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Behind-the-Meter PV Forecast

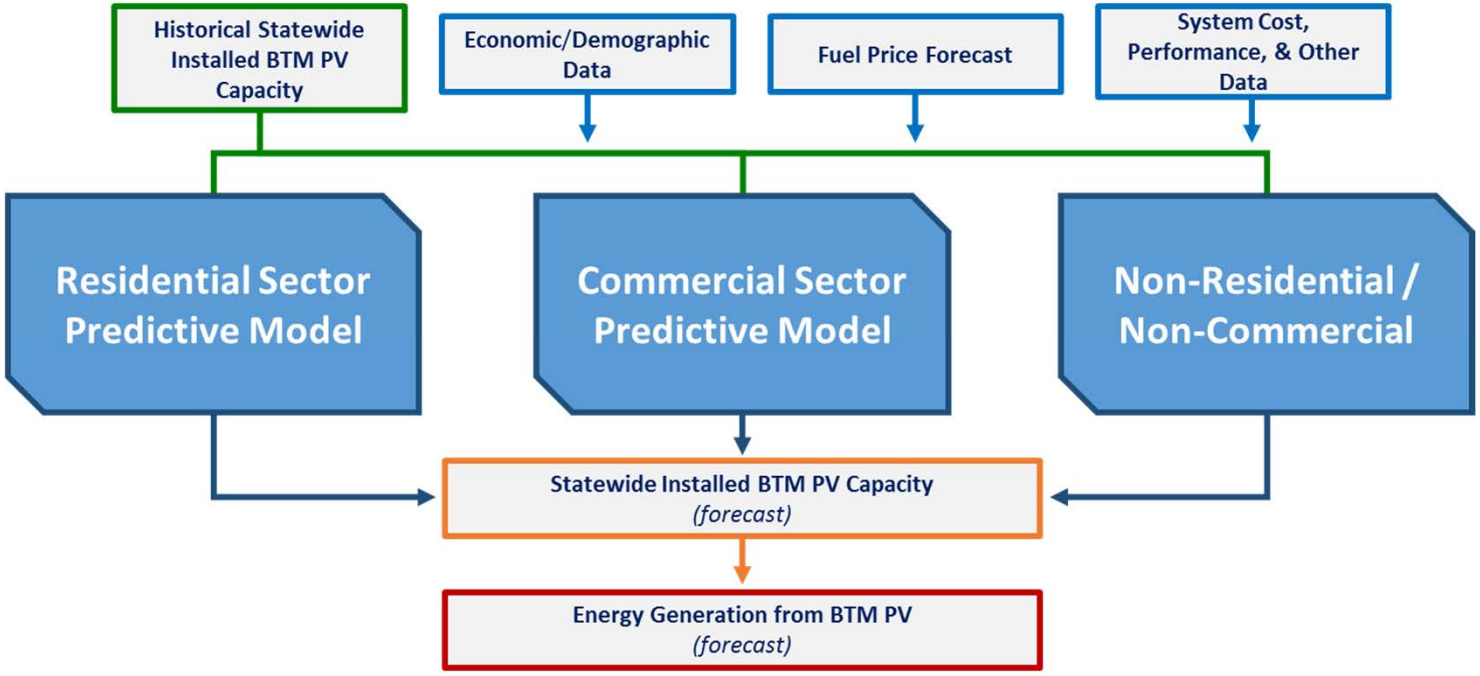
CED 2019 Revised Forecast

Sudhakar Konala
California Energy Commission
December 2, 2019

Scenario Definitions

- High = High Electricity Demand Case
  - High economic / demographic growth → high growth in building stock
  - Low electricity rates
  - Low PV adoption
- Low = Low Electricity Demand Case
  - Low economic / demographic growth → low growth in building stock
  - High electricity rates
  - High PV adoption
- Mid = Mid Electricity Demand Case

Energy Commission PV Model



- Residential and commercial models predict PV penetration based on calculated payback / bill savings.

Updates to 2019 Revised PV Forecast

- Demographic / economic data
  - Households
    - Higher compared to preliminary forecast
  - Commercial floorspace
    - Lower compared to preliminary forecast
  - GSP Deflator
- Forecast of Electricity rates
  - Generally higher than preliminary forecast
    - Especially in 2018-2021 period

2019 PV Adoptions YTD

Year over Year* Δ in PV Additions (2019 vs 2018)

Sector	PG&E	SCE	SDG&E
Residential	+ 6.3%	+ 7.9%	+ 27.6%
Commercial	- 14.5%	- 51.9%	- 41.4%
Overall	-3.8 %	- 12.1 %	+ 8.4%

* For January to September

Source: Staff analysis of NEM Interconnection Applications Data Set

- YoY increase in residential PV installations
  - YoY decline in commercial sector PV installations
- Reflects broader economy
- Federal ITC starts to decline

