NOVEC Data Center Load Forecast

PJM Load Analysis Subcommittee

October 25, 2024

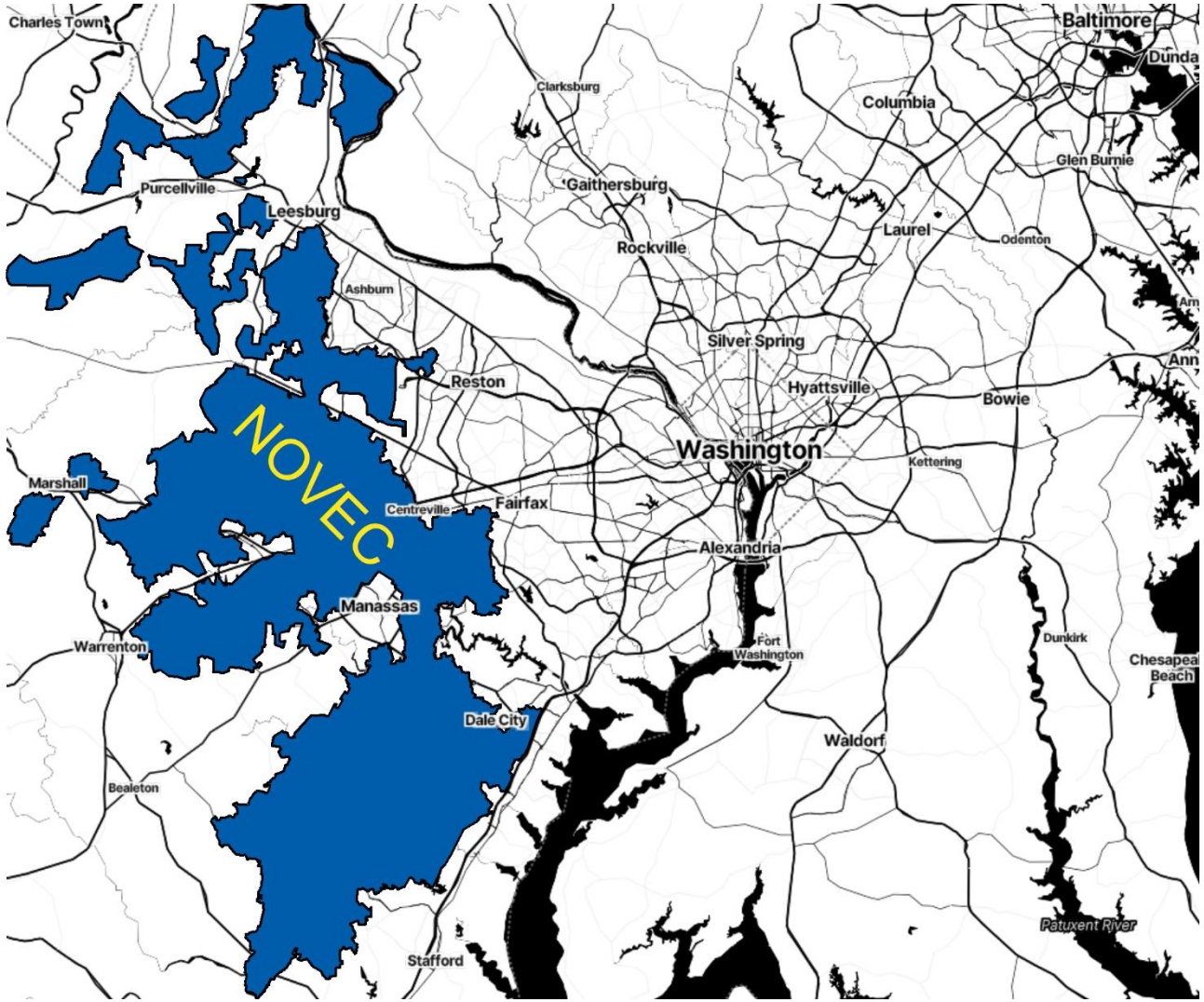
Overview

- NOVEC has requested that PJM incorporates an adjustment in the upcoming 2025 PJM Load Forecast to reflect data center growth in NOVEC service territory
- NOVEC 2024 Data Center Forecast Timeline:
  - ✓Aug 1: Forecast Finalized
  - ✓Aug 2: Distributed internally
  - ✓Sep 2: Submitted to Dominion Energy Transmission Planning
  - ✓Sep 9: Submitted to PJM Load Analysis Team
  - ✓Sep-Oct: Responded to inquiries from PJM staff
  - ❑**Oct 25: Present at PJM LAS**
  - ❑Nov-Dec: Prepare written document for PJM Load Forecast

