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Hourly Behind-The-Meter Distributed Generation Forecast Results

Presenter: Alex Lonsdale

Distributed Generation Forecast Supervisor

List of Acronyms and Initialisms

BTM – Behind-the-meter

CA – California

CAISO – California Independent System Operator

DAWG – Demand Analysis Working Group

DER – Distributed Energy Resource

DG – Distributed Generation

dGen – Distributed Generation Market Demand Model

HLM – Hourly Load Model

IEPR – Integrated Energy Policy Report

MW – Megawatt

NBT – Net Billing Tariff

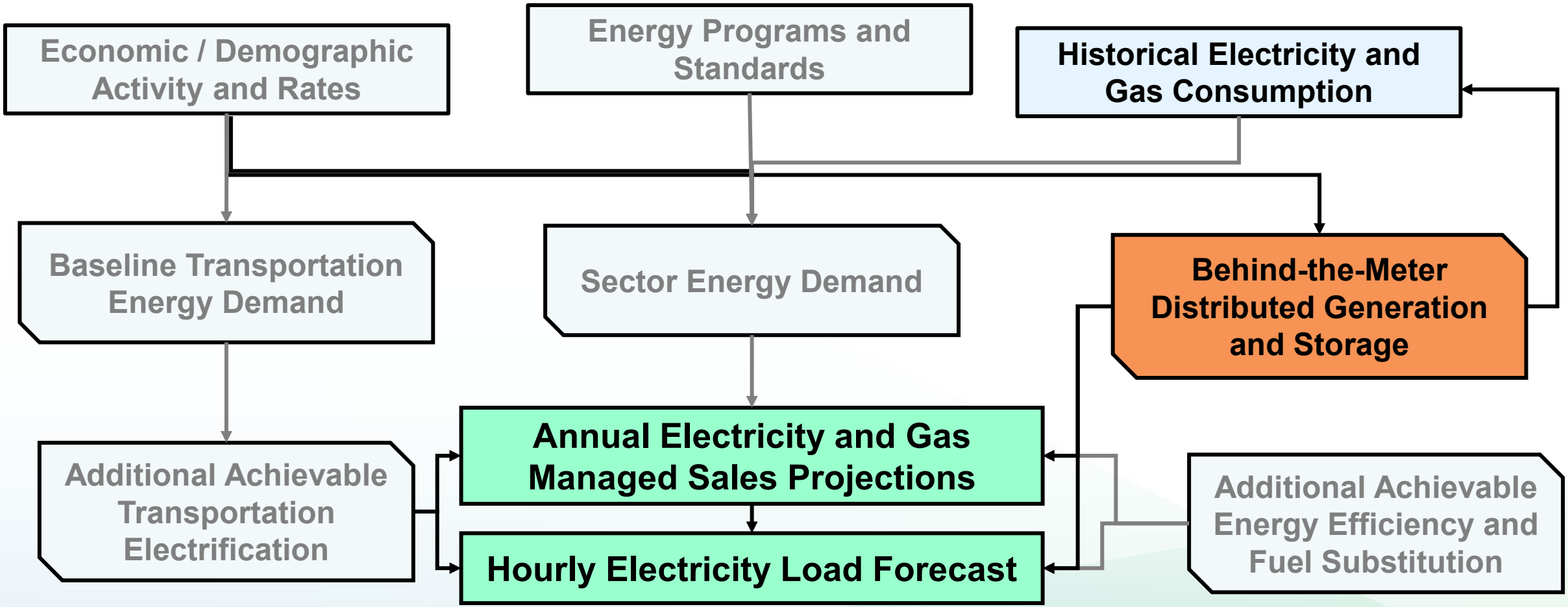
NEM – Net Energy Metering

PA – Planning Area

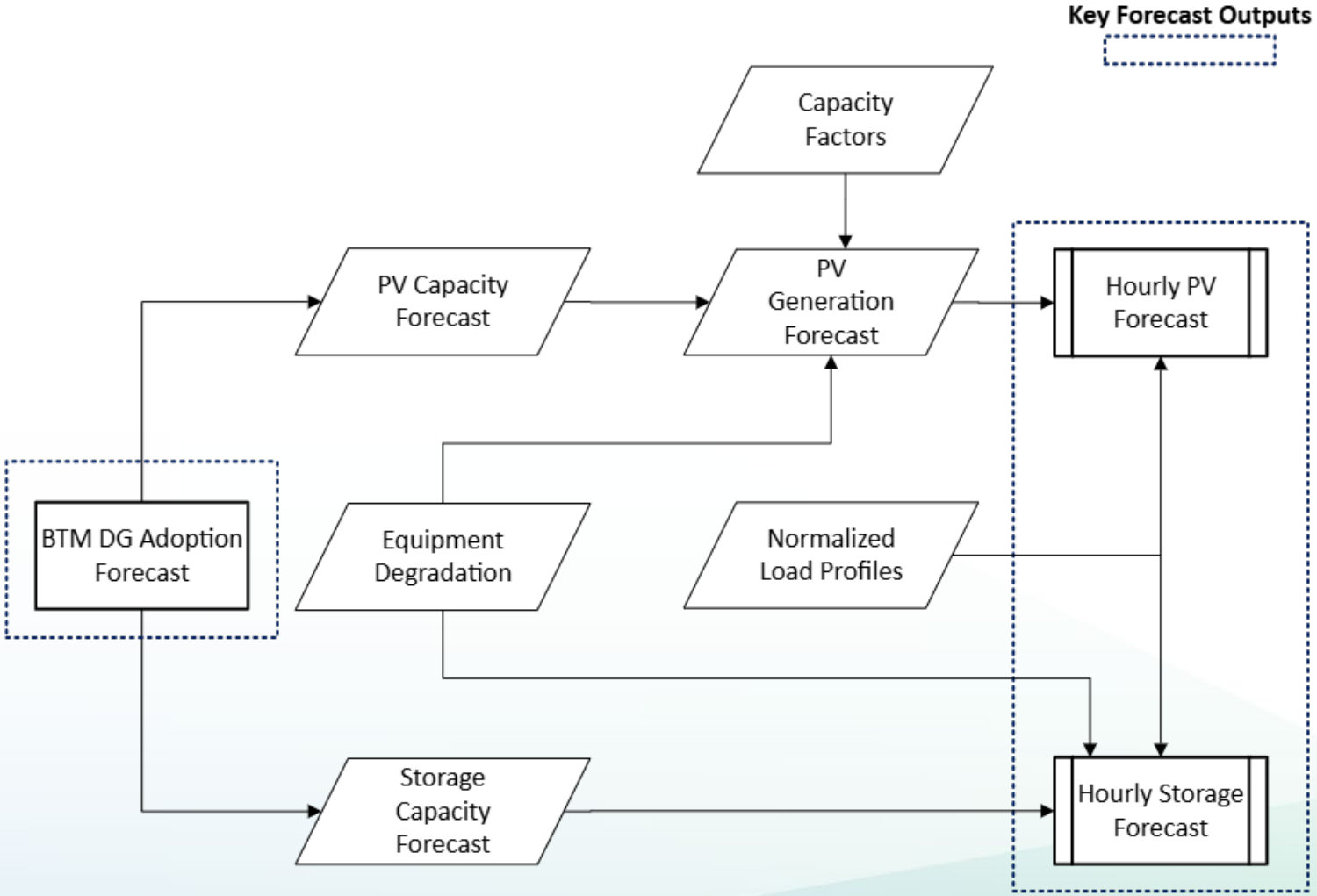
POU – Publicly Owned Utility

PV – Photovoltaics

Relevance: BTM PV & Storage



Hourly BTM PV and Storage Modeling Architecture



Source: CEC Staff

Forecast BTM PV Profiles

New Metered PV Data

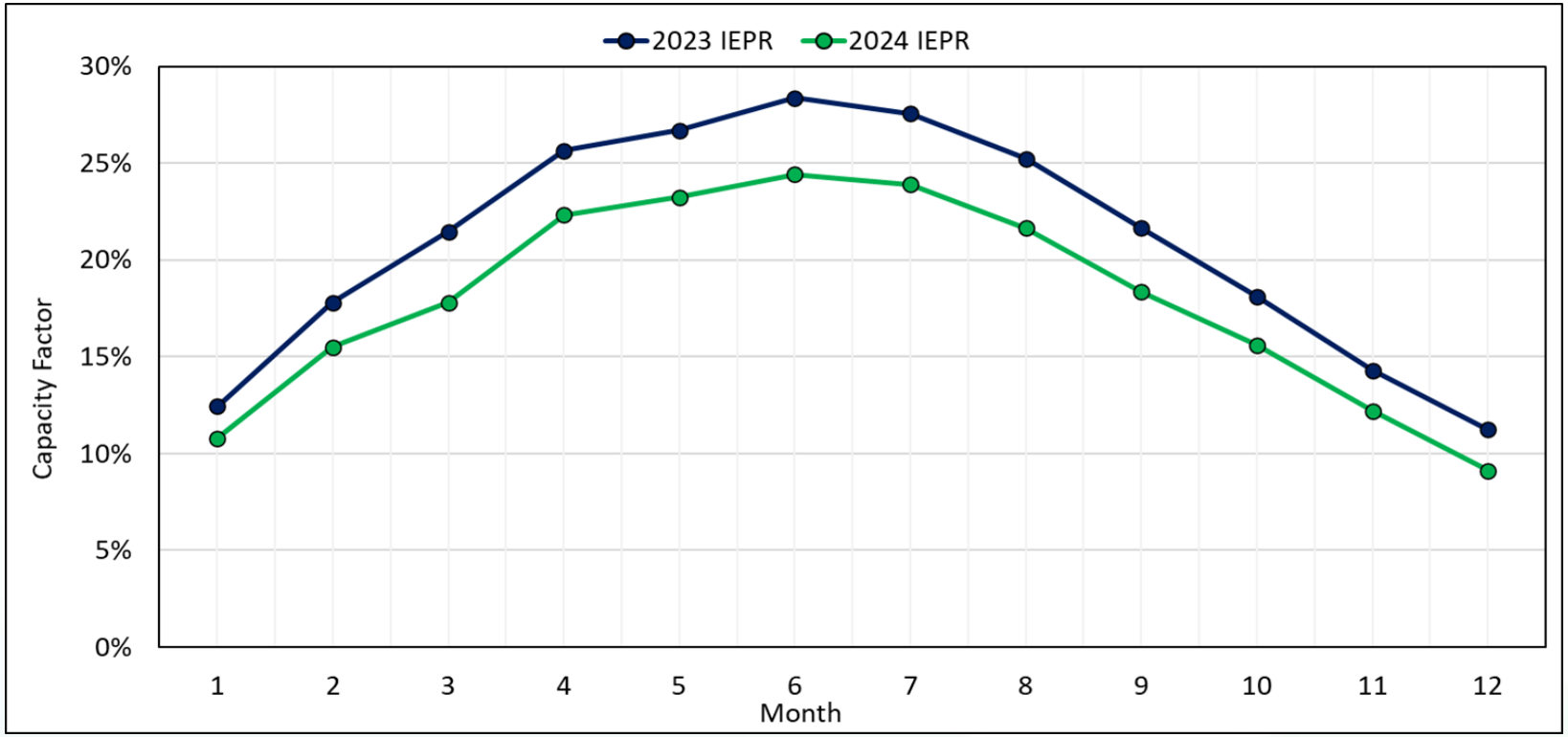
- **Data Procurement:**
  - In 2023, CEC procured a large sample of behind-the-meter (BTM) PV generation data
    - Includes metered data for:
      - Each CEC forecast zone
      - Residential and non-residential sectors
- **Key Finding:**