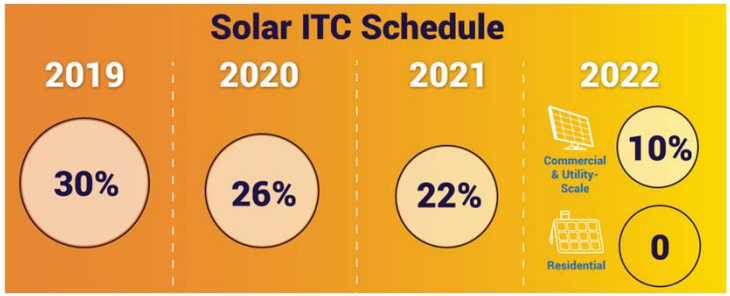


Image from Solar Energy Industries Association

The New York Times

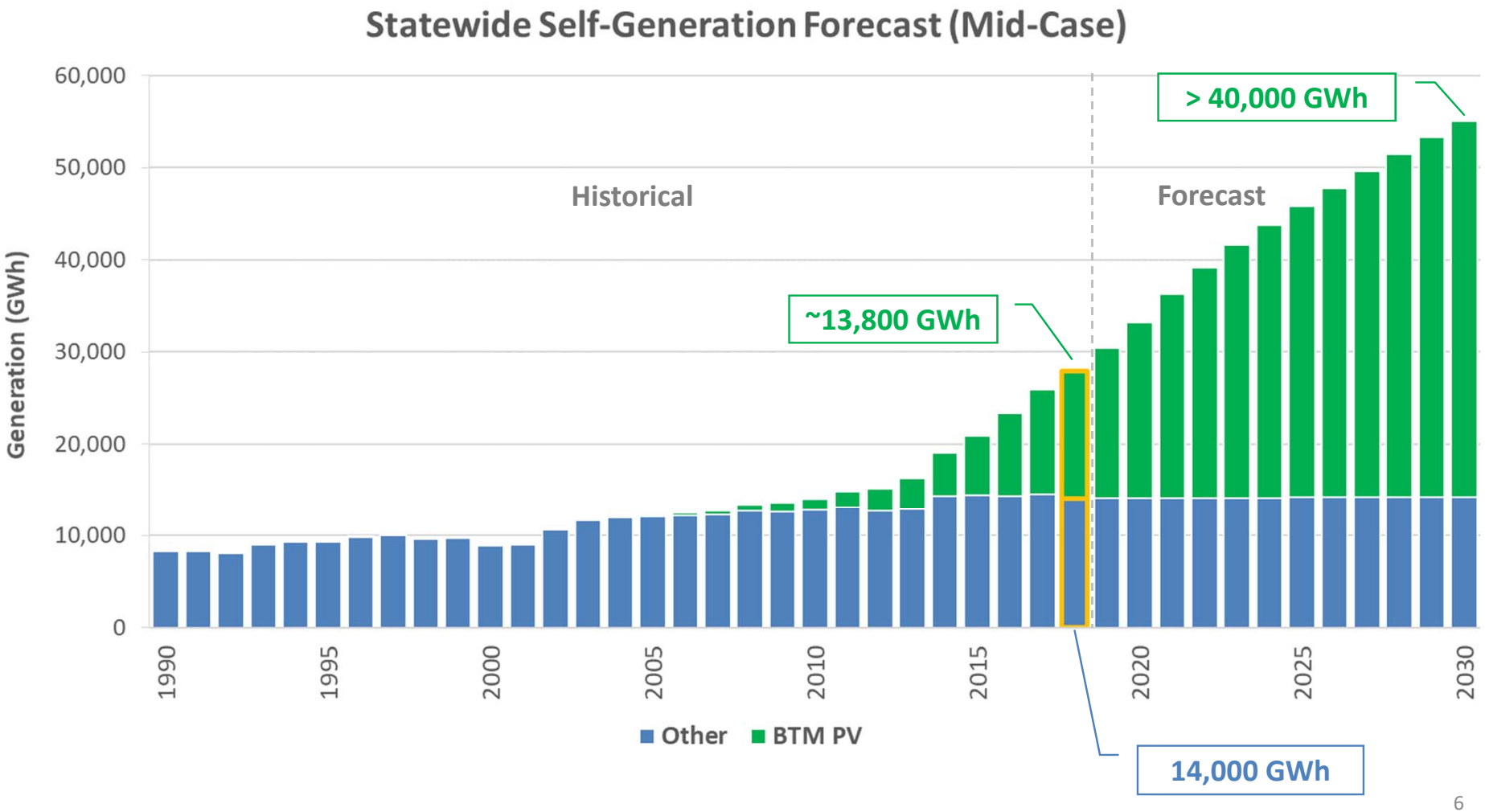
Companies Cut Back, but Consumers Party On, Driving the Economy

Things feel chillier in the executive suite than they do at the mall, and the future of a record expansion hangs in the balance.

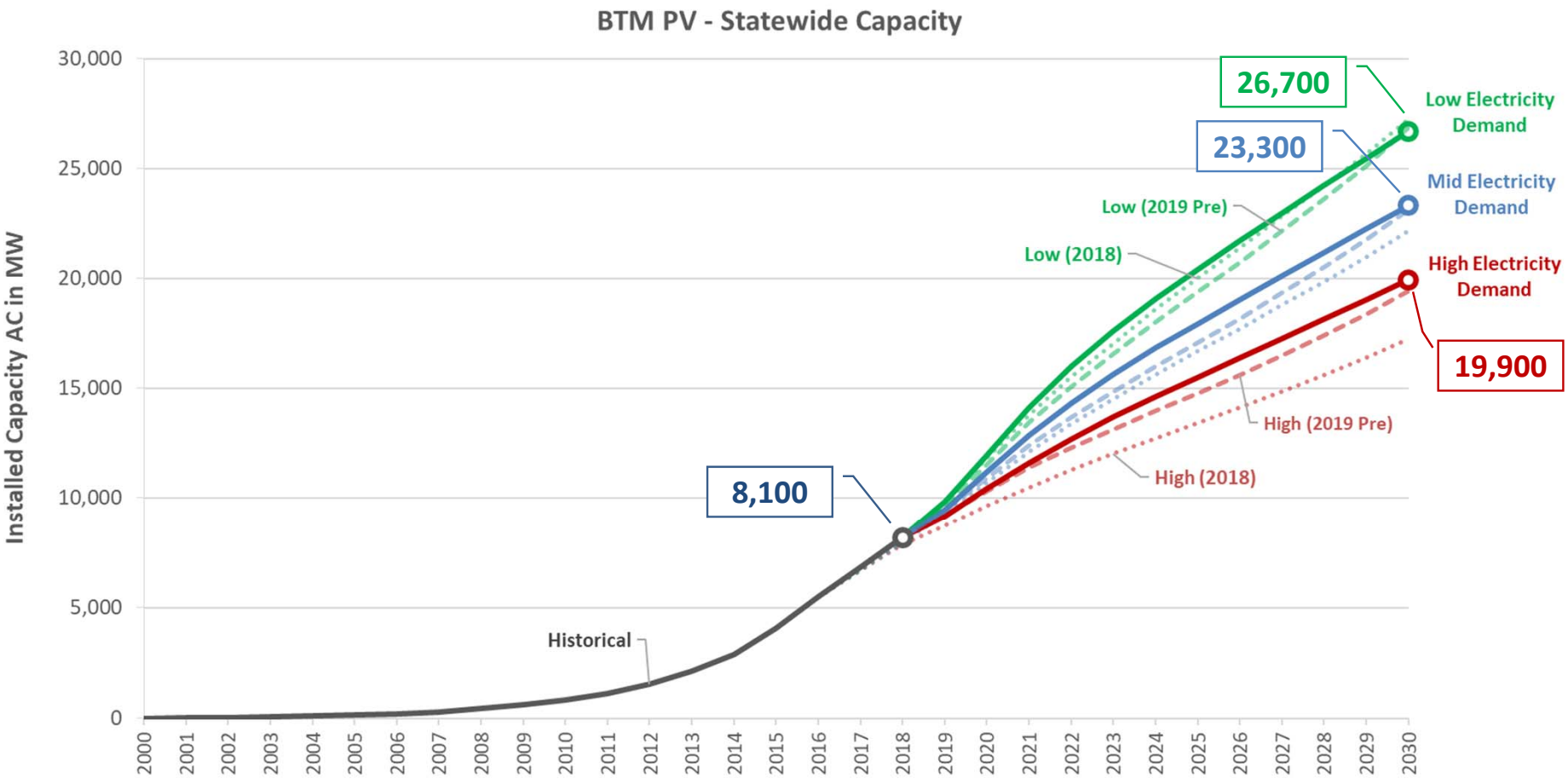
- *The New York Times*, November 4, 2019

