagara turns and heads north to Somerset. For purposes of this study, it was assumed that the new line would connect only to the Niagara – Rochester 345kV line #2 (neither of the other lines connected to Somerset), via a three breaker ring station. It is also assumed that the 345kV at Stolle Rd would have to be expanded to a four breaker ring configured in such a way that no stuck breaker contingencies would result in an outage to either both transformers or both lines. A straight bus configuration with two bus tie breakers would also be acceptable.

Screening of this option was started by reviewing the loading on the Five Mile – Homer Hill 115kV circuits. It was found that for an outage of one line, the other would overload to 110% of its STE rating. This is an increase above what was discussed earlier. Thus, this option would also require a reconductoring of both of these circuits.

Following the addition of the reconductoring, the next outage screened was a double circuit tower outage of 230kV lines #73 and #74. For this outage, the 230kV voltage at Dunkirk would fall to 93.7%. As discussed earlier, this would require the installation of a capacitor bank at Dunkirk. It was also found that for an N-1-1 outage of a Dunkirk transformer (either one) followed by a Dunkirk bus fault (either one), the 115kV voltage at Dunkirk would be below the load shed limit. The solution to this discussed above is a second Dunkirk capacitor bank.

Following these upgrades, all voltages and loadings would be within acceptable limits. However for an N-1 outage of lines #180 and #182 (double circuit tower outage), line

#181 would continue to load to 98% of LTE. It is expected that this would need to be addressed in future years.

This plan would thus consist of:

- Addition of two 33.3 MVAr capacitor banks on the two Dunkirk 115kV bus sections. ($2.5M)
- Reconductoring of the two 115kV lines between Five Mile Rd and Homer Hill, approximately 7.4 miles in length. ($17M-$19M)
- Addition of a new 345kV line from a new three breaker ring bus constructed at the point commonly referred to as Dysinger to Stolle with expansion of the Stolle 345kV bus to a four breaker ring.

Based on a $3M to $10M per mile cost of 345kV construction, cost of only the new 345kV line (estimated to be at least 22 miles long) would be over $70M, possibly as high as $200M. Thus expected cost of this complete set of projects is in excess of **$90M** possibly as high as $220M. As this cost is much higher than the other options considered, this option is not the recommended approach for the area. In addition to the high cost, it is expected that if this option were selected, line #181 would still have to be reconductored at some point outside the study horizon, further increasing the cost.

Table 33: Summary of Remaining N-1 Voltage Needs Identified Following Solution A5-4

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	None					
Out of Service	Reconductored	~75-80 MW	None					
In Service	Reconductored	~100-105 MW	None					
Out of Service	Reconductored	~100-105 MW	None					

Table 34: Summary of Remaining N-1 Thermal Needs Identified Following Solution A5-4

Indeck Olean	Line 171	Jamestown Net Load	Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~75-80 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
In Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 35: Summary of Remaining N-1-1 Voltage Needs Identified Following Solution A5-4

Indeck Olean	Line 171	Jamestown Net Load	First Outage	Second Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	None						
Out of Service	Reconductored	~75-80 MW	None						
In Service	Reconductored	~100-105 MW	None						
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 36: Summary of Remaining N-1-1 Thermal Needs Identified Following Solution A5-4

Indeck Olean	Line 171	Jamestown Net Load	First Outage	Second Outage	Element	Winter Peak 2016	Winter Peak 2021	Summer Peak 2016	Summer Peak 2021
In Service	Reconductored	~75-80 MW	None						
Out of Service	Reconductored	~75-80 MW	None						
In Service	Reconductored	~100-105 MW	None						
Out of Service	Reconductored	~100-105 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

9. Non-Wires Alternatives

The following sections discuss how non-wires alternatives (NWA), such as demand side management or distributed generation might be used to address the needs discussed within this report. For purposes of this review all analysis was performed with a summer 2016 case with Indeck Olean out of service and Jamestown at 75-80 MW (second level case). It was found that all summer problems were worse than those observed in the winter were.

9.1. Low Voltage Concerns

As discussed within the earlier sections, many of the plans include the addition of capacitor banks to support post contingency voltages. It is expected that the addition of two permanent capacitor banks at Dunkirk and a second capacitor bank at Huntley could all be in service by spring 2014. In addition, the mobile capacitor banks can and are utilized in western NY to support the system while these permanent upgrades are put into place. Because of these points, review of NWA to address the voltage needs or to reduce the need to run generation at Dunkirk was not undertaken. It is also expected that the cost to install capacitor banks would be comparable to the annual cost of doing a NWA.

9.2. Overloads on Five Mile – Homer Hill Circuits

To review the amount of NWA needed to address this overload concern, a review was performed to find out how much load would have to be reduced in the Homer Hill area to keep the loading on the Five Mile – Homer Hill circuits below LTE for an N-1 stuck breaker at Five Mile Rd. An N-1 outage of one of the lines between Five Mile and Homer Hill would also result in the overload; the stuck breaker was just used for screening, as the overload was slightly worse.

First, a test was performed to scale the entire western division down until the problem was corrected. It was found that the load had to be reduced to 62% of its initial value (peak) to correct the loading to 100% of its LTE rating. This suggests that the problem would be present over 1850 hours each summer.

Next, only the load between Dunkirk, Falconer, Homer Hill and Gardenville was scaled. This scaling included all customer loads and all municipal loads. It was found that the load had to be reduced to less than 74% of its initial value to correct the overload.

Based on these two tests, the use of NWA to address the area concerns was not considered a viable option. The reductions in these various targeted areas were larger than 20% of the total load in the targeted area of need. This value is used as a guideline by National Grid to determine if NWA are viable options as documented in National Grid's "Guidelines for Consideration of Non-Wires Alternatives in Transmission and Distribution Planning," Issue 1, approved February 2011. The number of hours of exposure also makes NWA impractical.

9.3. Overloads on Lines #181 and #180

To review the amount of NWA needed to address this overload concern, a review was performed to find out how much load would have to be reduced in the area supplied by lines #180, #181 and #182, including NYSEG's Erie area, to keep the loading on the Packard – Erie #181 circuit below LTE [redacted]

[redacted]

First, a test was performed to scale the entire western division down until the problem was corrected. It was found that the load had to be reduced to 84% of its initial value (peak) to correct the loading to 100% of its LTE rating. This suggests that the problem would be present over 240 hours each summer.

Next, only the load connected to line #181 was reduced. This scaling included all loads at National Grid's Station 130, Station 124 (served from Youngmann) and Station 58 (served from Youngmann) and customer stations Erie County Water Authority's (ECWA) Ball Pump Station and Veridian/Calspan. Only about 3 MW of the over 100 MW of load supplied by this line is at these two customer stations.

The review also scaled the load at a proposed station at Frankhauser Rd, which is planned to be completed in 2014. Approximately 35 MW of load will be moved to Frankhauser Rd Station from National Grid stations 130 (27%), 124 (9%), 58 (5%), 54 (12%), 224 (17%) and 140 (30%). Today the load at Stations 54 and 140 is supplied by circuits #38 and #39 and Station 224 is supplied by circuits #36 and #37.

Initially the load connected to NYSEG's 34.5kV network, [redacted] was not scaled.

The load at the National Grid distribution and customer stations had to be reduced [redacted] to reduce the loading on the line below its LTE rating.

Next, scaling of the NYSEG 34.5kV network was reviewed. [redacted]

Based on these tests, the use of NWA to address the area concerns was not considered a viable option. The reductions in the targeted area were larger than 20% of the total load in the targeted area of need. This value is used as a guideline by National Grid to determine if NWA are viable options as documented in National Grid's "Guidelines for Consideration of Non-Wires Alternatives in Transmission and Distribution Planning," Issue 1, approved February 2011. The number of hours of exposure also makes NWA impractical.

10. Summary

Based on the system analysis and a review of the potential cost of area upgrades, the recommendation is to address all N-1 problems and greatly mitigate the N-1-1 exposure by implementing the A5-1 plan. This plan includes:

- Addition of two 33.3 MVAr capacitor banks on the two Dunkirk 115kV bus sections. This project should be implemented as soon as possible. ($2.5M)
- Addition of a second 75 MVAr capacitor bank at the Huntley 115kV switchyard. This project should be implemented as soon as possible. ($1.4M)
- Reconductoring of the two 115kV lines between Five Mile Rd and Homer Hill, each approximately 7.4 miles in length. This project is recommended to be executed such that it is complete when Five Mile Rd comes into service. If the project cannot be completed by the time Five Mile Rd is completed, a review of the risk associated with the

outage/overload and the cost of continued operation of generation at Dunkirk will have to be undertaken to determine when the shutdown of the generation can occur. ($17M-$19M)

- Reconductoring of one mile of the Niagara – Gardenville #180 line. To facilitate the retirement of the generation as soon as possible, this project is recommended to be implemented such that it is complete at or before Five Mile Rd coming into service. If the project cannot be completed by the time Five Mile Rd is completed, a review of the risk associated with the outage/overload and the cost of continued operation of generation will have to be undertaken to determine when the shutdown of the generation can occur. ($3.7M)
- Reconductoring of 14 miles of the Packard – Erie #181 line. To facilitate the retirement of the generation as soon as possible, this project is recommended to be implemented such that it is complete at or before Five Mile Rd coming into service. If the project cannot be completed by the time Five Mile Rd is completed, a review of the risk associated with the outage/overload and the cost of continued operation of generation at Dunkirk will have to be undertaken to determine when the shutdown of the generation can occur. ($35M-$40M)

The expected cost of this set of projects is in the range of **$60M-$67M** based on investment grade estimates with a range of -50% - +200%.

Exhibit No.____ (NMP-9)

September 26, 2012 Review of
Dunkirk Mothball Notice - Part 2
(CONFIDENTIAL)

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THIS DOCUMENT HAS BEEN REMOVED FROM THE PUBLIC VERSION

CONTAINS CRITICAL ENERGY INFRASTRUCTURE INFORMATION (CEII) PURSUANT TO 18 C.F.R. § 388.112

****

Exhibit No.____ (NMP-10)

2012 Dunkirk RSS Agreement
(Public Version)

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THIS DOCUMENT HAS BEEN REDACTED FOR PRIVILEGED AND CONFIDENTIAL INFORMATION

PURSUANT TO 18 C.F.R. § 388.112

****

Reliability Support Services Agreement

between

Dunkirk Power LLC

and

Niagara Mohawk Power Corporation

(d/b/a National Grid)

August 27, 2012

Pursuant to the rates, terms and conditions of this Reliability Support Services Agreement ("Agreement"), Dunkirk Power LLC ("Dunkirk") will provide Reliability Support Service ("RSS") to Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid") from Dunkirk Unit Nos. 1 and 2 ("RSS Units") located at its Dunkirk Generating Station and connected to National Grid in the New York Independent System Operator, Inc.'s ("NYISO") Zone A.

RECITALS

Whereas, Dunkirk owns and operates a coal-fired generating station in Dunkirk, New York, made up of a nameplate capacity 100 MW Unit 1, a 100 MW Unit 2, a 217.6 MW Unit 3, and a 217.6 MW Unit 4, and is a generation-owning entity that sells its energy, capacity and ancillary services in the NYISO-administered wholesale power market; and

Whereas, National Grid is the transmission owner to which the Dunkirk station is interconnected; and

Whereas, on March 14, 2012, Dunkirk submitted a notification to the New York Public Service Commission ("NYPSC") in accordance with its established notice requirements for generation unit retirements to mothball all units at the Dunkirk station and cease providing service effective September 10, 2012; and

Whereas, National Grid conducted reliability studies on the planned deactivation of Dunkirk Units 1, 2, 3, and 4, and concluded that the RSS Units were needed to maintain the reliability of the local transmission system beyond the planned mothball date and until at least May 31, 2013; and

Whereas, both Parties have an interest in ensuring the RSS Units remain available to support system reliability in New York until certain transmission upgrades are completed; and

NOW THEREFORE, in consideration of the agreements and covenants set forth herein, and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, and intending to be legally bound by this Agreement as of the Effective Date, the Parties covenant and agree as follows:

ARTICLE I

DEFINITIONS

1.1 Definitions

1.1.1 **"Additional Expenditure"** shall mean the full cost of any individual project undertaken by Dunkirk necessary to enable one or both of the RSS Units to continue to provide safe and reliable service in accordance with this Agreement during the Term of the Agreement, in compliance with all applicable laws, other than those projects specifically identified in Schedule 2, that exceeds $50,000. Additional Expenditures shall not apply to normal maintenance activities anticipated during the term of this Agreement, as indicated in Attachment 1 of National Grid's July 30, 2012 Statement of Support filed in NYPSC Case 12-E-0136.

1.1.2 **"Agreed Upon Capacity Bid Price"** shall have the meaning described in Exhibit 2 hereto.

1.1.3 **"Change in Law"** shall mean a change in federal or state environmental or other law, policy, regulation or rule, or a change in the interpretation of the same, that has a material effect on the operations of Dunkirk, as determined by Dunkirk in a commercially reasonable manner, or that shall require additional expenditures that are not reimbursed as Additional Expenditures.

1.1.4 **"Commission"** shall mean the Federal Energy Regulatory Commission.

1.1.5 **"DPS"** shall mean New York State Department of Public Service Staff.

1.1.6 **"Dunkirk Officer's Certificate"** shall mean a certificate signed by an officer or director of Dunkirk in the form attached as Exhibit 1.

1.1.7 **"EBITDA"** shall mean Earnings Before Interest, Taxes, Depreciation and Amortization, less allocated regional and corporate general and administrative costs as more specifically detailed on Exhibit 1 hereto.

1.1.8 **"EBITDA Determination"** shall mean an attestation by Dunkirk's outside auditor, acceptable to both parties, in the form attached as Attachment A to Exhibit 1, of Dunkirk's EBITDA for the related calendar year, which is provided at Dunkirk's expense.

1.1.9 "**FERC**" shall mean the Federal Energy Regulatory Commission

1.1.10 **"Force Majeure Event"** shall mean any act of God, labor disturbance, act of the public enemy, war, insurrection, riot, fire, storm or flood, explosion, any order, regulation or restriction imposed by a Governmental Authority, breakage or accident of machinery or equipment not directly caused by a lack of proper care or maintenance, or any other cause beyond a Party's control.

1.1.11 **"Forced Outage"** shall have same definition in this Agreement as it has in the NYISO's Installed Capacity Manual – Attachment J.

1.1.12 **“FPA”** shall mean the Federal Power Act.

1.1.13 **“Good Utility Practice”** shall be as defined in Section 1.7 of the NYISO OATT.

1.1.14 **“Governmental Authority”** shall mean the government of any nation, state or other political subdivision thereof, including any entity lawfully exercising executive, military, legislative, judicial, regulatory, or administrative functions of or pertaining to a government.

1.1.15 **“Minimum Term”** shall have the meaning set forth in Section 2.1.

1.1.16 **“Monthly Fixed-Cost Charge”** shall have the meaning set forth in Section 4.1.

1.1.17 **“Necessary Extension”** shall have the meaning set forth in Section 2.3.

1.1.18 **“NERC”** shall mean the North American Electric Reliability Corporation.

1.1.19 **“NPCC”** shall mean the Northeast Power Coordinating Council, Inc.

1.1.20 **“NYISO”** shall mean the New York Independent System Operator, Inc., or successor organization charged with operating the transmission system and markets in the State of New York.

1.1.21 **“NYISO Day-Ahead Energy Market”** shall mean the NYISO-administered day-ahead energy market.

1.1.22 **“NYISO ICAP Market”** shall mean the monthly spot NYISO-administered Installed Capacity Market.

1.1.23 **“NYISO OATT”** shall mean the NYISO Open Access Transmission Tariff, as it may be amended by the NYISO.

1.1.24 **“NYISO Tariff”** shall refer to any published tariff of NYISO, as such tariff may be amended by the NYISO.

1.1.25 **“NYPSC”** shall mean the New York Public Service Commission.

1.1.26 **“NYSRC”** shall mean New York State Reliability Council, L.L.C.

1.1.27 **“Party”** shall mean either Dunkirk or National Grid. “Parties” means both Dunkirk and National Grid.

1.1.28 “**Planned Outage”** shall mean a planned interruption, in whole or in part, in the electrical output of a generating unit to permit Dunkirk to perform maintenance and repair of the unit, pursuant to the process for Installed Capacity providers set forth in the NYISO Tariff and Outage Scheduling Manual.

1.1.29 **“Refund Period”** shall have the meaning set forth in Section 4.3(a).

1.1.30 **“RSS”** shall mean Reliability Support Service.

1.1.31 **“RSS Units”** shall mean Dunkirk Unit Nos. 1 and 2.

1.1.32 **“Take or Pay Costs”** shall mean the costs incurred by NRG Power Marketing, LLC on behalf of Dunkirk for failure to meet the minimum volume requirement for coal shipments under contract UP-C-54152 with Union Pacific Railroad Company.

1.1.33 **“Term”** shall mean the Minimum Term and the Necessary Extension, if applicable.

ARTICLE II

TERM

2.1 Effective Date and Term

This Agreement shall become effective at the start of the hour ending 0100 Eastern Prevailing Time (“EPT”) on September 1, 2012 and remain in effect through the end of the hour ending 2400 EPT on May 31, 2013 (the “Minimum Term”).

2.2 Termination

(a) No provision of this Agreement shall terminate earlier than midnight on May 31, 2013, except pursuant to the provisions relating to Section 2.2(b) immediately below, Additional Expenditures (Section 5.3), Force Majeure Events (Section 7.1), or if the Agreement is not accepted for filing by the NYPSC (Section 10.9), in accordance with the August 16 order issued by the NYPSC in Case 12-E-0136.

(b) Upon 60 days written notice, a Party may terminate this Agreement prior to May 31, 2013 if any of the following events or circumstances materially and adversely affects the economic or reliability benefits of this Agreement: (1) a Change in Law; (2) a change to the NYISO Tariff or other NYISO policy or rule; or (3) an order of any Governmental Authority, other than as a result of an action or proceeding commenced by such Party.

(c) Nothing in this agreement shall prevent Dunkirk from ceasing operation and deactivating either or both of the RSS Units immediately upon the date this Agreement is terminated by National Grid.

2.3 Necessary Extension

(a) National Grid agrees to notify Dunkirk in writing of any finding of a reliability need past May 31, 2013 (“Necessary Extension”) or any finding of no reliability need, as soon as practicable, but no later than January 1, 2013.

(b) Such Necessary Extension will not exceed 90 days in duration. Upon receiving notice of a Necessary Extension, the Parties will engage in good faith negotiations to establish the terms and conditions of such Necessary Extension, including, without limitation, the determination of a reasonable level of compensation to be paid by National Grid to Dunkirk based on the length of the additional period of operation required by National Grid, in addition to the reasonably projected incremental cost to Dunkirk of providing service during the period of the Necessary Extension. If no agreement can be reached as to the reasonable level of compensation, Dunkirk shall not be obligated to enter into any Necessary Extension. Without the prior written consent of Dunkirk, which may be withheld in Dunkirk's sole discretion, no Necessary Extension shall extend beyond August 31, 2013, it being the intent of the Parties that the need for any Dunkirk units beyond August 31, 2013 will be the subject of a new agreement. If only one RSS Unit is needed at any time during a Necessary Extension, the particular RSS Unit will be selected by Dunkirk in its sole discretion, after consulting with National Grid.