Agenda

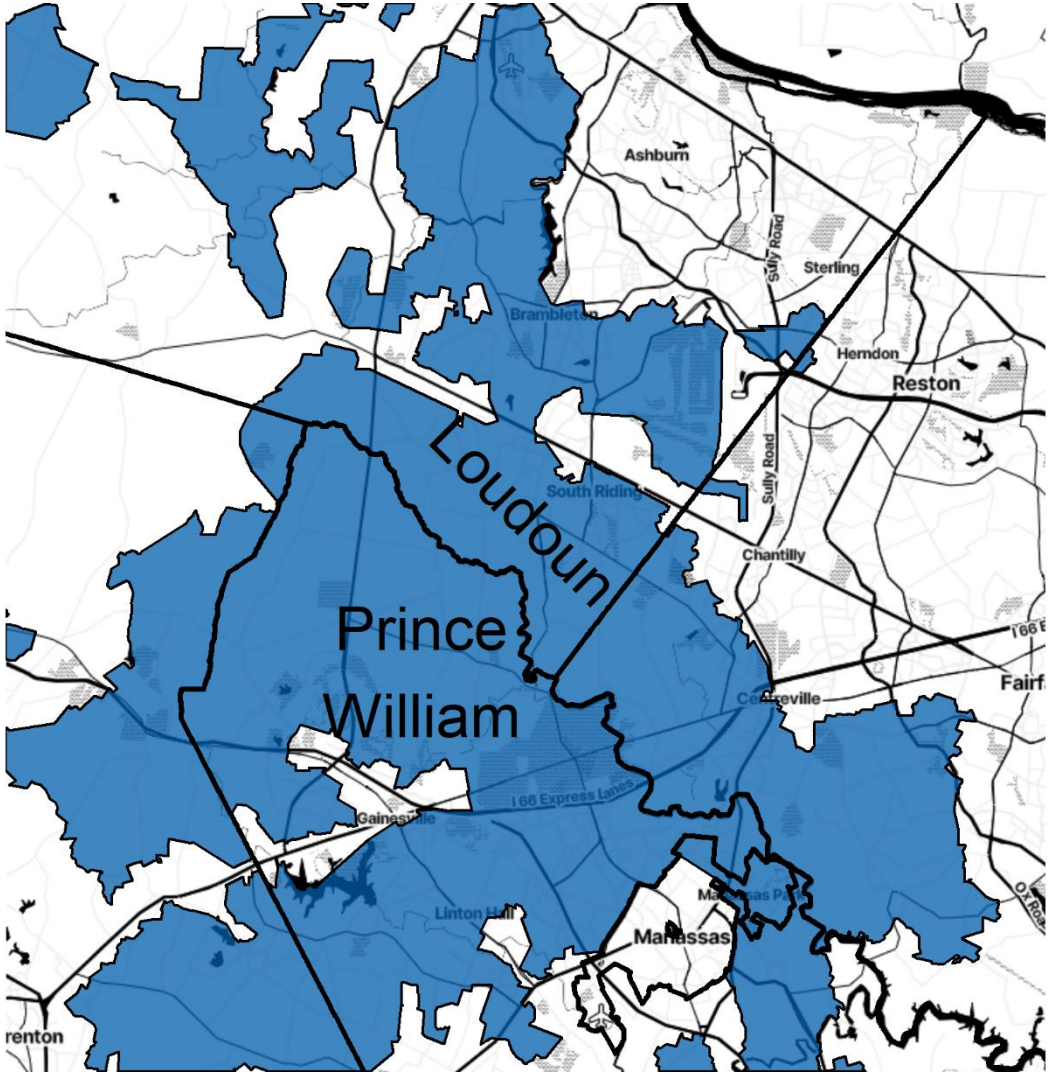
- Goal: Present on NOVEC's load forecast adjustment request as required by PJM Manual 19 Attachment B
- Agenda:
  - Brief background on NOVEC
  - Data center activity in Northern Virginia
  - NOVEC's forecasting methodology
  - NOVEC 2024 Data Center Load Forecast
  - Comparison of 2024 vs 2023 forecasts
  - Q&A
- Key takeaways:
  - NOVEC has a sound, defensible process for producing data center load forecasts
  - NOVEC's data center forecast should be incorporated as an adjustment in the 2025 PJM Load Forecast

