AC Transmission Public Policy Transmission Planning Report

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ESPWG/TPAS
June 1, 2018, KCC

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Review Process

- March 30, 2018: posted draft SECO report and preliminary evaluation results
- April 5, 2018: ESPWG/TPAS, summary of the review schedule
- April 6, 2018: reviewed results with all developers in the same meeting
- April 19, 2018: reviewed results with all developers in the same meeting
- April 30, 2018: ESPWG/TPAS
- May 10, 2018: ESPWG/TPAS
- May 22, 2018: ESPWG/TPAS
- June 1, 2018: ESPWG/TPAS
- June 20, 2018: Business Issue Committee (advisory vote)
- June 21, 2018: Operating Committee (for information, not required by Tariff)
- June 26, 2018: Special Management Committee (advisory vote)
- July 2018: draft report delivered to NYISO Board

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Agenda

- Ranking
- Selection Recommendation
- Next Steps

Ranking

Ranking Process

- **Inputs included for consideration**
  - Total performance of each project
  - Risks associated with each project
  - Feedback from developers, stakeholders, and DPS
- **Two-step ranking**
  - Step 1: Tiered ranking
  - Step 2: Individual Ranking

Ranking Process (continued)

- **Step 1: Tiered Ranking**
  - Individual projects in each segment were analyzed and compared
  - Major performance and risk differences were identified as distinguishing factors
  - Projects were divided into three tiers for each segment

- **Step 2: Individual Ranking**
  - Combinations of Segment A and Segment B projects were compared considering all the evaluation metrics
  - Synergies between projects were considered
    - Cost savings for Segment A and Segment B projects proposed by the same developers
    - Improved system efficiency or cost effectiveness due to combined electrical characteristics regardless of whether the projects are proposed by the same developers or not
  - The combination results were then used to inform the numerical ranking for each Segment

Tiered Ranking: Segment A

Project ID	Independent Cost Estimate: 2018 $M	Independent Duration Estimate: Months	Incremental Central East Voltage Transfer Limit	Operability	Propriety Rights	Expandability	PSC Criterion: Replacement of Aging Infrastructure	Risks			Tiered Ranking
								Overall Visual Impact	Easement Needed to Mitigate EMF (acres)	Other Risks Including Siting	
T018	520	52	Low	Breaker-and-a-half 345 kV Rotterdam substation, foundations and structures beyond NESC standard, low N-1-1 performance	-	-	-	Medium structure height increase	24	-	2
T021	498	52	Low	Breaker-and-a-half 345 kV Princetown substation, low N-1-1 performance	Non-utility property needed for Princetown substation, but with an option to purchase	Property available to expand the Princetown substation	No upgrades at Rotterdam substation	High structure height increase, more structures, less impact to agriculture due to monopoles	24	-	2
T025	861	54	Highest	Breaker-and-a-half 345 kV Rotterdam substation, ring-bus 345 kV Princetown substation, low N-1-1 performance	-	-	-	Low structure height increase	76	Potential mitigation for clearance and corona issues, hardware replacement for insulation, siting and permitting risks	3
T026	489	52	Lowest	Breaker-and-a-half 345 kV Rotterdam substation, low N-1-1 performance	-	-	-	Low structure height increase	24	-	3
T027	741	55	High	breaker-and-a-half 345 kV Rotterdam substation, breaker-and-a-half 345 kV Princetown substation, best N-1-1 performance	-	All projects allow one more 345 kV line to be added within existing ROW, but double-circuit design tends to maximize the Central East transfer capability	More replacement due to double-circuit design, rebuild of Edic - New Scotland 345 kV line #14 for 6.3 miles, terminal upgrades at Marcy and Edic 345 kV substations	High structure height increase, 6 miles of lattice tower removed, less impact to agriculture due to monopoles	0	-	1
T028	512	52	Low	breaker-and-a-half 345 kV Rotterdam substation, ring-bus 345 kV Princetown substation, low N-1-1 performance	-	-	-	Low structure height increase	24	-	2
T031	570	52	Low	Breaker-and-a-half Princetown substation looping in all 345 kV lines, straight-bus at Rotterdam substation, no bus reconfiguration at New Scotland, new tower contingency created south of Princetown, low N-1-1 performance	Non-utility property needed for Princetown substation	-	Rebuild of Edic - New Scotland 345 kV line #14 for 20 miles	Low structure height increase, more structures, more impact to agriculture, 20 miles of lattice tower removed	24	Property acquisition for Princetown substation	2