STATEWIDE SELF-GENERATION FORECAST

Self-Generation Forecast



2019 Revised PV Forecast



NOTE: For consistency, 2018 forecast is shown with baseline and AAPV forecast results.

Contribution of Title 24 Standards

- Require PV in new homes (starting in 2020)
- In CED 2019, incorporated into baseline PV forecast
  - Formerly accounted for by the Additional Achievable PV (AAPV) forecast
  - Past PV forecasts restated to include AAPV
- PV adoption in new homes…
  - Now a forecast of regulatory compliance
  - Directly correlated to forecast of new home construction
- Same assumptions as previous AAPV Forecasts
  - Expected level of compliance: Low = 90%, Mid = 80%, High = 70%
  - Average PV system size for new homes

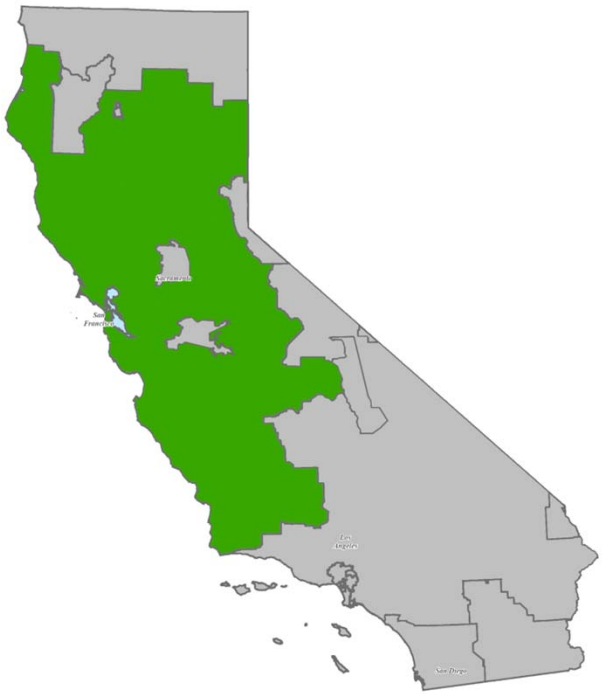
CUMULATIVE CAPACITY in MW by 2030

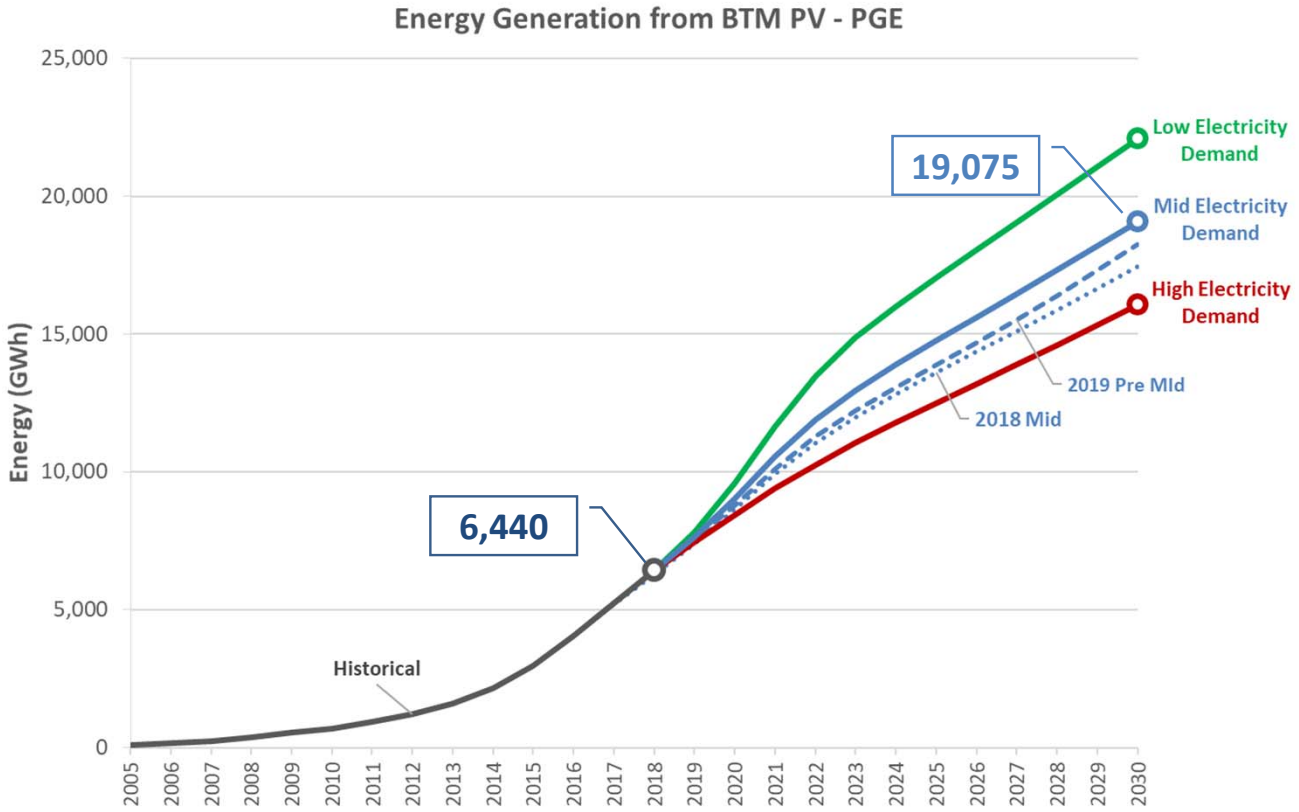
Scenario	PGE	SCE	SDGE	LADWP	SMUD	OTHER	CED 19 Rev Total	CED 19 Pre Total	*CEDU 18 Total*
High Demand	1,085	960	277	79	183	179	2,763	2,135	*2,290*
Mid Demand	875	840	207	95	178	186	2,380	2,011	*1,949*
Low Demand	665	719	137	111	173	193	1,997	1,887	*1,607*

