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Peak and Hourly Load Forecasts for IOU Planning Areas and CAISO

IEPR Workshop:

CED 2019 Preliminary Forecast

August 15, 2019

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Purpose of Hourly Load Modeling

- Capture “peak shift” to provide more accurate peak forecasts, accounting for differential impacts of demand modifiers
- Monthly peaks for Resource Adequacy
- Provide daily “ramp-ups” for hourly loads

Structure of Hourly Load Model

- Hourly “consumption” load ratios estimated for each hour for each CAISO TAC area based on weather and calendar variables
- Average hourly “consumption” applied to load ratios to give hourly unadjusted “consumption”
- Hourly EV load, climate change impacts, residential TOU, and other consumption adjustments added; hourly PV generation subtracted to give baseline hourly sales forecasts
- Hourly AAEE subtracted to give managed sales forecasts (*CED 2019 Revised*)

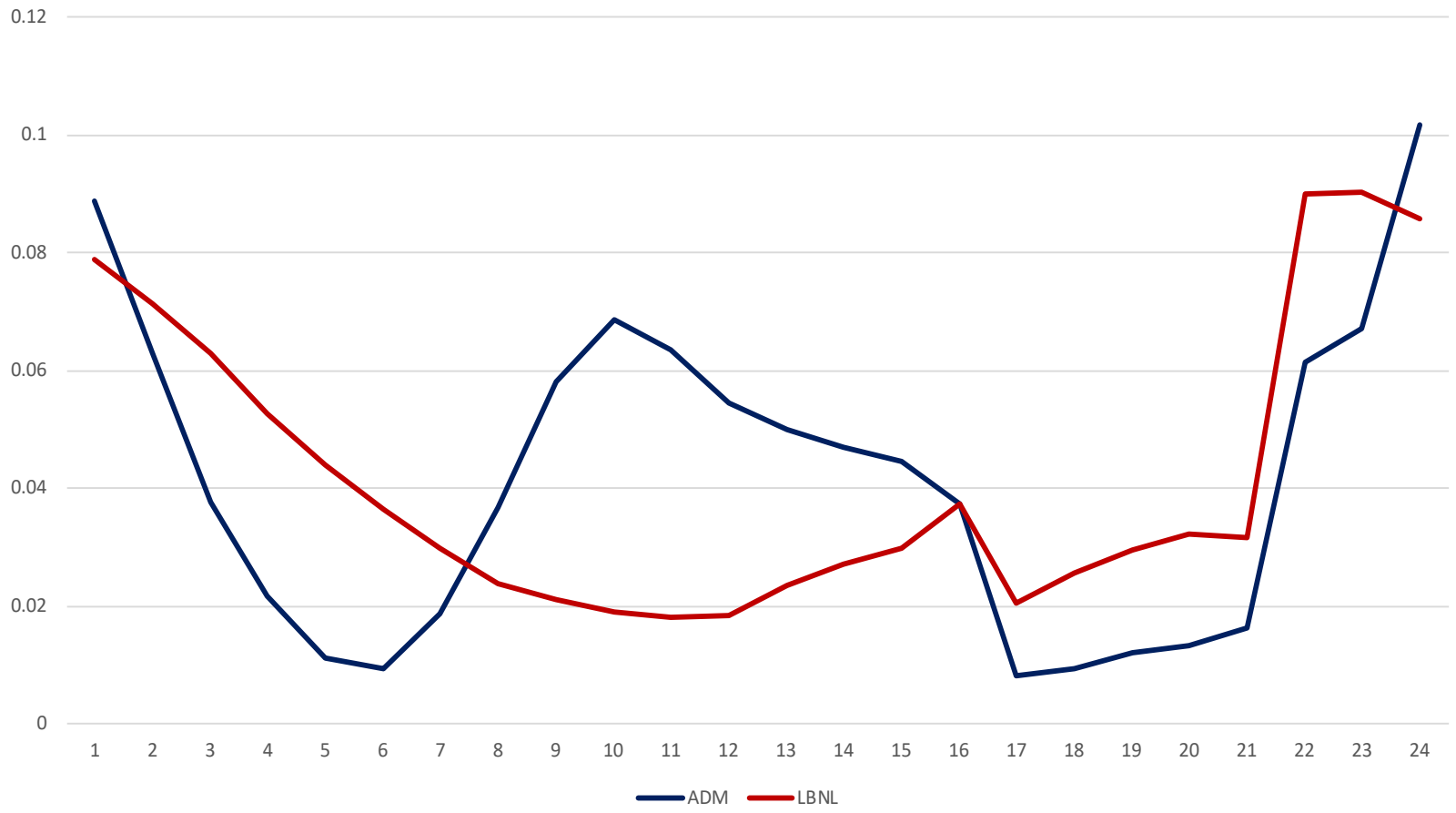
Updates for *CED 2019 Preliminary*

- Separate Estimation of Pumping Loads
  - CADWR for PG&E TAC
  - CADWR+MWD for SCE TAC
- New Hourly EV Loads
- New PV Forecast
- New AAEE numbers for revised forecast

Hourly EV Loads

- For CED 2017 and CEDU 2018, staff used hourly EV profiles from LBNL based on National Household Travel Survey
- For CEDU 2019, ADM has developed new profiles based on vehicle charging data from ChargePoint and Joint IOU Electric Vehicle Load Research Report metered residential charging profiles

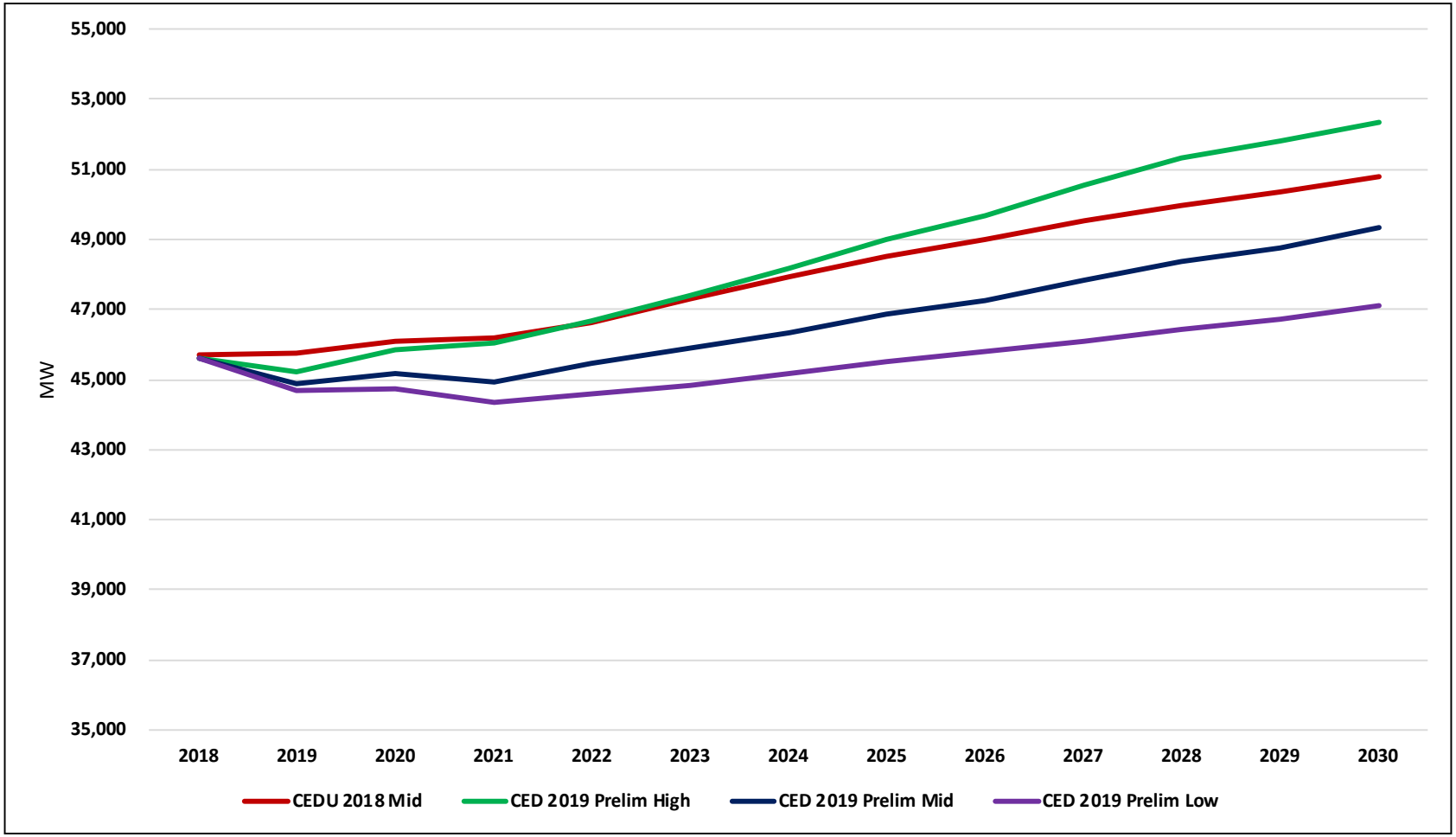
Light-Duty EV Load Comparison, SCE June Weekday 2030



