CIRs For ELCC Resources:
PJM Package D Alternatives 1 & 2 (New)

PC Special Session – CIRs for ELCC Resources

April 28, 2022

Introduction

- PJM Package D currently has two alternatives
- Both alternatives are similar except for certain elements of the transition mechanism related to non-ISA queue units
  - Both have 1 MW CIR = 1 MW summer deliverability
  - Both have the same new CIR request and retention policies
  - Both award wind and solar resources having an ISA at time of effective date of proposal with higher, default CIRs and the system will pay for any required baseline upgrades in the 2023 RTEP (currently 5 MW with $7M upgrades)
    - Summer $P_{80\%}$ for solar and offshore wind
    - Summer $P_{90\%}$ for onshore wind

Introduction

- Both have a summer generator deliverability study performed prior to each BRA during the transition to quantify any undeliverable MW above the requested amount of CIR MW but below the new higher, default amount
- Both cap ELCC hourly outputs for wind and solar resources at their deliverable MW
- Both have the new generator deliverability test implementation starting in next year's RTEP and in Transition Cycle 2

Transition Mechanism for Wind & Solar Units Without ISA

- Alternative 1
  - Transition wind and solar units in Fast Track and Transition Cycle 1 to higher, default CIRs and the load will pay for any required baseline upgrades. (PJM high level estimate of cost to load is ~$3B – see Appendix 2 for preliminary results summary)
  - Wind and solar units in Transition Cycle 2 need to submit a new queue request for higher CIRs if desired
  - Begin capping ELCC at deliverable MW in 2025/26 BRA

Transition Mechanism for Wind & Solar Units Without ISA

- Alternative 2 (PJM currently recommended)
  - Wind and solar units in Fast Track, Transition Cycle 1 and Transition Cycle 2 that do not have an ISA upon effective date of this proposal will need to submit a new queue request for higher CIRs if desired
  - Begin capping ELCC at deliverable MW in 2025/26 BRA

Assuring Deliverability During the Transition

- During the transition period, prior to each BRA for which such resources are eligible to participate, PJM will run summer, single contingency generator deliverability to determine whether wind and solar units are deliverable.
  - PJM will maximize amount of deliverable wind a solar MW by considering any overloaded flowgates and the DFAX of each wind and solar unit
  - Wind and solar units with an ISA at time of proposal effective date will be turned on first
  - In all cases, wind and solar deliverable MW will be above the requested amount of CIR MW but below the new higher, default amount

Appendix 1: Overloads In RTEP Baseline Under New Generator Deliverability Test

Additional RTEP Baseline Reliability Violations Under New Generator Deliverability Test

Violation Driver		Summer	Winter	Light Load	Total
Higher Intermittent	# of Violations:	2	0	2	4
	$M Cost	$ 7.00	$ -	$ 12.00	$ 19.00
Block Dispatch	# of Violations:	1	1	4	6
	$M Cost	$ 28.00	$ 8.50	$ 75.00	$ 111.50
Block Dispatch + Lower Intermittent Helpers	# of Violations:	2	0	0	2
	$M Cost	$ 11.50	$ -	$ -	$ 11.50
Impact of All Drivers	# of Violations:	**5**	**1**	**6**	**12**
	$M Cost	**$ 46.50**	**$ 8.50**	**$ 87.00**	**$ 142.00**

Appendix 2:
Summer Overloads In Queue Scenario Study Under New Generator Deliverability Test