UTILITY / PLANNING AREA FORECASTs

PG&E PV Forecast

- PV Generation forecast to grow to 19,000 GWh by 2030 in mid-case

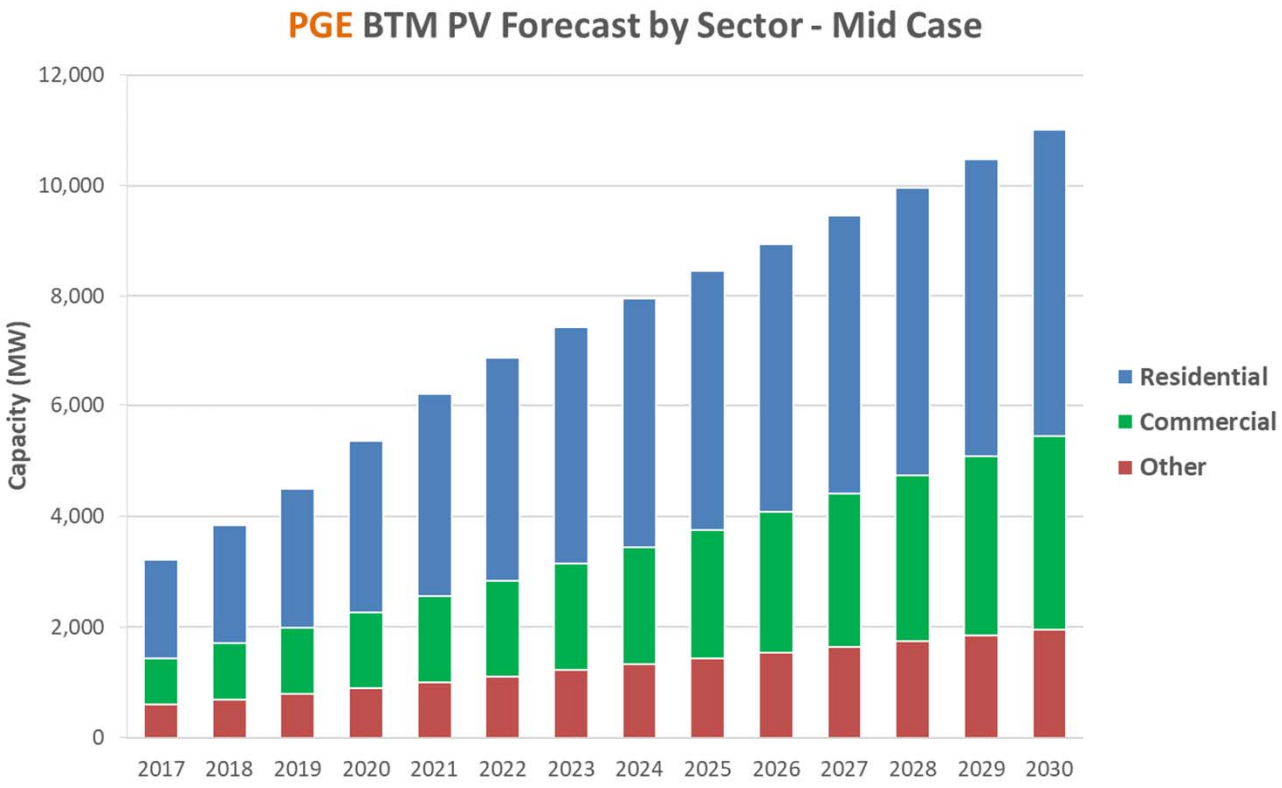




NOTE: 2018 forecast includes AAPV forecast results.

PG&E PV Forecast by Sector

- Almost half of BTM statewide PV capacity in 2018
  - Forecast: solid growth in PV especially in Central Valley.



Capacity (MW)

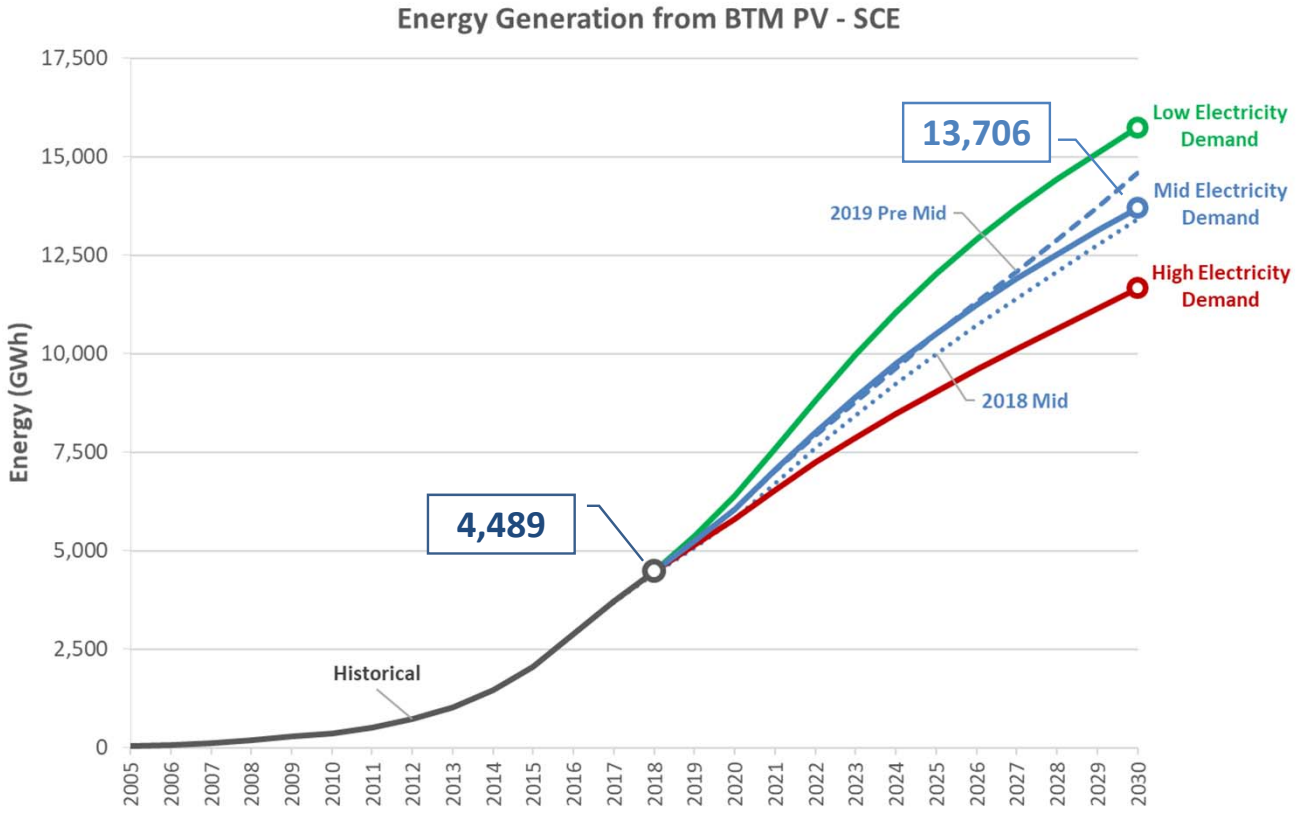
Sector	2018	2030	CAGR
Residential	2,125	5,570	8.4%
Commercial	1,022	3,485	10.8%
Other	690	1,959	9.1%
Total	3,837	11,013	9.2%

