NEW YORK INDEPENDENT SYSTEM OPERATOR
10 Krey Boulevard ♦ Rensselaer, NY 12144

By Electronic Delivery to secretary@dps.ny.gov

October 25, 2013

Hon. Kathleen S. Burgess
Secretary to the Commission
New York State Public Service Commission
Agency Building 3
Albany, NY 12223-1350

Subject: Submission for Filing, 12-E-0577
Proceeding on the Motion of the Commission to Examine Repowering Alternatives to Utility Transmission Reinforcements

Dear Ms. Burgess:

Attached for filing in the above-listed matter are two documents containing analysis performed by the New York Independent System Operator at the direction of New York DPS staff.

Should you have any questions, please contact me by phone at (518) 356-7537 or by email at csharp@nyiso.com.

Very truly yours,
/s/ Christopher R. Sharp
Christopher R. Sharp
Compliance Attorney

October 25, 2013

Dunkirk Repowering Production Cost Analyses Performed by the NYISO As Requested by NYS DPS[1]

Introduction

This memo summarizes the results of analyses—both near-term and mid- to long-term—performed by the NYISO in response to specific requests made by the NYS DPS to analyze the impacts of generator additions and transmission upgrades to relieve 230 kV congestion in Zone A on NYCA production costs and related-metrics.

<u>Near Term Analysis</u>

The DPS requested that the NYISO perform a series of production cost analyses for 2014 to identify potential constraints on the delivery of Niagara output or IESO imports to the NYCA system and how the availability of existing Dunkirk units might impact those constraints.

The NYISO ran the following cases for 2014:

- Dunkirk 2, in-service modeled as must run at minimum output
- Dunkirk 1 and 2, in-service modeled as must run at minimum output
- Dunkirk 1,2 and 4, in-service modeled as must run at minimum output
- Dunkirk 1,2,3 and 4, in-service modeled as must run at minimum output

<u>Mid to Long-Term Analysis</u>

The DPS requested that the NYISO conduct production cost analyses for 2019 and 2022, evaluating specific scenarios and certain sensitivities related to the repowering of the Dunkirk units and alternative transmission reinforcements.

As directed by DPS, the NYISO ran four separate scenarios for 2019 and 2022, as follows:

- No Dunkirk generation, local transmission upgrades in-service
- No Dunkirk generation, local transmission upgrades in-service, 230 kV constraints relaxed
- 100 MW of peakers at Dunkirk 230 kV (no local transmission upgrades)
- Dunkirk combined cycle (479 MW) proposal (no local transmission upgrades)

The DPS requested that the 2022 scenarios be analyzed with and without the Huntley units in-service.

[1] Modeling assumptions and case scenarios were provided by DPS

October 25, 2013

Production Cost Models

The NYISO performed these production cost analyses using the GE-MAPS production cost simulation tool. The base case assumptions were those contained in the 2013 CARIS 1 database. The production cost simulation utilizes a four-pool model (NYISO, IESO, ISO-NE and PJM) with joint-commitment and dispatch across the pools with hurdle rates applied to determine inter-control area flows. Niagara is modeled as a fixed dispatch unit, based on a five year history of actual production.

