PSE&G Load Forecast Adjustment Request

Presentation for the PJM Load Analysis Subcommittee

October 18, 2023

PSE&G Requests Adjustment To The 2024 PJM Load Forecast for PS Zone

- An accurate load forecast is crucial to ensuring grid reliability in the near-term and long-term.

- PSE&G requests adjustments to PJM's 2024 load forecast to improve the accuracy of PJM's load forecast. Adjustments include reflecting New Jersey state policy targets and capturing shifts in energy consumption patterns that PSE&G is observing.

- PSE&G's request spans four categories:

  - EV growth

  - Data center growth

  - Port electrification

  - New large load

Light Duty Electric Vehicle Load

The 2024 PJM load forecast should incorporate the PSE&G electric vehicle projections of peak contributions.

- New Jersey is expected to attain its Light Duty EV Goals.

  - The Plug In Vehicle Act adopted January 9, 2020 established state goals of at least 330,000 of the total number of light duty vehicles to be electric by 2025, at least 2 million by 2035, and at least 85 percent of all light duty vehicles sold or leased to be electric by 2040.

  - In July of 2023, the Governor of New Jersey announced the filing of the Advanced Clean Cars II proposal with the Office of Administrative Law. This proposal requires auto makers to increase the percentage of zero emission light duty vehicles, ramping up to 100% by 2035.

- PSE&G's load adjustment request is based on:

  - Electric vehicle population for the PS zone produced by Gabel Associates ("Gabel") in April 2022. Gabel is a New Jersey consulting firm headquartered in New Jersey that has a comprehensive electric vehicle policy and analysis practice.

  - PSE&G also used energy and power input factors from Gabel to forecast load. PSE&G's extension of the Gabel forecast framework to 2039 to incorporate the impact of New Jersey attaining the Advanced Clean Cars II goals

Light Duty Electric Vehicle Peak Load Impact

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Effective[1] Number (Million) Of LDVs	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.6	1.8	1.9
Percentage Of Vehicles Charging @ 6PM)																	
Residential (Private and Multi-Family)	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%
Workplace	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Public Charging (mostly DCFC)	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Average Charging Power Per Vehicle (kWs)																	
Residential (Private and Multi-Family)	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
Workplace	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
Public Charging (mostly DCFC)	53.8	57.7	61.5	65.4	69.2	73.1	76.9	80.8	84.6	88.5	92.3	96.2	100.0	100.0	100.0	100.0	100.0
Peak Load Calculations	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**
Peak Charging Load, Per Segment (MWs) @ 6PM																	
Residential (Private and Multi-Family)	54	81	116	159	207	259	315	373	435	502	572	646	758	898	1,024	1,136	1,236
Workplace	3	5	7	9	12	15	18	21	25	28	32	36	43	51	58	64	70
Public Charging (mostly DCFC)	14	22	34	49	67	89	114	142	173	209	249	292	357	423	482	535	582
Total	71	108	156	216	286	363	446	535	633	740	853	975	1,157	1,371	1,563	1,735	1,888

1:Effective Number of vehicles: Number of vehicles in the middle of the year

Medium and Heavy-Duty Electric Vehicle Load

> **The 2024 PJM load forecast should incorporate the PSE&G electric vehicle projections of peak contributions.**

- Gabel was also hired to provide a medium and heavy-duty ("MHD") electric vehicles forecast for the PS zone through 2035. Similar to the light-duty EV forecast, the MHD EV forecast was extended through 2039.

- Gabel estimated that up to 30% of the MHD vehicles will charge at the time of peak based on vehicle telematics data for several large diversified fleets as well as charging profiles for the subset of those vehicles already electrified.

- Forecast is supported by the Plug In Vehicle Act enacted in January 2020, which included electrification requirement on new bus purchases (ramping up from 2% to 100% by 2032) and the Advanced Clean Truck Act enacted in December 2021 that set increasing targets for new Class-2 to Class-8 vehicles to be electric through 2036.