About NOVEC



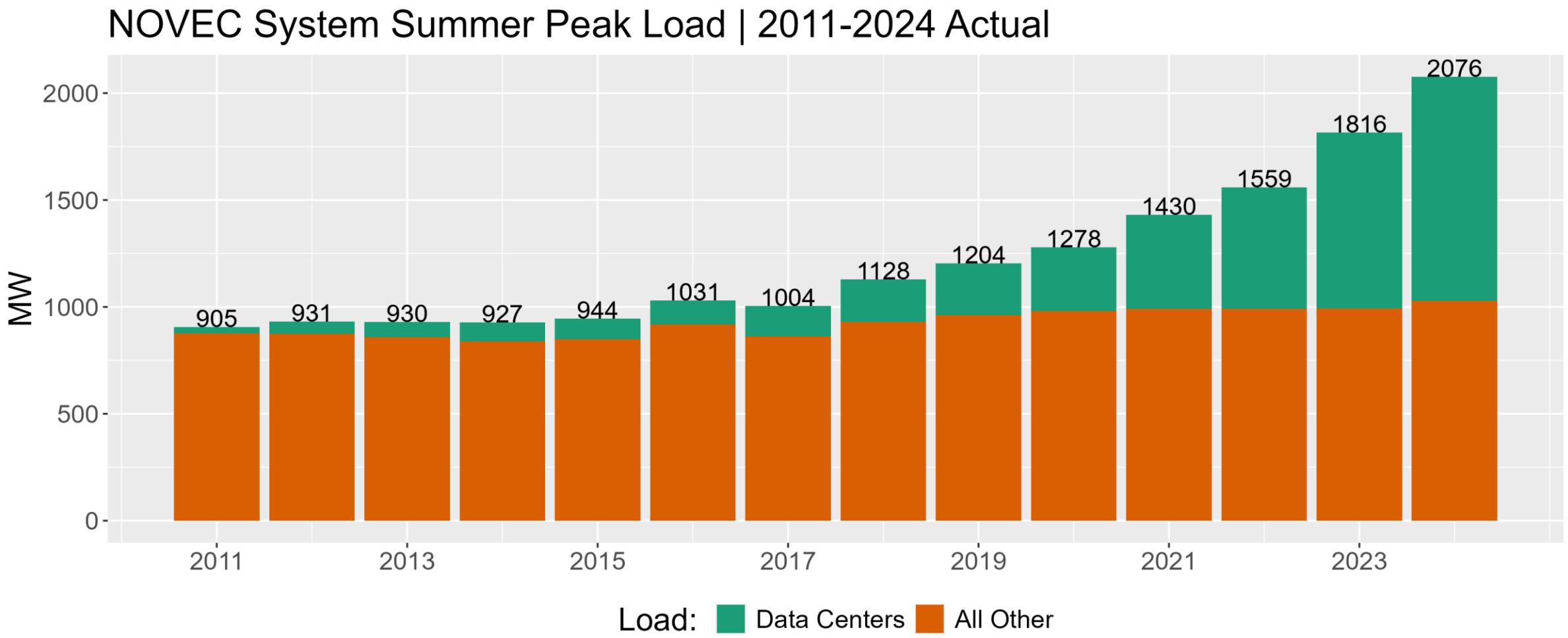
- NOVEC: Northern Virginia Electric Cooperative
- Largest US electric distribution cooperative by KWH sales
- Service Territory: 651 square miles of primarily suburban/exurban
- Customer Mix: residential, small commercial, critical government facilities, data centers, and other large power
- Meters: Approx. 180,000 (~275 per square mile)

NOVEC Data Centers



- NOVEC serves 50+ data centers with approx. load of 1000 MW
- Contribution:
  - Energy: 64% (Oct. 23-Sep. 24)
  - Summer Peak: 51% (Jul. 24)
  - Winter Peak: 51% (Jan. 24)
- Key hotspots: Loudoun and Prince William

