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<tr>
<td><strong>Docket Number:</strong></td>
<td>19-IEPR-03</td>
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<tr>
<td><strong>Project Title:</strong></td>
<td>Electricity and Natural Gas Demand Forecast</td>
</tr>
<tr>
<td><strong>TN #:</strong></td>
<td>230923</td>
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<tr>
<td><strong>Document Title:</strong></td>
<td>Statewide and Planning Area Summary</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>Presentation by Cary Garcia of CEC</td>
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<tr>
<td><strong>Filer:</strong></td>
<td>Raquel Kravitz</td>
</tr>
<tr>
<td><strong>Organization:</strong></td>
<td>California Energy Commission</td>
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<tr>
<td><strong>Submitter Role:</strong></td>
<td>Commission Staff</td>
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<tr>
<td><strong>Submission Date:</strong></td>
<td>12/2/2019 9:46:26 AM</td>
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<td><strong>Docketed Date:</strong></td>
<td>12/2/2019</td>
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</tbody>
</table>
California Energy Demand 2019
Revised Forecast, 2020-2030
Statewide and Planning Area Summary

Cary.Garcia@energy.ca.gov
12/2/2019
California Energy Commission
2019 Forecast Products

Electricity Consumption and Sales Forecast
  – Annual 2019 to 2030
  – by planning area and sector

Peak Forecasts
  – Annual and hourly 2020 to 2030
  – by TAC (Hourly) and BAA (Form 1.5)

End-Use Natural Gas Forecasts
  – Annual 2019 to 2030
  – by planning area and sector
Managed Sales and Peak Forecast

- Incorporate latest 2019 P&G Study for IOUs
- Also includes savings for POUs from CMUA study
- Mid-Mid and Mid-Low used for planning purposes
Method

Models
- End-use models by sector
- Electricity and NG rate forecasts
- Self-generation + Storage
- Transportation electrification
- Hourly Forecasting Model (HLM)

Adjustments
- Committed efficiency savings and AAEE
- Climate change
Three Baseline Demand Case

- **High Demand**
  - High econ/demo, climate change impacts, and EVs
  - Low electricity rates and self-generation

- **Low Demand**
  - Low econ/demo and EVs
  - High electricity rates and self-generation
  - No climate change impacts

- **Mid Demand**
  - Baseline assumptions between high and low demand cases
Economic Inputs

Economic and Demographics – Moody’s and DOF
– GSP, employment, households, population, employment, etc

Mid Case Assumptions
• Unemployment rate will increase through 2022
• Slower wage growth
• Uncertainty around trade limiting business investment
• Some rebound in the near-term
• Increase in households while population growth slows
Other Inputs

PV Energy
  – 2019-2030 CAGR of 8.7%
  – Reaches 40,800 GWh by 2030

LDEV
  – 15,000 GWh of consumption by 2030
  – 70% attributed to residential charging

MDHD
  – From 22 GWh in 2019 to 1,300 GWh by 2030 in Mid Case

Off-road
  – 1,750 GWh by 2030
Other Inputs

- **Climate Change**
  - Weather scenarios developed by Scripps
  - Applied to High and Mid Cases

- **Ag and water pumping (AGWP)**
  - Adjusted by new cannabis cultivation forecast
  - ~12,400 GWh by 2030, 1% annual growth
Climate Change

By 2030 reach 1,450 GWh in High Case and 1,200 GWh in Mid Case; Net effect due to more CDD but less HDD
Energy Efficiency

- CED 2019 Revised incorporates 2018-2019 utility program savings (IOU and POU)
- Also includes 2019 Title 24, Title 20, and Federal standards
- Additional Achievable Energy Efficiency (AAEE) updated based on latest Potential and Goals Study
New committed savings initial impact of 24,000 GWh in 2019 that declines to 17,800 GWh by 2030
Mid-Mid reaches nearly 16,500 GWh by 2030; more modest Mid-Low reaches 12,000 GWh
Cannabis Forecast

• Challenges
  – Historical data on production and consumption
  – Uncertainty around energy intensity of cultivation
    • Indoor, Outdoor, or Greenhouse
  – Non-commercial home operations
Cannabis Forecast Method

• Estimate CA usage
  – Users and amount
    • Substance Abuse and Mental Health Services Administration
    • Under-reporting (+22%: Kilmer et.al.)