October 25, 2013

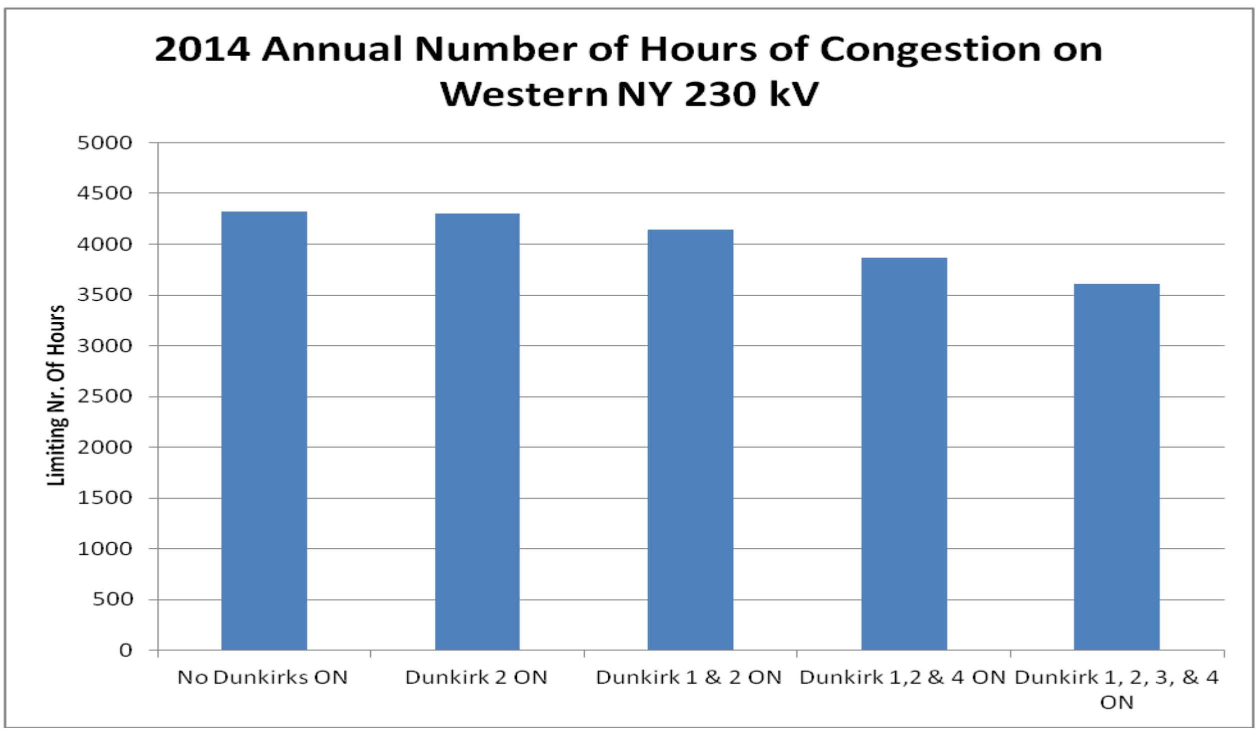
Near-Term Analysis Results

The modeling of Niagara as a fixed dispatch unit precludes a direct analysis of constraints on Niagara deliveries. The model will not constrain the Niagara output, but it does allow IESO imports to be constrained.

However, recognizing these limitations, the questions posed can be addressed indirectly through an analysis of (1) the quantity of hours in which the key western contingencies are limiting and (2) the aggregate energy being delivered by Niagara and IESO imports (over the Niagara ties) into the NYCA.

The chart below depicts the number of hours in 2014 for which any constraints occur on at least one of the key western 230 kV lines.[2] It shows that must-running Dunkirk 2 alone at minimum output does not materially impact the number of limiting hours. As additional units are incrementally committed at must-run, the number of limiting hours does decrease at varied rates[3]:

- Must-running Dunkirk 1 and 2 reduces the number of limiting hours by 166 hours
- Must-running Dunkirk 1, 2, and 4 reduces the number of limiting hours by 276 hours
- Must-running Dunkirk 1, 2, 3 and 4 reduces the number of limiting hours by 259 hours