  - New data results in **less BTM PV generation** compared to past IEPR forecasts

Forecasted BTM PV Profiles Methodology

- **Unchanged methodology for 2024 IEPR**
  - Based on six years of new metered PV data (2018-2023)
- Data groupings
  - Forecast zone
  - Sector
  - Month
  - Week of Month
  - Hour
- **Capacity Factor:** Measures ratio of actual power output to rated capacity
  - Are averaged across years and days to create one profile for each week of the month

Forecasted BTM PV Monthly Capacity Factors for CAISO Region

Season	% Point Reduction
Summer	3.8% - 4.3%
Fall	2.2% - 3.4%
Winter	1.9% - 2.7%
Spring	3.6% - 3.9%

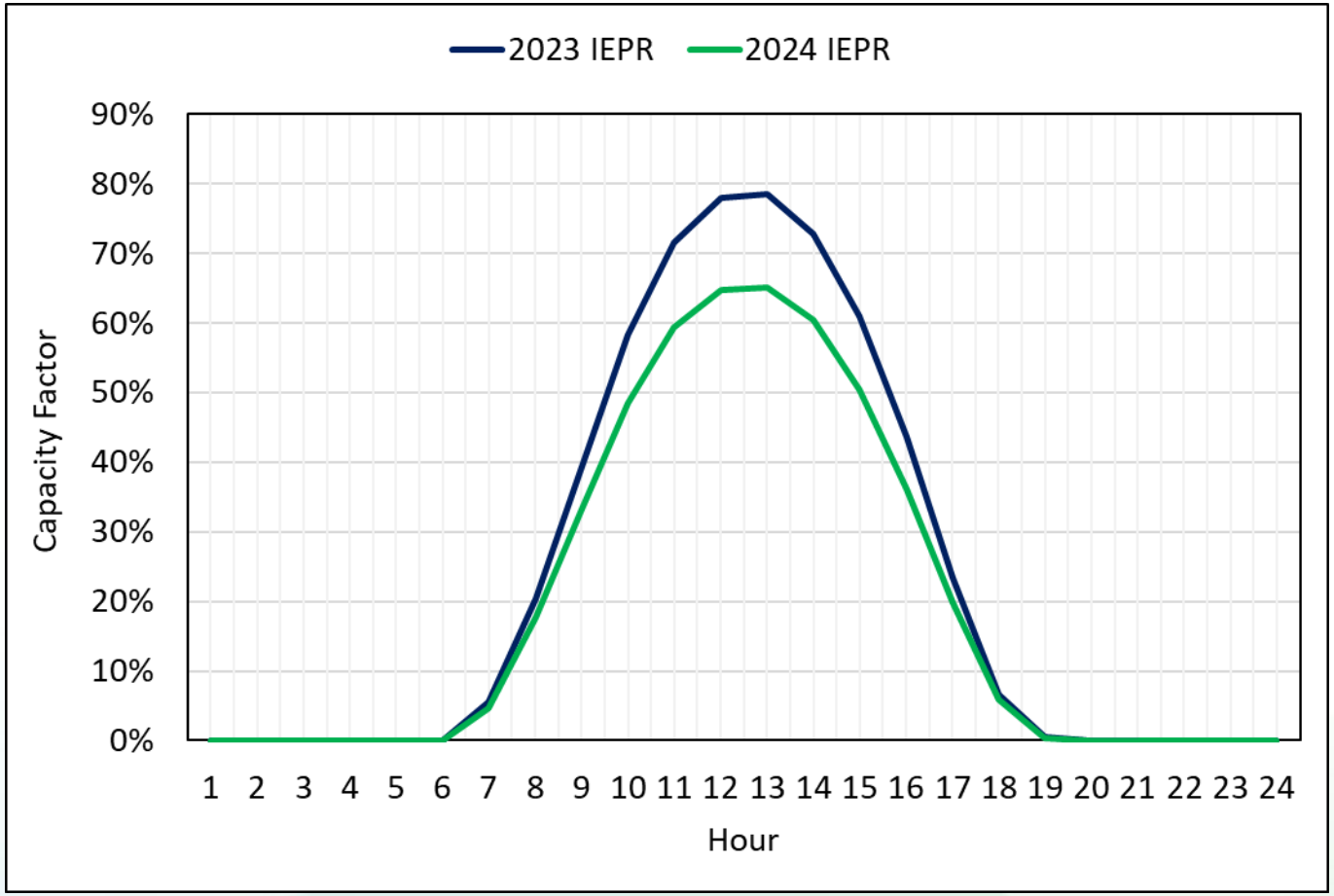


Source: CEC Staff

Forecasted Average Hourly PV Capacity Factors: September

- Capacity factor reductions for 2024 IEPR compared to 2023 IEPR for the CAISO region:
  - Hour of peak demand (17) – **3%**
  - Daily max generation (13) – **13%**

Hour	2023 IEPR	2024 IEPR
1	0%	0%
2	0%	0%
3	0%	0%
4	0%	0%
5	0%	0%
6	0%	0%
7	5%	5%
8	20%	18%
9	39%	33%
10	58%	48%
11	71%	59%
12	78%	65%
13	78%	65%
14	73%	60%
15	61%	50%
16	44%	36%
17	23%	20%
18	7%	6%
19	0%	0%
20	0%	0%
21	0%	0%
22	0%	0%
23	0%	0%
24	0%	0%

