Data Center Forecasts

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Agenda

- Definition of Scenarios 1 and 2
- Updates to Scenario 1 results
- Scenario 1 and 2 results

Scenario Assumptions

- **<u>Scenario 1</u>:**
  - Included only applications received as today, not those anticipated in the future.
  - Results currently considered for the Planning Forecast and Local Reliability Scenario.
- **<u>Scenario 2</u>:**
  - Excluded:
    - 50% of PG&E projected incremental capacity (MW) over 2025 – 2037, based on initial confidence level
    - Pre-Method of Service (MOS)[1] projects in SCE territory,
    - One project application in City of San Jose.

- **<u>References</u>**
  - "US data center demand is forecast to grow by some **10 percent / year** until 2030."
    - **Source:** McKinsey & Co. *Investing in the rising data center economy*. Exhibit 1. Jan 17, 2023.

  - Projection range for new US data center growth (CAGR) from 2023 – 2030 : **approximately 9 – 16% / year**
    - **Source:** Energy + Environmental Economics (E3). Figure ES-2. "Load Growth is Here to Stay, but Are Data Centers?" Page 2. July 2024.

[1] **Method of Service (MOS):** Identification of requirements by utilities for new and existing customers requesting to connect load at 66 kV or higher

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What Were the Updates?

Updates to Scenario 1:

- Incorporated historical SMUD peak data center demand.

- Updated SCE forecasts to maintain consistency.
  - Include project addition and attrition;
  - Remove confidence level associated with each project.

Elimination of Scenario 3 on Future Applications:

- Limited information on data center interconnection applications that could be submitted to utilities.