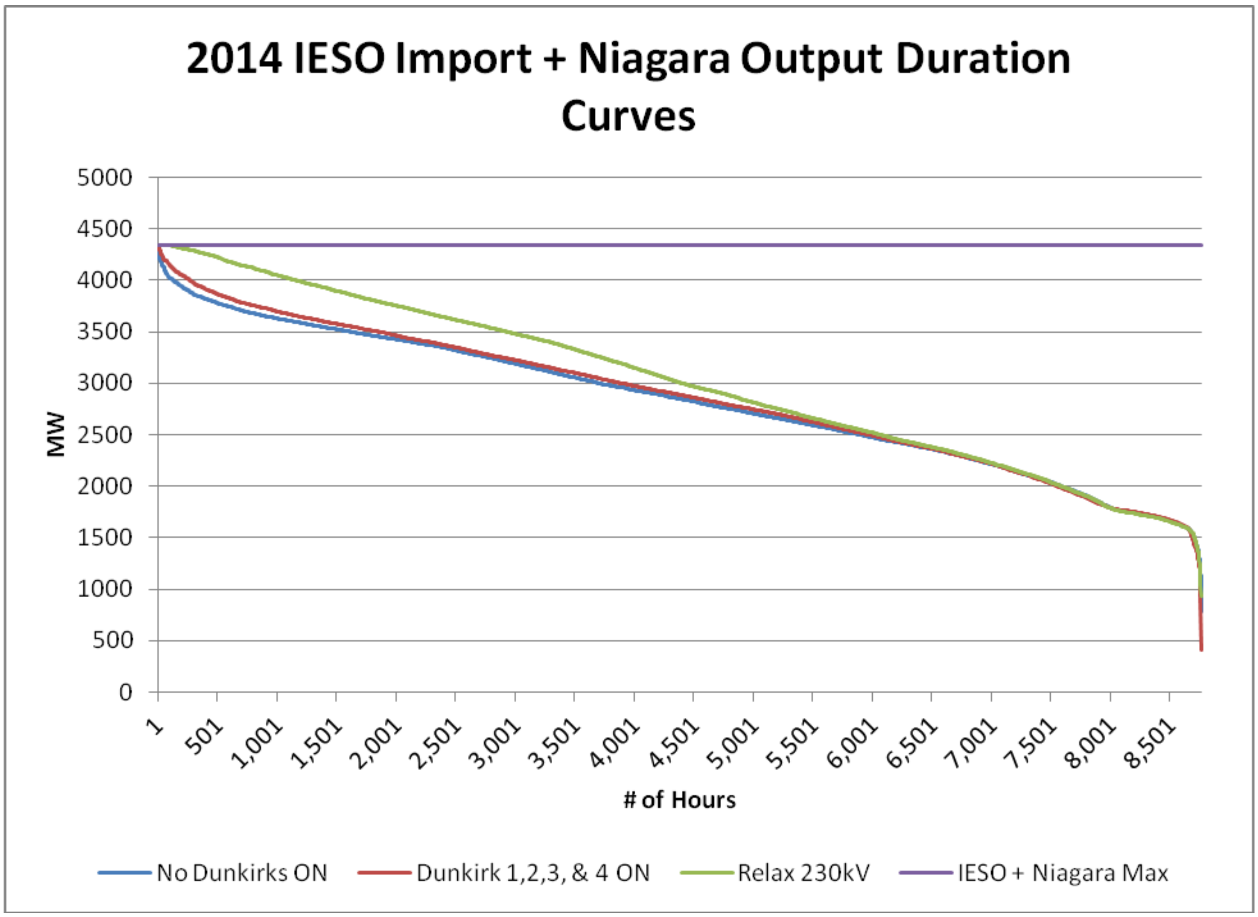
---

[2] The 230kV lines include Huntley-Packard, Beck-Niagara and Huntley-Sawyer.

[3] NYCA production costs increase between $3 Million and $10 Million annually as additional Dunkirk units are manually committed ("must run") for each scenario.

October 25, 2013

The NYISO has also developed the following duration chart that compares the aggregate of the Niagara output and IESO imports (over the Niagara ties) to the nominal maximum value of approximately 4,300 MW for the Base Case, and the case in which all four Dunkirk units are committed as must-run. As a point of reference, the chart also includes a duration curve for a 2014 case with the western 230 kV constraints relaxed. This chart shows (1) that the running of four Dunkirk units would increase the aggregate Niagara/IESO "output" to some degree (approximately 300 GWh annually) and (2) that the relaxation of constraints on the 230 kW would have a greater impact (approximately 1,500 GWh). Note that, while not reflected in the duration curve chart below, any differences in the duration curve between the Base Case and the case solely with Dunkirk 2 as must-run are immaterial.