(c) If the Parties are unable to agree on the terms and conditions of any Necessary Extension, they agree to seek the assistance of the DPS to help facilitate the resolution of said differences and shall at all times negotiate in good faith; provided, however, that each Party at any time shall be free to pursue any legal remedies available to it by law.

(d) Commencing in October 2012 and for the remainder of the Term of this Agreement, National Grid shall provide Dunkirk an update by the first business day of each calendar month on the status of National Grid's need for any units at Dunkirk expected to be necessary for providing reliability service beyond May 31, 2013, consistent with applicable laws and regulations. To the extent that National Grid knows and is not restricted from revealing such information consistent with the solicitation process ordered by the NYPSC, National Grid will indicate the units it expects to need, if any, and the period for which it expects to need them.

2.4 Survival of Obligations

Notwithstanding the termination of this Agreement, the Parties shall continue to be bound by the provisions of this Agreement that by their nature are intended to, and shall, survive such termination.

ARTICLE III

OBLIGATIONS AND OPERATIONS

3.1 General

During the Term, Dunkirk shall operate and maintain the RSS Units within standards of accepted Good Utility Practice, and in accordance with the NYISO Tariff.

3.2 Operating Characteristics and Environmental Compliance

Dunkirk shall have no obligation to cause the RSS Units to be operated in a manner inconsistent with the Dunkirk unit characteristics set forth in Schedule 1 to this Agreement, or in a manner that would be inconsistent with or in violation of the NYISO Tariff, NERC, NPCC, or NYSRC rules or would cause Dunkirk to violate the terms of any environmental regulations, restrictions, orders or decrees or any operating permit, which determination shall be made by Dunkirk in its reasonable discretion.

3.3 Dispatch Flexibility

The Parties acknowledge that during the Term of this Agreement and as a consequence of the provision of services under this Agreement, Dunkirk will need to run the RSS Units for testing and diagnostic purposes for reasons including, but not limited to, the performance of Dependable Maximum Net Capability ("DMNC") and Relative Accuracy Test Audit ("RATA") testing, or as otherwise required by plant management for health, safety, environmental or operational reasons. If warranted by system conditions, the Parties will coordinate the scheduling of the RSS Units for these purposes so that National Grid will either designate the related RSS Unit as the Day-Ahead Reliability Unit ("DARU") or commit that Unit pursuant to the NYISO's Supplemental Resource Evaluation ("SRE"). Such designation will be coordinated between the Parties so that the most appropriate designation is selected.

3.4 Reactive Power

Except when the RSS Units are unavailable, the RSS Units will provide reactive power consistent with the capability of the RSS Units and the procedures specified under the NYISO's Voltage Support Service.

3.5 Unit Selection

On any day where National Grid requires only a single RSS Unit to operate, unless only one of the RSS Units is available, Dunkirk shall have the right to select between Unit 1 and Unit 2. Additionally, unless only one of the RSS Units is available, Dunkirk has the right in its sole discretion, after consulting with National Grid, to provide the reliability services under this Agreement from either Unit 1 or Unit 2. National Grid shall not object to such election by Dunkirk.

ARTICLE IV

PRICING

4.1 Monthly Fixed-Cost Charge

Each month, National Grid shall pay a Monthly Fixed-Cost Charge of $2,924,324/month for the period September 1, 2012 through May 31, 2013.

4.2 True-Up Payments

(a) Property Tax True-Up – At any time between the effective date of this Agreement and the date that is 30 days after the end of the Minimum Term, Dunkirk may provide documentary evidence to National Grid showing the amount of property tax payments (or payments in lieu of taxes) that Dunkirk has made to local taxing jurisdictions and the Chautauqua County Industrial Development Authority during the Term of this Agreement. Such documentary evidence will be in the form of a receipt or other verification received from the taxing authority and must show that the tax obligation satisfied relates to the Term of this Agreement. Within 30 days of the date Dunkirk submits such evidence to National Grid, National Grid will reimburse Dunkirk for any such documented payments, up to a maximum amount for all property tax payments of $6,681,084.

(b) Capacity Revenue True-Up – Within 30 days of the date on which this Agreement terminates, Dunkirk will make a payment to National Grid in an amount equal to all capacity revenues earned by the RSS Units during the Term of this Agreement.

(c) Take or Pay Coal Contract True-Up – National Grid shall pay Dunkirk for Dunkirk's Take or Pay Costs as calculated based on the pre-determined minimum volume allocation to the Dunkirk plant, prorated to nine months, of 868,597 tons at $5.00/ton ($4,342,985). By January 15, 2013, Dunkirk will determine its prorated Take or Pay Costs allocable to Dunkirk during the period from September 1, 2012 to December 31, 2012 and shall provide National Grid with an accounting of such Take or Pay Costs. The determination of the first payment to be made under this provision will be based on actual coal deliveries to the Dunkirk plant during September 1, 2012 to December 31, 2012. Within 30 days of receiving such accounting, National Grid will make payment to Dunkirk of the prorated Take or Pay Costs. Within 30 days of the date on which this Agreement terminates, Dunkirk will determine its prorated Take or Pay Costs allocable to Dunkirk during the remainder of the Minimum Term and shall provide National Grid with an accounting of such Take or Pay Costs. Within 30 days of receiving such accounting, National Grid will make payment to Dunkirk of the prorated Take or Pay Costs. The determination of the final payment to be made under this provision will be based on actual coal deliveries to the Dunkirk plant during the remainder of the Minimum Term of this Agreement.

4.3 Refund Based on Future Operations

(a) Dunkirk shall pay National Grid a refund relating to one or more of the first five full calendar years after the Term of the Agreement ("Refund Period") if the Dunkirk plant has positive EBITDA in excess of $2 million in any such year during the Refund Period. On or before April 30 after any calendar year during the Refund Period when none of the Dunkirk units were the subject of a reliability support service agreement with National Grid, Dunkirk shall provide a Dunkirk Officer's Certificate to National Grid. An annual refund payment will be made to National Grid relating to the Refund Period as set forth in this Section 4.3.

(b) Dunkirk Officer's Certificate

(i) If the Dunkirk plant had less than $2 million of EBITDA during any calendar year of the Refund Period, Dunkirk shall provide such Dunkirk Officer's Certificate to National Grid which shall confirm that Dunkirk's EBITDA for the related year was less than $2 million, but which shall not include an EBITDA Determination.

(ii) If the Dunkirk plant had EBITDA equal to or greater than $2 million, but less than $3,680,000, Dunkirk shall provide such Dunkirk Officer's Certificate together with an EBITDA Determination to National Grid.

(iii) If the Dunkirk plant had EBITDA greater than $3,680,000, Dunkirk shall provide such Dunkirk Officer's Certificate to National Grid, but no EBITDA Determination shall be provided.

(c) If the Dunkirk Officer's Certificate with respect to any calendar year of the Refund Period indicates that the Dunkirk plant had EBITDA in excess of $2 million during such calendar year of the Refund Period, then Dunkirk shall pay National Grid 50 percent of the first $1,680,000 in excess of $2 million of EBITDA.

(d) If National Grid disagrees with any Dunkirk Officer's Certificate delivered to National Grid pursuant to Section 4.3(b)(i) or any EBITDA Determination delivered to National Grid pursuant to Section 4.3(b)(ii), then National Grid shall have the right to petition DPS to facilitate resolution of any such disagreement. If the disagreement is pursuant to Section 4.3(b)(i) and DPS requests that Dunkirk provide an EBITDA Determination, Dunkirk will provide such EBITDA statement within 90 days of such request.

(e) If required, any payment will be made within 45 days of the delivery of the related Dunkirk Officer's Certificate.

(f) The maximum refund payable by Dunkirk for any calendar year during the Refund Period is $840,000. No refund payment will be made for any year after the Refund Period.

4.4 Invoices

Dunkirk will invoice National Grid monthly. Each such invoice shall include the Monthly Fixed-Cost Charge and any true-up payments pursuant to Section 4.2, if applicable. Dunkirk will issue the invoice no later than 30 calendar days following the month in which service is provided. National Grid's payment shall be due no later than the 30th day after the day on which the invoice is issued.

ARTICLE V

OUTAGES AND MAINTENANCE

5.1 Planned Outages

Dunkirk shall be permitted to take either or both RSS Units out of operation, or reduce the capability of either or both of the RSS Units, during Planned Outages as permitted by the NYISO Tariff or policies. National Grid agrees, as the related Transmission Owner, that it will not unreasonably withhold Dunkirk's Planned Outage requests.

5.2 Forced Outages

(a) In the event Dunkirk needs to take either or both RSS Units out of operation or reduce the capability of either or both RSS Units upon the occurrence of a Forced Outage, Dunkirk shall notify National Grid, pursuant to established practice under the NYISO Outage Scheduling Manual, of the nature and expected duration of a Forced Outage as soon as practicable.

(b) Dunkirk shall continue to receive the Monthly Fixed-Cost Charge during a Forced Outage, calculated in accordance with the following (subject to Section 5.3(a)):

(i) if a Unit or its Automatic Voltage Regulator is not available for service for 50 percent or more but less than 75 percent of the hours in any particular month due to a Forced Outage, the Monthly Fixed-Cost Charge for that month shall be reduced by $100,000 per Unit that meets these criteria;

(ii) if a Unit or its Automatic Voltage Regulator is not available for service for 75 percent or more but less than 90 percent of the hours in any particular month due to a Forced Outage, the Monthly Fixed-Cost Charge for that month shall be reduced by $250,000 per Unit that meets these criteria;

(iii) if a Unit or its Automatic Voltage Regulator is not available for service for 90 percent or more of the hours in any particular month due to a Forced Outage, the Monthly Fixed-Cost Charge for that month shall be reduced by $500,000 per Unit that meets these criteria; and

(iv) if both Units and their Automatic Voltage Regulators are not available for service for 90 percent or more of the hours in any particular month due to a Forced Outage or Outages, the Monthly Fixed-Cost Charge for that month shall be reduced by $1.5 million.

5.3 Additional Expenditures

(a) Any period of time in which National Grid is considering whether to authorize Additional Expenditures with respect to any RSS Unit shall not count towards any availability calculation for such unit for purposes of determining the Monthly Fixed-Cost Charge reduction set forth in Section 5.2. This includes a situation in which Grid is disputing the amount of

Additional Expenditures, but does not include a situation in which Grid has already authorized the Additional Expenditures that Dunkirk expects to incur for a project and Grid is disputing the amount of actual Additional Expenditures for such project.

(b) Dunkirk shall not be obligated to incur any Additional Expenditures, except as permitted by this Section 5.3.

(c) If Dunkirk is required to incur any Additional Expenditure above the amount that can be recovered from National Grid pursuant to Section 5.3(d), Dunkirk will provide written notice to National Grid as soon as possible (but in no event greater than 10 days after Dunkirk becomes aware of the need for Additional Expenditures) whether expenses not recovered in the Monthly Fixed-Cost Charge are required to return the RSS Unit(s) to service or maintain such service. This notice will indicate the amount of Additional Expenditures expected to be required to return the RSS Unit(s) to service or to maintain service.

(i) If within 30 days of receipt of such notice, National Grid provides Dunkirk with written notification that it will pay for the Additional Expenditures, Dunkirk will incur such Additional Expenditures and, with reasonable promptness, restore the RSS Unit(s) to service.

(ii) Payment of Additional Expenditures, to the extent they are agreed to by National Grid, shall be included in the Monthly Fixed-Cost Charge pro-rated over the remaining Minimum Term (i.e., the total amount of such Additional Expenditures divided by the number of Monthly Fixed-Cost Charge payments remaining in the Minimum Term). If such Additional Expenditures are incurred during a Necessary Extension, the payment of such Additional Expenditures shall be pro-rated over such Necessary Extension period.

(iii) National Grid shall have the right to dispute the amount of Additional Expenditures identified as necessary by Dunkirk, in which case National Grid will provide notice to Dunkirk thereof stating a good faith basis for disputing Dunkirk's calculation. Thereafter, the Parties will engage in good faith negotiations to attempt to reach a resolution of the appropriate level of Additional Expenditures required. If the Parties are unable to agree on such compensation, they agree to seek the assistance of the DPS to help facilitate the resolution of said differences and shall at all times negotiate in good faith. Dunkirk shall have no obligation to incur any Additional Expenditure until National Grid has agreed in writing to reimburse Dunkirk for such Additional Expenditure in accordance with the terms of this Agreement.

(iv) Dunkirk is obligated to use commercially reasonable efforts to minimize Additional Expenditures and agrees that any Additional Expenditures shall be offset by any documented proceeds received by Dunkirk as a result of a claim against any third party for the recovery of such Additional Expenditures. Dunkirk shall refund to National Grid any payments by National Grid for Additional Expenditures that exceed the amount actually expended by Dunkirk with respect to any Additional Expenditures, after offsets.

(v) In the event that National Grid does not provide written notification of its commitment to fund the Additional Expenditures and Dunkirk does not make the voluntary election described in clause (vi) below, Dunkirk shall no longer have any obligation to provide

RSS Service from the affected unit or units. If Additional Expenditures are necessary to restore both of the RSS Units from Forced Outage and National Grid has not provided such notice, then this Agreement will be considered terminated as of the expiration of National Grid's notice period. However, if Additional Expenditures are only necessary to restore one of the RSS Units from a Forced Outage, this Agreement shall remain in full force and effect with respect to the remaining Unit. If the Parties are unable to agree on the appropriate compensation for one RSS Unit, they agree to seek the assistance of the DPS to facilitate the resolution of said differences and shall at all times negotiate in good faith; provided, however, that each Party at any time shall be free to pursue any legal remedies available to it by law.

(vi) Nothing in this Section 5.3 shall prevent Dunkirk from voluntarily electing to make any repair necessary to allow the affected unit(s) to return to service, without additional compensation, after being informed by National Grid that it does not intend to fund the Additional Expenditures.

(d) Dunkirk shall not be entitled to recover any Additional Expenditures from National Grid pursuant to this Section 5.3 until Dunkirk has incurred $450,000 in Additional Expenditures, after which Dunkirk shall be entitled to recover from National Grid only the amount of such Additional Expenditures in excess of the initial $450,000. Dunkirk will provide email notifications to one of the National Grid representatives designated for notice in Section 10.2 on the 15th of every month indicating the reasonable estimate of the amount of Additional Expenditures incurred through the end of the prior month.

ARTICLE VI

SCHEDULING

6.1 Dunkirk will interface and comply with NYISO scheduling deadlines and requirements for maintaining the RSS Unit as an eligible energy and capacity provider, as well as National Grid's dispatch instructions.

6.2 Dunkirk shall bid the energy and ancillary services from the RSS Units in compliance with existing NYISO market rules and Dunkirk shall retain the revenues resulting therefrom.

6.3 Dunkirk shall offer the RSS Units into the NYISO's ICAP Market auction at the Agreed Upon Capacity Bid Price, as set forth in Schedule 2. Any capacity revenues shall be credited to National Grid by Dunkirk and paid in accordance with Section 4.2(b).

6.4 Dunkirk shall offer the RSS Units into the NYISO Day-Ahead Energy Market, regardless of whether Dunkirk's capacity bid is accepted in the NYISO capacity market, whenever those units are not out of service. Subject to the provisions of Section 3.5, Dunkirk shall comply with any dispatch instruction issued by National Grid or NYISO under established NYISO protocols, consistent with the operating parameters of the RSS Units and in accordance with the NYISO Tariff.

6.5 National Grid shall not be responsible for any penalties or fines that relate to the bidding, scheduling, and operation of the RSS Units during the Term of this Agreement.

6.6 National Grid shall pay Dunkirk an amount equal to the amount of bad debt losses assessed to NRG Power Marketing, LLC by NYISO and attributable to the RSS Units with respect to the Term of this Agreement on a pro rata basis of the RSS Units' share of gross accounts receivable that contribute to the NYISO's calculation of the loss to be paid by each Transmission Customer under the NYISO OATT Section 27, Attachment U.

ARTICLE VII

FORCE MAJEURE EVENTS

7.1 Force Majeure Event

(a) If the availability of any of the RSS Units is reduced by reason of a Force Majeure Event (other than a Force Majeure Event with respect to the transmission or distribution system of National Grid or by equipment or materials owned by National Grid), such Force Majeure Event shall be deemed to create a Forced Outage, and shall be resolved pursuant to the provisions herein relating to Forced Outages and Additional Expenditures.

(b) The Party unable to perform by reason of a Force Majeure Event shall use commercially reasonable efforts to remedy its inability to perform and to mitigate the consequences of the Force Majeure Event as soon as reasonably practicable; provided that (i) no Party shall be required to settle any strike, walkout, lockout, or other labor dispute on terms which, in the Party's sole discretion, are contrary to its interests, and (ii) subject to the Additional Expenditure provision, the Party unable to perform shall, as soon as practicable, advise the other Party of the reason for its inability to perform, the nature of any corrective action needed to resolve performance, and its efforts to remedy its inability to perform and to mitigate the consequences of its inability to perform and shall advise the other Party of when it estimates it will be able to resume performance of its obligations under this Agreement.

ARTICLE VIII

LIMITATIONS OF LIABILITY

8.1 Limitation of Liability

(a) National Grid, its affiliates, successors and assigns shall not be liable to Dunkirk, its affiliates, successors and assigns, for actions or omissions by National Grid or National Grid's affiliates, officers, employees or agents in performing its obligations under this Agreement, provided it has not willfully breached this Agreement or engaged in willful misconduct. To the extent Dunkirk has claims against National Grid, Dunkirk may only look to the assets of National

Grid for the enforcement of such claims and may not seek to enforce any claims against the directors, members, officers, employees or agents of National Grid who, Dunkirk acknowledges and agrees, have no personal liability for obligations of National Grid by reason of their status as directors, members, officers, employees or agents of National Grid.

(b) Dunkirk, its affiliates, successor and assigns, shall not be liable to National Grid, its affiliates, successors and assigns, for actions or omissions by Dunkirk, or Dunkirk's affiliates, officers, employees or agents in performing its obligations under this Agreement, provided that Dunkirk has not willfully breached this Agreement or engaged in willful misconduct. To the extent National Grid has claims against Dunkirk, National Grid may only look to the assets of Dunkirk for the enforcement of such claims and may not seek to enforce any claims against the directors, members, officers, employees or agents of Dunkirk who, National Grid acknowledges and agrees, have no personal liability for obligations of Dunkirk by reason of their status as directors, members, officers, employees or agents of Dunkirk.

(c) In no event shall Dunkirk be liable to National Grid or National Grid be liable to Dunkirk for any incidental, consequential, multiple or punitive damages, loss of revenues or profits, attorneys fees or costs arising out of, or connected in any way with the performance or nonperformance of this Agreement; provided, however, that none of the payments to be made by National Grid hereunder shall be considered to fall within any of the foregoing categories.

ARTICLE IX

REMEDIES

9.1 Termination for Default

If any Party shall fail to perform any material obligation imposed on it by this Agreement, and that obligation has not been suspended pursuant to this Agreement, the other Party, at its option, may terminate this Agreement by giving the Party in default written notice setting out specifically the circumstances constituting the default and declaring its intention to terminate this Agreement. If the Party receiving the notice does not within ten (10) days after receiving the notice, remedy the default, the Party not in default shall be entitled by a further written notice to terminate this Agreement; provided that, if the default is reasonably expected to take more than ten (10) days to remedy, the defaulting Party shall notify the non-defaulting Party of its plan for remedying the default and must take actions to begin remedying the default within ten (10) days. The Party not in default shall have a duty to mitigate damages. Termination of this Agreement pursuant to this Section 9.1 shall be without prejudice to the right of any Party to collect any amounts due to it prior to the time of termination.

