AC Transmission Public Policy Transmission Report Addendum Comments

LS Power Grid New York / New York Power Authority

February 2019

Introduction

- AC Transmission Draft Report (June 2018) recommended selection of Proposal T027+T029
- Board of Directors Addendum (December 2018) recommended selection of Proposal T027+T019
- Proposal T027+T019 has much higher cost (at least $116 million greater than T027+T029)
- Proposal T027+T019 has higher UPNY/SENY Transfer, but this does not translate into sufficient benefits to justify the higher cost

Summary

Cost of Proposal T019 Relative to Proposal T029 > Incremental Benefits

	T027+T019	T027+T029	Difference
Cost	>$1,229	$1,113	>$116
Benefits	$2,511	>$2,438	
Production Cost Benefits: CES+Retirement Case	$1,080	>$1,076	<$4
Capacity Benefits: MMU CES+Retirement Case	$592	$523	$69
Avoided Refurbishment Costs	$839	$839	-
Benefit: Cost Ratio	**2.04**	**2.19**	+.15

All values in millions of dollars. Source: AC Transmission Draft Report (June 2018) or Addendum (December 2018, as updated February 2019)

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T019 Has Higher Cost with Higher Cost Increase Risk

	T027+T019	T027+T029	Difference
Cost	>$1,229	$1,113	>$116
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- SECO Independent Cost Estimate of T027+T019 is $116 million more than T027+T029
- T019 Has Higher Risk of Cost Increases above SECO Estimates, Additional Costs Could be Greater than $100 Million
  - SSR Mitigation Not Included $7.3 M ($4.875 M+15% Markup+30% Cont.)
  - TRV Mitigation Not Included
  - NE-NY Interface Mitigation Risk Greater for T019

SRIS	Impact	NUF Option 1	NUF Option 2	NUF Option 3
T019	-236 MW	$30 M - Alps PAR (Loopflow issues)	$123 M - PV Series Reactor, Reynolds Road Transformer, Reconductor Eastover 230 kV Line	$90 M - Reconductor Pleasant Valley – Long Mountain
T029	-140 MW	$30 M - Alps PAR	$60 M - PV Series Reactor, Reynolds Road Transformer	$90 M - Reconductor Pleasant Valley – Long Mountain

  - Visual Impact Mitigation
    - SECO estimate for T019 does not include cost measures to reduce structure heights such as matching existing structure locations, increasing conductor tension, adding in-line dead-ends, and adding structure weights to remediate uplift
    - SECO estimate for T029 includes these measures
  - T019 Has Increased SENY 30-Minute Reserve Requirement

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Production Cost Benefits Not Meaningful for Segment B

See NYPA/NAT May 3, 2018 Comments

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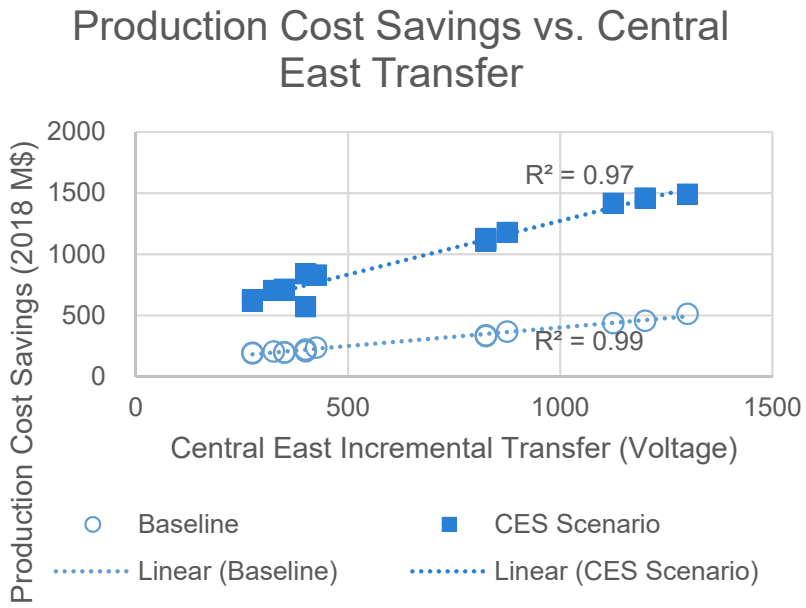