Energy (GWh)

Sector	2018	2030	CAGR
Residential	3,562	9,678	8.7%
Commercial	1,696	6,008	11.1%
Other	1,182	3,389	9.2%
Total	6,440	19,075	9.5%

SCE PV Forecast

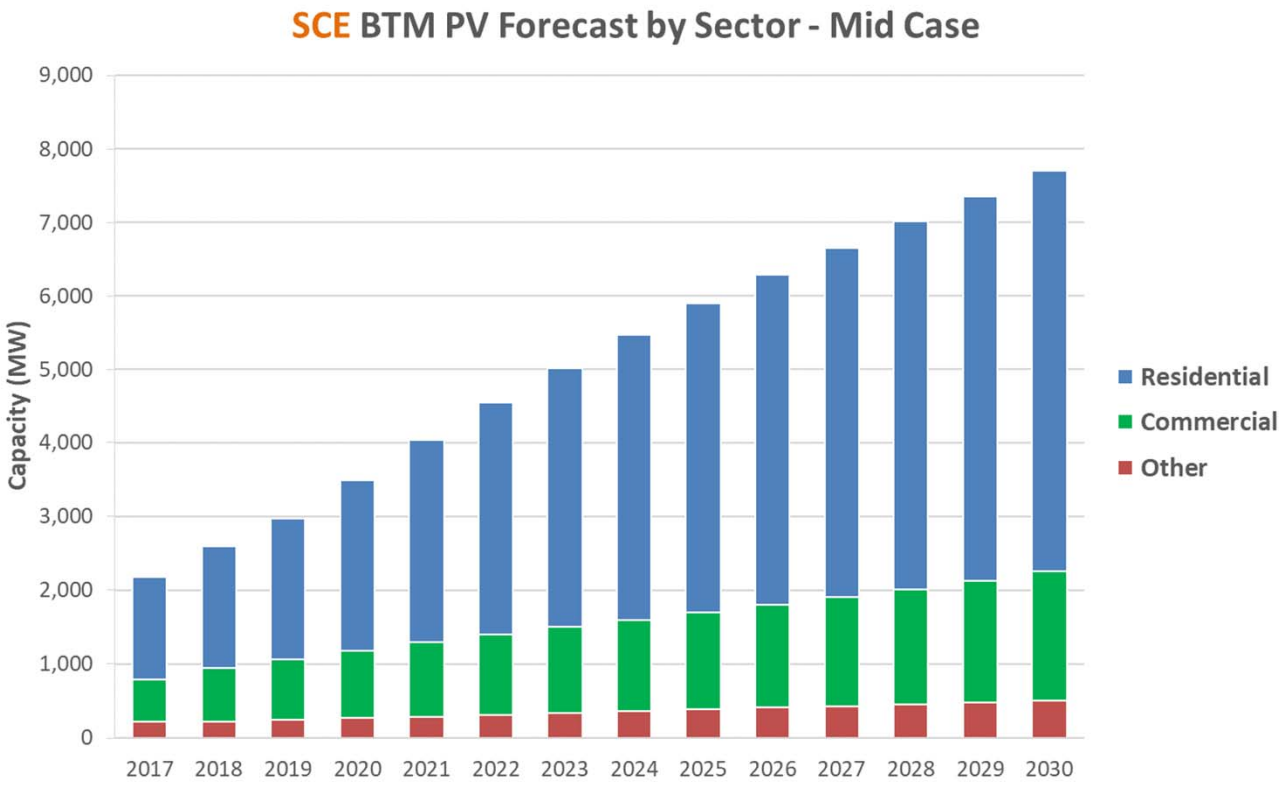
- PV Generation forecast to grow to 13,500+ GWh by 2030 in mid-case



NOTE: 2018 forecast includes AAPV forecast results.

SCE PV Forecast by Sector

- Lower PV penetration in 2018 (compared to other IOUs)
  - Faster growth in PV Adoption



Capacity (MW)