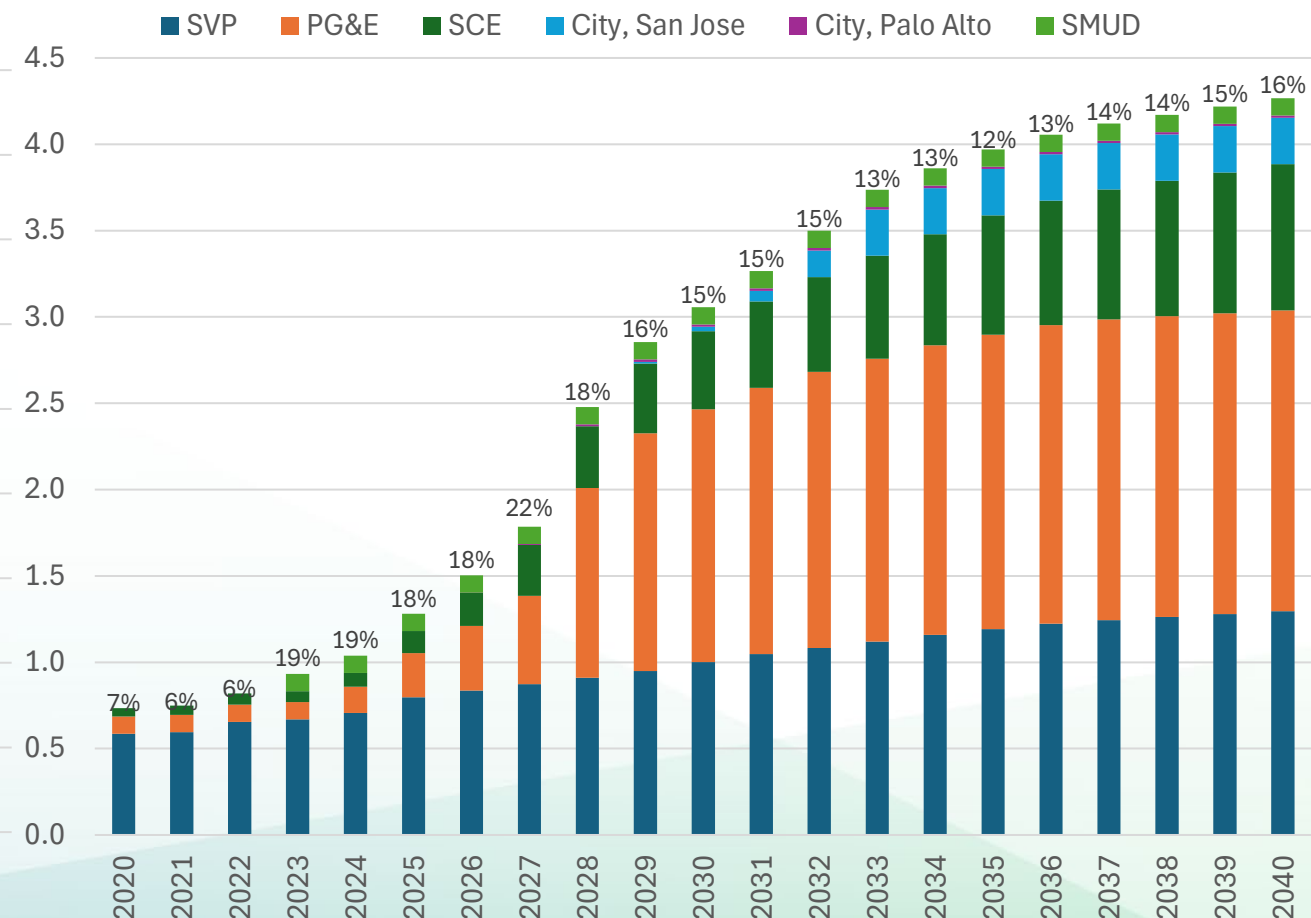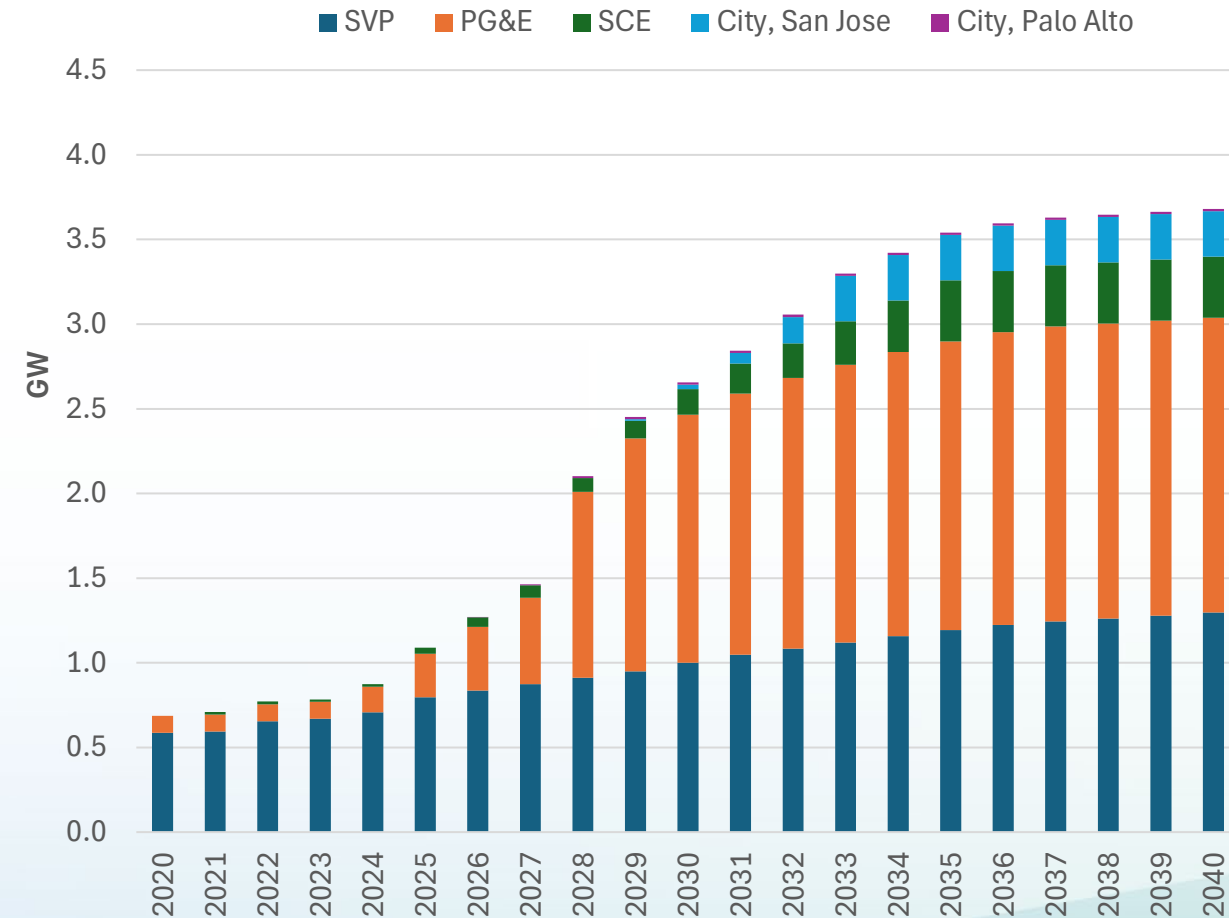- Consistent treatment of data collected from the utilities