Summer Overloads Under New Gen Deliv

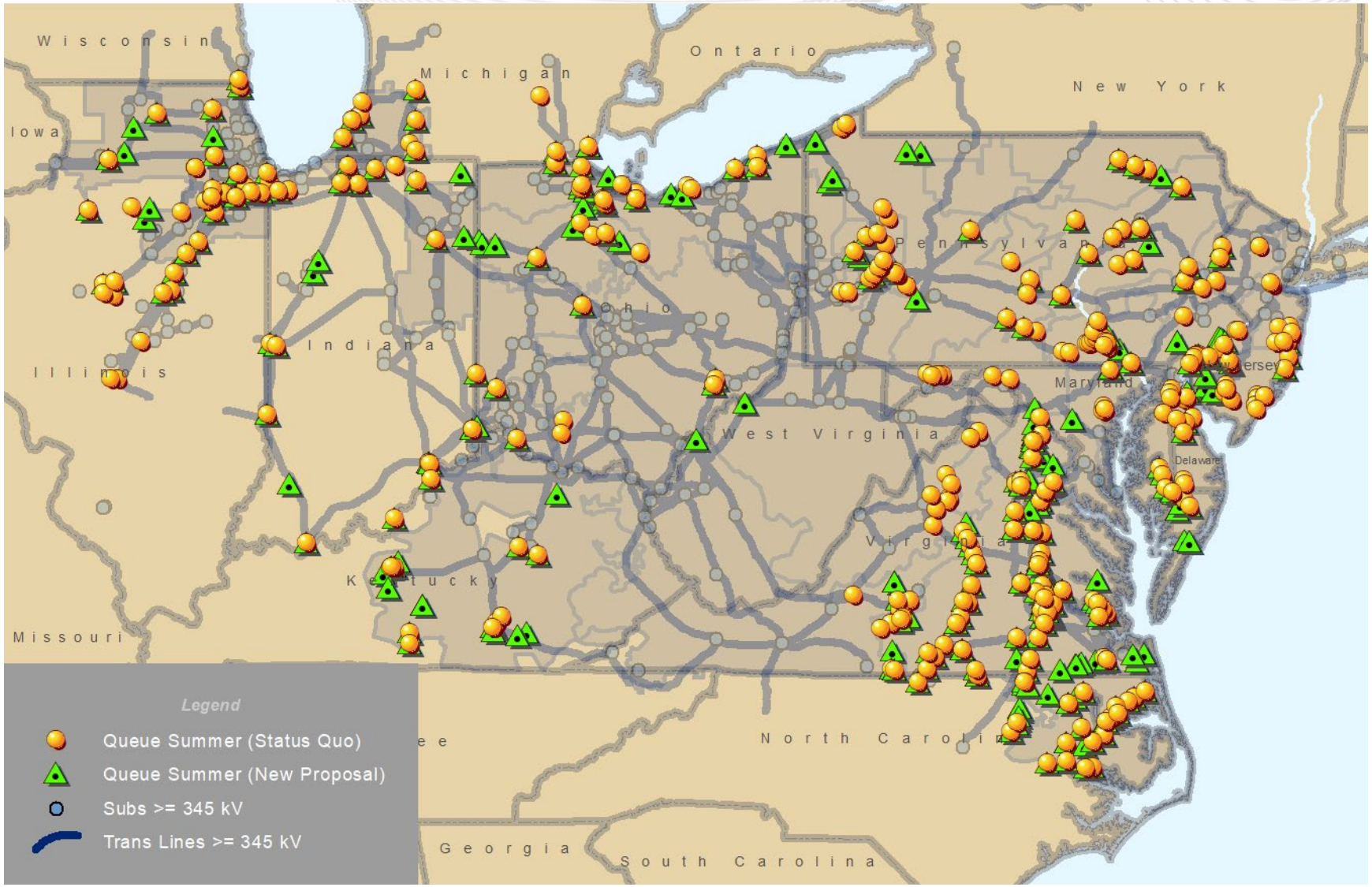
Violations Under Status Quo

kV	PJM East	PJM West	PJM South	TOTAL
765	0	3	0	**3**
500	3	0	17	**20**
345	0	77	0	**77**
230	44	2	70	**116**
161	0	0	0	**0**
138	10	34	2	**46**
115	27	0	18	**45**
69	12	5	0	**17**
765/345	0	8	0	**8**
500/230	3	0	4	**7**
345/230	2	0	0	**2**
345/138	0	6	0	**6**
230/115	4	0	9	**13**
115/69	0	0	0	**0**
TOTAL	**105**	**135**	**120**	**360**