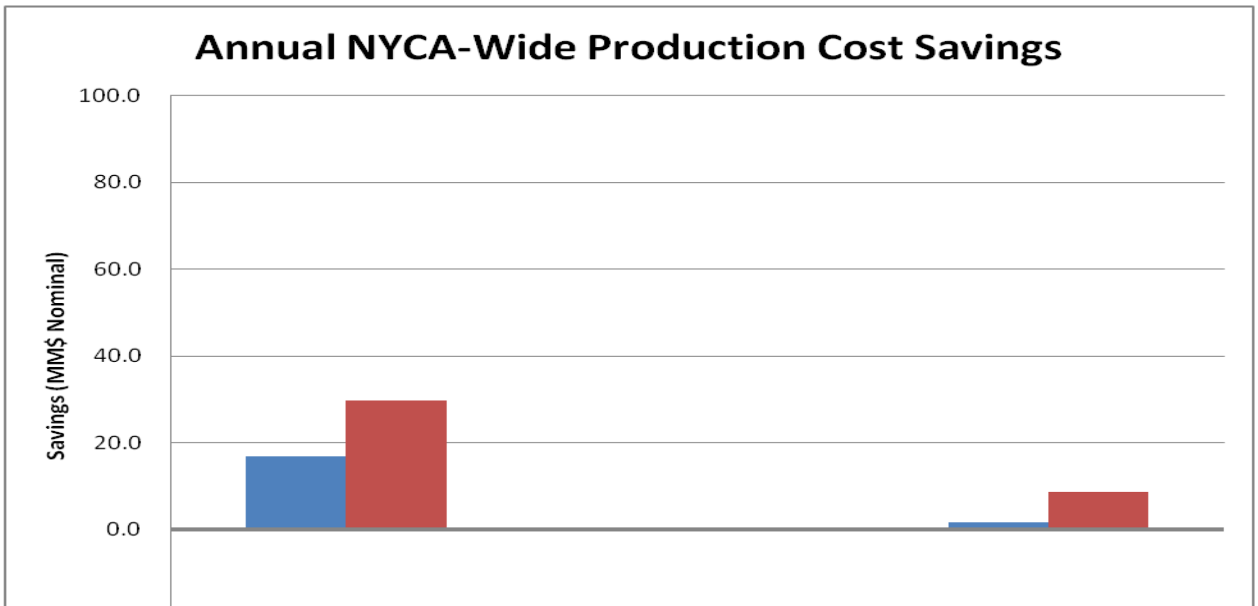


October 25, 2013

Mid- and Long-Term Analysis Results

These charts summarize the changes in NYCA production costs and LBMP payments in 2019 and 2022 between the Base Case (i.e., no Dunkirk generation, local transmission upgrades in-service, and the Huntley units in-service) and the three alternative scenarios. The NYISO also performed a sensitivity analysis for 2019 and 2022 with the Huntley units out-of-service.

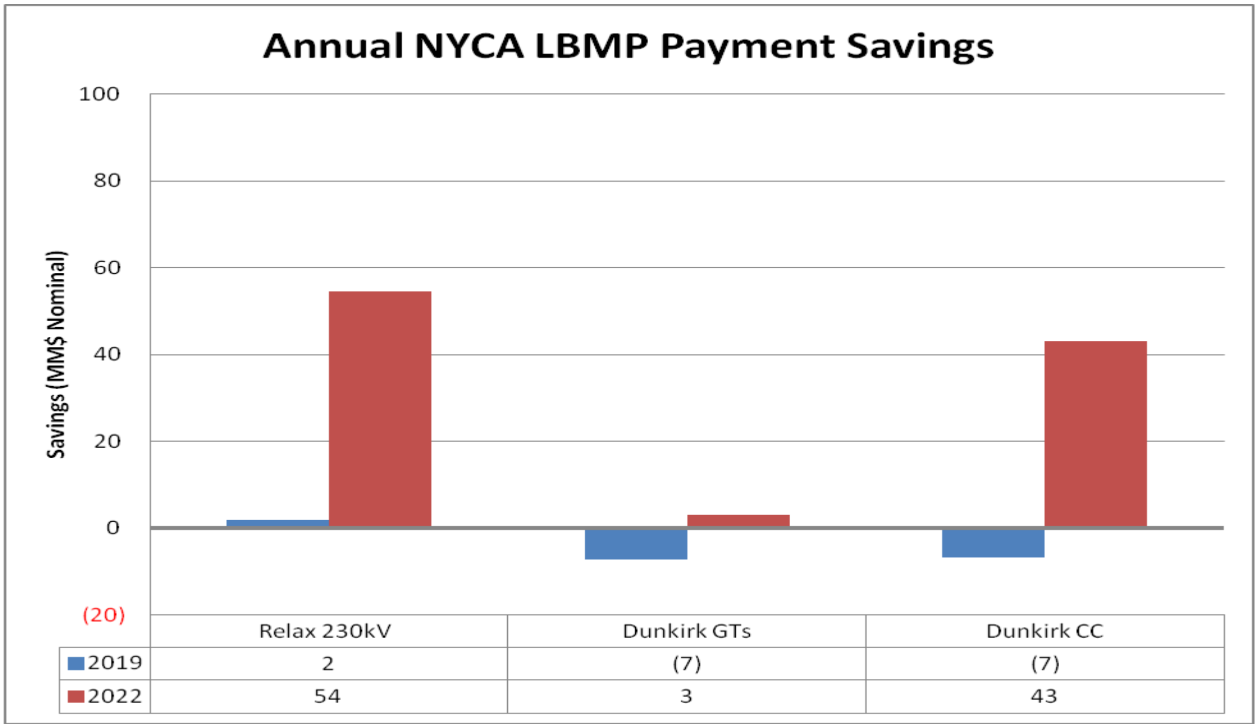
The following chart presents the NYCA-wide production cost savings for 2019 and 2022 between the Base Case and each of the scenarios. This represents the overall change in the cost to serve the NYCA load. It should be noted that a major assumption influencing these results is the imposition of a national CO_2 program in 2020 that would increase the emission costs of thermal units.