9.2 Waiver

The failure to exercise any remedy or to enforce any right provided in this Agreement or applicable law shall not constitute a waiver of such remedy or right or of any other remedy or right. A Party shall be considered to have waived any remedies or rights only if the waiver is in writing and signed by the Party against whom such waiver is to be enforced.

9.3 Beneficiaries

Except as is specifically set forth in this Agreement, nothing in this Agreement, whether express or implied, confers any rights or remedies under, or by reason of, this Agreement on any persons other than the Parties and their respective successors and assigns, nor is anything in this Agreement intended to relieve or discharge the obligations or liability of any third party, nor give any third person any rights of subrogation or action against any Party.

ARTICLE X

MISCELLANEOUS PROVISIONS

10.1 Assignment

None of the Parties shall assign its rights or delegate its duties under this Agreement without the prior written consent of the other Party, which consent shall not be unreasonably withheld, conditioned, or delayed. Any such assignment or delegation made without such written consent shall be null and void. Upon any assignment made in compliance with this section, this Agreement shall inure to and be binding upon the successors and assigns for the assigning Parties.

10.2 Notices and Correspondence

Except as otherwise expressly provided in this Agreements, permitted by NYISO rules or required by law, all invoices, notices, consents, requests, demands, approvals, authorizations and other communications provided for in this Agreements shall be in writing and shall be sent by email, followed by personal delivery, certified mail, return receipt requested, facsimile transmission, or by recognized overnight courier service, to the intended Party at such Party's address set forth below. All such notices shall be deemed to have been duly given and to have become effective: (a) upon receipt if delivered in person, facsimile, or email; (b) two days after having been delivered to a courier for overnight delivery; or (c) seven days after having been deposited in the United States mail as certified or registered mail, return receipt requested, all fees pre-paid, addressed to the applicable addresses set forth below. Each Party's address for notices shall be as follows (subject to change by notice in accordance with the provisions of this section):

TO DUNKIRK:

Elizabeth Quirk-Hendry
General Counsel – Northeast Region
NRG Energy, Inc.
211 Carnegie Center
Princeton, NJ 08540
Tel: (609) 524-5161
Fax: (609) 524-5160
E-mail: elizabeth.quirk-hendry
@nrgenergy.com

and

Judith Lagano
Vice President, Asset Management
NRG Energy, Inc.
Manresa Island Avenue
South Norwalk, CT 06854
Tel: (203) 854-3625
Fax: (203) 854-3658
E-mail: judith.lagano@nrgenergy.com

TO NATIONAL GRID:

Carlos A. Gavilondo
Senior Counsel II
National Grid
300 Erie Boulevard West
Syracuse, NY 13202
Tel: (315) 428-5862
Fax: (315) 428-5355
E-mail:
Carlos.Gavilondo@nationalgrid.com

and

Bill Malee
Director, Transmission Commercial Services
National Grid
40 Sylvan Road
Waltham, MA 02451
Tel: (781) 907-2422
Fax: (781) 907-5707
E-mail: Bill.Malee@nationalgrid.com

10.3 Parties' Representatives

All Parties to this Agreement shall ensure that throughout the Term of this Agreement, duly appointed representatives are available for communications between the Parties. The representatives shall have full authority to deal with all day-to-day matters arising under this Agreement. Acts and omissions of representatives shall be deemed to be acts and omissions of the Party. Dunkirk and National Grid shall be entitled to assume that the representatives of the other Party are at all times acting within the limits of the authority given by the representatives' Party.

10.4 Effect of Invalidation, Modification, or Condition

Each covenant, condition, restriction, and other Term of this Agreement is intended to be, and shall be construed as, independent and severable from each other covenant, condition, restriction, and other term. If any covenant, condition, restriction, or other Term of this Agreement is held to be invalid or otherwise modified or conditioned by any Governmental Authority, the invalidity, modification, or condition of such covenant, condition, restriction, or other term shall not affect the validity of the remaining covenants, conditions, restrictions, or other terms hereof. If an invalidity, modification, or condition has a material impact on the rights and obligations of the Parties, the Parties shall make a good faith effort to renegotiate and restore the benefits and burdens of this Agreement as they existed prior to the determination of the invalidity, modification, or condition. If the Parties fail to reach agreement, then the Party whose rights and obligations have been adversely affected may, in its sole discretion, terminate this Agreement.

10.5 Amendments

Any amendments or modifications of this Agreement shall be made only in writing and duly executed by all Parties to this Agreement. Such amendments or modifications shall become effective only after the Parties have received any authorizations required from the NYPSC. The Parties agree to negotiate in good faith any amendments to this Agreement that are needed to reflect the intent of the Parties as expressed herein and to reflect any changes to the design of the New York markets that are approved by the Commission from time to time.

10.6 Dispute Resolution

Except where otherwise provided for in the Agreement, disputes under this Agreement shall be submitted to representatives of each Party for resolution. If the dispute remains unresolved, after 45 days, either Party may pursue any legal remedies available to it by law.

10.7 Entire Agreement

This Agreement consists of the terms and conditions set forth herein, as well as the attachments hereto, which are incorporated by reference herein and made a part hereof. This Agreement contains the entire agreement between the Parties with respect to the matters set forth herein and supersedes all prior negotiations, undertakings, agreements and business term sheets.

10.8 Confidentiality

Information provided by any Party to the other pursuant to this Agreement may, at the Party's discretion, be provided subject to the terms of the Confidentiality Agreement between NRG Energy, Inc. and National Grid, dated as of November 10, 2011. All information provided to either Party in connection with the negotiations regarding this agreement shall remain subject to the provisions of such Confidentiality Agreement.

10.9 Binding Nature

It is the Parties' expectation that this Agreement will be filed with the NYPSC no later than August 27, 2012. To comply with the August 16 order of the NYPSC approving the Binding Term Sheet for this reliability Support Services Agreement for Dunkirk Power Generating Units, dated July 20, 2012, in a manner that is reasonably satisfactory to the Parties, this Agreement shall be signed by both Parties and will be binding; provided that if this Agreement is rejected by the NYPSC, it shall be deemed terminated as of the date of such rejection.

10.10 Final Non-Appealable Order

Once an NYPSC order with respect to this Agreement becomes final and nonappealable, Seller will withdraw its filing made with FERC in Docket No. ER12-2237-000. If the NYPSC does not separately act on this Agreement, Seller will withdraw its filing made with FERC in Docket No. ER12-2237-000 once the NYPSC's August 16 order becomes final and nonappealable. For purposes of this Section 10.10, a NYPSC order becomes final and nonappealable once the appeals period(s) authorizing a challenge to said order under federal and/or state law has (have) expired.

ARTICLE XI

STANDARD OF REVIEW

The standard of review for changes in the rates, terms or conditions of this Agreement whether proposed by a Party or a non-party must meet the "public interest" application of the statutory "just and reasonable" standard of review as set forth in *United Gas Pipe Line Co. v. Mobile Gas Service Corp.*, 350 U.S. 332 (1956) and *Federal Power Commission v. Sierra Pacific Power Co.*, 350 U.S. 348 (1956); as clarified by *NRG Power Marketing, LLC v. Maine Public Utilities Commission*, 130 S. Ct. 693, Case No. 08-674 (2010); *Morgan Stanley Capital Group, Inc. v. Public Util. Dist. No. 1 of Snohomish*, 554 U.S. 527 (2008).

SIGNATURE PAGES TO FOLLOW

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement.

DUNKIRK POWER LLC

By: Lee Davis

Name: Lee Davis

Title: President

NIAGARA MOHAWK POWER CORPORATION d/b/a NATIONAL GRID

By:________________________

Name:________________________

Its:________________________

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement.

DUNKIRK POWER LLC

By:____________________________

Name: __________________________

Title:____________________________

NIAGARA MOHAWK POWER CORPORATION d/b/a NATIONAL GRID

By: Will L Malee

Name: William L Malee

Its: Director, Transmission Commercial

SCHEDULE 1

Dunkirk Unit Characteristics

	Unit 1	Unit 2
Low Operating Limit:	35 MW	35 MW
High Operating Limit (normal):	75 MW	75 MW
High Operating Limit (emergency):	75 MW	75 MW
Ramp Rate (normal):	0.5 MW/minute	0.5 MW/minute
Ramp Rate (emergency):	0.5 MW/minute	0.5 MW/minute
Minimum Run Time (hours):	24 hours	24 hours
Minimum Shutdown Time:	48 hours	48 hours
Start Up Notification Time:	24 hours	24 hours
Cold Start[1] (Down Time)	36 hours	36 hours
Warm Start[2] (Down Time)	12 hours	12 hours
Hot Start[3] (Down Time)	1 hour	1 hour

[1] For purposes of this Agreement, a "Cold Start" is considered to be when an RSS Unit has been shutdown for more than 36 hours.

[2] For purposes of this Agreement, a "Warm Start" is considered to be when an RSS Unit has been shutdown for more than 12 hours but less than 36 hours.

[3] For purposes of this Agreement, a "Hot Start" is any start other than a Cold Start or a Warm Start.

Schedule 2 – Confidential

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Exhibit 1
Dunkirk Officer's Certificate - Confidential

DUNKIRK OFFICER'S CERTIFICATE

I am the ___________________________ of Dunkirk Power LLC, a Delaware limited liability company (the "Company"), and I DO HEREBY CERTIFY on behalf of the Company that the information provided below is accurate with regards to the [redacted] (EBITDA), as defined in the Reliability Support Services Agreement between the Company and Niagara Mohawk Power Corporation d/b/a National Grid ("the Agreement").

_____ The Company's EBITDA was less than $2,000,000 for the year ended December 31, 20xx. No EBITDA Determination or payment is required under Section 4.3 of the Agreement.

_____ The Company's EBITDA was greater than $2,000,000 but less than $3,680,000 for the year ended December 31, 20xx. See attached EBITDA Determination for the calculation of the payment required under Section 4.3 of the Agreement

_____ The Company's EBITDA was equal to or greater than $3,680,000 for the year ended December 31, 20xx. No EBITDA Determination is required as Dunkirk intends to pay the annual maximum refund amount of $840,000.

IN WITNESS WHERE OF, I have set my hand this _____ day of ____________, 20__.

Dunkirk Power LLC

By: ______________________
Name:

____
Title

____
Date

Attachment A

EBITDA DETERMINATION - Confidential

If an EBITDA Determination, as defined, is required under Section 4.3 (b)(ii) of the Agreement for any fiscal year during the Refund Period, the related auditor attestation shall include results on the following procedures:

1. Obtain Dunkirk Power LLC's (Dunkirk) profit and loss statement for the calendar year-ended December 31, 20xx and compare amounts to the general ledger, rounded to the nearest dollar.
2. Using the Dunkirk profit and loss statement obtained in step 1 above, calculate [redacted] (EBITDA, as defined in Exhibit 1 to the Reliability Support Services Agreement).
3. Using the EBITDA amount calculated in Step 2 above, calculate the annual refund payment amount of 50% of the first $1,680,000 of EBITDA in excess of $2,000,000.

Exhibit 2
Agreed Upon Capacity Bid Price – Confidential

[redacted]

Exhibit No.____ (NMP-11)

2012 Dunkirk RSS Agreement
(CONFIDENTIAL)

****

THIS DOCUMENT HAS BEEN REMOVED FROM THE PUBLIC VERSION

CONTAINS CONFIDENTIAL INFORMATION PURSUANT TO 18 C.F.R. § 388.112

****

Exhibit No.____ (NMP-12)

2013 Dunkirk RSS Agreement
(Public Version)

****

THIS DOCUMENT HAS BEEN REDACTED FOR PRIVILEGED AND CONFIDENTIAL INFORMATION

PURSUANT TO 18 C.F.R. § 388.112

****

Reliability Support Services Agreement

between

Dunkirk Power LLC

and

Niagara Mohawk Power Corporation

(d/b/a National Grid)

March 4, 2013

Pursuant to the rates, terms and conditions of this Reliability Support Services Agreement ("Agreement"), Dunkirk Power LLC ("Dunkirk") will provide Reliability Support Service ("RSS") to Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid") from Dunkirk Unit No. 2 ("RSS Unit") located at its Dunkirk Generating Station and connected to National Grid in the New York Independent System Operator, Inc.'s ("NYISO") Zone A.

RECITALS

Whereas, Dunkirk owns and operates a coal-fired generating station in Dunkirk, New York, made up of a nameplate capacity 100 MW Unit 1, a 100 MW Unit 2, a 217.6 MW Unit 3, and a 217.6 MW Unit 4, and is a generation-owning entity that sells its energy, capacity and ancillary services in the NYISO-administered wholesale power market; and

Whereas, National Grid is the transmission owner to which the Dunkirk station is interconnected; and

Whereas, on March 14, 2012, Dunkirk submitted a notification to the New York Public Service Commission ("NYPSC") in accordance with its established notice requirements for generation unit retirements to mothball all units at the Dunkirk station and cease providing service effective September 10, 2012; and

Whereas, National Grid conducted reliability studies on the planned deactivation of Dunkirk Units 1, 2, 3, and 4, and concluded that Dunkirk Unit 1and Unit 2 were needed to maintain the reliability of the transmission system beyond the planned mothball date and until May 31, 2013; and

Whereas, on August 27, 2012, Dunkirk and National Grid entered into a Reliability Support Service Agreement pursuant to which Dunkirk Units 1 and 2 provide reliability support services to National Grid through May 31, 2013; and

Whereas, pursuant to an Order dated August 16, 2012, the NYPSC directed National Grid to conduct a procurement process for alternative sources of reliability support services other than Dunkirk Units 1 and/or 2 for reliability needs anticipated for the period after May 31, 2013 (such procurement process, the "RFP Process"); and

Whereas, National Grid has determined that contracting with Dunkirk for reliability support services commencing June 1, 2013 is the preferred alternative of those presented in the RFP Process; and

Whereas, both Parties have an interest in ensuring the RSS Unit remains available to support system reliability in New York until certain transmission upgrades are completed, which completion is currently expected to take place by May 31, 2015;

NOW THEREFORE, in consideration of the agreements and covenants set forth herein, and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, and intending to be legally bound by this Agreement as of the Effective Date, the Parties covenant and agree as follows:

ARTICLE I

DEFINITIONS

1.1 Definitions

1.1.1 **"Additional Expenditure"** shall mean the full cost of any individual project undertaken by Dunkirk necessary to enable the RSS Unit to continue to provide safe and reliable service in accordance with this Agreement during the Term of the Agreement, in compliance with all applicable laws, other than those projects specifically identified in Schedule 4, that exceeds $50,000. Additional Expenditures shall not apply to normal maintenance activities anticipated during the term of this Agreement which include but are not limited to the normal maintenance activities set forth in Schedule 4.

1.1.2 **"Agreed Upon Capacity Bid Price"** shall have the meaning described in Schedule3 hereto.

1.1.3 **"Change in Law"** shall mean a change in federal or state environmental or other law, policy, regulation or rule, or a change in the interpretation of the same, that has a material adverse effect on the operations of Dunkirk, as determined by Dunkirk in a commercially reasonable manner, or that shall require additional expenditures that are not reimbursed as Additional Expenditures.

1.1.4 **"Commission"** shall mean the Federal Energy Regulatory Commission.

1.1.5 **"DPS"** shall mean New York State Department of Public Service Staff.

1.1.6 "**FERC**" shall mean the Federal Energy Regulatory Commission

1.1.7 **"Force Majeure Event"** shall mean any act of God, labor disturbance, act of the public enemy, war, insurrection, riot, fire, storm or flood, explosion, any order, regulation or restriction imposed by a Governmental Authority, breakage or accident of machinery or equipment not directly caused by a lack of proper care or maintenance, or any other cause beyond a Party's control.

1.1.8 **"Forced Outage"** shall have same definition in this Agreement as it has in the NYISO's Installed Capacity Manual – Attachment J.

1.1.9 **"FPA"** shall mean the Federal Power Act.

1.1.10 **"Good Utility Practice"** shall be as defined in Section 1.7 of the NYISO OATT.

1.1.11 **"Governmental Authority"** shall mean the government of any nation, state or other political subdivision thereof, including any entity lawfully exercising executive, military, legislative, judicial, regulatory, or administrative functions of or pertaining to a government.

1.1.12 **"Minimum Term"** shall have the meaning set forth in Section 2.1.

1.1.13 **"Monthly Fixed-Cost Charge"** shall have the meaning set forth in Section 4.1.

1.1.14 **"Necessary Extension"** shall have the meaning set forth in Section 2.3.

1.1.15 **"NERC"** shall mean the North American Electric Reliability Corporation.

1.1.16 **"NPCC"** shall mean the Northeast Power Coordinating Council, Inc.

1.1.17 **"NYISO"** shall mean the New York Independent System Operator, Inc., or successor organization charged with operating the transmission system and markets in the State of New York.

1.1.18 **"NYISO Day-Ahead Energy Market"** shall mean the NYISO-administered day-ahead energy market.

1.1.19 **"NYISO ICAP Market"** shall mean the monthly spot NYISO-administered Installed Capacity Market.

1.1.20 **"NYISO OATT"** shall mean the NYISO Open Access Transmission Tariff, as it may be amended by the NYISO.

1.1.21 **"NYISO Tariff"** shall refer to any published tariff of NYISO, as such tariff may be amended by the NYISO.

1.1.22 **"NYPSC"** shall mean the New York Public Service Commission.

1.1.23 **"NYSRC"** shall mean New York State Reliability Council, L.L.C.

1.1.24 **"Party"** shall mean either Dunkirk or National Grid. "Parties" means both Dunkirk and National Grid.

1.1.25 "**Planned Outage"** shall mean a planned interruption, in whole or in part, in the electrical output of a generating unit to permit Dunkirk to perform maintenance and repair of the unit, pursuant to the process for Installed Capacity providers set forth in the NYISO Tariff and Outage Scheduling Manual.

1.1.26 "**Optional Extension**" shall have the meaning set forth in Section 2.4.

1.1.27 **"RSS"** shall mean Reliability Support Service.

1.1.28 **"RSS Unit"** shall mean Dunkirk Unit No. 2.

1.1.29 **"Take or Pay Costs"** shall mean the costs incurred by NRG Power Marketing, LLC on behalf of Dunkirk for failure to meet the minimum volume requirement for coal shipments under contract UP-C-54152 with Union Pacific Railroad Company.

1.1.30 **"Term"** shall mean the Minimum Term and the Necessary Extension or Optional Extension, if applicable.

ARTICLE II

TERM

2.1 Effective Date and Term

This Agreement shall become effective at the start of the hour ending 0100 Eastern Prevailing Time ("EPT") on June 1, 2013 and remain in effect through the end of the hour ending 2400 EPT on May 31, 2015 (the "Minimum Term").

2.2 Termination

(a) No provision of this Agreement shall terminate earlier than midnight on May 31, 2015, except pursuant to the provisions relating to Section 2.2(b) immediately below, Additional Expenditures (Section 5.3), Force Majeure Events (Section 7.1), or if not approved by the NYPSC (Section 10.10).