Results

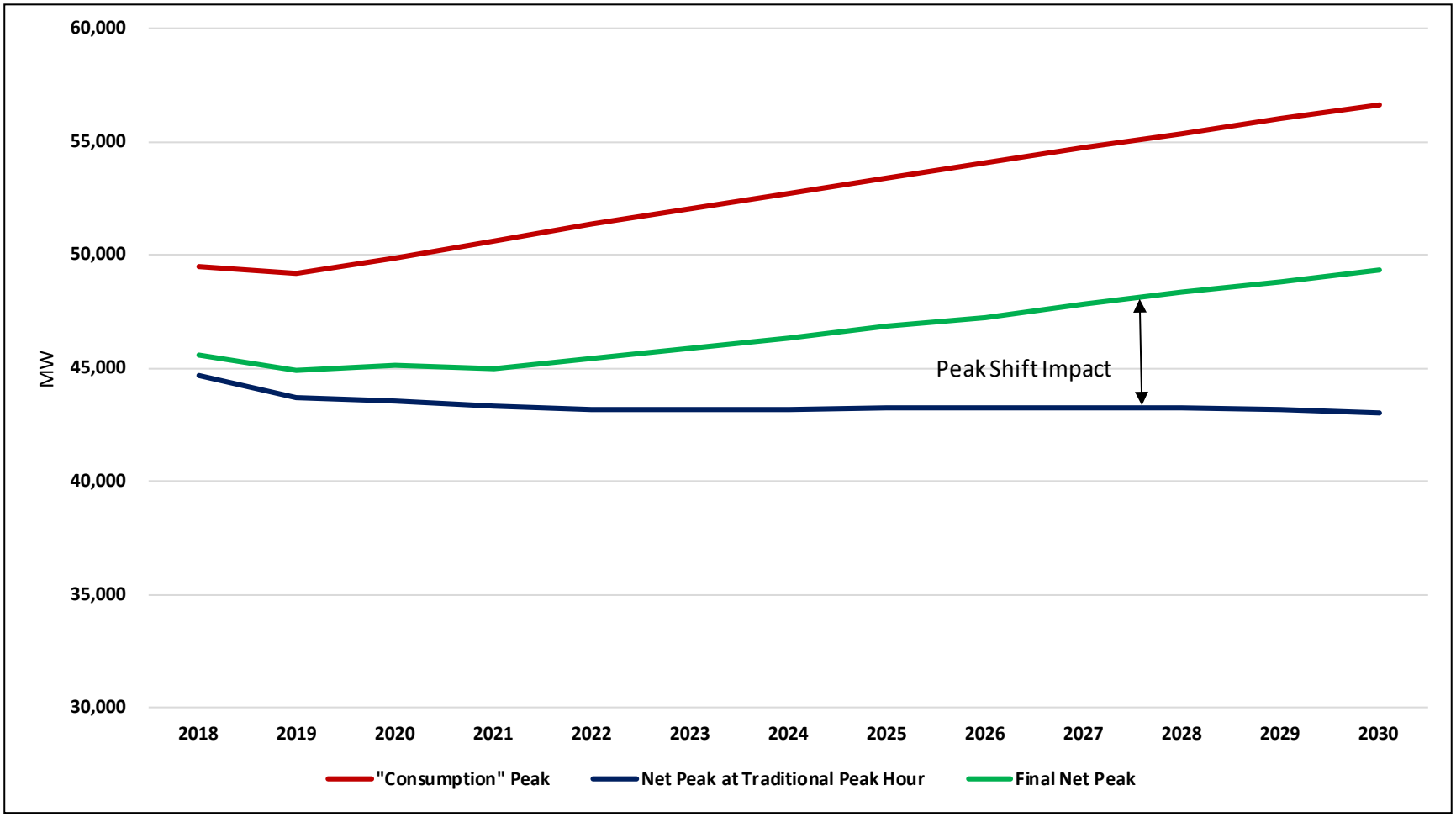
Baseline Net Peak: CAISO Territory

Average annual growth 2018-2030 of 0.66% in new mid case vs. 0.88% for CEDU 2018

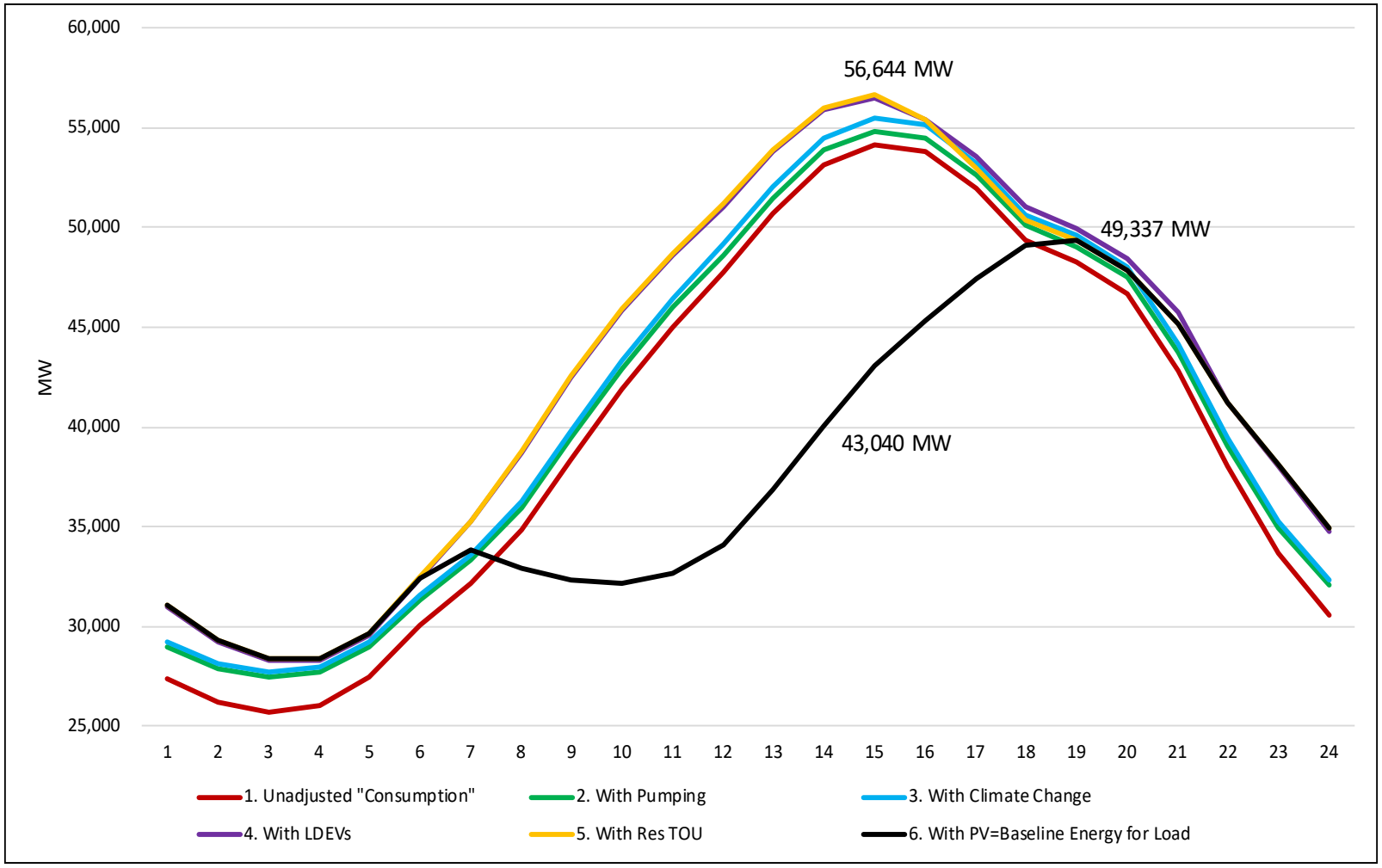


“Consumption” and Net Peaks: CAISO Mid Case