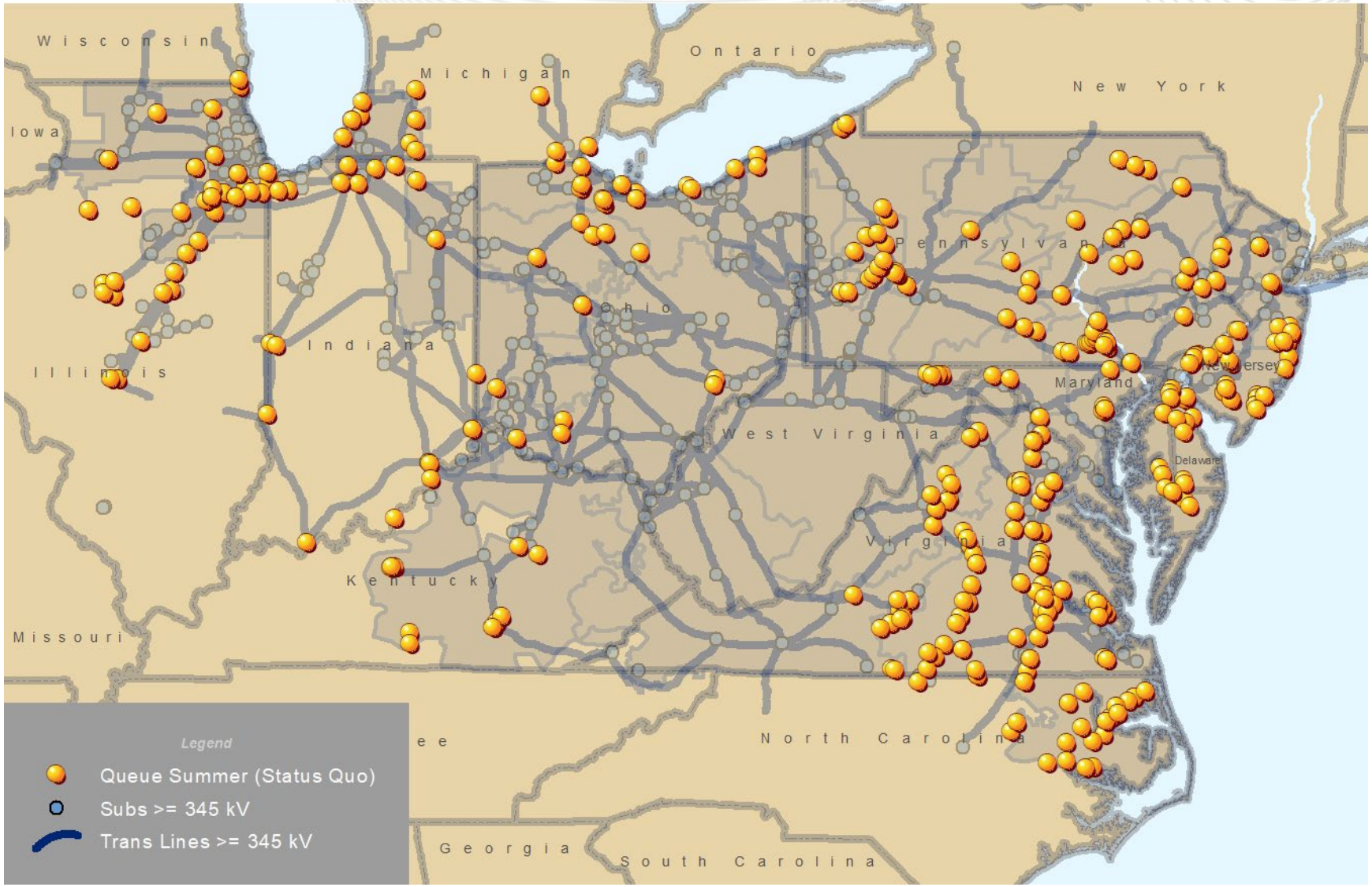
Violations Under Proposal

kV	PJM East	PJM West	PJM South	TOTAL
765	0	6	0	**6**
500	7	0	25	**32**
345	1	75	0	**76**
230	25	0	95	**120**
161	0	2	0	**2**
138	1	24	0	**25**
115	4	0	28	**32**
69	10	6	1	**17**
765/345	0	4	0	**4**
500/230	4	0	6	**10**
345/230	0	0	0	**0**
345/138	0	3	0	**3**
230/115	1	0	3	**4**
115/69	0	3	0	**3**
TOTAL	**53**	**123**	**158**	**334**