(b) Upon at least 90 days written notice, a Party may terminate this Agreement prior to May 31, 2015 if any of the following events or circumstances materially and adversely affects the economic or reliability benefits of this Agreement for that Party: (1) a Change in Law; (2) a change to the NYISO Tariff or other NYISO policy or rule; or (3) an order of any Governmental Authority, other than as a result of an action or proceeding commenced by such Party. Any such termination shall be effective only on the last day of a calendar month.

(c) Nothing in this agreement shall prevent Dunkirk from ceasing operation and deactivating the RSS Unit immediately upon the effective date of any termination of this Agreement by National Grid.

2.3 Necessary Extension

(a) National Grid agrees to notify Dunkirk in writing of any finding of a reliability need past May 31, 2015 caused by a delay of planned transmission upgrades by National Grid ("Necessary Extension") or any finding of no reliability need, as soon as practicable, but no later than January 1, 2015.

(b) Upon receiving notice of a Necessary Extension, the Parties will engage in good faith negotiations as promptly as possible to establish the terms and conditions of such Necessary Extension, including, without limitation, the determination of a reasonable level of compensation to be paid by National Grid to Dunkirk based on the length of the additional period of operation required by National Grid, in addition to the reasonably projected incremental cost to Dunkirk of providing service during the period of the Necessary Extension. If no agreement can be reached as to the reasonable level of compensation, Dunkirk shall not be obligated to enter into any Necessary Extension. The Parties contemplate that any Necessary Extension agreement will be presented to the NYPSC for approval.

(c) Commencing in June 2014 and for the remainder of the Term of this Agreement, National Grid shall provide Dunkirk an update by the first business day of each calendar month on the status of National Grid's need for any units at Dunkirk expected to be necessary for providing reliability service beyond May 31, 2015, consistent with applicable laws and regulations. National Grid will indicate the units it expects to need, if any, and the period for which it expects to need them.

2.4 Optional Extension

If during the Term of this Agreement, but no later than six months prior to its expiration, National Grid desires to contract with Dunkirk beyond the Initial Term in order to continue RSS service until such time replacement generation capacity is to be constructed at Dunkirk, the Parties will engage in good faith negotiations to establish the terms and conditions of such extension (such extension, the "Optional Extension"), including, without limitation, the determination of a reasonable level of compensation to be paid by National Grid to Dunkirk based on the length of the additional period of operation desired by National Grid, in addition to the reasonably projected incremental cost to Dunkirk of providing service during the period until such time the new capacity can be commissioned. The Parties contemplate that any Optional Extension agreement will be presented to the NYPSC for approval.

2.5 Survival of Obligations

Notwithstanding the termination of this Agreement, the Parties shall continue to be bound by the provisions of this Agreement that by their nature are intended to, and shall, survive such termination.

ARTICLE III

OBLIGATIONS AND OPERATIONS

3.1 General

During the Term, Dunkirk shall operate and maintain the RSS Unit within standards of accepted Good Utility Practice, and in accordance with the NYISO Tariff.

3.2 Operating Characteristics and Environmental Compliance

Dunkirk shall have no obligation to cause the RSS Unit to be operated in a manner inconsistent with the Dunkirk unit characteristics set forth in Schedule 1 to this Agreement, or in a manner that would be inconsistent with or in violation of the NYISO Tariff, NERC, NPCC, or NYSRC rules or would cause Dunkirk to violate the terms of any environmental regulations, restrictions, orders or decrees or any operating permit, which determination shall be made by Dunkirk in its reasonable discretion.

3.3 Dispatch Flexibility

The Parties acknowledge that during the Term of this Agreement and as a consequence of the provision of services under this Agreement, Dunkirk will need to run the RSS Unit for testing and diagnostic purposes for reasons including, but not limited to, the performance of Dependable Maximum Net Capability ("DMNC"), VAR testing, and Relative Accuracy Test Audit ("RATA") testing, or as otherwise required by plant management for health, safety, environmental or operational reasons. If warranted by system conditions, the Parties will coordinate the scheduling of the RSS Units for these purposes so that National Grid will either designate the related RSS Unit as the Day-Ahead Reliability Unit ("DARU") or commit that Unit pursuant to the NYISO's Supplemental Resource Evaluation ("SRE"). Such designation will be coordinated between the Parties so that the most appropriate designation is selected.

3.4 Reactive Power

Except when the RSS Unit is unavailable, the RSS Unit will provide reactive power consistent with the capability of the RSS Unit and the procedures specified under the NYISO's Voltage Support Service.

3.5 Extended Shutdown Notice

If National Grid expects that the RSS Unit will not be called to provide system support for greater than two weeks, National Grid will use commercially reasonable efforts to provide Dunkirk with 24 hours notice prior to such period. Notwithstanding the foregoing, Dunkirk shall operate the RSS Unit such that it meets the characteristics in Schedule 1.

ARTICLE IV

PRICING

4.1 Monthly Fixed-Cost Charge

Each month, National Grid shall pay a Monthly Fixed-Cost Charge in accordance with Schedule 2.

4.2 True-Up Payments

(a) Capacity Revenue True-Up – Within 30 days of June 1, 2014 and within 30 days of the date on which this Agreement terminates, Dunkirk will make a payment to National Grid in an amount equal to all capacity revenues earned by the RSS Unit from the period June 1, 2013 through May 31, 2014 and the period June 1, 2014 through the date of termination of this Agreement (unless this Agreement is terminated before June 1, 2014), respectively.

(b) Property Tax True-Up – At any time between the effective date of this Agreement and February 28, 2016, Dunkirk may provide documentary evidence to National Grid showing the amount of property tax payments (or payments in lieu of taxes) that Dunkirk has made to local taxing jurisdictions and the Chautauqua County Industrial Development Authority for property taxes incurred as a result of providing services during the Minimum Term of the Agreement. Such documentary evidence will be in the form of verifiable banking records, a receipt or other verification received from the taxing authority and must show that the tax obligation satisfied relates to the Term of this Agreement. Within 30 days of the date Dunkirk submits such evidence to National Grid, National Grid will reimburse Dunkirk for any such documented payments, up to a maximum amount for all property tax payments of $13,064,877.

(c) Take or Pay Coal Contract True-Up – National Grid shall pay Dunkirk for Dunkirk's Take or Pay Costs as calculated based on the pre-determined minimum volume allocation to the Dunkirk plant, up to a maximum cost of $8,718,523 for the for 24 month Minimum Term of this Agreement. By January 15, 2014, Dunkirk will determine its prorated Take or Pay Costs allocable to Dunkirk during the period from June 1, 2013 to December 31, 2013 and shall provide National Grid with an accounting of such Take or Pay Costs. The determination of the first payment to be made under this provision will be based on actual coal deliveries to the Dunkirk plant during June 1, 2013 to December 31, 2013. By January 15, 2015, Dunkirk will determine its prorated Take or Pay Costs allocable to Dunkirk during the period from January 1, 2014 to December 31, 2014 and shall provide National Grid with an accounting of such Take or Pay Costs. The determination of the second payment to be made under this provision will be based on actual coal deliveries to the Dunkirk plant during January 1, 2014 to December 31, 2014. Within 30 days of receiving such accounting, National Grid will make payment to Dunkirk of the prorated Take or Pay Costs. Within 30 days of the date on which this Agreement terminates, Dunkirk will determine its prorated Take or Pay Costs allocable to Dunkirk during the remainder of the Minimum Term and shall provide National Grid with an accounting of such Take or Pay Costs. Within 30 days of receiving such accounting, National Grid will make payment to Dunkirk of the prorated Take or Pay Costs. The determination of the final payment to be made under this provision will be based on actual coal deliveries to the Dunkirk plant during the remainder of the Minimum Term of this Agreement.

4.3 [Reserved]

4.4 Invoices

Dunkirk will invoice National Grid monthly. Each such invoice shall include the Monthly Fixed-Cost Charge and any true-up payment pursuant to Section 4.2, if applicable. Dunkirk will issue the invoice no later than 30 calendar days following the month in which service is provided. National Grid's payment shall be due no later than the 30th day after the day on which the invoice is received.

ARTICLE V

OUTAGES AND MAINTENANCE

5.1 Planned Outages

Dunkirk shall be permitted to take the RSS Unit out of operation, or reduce the capability of the RSS Unit, during Planned Outages as permitted by the NYISO Tariff or policies. National

Grid agrees, as the related Transmission Owner, that it will not unreasonably withhold Dunkirk's Planned Outage requests.

5.2 Forced Outages

(a) In the event Dunkirk needs to take the RSS Unit out of operation or reduce the capability of the RSS Unit upon the occurrence of a Forced Outage, Dunkirk shall notify National Grid, pursuant to established practice under the NYISO Outage Scheduling Manual, of the nature and expected duration of a Forced Outage as soon as practicable.

(b) Dunkirk shall continue to receive the Monthly Fixed-Cost Charge during a Forced Outage, subject to Section 5.3(a).

(c) Credits relating to Forced Outage performance shall be determined as follows:

(i) Year 1 (June 1, 2013 – May 31, 2014).

(1) Summer and Fall periods. If the RSS Unit or its Automatic Voltage Regulator is not available for service for 15 percent or more of the cumulative total hours in the months of June, July, August, September, October and November in Year 1 due to one or more Forced Outages, Dunkirk shall provide National Grid a credit payment calculated as follows: the Unit's hourly rate, calculated by dividing the total Monthly Fixed-Cost Charges for the respective six months by the number of hours in such months, multiplied by the total number of hours the Unit was forced out in excess of 15 percent of all hours in the six months. For example, if the Unit were forced out 17% of the hours in the six month period, the credit payment would be calculated by multiplying the Unit's hourly rate by 2% of the total amount of hours in the six month period. If the Unit were forced out less than or equal to 15% of the hours in the six months, no credit payment would be due to National Grid.

(2) Winter and Spring periods. If the RSS Unit or its Automatic Voltage Regulator is not available for service for 15 percent or more of the cumulative total hours in the months of December, January, February, March, April and May in Year 1 due to one or more Forced Outages, Dunkirk shall provide National Grid a credit payment calculated as follows: the Unit's hourly rate, calculated by dividing the total Monthly Fixed-Cost Charges for the respective six months by the number of hours in such months, multiplied by the total number of hours the Unit was forced out in excess of 15 percent of all hours in the six months.

(3) Within 15 days following Year 1, Dunkirk shall calculate whether any credit is due and shall provide notice of the credit amount to National Grid. Any Year 1 credit shall be applied against the amount of Monthly Fixed-Cost Charge invoices issued following Year 1 until the credit is satisfied.

(ii) Year 2 (June 1, 2014 – May 31, 2015).

(1) Summer and Fall periods. If the RSS Unit or its Automatic Voltage Regulator is not available for service for 12.5 percent or more of the cumulative total hours in the months of June, July, August, September, October and November in Year 2 due to

one or more Forced Outages, Dunkirk shall provide National Grid a credit payment calculated as follows: the Unit's hourly rate, calculated by dividing the total Monthly Fixed-Cost Charges for the respective six months by the number of hours in such months, multiplied by the total number of hours the Unit's Forced Outage(s) exceeded 12.5 percent of all hours in the six months.

(2) Winter and Spring periods. If the RSS Unit or its Automatic Voltage Regulator is not available for service for 12.5 percent or more of the cumulative total hours in the months of December, January, February, March, April and May in Year 2 due to one or more Forced Outages, Dunkirk shall provide National Grid a credit payment calculated as follows: the Unit's hourly rate, calculated by dividing the total Monthly Fixed-Cost Charges for the respective six months by the number of hours in such months, multiplied by the total number of hours the Unit's Forced Outage(s) exceeded 12.5 percent of all hours in the six months.

(3) Within 15 days following Year 2, Dunkirk shall calculate whether any credit is due and shall provide notice of the credit amount to National Grid. If a credit payment is due, Dunkirk shall provide National Grid such credit payment within 45 days following Year 2.

(iii) If this Agreement is terminated prior to the end of the Minimum Term, the RSS Unit's performance will be measured by dividing the forced outage hours that occurred in the six months prior to the Termination Date by the total hours over that six month period or a minimum of six months should the early termination occur in months 1-5. If this percentage exceeds the average monthly target percentage over the last six months, Dunkirk shall provide National Grid a credit payment calculated as the hourly rate for the pro-rated period by the hours in the pro-rated period exceeding the average target forced outage hours. For example, if the pro-rated period was three months long and occurred at the end of Month 15, the average monthly target availability percentage would be 13.8% (average of three months of 15% and three months of 12.5%). If the sum of the forced outage hours from month 10 through month 15 divided by six months of total hours is 15%, Dunkirk would refund to National Grid an amount equal to 1.2% of the hours in the three month pro-rated period multiplied by the three month hourly rate.

5.3 Additional Expenditures

(a) Any period of time in which National Grid is considering whether to authorize Additional Expenditures with respect to the RSS Unit shall not count towards any availability calculation for such unit for purposes of determining the Monthly Fixed-Cost Charge reduction set forth in Section 5.2. This includes a situation in which Grid is disputing the amount of Additional Expenditures, but does not include a situation in which Grid has already authorized the Additional Expenditures that Dunkirk expects to incur for a project and Grid is disputing the amount of actual Additional Expenditures for such project.

(b) Dunkirk shall not be obligated to incur any Additional Expenditures, except as permitted by this Section 5.3.

(c) If Dunkirk is required to incur any Additional Expenditure above the amount that can be recovered from National Grid pursuant to Section 5.3(d), Dunkirk will provide written notice to National Grid as soon as possible (but in no event greater than 10 days after Dunkirk becomes aware of the need for Additional Expenditures) whether expenses not recovered in the Monthly Fixed-Cost Charge are required to return the RSS Unit to service or maintain such service. This notice will indicate the amount of Additional Expenditures expected to be required to return the RSS Unit to service or to maintain service.

(i) If within 30 days of receipt of such notice, National Grid provides Dunkirk with written notification that it will pay for the Additional Expenditures, Dunkirk will incur such Additional Expenditures and, with reasonable promptness, restore the RSS Unit to service.

(ii) Payment of Additional Expenditures, to the extent they are agreed to by National Grid, shall be included in the Monthly Fixed-Cost Charge pro-rated over the remaining Minimum Term (i.e., the total amount of such Additional Expenditures divided by the number of Monthly Fixed-Cost Charge payments remaining in the Minimum Term). If such Additional Expenditures are incurred during a Necessary Extension, the payment of such Additional Expenditures shall be pro-rated over such Necessary Extension period.

(iii) National Grid shall have the right to dispute the amount of Additional Expenditures identified as necessary by Dunkirk(including disputing whether such expenditures qualify as Additional Expenditures), in which case National Grid will provide notice to Dunkirk thereof stating a good faith basis for disputing Dunkirk's calculation. Thereafter, the Parties will engage in good faith negotiations to attempt to reach a resolution of the appropriate level of Additional Expenditures required.

(iv) Dunkirk is obligated to use commercially reasonable efforts to minimize Additional Expenditures and agrees that any Additional Expenditures shall be offset by any documented proceeds received by Dunkirk as a result of a claim against any third party for the recovery of such Additional Expenditures. Dunkirk shall refund to National Grid any payments by National Grid for Additional Expenditures that exceed the amount actually expended by Dunkirk with respect to any Additional Expenditures, after offsets.

(v) In the event that National Grid does not provide written notification of its commitment to fund the Additional Expenditures and Dunkirk does not make the voluntary election described in clause (vi) below, Dunkirk shall no longer have any obligation to provide RSS from the RSS Unit. If Additional Expenditures are necessary to restore the RSS Unit from Forced Outage and National Grid has not provided such notice, then this Agreement will be considered terminated as of the expiration of National Grid's notice period.

(vi) Nothing in this Section 5.3 shall prevent Dunkirk from voluntarily electing to make any repair necessary to allow the RSS Unit to return to service, without additional compensation, after being informed by National Grid that it does not intend to fund the Additional Expenditures.

(vii) In each 12 month period, from June 1, 2013 through May 31, 2014 and June 1, 2014 through May 31, 2015 of this Agreement, Dunkirk will not be entitled to recover any Additional Expenditures from National Grid pursuant to this Section 5.3 until Dunkirk has incurred $500,000 in Additional Expenditures in the applicable 12 month period. In the event of an Early Termination, the remaining Additional Expenditure amount above the applicable threshold will be invoiced immediately for those amounts not already collected thru the Monthly Fixed Charge Payments. Dunkirk will provide email notifications to one of the National Grid representatives designated for notice in Section 10.2 on the 15th of every month indicating the reasonable estimate of the amount of Additional Expenditures incurred through the end of the prior month.

(d) The Parties contemplate that National Grid will request NYPSC approval for any Additional Expenditure authorization more than $1 million above the $500,000 annual threshold established in Section 5.3(c)(vii).

ARTICLE VI

SCHEDULING

6.1 Dunkirk will interface and comply with NYISO scheduling deadlines and requirements for maintaining the RSS Unit as an eligible energy and capacity provider, as well as National Grid's dispatch instructions.

6.2 Dunkirk shall bid the energy and ancillary services from the RSS Unit in compliance with existing NYISO market rules and Dunkirk shall retain the revenues resulting there from.

6.3 Dunkirk shall offer the RSS Unit into the NYISO's ICAP Market auction at the Agreed Upon Capacity Bid Price, as set forth in Schedule 3. Any capacity revenues shall be credited to National Grid by Dunkirk and paid in accordance with Section 4.2(b).

6.4 Dunkirk shall offer the RSS Unit into the NYISO Day-Ahead Energy Market, regardless of whether Dunkirk's capacity bid is accepted in the NYISO capacity market, whenever those units are not out of service. Subject to the provisions of Section 3.5, Dunkirk shall comply with any dispatch instruction issued by National Grid or NYISO under established NYISO protocols, consistent with the operating parameters of the RSS Unit and in accordance with the NYISO Tariff.

6.5 National Grid shall not be responsible for any penalties or fines that relate to the bidding, scheduling, and operation of the RSS Unit during the Term of this Agreement.

6.6 National Grid shall pay Dunkirk an amount equal to the amount of bad debt losses assessed to NRG Power Marketing, LLC by NYISO and attributable to the RSS Unit with respect to the Term of this Agreement on a pro rata basis of the RSS Unit's share of gross accounts receivable that contribute to the NYISO's calculation of the loss to be paid by each Transmission Customer under the NYISO OATT Section 27, Attachment U.

ARTICLE VII

FORCE MAJEURE EVENTS

7.1 Force Majeure Event

(a) If the availability of the RSS Unit is reduced by reason of a Force Majeure Event (other than a Force Majeure Event with respect to the transmission or distribution system of National Grid or by equipment or materials owned by National Grid), such Force Majeure Event shall be deemed to create a Forced Outage, and shall be resolved pursuant to the provisions herein relating to Forced Outages and Additional Expenditures.

(b) The Party unable to perform by reason of a Force Majeure Event shall use commercially reasonable efforts to remedy its inability to perform and to mitigate the consequences of the Force Majeure Event as soon as reasonably practicable; provided that (i) no Party shall be required to settle any strike, walkout, lockout, or other labor dispute on terms which, in the Party's sole discretion, are contrary to its interests, and (ii) the Party unable to perform shall, as soon as practicable, advise the other Party of the reason for its inability to perform, the nature of any corrective action needed to resolve performance, and its efforts to remedy its inability to perform and to mitigate the consequences of its inability to perform and shall advise the other Party of when it estimates it will be able to resume performance of its obligations under this Agreement.