Peak shift impact ~ 6,300 MW in 2030

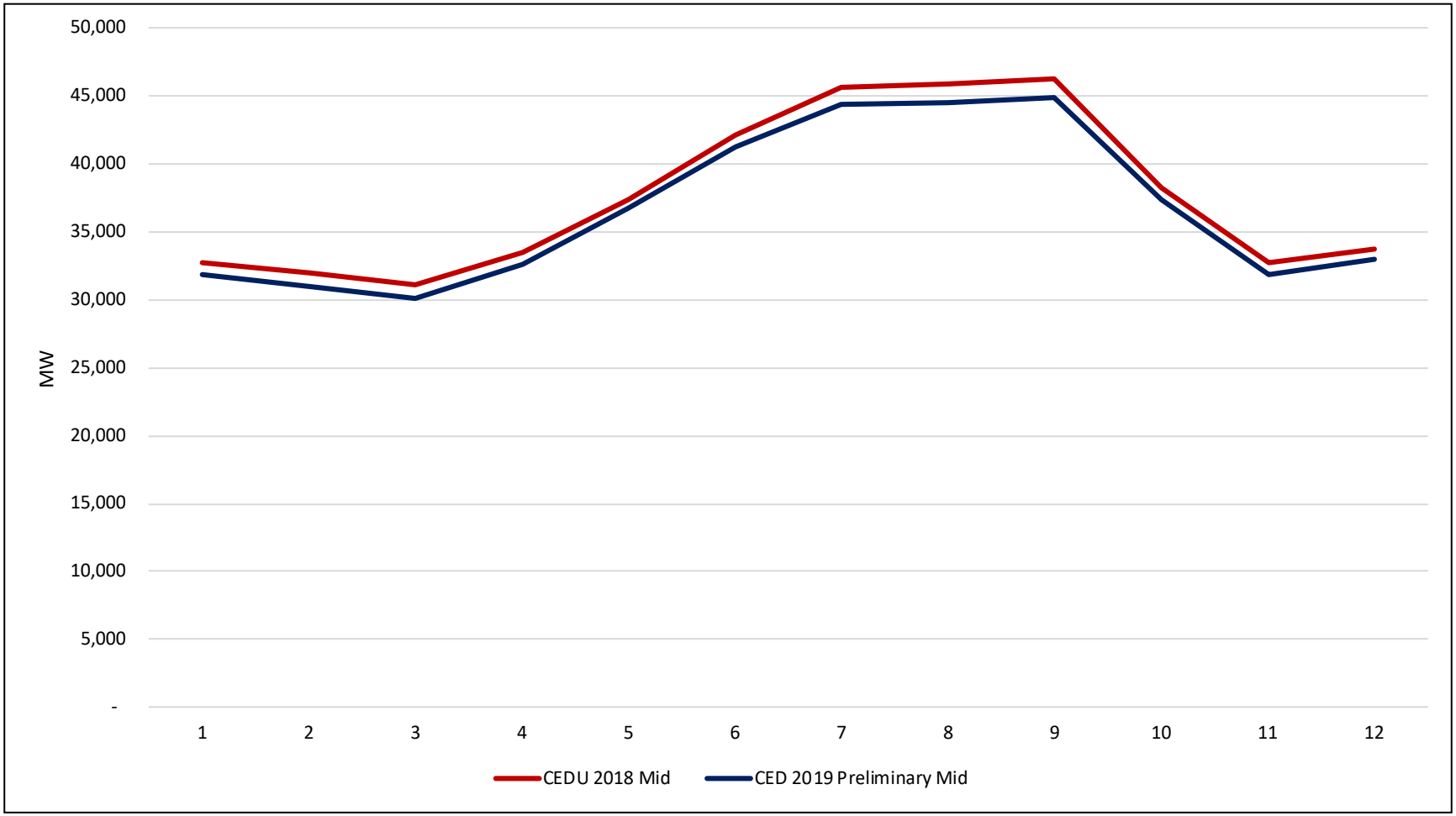


2030 Peak Day: CAISO Mid Case



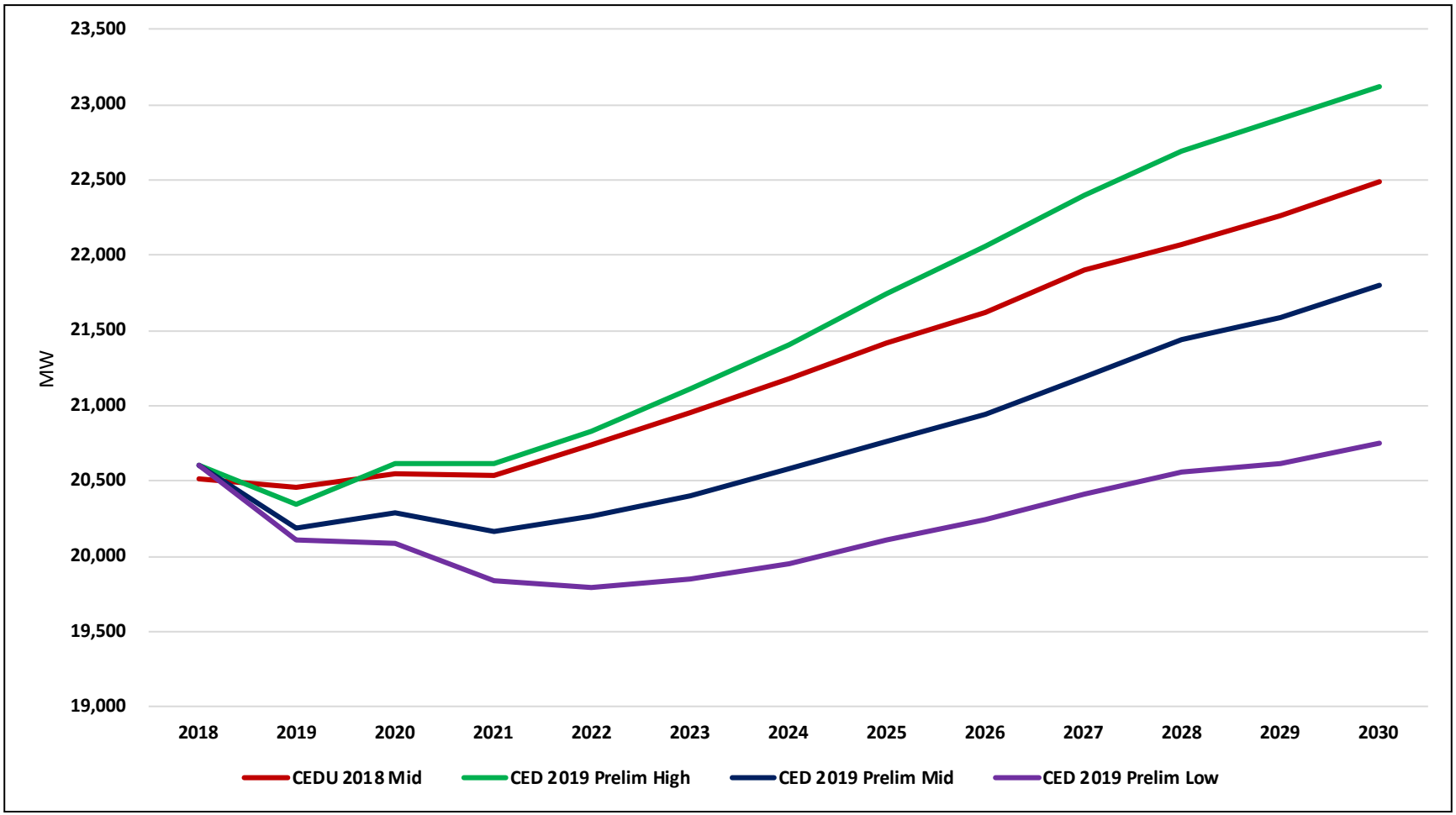
CAISO Monthly Coincident Baseline Net Peaks, Mid Case, 2021

