PJM Interconnection Study Process Update

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PREPARED FOR: Pennsylvania Renewable Summit

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PJM Forecasting Substantial Demand Growth Through 2040 Thanks To Data Center Build Out & Electrification

Growth concentrated in Dominion's VA service territory currently, but trend expanding to other areas in PJM

Primary Observations

Substantial & accelerating data center load growth in VA is driving the demand narrative for PJM

- "Data Center Alley" in Northern VA is the epicenter of PJM load growth, with ~2.8 GW of actual demand in 2022 growing to ~3.4 GW in 2023 (+608 MW)

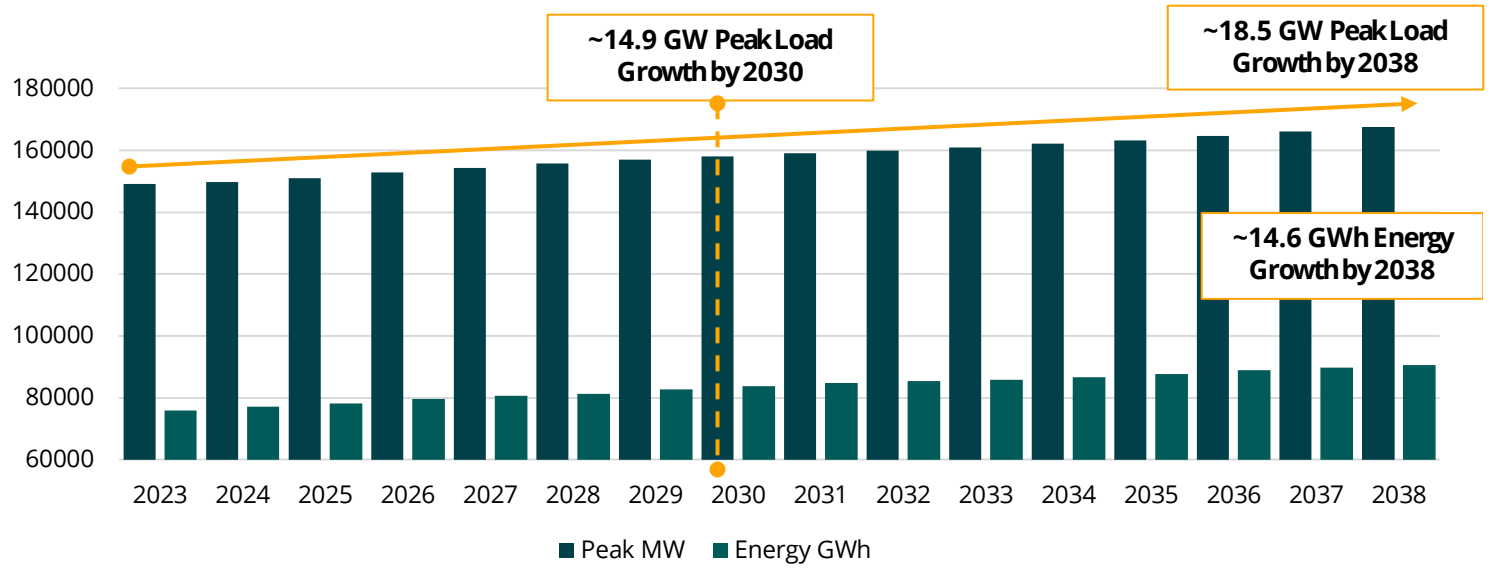
Trend is durable and expanding beyond Dominion's V A service territory

- *NOVEC:* + ~1.5 GW new data center load in Northern VA by 2028
- *AEP Ohio:* + ~3.8 GW of new load boy 2032 from 80 data centers currently in new large customer queue
- *FirstEnergy Ohio:* +300 MW BlueScope Steel plant load in 2023
- *APS West VA*: + 900 MW West VA shale fracking load by 2028
- *APS VA:* + ~3 GW data center load growth by 2033
- *PSEG:* 145 MW of new load in 2024, growing to ~3.7 GW in 2039