ARTICLE VIII

LIMITATIONS OF LIABILITY

8.1 Limitation of Liability

(a) National Grid, its affiliates, successors and assigns shall not be liable to Dunkirk, its affiliates, successors and assigns, for actions or omissions by National Grid or National Grid's affiliates, officers, employees or agents in performing its obligations under this Agreement, provided it has not willfully breached this Agreement or engaged in willful misconduct. To the extent Dunkirk has claims against National Grid, Dunkirk may only look to the assets of National Grid for the enforcement of such claims and may not seek to enforce any claims against the directors, members, officers, employees or agents of National Grid who, Dunkirk acknowledges and agrees, have no personal liability for obligations of National Grid by reason of their status as directors, members, officers, employees or agents of National Grid.

(b) Dunkirk, its affiliates, successor and assigns, shall not be liable to National Grid, its affiliates, successors and assigns, for actions or omissions by Dunkirk, or Dunkirk's affiliates, officers, employees or agents in performing its obligations under this Agreement, provided that Dunkirk has not willfully breached this Agreement or engaged in willful misconduct. To the extent National Grid has claims against Dunkirk, National Grid may only look to the assets of Dunkirk for the enforcement of such claims and may not seek to enforce any claims against the directors, members, officers, employees or agents of Dunkirk who, National Grid acknowledges and agrees, have no personal liability for obligations of Dunkirk by reason of their status as directors, members, officers, employees or agents of Dunkirk.

(c) In no event shall Dunkirk be liable to National Grid or National Grid be liable to Dunkirk for any incidental, consequential, multiple or punitive damages, loss of revenues or profits, attorneys fees or costs arising out of, or connected in any way with the performance or nonperformance of this Agreement; provided, however, that none of the payments to be made by National Grid hereunder shall be considered to fall within any of the foregoing categories.

ARTICLE IX

REMEDIES

9.1 Termination for Default

If any Party shall fail to perform any material obligation imposed on it by this Agreement, and that obligation has not been suspended pursuant to this Agreement, the other Party, at its option, may terminate this Agreement by giving the Party in default written notice setting out specifically the circumstances constituting the default and declaring its intention to terminate this Agreement. If the Party receiving the notice does not within ten (10) days after receiving the notice, remedy the default, the Party not in default shall be entitled by a further written notice to terminate this Agreement; provided that, if the default is reasonably expected to take more than ten (10) days to remedy, the defaulting Party shall notify the non-defaulting Party of its plan for remedying the default and must take actions to begin remedying the default within ten (10) days. The Party not in default shall have a duty to mitigate damages. Termination of this Agreement pursuant to this Section 9.1 shall be without prejudice to the right of any Party to collect any amounts due to it prior to the time of termination.

9.2 Waiver

The failure to exercise any remedy or to enforce any right provided in this Agreement or applicable law shall not constitute a waiver of such remedy or right or of any other remedy or right. A Party shall be considered to have waived any remedies or rights only if the waiver is in writing and signed by the Party against whom such waiver is to be enforced.

9.3 Beneficiaries

Except as is specifically set forth in this Agreement, nothing in this Agreement, whether express or implied, confers any rights or remedies under, or by reason of, this Agreement on any persons other than the Parties and their respective successors and assigns, nor is anything in this Agreement intended to relieve or discharge the obligations or liability of any third party, nor give any third person any rights of subrogation or action against any Party.

ARTICLE X

MISCELLANEOUS PROVISIONS

10.1 Assignment

None of the Parties shall assign its rights or delegate its duties under this Agreement without the prior written consent of the other Party, which consent shall not be unreasonably withheld, conditioned, or delayed. Any such assignment or delegation made without such written consent shall be null and void. Upon any assignment made in compliance with this section, this Agreement shall inure to and be binding upon the successors and assigns for the assigning Parties.

10.2 Notices and Correspondence

Except as otherwise expressly provided in this Agreements, permitted by NYISO rules or required by law, all invoices, notices, consents, requests, demands, approvals, authorizations and other communications provided for in this Agreements shall be in writing and shall be sent by email, followed by personal delivery, certified mail, return receipt requested, facsimile transmission, or by recognized overnight courier service, to the intended Party at such Party's address set forth below. All such notices shall be deemed to have been duly given and to have become effective: (a) upon receipt if delivered in person, facsimile, or email; (b) two days after having been delivered to a courier for overnight delivery; or (c) seven days after having been deposited in the United States mail as certified or registered mail, return receipt requested, all fees pre-paid, addressed to the applicable addresses set forth below. Each Party's address for notices shall be as follows (subject to change by notice in accordance with the provisions of this section):

TO DUNKIRK:

Elizabeth Quirk-Hendry
General Counsel – East Region
NRG Energy, Inc.
211 Carnegie Center
Princeton, NJ 08540
Tel: (609) 524-5161
Fax: (609) 524-5160
E-mail:elizabeth.quirk-hendry
@nrgenergy.com

and

Judith Lagano
Vice President, Asset Management
NRG Energy, Inc.
Manresa Island Avenue
South Norwalk, CT06854
Tel: (203) 854-3625
Fax: (203) 854-3658
E-mail: judith.lagano@nrgenergy.com

TO NATIONAL GRID:

Carlos A. Gavilondo
Senior Counsel II
National Grid
300 Erie Boulevard West
Syracuse, NY13202
Tel: (315) 428-5862
Fax: (315) 428-5355
E-mail:
Carlos.Gavilondo@nationalgrid.com

and

Bill Malee
Director, Transmission Commercial Services
National Grid
40 Sylvan Road
Waltham, MA 02451
Tel: (781) 907-2422
Fax: (781) 907-5707
E-mail: Bill.Malee@nationalgrid.com

10.3 Parties' Representatives

All Parties to this Agreement shall ensure that throughout the Term of this Agreement, duly appointed representatives are available for communications between the Parties. The representatives shall have full authority to deal with all day-to-day matters arising under this Agreement. Acts and omissions of representatives shall be deemed to be acts and omissions of the Party. Dunkirk and National Grid shall be entitled to assume that the representatives of the other Party are at all times acting within the limits of the authority given by the representatives' Party.

10.4 Effect of Invalidation, Modification, or Condition

Each covenant, condition, restriction, and other Term of this Agreement is intended to be, and shall be construed as, independent and severable from each other covenant, condition, restriction, and other term. If any covenant, condition, restriction, or other Term of this Agreement is held to be invalid or otherwise modified or conditioned by any Governmental Authority, the invalidity, modification, or condition of such covenant, condition, restriction, or other term shall not affect the validity of the remaining covenants, conditions, restrictions, or other terms hereof. If an invalidity, modification, or condition has a material impact on the rights and obligations of the Parties, the Parties shall make a good faith effort to renegotiate and restore the benefits and burdens of this Agreement as they existed prior to the determination of the invalidity, modification, or condition. If the Parties fail to reach agreement, then the Party whose rights and obligations have been adversely affected may, in its sole discretion, terminate this Agreement in accordance with the terms hereof.

10.5 Amendments

Any amendments or modifications of this Agreement shall be made only in writing and duly executed by all Parties to this Agreement. The Parties agree to negotiate in good faith any amendments to this Agreement that are needed to reflect the intent of the Parties as expressed herein and to reflect any changes to the design of the New York markets that are approved by the Commission from time to time.

10.6 Dispute Resolution

Except where otherwise provided for in the Agreement, disputes under this Agreement shall be submitted to representatives of each Party for resolution. If the dispute remains unresolved, after 45 days, either Party may pursue any legal remedies available to it by law.

10.7 Late Payments

If any payment owed to any Party hereunder is not made within 30 days after an invoice for such payment is received, a late payment charge at the rate of one and one-half percent per month or the interest rate permitted by National Grid's then-current electric service tariff, whichever is greater, will be assessed on the entire unpaid amount.

10.8 Entire Agreement

This Agreement consists of the terms and conditions set forth herein, as well as the attachments hereto, which are incorporated by reference herein and made a part hereof. This Agreement contains the entire agreement between the Parties with respect to the matters set forth herein and supersedes all prior negotiations, undertakings, agreements and business term sheets.

10.9 Confidentiality

Information provided by any Party to the other pursuant to this Agreement may, at the Party's discretion, be provided subject to the terms of the Confidentiality Agreement between NRG Energy, Inc. and National Grid, dated as of November 10, 2011 and the Supplemental Confidentiality Agreement between NRG Energy, Inc. and National Grid dated as of December 10, 2012. All information provided to either Party in connection with the negotiations regarding this agreement shall remain subject to the provisions of such Confidentiality Agreement.

10.10 Binding Nature

It is the Parties' expectation that this Agreement will be binding from the date of execution of both Parties. National Grid shall file this Agreement with the NYPSC for approval within five (5) business days of execution. If the NYPSC does not approve this Agreement in its entirety, either Party may terminate this Agreement upon written notice to the other Party. Such notice shall be provided within five (5) business days of the NYPSC disapproval and shall not become effective less than sixty (60) days from the date of the NYPSC disapproval unless the Parties mutually agree to a shorter period. Termination of this Agreement pursuant to this

Section 10.10 shall not relieve either Party of its obligation to pay amounts due under the Agreement prior to the termination.

National Grid agrees that Dunkirk will request a Planned Outage on the RSS Unit prior to the effective date of this Agreement in reliance on the effectiveness of this Agreement. Additionally, Dunkirk may undertake financial obligations with respect to a Planned Outage that will occur during Fall 2013. Notwithstanding anything to the contrary contained in this Agreement, if this Agreement is terminated so that the effective date of such termination occurs on or before May 31, 2013, National Grid shall reimburse Dunkirk for all documented expenses not previously paid by National Grid, inclusive of Dunkirk's carrying costs, incurred between the date hereof and the date such termination notice is delivered to Dunkirk if such expenses are related to the aforementioned maintenance outages on the RSS Unit.

Section 10.11 Audit Rights

(a) Subject to the confidentiality requirements under Section 10.9 of this Agreement and Dunkirk's confidentiality obligations to third parties, National Grid shall have the right, during normal business hours, and upon prior written notice to Dunkirk during the term of this Agreement, to audit, at National Grid's expense, Dunkirk's accounts and records to the extent necessary to audit and verify the accuracy of all reports, statements, invoices, charges, or computations pursuant to this Agreement. Such written notice must include a reasonable, good faith basis for the need for such audit. Such audit rights shall be limited to information relating to performance of this Agreement as set forth in Section 10.11(b). Any audit performed pursuant to this Section 10.11 shall be performed at the office where such accounts and records are maintained and shall be limited to those portions of such accounts and records that relate to Dunkirk's performance and satisfaction of obligations under this Agreement. Records may be reviewed during such audit, but such records may not be removed or copied.

(b) Accounts and records related to the following sections under this Agreement shall be subject to reasonable audit: (i) dispatch flexibility (Section 3.3 and Schedule 1); (ii) capacity revenues (Section 4.2 and Schedule 3); (iii) property tax expense; (iv) Take or Pay Costs;(v) communications with the NYISO regarding planned or forced outages and unit scheduling (Sections 5.1 and 5.2 and Article VI); (vi) Force Majeure events (Section 7.1); (vii) Additional Expenditures (Section 5.3); and (viii) if the Public Service Commission does not approve this Agreement and National Grid terminates this Agreement pursuant to Section 10.10, costs incurred in connection with the outages referenced in Section 10.10 between the date hereof and the date of any such termination if Dunkirk seeks reimbursement of such costs from National Grid with respect to the term of this Agreement.

ARTICLE XI

STANDARD OF REVIEW

The standard of review for changes in the rates, terms or conditions of this Agreement whether proposed by a Party or a non-party must meet the "public interest" application of the statutory "just and reasonable" standard of review as set forth in *United Gas Pipe Line Co. v. Mobile Gas*

Service Corp., 350 U.S. 332 (1956) and *Federal Power Commission v. Sierra Pacific Power Co.*, 350 U.S. 348 (1956); as clarified by *NRG Power Marketing, LLC v. Maine Public Utilities Commission*, 130 S. Ct. 693, Case No. 08-674 (2010); *Morgan Stanley Capital Group, Inc. v. Public Util. Dist. No. 1 of Snohomish*, 554 U.S. 527 (2008).

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement.

DUNKIRK POWER LLC

By: William Lee Davis

Name: William Lee Davis

Title: President

NIAGARA MOHAWK POWER CORPORATION d/b/a NATIONAL GRID

By: William L Malee

Name: William L Malee

Title: Director, Transmission Commercial

SCHEDULE 1

	Unit 2
Low Operating Limit:	35 MW
High Operating Limit (normal):	75 MW
High Operating Limit (emergency):	75 MW
Ramp Rate (normal):	0.5 MW/minute
Ramp Rate (emergency):	0.5 MW/minute
Minimum Run Time (hours):	24 hours
Minimum Shutdown Time:	48 hours
Start Up Notification Time:	24 hours
Cold Start[1] (Down Time)	36 hours
Warm Start[2] (Down Time)	12 hours
Hot Start[3] (Down Time)	1 hour

[1] For purposes of this Agreement, a "Cold Start" is considered to be when the RSS Unit has been shutdown for more than 36 hours.

[2] For purposes of this Agreement, a "Warm Start" is considered to be when the RSS Unit has been shutdown for more than 12 hours but less than 36 hours.

[3] For purposes of this Agreement, a "Hot Start" is any start other than a Cold Start or a Warm Start.

SCHEDULE 2

Monthly Fixed-Cost Charge

National Grid's payment of the Monthly Fixed-Cost Charge as detailed in Table 1 shall be made within 30 calendar days of receipt of Dunkirk's monthly invoice to National Grid.

Year	Month	Monthly Fixed-Cost Charge
2013	Jun-13	$2,076,076
2013	Jul-13	$2,076,076
2013	Aug-13	$2,076,076
2013	Sep-13	$2,076,076
2013	Oct-13	$2,076,076
2013	Nov-13	$2,076,076
2013	Dec-13	$2,076,076
2014	Jan-14	$2,185,567
2014	Feb-14	$2,185,567
2014	Mar-14	$2,185,567
2014	Apr-14	$2,185,567
2014	May-14	$2,185,567
2014	Jun-14	$2,185,567
2014	Jul-14	$2,185,567
2014	Aug-14	$2,185,567
2014	Sep-14	$2,185,567
2014	Oct-14	$2,185,567
2014	Nov-14	$2,185,567
2014	Dec-14	$2,185,567
2015	Jan-15	$2,039,566
2015	Feb-15	$2,039,566
2015	Mar-15	$2,039,566
2015	Apr-15	$2,039,566
2015	May-15	$2,039,566

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SCHEDULE 3

[redacted]

SCHEDULE 4

Major Maintenance

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Capital Expenditures

[redacted]

Normal Maintenance (Materials & Supplies)

The following are examples of normal, routine maintenance activities that will be performed during the term of the reliability agreement organized by major equipment components.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted], [redacted]

The classification of an activity as normal maintenance will be determined based on the facts and circumstances of each activity.

ATTACHMENT 2

RFP BID COMPARISON SUMMARY

CONTAINS CONFIDENTIAL INFORMATION

DO NOT DISCLOSE

National Grid
Dunkirk Alternatives RFP-Proposal Comparison Summary

Executive Summary

The following provides a summary comparison of bids received from Dunkirk Power LLC ("Dunkirk") [redacted] Dunkirk Alternatives Request for Proposal ("RFP") directed by the NYPSC in case 12-E-0136. The RFP was performed to obtain reliability support services in Western NY to maintain the reliability of the transmission system and determine if the market could supply an alternative at a reduced cost to the existing Dunkirk Reliability Support Service (RSS) Agreement. The RFP was issued on October 24, 2012 and RFP responses were received on December 14, 2012. The evaluation of bids took place from December 14 to January 18 followed by negotiations with the bidders from January 22 to February 8. After negotiating with [redacted]

Quick Comparison- Results of Negotiations

Dunkirk - $70.8M	[redacted]
o Proposal can be achieved by 6/1/13 o Lowest cost option o Low implementation risk o No National Grid resources are required for implementation o Minimal change in Contract terms from existing contract o The proposal would continue to provide a positive impact on the local economy in Dunkirk, NY o [redacted]	o [redacted]

Proposal Details

[redacted]

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[redacted]

Timeline

[redacted]

Risks

[redacted]

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[redacted]

Costs

[redacted]

[redacted]

[redacted]

Dunkirk

- Dunkirk submitted [redacted]

Timeline

- Dunkirk is prepared to start providing service on June 1, 2013.

Risks

- Low risk solution. Continuation of current situation. [redacted]
- Single unit agreement. An extended outage could affect Dunkirk's ability to provide service from Unit 2. [redacted] Payment structure designed to incentivize Dunkirk to maintain unit reliability.

Costs

- The overall cost to the Company to obtain services from Dunkirk for the two year period is $70.8M dollars [redacted]
- Property taxes will be reconciled through a true up mechanism by Dunkirk providing documentary evidence to National Grid showing the amount of property tax payments (or payments in lieu of taxes) that Dunkirk has made to local taxing jurisdictions up to a maximum amount for all property tax payments of $13,064,877.
- The Take or Pay coal transportation contract will be reconciled through a true up mechanism calculated based on the pre-determined minimum volume allocation to the Dunkirk plant, up to a maximum cost of $8,718,523. The payments to be made under this provision will be based on actual coal deliveries to the Dunkirk plant.

Dunkirk	Fix Costs	Property Tax	Take or Pay	Price Schedule
Jun-2013	$2,076,076	-	-	$2,076,076
Jul-2013	$2,076,076	-	-	$2,076,076
Aug-2013	$2,076,076	-	-	$2,076,076
Sep-2013	$2,076,076	-	-	$2,076,076
Oct-2013	$2,076,076	-	-	$2,076,076
Nov-2013	$2,076,076	-	-	$2,076,076
Dec-2013	$2,076,076	-	-	$2,076,076
Jan-2014	$2,185,567	Property Tax True up	-	$2,185,567
Feb-2014	$2,185,567	Property Tax True up	Take or Pay True up	$2,185,567 + True Up

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Confidential

Mar-2014	$2,185,567	-	-	$2,185,567
Apr-2014	$2,185,567	-	-	$2,185,567
May-2014	$2,185,567	-	-	$2,185,567
Jun-2014	$2,185,567	-	-	$2,185,567
Jul-2014	$2,185,567	-	-	$2,185,567
Aug-2014	$2,185,567	-	-	$2,185,567
Sep-2014	$2,185,567	-	-	$2,185,567
Oct-2014	$2,185,567	-	-	$2,185,567
Nov-2014	$2,185,567	-	-	$2,185,567
Dec-2014	$2,185,567	-	-	$2,185,567
Jan-2015	$2,039,566	Property Tax True up	-	$2,039,566 + True Up
Feb-2015	$2,039,566	Property Tax True up	Take or Pay True up	$2,039,566 + True Up
Mar-2015	$2,039,566	-	-	$2,039,566
Apr-2015	$2,039,566	-	-	$2,039,566
May-2015	$2,039,566	-	Take or Pay True up	$2,039,566 + True Up
Total	**$ 50,957,166**	**$ 13,064,877**	**$ 8,718,523**	**$72,740,561**

Note: [redacted]

(2) The property tax true up will continue until February 28, 2016 when taxes for 2015 are due.