Data Center Demand (GW) - Update

Scenario 1:
Annual Average Growth Rate, 2024 – 2040: **~8.8%**

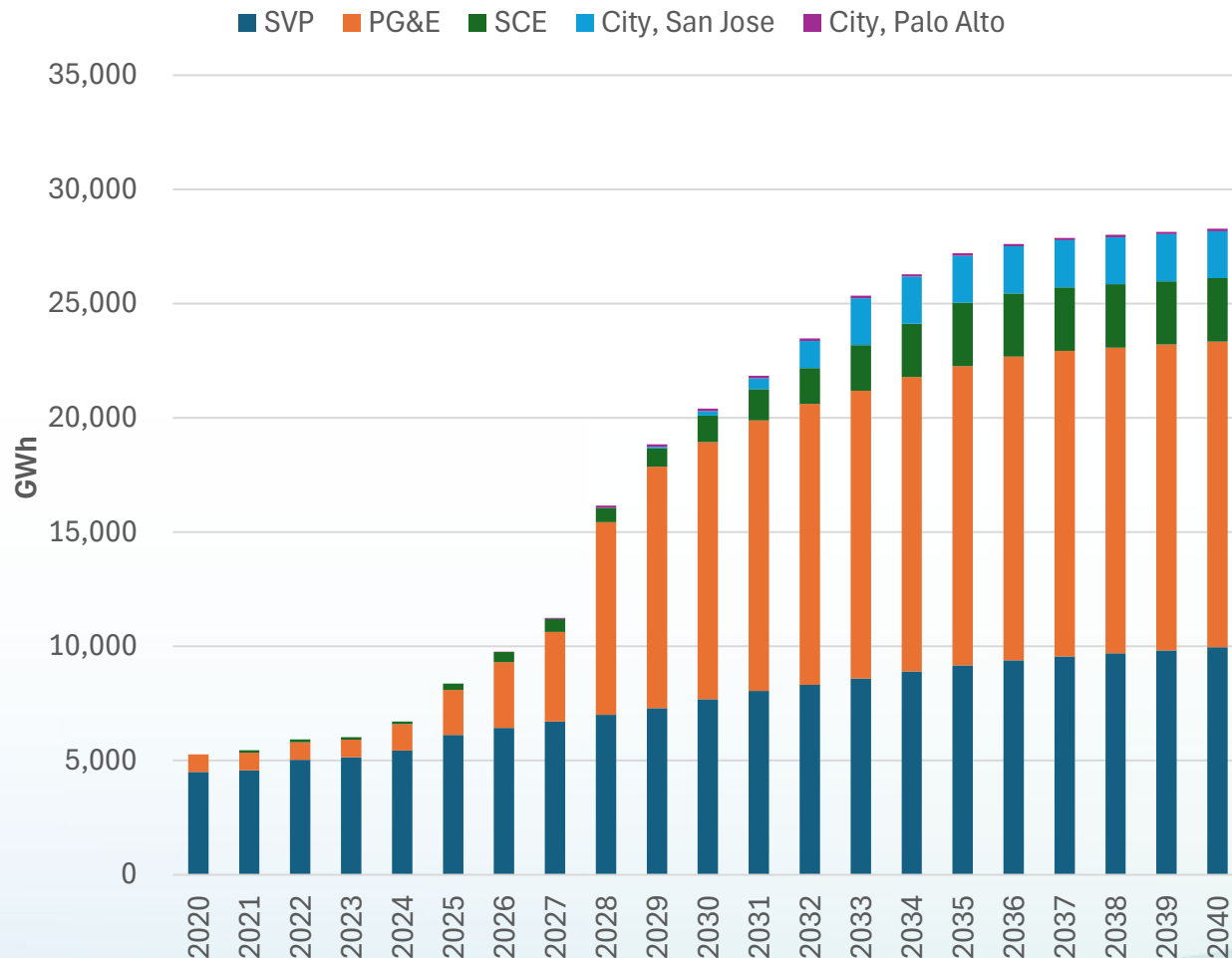**Scenario 1 Update:**
Annual Average Growth Rate, 2024 – 2040: **~8.7%**