• Forecast # of Users
  – Population growth (main driver)
  – Heavy users keep using
  – Light users increase due to legalization

• Account for exports
  – 3x multiplier based on current literature
Cannabis Forecast Method

- Indoor vs Outdoor Production
  - California Department of Food and Agriculture
    - Outdoor = 20%
    - Indoor = 28%
    - Greenhouse = 52%
Cannabis Next Steps

- More reliable California specific data on:
  - Number of users of each type (heavy & light)
  - Grams used per user
  - Total cannabis production
  - Distribution of production between indoors and greenhouses
  - Energy intensity of each mode of production
Statewide Results
# State Baseline Econ/Demo

## CED 2019 Revised average annual % growth 2019-2030

<table>
<thead>
<tr>
<th>Driver</th>
<th>Mid</th>
<th>Mid CEDU 2018</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>0.76%</td>
<td>0.79%</td>
<td>0.76%</td>
<td>0.76%</td>
</tr>
<tr>
<td>Households</td>
<td>1.03%</td>
<td>0.88%</td>
<td>1.15%</td>
<td>1.03%</td>
</tr>
<tr>
<td>Personal Income</td>
<td>2.51%</td>
<td>2.54%</td>
<td>2.68%</td>
<td>2.23%</td>
</tr>
<tr>
<td>Manufacturing Output</td>
<td>2.35%</td>
<td>2.42%</td>
<td>2.55%</td>
<td>1.91%</td>
</tr>
<tr>
<td>Total Employment</td>
<td>0.45%</td>
<td>0.44%</td>
<td>0.58%</td>
<td>0.35%</td>
</tr>
</tbody>
</table>
### State Baseline Rates

**CED 2019 Revised average annual % growth 2019-2030**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Mid</th>
<th>Mid CEDU 2018</th>
<th>High Demand</th>
<th>Low Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>1.63%</td>
<td>0.38%</td>
<td>-0.24%</td>
<td>2.53%</td>
</tr>
<tr>
<td>Commercial</td>
<td>1.83%</td>
<td>0.37%</td>
<td>0.34%</td>
<td>3.12%</td>
</tr>
</tbody>
</table>

- PG&E and SCE distribution and revenue requirements adjusted upwards based on wildfire mitigation
- SDG&E rates include estimated impacts of 2019 GRC Phase 1 decision
State Baseline Consumption Results

Mid case reaches 320 TWh by 2030; 1.1% average annual growth 2019-2030 vs. 1.4% in CEDU 2018 Mid Case
State Baseline Sales Results

0.5% average annual growth 2019-2030 vs. 0.9% in CEDU 2018 Mid Case; AAPV is now added to baseline self-generation forecast; faster PV growth in near-term vs long-term
Statewide Baseline Mid Case Sales Results

<table>
<thead>
<tr>
<th>CAGR Years</th>
<th>Residential</th>
<th>Commercial</th>
<th>Industrial</th>
<th>Mining</th>
<th>AGWP</th>
<th>TCU</th>
<th>Street Lighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019-2025</td>
<td>0.51%</td>
<td>0.28%</td>
<td>-0.32%</td>
<td>-1.25%</td>
<td>0.89%</td>
<td>0.55%</td>
<td>-0.54%</td>
</tr>
<tr>
<td>2025-2030</td>
<td>1.50%</td>
<td>0.16%</td>
<td>-0.21%</td>
<td>-2.30%</td>
<td>1.16%</td>
<td>0.74%</td>
<td>-0.69%</td>
</tr>
<tr>
<td>2019-2030</td>
<td>0.96%</td>
<td>0.23%</td>
<td>-0.27%</td>
<td>-1.73%</td>
<td>1.01%</td>
<td>0.64%</td>
<td>-0.60%</td>
</tr>
</tbody>
</table>

vs. CEDU 2018

- Residential and commercial previously grew at 1.7 and 0.9% annually in CEDU 2018
- Decreasing PPH and slower growth in commercial floorspace
- Increasing rates also contribute to slower growth in forecast
Planning Area Results
PG&E Input Summary

Econ
- Increasing rates
- Less households add in near-term
- Larger decline in employment in 2021 and slower growth compared to CEDU 2018

PV Energy
- 2019-2030 CAGR of 8.7%
- Reaches 19,000 GWh by 2030

LDEV
- 6,300 GWh of consumption by 2030

MDHD
- 500 GWh by 2030
## PG&E Baseline Sales Results

<table>
<thead>
<tr>
<th>CAGR Years</th>
<th>Residential</th>
<th>Commercial</th>
<th>Industrial</th>
<th>Mining</th>
<th>AGWP</th>
<th>TCU</th>
<th>Street Lighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019-2025</td>
<td>0.21%</td>
<td>0.21%</td>
<td>-0.91%</td>
<td>-2.26%</td>
<td>0.61%</td>
<td>0.67%</td>
<td>-0.54%</td>
</tr>
<tr>
<td>2025-2030</td>
<td>1.52%</td>
<td>-0.12%</td>
<td>-0.92%</td>
<td>-4.10%</td>
<td>1.08%</td>
<td>0.78%</td>
<td>-0.69%</td>
</tr>
<tr>
<td>2019-2030</td>
<td>0.80%</td>
<td>0.06%</td>
<td>-0.91%</td>
<td>-3.10%</td>
<td>0.82%</td>
<td>0.72%</td>
<td>-0.60%</td>
</tr>
</tbody>
</table>

