Needs Assessment Overview & Results

April 10, 2018

Overview

- The Needs Assessment provides forecasts of Federal system energy, capacity, and balancing reserve needs
  - Considers federal system resources and load obligations

- These results inform later steps of the Resource Program process

- The Needs Assessment methodology is largely unchanged from previous Resource Programs
  - Expanded to a 20 year continuous forecast
  - Updated to a frozen efficiency load forecast

Metrics

- **Annual Energy**
  - Evaluates the annual energy surplus/deficit under 1937-critical water conditions
- **P10 Heavy Load Hour**
  - Evaluates the 10th percentile (P10) surplus/deficit over heavy load hours by month, given variability in hydro generation, loads, and Columbia Generating Station output
- **P10 Superpeak**
  - Evaluates the P10 surplus/deficit over the six peak load hours per weekday by month, given variability in hydro generation, loads, and Columbia Generating Station output
- **18-Hour Capacity**
  - Evaluates the ability to meet the six peak load hours per day over three-day extreme weather events assuming median water conditions
- **Balancing Reserves**
  - Evaluates the ability to meet forecasted balancing reserve demand in the BPA balancing authority area
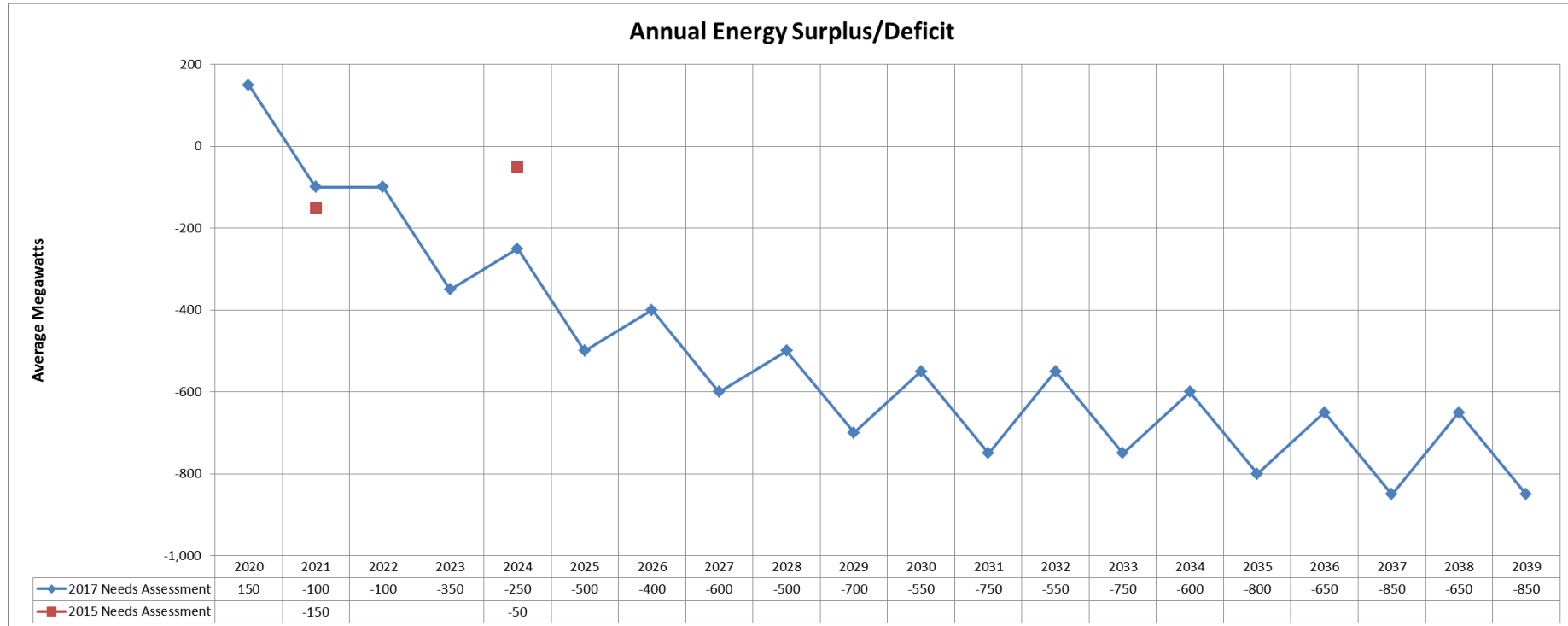
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Results Summary – Energy