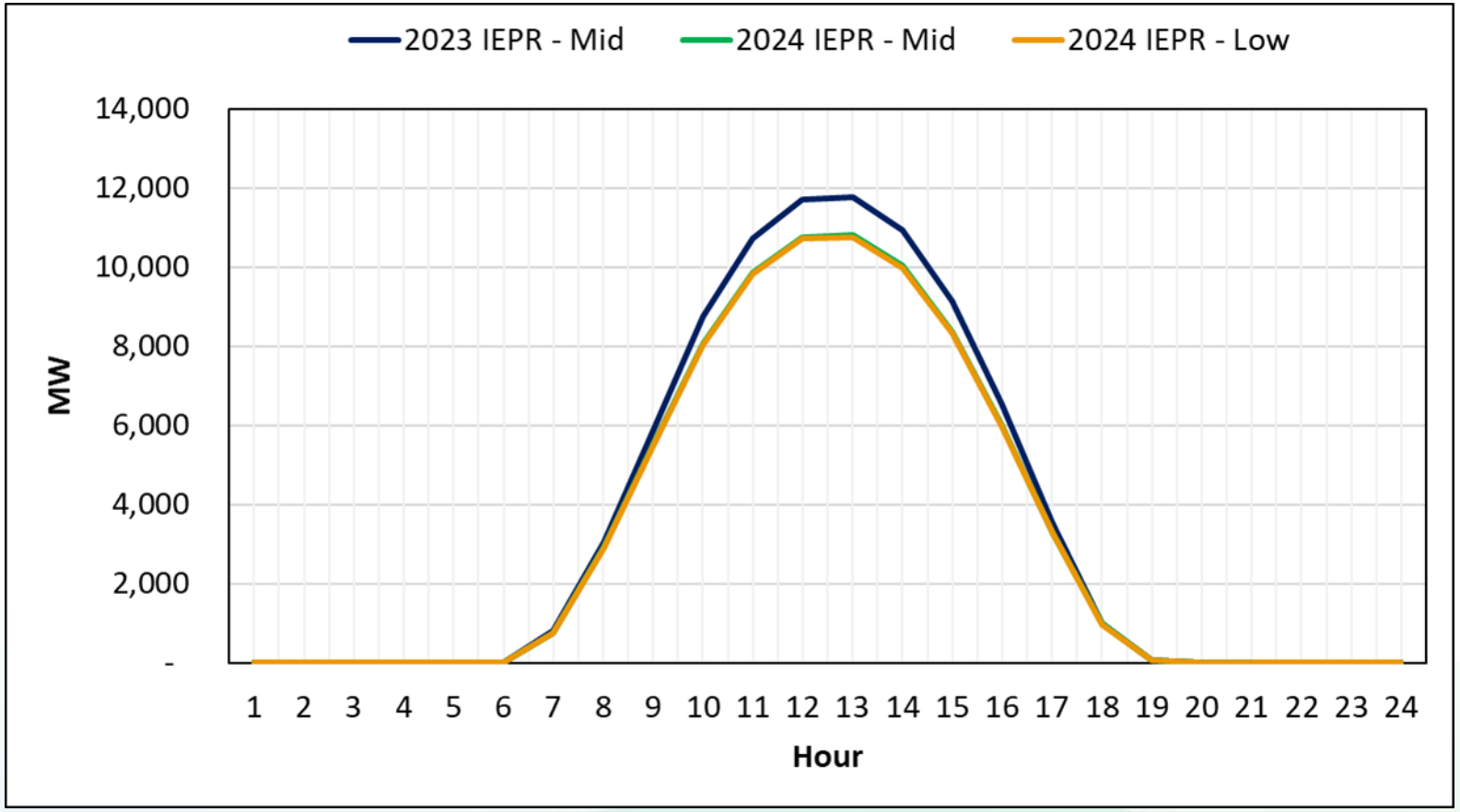


Source: CEC Staff

Forecasted Average Hourly PV Generation: September 2024

- 2024 IEPR includes ~1.2 GW more capacity in 2024 than the 2023 IEPR for the CAISO region
- PV generation reductions for 2024 IEPR compared to 2023 IEPR:

Hour	2024 IEPR Mid (MW)	2024 IEPR Low (MW)
13	-960	-1,010
17	-220	-240



Source: CEC Staff

Forecasted Average Hourly PV Generation: September 2030

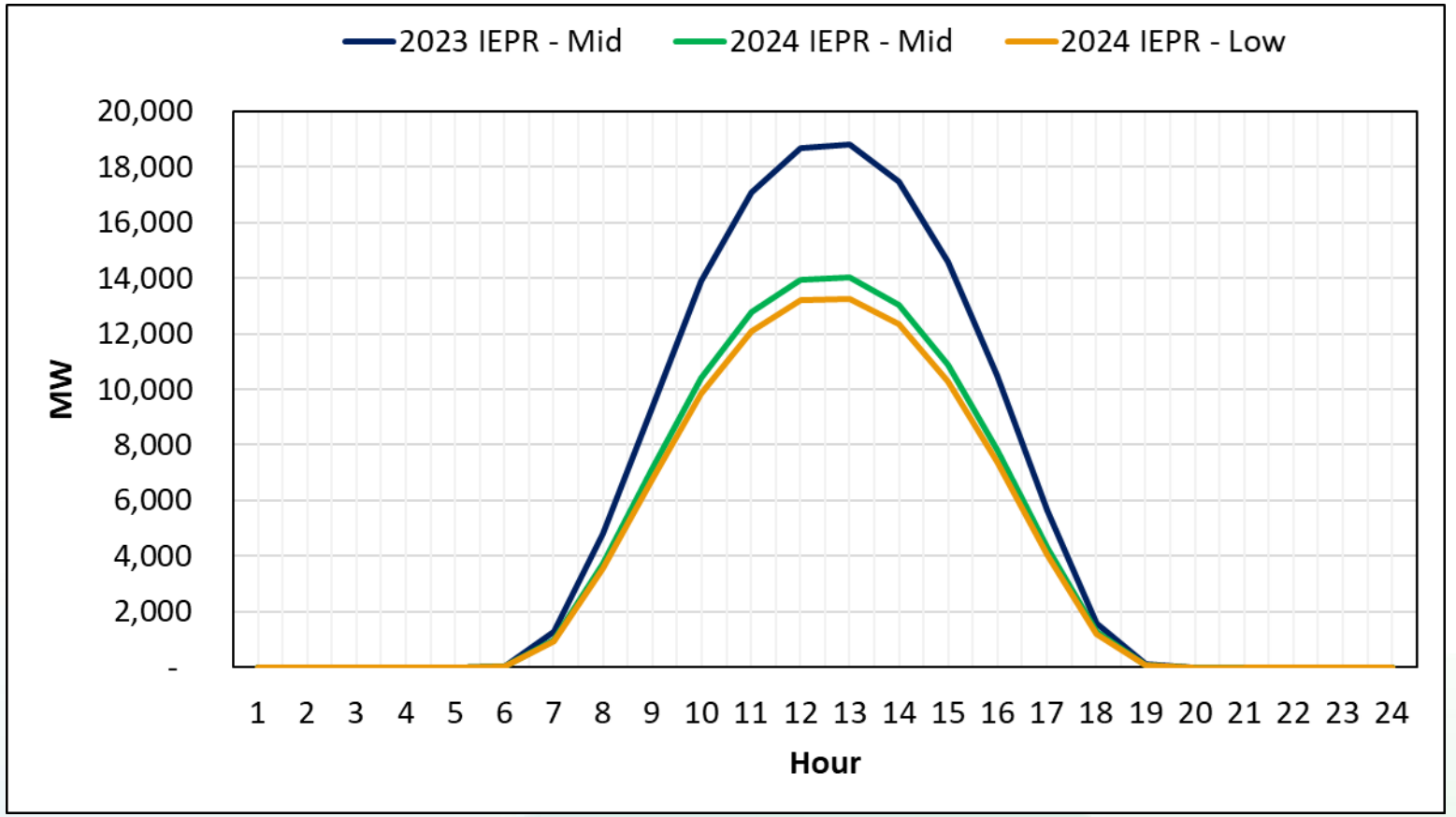
- Capacity comparison:

2023 IEPR Mid (MW)	2024 IEPR Mid (MW)	2024 IEPR Low (MW)
24,939	22,213	21,013

- PV generation reductions for 2024 IEPR compared to 2023 IEPR:

Hour	2024 IEPR Mid (MW)	2024 IEPR Low (MW)
13	-4,760	-5,530
17	-1,340	-1,570

CAISO Region



Source: CEC Staff

Forecasted Average Hourly PV Generation: September 2040

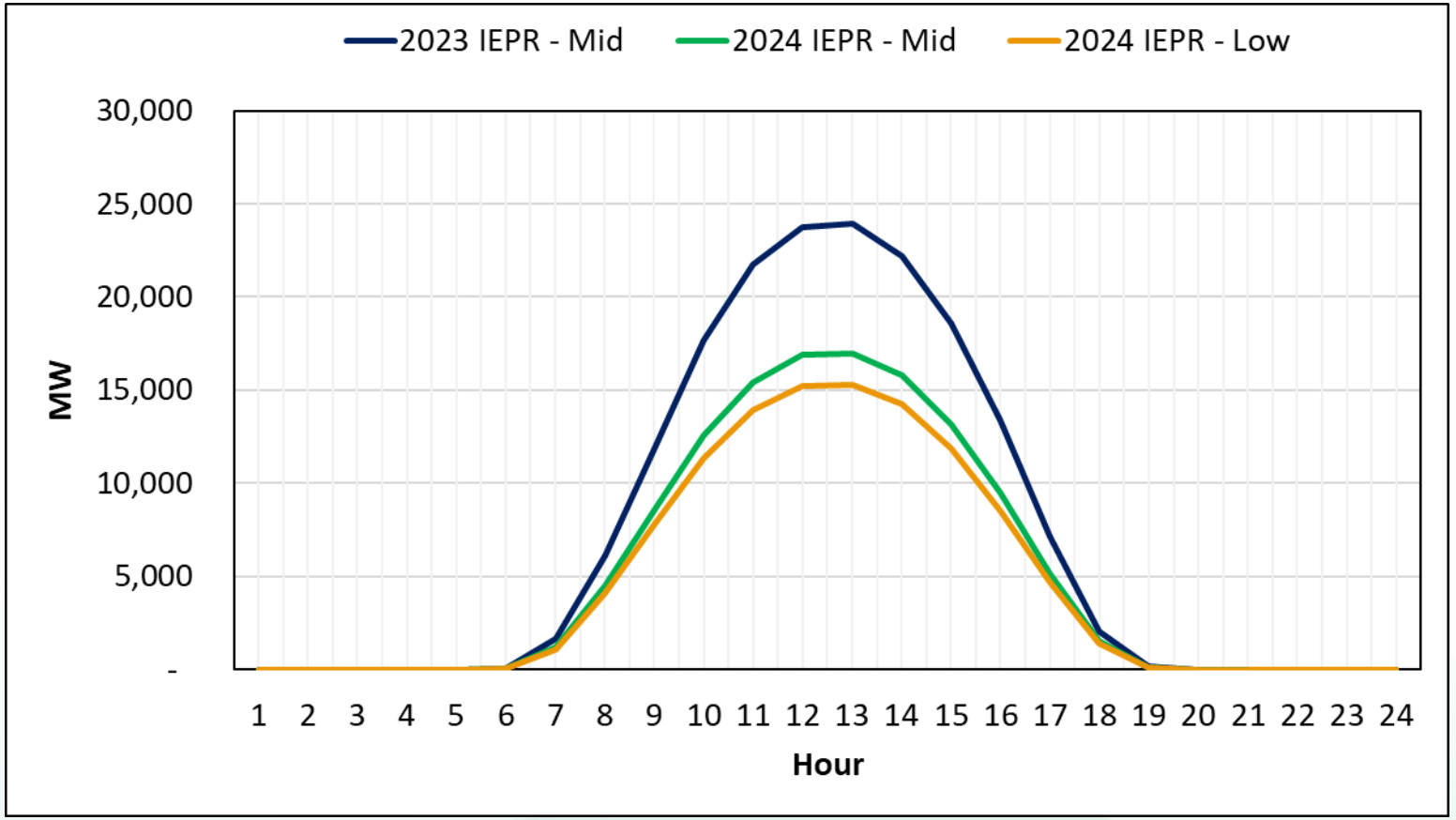
- Capacity comparison:

2023 IEPR Mid (MW)	2024 IEPR Mid (MW)	2024 IEPR Low (MW)
32,850	27,967	25,276

- PV generation reductions for 2024 IEPR compared to 2023 IEPR:

Hour	2024 IEPR Mid (MW)	2024 IEPR Low (MW)
13	-6,940	-8,610
17	-1,980	-2,490

CAISO Region



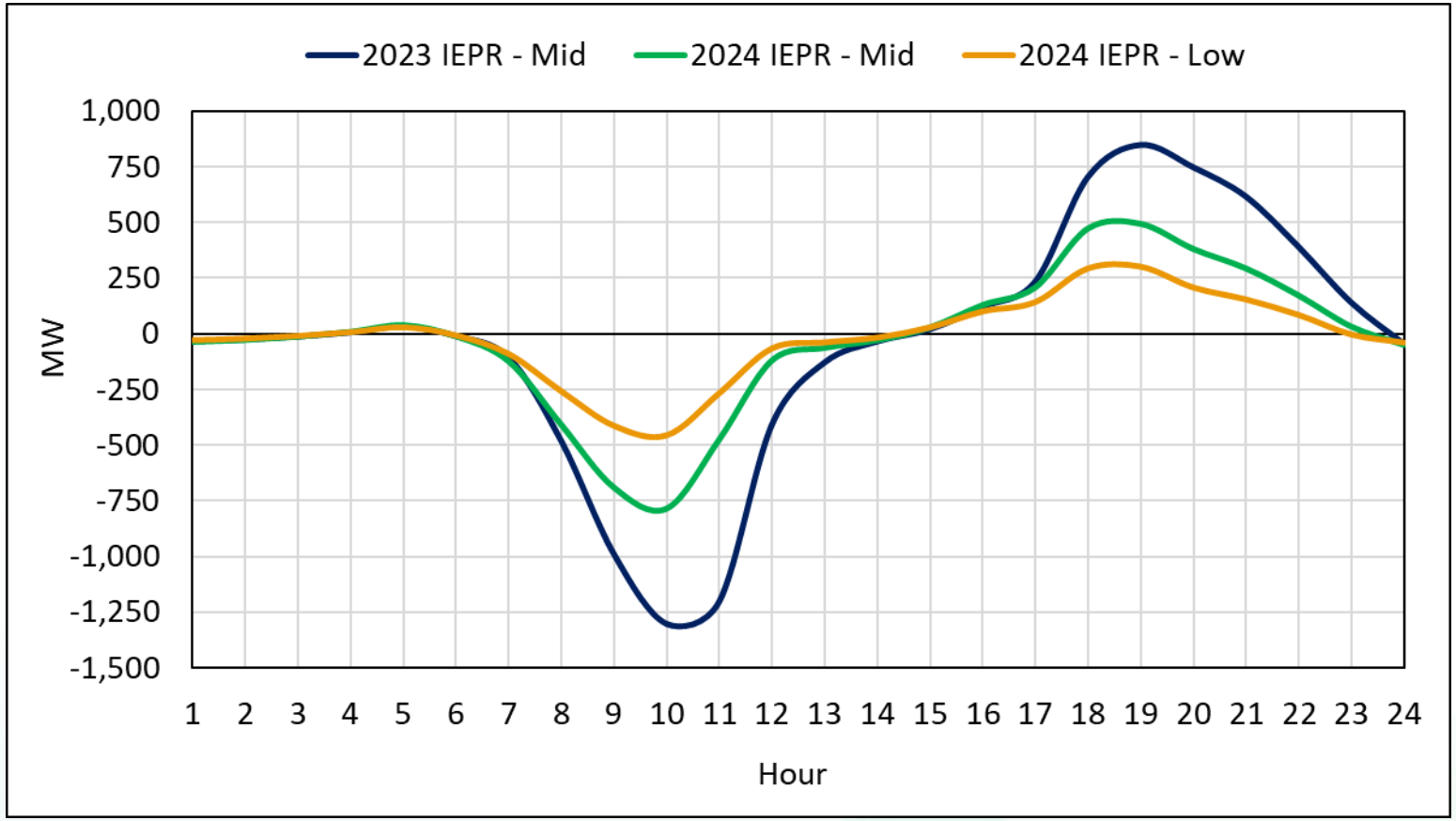
Source: CEC Staff

Hourly Storage Profiles

Forecasted Average Hourly Storage: September 2030

- Reductions in daily max discharge driven by more conservative BTM DG adoption forecasts
- Difference between forecasted daily max discharge for 2024 IEPR and 2023 IEPR for CAISO region:

Hour	2024 IEPR Mid (MW)	2024 IEPR Low (MW)
19	-355	-549

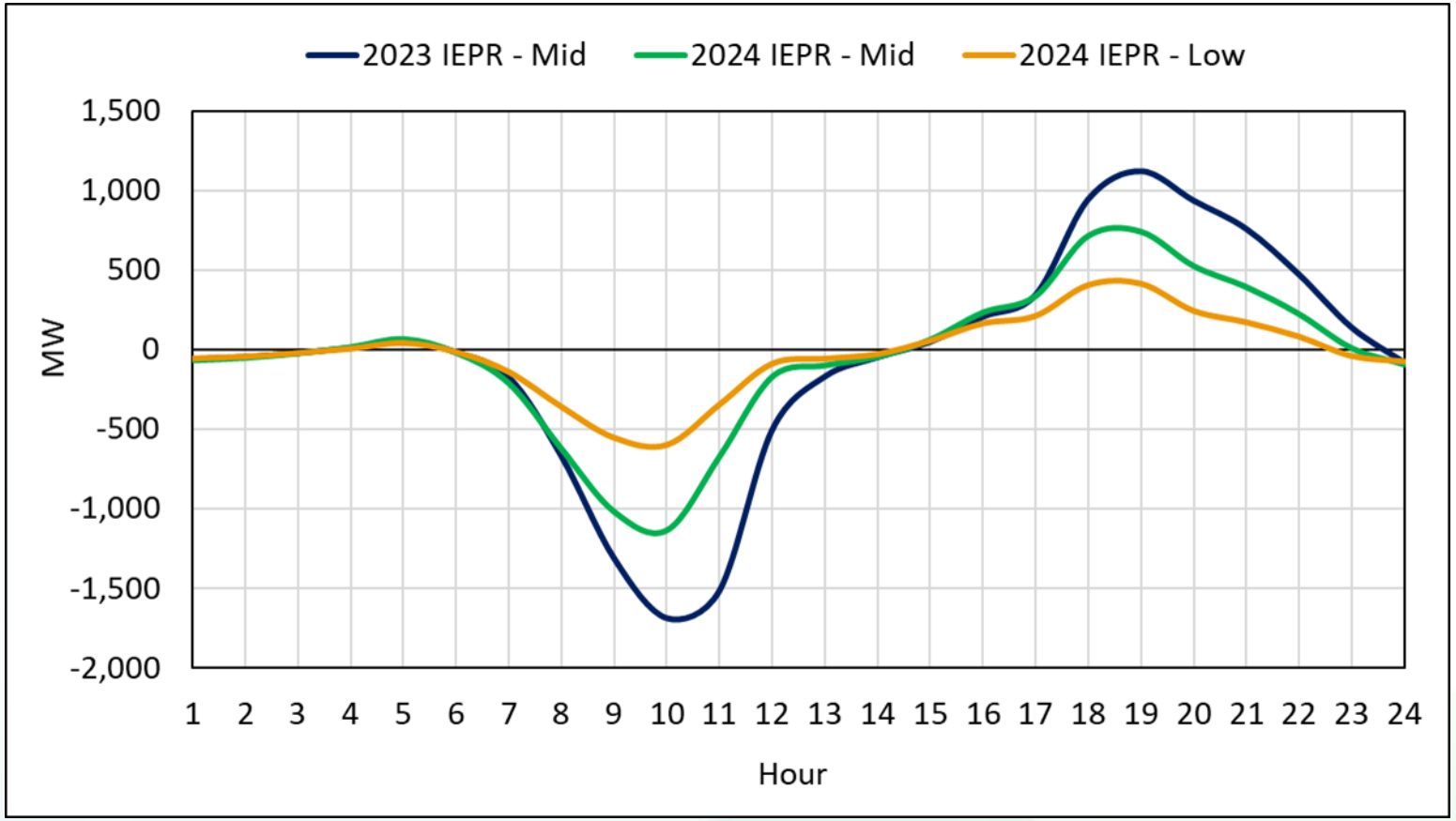


Source: CEC Staff

Forecasted Average Hourly Storage: September 2040

- Difference between forecasted daily max discharge for 2024 IEPR and 2023 IEPR for CAISO region:

Hour	2024 IEPR Mid (MW)	2024 IEPR Low (MW)
19	-380	-704



Source: CEC Staff

Hourly Results: Summary & Next Steps

- Compared to 2023 IEPR, lower BTM PV generation and BTM energy storage use will likely lead to greater:
  - Hourly net load forecasts across planning areas
  - Annual net sales forecasts
- Overall annual and hourly forecast results will be presented at the Nov 21 DAWG and the Dec 12 IEPR workshop