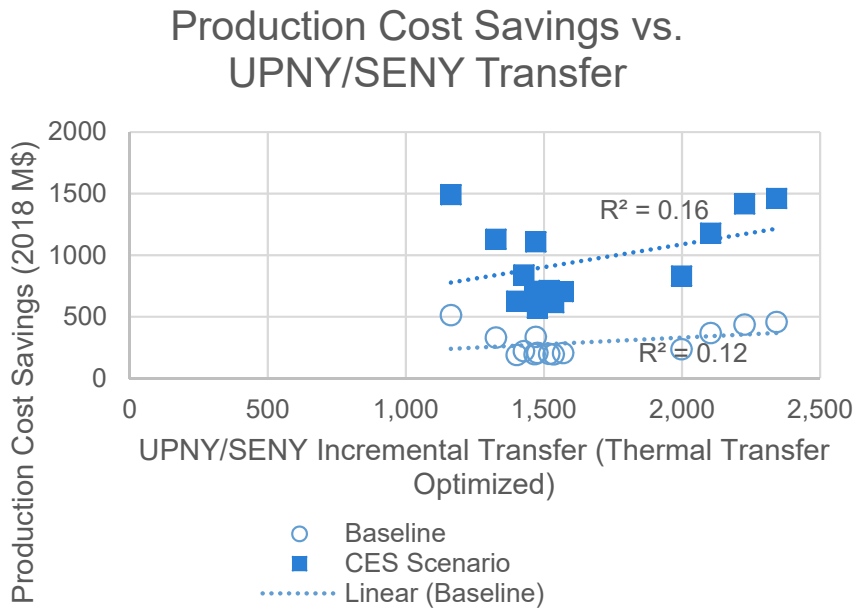

R^2 greater than 0.70 is strong correlation.

R^2 less that 0.30 is weak correlation/no correlation.

Incremental UPNY-SENY Transfer Does Not Provide Production Cost Benefits

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Production Cost Benefits New Scotland-Knickerbocker

See slide 15 of February 11, 2019 ESPWG Presentation

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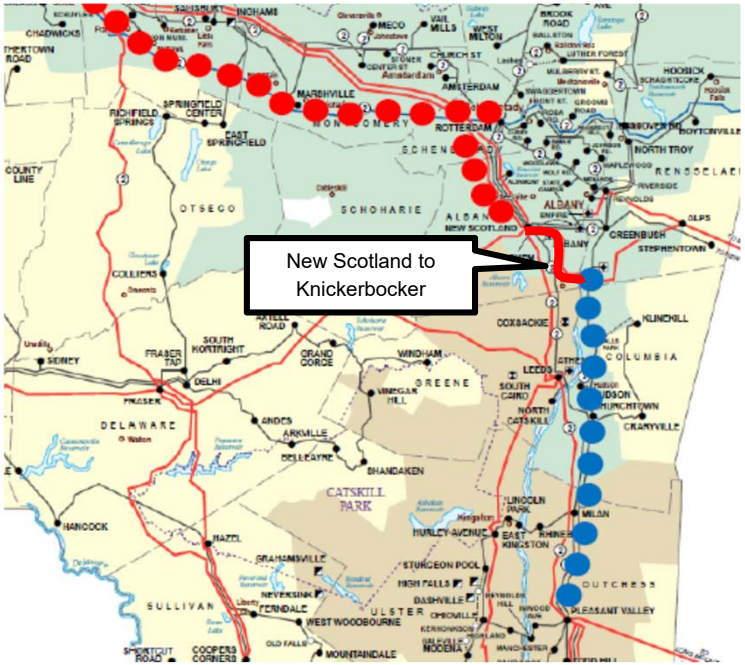
Annual Demand Congestion in 2018 M$ for New Scotland - Knickerbocker:

CES+ Retirement Scenario	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	Total ($2018 M)	Potential Limiting Element
Pre-Project*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
T027+T019	5	10	17	26	50	97	127	199	175	161	174	165	173	160	159	128	138	115	129	114	2,322	Conductor Limited
T027+T029	2	7	11	14	32	54	76	119	104	93	107	101	105	91	92	72	84	69	79	68	1,380	Terminal Upgrades Available
T027+T030	7	12	18	27	52	94	126	191	170	158	172	164	171	153	146	123	133	114	126	109	2,266	Terminal Upgrades Available



- Additional UPNY-SENY flow of Proposal T019 causes significant New Scotland-Knickerbocker Congestion, even after upgrading NS-K terminal equipment
- NYISO stated T019 has benefit of NS-K terminal equipment upgrades, but T029 and T030 do not. However there should be no differences. Proposal T027 builds new terminal at New Scotland and all proposals build new terminal at Knickerbocker. Terminal equipment should not be limiting in any case.
- Correct modeling of Proposals T029 and T030 NS-K with new terminal equipment should relieve this congestion for T029 and T030. As a result, T029 and T030 likely have greater Production Cost Benefits than T019