Main Take Away

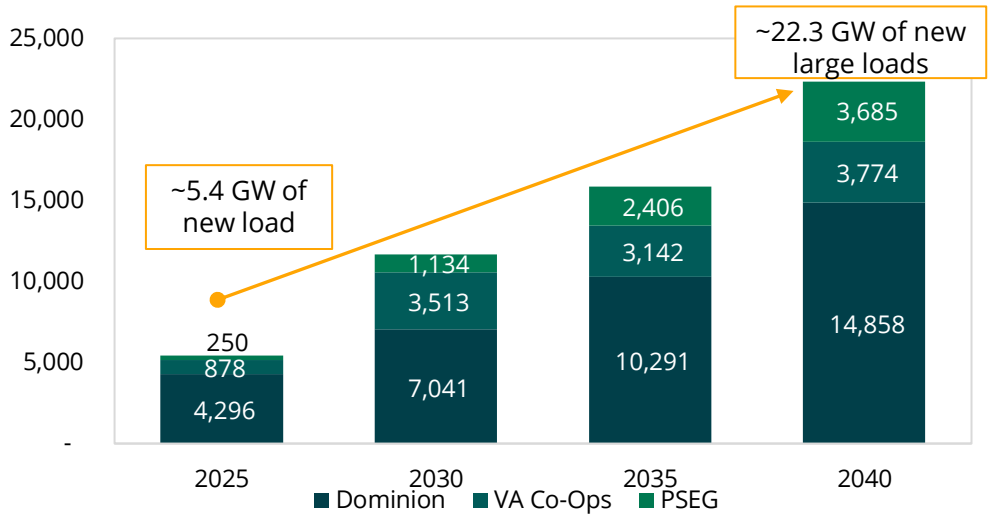
- PJM experiencing substantial load growth for first time in decades
- Durable trend that is likely to persist event if economics drive data centers away from Virginia
- Rapid growth challenging PJM's ability to expand transmission system and meet resource adequacy needs

PJM Forecasting Substantial Demand Growth Through 2038



~8.7 GW of new data center load under contract in Dominion as of October 2023

Projects have signed Substation Engineering Letters of Authorization ("SELOA") and posted construction deposits



Generation Retirements Are Accelerating As Unfavorable Economics And Public Policies Challenge Legacy Generation Fleet In PJM

Shift in public policy could temporarily slow retirement trend, but aging infrastructure retirements are imminent as new entry slows

Primary Observations

~35 GW of coal remains in PJM's capacity supply stack

- Coal made up ~38% of cleared capacity in 2024/2025 BRA
- PJM's coal assets are ~45 years old on average, indicating that relief from unfavorable energy policies would not meaningfully change the retirement narrative

Coal retirements are accelerating as the energy transition gains steam in PJM

- ~6.6 GW of actual or announced coal retirements from 2023-2026
- Coal accounts for ~67% of all announced retirements, with other major closures likely
    - *~1.3 GW AEP Rockport and ~3.4 GW Keystone Conemaugh coal assets announced closures by 2028 but not yet reported to PJM*