Drop in consumption and increase in PV reduce monthly peaks



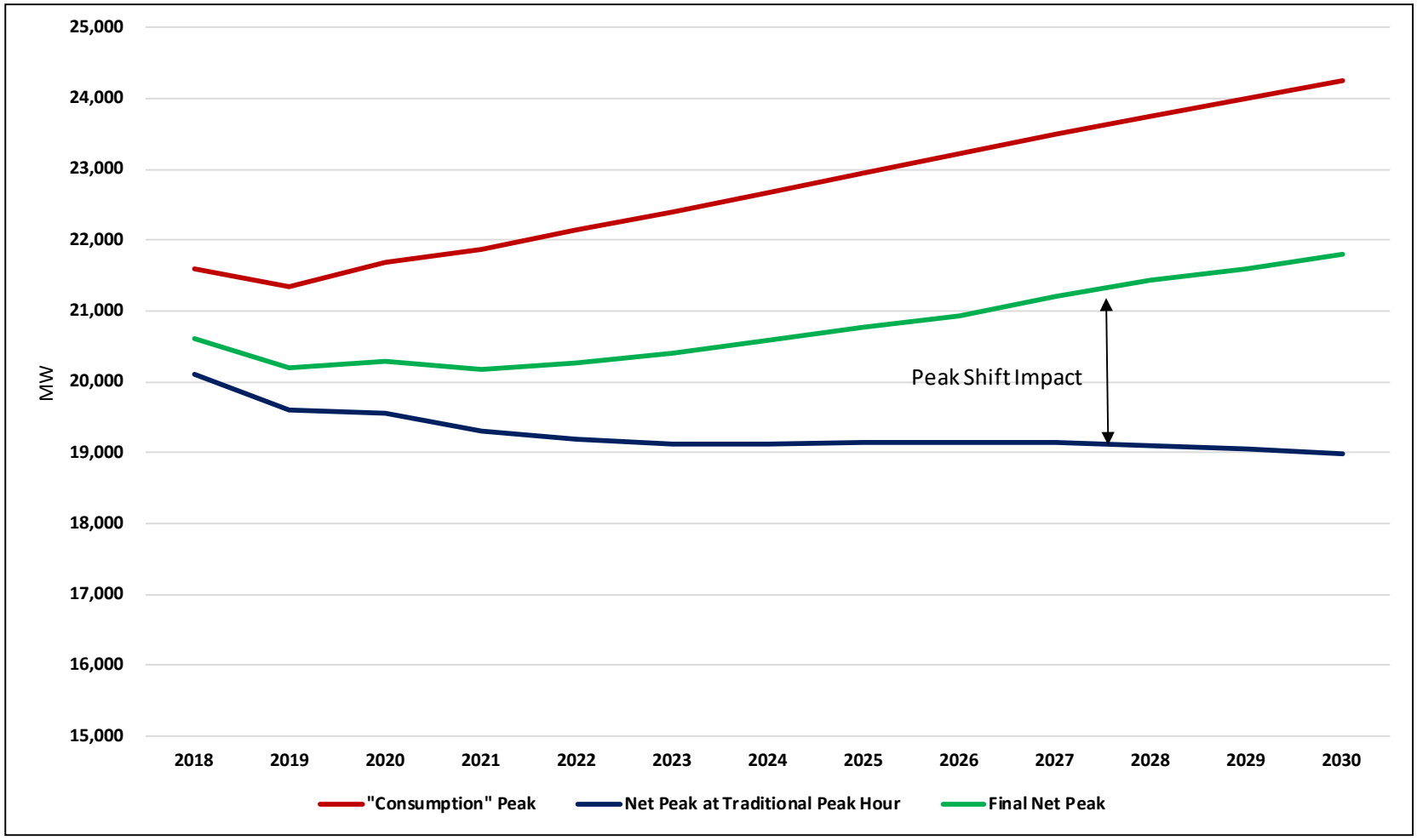
Baseline Net Peak: PG&E Planning Area

Average annual growth 2018-2030 of 0.47% in new mid case vs. 0.77% for CEDU 2018

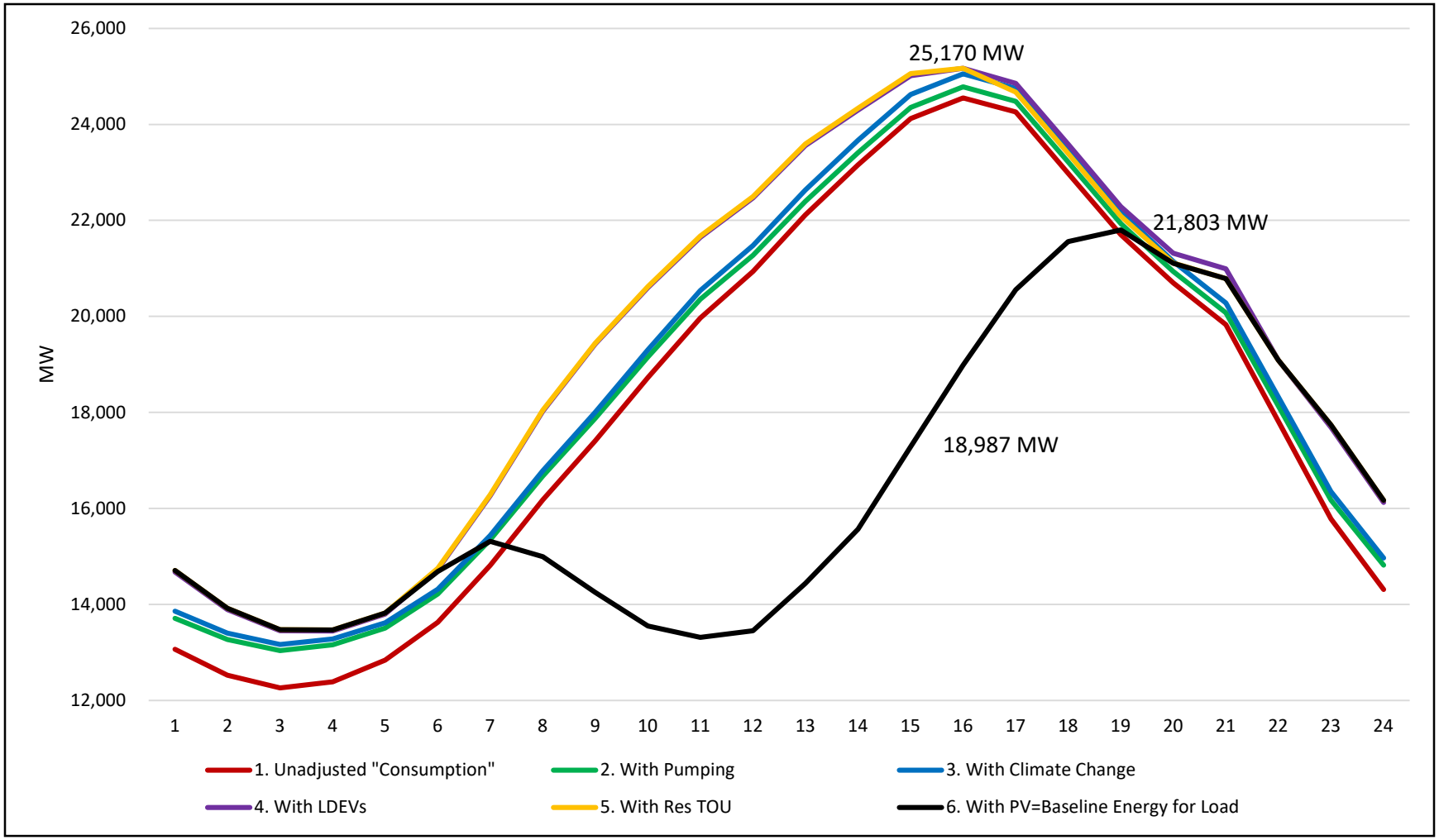


“Consumption” and Net Peaks: PG&E Mid Case

Peak shift impact ~ 2,800 MW in 2030

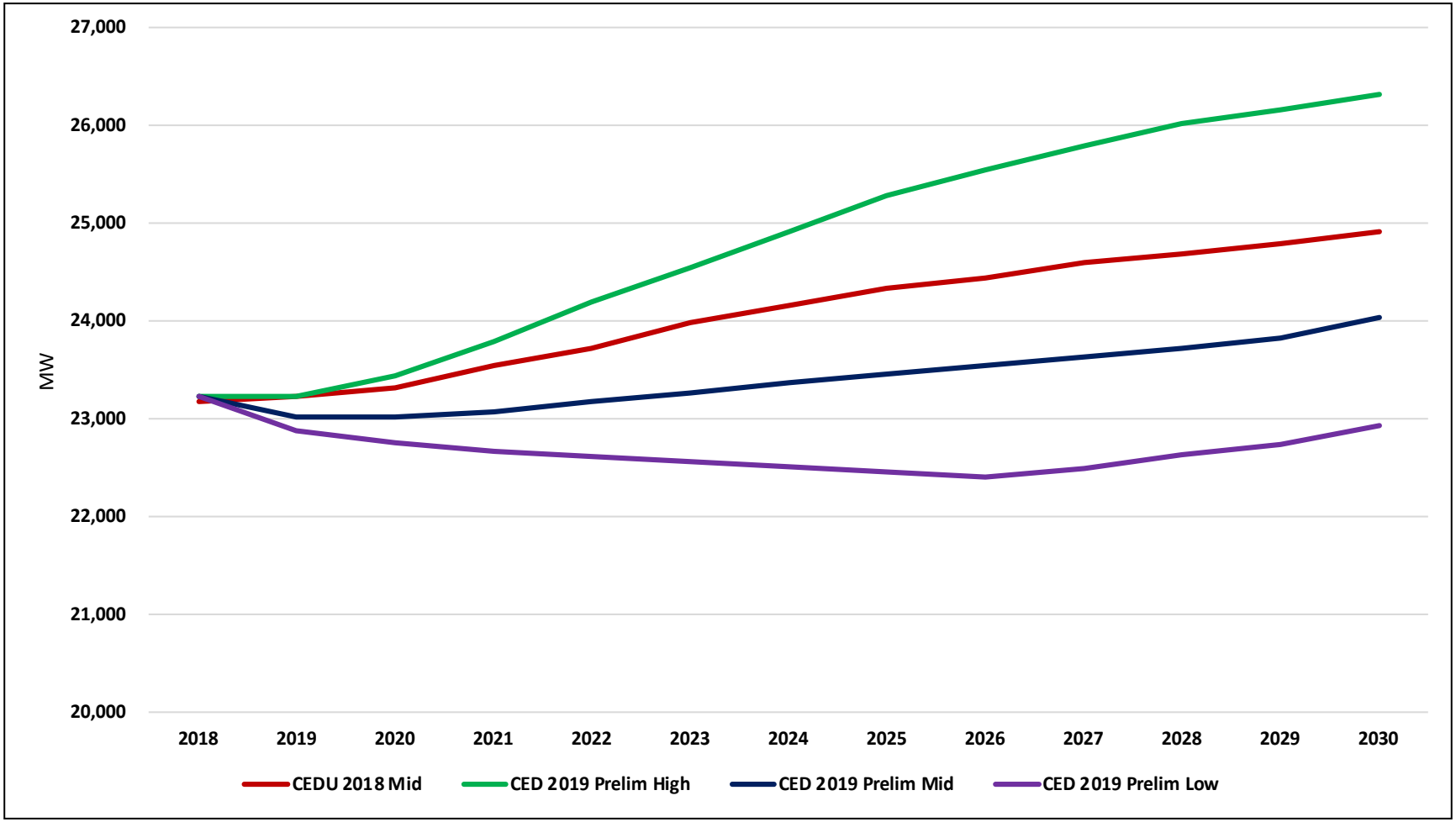


2030 Peak Day: PG&E Mid Case



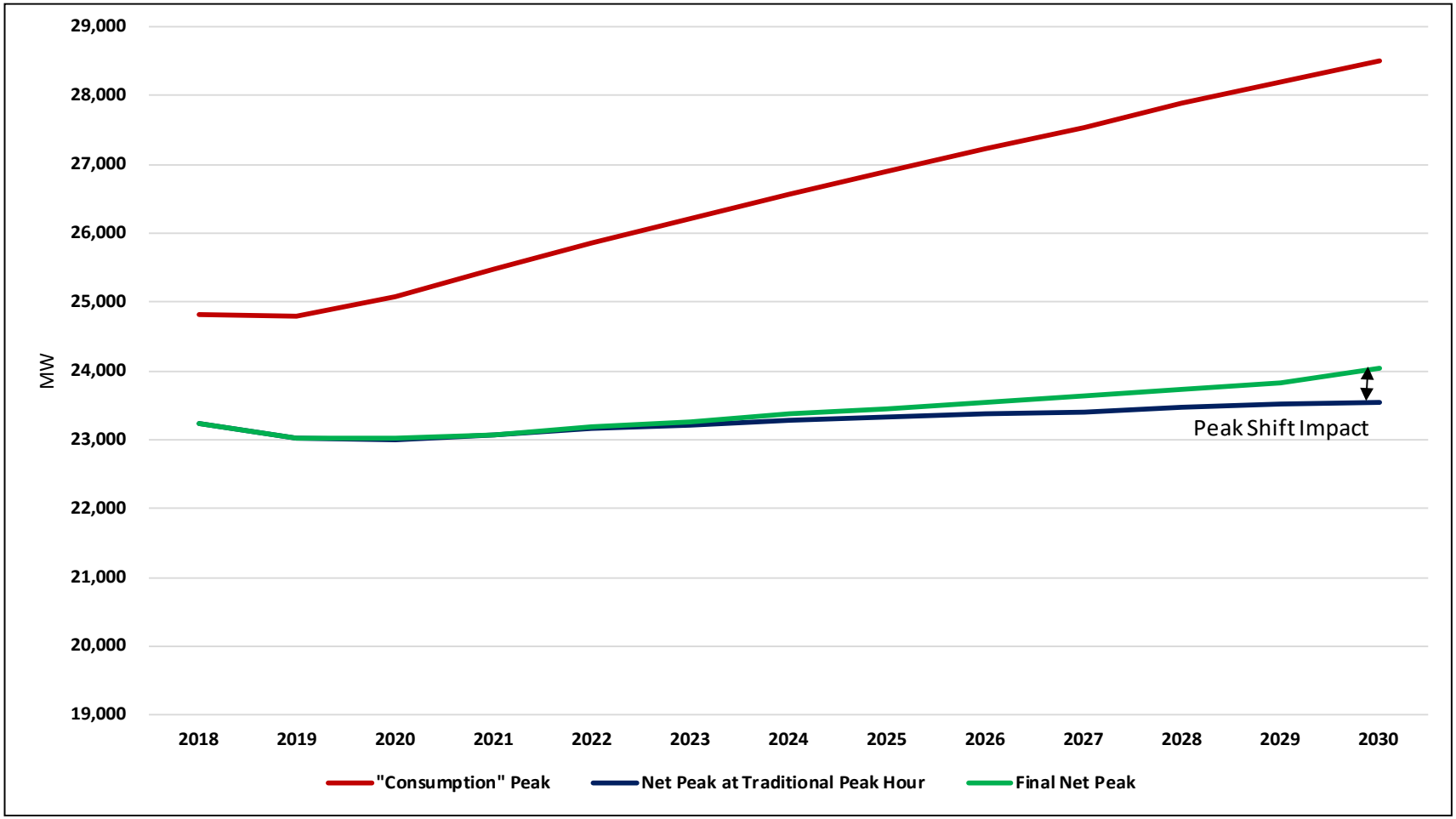
Baseline Net Peak: SCE Planning Area

Average annual growth 2018-2030 of 0.29% in new mid case vs. 0.60% for CEDU 2018