Rapid Load Growth for NOVEC

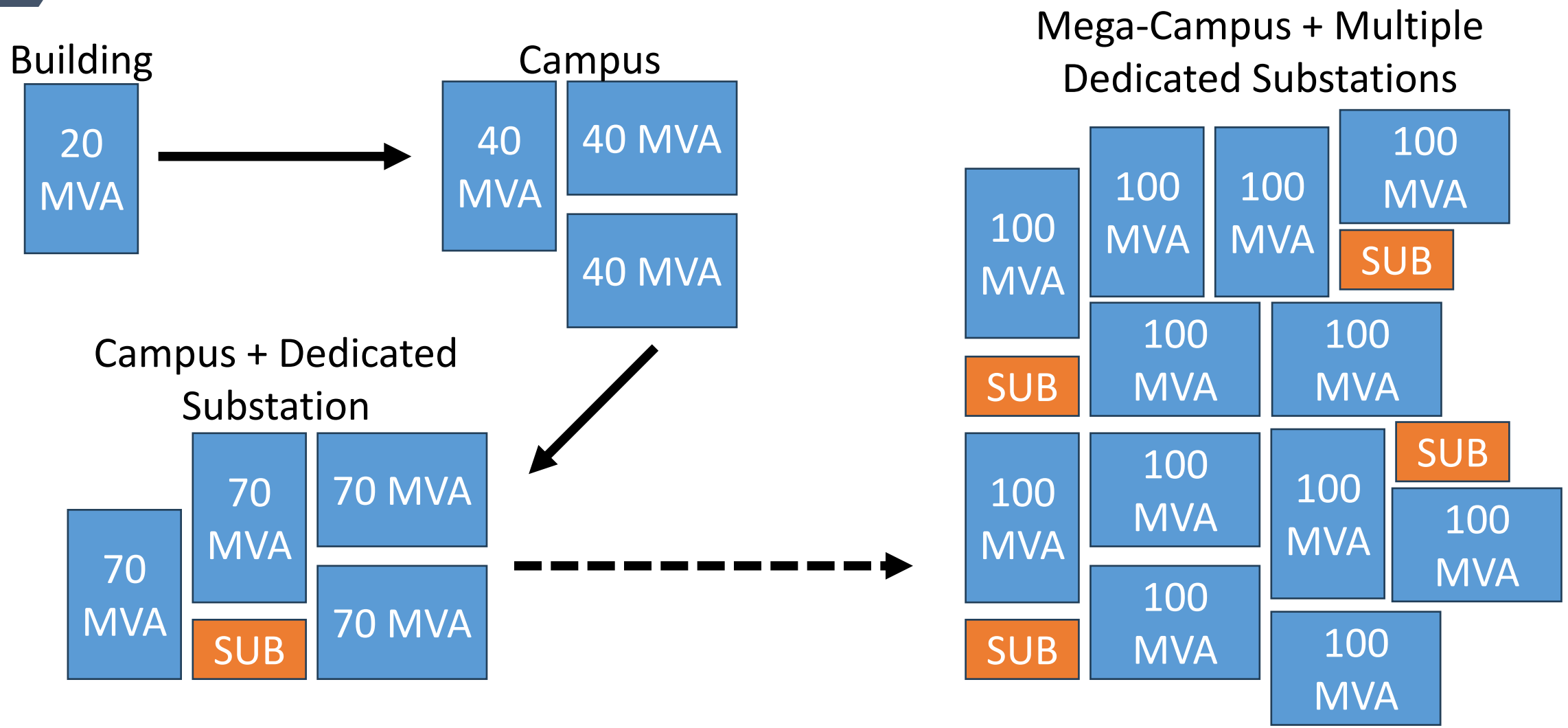


Source: NOVEC

Data Center 101

- Key terms:
- Contracted capacity – nameplate capacity of the building's electric service
- Metered demand – building's actual usage
- Utilization rate – metered demand as a percentage of contracted capacity

Data Center Developments



Data Center Load Profile

- Two phases:
  1. Ramping – load increases over time while building is filled out
  2. Maturity – building is fully constructed, load remains relatively stable over time
- Key features:
  - Daily/weekly/annual seasonal patterns
  - Weather sensitivity (cooling only)
  - Very high load factor
- Heterogeneity: every customer, campus, and building is unique

Methodology Overview

- NOVEC utilizes a bottom-up forecasting approach for data centers
  - Forecast load on individual buildings
  - Aggregate building loads to campus, substation, region, system
- Phase one: identify all data centers in NOVEC service territory
- Phase two: produce metered load forecast for each building

Phase one: Planning

- NOVEC identifies all current and upcoming data center projects within our service territory
- Includes: active, under construction, or planned projects highly likely to be successfully developed
- NOVEC's analysis includes:
  - Collecting a detailed site plan
  - Identifying the electric infrastructure that will serve each project