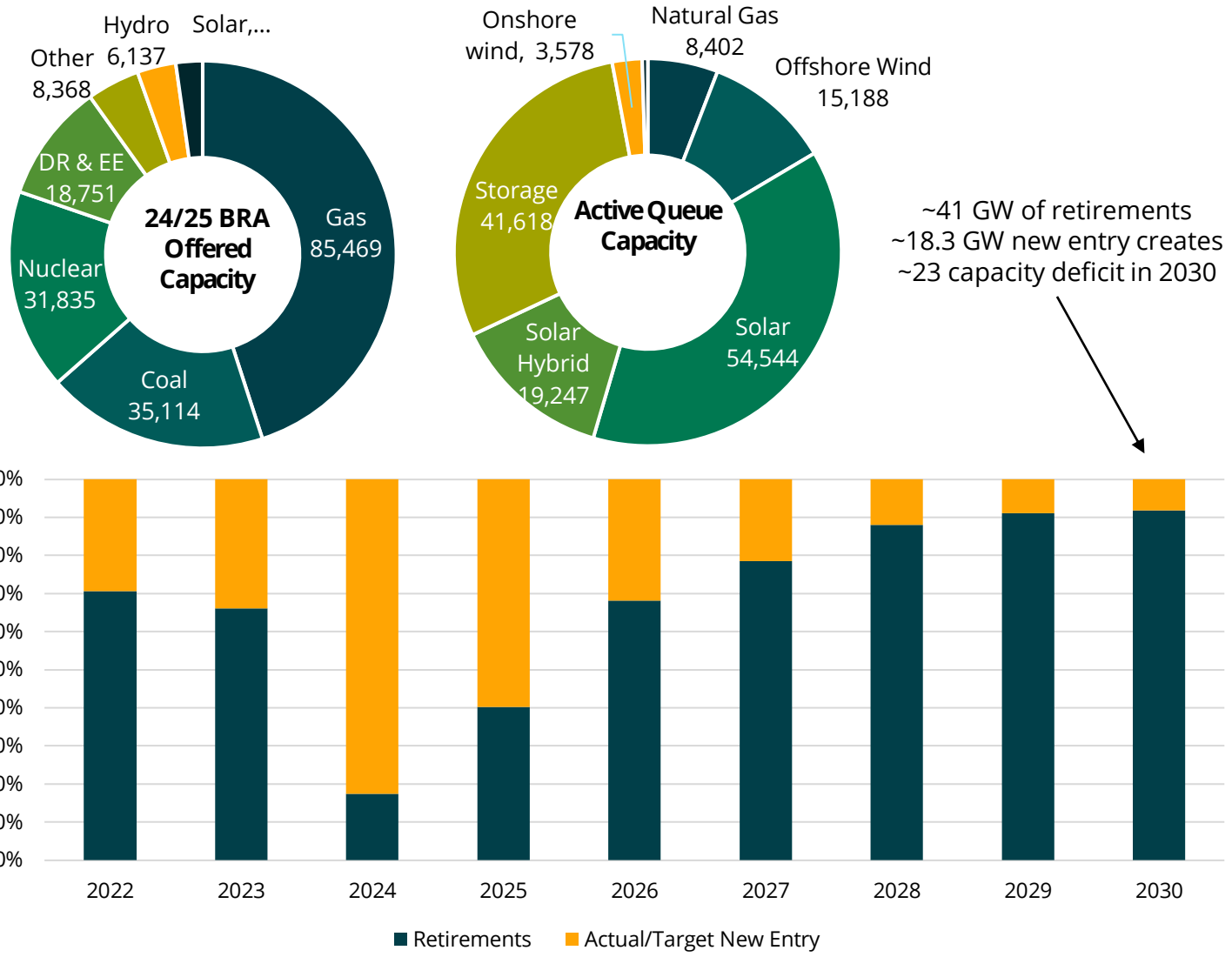
Retirements outpacing capacity new entry due to interconnection queue delays and other challenges

- PJM forecasting ~40 GW of thermal retirements by 2030
- Just ~3.3 GW of new generation came online in 2023 despite 40+ GW of generation with signed Interconnection Service Agreements

Main Takeaway

- PJM's capacity supply stack is contracting as retirements outpace new entry while demand continues to grow
- ~94% of interconnection queue capacity from renewables, meaning more generation is necessary to replace retiring thermal resources

PJM's Changing Resource Mix



PJM new "cluster study" interconnection queue process goes live July 2023

New "first read first served" model leverages administrative efficiencies to accelerate the interconnection study timeline and allow projects with the fewest upgrades to exit the queue faster