MHDV Peak Load Impact

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Effective Number Of MHDVs	367	1,272	2,537	4,243	6,627	9,875	13,924	18,642	23,905	29,636	35,603	41,598	47,617	53,636	59,655	65,675	71,694
Percentage Of Vehicles Charging at Loacation																	
Depot Charging	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
En-Route Charging	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Average Charging Power Per Vehicle, Per Day (kWs)																	
Depot Charging	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
En-Route Charging	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Peak Load Calculations	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**
Depot Charging	17	57	114	191	298	444	627	839	1,076	1,334	1,602	1,872	2,143	2,414	2,684	2,955	3,226
En-Route Charging	6	19	38	64	99	148	209	280	359	445	534	624	714	805	895	985	1,075
Total	22	76	152	255	398	592	835	1,119	1,434	1,778	2,136	2,496	2,857	3,218	3,579	3,940	4,302
30% Coincidence at time of Peak (MHDVs)	7	23	46	76	119	178	251	336	430	533	641	749	857	965	1,074	1,182	1,290

LDV & MHDV Peak Load Impact

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Total Peak Load Charging (LDVs + MHDVs)	78	131	202	293	405	541	697	871	1,063	1,273	1,494	1,723	2,014	2,337	2,637	2,917	3,178

Data Centers

The 2024 PJM load forecast should be adjusted to incorporate the PSE&G projections of additional data center peak load contributions expected in the 2024-2039 timeframe.

- PSE&G currently has 34 data center sites with a summer peak demand of 290MW.

- Data centers are significant users of on-peak electricity and, since they are more energy intensive than the average commercial activity, data centers are not captured by the PJM econometric based load forecast model framework.

- PSE&G's data center load will increase by 277 MW by 2031 due to addition of four new data centers and the expansion requests of 18 of the existing data center.

- These additions are consistent with the analysts' projections of 10 percent annual growth in energy use by data centers[2,3].

- Data center load will continue to grow past 2031 given the trend that factors driving the increased demand for data centers will continue past 2031 and evidence[4] that companies are planning to investing in data centers beyond 2031.

2: McKinsey & Company, "Investing in the rising data center economy", January 17, 2023
3: Prescient & Strategic Intelligence, "Data Center Market Size and Share Analysis by Infrastructure Type (IT Infrastructure, Support Infrastructure, General Construction), Type (Co-Location, Hyperscale), End User (BFSI, IT and Telecom, Healthcare, Government and Defense) - Global Industry Demand Forecast to 2030", March 2023
4: Insidenova.com, "Amazon investing $35 billion in data centers across Virginia by 2040", January 20, 2023.

Existing and Projected Data Center Load (MW)

	Existing Customers	Expansions of Existing Customers	New Customers	Forecast	Total
2023	290	13	0	0	303
2024	290	34	15	0	339
2025	290	56	37	0	383
2030	290	136	127	0	553
2035	290	147	130	115	682
2039	290	147	130	230	797

Port Electrification

The 2024 PJM load forecast should be adjusted to incorporate additional peak load contributions due to the electrification of the ports of Newark, Elizabeth, and Bayonne expected in the 2027-2030 time frame.

- The Clean Ports Program in the Inflation Reduction Act includes $3 billion in funding to plan, purchase or install zero-emission port equipment or technology at the nation's ports[5].

- The electrification of ports is seen as a key way to reduce air pollutants and address public health and environmental impacts on surrounding communities.

- The Port Authority of New York and New Jersey (PANYNJ) has begun planning to electrify the Ports of Newark, Elizabeth and Bayonne to achieve the goal of net zero carbon emissions by 2050[6].

- This load increase is not captured by the PJM Load Forecasting Model's economic drivers.

5: United States Environmental Protection Agency, "Clean Ports Program", https://www.epa.gov/inflation-reduction-act/clean-ports-program
6: Squires, Anna," NREL Leads the Charge to Electric Trucks at Port of New York and New Jersey", National Renewable Energy Laboratory, January 30, 2023.

Port Electrification; Cont'd.

- PSE&G estimated the load impacts of the electrification of these three ports.

- The following port equipment would be electrified, which would result in an additional 81MW of peak load by 2030:

    ➢ Container cranes

    ➢ Gantry cranes

    ➢ Forklifts

    ➢ Stackers

    ➢ Tractor trucks

- This initiative will also include the electrification of the "cold iron"[7] function of the ports, which is estimated to be 49MW by 2030.