- **Annual Energy** deficits begin in fiscal year (FY) 2021 and grow to 850 aMW

- The largest **P10 Heavy Load Hour** deficits occur in winter, the first half of April, and fall
  - January has the largest deficits (650 aMW in FY 2020 and 1,850 aMW in FY 2039)

- The largest **P10 Superpeak** deficits occur in winter, the first half of April, and late summer/fall
  - Near load-resource balance in FY 2020 and deficits grow to 1,000 aMW by FY 2039
  - The P10 Superpeak deficits are smaller than the P10 Heavy Load Hour deficits in most months, with the second halves of April and August being the exceptions

Results Summary – Capacity & Reserves

- Winter is **18-Hour Capacity** surplus over the study horizon, while summer is surplus in FY 2020 and deficit thereafter (550 MW in FY 2039)
    - The summer 18-Hour Capacity deficits are smaller than the P10 Superpeak deficits

- **Demand for balancing reserves** in the BPA balancing authority area is not expected to reach 900 MW of incremental reserve over the study horizon

Results: Annual Energy

Annual Energy Surplus/Deficit

|	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
2017 Needs Assessment	150	-100	-100	-350	-250	-500	-400	-600	-500	-700	-550	-750	-550	-750	-600	-800	-650	-850	-650	-850
2015 Needs Assessment		-150			-50															

- Key assumptions:
  - Hydro generation based on 1937-critical water conditions
  - Loads and Columbia Generating Station output reflect expected values

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Results: P10 Heavy Load Hour
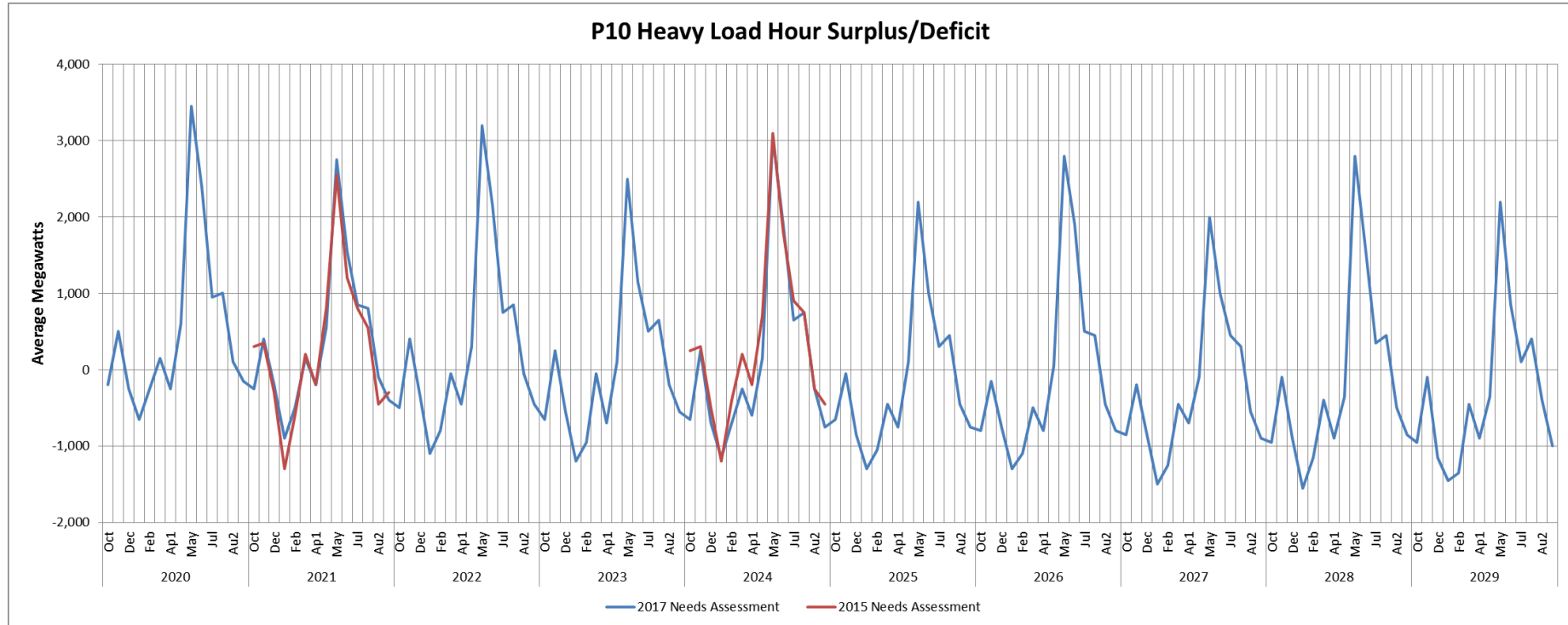
P10 Heavy Load Hour Surplus/Deficit