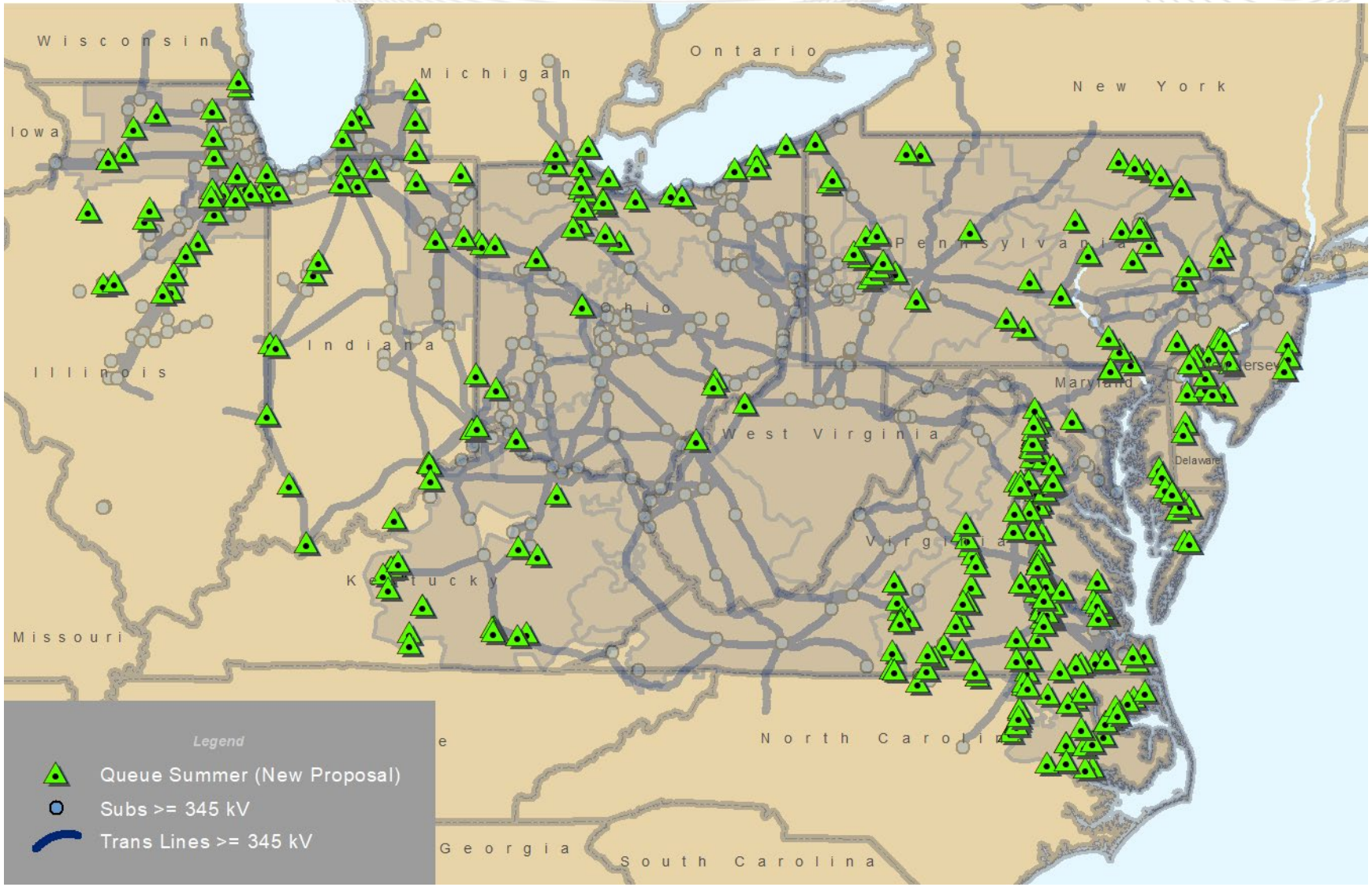
Identified Overloads



Identified Overloads: Status Quo Gen Deliv



Identified Overloads: New Gen Deliv



Circuit Miles

		Status Quo				Proposal			
	kV	PJM East	PJM West	PJM South	TOTAL (miles/unit)	PJM East	PJM West	PJM South	TOTAL (miles/unit)
Circuit	**765**	0	275	0	**275**	0	492	0	**492**
	500	144	0	364	**508**	97	23	493	**613**
	345	0	1,342	0	**1,342**	13	1,527	0	**1,540**
	230	403	35	512	**950**	263	0	725	**988**
	138	32	240	9	**280**	10	146	0	**156**
	115	126	0	89	**215**	48	14	129	**190**
	TOTAL	704	1,892	973	**3,569**	432	2,202	1,347	**3,980**

Basis For Per Mile/Unit Cost Estimate

Cost Estimates for New Transformers ($M per unit)	**138 kV** High Side	$4
	230 kV High Side	$6
	345 kV High Side	$9
	500 kV High Side	$25
	765 kV High Side	$45

	Upgrades	Reconductor	Loadings	Rebuild	Loadings
Cost Estimates for Transmission Line Upgrades ($M per mile)	**115 kV & 138 kV**	$0.8	≤ 400 MVA	$1.2	> 400 MVA
	230 kV	$1.2	≤ 1,200 MVA	$1.8	> 1200 MVA