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Tiered Ranking: Segment B

Project ID	Independent Cost Estimate: 2018 $M	Independent Duration Estimate: Months	Incremental UPNY-SENY Thermal Transfer Limit	Operability	Propriety Rights	Expandability	PSC Criterion: Replacement of Aging Infrastructure	Risks		Tiered Ranking
								Overall Visual Impact	Other Risks Including Siting	
T019	445	49	Higher with series compensation, but similar to others if bypassed	Foundations and structures beyond NESC standard	-	-	Churchtown 115 kV substation rebuild, terminal upgrades at New Scotland and Roseton substations	Medium structure height increase	Risk of SSR due to 50% series compensation, voltage rise mitigation, relay coordination	3
T022	357	47	-		-	-	Less 115 kV upgrades between Churchtown and Pleasant Valley	Medium structure height increase	-	2
T023	390	49	-		-	-		High structure height increase	-	3
T029	387	49	-	Improved N-1-1 performance due to Middletown upgrades	-	-	Middletown upgrades, Churchtown 115 kV substation rebuild	Low structure height increase, reduced height for more than 50% of the structures	-	1
T030	406	49	-	Improved N-1-1 performance due to Middletown upgrades	-	-	Middletown upgrades, Churchtown 115 kV substation rebuild	Low structure height increase, reduced height for more than 50% of the structures	-	1
T032	502	51	-	-	-	Transformers could be added to connect the Knickerbocker 345kV and 115 kV switching stations	-	Low structure height increase, more structures, more impact to agriculture, two-pole configuration with triple circuits	Operation and maintenance complexity due to triple-circuit design	3

Summary of Combination Evaluation

1	2	3	4	5	6	7	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Project ID	Independent Cost Estimate: 2018 $M (1)	Independent Duration Estimate: Months (2)	UPNY-SENY Incremental Thermal Transfer Limit: MW (3)	Central East Incremental Voltage Transfer Limit: MW	UPNY-SENY Cost/MW: $M/MW (3)	Central East Cost/MW: $M/MW	Baseline Production Cost Savings: 2018 $M	Baseline Production Cost Savings /Capital Cost	CES Production Cost Savings: 2018 $M	CES Production Cost Savings /Capital Cost	System CO2 Emission Reduction: 1000 tons (4)	Performance: 20-Year Incremental Flow on UPNY-SENY + Central East: GWh (4)	Operability		Expandability		Property Rights		PSC Criterion: Aging Infrastructure		Tiered Ranking	
													Seg A	Seg B	Seg A	Seg B	Seg A	Seg B	Seg A	Seg B	Seg A	Seg B
T018+T022	858	52	1,519	425	0.22	1.22	236	0.27	830	0.97	4,686	86,987	Good	Good	Good	Good	Good	Good	Good	Fair	2	2
T018+T029	908	52	1,401	425	0.28	1.22	236	0.26	830	0.91	4,686	86,987	Good	Excellent	Good	Good	Good	Good	Good	Good	2	1
T018+T030	926	52	1,535	425	0.26	1.22	236	0.25	830	0.90	4,686	86,987	Good	Excellent	Good	Good	Good	Good	Good	Good	2	1
T021+T022	794	52	1,519	350	0.21	1.35	199	0.25	714	0.90	7,298	78,917	Good	Good	Good	Good	Good	Good	Good	Fair	2	2
T021+T029	885	52	1,401	350	0.28	1.42	196	0.22	707	0.80	8,235	77,865	Good	Excellent	Good	Good	Good	Good	Good	Good	2	1
T021+T030	904	52	1,535	350	0.26	1.42	196	0.22	707	0.78	8,235	77,865	Good	Excellent	Good	Good	Good	Good	Good	Good	2	1
T027+T022	1088	55	1,326	825	0.26	0.91	331	0.30	1129	1.04	9,429	133,565	Excellent	Good	Excellent	Good	Good	Good	Excellent	Fair	1	2
T027+T029	1080	55	1,326	825	0.28	0.86	331	0.31	1129	1.05	9,429	133,565	Excellent	Excellent	Excellent	Good	Good	Good	Excellent	Good	1	1
T027+T030	1098	55	1,470	825	0.26	0.86	337	0.31	1108	1.01	10,184	135,044	Excellent	Excellent	Excellent	Good	Good	Good	Excellent	Good	1	1
T028+T022	852	52	1,519	400	0.22	1.28	221	0.26	840	0.99	4,056	74,942	Good	Good	Good	Good	Good	Good	Good	Fair	2	2
T028+T029	856	52	1,427	400	0.26	1.22	221	0.26	840	0.98	4,056	74,942	Good	Excellent	Good	Good	Good	Good	Good	Good	2	1
T028+T030	874	52	1,569	325	0.25	1.50	205	0.23	704	0.81	5,901	68,551	Good	Excellent	Good	Good	Good	Good	Good	Good	2	1
T031+T022	908	52	1,519	400	0.22	1.43	206	0.23	570	0.63	8,814	73,429	Good	Good	Good	Good	Fair	Good	Excellent	Fair	2	2
T031+T029	957	52	1,427	400	0.27	1.43	206	0.22	570	0.60	8,814	73,429	Good	Excellent	Good	Good	Fair	Good	Excellent	Good	2	1
T031+T030	976	52	1,569	400	0.26	1.43	206	0.21	570	0.58	8,814	73,429	Good	Excellent	Good	Good	Fair	Good	Excellent	Good	2	1