- Key assumptions:
  - Variability in hydro generation, loads, and Columbia Generating Station output

Results: P10 Superpeak
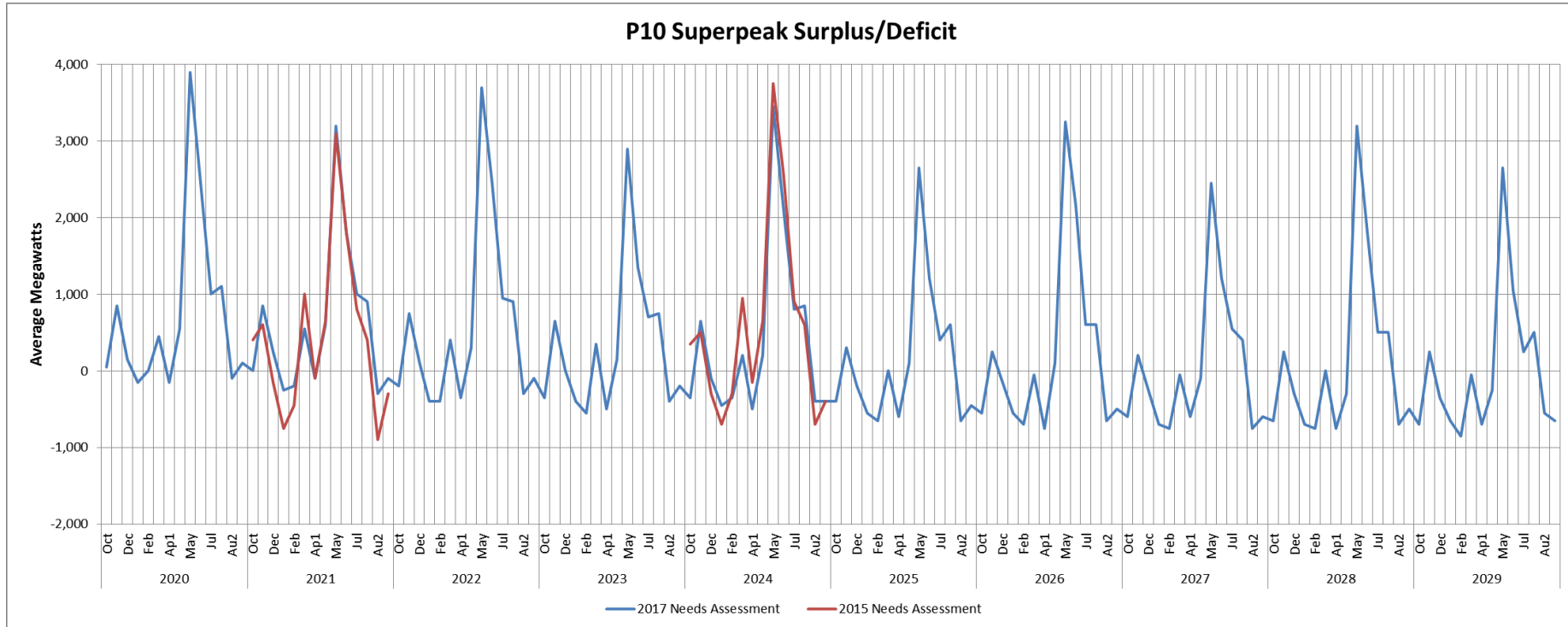
P10 Superpeak Surplus/Deficit
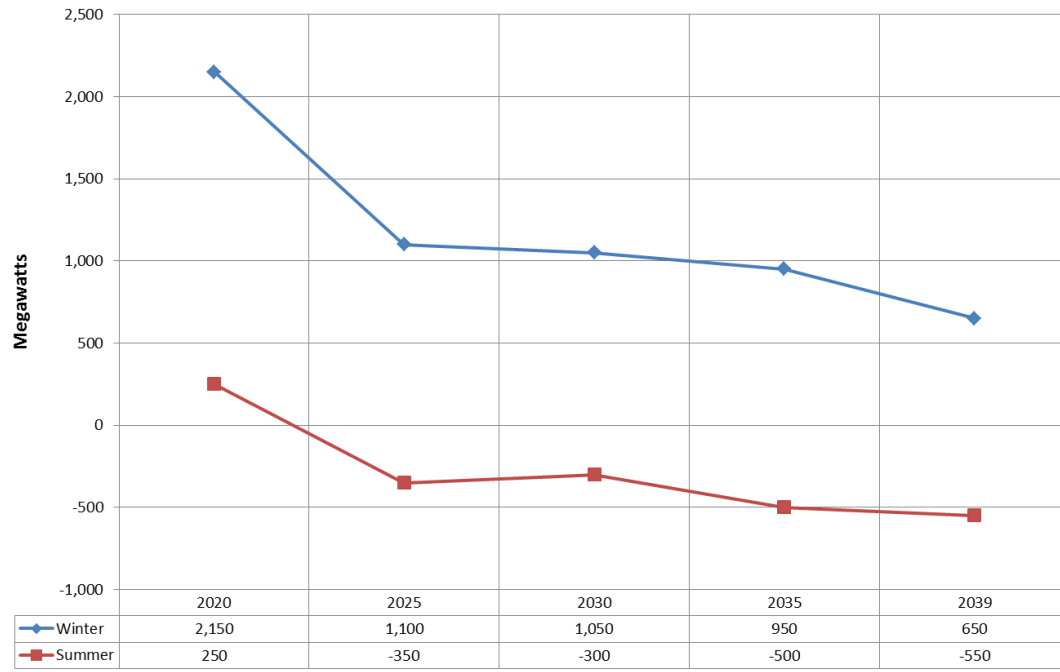
- Key assumptions:
  - Variability in hydro generation, loads, and Columbia Generating Station output

Results: 18-Hour Capacity

18-Hour Capacity Surplus/Deficit

	2020	2025	2030	2035	2039
Winter	2,150	1,100	1,050	950	650
Summer	250	-350	-300	-500	-550

- Key assumptions:
  - Hydro generation based on median water conditions
  - Loads based on three-day extreme weather event

- The 2015 Needs Assessment had surpluses of:
  - 1,150 MW in winter
  - 250 MW in summer