Cluster Study Overview

Three-phase process gives developers actionable information sooner

- *Phase 1 System Impact Study:* desk-level engineering study of interconnection and network upgrades
- *Phase 2 Interconnection Facilities Study:* good faith engineering study of interconnection facilities costs
- *Phase 3 Network Facilities Study* good faith engineering study of network upgrade costs

Higher Readiness Deposits at risk escalate during study process

- More "skin in the game" disincentivizes speculation and encourages non-viable projects to exit sooner

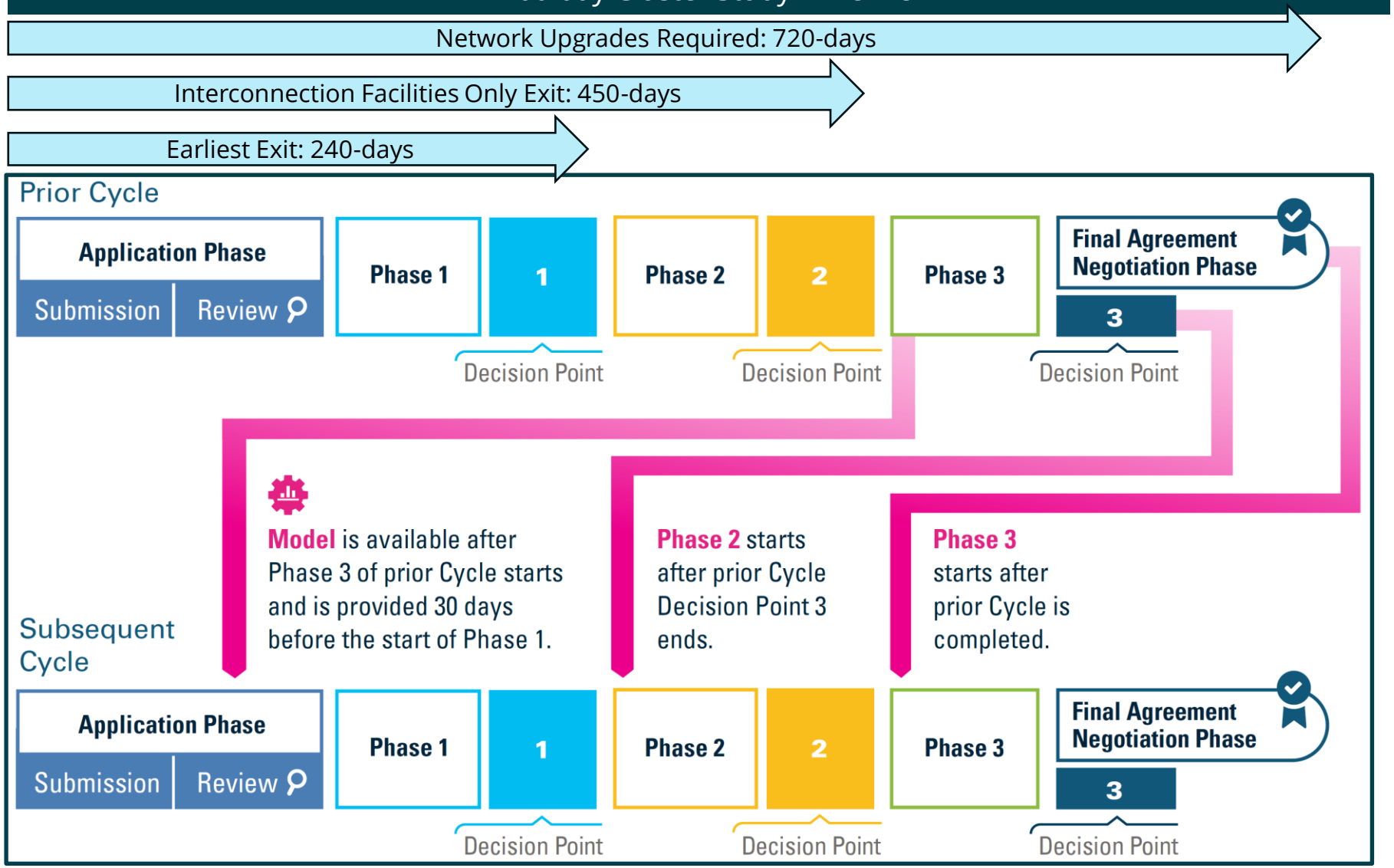
Strict site control requirements incentivize active project development