Conclusion

Balancing the overall costs and risks of the two proposals, the Company determined Dunkirk to provide the preferred solution.

Exhibit No.____ (NMP-13)

2013 Dunkirk RSS Agreement
(CONFIDENTIAL)

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THIS DOCUMENT HAS BEEN REMOVED FROM THE PUBLIC VERSION

CONTAINS CONFIDENTIAL INFORMATION PURSUANT TO 18 C.F.R. § 388.112

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Exhibit No.____ (NMP-14)

NYPSC August 16, 2012 Order
Deciding Reliability Issues and
Addressing Cost Allocation and Recovery

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

At a session of the Public Service Commission held in the City of Albany on August 16, 2012

COMMISSIONERS PRESENT:

Garry A. Brown, Chairman
Patricia L. Acampora
Maureen F. Harris
James L. Larocca
Gregg C. Sayre

CASE 12-E-0136 - Petition of Dunkirk Power LLC and NRG Energy, Inc. for Waiver of Generator Retirement Requirements.

ORDER DECIDING RELIABILITY ISSUES AND ADDRESSING COST ALLOCATION AND RECOVERY

(Issued and Effective August 16, 2012)

BY THE COMMISSION:

INTRODUCTION

On March 14, 2012, NRG Energy, Inc. and Dunkirk Power LLC (collectively, NRG) filed a notice, pursuant to the Commission's Order Adopting Notice Requirements for Generation Unit Retirements (Retirement Order), which stated that NRG intended to "mothball" its Dunkirk generating station by September 10, 2012.[1] NRG sought a waiver of the Commission's notice requirement adopted in the Retirement Order so that it

[1] Case 05-E-0889, Policies and Procedures Regarding Generating Unit Retirements, Order Adopting Notice Requirements for Generation Unit Retirements (issued December 20, 2005).

could proceed with the mothballing of the Dunkirk generating station prior to September 10, 2012.[2]

In response to NRG's Retirement Notice, Niagara Mohawk Power Corporation d/b/a National Grid (National Grid) conducted an analysis of the reliability impacts associated with the planned mothballing. The analysis identified adverse reliability impacts attending the mothballing. National Grid also identified system reinforcements needed to resolve those reliability impacts. However, because it anticipated that the reinforcements could not be completed by September 10, 2012 (i.e., the proposed mothball date for the Dunkirk generating station), National Grid determined that a portion of the Dunkirk generating station must remain available for an interim period in order to maintain system reliability.

On July 20, 2012, National Grid submitted a proposed "Term Sheet Agreement" whereby NRG would agree to provide "Reliability Support Services" (RSS) in order to maintain reliability. National Grid and NRG requested the Commission's approval of the Term Sheet Agreement before entering into a bilateral contract for RSS from the Dunkirk facility for a period beginning September 1, 2012, and ending May 31, 2013. Under the Term Sheet Agreement, RSS would be procured from two units at NRG's Dunkirk generating station until National Grid completes, as is expected by May 31, 2013, the transmission upgrades sufficient to reduce the reliability need to no more than one Dunkirk unit. In the event there are delays in National Grid's schedule for deployment of the upgrades, the

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[2] The term "mothball" is synonymous with a "retirement" for purposes of providing notice under the Retirement Order, given that each action may result in adverse reliability impacts. However, as discussed below, "mothballing," in comparison to "retirement" may have unique implications for establishing appropriate levels of compensation.

Term Sheet Agreement provides that National Grid may obtain a 90-day extension beyond May 31, 2013, until August 31, 2013. Before agreeing that NRG should continue to operate any portion of the Dunkirk generating station beyond May 31, 2013, or, if the initial period is extended, beyond August 31, 2013, National Grid intends to evaluate potential alternative reliability solutions. National Grid indicates that its identified permanent solution to the reliability need could be implemented by June 2015.

On July 20, 2012, National Grid also proposed amendments to its tariffs that would create a mechanism for allocating and recovering the costs it will incur in procuring RSS from NRG (Tariff Amendments). The Tariff Amendments provide for the deferral of the recovery of the costs of procuring RSS from NRG from the inception of National Grid's payment obligation to NRG until lower base rates, proposed in its pending rate proceeding, Case 12-E-0201, are approved and go into effect on April 1, 2013. These costs would be recovered from all retail delivery customers in the same manner as other transmission capital and operating costs.

In this Order, we confirm that National Grid is taking the steps necessary to ensure reliability in the short-term by procuring necessary generation services from NRG, and by soliciting alternatives to meet reliability needs from market participants in the longer term. As discussed more fully below, the proposed Term Sheet Agreement is approved as necessary to ensure that adequate generation facilities have been procured to meet local reliability needs, subject to the filing of an executed contract. However, we reject the proposed Tariff Amendments and refer issues pertaining to the recovery of RSS costs from National Grid's retail customers to the utility's pending rate case, Case 12-E-0201. These actions will ensure the provision of safe and adequate service at just and reasonable rates, and are therefore in the public interest.

BACKGROUND

The Retirement Order, in adopting requirements for providing notice of generator retirements, was intended to address the potential that a retirement of electric generating units could cause the level of generation supply to decline to a point that would threaten the reliability of electric service.[3] These notification requirements were needed so that generation unit retirements that might undermine electric system reliability and render service unsafe or inadequate could be evaluated, and, if necessary, adverse impacts to reliability could be avoided. However, no specific remedies that would be used to address adverse reliability impacts attending a retirement were identified, and the process that would be used to consider such remedies was left open. Instead, the remedies would be considered on a “case-by-case basis, given the potential variety of circumstances that could be encountered.” Designing a remedy would “depend upon the exact nature of those circumstances, which cannot be adequately forecast.”[4]

On March 14, 2012, NRG filed a notice in Case 05-E-0089, pursuant to the Retirement Order, that stated it intended to “mothball” its Dunkirk generating station and cease operations for an undefined period, by no later than September 10, 2012 (NRG Retirement Notice). The Dunkirk generating station consists of four units with a combined nameplate rating of over 635 MW. Dunkirk units 1 and 2 are each rated at 100 MW and interconnect to the transmission system at 115 kV, while

[3] Retirement Order, p. 13. For units 80 MW or larger, a 180-day notice requirement was adopted.

[4] Retirement Order, p. 20.

Dunkirk units 3 and 4 are each rated 217.6 MW and interconnect to the transmission system at 230 kV. NRG also sought a waiver of the retirement notification requirement so that its units could be mothballed prior to September 10, 2012.

The NRG Retirement Notice explained that the proposed mothballing was due to the disparity between current and forecasted wholesale electric prices in Western New York and the underlying cost of operation of the Dunkirk facility, leading to a net loss for NRG if operations continued. Thus, NRG indicated that the facility would be mothballed "until such time as market conditions improve."[5]

In conformance with the State Administrative Procedure Act (SAPA) §202(1), notice of the NRG Retirement Notice was published in the State Register on April 11, 2012. The SAPA §202(1)(a) period for submitting comments in response to the notice expired on May 29, 2012. No comments were received by that date.

Subsequent to the filing of the NRG Retirement Notice, National Grid conducted analyses to determine the system reliability impacts of permanently removing all four Dunkirk units from the electric system. In a letter dated March 30, 2012, National Grid advised Staff of the New York State Department of Public Service (DPS Staff) that "the proposed mothballing of Dunkirk units 1-4 will result in significant impacts to transmission system reliability in western NY."[6]

National Grid's preliminary analyses suggested that three Dunkirk units (one 230 kV unit and the two 115 kV units) would be required to meet reliability needs, with two of these

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[5] NRG Retirement Notice, p 2.

[6] Letter from Christopher E. Root, National Grid Senior Vice President, Network Strategy, to Thomas Dvorsky, Department of Public Service (dated March 30, 2012).

three units required all year and all three operating in the 2013 summer season. National Grid subsequently revised its need assessment, and on June 29, 2012, indicated to NRG that only two 115 kV units were required from September 2012, until May 31, 2013, when certain transmission system reinforcements would be completed. Further, National Grid thought that a single unit would likely be required from June 1, 2013, until June 1, 2015, when critical substation and line projects would be completed. National Grid noted that it was continuing to examine whether it is possible to avoid the need for the single Dunkirk unit after May 31, 2013.[7]

In a letter dated June 11, 2012, our Counsel advised National Grid and NRG that we could exercise our authority to ensure that adequate generation facilities have been procured to meet local reliability needs, and that the parties should pursue an agreement to ensure adequate generation resources were available during the proposed mothballing period. The letter directed National Grid and NRG to advise the Commission by July 12, 2012 whether such an agreement was negotiated or, alternatively, to submit proposed term sheets individually for our consideration.

On July 12, 2012, National Grid and NRG responded that they were continuing to negotiate, and that they believed additional time could be beneficial in their efforts to reach agreement. The parties asserted that submitting respective proposed terms at that time would be counterproductive. On the same date, NRG filed a proposed, but unexecuted, reliability must-run (RMR) agreement with the Federal Energy Regulatory Commission (FERC). The RMR applied to Dunkirk Units 1 and 2 for the period ending May 31, 2013, and to one of the two units for

[7] Case 12-E-0201, National Grid Response to Information Request DPS-464 (dated August 2, 2012).

an additional two-year period ending June 1, 2015. Pursuant to the proposed RMR, National Grid would compensate NRG through a monthly fixed-cost charge of $5,607,513 for keeping Units 1 and 2 in service through May 31, 2013, and $4,450,332/month to keep a single unit in service between June 1, 2013, and June 1, 2015. NRG characterized these amounts as based on its "cost-of-service" (COS).

On July 18, 2012, a Notice was issued by the Secretary directing National Grid and NRG to file either an agreement, or proposed terms recommended by each party for consideration by no later than July 20, 2012, so that the filings could be acted upon at our August 16, 2012 session. The Notice solicited comments from interested parties on the National Grid and NRG filings by July 30, 2012.

On July 20, 2012, National Grid submitted a proposed Term Sheet Agreement for which it and NRG sought approval. The Term Sheet Agreement was intended to supersede NRG's RMR filing with FERC. National Grid also proposed Tariff Amendments to provide a mechanism for allocating and recovering the costs it would incur in procuring RSS from NRG (Petition).[8] On July 30, 2012, comments were filed on the Term Sheet Agreement and Tariff Amendments by National Grid, Independent Power Producers of New York (IPPNY), Sierra Club, and Multiple Intervenors (MI). The parties' comments are summarized below.

[8] NRG subsequently filed a motion to hold the FERC proceeding in abeyance pending the possible approval by the Commission of the proposed Term Sheet Agreement. In the event the Term Sheet Agreement is approved, without modification, and becomes final, NRG plans to withdraw its RMR filing at FERC.

THE PETITION

Term Sheet Agreement

The Term Sheet Agreement provides that NRG shall defer mothballing actions on Dunkirk Units 1 and 2, which are interconnected to the 115 kV transmission system, and keep them available to support reliability. The length of the contract would cover the period from September 1, 2012, until May 31, 2013, although it may be extended by National Grid for up to an additional 90 days beyond May 31, 2013, in the event there are delays in the planned in-service dates of the transmission reinforcements. Under the Term Sheet Agreement, National Grid would pay NRG a monthly fixed-price charge of $2,924,324, plus true-ups for "verified expenses" supporting NRG's property tax payments (i.e., payment in-lieu of taxes (PILOT)) and coal delivery charges.[9]

The Term Sheet Agreement provides for the crediting of any Installed Capacity (Capacity) revenues earned in New York Independent System Operator, Inc. (NYISO) markets against the costs of the contract, while NRG would retain any Energy and Ancillary Services market revenues. In the event that the Dunkirk generating station exceeds certain earnings thresholds in the five-year period following the termination of the contract, a portion of such earnings would be credited to National Grid for the benefit of customers. In addition, monies may also be credited to National Grid in the event NRG's generating units fail to meet certain performance standards.

National Grid's preliminary evaluation indicates that there may be a need for RSS beyond May 31, 2013. However, National Grid believes that it is premature, at this time, to

[9] For the nine month period of the contract, taxes/PILOT expenses would be paid up to $6,681,084, and "take or pay" coal contract true-up expenses would be paid up to $4,342,985.

contract for continued RSS from Dunkirk beyond the period(s) that are specified in the Term Sheet Agreement, pending an evaluation of other potential reliability solutions that may become available in the future.

Tariff Amendments

National Grid proposes that the costs of procuring the RSS be deferred from the start of the payment obligation until lower base rates, which are proposed in Case 12-E-0201, go into effect on April 1, 2013. National Grid believes the deferred amounts should accrue carrying charges at the customer deposit rate (currently 1.65%). These costs would be recovered from retail delivery customers in the same manner as other transmission capital and operating costs.

Beginning with the effective date of new base rates, it proposes to commence recovery from retail customers of the current RSS costs as well as deferred RSS amounts inclusive of accumulated carrying charges. National Grid maintains that because the rate proposal in Case 12-E-0201 is expected to result in a rate decrease, deferring cost recovery until that time helps promote “rate stability.”

National Grid proposes to recover RSS costs through service class specific surcharges over a period to be identified.[10] As proposed, the costs of the RSS would be recovered from all delivery customers regardless of supplier, except for Empire Zone qualifying load, Excelsior Jobs Program

[10] National Grid stated that “[t]he Company did not propose a specific period over which to recover the RSS costs; however, the Company’s filing modeled recovery of the forecast RSS amounts over 12 months beginning April 1, 2013;” and “[a]lthough the 12-month period modeled in the filing appears reasonable given the nine-month term of the contract, the Company anticipates proposing an appropriate surcharge recovery period in the future when additional cost information will be available.” Case 12-E-0136, National Grid Response to Information Request MI-4 (dated July 27, 2012).

qualifying load, and certain S.C. 12 customers with individually negotiated contracts that disallow surcharges.

National Grid proposes to allocate the costs of the RSS charges in the same manner as other transmission capital and operating costs. The allocation is based on the respective contribution of each service class to the coincident peak demand, and the proposed methodology will recover costs from each service class on either a demand or kilowatt-hour basis.

COMMENTS

National Grid

In its Statement in Support of the Term Sheet Agreement, National Grid reiterates that Dunkirk Units 1 and 2 must remain in operation through at least May 2013 in order to maintain reliability. National Grid asserts that the Term Sheet Agreement addresses the reliability need at far less cost, and under more favorable terms, than those NRG proposed to FERC.

In its filing with FERC on July 12, 2012, NRG requested recovery of a monthly fixed-cost charge of $5,607,513 (or $50,467,617 for nine months), based on “cost-of-service” rates, for keeping Dunkirk Units 1 and 2 available. National Grid points out that this amount is significantly more than the fixed-price charges and tax-related payments of $33,000,000, plus actual coal contract costs of up to $4,342,985, over the nine months under the Term Sheet Agreement. Neither the coal contract adjustment clause, the provision for refunds to ratepayers if the Dunkirk plant exceeds a certain earnings threshold within five years, or the unit performance standards were included in NRG’s filing with FERC.

National Grid asserts that the deferral of the RSS surcharges would help promote rate stability for customers. Even with the implementation of the surcharge, National Grid estimates that most typical customers' delivery bills will be lower beginning April 1, 2013 than they are currently.

In sum, National Grid maintains that the Term Sheet Agreement is reasonable, fair to customers, consistent with public policy, and is in the public interest. National Grid contends that the Term Sheet Agreement is the product of agreement among normally adversarial parties, and reflects a reasonable compromise position that is within the range of results that may have arisen from litigation.

Sierra Club

Sierra Club argues that the reasonable term of the agreement should coincide with the period for which a reliability need has been demonstrated, which it maintains is only September 10, 2012, to May 31, 2013. Limiting the term of the agreement would also minimize the potential for effects that would distort the market. Sierra Club cites FERC orders stating that "RMR contracts suppress market-clearing prices, increase uplift payments, and make it difficult for new generators to profitably enter the market."[11]

According to Sierra Club, a process is needed for selecting competitive bids to provide any needed reliability services beyond June 1, 2013, and prior to June 1, 2015. Such a solicitation, Sierra Club maintains, may identify a less expensive alternative to operating the Dunkirk facility and will ensure that National Grid customers are not forced to make unjust and unreasonable payments to NRG.

Sierra Club takes issue with the provision in the Term Sheet Agreement that provides a refund to National Grid for a portion of the $4.2 million debt-related allowance in the event NRG's profits exceed certain thresholds. Rather, Sierra Club

[11] Sierra Club comments, p. 4 (citing Devon Power, LLC, 103 FERC ¶61,082 at 9, ¶ 29) (issued April 25, 2003).

suggests that refunds should be triggered by any profits NRG obtains beyond the termination of the agreement.

Finally, Sierra Club notes the various examples where upstate New York coal plants are facing challenges to remaining in operation because of aging plant and adverse financial circumstances. To forestall future out-of-market reliability payments, Sierra Club requests that an analysis of the need for transmission upgrades be undertaken to protect ratepayers from unjust and unreasonable increases in their rates.

Multiple Intervenors (MI)

Although MI generally supports the procurement of RSS from NRG to the extent needed to ensure reliability, it opposes several aspects of National Grid’s filing. In particular, MI objects to the Tariff Amendment for recovering the RSS costs, which it argues are exorbitant and unnecessary. MI notes that National Grid has identified, in its current Case 12-E-0201 rate proceeding, approximately $128.349 million in deferrals owed to customers, and MI requests that a portion of that deferral be used to pay for RSS costs incurred to support RSS operations of two Dunkirk units. Such an approach would obviate any need to institute an RSS surcharge. Alternatively, MI proposes that the Commission refer issues pertaining to the recovery of RSS costs from National Grid’s retail customers to the utility’s pending rate case, Case 12-E-0201. MI states that if the RSS surcharge is allowed to go into effect as National Grid proposes, S.C. 3 and S.C. 3-A customers would experience a demand rate increase of between 4.37% and 12.74%, not including the delivery rate increase being sought by the utility in Case 12-E-0201.

If the imposition of an RSS surcharge is authorized, MI suggests that the RSS costs should be recovered over a time period consistent with transmission system investments (i.e., by extending the recovery period over multiple decades), rather than the proposed 12-month period for recovering deferred costs. Treating the RSS costs in a manner comparable to transmission system investments for amortization and recovery purposes, if a surcharge is allowed, would reduce the amount of the surcharge, and its impact on customers. Further, MI contends that, in addition to the proposed recovery from retail customers, RSS costs should also be recovered on an equitable basis from wholesale customers, other investor-owned utilities, and municipal utilities that would similarly benefit from the RSS. However, MI supports National Grid's proposed allocation of any such surcharge to service classes based on their contribution to coincident peak demand, and recovery based on a per kW basis.

MI does not take a position on the amount of financial compensation provided for under the Term Sheet Agreement, and maintains that the process in this proceeding precluded it from meaningful participation. MI notes that it was not notified of any settlement discussions, had no opportunity to participate in the negotiations, and did not have access to the facts and data relied upon in negotiating the Term Sheet Agreement. MI requests that under this process, no precedential value should be attached to this proceeding.