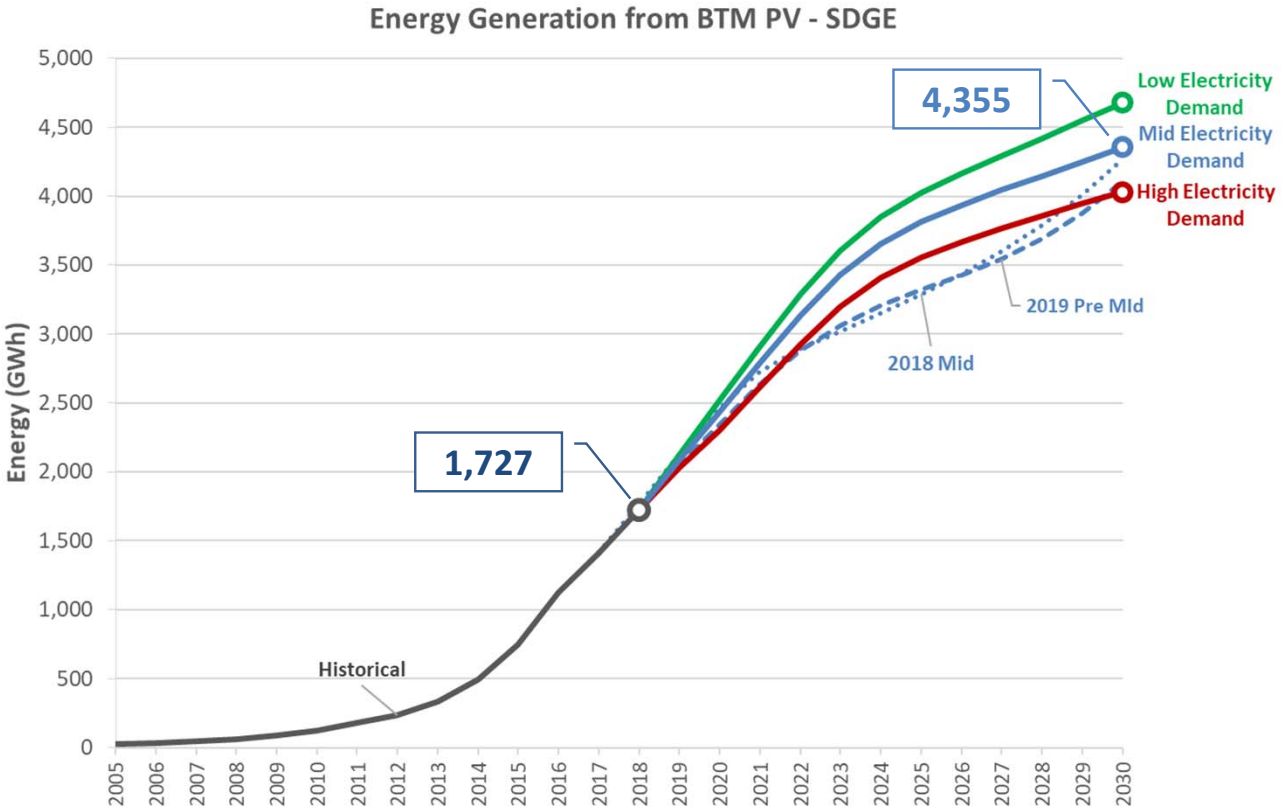
Sector	2018	2030	CAGR
Residential	1,648	5,438	10.5%
Commercial	727	1,756	7.6%
Other	221	504	7.1%
Total	2,596	7,698	9.5%

Energy (GWh)

Sector	2018	2030	CAGR
Residential	2,855	9,714	10.7%
Commercial	1,220	3,093	8.1%
Other	414	899	6.7%
Total	4,489	13,706	9.7%

SDG&E PV Forecast

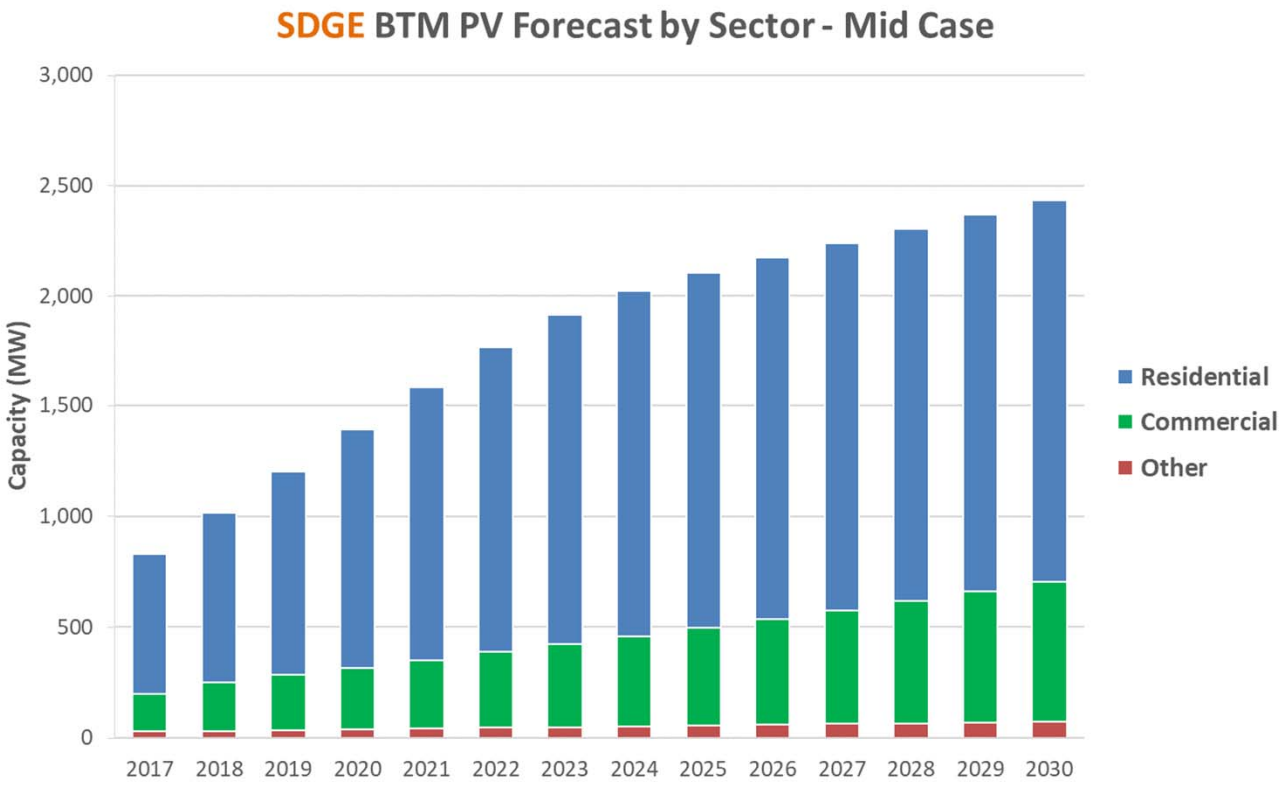
- PV Generation forecast to increase to 4,300 GWh by 2030 in mid-case



NOTE: 2018 forecast includes AAPV forecast results.