### vs. CEDU 2018

- Residential and commercial sales for 2030, 17% and 12% lower
- AGWP slighting higher due to increased demand from crop production and municipal water supply plus cannabis cultivation
  - Nearly 600 GWh of attributed to cultivation by 2030
Sales grows at 0.2% annually, 2019-2030 in Mid Case

- Slower than CEDU 2018 at 0.8%
- PV energy grows at nearly 18% per year through 2021
AAEE Impacts

- 6,000 GWh of savings by 2030 in Mid-Mid
- 3,300 GWh in Mid-Low
- Sales decreased by 4.8% in 2030 Mid-Mid
SCE Input Summary

**Econ**
- Increasing rates
- Less decline in employment in 2021

**PV Energy**
- 2019-2030 CAGR of 9%
- Reaches 13,700 GWh by 2030

**LDEV**
- 4,800 GWh of consumption by 2030

**MDHD**
- 5 GWh in 2019 to 445 GWh by 2030 in Mid Case
### SCE Baseline Sales Results

<table>
<thead>
<tr>
<th>CAGR Years</th>
<th>Residential</th>
<th>Commercial</th>
<th>Industrial</th>
<th>Mining</th>
<th>AGWP</th>
<th>TCU</th>
<th>Street Lighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019-2025</td>
<td>0.70%</td>
<td>0.27%</td>
<td>0.20%</td>
<td>-0.99%</td>
<td>0.92%</td>
<td>0.51%</td>
<td>-0.54%</td>
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<tr>
<td>2025-2030</td>
<td>1.41%</td>
<td>0.23%</td>
<td>0.22%</td>
<td>-1.95%</td>
<td>1.02%</td>
<td>0.73%</td>
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</tr>
<tr>
<td>2019-2030</td>
<td>1.02%</td>
<td>0.25%</td>
<td>0.21%</td>
<td>-1.43%</td>
<td>0.96%</td>
<td>0.61%</td>
<td>-0.60%</td>
</tr>
</tbody>
</table>

**vs. CEDU 2018**

- Cannabis adds 600 GWh of additional demand by 2030 to AGWP
- Residential and commercial 2030 forecasts down 6 and 7%, respectively
SCE Baseline Sales Results

- Mid sales grows at 0.5% vs 0.9% in CEDU 2018
- 104 TWh by 2030
- 4% lower than CEDU 2018
SCE Managed Sales Results

AAEE Impacts
- 4,800 GWh of savings by 2030 in Mid-Mid
- 3,500 GWh in Mid-Low
- Mid-Mid 4.7% percent lower than baseline in 2030
Econ
– Decrease in employment in 2021 along with slower growth in long-term
– Household additions dip in 2020
– Rates see modest growth vs. CEDU 2018 with flat/declining

PV Energy
– 2019-2030 CAGR of 7%
– Reaches 4,300 GWh by 2030

LDEV
– 1,350 GWh of consumption by 2030

MDHD
– 2 GWh in 2019 to 129 GWh by 2030 in Mid Case
### SD&GE Baseline Sales Results

<table>
<thead>
<tr>
<th>CAGR Years</th>
<th>Residential</th>
<th>Commercial</th>
<th>Industrial</th>
<th>Mining</th>
<th>AGWP</th>
<th>TCU</th>
<th>Street Lighting</th>
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<tbody>
<tr>
<td>2019-2025</td>
<td>-0.49%</td>
<td>0.27%</td>
<td>-0.89%</td>
<td>-0.05%</td>
<td>2.43%</td>
<td>-0.26%</td>
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<td>2025-2030</td>
<td>2.85%</td>
<td>-0.07%</td>
<td>-0.35%</td>
<td>-0.23%</td>
<td>2.31%</td>
<td>0.05%</td>
<td>-0.69%</td>
</tr>
<tr>
<td>2019-2030</td>
<td>1.02%</td>
<td>0.11%</td>
<td>-0.64%</td>
<td>-0.13%</td>
<td>2.37%</td>
<td>-0.12%</td>
<td>-0.60%</td>
</tr>
</tbody>
</table>

### vs. CEDU 2018

- Slower growth in residential and commercial
  - 2030: 13% and 6% lower, respectively
- AGWP sees effects of cannabis cultivation
  - Additional 150 GWh by 2030
• Mid case sales grows at 0.4% annually
• 6% less than CEDU 2018 in 2030, ~19,000 GWh
• Faster PV adoption in mid-term
SD&GE Managed Sales Results