Results: Balancing Reserves

- There is considerable uncertainty in future demand for balancing reserves, which includes:
  - Amount and location of wind and solar development in the region
  - Scheduling practices and elections
  - Elections to self-supply
  - New or expanded markets
  - Departure of existing resources

- However, market conditions and RPS forecasts suggest future balancing reserve demand is unlikely to reach 900 MW of incremental reserve

- Will continue to monitor the balancing reserves landscape and address the issue as warranted in future Needs Assessments

Conclusion

- Overall, the results demonstrate that BPA is energy (fuel) limited
  - P10 Heavy Load Hour deficits are larger than P10 Superpeak deficits in most months
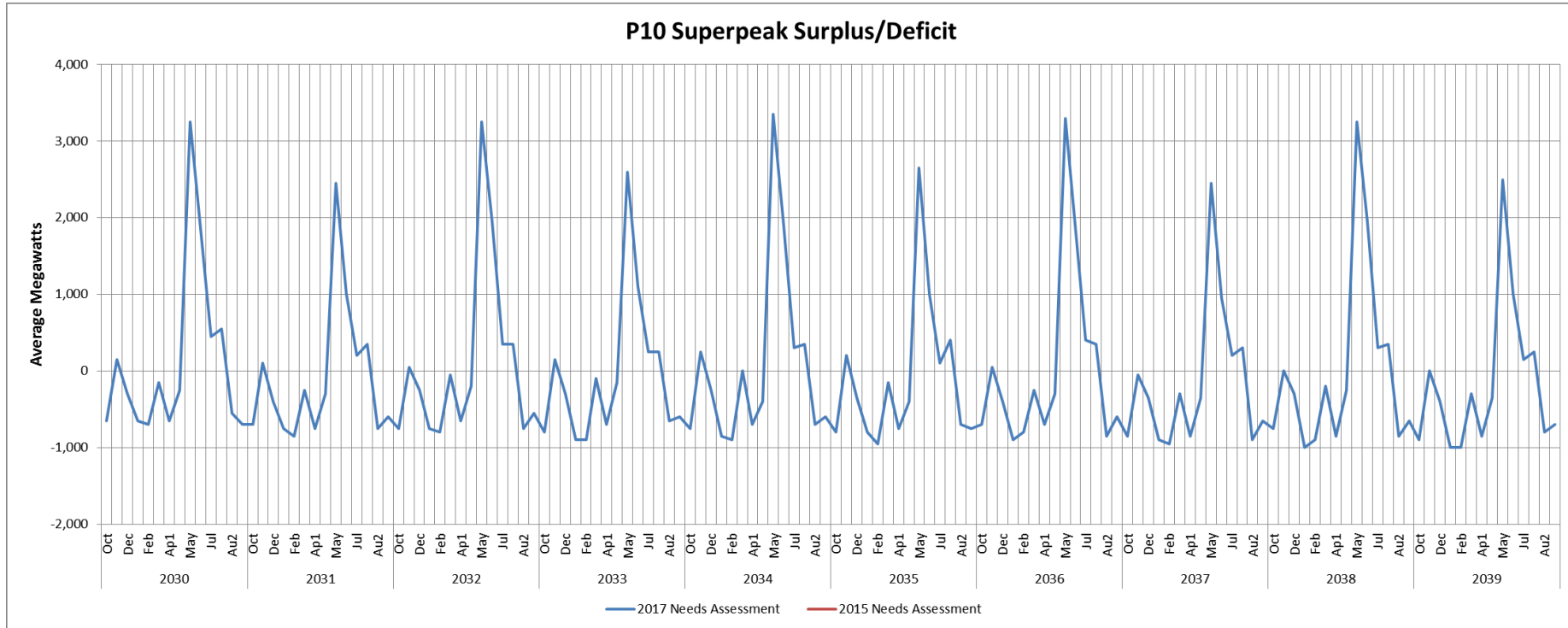 - P10 Superpeak deficits are larger than 18-Hour Capacity deficits