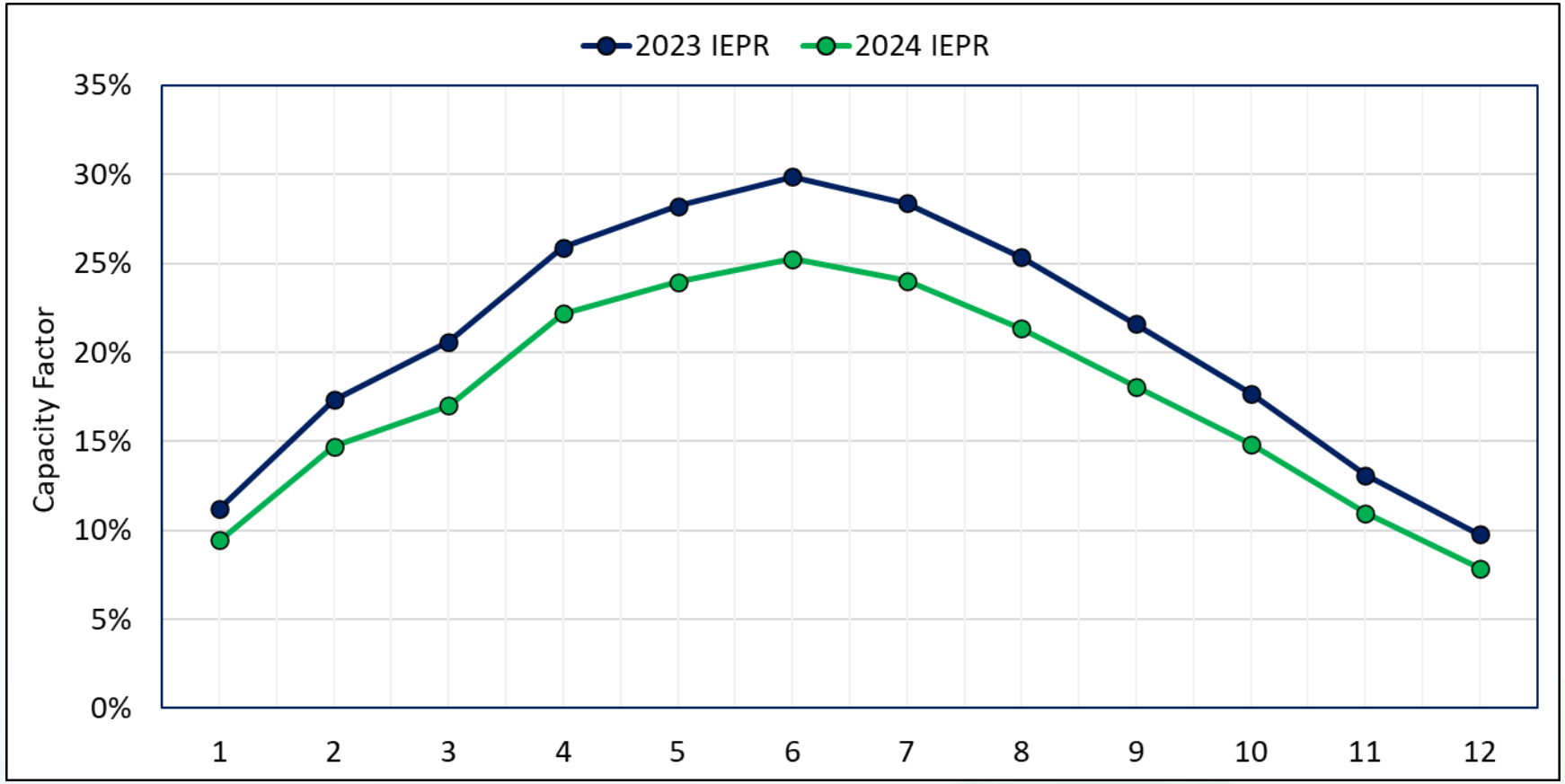
Closing

- Thank you for your participation at today's IEPR workshop
- Remarks and questions from the dais
- Q&A from workshop attendees
- Written comments or questions via email
  - Mark Palmere - mark.palmere@energy.ca.gov
  - Alex Lonsdale - alexander.lonsdale@energy.ca.gov

Appendix

Forecast Monthly PV Capacity Factors: PG&E

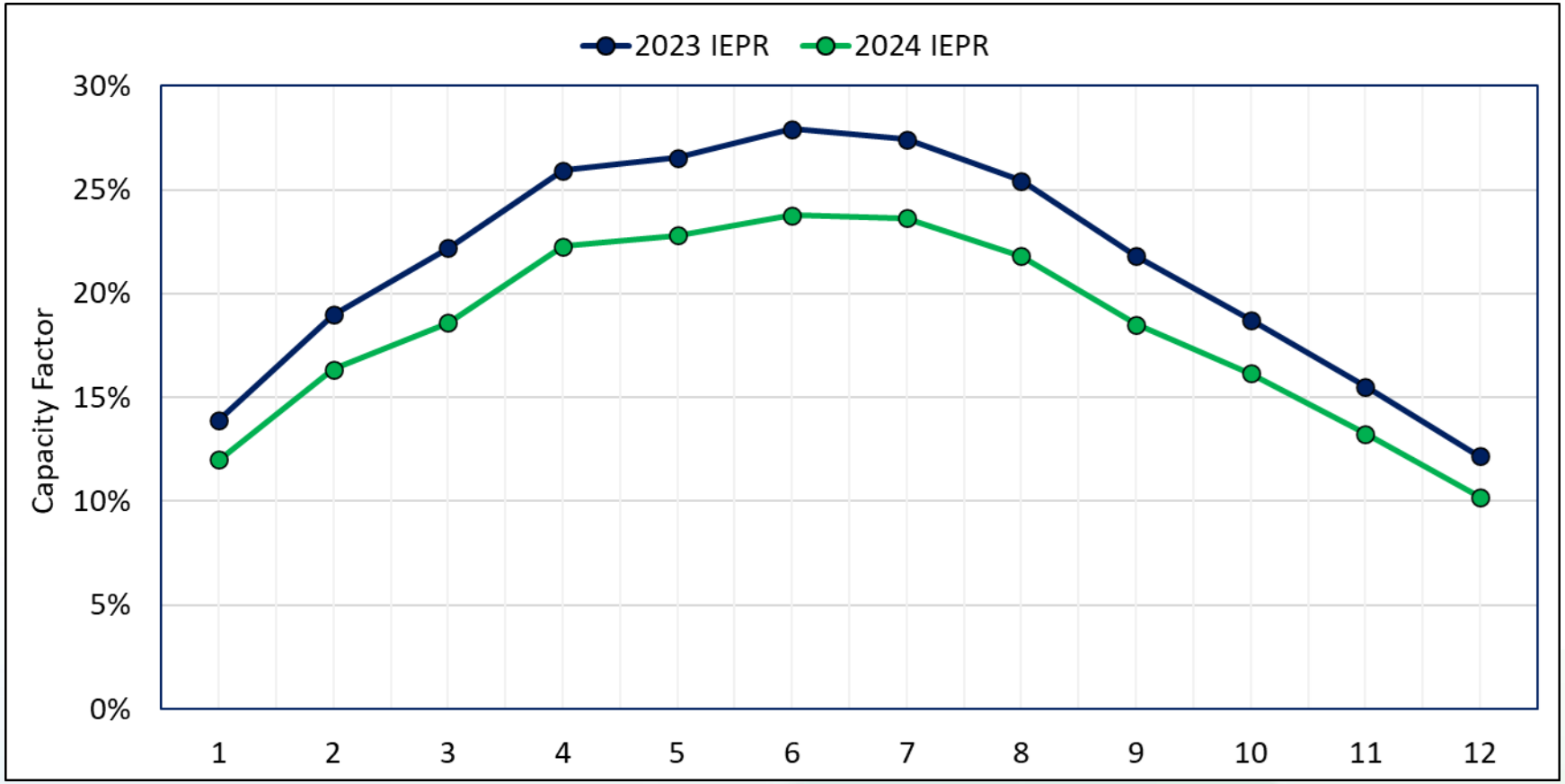
Month	2023 IEPR	2024 IEPR
1	11.2%	9.5%
2	17.3%	14.7%
3	20.6%	17.0%
4	25.9%	22.2%
5	28.2%	23.9%
6	29.9%	25.2%
7	28.4%	24.0%
8	25.3%	21.3%
9	21.6%	18.1%
10	17.7%	14.8%
11	13.1%	11.0%
12	9.8%	7.9%