Phase two: Forecasting

- NOVEC generates a metered load forecast for each building identified in the planning phase
- Econometric models were developed and are used by NOVEC staff to predict building-level utilization rates (metered demand/contracted capacity) conditional on:
  - Calendar factors (day of week/day of year)
  - Weather factors (cooling degree days)
  - Past behavior at the customer, campus, and/or building-level when available
- Building-level forecasts are aggregated to campus/substation/region/system as needed

NOVEC Data Center Forecast

August 2024 Forecast Vintage

- Forecast generated August 2024
  - Incorporates projects identified and vetted through 2024-07-31
  - Econometric models estimated with metered load data through 2024-07-31
- **NOVEC requests PJM incorporate this forecast as an adjustment to the upcoming 2025 PJM Load Forecast**

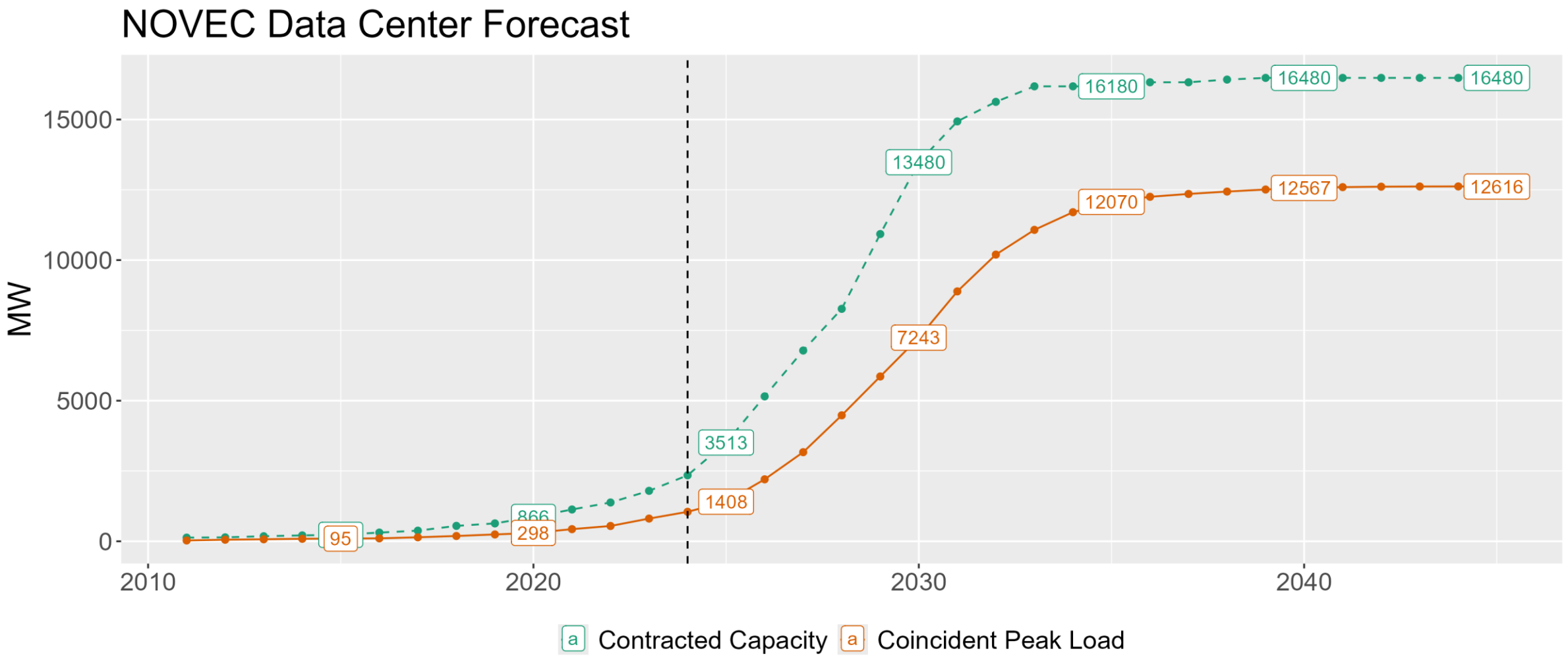
Near-term Forecast

August 2024 Forecast Vintage

	Actual					Forecast				
	Jul 2020	Jul 2021	Jul 2022	Jul 2023	Jul 2024	Jul 2025	Jul 2026	Jul 2027	Jul 2028	Jul 2029
Data Centers (#)	29	33	37	47	55	74	97	118	138	167
Yr-Yr Change	5	4	4	10	8	19	23	21	20	29
Contracted Capacity (MVA)	866	1,131	1,380	1,794	2,347	3,513	5,153	6,784	8,266	10,927
Yr-Yr Change	230	265	249	414	553	1,166	1,640	1,631	1,482	2,661
Coincident Peak Load (MW)	**298**	**432**	**545**	**808**	**1,049**	**1,408**	**2,204**	**3,170**	**4,480**	**5,861**
Yr-Yr Change	**55**	**134**	**113**	**263**	**241**	**359**	**796**	**966**	**1,310**	**1,381**