- The most notable change from the 2015 Needs Assessment results is that the current studies forecast summer 18-Hour Capacity deficits for most of the study horizon

Appendix: P10 Heavy Load Hour (last 10 years)
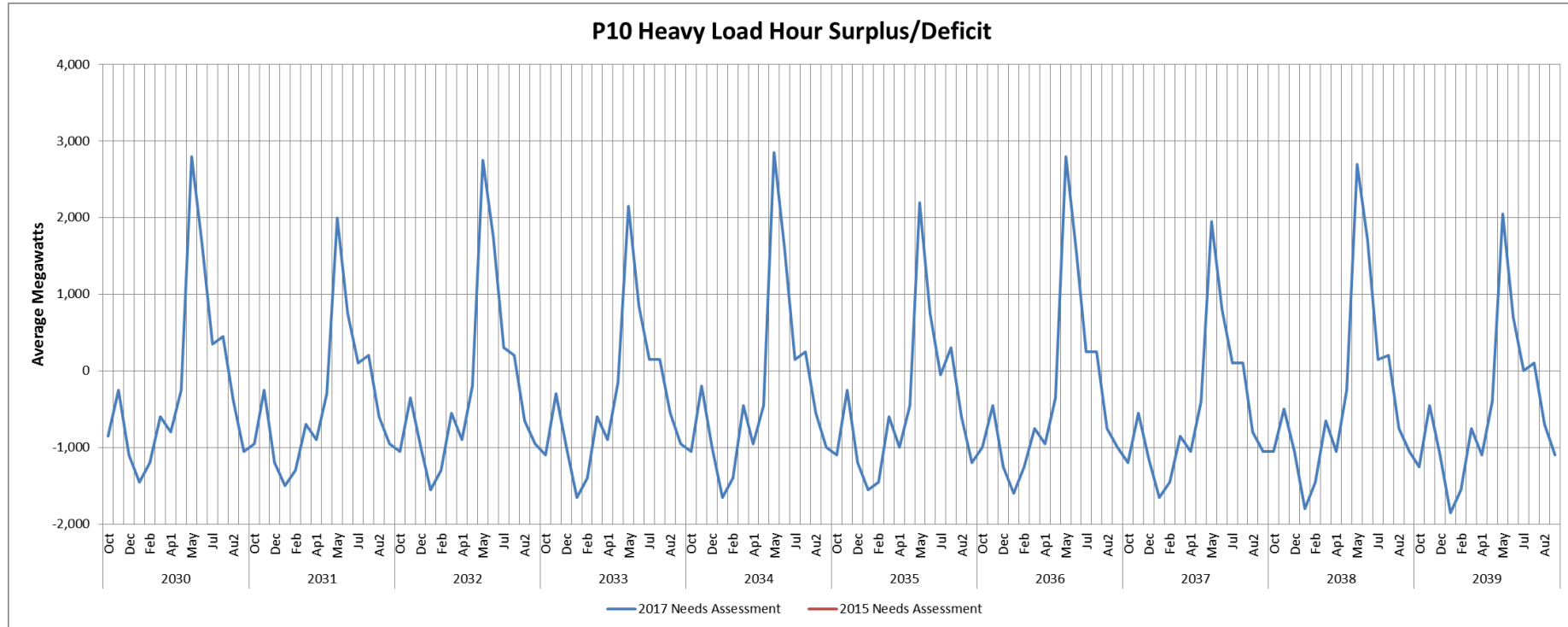
P10 Heavy Load Hour Surplus/Deficit

- Key assumptions:
  - Variability in hydro generation, loads, and Columbia Generating Station output

Appendix: P10 Superpeak (last 10 years)

P10 Superpeak Surplus/Deficit

- Key assumptions:
  - Variability in hydro generation, loads, and Columbia Generating Station output

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