Notwithstanding the constraints on its ability to participate, MI contends that the compensation provided to NRG for the RSS should not begin prior to the expiration of the 180-day notice period, which is September 10, 2012. In its view, NRG should not be entitled to any compensation prior to that date because NRG is precluded, by operation of the Retirement Order, from mothballing the Dunkirk generating station prior to that date. MI is further concerned that the amount of the monthly fixed-price charge refunded to National Grid, if one or both Dunkirk units are unavailable due to a forced outage, is unreasonably low.

Independent Power Producers of New York (IPPNY)

IPPNY takes no position on the provisions of the Term Sheet Agreement or Tariff Amendments, but requests that the waivers of the Retirement Order notice requirements be granted with respect to Dunkirk Units 3 and 4. IPPNY argues that these units have not been identified as needed for reliability.

IPPNY points out that the Retirement Order found that remedies should be considered on a case-by-case basis, given the varied circumstances that could be encountered, and requests that the Term Sheet Agreement should not be considered precedential to the resolution of any other reliability situations that may arise. IPPNY seeks to ensure that approval of the Term Sheet Agreement will not be interpreted as a waiver of what it deems a generation owner’s rights under the Federal Power Act to file with FERC proposed rates, terms, and conditions for the provision of service needed to ensure reliability within New York.[12]

DISCUSSION

As discussed in prior orders, the movement to competitive electricity markets requires that new approaches be taken to maintaining the adequate generation resources needed to ensure reliability.[13] If independent owners of lightly regulated generation units can discontinue or abandon a service needed for reliability without sufficient regulatory oversight, it is possible that the reliability of electric service would be threatened. Accordingly, policies and procedures were developed

[12] In a comment filed late on August 9, 2012, the “Indicated Transmission Owners” discuss issues raised by other parties; as a result, its comment need not be considered further.

[13] Case 05-E-0889, supra, Order Instituting Proceeding and Notice Soliciting Comments (issued July 27, 2005)(Retirement Notice Order), p. 1.

in the Retirement Order to ensure regulatory review of generation retirements in order to prevent or mitigate any adverse impacts a retirement may have on system reliability.

It is in this context that NRG filed its notice of generation retirement and National Grid identified a potential adverse reliability impact associated with the retirement. The Term Sheet Agreement between NRG and National Grid for the provision of RSS on an interim basis is proposed for the purpose of ensuring the maintenance of adequate generation resources necessary for safe, adequate, and reliable service. While various notices of other planned generation retirements have been received, this is the first instance where a generation unit slated to close operations must instead remain available beyond the end of the notice period prescribed in the Retirement Order.

RSS Jurisdiction

Article 4 of the Public Service Law (PSL) establishes the scope of our jurisdiction over electric generation facilities. That jurisdiction extends to the abandonment of service by wholesale electric generation companies, which may pose the potential for a significant adverse impact to system reliability, thereby threatening the provision of “safe and adequate” service. Moreover, the retirement of a generating unit subject to a lightened regulatory regime under the PSL, or operated as an Exempt Wholesale Generator (EWG) under federal law, could raise public interest considerations analogous to a franchised utility’s abandonment of service to an identifiable group of customers. Since the RSS is a remedy for NRG’s proposal to abandon service by mothballing the Dunkirk generating station, the RSS falls within the ambit of jurisdiction over abandonments.

The issue of regulating a large-scale independent generator first arose in the 1994 Wallkill Order, where a regulatory regime was established for such a generation facility.[14] That generator was exempted from provisions of the PSL where feasible, such as those provisions explicitly applicable only to retail service. It was also decided that some provisions of Article 4 would be flexibly applied to the generator, by reducing filing requirements and the level of scrutiny applied upon review of those filings. Flexible application of Article 4, however, did not carry with it a general exemption from all of the substantive provisions of that Article, leaving the generator subject to certain PSL Article 4 regulation of its activities.

In the AES and Carr Street Orders, the Wallkill regulatory regime was updated and applied to EWGs generally,[15] including those, like NRG Dunkirk, formed out of the divestiture of generation by formerly integrated electric utilities. While those Orders continue to provide for lightened Article 4 regulation, they explicitly provide that EWGs remain subject to PSL jurisdiction with respect to matters like safety, reliability and system improvement.[16] All EWGs requesting lightened regulation have been held to similar requirements.

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[14] See Case 91-E-0350, Wallkill Generating Company, L.P., Order Establishing Regulatory Regime (issued April 11, 1994) (Wallkill Order) and Declaratory Ruling on Regulatory Policies Affecting Wallkill Generating Company and Notice Soliciting Comments (issued August 21, 1991).

[15] Case 99-E-0148, AES Eastern Energy, L.P., Declaratory Ruling on Lightened Regulation (issued March 23, 1999) and Order Providing For Lightened Regulation (issued April 23, 1999) (AES Order); Case 98-E-1670, Carr Street Generating Station, L.P., Order Providing For Lightened Regulation (issued April 23, 1999) (Carr Street Order).

[16] AES Order, p. 9; Carr Street Order, p. 10.

Recent orders similarly provide that EWGs remain subject to the PSL “with respect to matters such as enforcement, investigation, safety, reliability, and system improvement, and the other requirements of PSL Articles 1 and 4,” to the extent not specifically exempted from those Articles elsewhere in the orders.[17] This jurisdiction extends to EWG abandonment of service.

Moreover, our role in establishing the compensation due generation owners whose facilities are needed for reliability is explicitly recognized in the FERC-approved NYISO tariff. In particular, Attachment Y of the NYISO’s Open Access Transmission Tariff provides that the “[c]osts related to regulated non-transmission reliability projects will be recovered by Responsible Transmission Owners, Transmission Owners and Other Developers in accordance with the provisions of New York Public Service Law, New York Public Authorities Law, or other applicable state law.”[18] Although this provision of the NYISO tariff is not implicated under these circumstances, given that the reliability need arose due to local, and not bulk system, reliability issues, it is instructive on the jurisdictional responsibilities we assume in situations similar to those present here.

Reliability Needs

In response to NRG’s notice of intent to mothball its Dunkirk generating station, National Grid performed reliability

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[17] See, e.g., Case 11-E-0351, Stony Creek Energy LLC, Order Granting Certificate of Public Convenience and Necessity, Providing for Lightened Ratemaking Regulation and Approving Financing (issued December 15, 2011).

[18] OATT, Attachment Y, §31.4.1.6. Policies and procedures for addressing the need for a reliability backstop solution were implemented in Case 07-E-1507, Long-Range Electric Resource Plan and Infrastructure Planning Process, Policy Statement on Backstop Project Approval Process (issued February 18, 2009).

studies that showed the mothballing, after September 10, 2012, of Dunkirk Units 3 and 4, which are interconnected to the 230 kV transmission system, would not result in reliability criteria violations. However, these studies also indicated that mothballing Dunkirk Units 1 and 2, interconnected at 115 kV, would result in reliability criteria violations on the local 115 kV transmission system in the Southwestern New York Area, absent transmission reinforcements. The NYISO found no reliability issues on the Bulk Power System caused by the mothballing of Dunkirk, but concurred with National Grid with respect to reliability violations on the local transmission system.[19]

National Grid plans several system reinforcements to reduce the dependence upon the NRG Dunkirk generating station. The reinforcements to address the identified reliability needs are scheduled to be in service by May 31, 2013. It is extremely important that these facilities be completed in a timely manner in order to minimize the extent of the reliability need and to avoid imposing on ratepayers costs beyond those necessary to support NRG Dunkirk operations for the shortest possible period of time. National Grid shall proceed expeditiously with its planned reinforcements, and shall alert DPS Staff to any developments that may jeopardize their timely completion.

Until the anticipated completion of the planned system reinforcements by May 31, 2013, National Grid has determined that Dunkirk Units 1 and 2 must be available to avoid violating post-contingency reliability criteria and to help ensure the reliability of the local transmission system. Once the appropriate system reinforcements are in place, National Grid expects that one of the Dunkirk 115 kV units may continue to be

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[19] Letter from Wesley Yeomans, NYISO Vice President of Operations, to Thomas Dvorsky, Department of Public Service (dated July 30, 2012).

needed until longer-term system reinforcements can be installed. National Grid’s approach is designed to minimize the amount and duration of the RSS that must be procured from NRG.

NRG requests a waiver of the Retirement Order notice requirement so that the Dunkirk generating station could be mothballed prior to the expiration of the notice period. A waiver of the notice period may be granted only where it is demonstrated that there is no reliability need prior to the end of the notice period. Regarding Dunkirk Units 1 and 2, National Grid in its analyses examined the reliability impacts of mothballing the Dunkirk generating station as of September 10, 2012. There is no reason to believe, however, that the Dunkirk capacity would be any less needed before that date than it is afterwards. The Term Sheet Agreement recognizes that such a need does exist by procuring RSS prior to September 10, 2012. Similarly, the absence of a reliability need for Dunkirk Units 3 and 4, prior to September 10, 2012, has not been demonstrated. Moreover, granting the waiver could allow the mothballing to occur during the summer Capability Period, when the Dunkirk facility is most needed to ensure that high peak loads can be met. Therefore, there is no basis for granting NRG’s request for waiver of the Retirement Order notice requirement and its request is denied.

Sierra Club and MI take issue with the September 1, 2012 commencement date for the bilateral RSS contract between National Grid and NRG, given that NRG cannot mothball its units any sooner than September 10, 2012, due to the 180-day notice requirement under our Retirement Order. Under the provisions of the Term Sheet Agreement, the date for commencement of the RSS is just one part of an overall agreement that resolves a multitude of matters by balancing the interests of the parties. Moreover, we note that the proposed start date is only nine days prior to the date suggested by Sierra Club and MI. Under these circumstances, the proposed commencement date of September 1, 2012, which the parties arrived at in balancing their interests, is a reasonable term that addresses the procurement of adequate generation facilities for reliability needs while providing a sufficient level of compensation to the owner of the needed facilities.

We do, however, agree with Sierra Club that a process is needed to determine whether alternatives can solve reliability needs beyond the expiration of the Term Sheet Agreement (i.e., May 31, 2013 or August 31, 2013, depending on the optional extension tied to National Grid's completion of system reinforcements). This is an important step to ensure that ratepayers are contributing no more than necessary to keep the Dunkirk generating station available, and to evaluate whether reliability needs can be met more cost-effectively and efficiently than through continued reliance on NRG's Dunkirk facility. Moreover, a solicitation of alternatives is comparable to the NYISO tariff means for addressing reliability backstop solutions. Therefore, we direct National Grid to consult with DPS Staff and to file a proposed schedule and process for soliciting alternative solutions to any remaining reliability needs that may exist after completing the planned reinforcements.

Term Sheet Agreement

In reviewing whether the costs incurred under the Term Sheet Agreement are just and reasonable, it is appropriate to begin with an inquiry into the economic impacts of a temporary shut-down of a generating facility (i.e., mothballing) as an efficient market response to currently unfavorable economic conditions. In such circumstances, it is arguable that an appropriate level of compensation would meet the costs that a generation owner could avoid by mothballing a generation unit. There are several costs that an owner may "avoid" or minimize by mothballing a generating unit, including: 1) labor and other operating and maintenance (O&M) costs; 2) capital expenditures; 3) taxes or PILOT; 4) operating risks (e.g., risks of equipment failures during operation); and, 5) corporate overhead costs.

These "avoidable" costs do not include "sunk" costs, such as past investments in environmental controls. Similarly, debt and equity costs are considered sunk costs. While depreciation costs begin as sunk costs, they reflect expected service life of the plant. By mothballing a unit, the owner can avoid operating risks and thereby extend the remaining service life of that unit once more favorable economic conditions exist (e.g., higher natural gas prices relative to coal) and the plant can return to profitability. Thus, depreciation costs could be regarded as a proxy for the operating risks avoidable through mothballing.

In the case of a "take-or-pay" coal transportation contract where payments are required for shipment, even if no fuel is actually delivered, the costs may be considered sunk and unavoidable. However, it is possible that these costs may be avoided through bankruptcy, or renegotiation of the contract with the coal transporter, although those outcomes are speculative. Taking all these factors into account, we estimate that avoidable costs for procuring NRG's Dunkirk Units 1 and 2 over nine months would be between approximately $24 million and $40 million, depending on the treatment of Administrative &

General (A&G) corporate expenses, the take-or-pay coal contract, and depreciation.[20]

NRG's filing at FERC, which was characterized as a "Cost of Service" (COS) rate, provides another means for measuring the reasonableness of the costs incurred under the RSS Term Sheet Agreement. In the COS filing at FERC, NRG claimed the compensation for continuing two Dunkirk units in service for nine months should be set at a rate of $50.5 million. This rate includes recovery of sunk costs on the same basis as if NRG were a regulated supplier.

However, a COS rate yields poor operating incentives because, under that approach, NRG would lack the incentive to operate its units efficiently. Moreover, a COS approach is problematic from our perspective of promoting competitive markets, as it allows a generation owner such as NRG to earn market-based returns (potentially in excess of a COS rate) when market conditions are favorable, and to obtain a regulated COS rate, including profits, when market conditions are not favorable. If market conditions improve, as NRG hopes they will by mothballing instead of retiring its Dunkirk facility, then the generation unit could return to a more lucrative market-based rate. By taking this approach, some merchant generation owners could thereby avoid market risks and shift the risks of higher costs to ratepayers.

[20] Based on the costs identified by NRG in its RMR filing with FERC, the upper bound of the avoidable costs for nine months ($40.1 million) could be estimated by reducing the fully embedded COS amount ($50.5 million) by cost of capital ($7.5 million) and related income taxes ($2.8 million). The lower bound of the avoidable costs ($24.2 million) could be estimated by further reducing from the upper bound by potentially sunk costs associated with depreciation ($7.0 million), A&G ($4.6 million), and the coal take-or-pay contract ($4.2 million).

The proposed condition in the Term Sheet Agreement, whereby NRG would be required to refund a portion of its profits above a certain threshold amount, reduces this concern to some degree. While, as Sierra Club suggests, a provision requiring NRG to refund any profits to National Grid may be preferable from a ratepayer perspective, the proposed condition balances the interests of ratepayers and generation owners, and is reasonable under the circumstances.

The Term Sheet Agreement covers a term of nine months, at a cost of $33 million, plus coal delivery costs. The costs are less than what NRG sought in its COS filing at FERC, and are within the range of estimates of avoidable costs.

Allowing NRG to retain energy revenues is reasonable since it creates an incentive for operating efficiently. Under the proposed Term Sheet Agreement, capacity revenues are credited to ratepayers. This is reasonable, as the capacity revenues will help to reduce the burden on ratepayers of the contract payments. However, because NRG will not retain the capacity revenues, this provision could vitiate NRG’s incentive to offer Dunkirk Units 1 and 2 competitively into the capacity market. Indeed, NRG might profit from offering them at a price so high they would fail to clear the capacity market, effectively withholding that capacity in order to increase the market price of capacity received by its other generating units remaining in the market. The Term Sheet Agreement addresses this concern by committing NRG to offer its units into the capacity market at a price no higher than their going-forward costs. However, the Term Sheet Agreement does not define the term “going-forward costs”.

We note that the Term Sheet Agreement provides sufficient revenues to keep Dunkirk Units 1 and 2 in operation for local reliability, and requires the units be bid into the

NYISO's day-ahead energy market, except for outages. Therefore, the incremental costs (i.e., the costs above those set in the RSS Term Sheet Agreement, which establishes the costs NRG will incur in providing the local reliability service itself) of Dunkirk Units 1 and 2 supplying capacity (i.e., bidding into the capacity market) appear de minimus. Thus, the parties should have expected and we would expect that the capacity associated with Dunkirk Units 1 and 2 will be bid into the capacity market at a correspondingly de minimus price. The Term Sheet Agreement appears to be reasonable based on these expectations. When the final executed copy of the contract implementing the Term Sheet Agreement is filed as discussed below, National Grid and NRG shall describe how the bid prices reflecting these expectations will be set.

Tariff Amendments/Cost Allocation and Recovery

Upon consideration, we agree with MI's recommendation that we refer issues pertaining to the recovery of RSS costs from National Grid's retail customers to the utility's pending rate case, Case 12-E-0201. Determining the appropriate cost recovery mechanism in the context of the ongoing rate case will allow us to fully understand the rate implications of the various cost recovery approaches advanced by the parties. Therefore, the proposed RSS surcharge tariffs are rejected. National Grid is directed to defer the RSS costs and accrue carrying charges at the other customer provided capital rate, which is appropriately applied in circumstances such as these when it is expected that the duration of the deferral will be short. If, however, the recovery period for the RSS costs determined in Case 12-E-0201 extends beyond the rate year in that proceeding, accrual of interest on the RSS costs will be increased to the allowed pre-tax rate of return starting on April 1, 2013.

With regard to MI’s concerns about the allocation of the RSS costs, we concur with MI that it would be inequitable for retail customers to be solely responsible for paying the RSS costs. National Grid acknowledges that wholesale transmission customers, as well as customers of New York State Electric & Gas (NYSEG), will benefit from the RSS agreement. We estimate that approximately 7.5% of the RSS costs could be recovered from National Grid’s wholesale transmission customers. However, we do not expect National Grid to seek recovery from NYSEG. It is National Grid’s customers that will realize the vast majority of the RSS benefits; in comparison, NYSEG’s customers will experience only comparatively de minimus benefits.

National Grid is expected to include in its transmission revenue requirement filing, due to FERC next June, the costs associated with the executed RSS agreement, as allocated between retail and wholesale customers. The wholesale customers’ share of the costs, expected to be recovered through the FERC Transmission Service Charge, would be credited to retail customers through National Grid’s Transmission Revenue Adjustment mechanism.

MI and National Grid misapprehend our settlement guidelines and their relevance to this proceeding. Entry into the RSS term sheet was not a settlement of issues in this proceeding pursuant to the settlement guidelines. Instead, it was a decision made by National Grid in furtherance of its responsibilities as a fully-regulated electric retail utility. In so doing, National Grid proceeded in accordance with the usual PSL regulatory process, where decisions a regulated utility makes are subject to subsequent review. Therefore, the settlement guidelines are not applicable in this situation, and arguments to the contrary are rejected.

Several parties question the precedential value of the decisions reached here. We note that the facts involved in the review of each notice submitted in compliance with the Retirement Notice Order are unique, and may warrant different treatment on a case-by-case basis.

CONCLUSION

It is essential that the mothballing or retirement of generation units that are subject to a lightened regulatory regime do not jeopardize the reliability of the electric system. We have taken the necessary steps herein to ensure that National Grid procures sufficient generation facilities necessary for its provision of safe and adequate service, as required under the PSL. The Term Sheet Agreement governing National Grid's procurement of RSS from NRG represents a reasonable balance of the interests of electric consumers and the generation owner, and is in the public interest.

The Commission orders:

1. The request of NRG Energy, Inc. and Dunkirk Power LLC for waiver of generator retirement notification requirements is denied.

2. National Grid shall procure Reliability Support Services from Dunkirk Power LLC, and Dunkirk Power LLC shall provide Reliability Support Services to National Grid, in accordance with the Term Sheet Agreement, which is approved, as discussed in the body of this Order.

3. National Grid and NRG Power Marketing LLC shall file a final executed copy of the contract implementing the Term Sheet Agreement at least five days prior to the commencement of Reliability Support Services.

4. National Grid shall consult with Department of Public Service Staff and file, within 30 days of the date of

this Order, a schedule and process for soliciting alternative solutions to any remaining reliability needs that may exist after completing the facility improvements scheduled for completion by May 31, 2013.