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Annual Consumption (GWh) - Update

Scenario 1

Legend: SVP, PG&E, SCE, City, San Jose, City, Palo Alto

Scenario 1 Update

Legend: SVP, PG&E, SCE, City, San Jose, City, Palo Alto, SMUD, Delta

Delta values: 369, 303, 367, 1,140, 1,273, 1,469, 1,792, 2,467, 2,885, 3,086, 3,081, 3,241, 3,407, 3,359, 3,369, 3,301, 3,541, 3,781, 4,021, 4,260
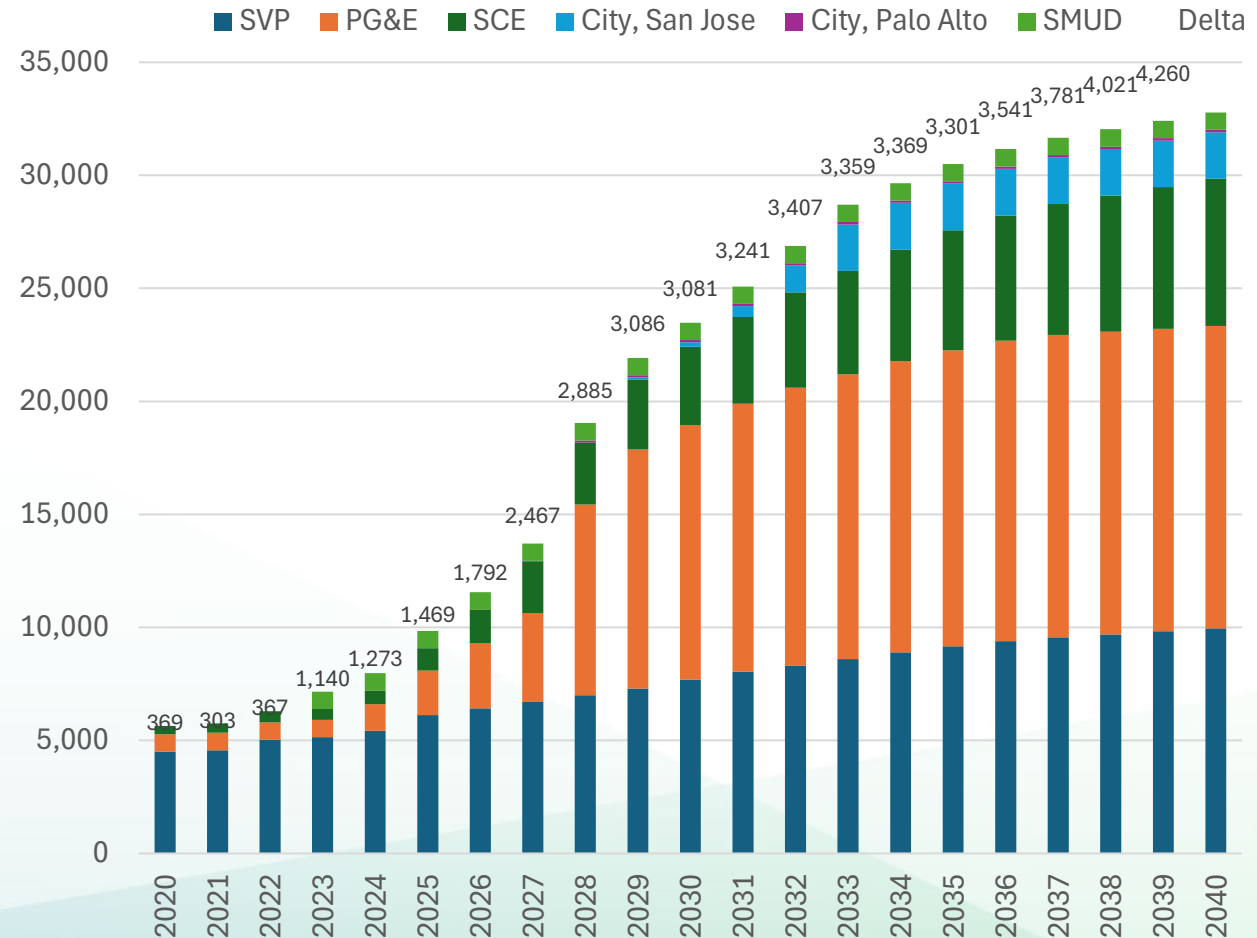
Source: CEC Staff (with data inputs from PG&E, Palo Alto, SVP, San Jose, SCE)
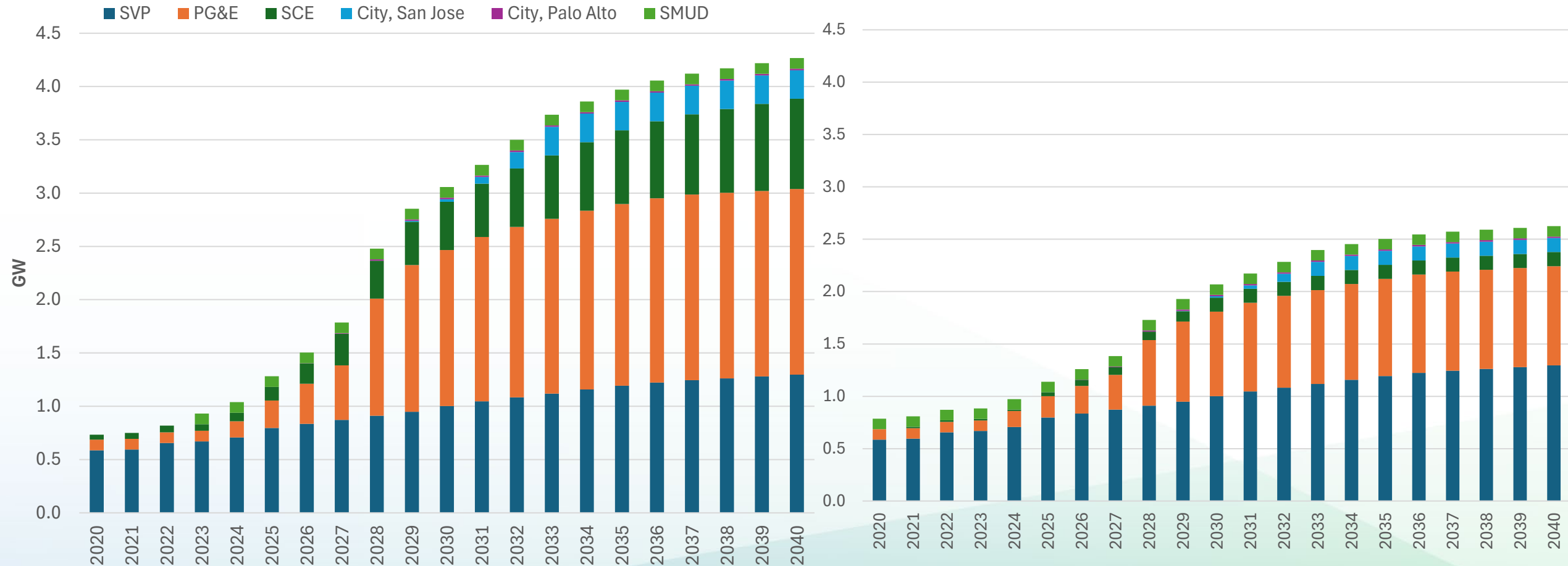
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Data Center Demand (GW)