- PJM views site control as evidence of commercial readiness
- Projects that do not meet requirements are withdrawn from queue

Main Takeaway

- New process is generally consistent with recent FERC Order 2023 "best practices" interconnection study requirements

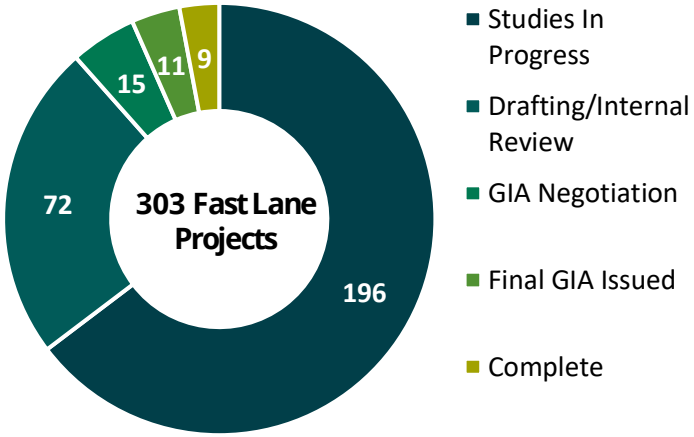
~700-day Cluster Study Timeline



Transitional Studies to clear queue backlog before PJM accepts new interconnection applications

New "first read first served" model leverages administrative efficiencies to accelerate the interconnection study timeline and allow projects with the fewest upgrades to exit the queue faster