5. The Tariff Amendments filed by National Grid are rejected.

6. National Grid shall file a supplement, on not less than one day's notice, to become effective August 31, 2012, canceling the tariff amendments listed in the Appendix.

7. The requirement of Section 66(12)(b) of the Public Service Law regarding newspaper publication of the cancellation supplement in Clause No. 5 is waived.

8. National Grid shall defer the costs of procuring Reliability Support Services from Dunkirk Power LLC and accrue carrying charges at the other customer provided capital rate. If the recovery period for the Reliability Support Service costs decided in Case 12-E-0201 extends beyond the rate year in that proceeding, accrual of interest on the Reliability Support Service costs will be increased to the allowed pre tax rate of return starting on April 1, 2013.

9. Issues pertaining to the recovery of costs associated with procuring Reliability Support Services from Dunkirk Power LLC from National Grid's retail customers are referred to the utility's pending rate case, Case 12-E-0201.

10. The deadlines provided for in this Order may be extended by the Secretary in her discretion.

11. This proceeding is continued.

By the Commission,

(SIGNED) JACLYN A. BRILLING
Secretary

SUBJECT: Filing by NIAGARA MOHAWK POWER CORPORATION D/B/A NATIONAL GRID

Amendments to Schedule P.S.C. No. 6 – Electricity

Original Leaf No. 235.0.1
Sixth Revised Leaf No. 235
Ninth Revised Leaf No. 3

Issued: July 20, 2012 Effective: September 1, 2012

NEWSPAPER PUBLICATION: Waived.

Exhibit No.____ (NMP-15)

NYPSC May 20, 2013 Order
Deciding Reliability Issues and
Addressing Cost Allocation and Recovery

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

At a session of the Public Service Commission held in the City of Albany on May 16, 2013

COMMISSIONERS PRESENT:

Garry A. Brown, Chairman
Patricia L. Acampora
Maureen F. Harris
James L. Larocca
Gregg C. Sayre

CASE 12-E-0136 - Petition of Dunkirk Power LLC and NRG Energy, Inc. for Waiver of Generator Retirement Requirements.

ORDER DECIDING RELIABILITY NEED ISSUES
AND ADDRESSING COST ALLOCATION AND RECOVERY

(Issued and Effective May 20, 2013)

BY THE COMMISSION:

BACKGROUND

On March 14, 2012, NRG Energy, Inc. and Dunkirk Power LLC (collectively, NRG) filed a notice, pursuant to the Commission's Order Adopting Notice Requirements for Generation Unit Retirements (Retirement Order),[1] which stated that NRG intended to "mothball" its Dunkirk generating station by September 10, 2012.[2] Niagara Mohawk Power Corporation d/b/a

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[1] Case 05-E-0889, Policies and Procedures Regarding Generating Unit Retirements, Order Adopting Notice Requirements for Generation Unit Retirements (issued December 20, 2005).

[2] The term "mothball" is synonymous with a "retirement" for purposes of providing notice under the Retirement Order, given that each action may result in adverse reliability impacts. However, as discussed below, "mothballing," in comparison to "retirement" may have unique implications for establishing appropriate levels of compensation.

National Grid (National Grid) advised Department of Public Service Staff (DPS Staff) that the proposed mothballing would have adverse impacts on transmission system reliability in western New York.[3] National Grid's analysis concluded that two generating units were needed at the Dunkirk station for an interim period until certain transmission system reinforcement projects could be completed in May 2013. National Grid further indicated that at least one generating unit at the Dunkirk station might be required beyond May 2013 until permanent solutions could be implemented in June 2015.

On July 18, 2012, the Commission issued a notice directing National Grid and NRG to file proposed terms for an agreement that would ensure adequate generation support services were being procured to meet reliability needs. On July 20, 2012, National Grid and NRG submitted a proposed Term Sheet Agreement, which provided for reliability support services (RSS) from September 1, 2012, through May 31, 2013 (2012 RSS Agreement). Pursuant to the 2012 RSS Agreement, NRG committed to defer mothballing actions on two 115 kV generating units and to keep them available during the nine month term of the agreement in exchange for a monthly fixed-price charge, tax related payments and other provisions. On August 16, 2012, the Commission approved the Term Sheet Agreement, and directed National Grid and NRG to file a final executed contract implementing the Term Sheet Agreement.[4] The Commission also directed that cost

[3] Letter from C.E. Root, National Grid Sr. V.P., Network Strategy to T.G. Dvorsky, DPS Director, Office of Electric, Gas and Water, dated March 30, 2012.

[4] Case 12-E-0136, Petition of Dunkirk Power LLC and NRG Energy, Inc. for Waiver of Generator Retirement Requirements, Order Deciding Reliability Need Issues and Addressing Cost Allocation and Recovery (issued August 16, 2012) (August 16 Order).

recovery matters should be addressed in National Grid's rate proceeding in Case 12-E-0201.[5]

In the August 16 Order, the Commission also directed National Grid to work with DPS Staff to develop a schedule and process for soliciting alternative solutions to any remaining reliability needs that may exist after May 31, 2013.[6] On September 17, 2012, National Grid filed a schedule for soliciting alternative RSS to address the remaining reliability needs beyond May 31, 2013, until system reinforcement projects can be completed in June 2015. In accordance with the schedule, National Grid issued a request for proposal (RFP) on October 24, 2012, seeking proposals from various sectors, including merchant and portable generation, energy storage, demand response, and energy efficiency. The RFP was published to over 40 potential bidders.

National Grid held a pre-bid conference on November 14, 2013, which was attended by participants from each sector, as well as by the Pace Energy Center and DPS Staff. The pre-bid conference provided bidders an opportunity to discuss the technical requirements of the work scope, including questions on air permitting, site ownership, interconnection, and cost structures.

Three responses to the RFP were received on December 14, 2013. National Grid conducted a review and analysis of the responses and determined that one proposal should not be

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[5] On August 27, 2012, National Grid filed a copy of the executed 2012 RSS Agreement between NRG and National Grid.

[6] National Grid concluded from its reliability studies that, lacking other alternatives, a single Dunkirk 115 kV unit would be needed from June 1, 2013, until June 1, 2015, when a new substation and associated transmission projects would be completed.

considered because it did not meet the technical criteria necessary for ensuring reliability. National Grid compared the remaining two proposals and identified NRG's proposal as its preferred solution following extensive review and negotiations.

On March 5, 2013, National Grid submitted a proposed RSS Agreement that sets forth the terms under which National Grid would procure RSS from NRG's Dunkirk generating station from May 31, 2013, to June 1, 2015, in order to maintain transmission system reliability in western New York (2013 RSS Agreement). National Grid proposed that the costs associated with the 2013 RSS Agreement should be recovered consistent with the terms of the Joint Proposal filed in Case 12-E-0201.[7]

In conformance with the State Administrative Procedure Act (SAPA) §202(1), notice of the proposed 2013 RSS Agreement was published in the State Register on March 20, 2013. The SAPA §202(1)(a) period for submitting comments in response to the notice expired on May 6, 2013. One comment was received by that date.

THE PETITION

National Grid provided its rationale for why NRG's Dunkirk generating station was its preferred solution among the two remaining bids after eliminating the other bid that would not address the reliability needs. First, it asserts that NRG is able to implement RSS on June 1, 2013. Absent implementation of a solution on June 1, 2013, an extension of the 2012 RSS Agreement would be required, thereby increasing costs. Under the 2012 RSS Agreement, the maximum extension possible would be

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[7] Case 12-E-0201, Niagara Mohawk Power Corporation d/b/a National Grid – Electric and Gas Rates, Order Approving Electric and Gas Rate Plans In Accord With Joint Proposal (issued March 15, 2013).

to September 1, 2013. National Grid concluded that the other proposal presented significant implementation risks which may have delayed support services from being available until September 1, 2013, or later.

Second, it found that NRG's proposal provided a lower overall cost compared to the other proposal, which included certain variable expenses and exposure to delay-related costs. Such factors had the potential to raise the costs of that option. Ultimately, National Grid determined that obtaining An RSS agreement from NRG was the lower cost and lower risk solution. Moreover, National Grid notes that NRG is currently providing RSS and could continue to do so without interruption or local community disruption.

2013 RSS Agreement

The 2013 RSS Agreement provides for NRG to defer mothballing actions on one of its 115 kV-connected 80 MW generating units and to operate and maintain that unit during the term of the contract from June 1, 2013 through May 31, 2015. The 2013 RSS Agreement includes a Fixed-Cost Charge of approximately $2.1 million/month or $51.0 million for the 24 month period. The agreement also provided for the following adjustments: (a) property tax costs of up to $13 million to be paid by National Grid for the 24 month period; (b) a Capacity Revenue True-Up to be paid by NRG to National Grid in the amount of capacity revenues earned by the RSS Units during the Term of the Agreement; and (c) a Take or Pay Coal Contract True-Up to be paid by National Grid based upon actual coal deliveries to the plant. The contractual agreement would address planned and forced outages, additional expenditures that may be incurred to continue providing safe and reliable service, force majeure events and National Grid's right to audit NRG's accounts and records relating to the contract.

Cost Recovery

The Joint Proposal in the recently approved National Grid rate case addresses recovery of these costs. Specifically, Section 12.1.1 of the Joint Proposal provides in part:

> Up to $57[] million of electric deferred credits will be used to offset Reliability Support Services ("RSS") costs associated with RSS agreements relating to the Dunkirk plant or other RSS agreements with other generators.

Section 12.1.2 provides:

> Any RSS costs to be recovered through retail delivery rates must be approved by the Commission. Any RSS costs (above $57[] million) relating to the Dunkirk plant or any other RSS agreements with other generators will be recovered through a generic RSS surcharge that will be implemented on April 1, 2013. Unless and until [National Grid] incurs $57[] million of RSS costs, the generic RSS surcharge will be set at $0. To qualify for recovery through this surcharge, the RSS agreements must be approved or authorized by the authority having jurisdiction over the agreement, including but not limited to the Commission or other regulatory entity.

Accordingly, the 2012 RSS Agreement costs and a portion of the costs associated with the 2013 RSS Agreement would be offset by deferral credits up to $57.0 million. Amounts incurred in excess of $57.0 million under the 2013 RSS Agreement would be recovered through the generic RSS surcharge.

DISCUSSION

2013 RSS Agreement

National Grid has carefully evaluated the available alternatives and identified NRG's proposal as the most cost-effective and reliable support services available beginning June 1, 2013, until planned system reinforcement projects can be implemented. The proposed 2013 RSS Agreement between NRG and National Grid for the provision of RSS on an interim basis is proposed for the purpose of ensuring the maintenance of adequate generation resources necessary for safe, adequate, and reliable service.

In reviewing whether the costs incurred under the 2012 RSS Agreement are just and reasonable, we find that the 2013 Agreement adheres to the economic rationale we adopted in our August 16 Order. Furthermore, the 2013 Agreement was the culmination of a competitive bidding process. Accordingly, we approve the 2013 RSS Agreement as in the public interest. This addresses the concerns with the economic impacts of closing NRG's Dunkirk generating station, which were raised in the public comments filed by Page Woodbury on May 6, 2013.

Cost Recovery

Upon consideration, we concur that cost recovery for the 2013 RSS Agreement should proceed according to the applicable provisions approved as part of the Joint Proposal in Case 12-E-0201.[8] National Grid is expected, however, to include in its transmission revenue requirement filing, due to FERC in June 2013, the costs associated with the 2012 and 2013 RSS Agreements, as allocated between retail and wholesale customers. The wholesale customers' share of the costs, expected to be recovered through the FERC Transmission Service Charge, would be credited to retail customers through National Grid's Transmission Revenue Adjustment mechanism.

CONCLUSION

As we have noted previously, it is essential that the mothballing or retirement of generation units that are subject

[8] Case 12-E-0201, Niagara Mohawk Power Corporation d/b/a National Grid – Electric and Gas Rates, Order Approving Electric and Gas Rate Plans In Accord With Joint Proposal (issued March 15, 2013).

to a lightened regulatory regime do not jeopardize the reliability of the electric system. We have taken the necessary steps herein to ensure the procurement of sufficient generation facilities necessary for the provision of safe and adequate service, as required under the Public Service Law. The 2013 RSS Agreement governing the procurement of RSS from NRG represents a reasonable balance of the interests of electric consumers and the generation owner, and is in the public interest.

The Commission orders:

1. National Grid shall procure Reliability Support Services from Dunkirk Power LLC, and Dunkirk Power LLC shall provide Reliability Support Services to National Grid in accordance with the proposed 2013 Reliability Support Services Agreement, which is approved.

2. National Grid and NRG Power Marketing LLC shall file a final executed copy of the contract implementing the 2013 Reliability Support Services Agreement at least five days prior to the commencement of Reliability Support Services thereunder.

3. National Grid shall recover the costs of the 2013 Agreement in accordance with the provisions of the applicable terms of the Joint Proposal approved in Case 12-E-0201 on March 15, 2013, and as discussed in the body of this order.

4. The deadline provided for in this order may be extended as the Secretary may require.

5. This proceeding is continued.

By the Commission,

(SIGNED) JEFFREY C. COHEN
Acting Secretary

Exhibit No.____ (NMP-16)

Estimated Impact of
RSS Transmission Support Payments on
Historical Revenue Requirement

EXHIBIT NMP-16

Estimated Impact of RSS Transmission Support Payments on Historical Revenue Requirement

	Estimated Transmission Support Payments under Dunkirk Contracts	Impact on Historical Revenue Requirement and True Up	Total Annual Billing Units (BU) MWh	Rate $/MWh	Wholesale TSC Rate Billing Units	Amount Forecasted to be Billed in TSC Rates
Calendar Year 2012 Payments, Billed Transmission rates July 1 2013 - June 30 2014	13,477,625	13,921,516	37,110,982	0.37513	3,043,504	1,141,716
Calendar Year 2013 Payments, Billed Transmission rates July 1 2014 - June 30 2015	36,798,106	37,994,153	37,110,982	1.02380	3,043,504	3,115,934
Calendar Year 2014 Payments, Billed through Wholesale rates July 1, 2015 - June 30, 2016	34,844,083	35,977,053	37,110,982	0.96944	3,043,504	2,950,510
Calendar Year 2015 Payments, Billed through Wholesale rates July 1, 2016 - June 30, 2017	17,697,583	18,277,626	37,110,982	0.49251	3,043,504	1,498,964
Calendar Year 2016 Payments, Billed through Wholesale rates July 1, 2017 - June 30, 2018	1,240,041	1,289,431	37,110,982	0.03475	3,043,504	105,747

Exhibit No.____ (NMP-17)

Estimate of Payments
to be Made by National Grid
Under Dunkirk RSS Agreements

EXHIBIT NMP-17

Estimate of Payments to be Made by National Grid Under Dunkirk RSS Agreements

Month	total	Op Expense	Property Tax	Take or Pay	Rebate
Sep-12	$ 2,924,324.00	$ 2,924,324.00	$ -	$ -	$ -
Oct-12	$ 2,924,324.00	$ 2,924,324.00	$ -	$ -	$ -
Nov-12	$ 2,924,324.00	$ 2,924,324.00	$ -	$ -	$ -
Dec-12	$ 4,704,653.00	$ 2,924,324.00		$ 1,780,329.00	$ -
Sub Total Payments	$ 13,477,625.00	$ 11,697,296.00	$ -	$ 1,780,329.00	$ -
Jan-13	$ 2,924,324.00	$ 2,924,324.00	$ -		
Feb-13	$ 9,605,408.00	$ 2,924,324.00	$ 6,681,084.00		
Mar-13	$ 2,924,324.00	$ 2,924,324.00			
Apr-13	$ 2,924,324.00	$ 2,924,324.00			
May-13	$ 2,924,324.00	$ 2,924,324.00			
Sub Total Payments	$ 21,302,704.00	$ 14,621,620.00	$ 6,681,084.00	$ -	$ -
Jun-13	$ 573,754.91	$ 2,076,076.00	$ -	$ 1,809,948.91	$ (3,312,270.00)
Jul-13	$ 2,076,076.00	$ 2,076,076.00	$ -	$ -	$ -
Aug-13	$ 2,076,076.00	$ 2,076,076.00	$ -	$ -	$ -
Sep-13	$ 2,076,076.00	$ 2,076,076.00	$ -	$ -	$ -
Oct-13	$ 2,076,076.00	$ 2,076,076.00	$ -	$ -	$ -
Nov-13	$ 2,076,076.00	$ 2,076,076.00	$ -	$ -	$ -
Dec-13	$ 4,541,267.00	$ 2,076,076.00	$ 2,465,191.00	$ -	$ -
Sub Total Payments	$ 15,495,401.91	$ 14,532,532.00	$ 2,465,191.00	$ 1,809,948.91	$ (3,312,270.00)
Jan-14	$ 4,650,758.00	$ 2,185,567.00	$ 2,465,191.00	$ -	$ -
Feb-14	$ 5,870,996.00	$ 2,185,567.00	$ -	$ 3,685,429.00	$ -
Mar-14	$ 2,185,567.00	$ 2,185,567.00	$ -	$ -	$ -
Apr-14	$ 2,185,567.00	$ 2,185,567.00	$ -	$ -	$ -
May-14	$ 2,185,567.00	$ 2,185,567.00	$ -	$ -	$ -
Jun-14	$ 2,185,567.00	$ 2,185,567.00	$ -	$ -	$ -
Jul-14	$ 1,204,999.00	$ 2,185,567.00	$ -	$0	(980,568.00)
Aug-14	$ 2,185,567.00	$ 2,185,567.00	$ -	$ -	$ -
Sep-14	$ 2,185,567.00	$ 2,185,567.00	$ -	$ -	$ -
Oct-14	$ 2,185,567.00	$ 2,185,567.00	$ -	$ -	$ -
Nov-14	$ 2,185,567.00	$ 2,185,567.00	$ -	$ -	$ -
Dec-14	$ 5,632,794.00	$ 2,185,567.00	$ 3,447,227.00	$ -	$ -
Sub Total Payments	$ 34,844,083.00	$ 26,226,804.00	$ 5,912,418.00	$ 3,685,429.00	$ (980,568.00)
Jan-15	$ 5,486,793.00	$ 2,039,566.00	$ 3,447,227.00	$ -	$ -
Feb-15	$ 7,072,660.00	$ 2,039,566.00	$ -	$ 5,033,094.00	$ -
Mar-15	$ 2,039,566.00	$ 2,039,566.00	$ -	$ -	$ -
Apr-15	$ 2,039,566.00	$ 2,039,566.00	$ -	$ -	$ -
May-15	$ 2,039,566.00	$ 2,039,566.00	$ -	$ -	$ -
Jun-15	$ (980,568.00)	$ -	$ -	$ -	$ (980,568.00)
Sub Total Payments	$ 17,697,583.00	$ 10,197,830.00	$ 3,447,227.00	$ 5,033,094.00	$ (980,568.00)
Jan-16	$ 620,020.50	$ -	$ 620,020.50	$ -	$ -
Feb-16	$ 620,020.50	$ -	$ 620,020.50	$ -	$ -
Sub Total Payments	$ 1,240,041.00	$ -	$ 1,240,041.00	$ -	$ -

NOTE - Data through September 2013 represents actuals. All other figures are estimates.