	Relax 230kV	Dunkirk GTs	Dunkirk CC
2019	17.0	0.2	1.6
2022	29.8	(0.2)	8.6

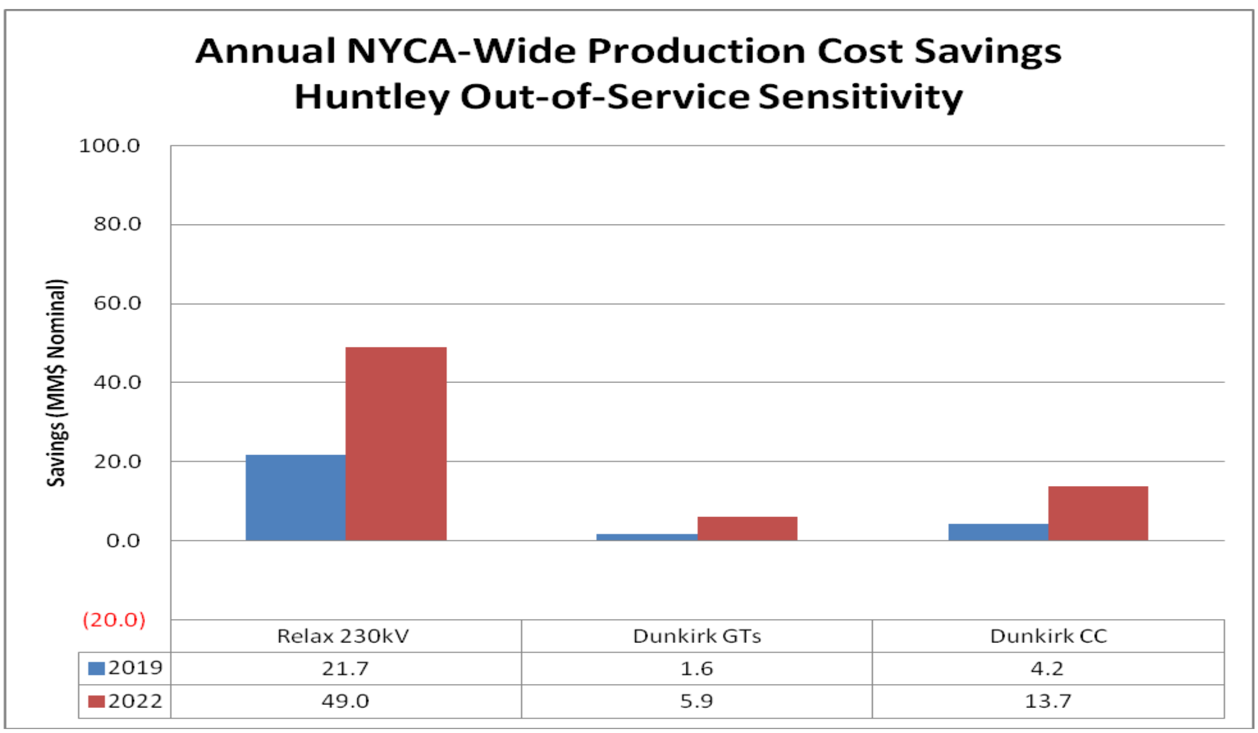
October 25, 2013

The following chart presents reduction in NYCA LBMP payments (or savings) for 2019 and 2022 between the Base Case and each of the scenarios. This represents the overall change in the costs paid by NYCA loads.