SDG&E PV Forecast by Sector

- 2018 - Highest PV penetration in residential sector



Capacity (MW)

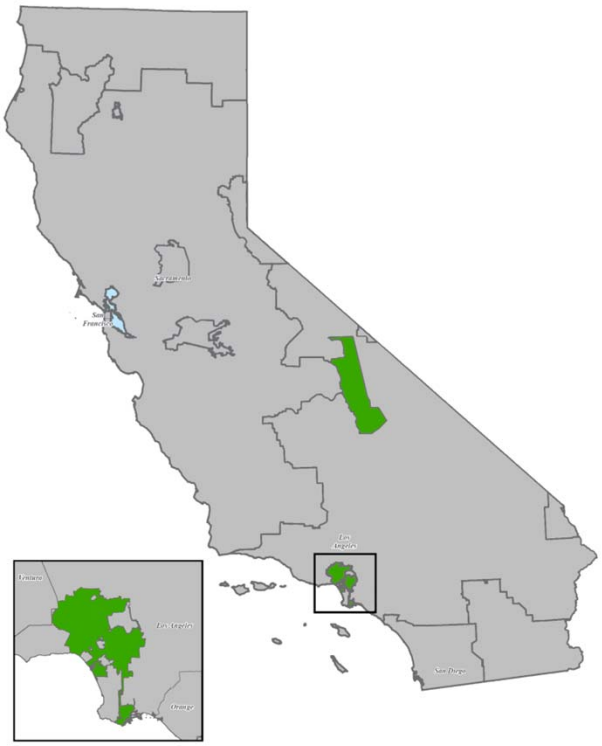
Sector	2018	2030	CAGR
Residential	765	1,732	7.0%
Commercial	219	630	9.2%
Other	32	74	7.3%
Total	1,015	2,436	7.6%

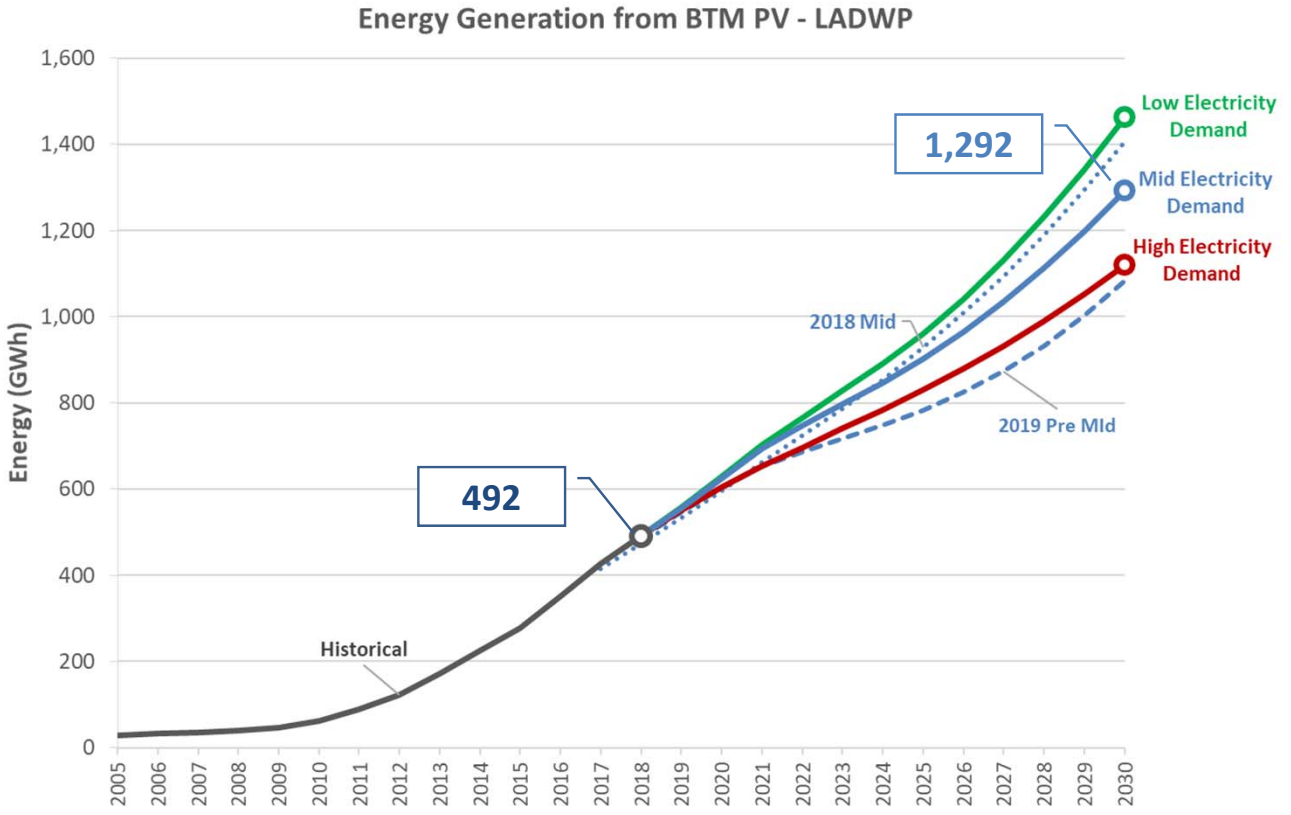
Energy (GWh)

Sector	2018	2030	CAGR
Residential	1,305	3,109	7.5%
Commercial	362	1,115	9.8%
Other	60	131	6.8%
Total	1,727	4,355	8.0%

