Geenex Solar

PJM INTERCONNECTION

QUEUE REFORM DESIGN COMPONENTS

November 18, 2021

What is Inter-Cycle Network Upgrade (NU) Funding?

- Large Network Upgrade costs are spread among two or more cycles.
- Initial Cycle funds NU and Subsequent Cycles reimburse previous Cycle(s) that fund NU.
- Current Serial process allows for Inter-Cycle (cluster) funding for up to five years.
- PJM's proposed Cluster process eliminates it.

Why Inter-Cycle Network Upgrade (NU) Funding?

- ❑ Minimize risk of **Cycle Failures**
  - Cycle failures occur when the burden of funding Network Upgrades exceeds the financial capabilities of the interconnection customers in a cycle.

- ❑Cascading cycle failures can lead to **dead zones** containing favorable areas for renewable generation.
  - Locations for renewable generation is dependent on resource rich location with acceptable land attributes.

- ❑Minimize "Free Rider"
  - "Free-Riders" in subsequent clusters unfairly benefit from network upgrades.
  - "Free-Riders" impact competition.

Inter-Cycle Network Upgrade (NU) Funding Rules

Qualifications for Inter-Cycle NU Funding:

- Available for NU that exceed $25,000 per MW-MFO in a cycle.
- Limited to Cycles that begin within five years of NU initially being funded.
- Multi-Party Shared Network Upgrade Agreement (MPFCA) contains cross indemnification and contingency measures should one or more projects withdraw from the MPFCA

Example 1: Rebuild 14.53 miles of 500 kV Line 575 from North Anna to Ladysmith. Total cost: **$45,043,000**

1 cycle funds

Queue Position	MFO MW	MW Contribution	AE cycle funds	AE $/MFO
AE2-031	290	34.63	$2,069,191	$ 7,135
AE2-094	300	41.5	$2,479,683	$ 8,266
AE2-122	800.1	115.02	$6,872,607	$ 8,590
AE2-123	800.1	115.02	$6,872,607	$ 8,590
AE2-124	800.1	115.03	$6,876,192	$ 8,594
AE2-313	314	62.52	$3,735,658	$ 11,897
$ NU/MFO-MW = 45,043,000/3304.3 =				**$ 13,632**

- Total output of Cycle is 3304.3 MW-MFO.
- Cost of Network Upgrade/MW-MW = $13,632/MW
- Does not qualify for Inter-Cycle Network Funding.

Source: https://www.pjm.com/pub/planning/project-queues/impact_studies/af2042_imp.pdf

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Example 2: Build new 500 kv line from Rawlings to Morrisville Substation 110 miles. Total cost: **$400,000,000**

1 cycle funds | 2 cycles funds +

Queue Position	MFO MW	MW Contribution	AE cycle funds	AE $/MFO	AE & AF cycle funds	AE - AF $/MFO
AE2-031	290	50.74	$14,091,900	$ 48,593	$ 8,454,764	$ 29,154
AE2-033	149	44.27	$12,295,002	$ 82,517	$ 7,376,674	$ 49,508
AE2-051	150	46.09	$12,800,467	$ 85,336	$ 7,679,939	$ 51,200
AE2-094	300	103.22	$28,667,046	$ 95,557	$ 17,199,463	$ 57,332
AE2-122	800.1	258.98	$71,925,902	$ 89,896	$ 43,153,624	$ 53,935
AE2-123	800.1	258.98	$71,925,902	$ 89,896	$ 43,153,624	$ 53,935
AE2-124	800.1	258.9	$71,903,684	$ 89,868	$ 43,140,293	$ 53,919
AE2-147	150	46.83	$13,005,985	$ 86,707	$ 7,803,244	$ 52,022
AE2-156	100	32.48	$9,020,594	$ 90,206	$ 5,412,116	$ 54,121
AE2-270	150	49.68	$13,797,509	$ 91,983	$ 8,278,137	$ 55,188
AE2-313	314	130.64	$80,566,009	$ 256,580	$ 48,337,457	$ 153,941
AF1-123	880	130.64			$ 21,768,435	$ 24,737
AF1-124	880	130.64			$ 21,768,435	$ 24,737
AF1-125	880	133.39			$ 21,768,435	$ 24,737
AF1-128	569	205.92			$ 22,226,666	$ 39,063
AF1-236	569	74.96			$ 34,312,280	$ 60,303
AF1-265	150	154.09			$ 12,490,523	$ 83,270
AF2-042	500	130.64			$ 25,675,890	$ 51,352
$ NU/MFO-MW = 400,000,000/4000.3 =				$ 99,918	400,000,000/8432 =	$ 47,442

EXAMPLE OF "FREE RIDERS" THAT COULD BENEFIT FROM NU.

- Large Network upgrades are increasing; especially in Dominion's territory.
- More than two cycles would be needed to get the average cycle cost below $25,000/MW-MFO.
- Maximum number of cycles is limited to those that begin within five years of the initial funding of the Network Upgrade.

Requires additional cycles to reach $25,000/MW-MFO

Source: https://www.pjm.com/pub/planning/project-queues/impact_studies/af2042_imp.pdf

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