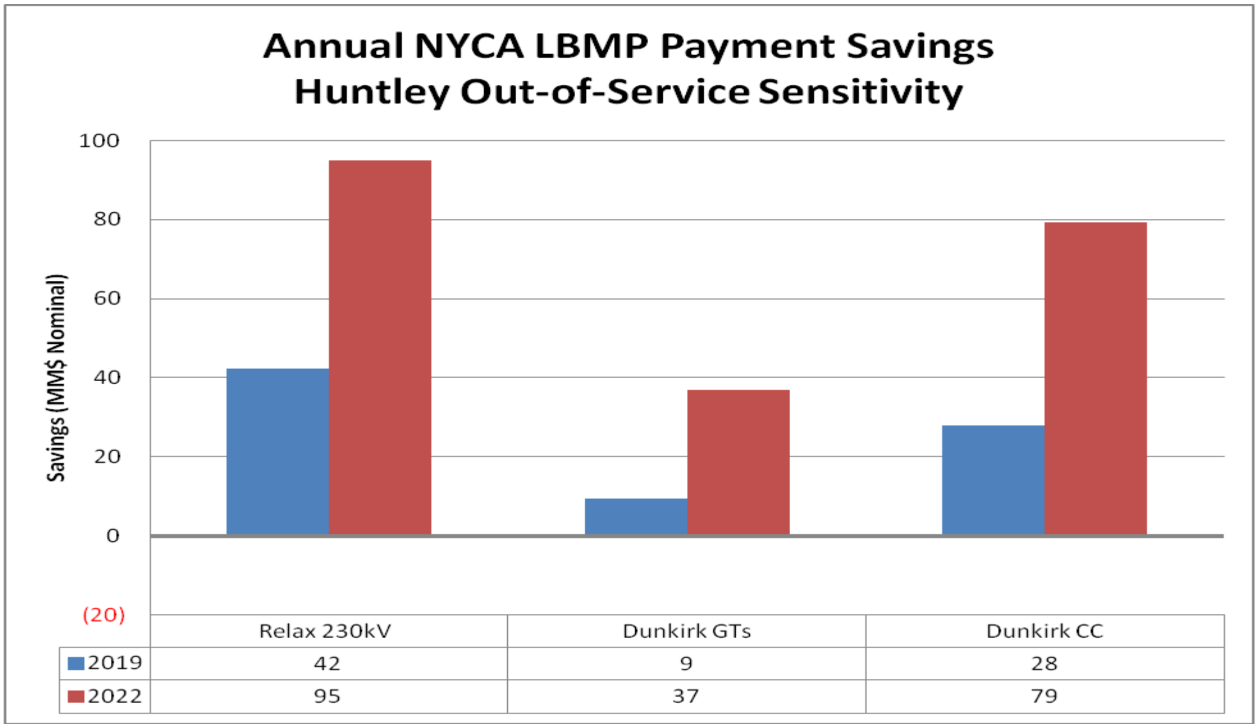
	Relax 230kV	Dunkirk GTs	Dunkirk CC
2019	2	(7)	(7)
2022	54	3	43

The following chart depicts changes in NYCA production costs with Huntley out-of-service for each of the modeled scenarios in years 2019 and 2022.



	Relax 230kV	Dunkirk GTs	Dunkirk CC
2019	21.7	1.6	4.2
2022	49.0	5.9	13.7

The following chart depicts changes in NYCA load payments with Huntley out-of-service for each of the modeled scenarios in years 2019 and 2022.



Summary

The results of the production cost simulations indicate that transmission upgrades in Zone A, as reflected by relaxed Western NY 230 kV transmission constraints, would, to varying degrees, generate lower NYCA production costs than the alternative installation of gas turbines or a single combined-cycle unit at Dunkirk. This result is consistent between 2019 and 2022, and between cases run with the Huntley units in-service and out-of-service. For example, for 2019, with Huntley in-service, the 230 kV relaxation case yielded $17M in production costs savings whereas the combined-cycle case yielded $1.6M and the gas turbine yielded $200K. For year 2019, with Huntley out-of-service, the production cost savings increased for the 230 kV relaxation and combined cycle cases to $21.7M and $4.2M, respectively; and the gas turbine yielded $1.6M.