AAEE
- Mid-Mid reaches 18,200 GWh by 2030
- 5% reduction in sales compared to baseline
- 900 GWh of AAEE by 2030 in Mid-Mid
- 600 GWh in Mid-Low
LADWP Input Summary

Econ
- Increased rates compared to CEDU 2018
- Larger decrease in 2021 employment and slower growth

PV Energy
- 2019-2030 CAGR of 8%
- Reaches 1,300 GWh by 2030

LDEV
- 1,600 GWh of consumption by 2030

MDHD
- 1.5 GWh in 2019 to 130 GWh by 2030 in Mid Case
LADWP Baseline Sales Results

<table>
<thead>
<tr>
<th>CAGR Years</th>
<th>Residential</th>
<th>Commercial</th>
<th>Industrial</th>
<th>Mining</th>
<th>AGWP</th>
<th>TCU</th>
<th>Street Lighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019-2025</td>
<td>1.39%</td>
<td>0.43%</td>
<td>-0.82%</td>
<td>-0.19%</td>
<td>14.54%</td>
<td>0.80%</td>
<td>-0.54%</td>
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<td>2025-2030</td>
<td>1.46%</td>
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<td>-0.07%</td>
<td>-0.41%</td>
<td>8.01%</td>
<td>1.28%</td>
<td>-0.69%</td>
</tr>
<tr>
<td>2019-2030</td>
<td>1.42%</td>
<td>0.45%</td>
<td>-0.48%</td>
<td>-0.29%</td>
<td>11.52%</td>
<td>1.02%</td>
<td>-0.60%</td>
</tr>
</tbody>
</table>

vs. CEDU 2018

- Residential and commercial sector growth reduced from 1.9 and 1% CAGR, respectively
- 2030 AGWP previously 21 GWh, now reaches 176 GWh due to cultivation
LADWP Baseline Sales Results

- Sales growth at 0.8% in Mid Case vs. 1.2% in CEDU 2018
- Reaches 23,800 GWh by 2030
- 2018 actual sales was far lower
- New committed savings bring forecast down a little further
LADWP Net Peak Results

2019-2020 grows at 0.4% annually vs. 1% in CEDU 2018; reached 6,300 MW by 2030; Updated projections more aligned with LADWP IEPR forecast growth
LADWP Managed Sales Results

AAEE
- Mid-Mid AAEE reduces 2030 sales by 16%
- 19,900 GWh in Mid-Mid by 2030
- 3,900 GWh by 2030 in Mid-Mid
- Mid-Low reaches 2,900 GWh
Econ
- Near-term household growth is slower and total additions by 2030 is reduced
- Long-term employment is slowed along with larger 2021 dip
- Population also see slower growth

PV Energy
- 2019-2030 CAGR of 11% vs 7% in CEDU 2018
- Reaches 1,200 GWh by 2030

LDEV
- 470 GWh of consumption by 2030

MDHD
- 43 GWh by 2030 in Mid Case
### SMUD Baseline Sales Results

<table>
<thead>
<tr>
<th>CAGR Years</th>
<th>Residential</th>
<th>Commercial</th>
<th>Industrial</th>
<th>Mining</th>
<th>AGWP</th>
<th>TCU</th>
<th>Street Lighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019-2025</td>
<td>0.91%</td>
<td>0.54%</td>
<td>-0.15%</td>
<td>-0.10%</td>
<td>3.30%</td>
<td>0.48%</td>
<td>-0.54%</td>
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<tr>
<td>2025-2030</td>
<td>1.32%</td>
<td>0.65%</td>
<td>0.76%</td>
<td>-0.28%</td>
<td>3.20%</td>
<td>0.61%</td>
<td>-0.69%</td>
</tr>
<tr>
<td>2019-2030</td>
<td>1.10%</td>
<td>0.59%</td>
<td>0.26%</td>
<td>-0.18%</td>
<td>3.25%</td>
<td>0.54%</td>
<td>-0.60%</td>
</tr>
</tbody>
</table>

### vs. CEDU 2018

- 2019-2030 residential and commercial sector growth reduced from 1.7 and 1.4% annually, respectively.
- Cultivation adds ~70 GWh by 2030 to AGWP.
SMUD Baseline Sales Results

11,300 GWh by 2030 in Mid Case; 2019-2030 annual growth of 0.8% vs 1.4% in CEDU 2018
SMUD Baseline Peak Results

Reaches 3,200 MW by 2030 in Mid Case; 2019-2030 annual growth of 0.8% compared to 1.3% in CEDU 2018 Mid Case
SMUD Managed Sales Results

AAEE
- 1,300 GWh of AAEE in Mid-Mid by 2030
- Mid-Low at 1,000 GWh
- Mid-Mid declines 0.3% annually