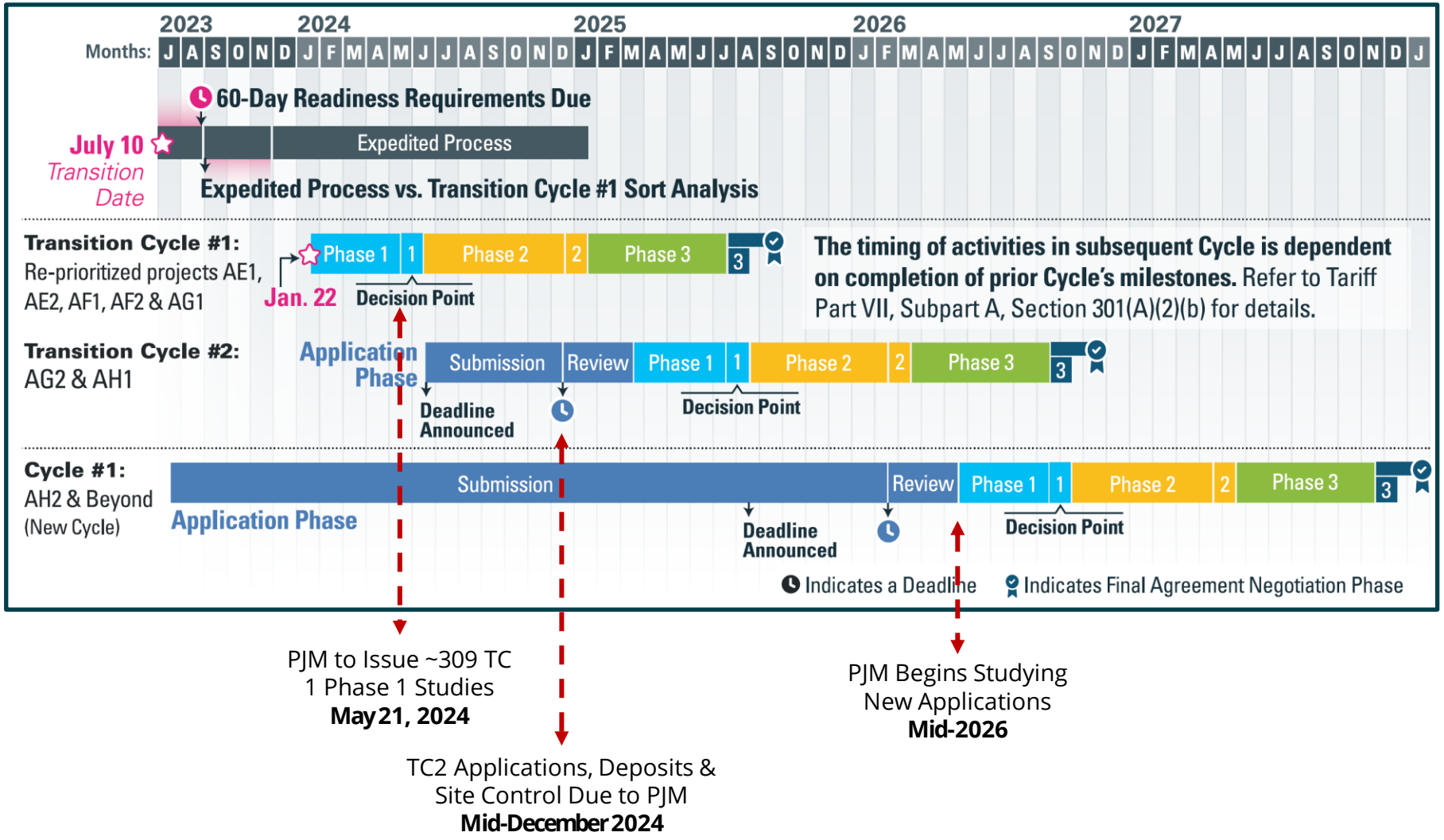
Cluster Study Overview



Main Takeaway

- Just ~3% completion rate for Fast Lane projects with < $5 mm shared upgrades
- PJM processing TC1 studies while completing Fast Lane projects
- "Lazer focus" on accelerating the Transition Cycle study timeline
- Very strict review of site control standards and GIS/ISA project development milestones

~700-day Cluster Study Timeline



PJM to Issue ~309 TC 1 Phase 1 Studies
May 21, 2024

TC2 Applications, Deposits & Site Control Due to PJM
Mid-December 2024

PJM Begins Studying New Applications
Mid-2026

PJM Management Believes That Interconnection Queue Challenges Are Not A Barrier To New Entry & Are Concerned With Lack Of New Generation Coming Online

What factors are challenging CFE + BESS development in PJM?

~43.1 GW of New Generation with Signed GIAs but not in Service

TO Zone	Other	Natural Gas	Offshore Wind	Solar	Solar + Storage	Storage	Wind	Total	% Total w ISAs	Total In Queue	% Total In Queue
AEC		230	1,942	316		-		**2,488**	6%	**4,827**	2%
AEP	65	1,200		8,518	403	537	550	**11,273**	26%	**72,852**	28%
AMPT				40				**40**	0%	**206**	0%
APS		1,895		1,635	20		135	**3,685**	9%	**18,055**	7%
ATSI		940		1,471	58		298	**2,767**	6%	**10,775**	4%
BGE				30		4		**34**	0%	**1,893**	1%
ComEd		738		589	20	10	2,385	**3,741**	9%	**33,927**	13%
Dayton				1,429				**1,429**	3%	**4,436**	2%
DEOK				169		52		**221**	1%	**1,976**	1%
DL	38				18			**56**	0%	**414**	0%
Dominion		1,138	2,640	6,810	50	501	267	**11,406**	26%	**57,294**	22%
DPL			255	1,033	27	13		**1,327**	3%	**10,161**	4%
EKPC				571	395			**966**	2%	**8,864**	3%
JCPL			816	71	70	80		**1,037**	2%	**16,058**	6%
ME				338	106			**444**	1%	**1,606**	1%
PECO	44							**44**	0%	**145**	0%
PENELEC				949	20	160	110	**1,239**	3%	**609**	0%
PEPCO						1		**1**	0%	**141**	0%
PPL				580		190		**770**	2%	**9,052**	3%
PSEG		56		10	3	15		**83**	0%	**3,262**	1%
PSEG N					0			**0**	0%	**3,156**	1%
SMECO				40				**40**	0%	**3,950**	1%
Total	**147**	**6,197**	**5,653**	**24,599**	**1,189**	**1,562**	**3,744**	**43,091**		**263,924**	
CFE + BESS % Total	0%	14%	13%	57%	3%	4%	9%	36,747			