Source: CEC Staff

Forecast Monthly PV Capacity Factors: SCE

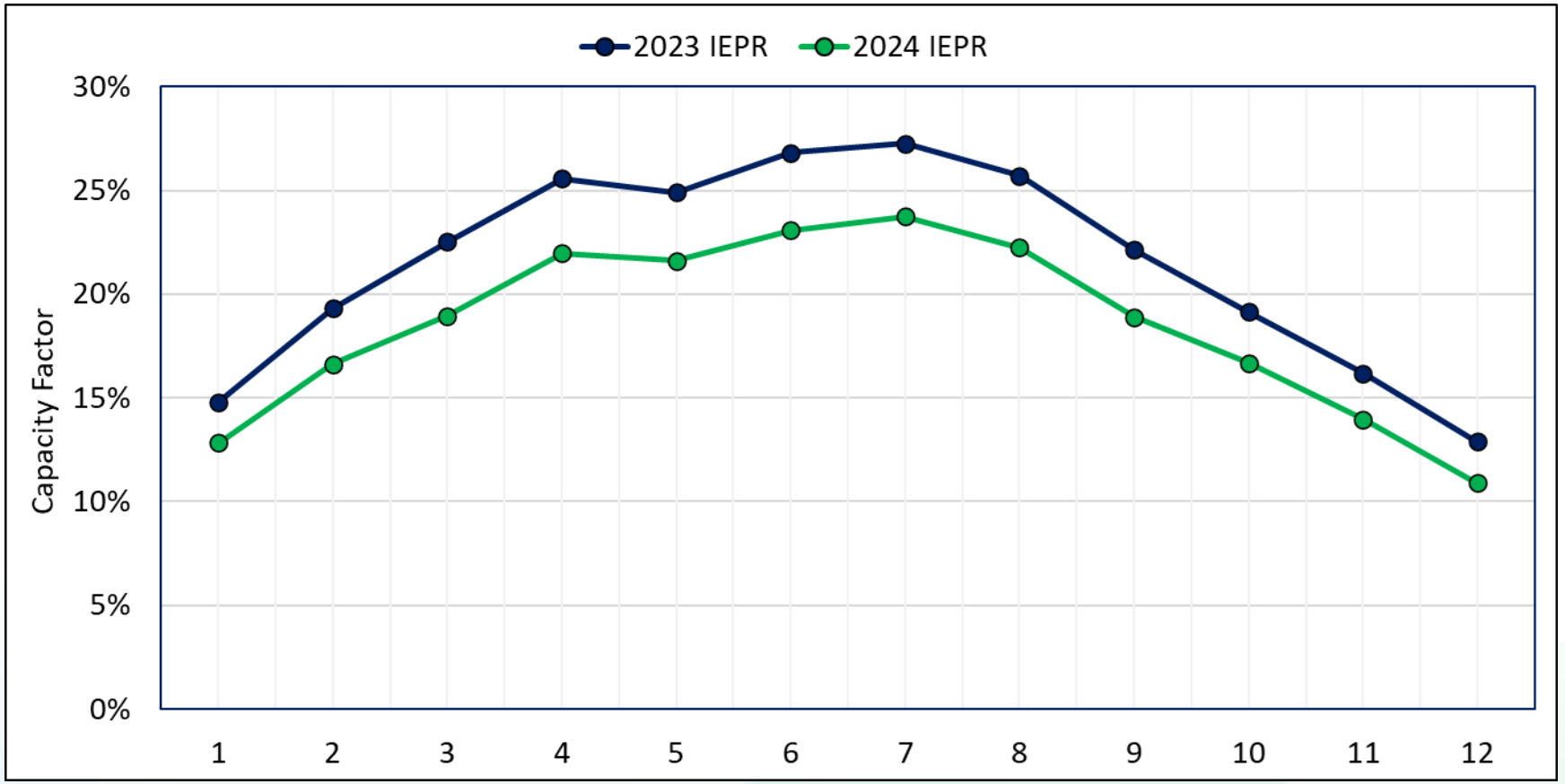
Month	2023 IEPR	2024 IEPR
1	11.2%	9.5%
2	17.3%	14.7%
3	20.6%	17.0%
4	25.9%	22.2%
5	28.2%	23.9%
6	29.9%	25.2%
7	28.4%	24.0%
8	25.3%	21.3%
9	21.6%	18.1%
10	17.7%	14.8%
11	13.1%	11.0%
12	9.8%	7.9%



Source: CEC Staff

Forecast Monthly PV Capacity Factors: SDG&E

Month	2023 IEPR	2024 IEPR
1	11.2%	9.5%
2	17.3%	14.7%
3	20.6%	17.0%
4	25.9%	22.2%
5	28.2%	23.9%
6	29.9%	25.2%
7	28.4%	24.0%
8	25.3%	21.3%
9	21.6%	18.1%
10	17.7%	14.8%
11	13.1%	11.0%
12	9.8%	7.9%

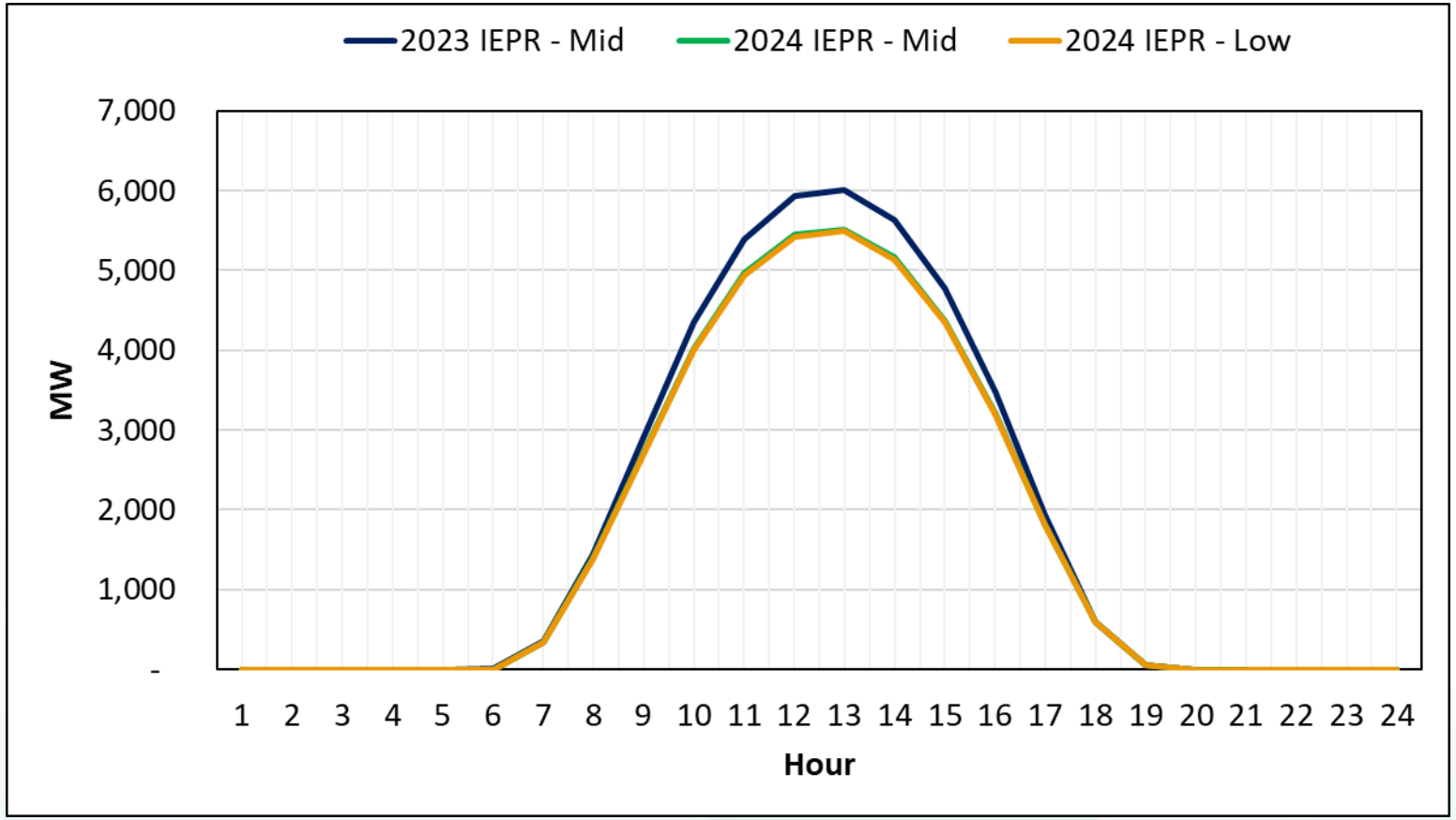


Source: CEC Staff

PG&E Forecast Average Hourly PV Generation: September 2024

- 2024 IEPR includes **additional ~1.2GW of nameplate capacity**
- PV generation forecast **reductions**:

Hour	2024 IEPR Mid (MW)	2024 IEPR Low (MW)
13	-499	-525
17	-111	-120

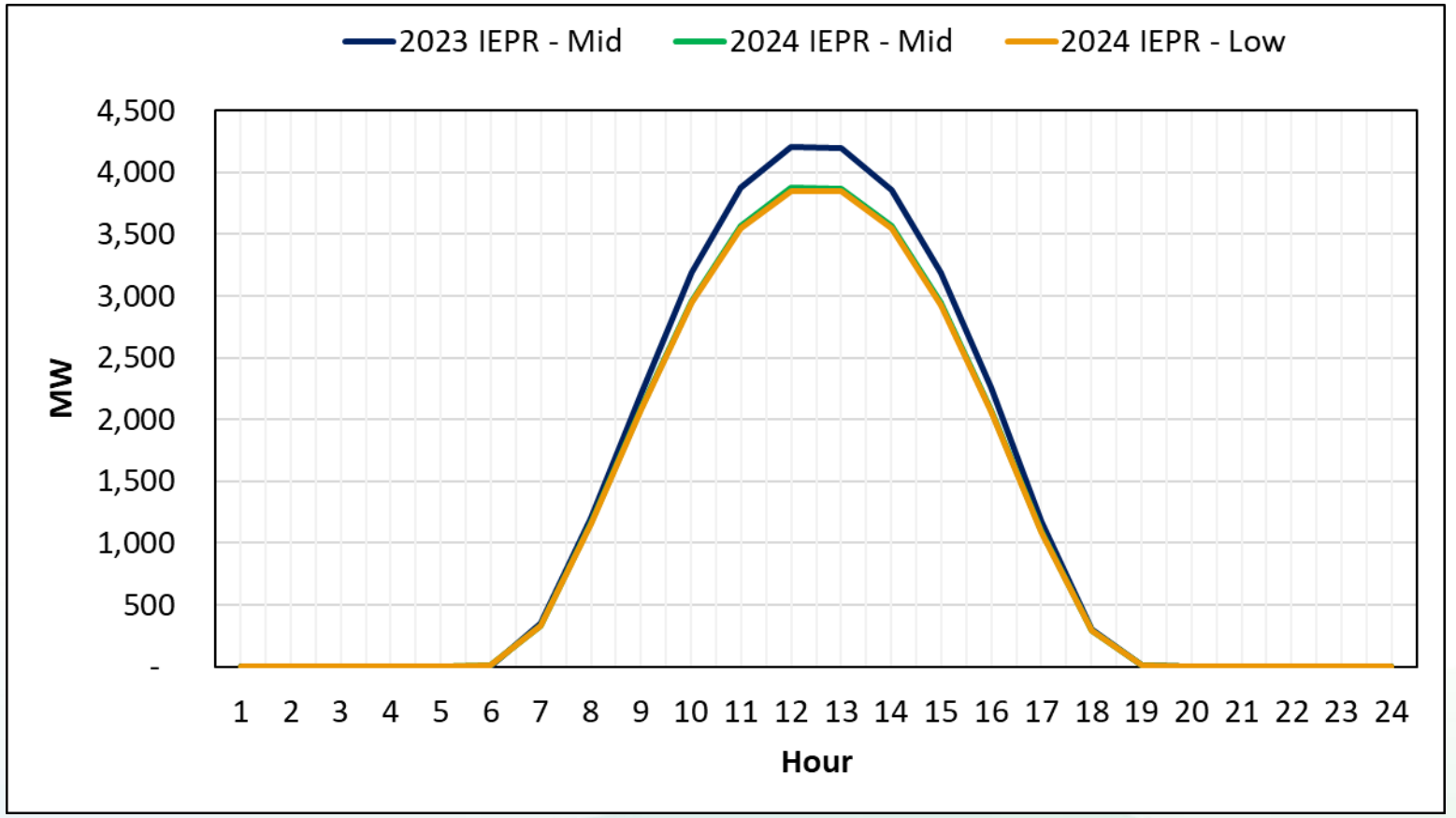


Source: CEC Staff

SCE Forecast Average Hourly PV Generation: September 2024

- 2024 IEPR includes **additional ~1.2GW of nameplate capacity**
- PV generation forecast **reductions**:

Hour	2024 IEPR Mid (MW)	2024 IEPR Low (MW)
13	-327	-348
17	-79	-85

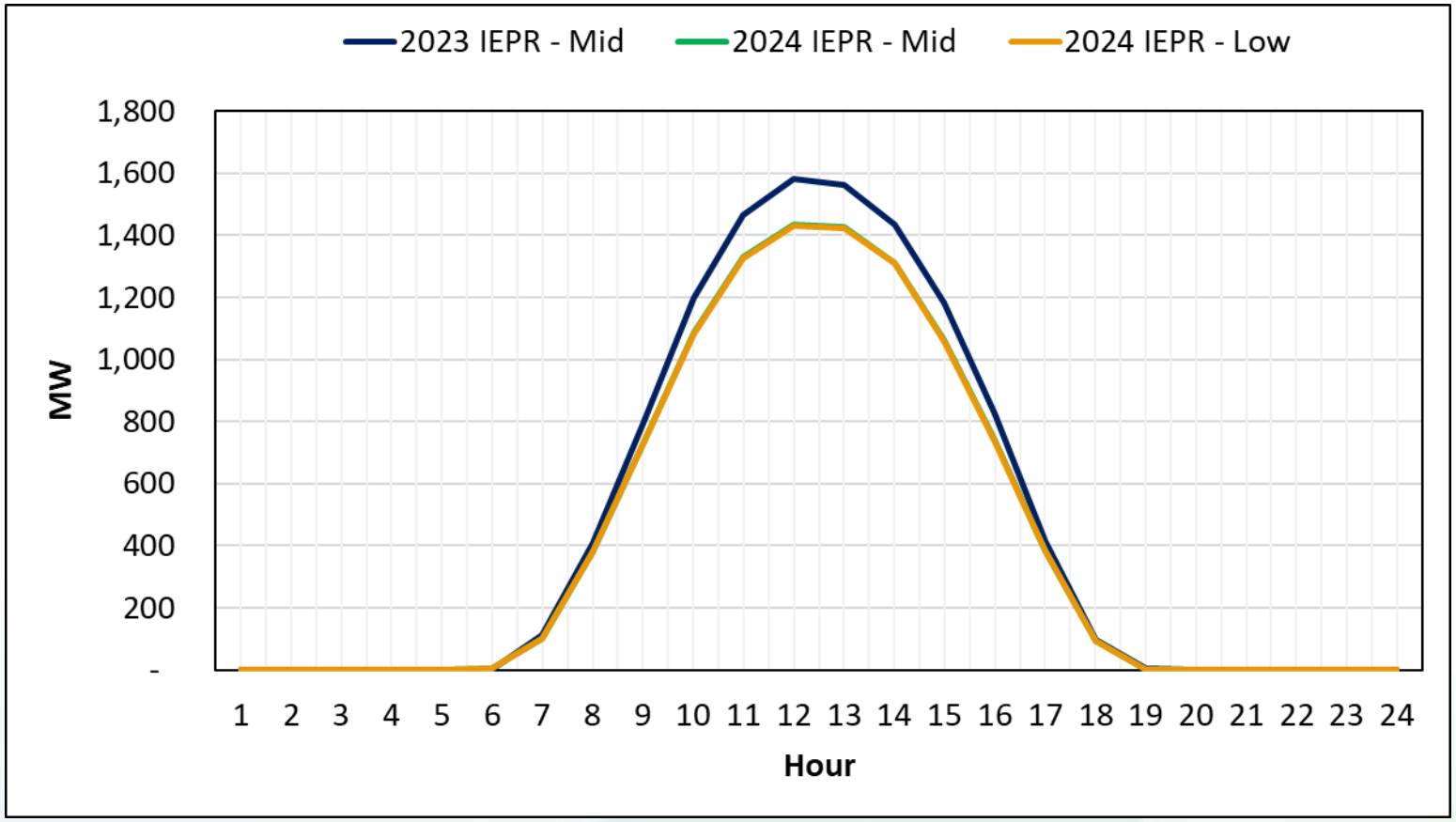


Source: CEC Staff

SDG&E Forecast Average Hourly PV Generation: September 2024

- 2024 IEPR includes **additional ~1.2GW of nameplate capacity**
- PV generation forecast **reductions**:

Hour	2024 IEPR Mid (MW)	2024 IEPR Low (MW)
13	-136	-140
17	-33	-34



Source: CEC Staff

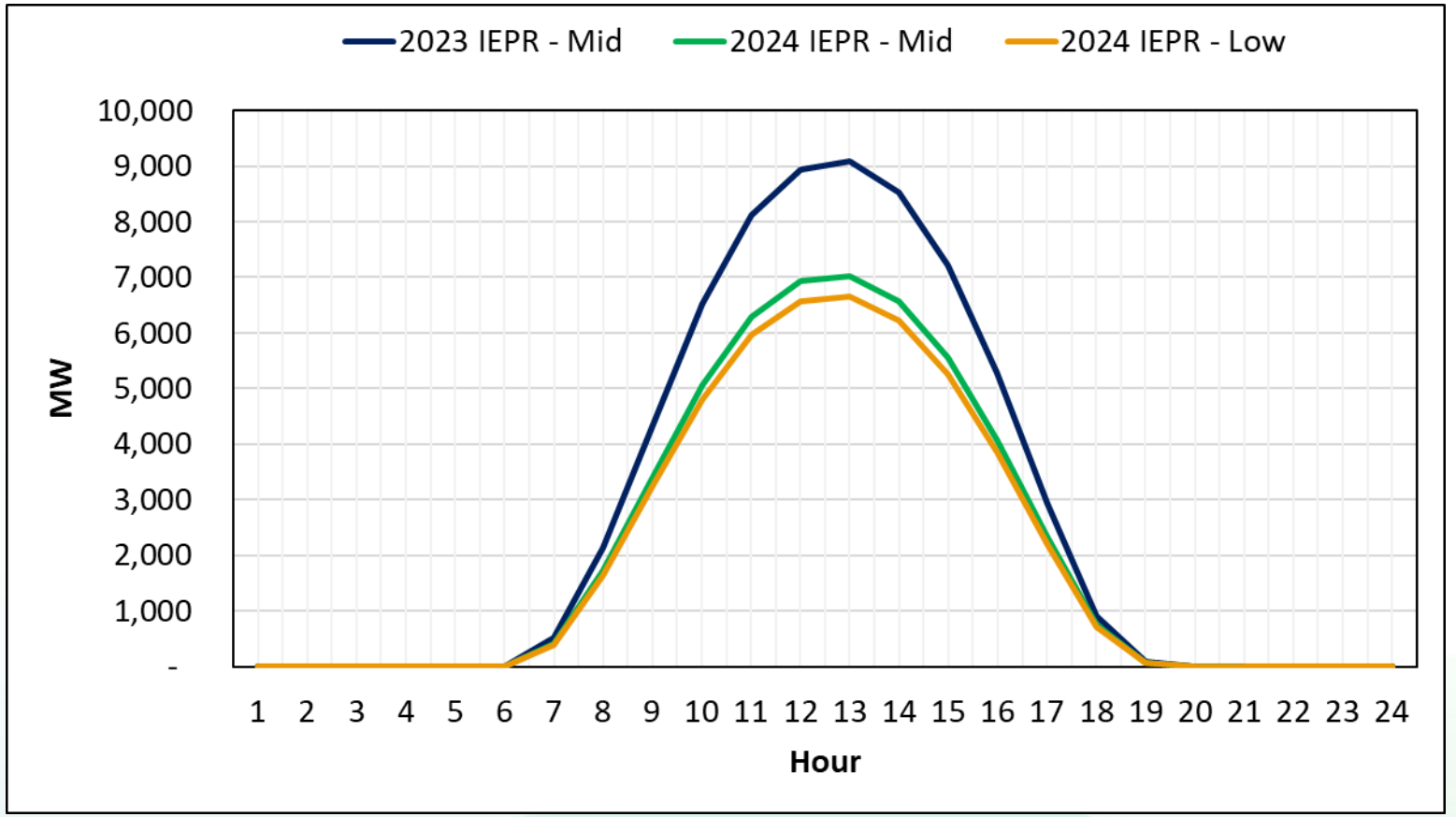
PG&E Forecast Average Hourly PV Generation: September 2030