Scenario 1 Update:
Annual Average Growth Rate, 2024 – 2040: **~8.7%**

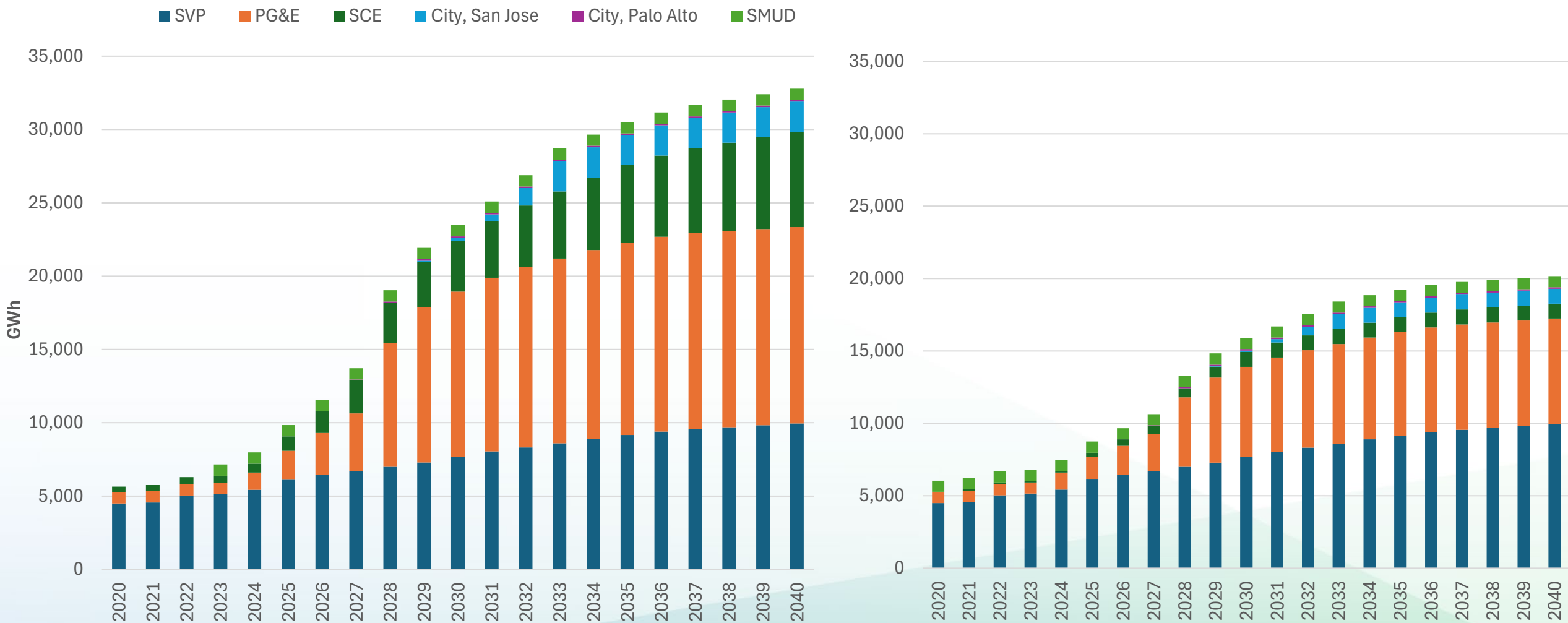**Scenario 2:**
Annual Average Growth Rate, 2024 – 2040: **~6.0%**