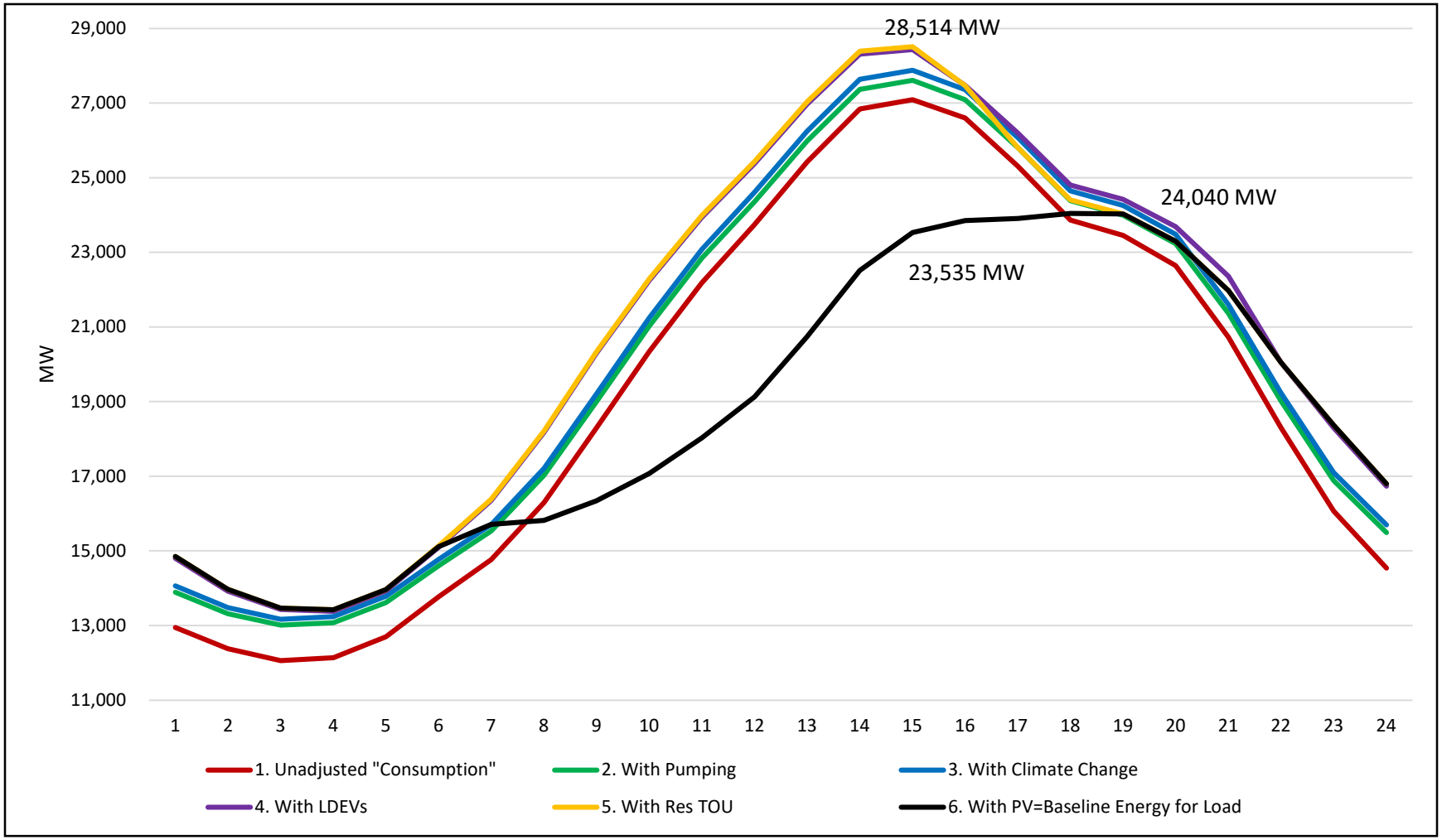


“Consumption” and Net Peaks: SCE Mid Case

Peak shift impact ~ 500 MW in 2030

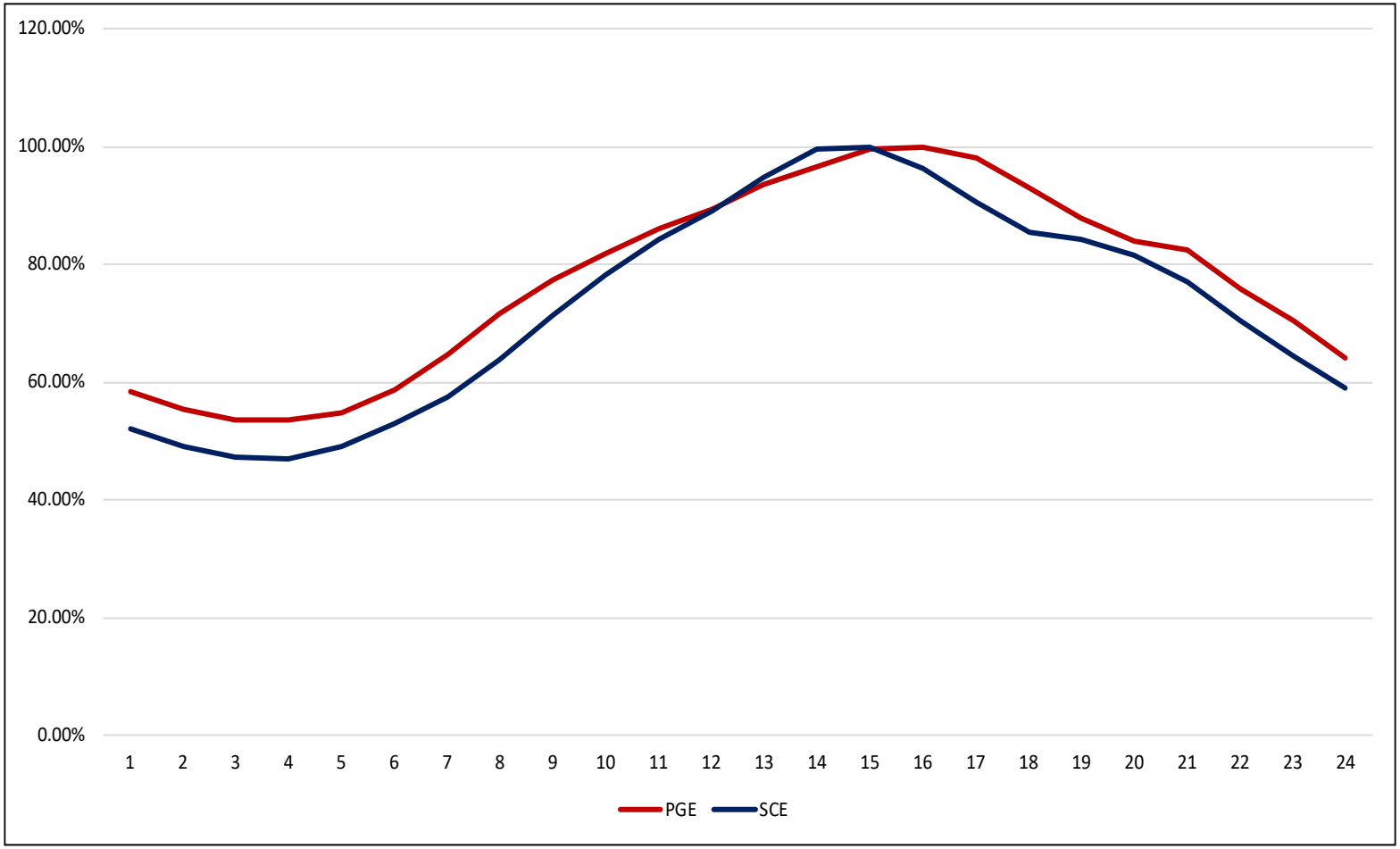


2030 Peak Day: SCE Mid Case



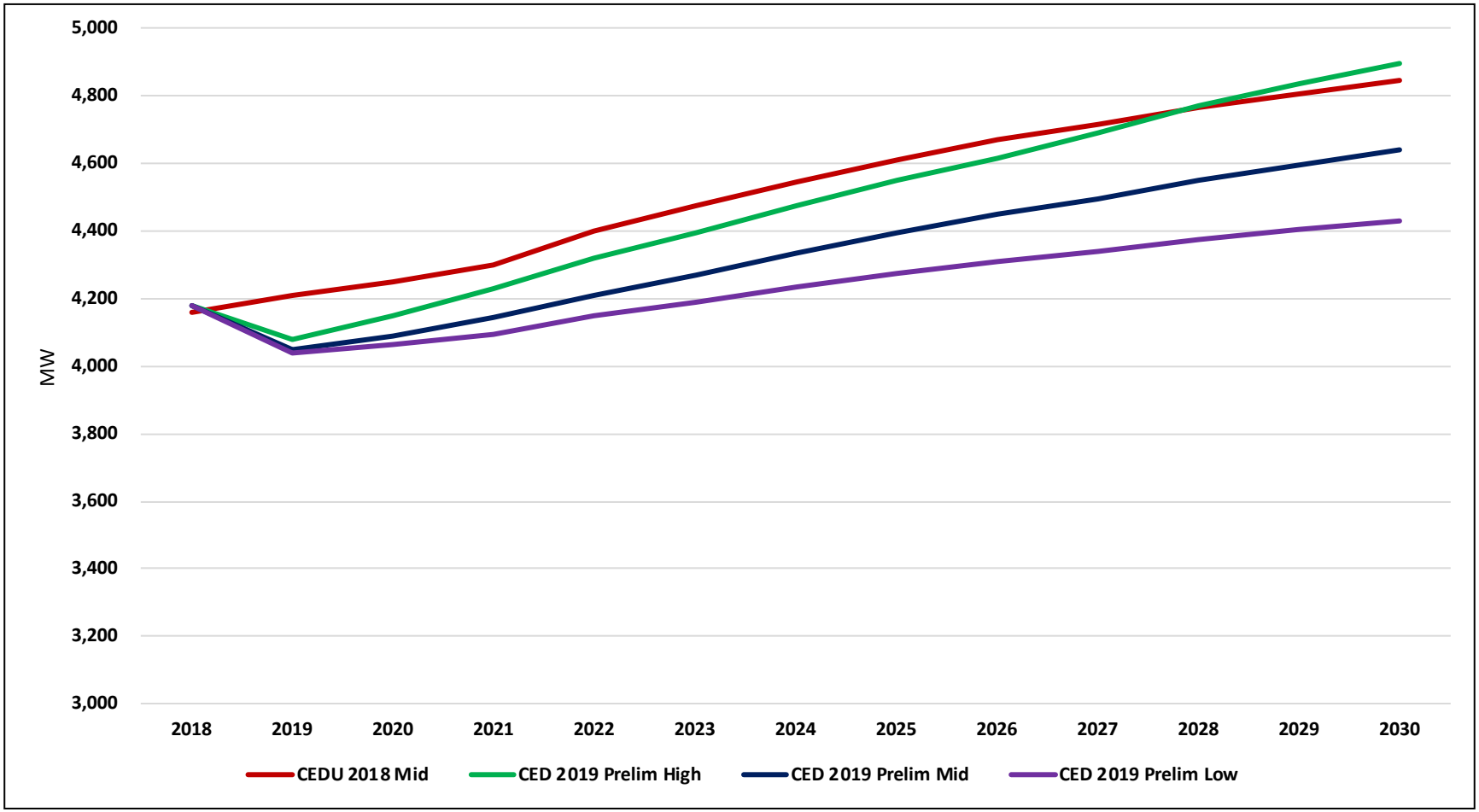
Peak Shift Difference: SCE vs. PGE

Percentage of Peak by Hour on Peak Day, 2030



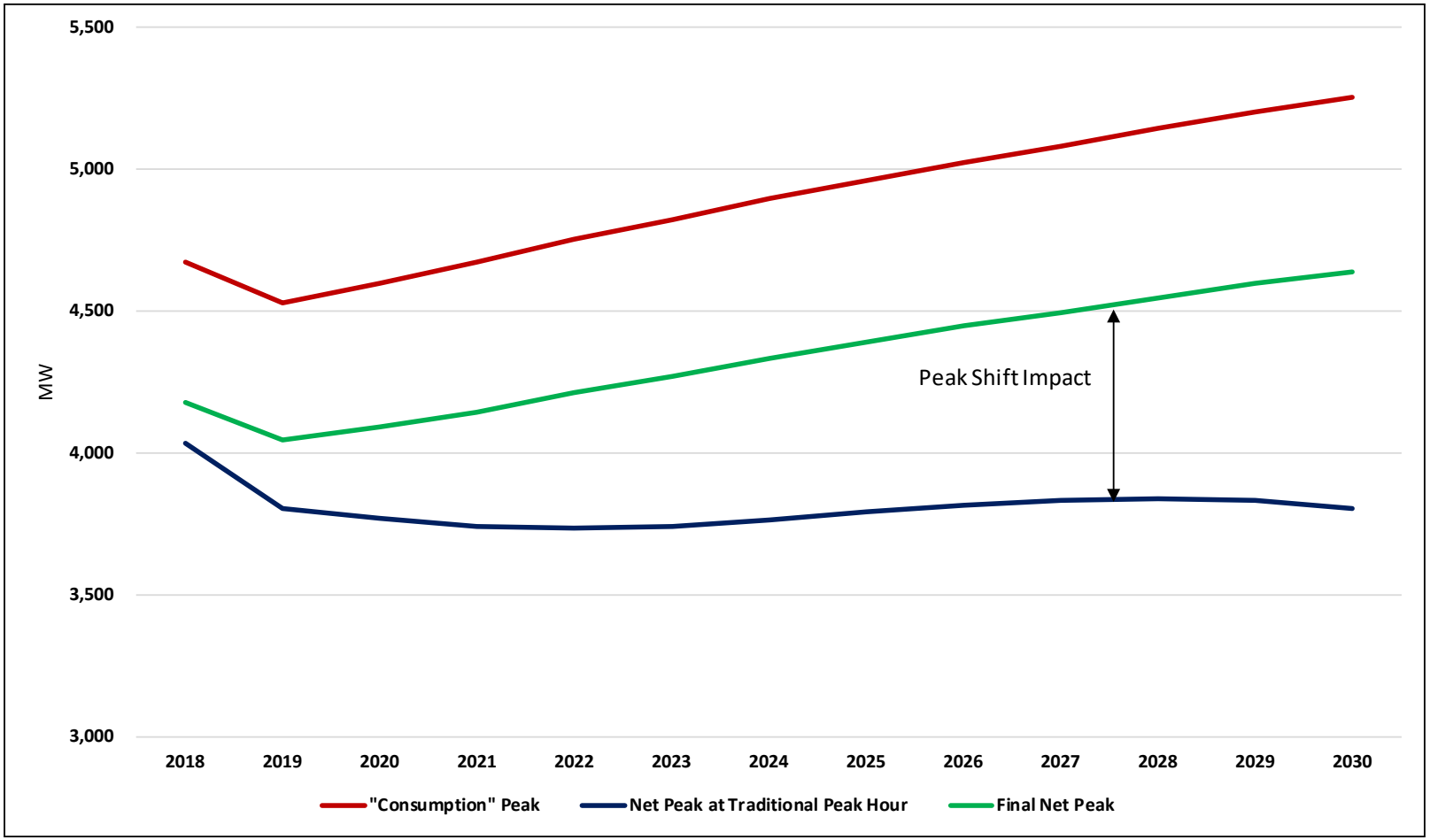
Baseline Net Peak: SDG&E Planning Area

Average annual growth 2018-2030 of 0.88% in new mid case vs. 1.28% for CEDU 2018

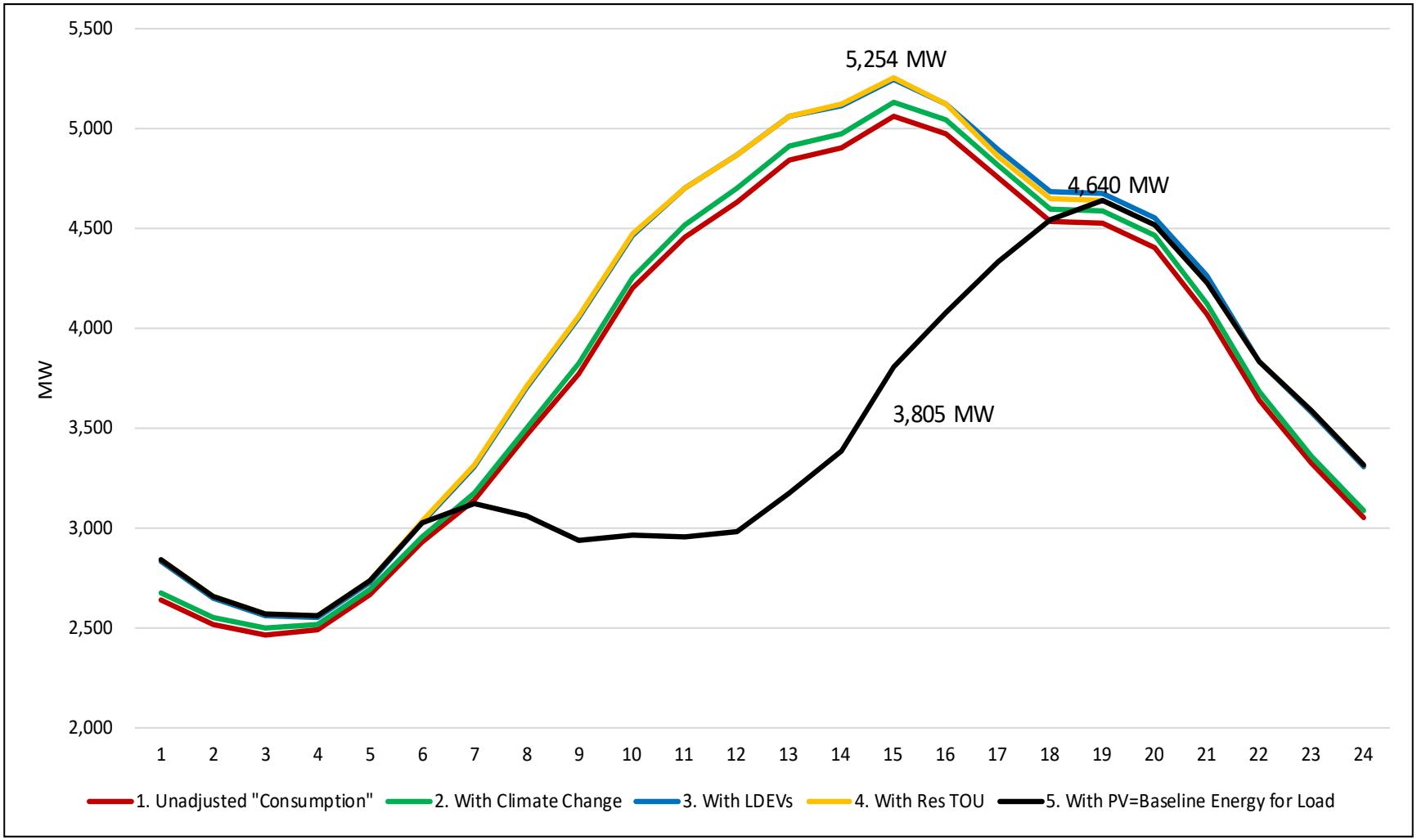


“Consumption” and Net Peaks: SDG&E Mid Case