- The projected schedule for the port electrification is shown below:

	2027	2028	2029	2030
Port Electrification Peak Impact (MW)	33	66	99	130

7: Supplying the electrical needs of the docked ships while at the port
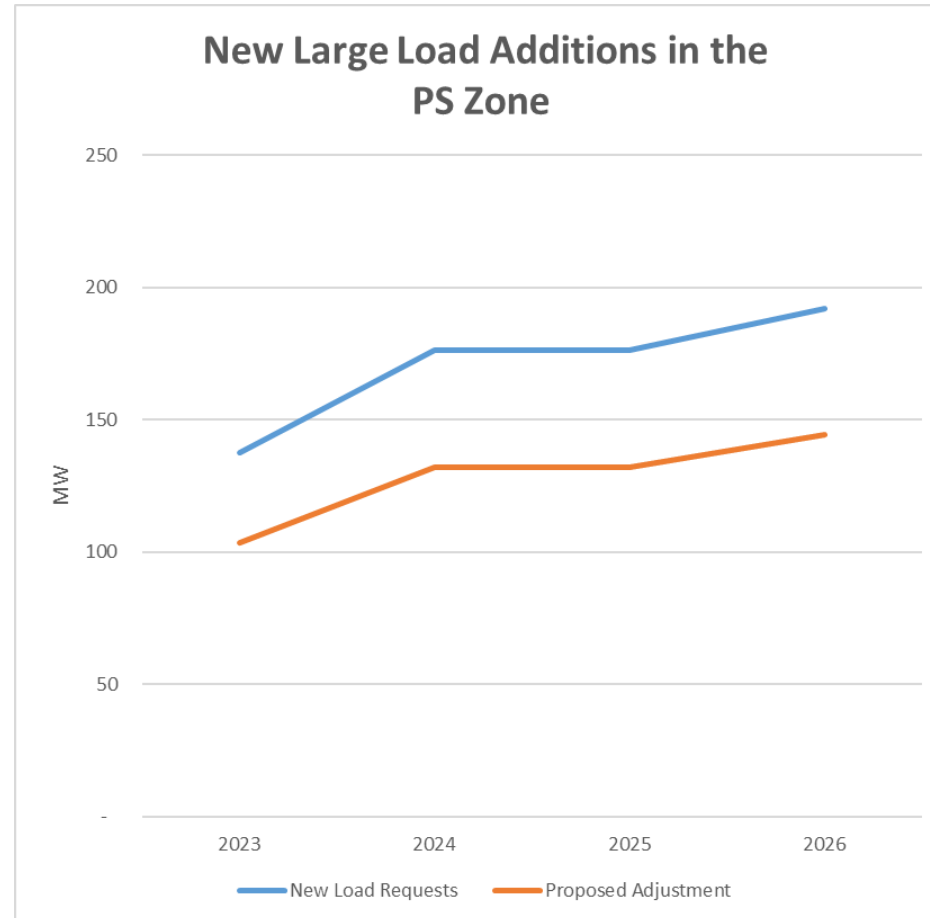
New Large Load

The 2024 PJM load forecast should be adjusted to incorporate 75 percent of the PSE&G projections (143 MW) of the New Large Load.

- As the economy has recovered from the pandemic-induced economic slowdown, PSE&G has received many requests for service of new large loads.

- These large loads are not fully captured by the PJM Load Forecasting Model's economic drivers.

- Requests for load, in excess of 1MW in demand, have come from diverse group of economic sectors and amount to 191MW.

- This load is expected to come online between 2023 and 2026.

- PSE&G continues to receive large load requests such as site-specific truck charging, and hydrogen electrolysis.

Customer Type	Peak Load (MW)
Residental Building	78
Transportantion	24
Movie Studio	15
Hospital	14
Gas Pumping	13
State Government	10
Education	9
Manufacturing	9
Vertical Farming	5
Airport	3
Others	3
Commerial Real Estate	3
Religious	2
Movie Theatre	2
Retail	1
Total	**191**

New Large Load; Cont'd.

- Internal analysis indicates that a significant portion, historically 75%, will reach completion and be added to the system.

- Therefore, PSE&G expects approximately 143MW of peak demand added over the next few years.

New Large Load Additions in the PS Zone

PSEG

Thank *you*