- Nameplate capacity comparison:

2023 IEPR Mid (MW)	2024 IEPR Mid (MW)	2024 IEPR Low (MW)
11,991	11,159	10,581

- PV generation forecast **reductions**:

Hour	2024 IEPR Mid (MW)	2024 IEPR Low (MW)
13	-2,065	-2,436
17	-614	-738



Source: CEC Staff

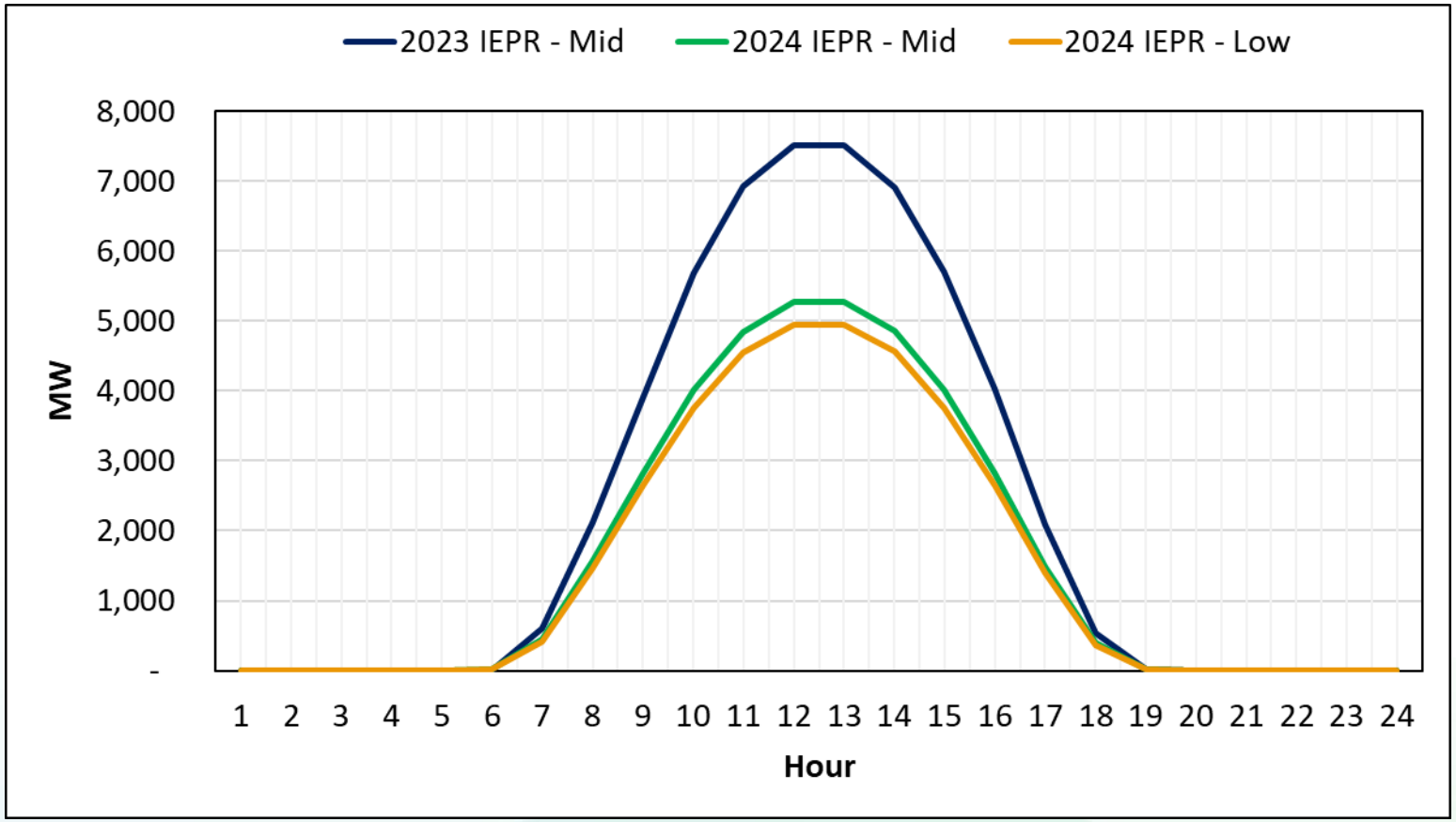
SCE Forecast Average Hourly PV Generation: September 2030

- Nameplate capacity comparison:

2023 IEPR Mid (MW)	2024 IEPR Mid (MW)	2024 IEPR Low (MW)
10,014	8,353	7,832

- PV generation forecast **reductions**:

Hour	2024 IEPR Mid (MW)	2024 IEPR Low (MW)
13	-2,239	-2,571
17	-605	-698



Source: CEC Staff

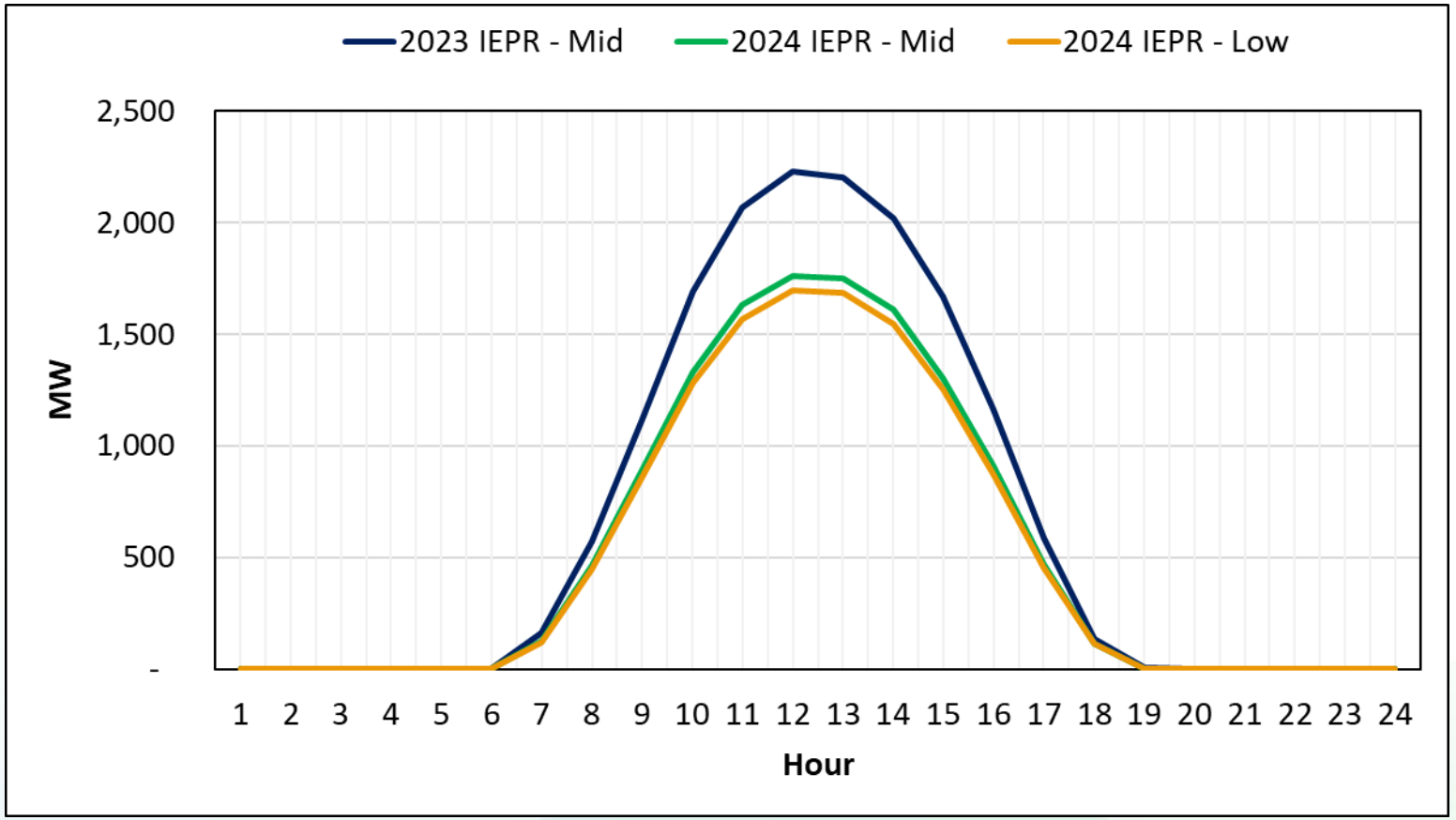
SDG&E Forecast Average Hourly PV Generation: September 2030

- Nameplate capacity comparison:

2023 IEPR Mid (MW)	2024 IEPR Mid (MW)	2024 IEPR Low (MW)
2,933	2,701	2,600

- PV generation forecast **reductions**:

Hour	2024 IEPR Mid (MW)	2024 IEPR Low (MW)
13	-454	-521
17	-117	-135



Source: CEC Staff