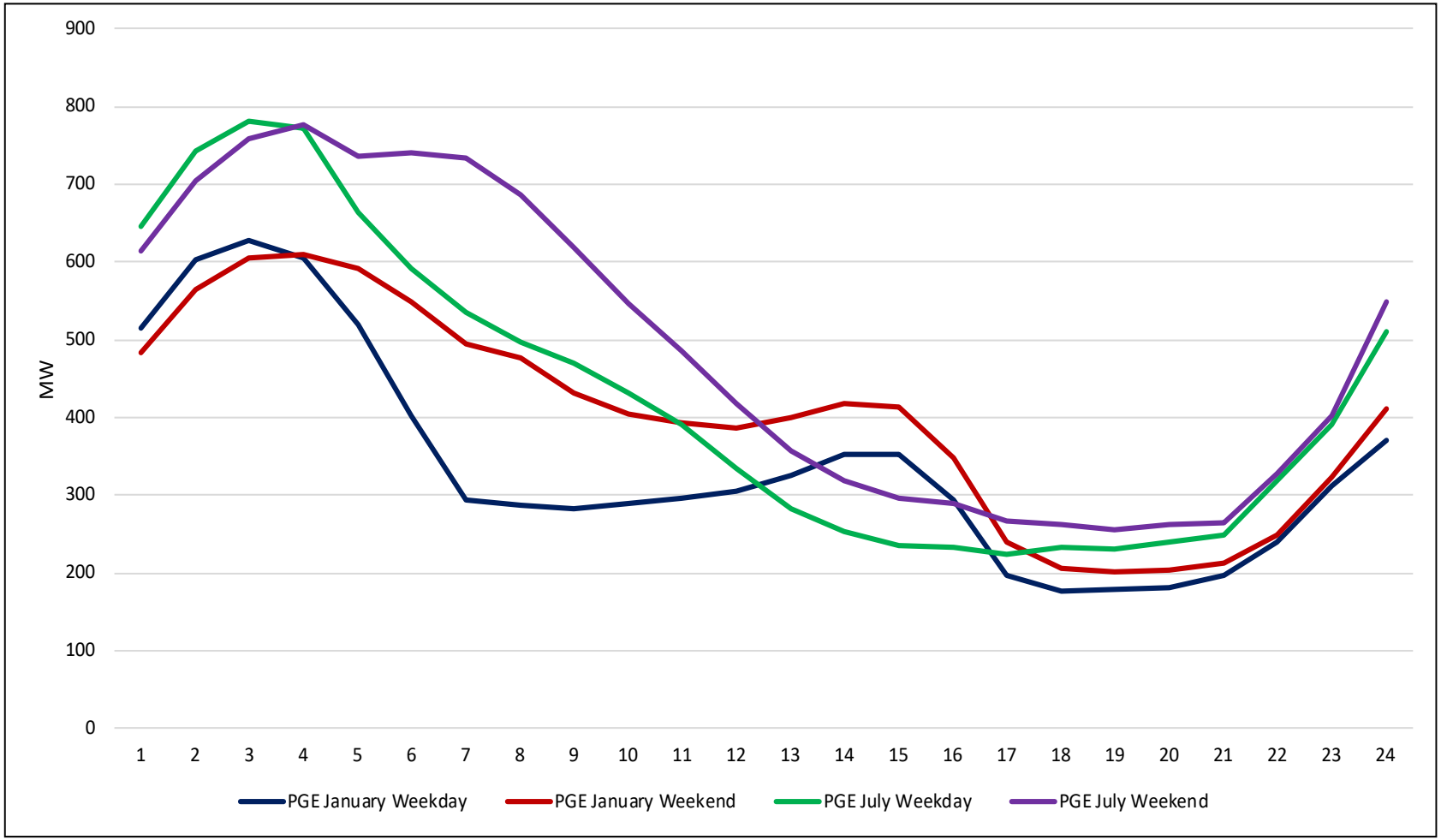
Peak shift impact ~ 800 MW in 2030



2030 Peak Day: SDG&E Mid Case



Pumping: PG&E TAC (CADWR)



Next Steps (Revised Forecast)

- Incorporate new AAEE
- Incorporate storage
- Hourly LMDR
- Updated residential TOU
- Incorporate hourly temperature projections under climate change from Scripps
- Integrate with HELM 2.0

Hourly Electricity Load Model (HELM), Version 2.0

HELM Methodology

- Annual consumption by end use and building type (residential and commercial) or NAICS groupings (remaining sectors) input from sector forecasts
- Applies end use or NAICS grouping load shapes to consumption to give hourly loads; hourly assignment of weather-sensitive end use load based on average temperatures
- Traditionally used to develop annual consumption and net peaks by planning area

HELM 2.0

- Updated end use/building type and NAICS grouping load shapes
- Adds:
  - Efficiency load shapes
  - PV hourly generation profiles
  - Electric vehicle charging profiles (EVIL submodel)
  - Forecast zone level
- New platform

Data Sources

- 2006 CEUS
- Database for Energy Efficiency Resources
- EPRI Load Shape Library
- E3 Energy Efficiency Calculator
- Various end-use load research studies
- Previous ADM work products
- IOU interval meter data
- Chargepoint data
- CSI data

Link for HELM 2.0/Load Shapes Report

- https://ww2.energy.ca.gov/publications/displayOneReport_cms.php?pubNum=CEC-500-2019-046

Integrating HLM and HELM 2.0

- Ideally, HELM 2.0 will provide a sound 8760 hourly forecast for each year
  - In this case, the HLM would be used as a check and for regional studies (regions not covered in HELM 2.0)
- If not, HLM could be calibrated each year to HELM 2.0 annual peaks

Questions/Comments