Notes:

1. With 30% contingency rate, with 5% synergy if from same developers, and without cost for Rock Tavern and Shoemaker-Sugarloaf upgrades
2. Max of Segment A and Segment B
3. UPNY-SENY N-1 optimized thermal transfer
4. CES + Retirement w/o National CO2

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Critical Comparison for Segment A Projects

- **T027 consistently performs best regardless of which Segment B project is paired with it**
  - While T027 has the second highest cost among Segment A projects, the overall benefits provided by the double-circuit design warrant the cost. These benefits include a significant increase in Central East transfer capability, increased production cost savings, and excellent operability and expandability.
  - T027 also has the lowest risk to mitigate the EMF issues compared with other Segment A projects.
- **T028 was ranked higher than T018**
  - The combinations with either T028 or T018 for Segment A have similar performance in several metrics based on representative results. T028 includes the new Princetown 345 kV substation that better integrates the existing system and provides future expandability. Moreover, T028 includes terminal upgrades at the Edic and Marcy 345 kV substations, which help reduce congestion.

Critical Comparison for Segment A Projects

- **T018 ranks better than T021, and T021 ranks better than T031.**
  - T018 has several key features, such as including a capacitor bank, looping the existing Edic to New Scotland 345 kV line #14 into the Rotterdam GIS substation, which has three proposed transformers, and the foundations and structures proposed are beyond the minimum requirement of National Electrical Safety Code (NESC).
  - T021 loops the existing Marcy to New Scotland 345 kV line into the Princetown substation with two proposed transformers, which causes congestion under certain system conditions. Moreover, T021 does not propose to replace the aging infrastructure at the Rotterdam substation.
  - T031 is the most expensive among the Segment A Tier 2 projects. While T031 provides a good increase in the Central East transfer capability, it creates an additional tower contingency south of Princetown. Compared with the combinations with T021, the combinations with T031 perform less efficiently in several metrics, such as cost per MW. Furthermore, T031 requires additional non-utility property for Princetown substation due to its large footprint, which poses a potential siting risk.

Critical Comparison for Segment A Projects

- **T026 was ranked lower**
  - Tier 3 project
  - Provides the least benefits of all Segment A projects, even though it is also the least expensive
- **T025 was ranked lowest**
  - It is a Tier 3 project with the highest cost
  - Although it greatly increases the Central East voltage transfer capability, it has the highest risks due to the potential siting and operations risks associated with its 765 kV design

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Critical Comparison for Segment B Projects

- **T029 was ranked higher than T030**
  - T029 and T030, both Tier 1 projects, propose the lowest structure height increase and more than half of the new structures have a reduced height. Compared with other projects, they also have more replacement of aging infrastructure and better operability. Therefore, they were ranked higher among Segment B projects.
  - The additional cost of the triple-bundle circuit proposed in T030 is less than the incremental production cost savings, and T030 is therefore less preferable.
- **T022 ranked the next**
  - Tier 2 project
  - It is the least expensive Segment B project with medium structure height increase and relatively less aging infrastructure replacement. Therefore, it was ranked following T029 and T030.