Legend: ■ SVP ■ PG&E ■ SCE ■ City, San Jose ■ City, Palo Alto ■ SMUD

Source: CEC Staff (with data inputs from PG&E, Palo Alto, SVP, San Jose, SCE)

Annual Consumption (GWh)

Scenario 1 Update:

Scenario 2

Legend: ■ SVP ■ PG&E ■ SCE ■ City, San Jose ■ City, Palo Alto ■ SMUD

Source: CEC Staff (with data inputs from PG&E, Palo Alto, SVP, San Jose, SCE) 8

Next Steps and Recommendations

- Next Steps
  - Meet with SVP, City of San Jose and others to obtain feedback on draft results.
  - Seek feedback regarding use of Scenario 1 results for Planning Forecast and Local Reliability Scenario.

Special Thanks to:

- Staff at PG&E, SCE, SVP, Palo Alto, San Jose who provided data and spent many hours with us explaining their projections
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- Claire Petersen, CEC
- Chris Kavalec, CEC
- Heidi Javanbakht, CEC
- Jeremy Smith, CEC

Thank You!

Written Comments or Questions via Email
Jenny Chen (jenny.chen@energy.ca.gov)

Appendix

Definitions

- **Installed Capacity / Nameplate Capacity**
  - Capacity of the facility

- **Peak Demand / Load**
  - Highest level of power consumption used by the data center during a specific timeframe ("max demand")

- **Utilization Factor (UF)**
  - Percentage of installed or nameplate capacity at which data center operates at peak demand, based on historical AMI data for a sample of data centers (peak demand ÷ installed capacity)

- **Hourly Load Factor**
  - Data center consumption for the hour ÷ (data center peak demand)

- **Average Demand**
  - Load averaged over 8760 hours of the year

- **Method of Service (MOS) Study**
  - Identification of requirements by utilities for new and existing customers requesting to connect load at 66 kV or higher. It addresses all technical requirements of the customer facility.

Data Received and Methods

Estimated Peak Load, using Assumptions from Existing Data Centers

PG&E	• Projections of incremental installed capacity from 2025 – 2037, based on customer-provided ramping schedule
SCE	• Peak demand of planned data centers to be served at the distribution-level from 2024 - 2028, • Installed capacity of planned data centers at the sub-transmission level
City of San Jose	• Received start dates and total capacity for potential data center projects.

Unaltered Utility-provided Data

SVP	• Annual peak demand for SVP system under 1-in-2 weather scenario. • Broke out peak demand for data centers.
City of Palo Alto	• Annual peak demand for City of Palo Alto system under 1-in-2 weather scenario. • Broke out peak demand for data centers.

Estimating Peak Load & Annual Consumption

Based on historical load of 60+ data centers in SVP territory:

1. Demand of either new or existing project requests assumed to be 5.0 MW at Year 1.

2. Year 1 demand ramped up year over year (YoY) 149% from Year 1 – 5; 113% from Year 6 – 10, until peak demand of data center is reached.

3. Peak demand of data center: ~67% of installed capacity

4. Normalize 2023 data center consumption by data center peak demand to create hourly load factors (8760 hours).

5. Calculate hourly load factors for weekday and weekend (24 hours).

6. Multiply estimated peak demand (MW) for each year by hourly load factors.

7. Sum consumption across all hours of each year to derive annual consumption (GWh).

Source: Silicon Valley Power (SVP). Data Center Load Estimation Data & Methods. SVP Engineering Division. Sep 11, 2024.