	345 kV	$2.0	≤ 1,800 MVA	$3.0	> 1,800 MVA
	500 kV	$5.5	≤ 4,000 MVA	$8.0	> 4,000 MVA
	765 kV	$8.0	≤ 6,000 MVA	$12.0	> 6,000 MVA
	230 kV Cable	$15 ($M per mile)			

Cost Estimate Comparison

		Status Quo				Proposal			
	kV	PJM East	PJM West	PJM South	TOTAL($M)	PJM East	PJM West	PJM South	TOTAL ($M)
Circuit	**765**	$0	$2,199	$0	**$2,199**	$0	$3,939	$0	**$3,939**
	500	$791	$0	$2,185	**$2,976**	$581	$64	$3,570	**$4,215**
	345	$0	$3,385	$0	**$3,385**	$20	$3,899	$0	**$3,919**
	230	$559	$31	$660	**$1,250**	$335	$0	$961	**$1,296**
	138	$32	$197	$3	**$232**	$8	$119	$0	**$127**
	115	$111	$0	$73	**$184**	$39	$11	$103	**$152**
Transformer	**765/345**	$0	$630	$0	**$630**	$0	$180	$0	**$180**
	500/230	$75	$0	$100	**$175**	$100	$0	$150	**$250**
	345/230	$36	$0	$0	**$36**	$0	$0	$0	**$0**
	345/138	$0	$72	$0	**$72**	$0	$27	$0	**$27**
	230/115	$24	$0	$54	**$78**	$0	$0	$18	**$6**
	TOTAL	**$1,627**	**$6,513**	**$3,076**	**$11,216**	**$1,082**	**$8,238**	**$4,802**	**$14,122**

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