Long-term Forecast

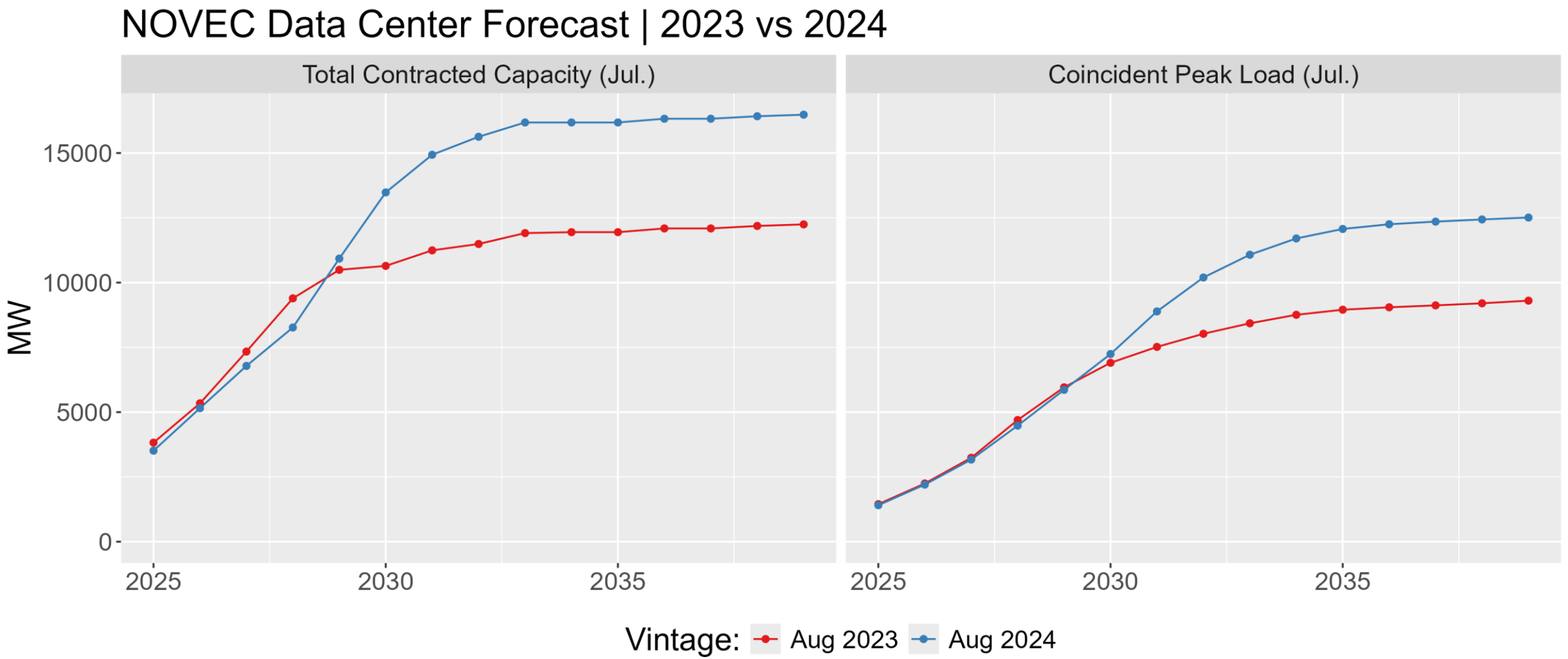
August 2024 Forecast Vintage



- Updates for the 2024 Forecast:

1. New projects added
   - Net impact: substantial increase in long-term contracted capacity/peak load levels
2. Updates to existing project timelines
   - Net impact: modest reduction in near-term growth
3. Re-trained load models with latest metered load readings
   - Net impact: negligible change in projected utilization rates

Forecast Updates: 2023 vs 2024



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