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Capacity Benefits

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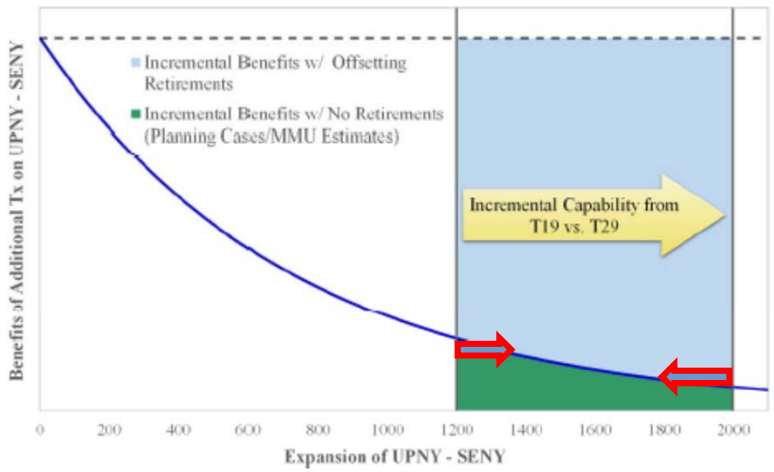
- "In summary, the NYISO continues to develop its ICAP benefit metric methodology, and therefore, it did not use this metric to distinguish among projects." Draft Report p. 79
- Addendum Estimates Benefits Under Several Scenarios
- Addendum States a "corollary effect" from Impedance Correction
  - T029 from 1150 MW to 1300 MW, T019 from 2100 MW to 1850 MW

Figure 1: Incremental Benefits of Additional Capacity on the UPNY-SENY Interface



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- Values estimated based on UPNY-SENY ETC Limits

ICAP Benefits, 20-year savings, 2018 $M	T027+T019 Addendum	T027+T019 Estimated	T027+T029 Estimated	T027+T029 Addendum	Estimated Difference
UPNY-SENY ETC Limits	2100	1850	1300	1150	
Existing Localities Convergence to Net CONE	744	702	609	584	93
Existing Localities Net CONE	1040	981	851	816	130
Eliminate G-J Convergence to Net CONE	1385	1370	1336	1327	34
Eliminate G-J Net CONE	1936	1915	1869	1856	46
MMU - Baseline Case	237			218	19
MMU - CES+Retirement Case	592			523	69

T019 Benefit >Incremental cost ($116 million) only if ICAP = Net Cone

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Long-Term Planning Approach

- Installation of 50% Series Compensation in 2023 Not Prudent Planning
  - T019 Series Compensation (50%) is not optimized as it was designed for Segment A Proposal T018 (single circuit) not T027 (double circuit)
  - Too Much Series Compensation Can Limit UPNY-SENY Transfer in Future
    - Creates congestion such as New Scotland to Knickerbocker
    - Draft Report - T025 (765 kv) +T019 has lowest UPNY-SENY Transfer (N-1 NTC Limit)
    - MMU memo identifies UPNY-ConEd to become bottleneck
  - System changes will impact the appropriate level of compensation
- Series Compensation is Discrete Substation Equipment, Easy to Add to a Station
- Selecting T029 Preserves Optionality to Install Series Compensation in the Future, Allowing for:
  - Amount of series compensation matched to specific system conditions
  - Significantly lower cost
  - Ability to incorporate new technology developments

Other Comments

- New Findings that T019 Design Provides Resilience Benefits is Unsubstantiated
  - T029 foundations and structures also designed to specifications that exceed minimum engineering standards (100 mph extreme wind)
  - With respect to transverse loads (cascading resistance) T029 foundations and structures are stronger than T019

Incomplete Analysis of Proposal T030

	T027+T019	T027+T029	T027+T030
Cost	>$1,229	$1,113	$1,131
Benefits	$2,511	>$2,438	?
Production Cost Benefits: CES+Retirement Case	$1,080	>$1,076	>$1,012
Capacity Benefits: MMU CES+Retirement Case	$592	$523	?
Avoided Refurbishment Costs	$839	$839	$839
Benefit: Cost Ratio	**2.04**	**2.19**	?

"The Board concludes that it is critically important to maximize the transmission capacity of these important rights-of-way at this juncture, especially when considering that no major AC transmission infrastructure has been developed in New York in over 30 years." Board December 27, 2018 Memo, page 4

- Proposal T019 does not maximize the capacity of the right-of-way. T019 and T029 install the same conductor within the right-of-way. Incremental transfer of Proposal T019 arises from substation equipment (series compensation)
- Proposal T030 maximizes the transmission capacity of the right-of-way. Proposal T030 has the greatest transfer based on transmission line upgrade alone of any Segment B Proposal.
- Selecting Proposal T030 would maximize use of existing ROW and preserve option to install series compensation in the future

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Conclusion

- T019 Incremental Costs > Incremental Benefits

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- Series Compensation Can Be Installed in Future - Designed to System Conditions, Lower Cost, Less Risk

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