The impact on LBMP load payments is more varied, dependent upon model assumptions. For 2019, the changes were relatively small, with slight decreases in load payments associated with the transmission upgrades and small increases associated with the generation alternatives. For 2022, the savings for load payments were significantly higher for both the 230 kV relaxation and combined cycle cases, and somewhat higher for the gas turbine case. When the Huntley units are removed from service, each alternative experiences a greater decrease in LBMP payments compared to when the units are in-service.

October 25, 2013

Dunkirk Repowering Power Flow Analysis Prepared by the NYISO As Requested by NYS DPS [1]

Objective Provided by DPS

Determine megawatts of generation needed at Dunkirk to mitigate 230 kV overloads with Niagara and Lewiston dispatched at full output (2,681 MW) and Ontario import of 1,500 MW with Huntley dispatch optimized.

Study Assumptions for All Cases Provided by DPS:

- Developed the results using the 2018 Area Transmission Review (ATR) 50-50 case. The forecasted Zone A load level in 2023 is only 25 MW higher than 2018, therefore there would be no significant difference in results.
- Niagara & Lewiston are set at Pmax and generation is reduced at Oswego 5 & 6 first and then Zone F as necessary for Ontario imports.
- The contingencies run were only on the Bulk Power Transmission Facilities (BPTF).
- The monitored facilities were only on the BPTF consistent.

Case 1:

- Ontario import at 1500 MW
- Allowed Dunkirk and Huntley to adjust to optimum values to relieve overloads
- Zones F – K generation is allowed to re-dispatch

Case 1 Result:

There are several transmission elements for Case 1 above 100% LTE, excluding elements to which New York State Reliability Council Rule Exception No. 13 applies. Some of these transmission elements that are above 100% LTE are used in the transfer of power out of Zone A and therefore, adding additional generation in Zone A, including at Dunkirk, will not relieve the Zone A transmission constraints.

[1] Modeling assumptions and case scenarios were provided by DPS

Case 2:

- Ontario import at 1200 MW
- Allowed Dunkirk and Huntley to adjust to optimum values to relieve overloads
- Zones F – K generation is allowed to re-dispatch

Case 2 Result:

Generator	Initial MW	Resulting MW	MW Change
Dunkirk	0	727	727
Huntley	314	236	-78

There are no transmission paths in Case 2 that are overloaded beyond the limit permitted per New York State Reliability Council Rule Exception No. 13. Dunkirk and Huntley generation dispatch is optimized to manage limitations on various Western 230 kV lines.

Case 3:

- Ontario Import at 1000 MW
- Allowed Dunkirk and Huntley to adjust to optimum values to relieve overloads
- Zones F - K generation is allowed to re-dispatch

Case 3 Result:

Generator	Initial MW	Resulting MW	MW Change
Dunkirk	0	614	614
Huntley	314	297	-17

There are no transmission paths in Case 3 that are overloaded.

Case 4:

- Dunkirk dispatched at 479 MW (based on NRG proposed combined cycle option)
- Huntley dispatched at 0 MW

Case 4 Result:

The Ontario transfer limit with Huntley at 0 MW is approximately 225 MW. For this transfer analysis, limits are calculated consistent with Reliability Rules Exception Reference No. 13.

Additional Cases Considered:

The Dunkirk repowering analysis was also considered with a 2018 ATR 90-10 case using the same assumptions used in Cases 1 through 3. Due to the higher load, no Dunkirk generation dispatch was achieved that relieved the Zone A 230 kV transmission constraints.

Conclusion

Optimizing the Dunkirk generation in Case 1 and Case 2 did not relieve the 230 kV overloads in Zone A. In Case 3, an optimal generation dispatch at Dunkirk of 614 MW is found that eliminates the Zone A 230 kV overloads at a reduced Ontario import of 1000 MW.

When assuming that Huntley is unavailable and assuming that the largest of the Dunkirk repowering options (combined cycle, 479 MW) is in-service, the Ontario import limit drops significantly to 225 MW when maintaining full output of the Niagara facilities. Analysis of local reliability was not performed for this case; additional resources (generation or transmission) may be necessary to meet reliability criteria.