Framing Resource Mix Dilemma

Accelerating retirements and stagnant new entry challenging regional resource adequacy

- PJM management perceives intervention to delay retirements as the "only tool in the toolkit" to address resource adequacy needs
- PJM market reforms attempting to signal the need for new baseload generation

Need to reconcile the narrative around the impact of queue delays on CFE market entry

- Interconnection queue delays continue to stall new renewable entry but are not the only primary barrier to entry
- PJM leadership questioning the viability of "markets as enabler of reliability" experiment

Concerns that renewable resources and storage are unable or unwilling to provide essential reliability services

- RECs, PTC, and PPA MWh delivery obligations mitigate incentives for renewable resources to provide ancillary services

Main Takeaway

- ~37 GW of renewable generation and storage in PJM with signed GIAs but just 3.5 GW of new entry in 2023 to date
- Lack of capacity expansion is not unique to PJM as MISO and SPP both have ~30+ GW of generation with signed GIAs not in service

Data Center Load Is Pressuring Eastern & Western Ends Of PJM's Primary High Voltage Transmission System

Transmission cost allocation is likely to be a key issue as data center and emerging industrial load growth drive a need to build build-out PJM's aging 500kV + transmission backbone

Primary Observations

Data centers load growth is pressuring PJM's strategically important high voltage transmission interfaces

- AEP's 765 kV and 500 kV systems connect western and eastern PJM
- DOM's 500 kV system provides power flow to Northeastern load centers
- OH and VA load pockets are applying systemic pressure on these systems and driving a need for substantial investment in new > 500 kV infrastructure

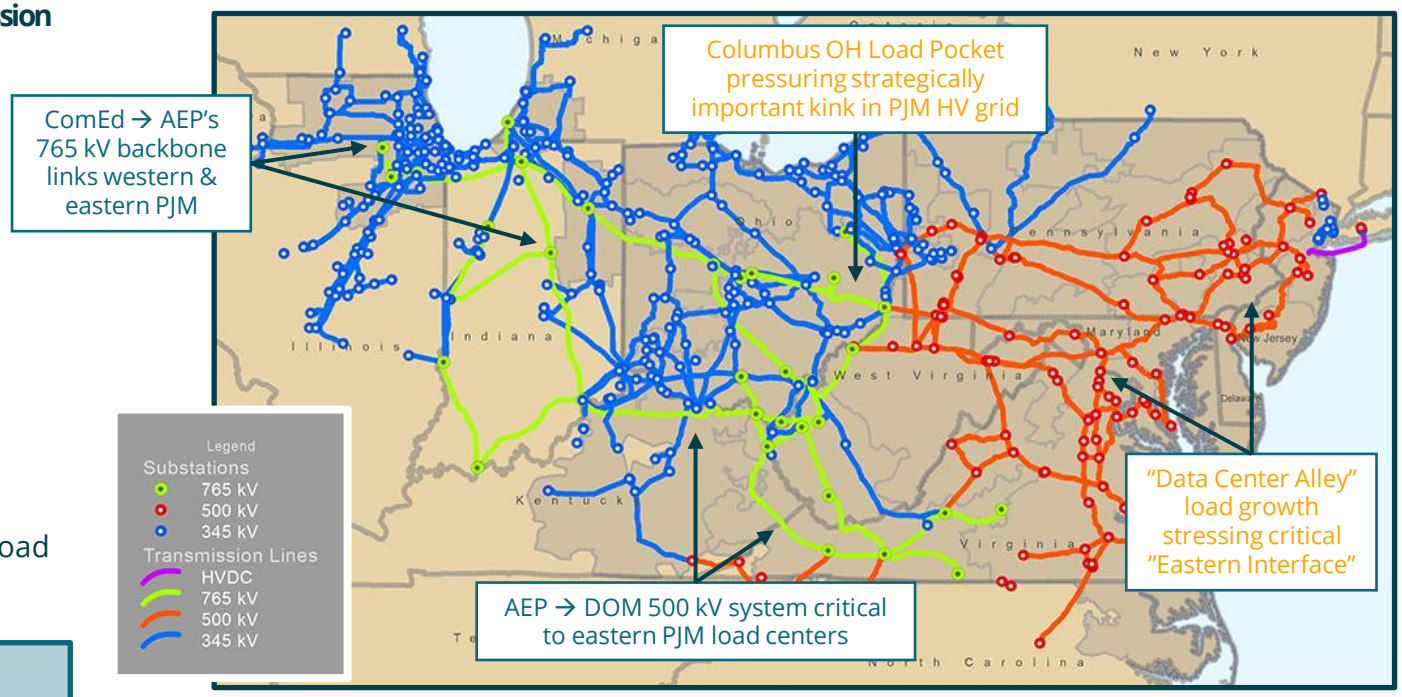
PJM inherited most of its existing high voltage transmission infrastructure