Critical Comparison for Segment B Projects

- **T019 was ranked higher than T023**
  - Both are Tier 3 projects.
  - T023 has lower cost but more increase in structure height.
  - T019 proposes medium structure height increase and stronger foundations and structures beyond the minimum requirements of NESC standards
  - T019 enables higher UPNY-SENY transfer capability, though it poses risks of potential voltage rise, relay coordination, and SSR mitigation due to the proposed 50% series compensation
- **T032 is the most expensive Segment B project with numerous inherent risks in the design. As a result, it was ranked the lowest for Segment B.**

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Individual Ranking

Segment	Ranking	Project ID	Developer Name	Project Name
A	1	T027	North America Transmission / NYPA	Segment A Double Circuits
	2	T028	North America Transmission / NYPA	Segment A Enhanced
	3	T018	National Grid / Transco	New York Energy Solution Seg. A
	4	T021	NextEra Energy Transmission New York	Enterprise Line: Segment A
	5	T031	ITC New York Development	16NYPP1-1A AC Transmission
	6	T026	North America Transmission / NYPA	Segment A Base
	7	T025	North America Transmission / NYPA	Segment A + 765 kV
B	1	T029	North America Transmission / NYPA	Segment B Base
	2	T030	North America Transmission / NYPA	Segment B Enhanced
	3	T022	NextEra Energy Transmission New York	Enterprise Line: Segment B
	4	T019	National Grid / Transco	New York Energy Solution Seg. B
	5	T023	NextEra Energy Transmission New York	Enterprise Line: Segment B-Alt
	6	T032	ITC New York Development	16NYPP1-1B AC Transmission

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Selection Recommendation

Selection Recommendation

- **Based on consideration of all the evaluation metrics for efficiency or cost effectiveness, together with input from developers, stakeholders, and DPS, the NYISO staff recommends that the Board of Directors selects NAT/NYPA's T027 Segment A Double-Circuit proposal and NAT/NYPA's T029 Segment B Base proposal as the more efficient or cost-effective transmission solutions to satisfy the AC Transmission Needs.**
  - Compared with other projects, the overall benefits provided by the double-circuit design of T027 warrant the more-expensive cost. These benefits include:
    - significant increase in Central East transfer capability,
    - increased production cost savings,
    - excellent operability and expandability, and
    - lowest EMF risk due to the EMF cancelling effect of the double circuit design.
  - T029 provides similar UPNY/SENY transfer incremental and production cost savings with the second lowest cost, in addition to the following benefits:
    - excellent operability, and
    - lowest potential siting risk due to the lower increases in structure height compared to other projects; in fact, more than half of its new structures will be lower than existing structure heights along the right-of-way.
  - Both T027 and T029 are proposed by the same Developer, NAT/NYPA, which would result in synergy cost savings when developing two projects simultaneously. The selection of T029 for Segment B by itself will not likely result in significant production cost savings to relieve Central East congestions, but when combined with T027 for Segment A, the synergies of transmission projects lead to best overall performance across evaluation metrics.

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Selection Recommendation

- The combination of T027 and T029 is estimated to cost $1,080 million, taking into consideration a 30% contingency factor and a 5% discount for cost efficiency synergies of having a single developer for both projects. The projects are expected to provide combined production cost savings and capacity procurement savings in a range of $881 million to $1,979 million depending on future system conditions.
- Based on the project schedule estimated by SECO, the in-service date for the selected projects is April 2023, assuming that the preparation of an Article VII application will begin immediately following the approval of this report and the selection of the projects by the NYISO Board of Directors.

Next Steps

Next Steps

- Please provide additional comments to PublicPolicyPlanningMailbox@nyiso.com
- Review draft report at BIC, OC, and MC

Questions?

We are here to help. Let us know if we can add anything.

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The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system

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