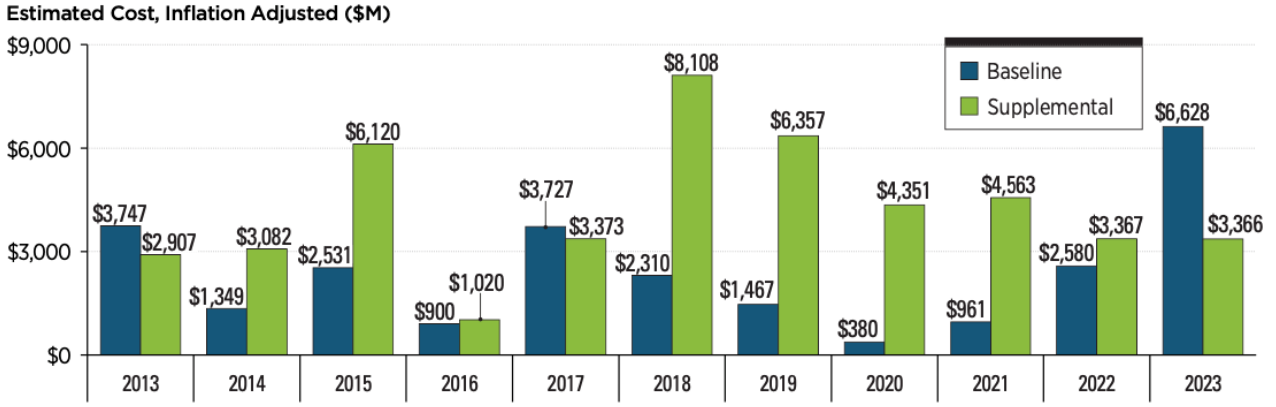
- Most of PJM's + 500 kV infrastructure in PJM was installed ~1970
- > 500 kV transmission development pre-dates PJM's western expansion
- PJM transmission planning has largely maintained status quo
- Transmission backbone end-of-life occurring simultaneously with data center load expansion driving need for systemic infrastructure investment

Main Takeaway

- PJM consistently identifying a need for upgrades on 500kV backbone that links eastern interconnection
- Aging infrastructure and new transmission needs due to higher load will lead to a substantial investment cycle throughout mid-term horizon

Data Center Load Growth Stressing PJM Transmission Backbone





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