LADWP PV Forecast

- PV Generation forecast to grow to ~1,300 GWh by 2030 in mid-case

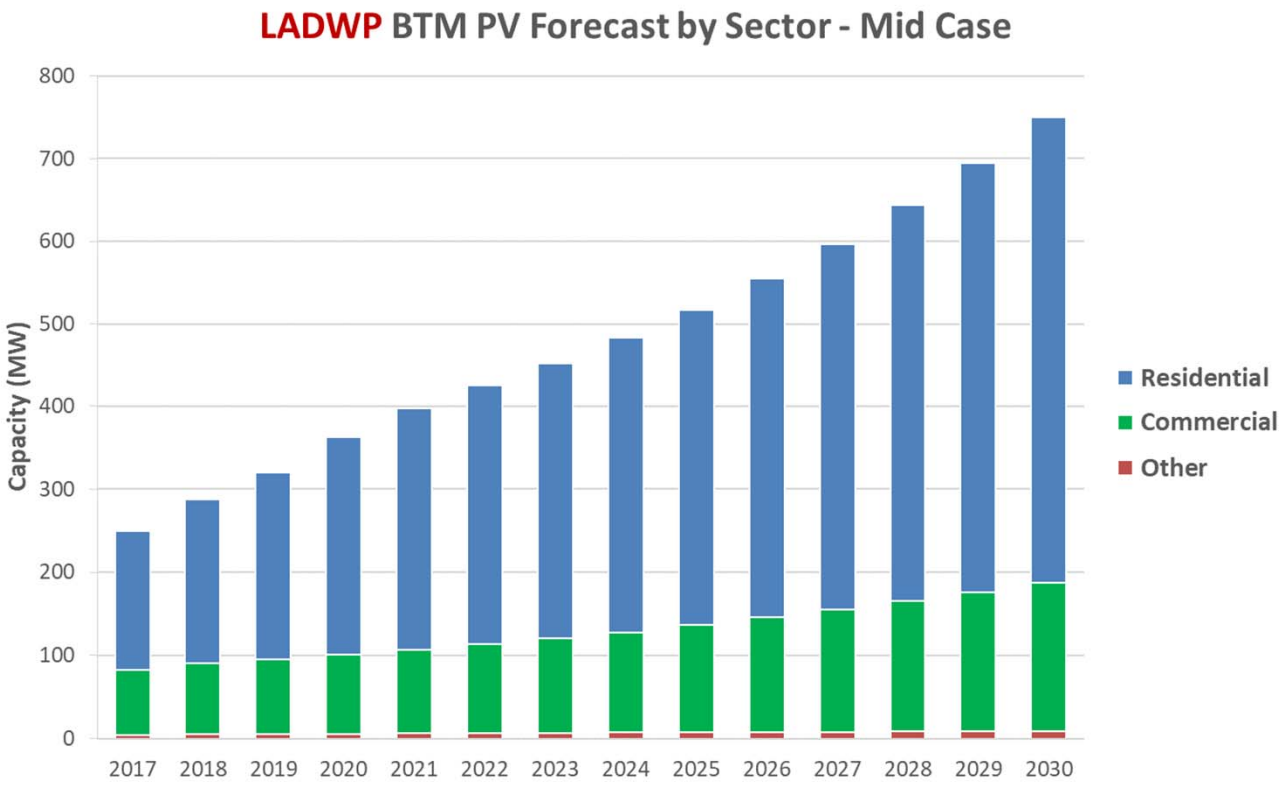




NOTE: 2018 forecast includes AAPV forecast results.

LADWP PV Forecast by Sector

- Lower initial PV penetration = more room for growth



Capacity (MW)

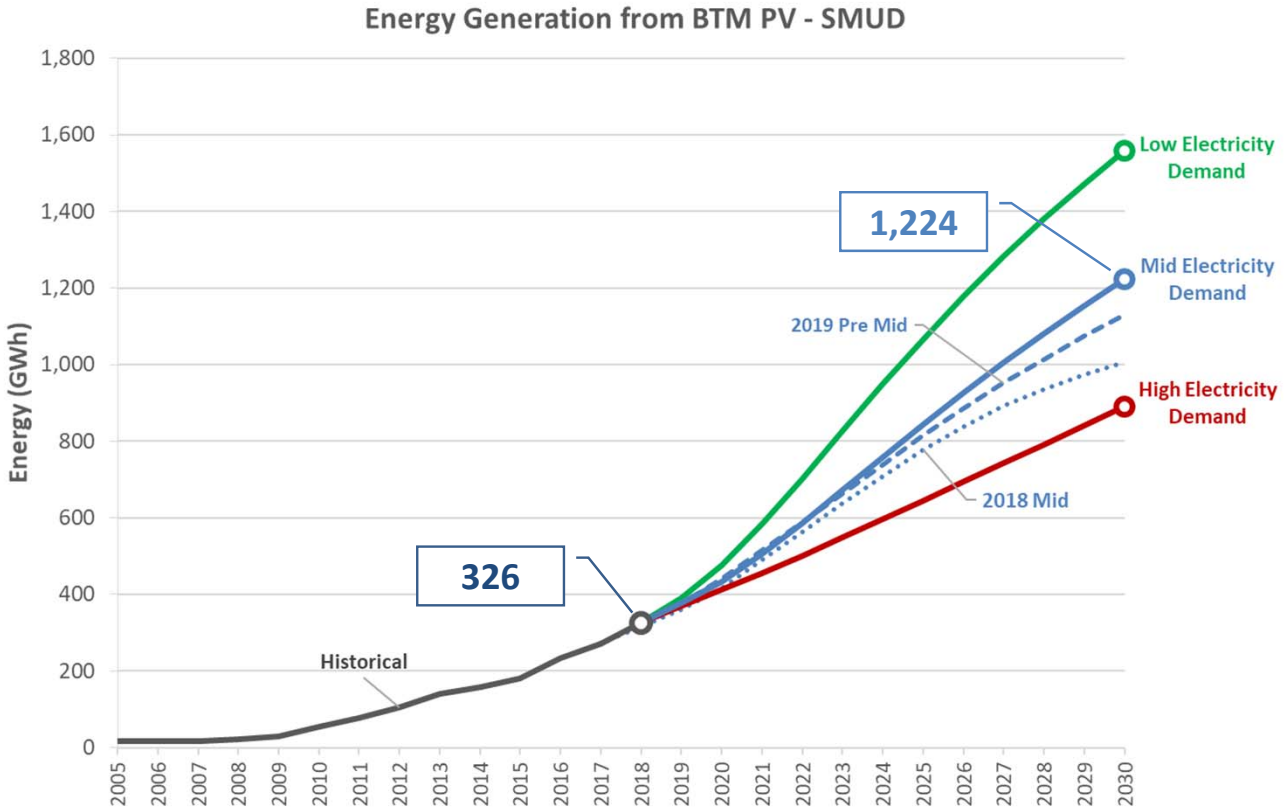
Sector	2018	2030	CAGR
Residential	197	562	9.1%
Commercial	86	178	6.3%
Other	5	9	5.5%
Total	287	750	8.3%

Energy (GWh)

Sector	2018	2030	CAGR
Residential	336	971	9.3%
Commercial	148	305	6.2%
Other	9	16	5.3%
Total	492	1,292	8.4%

SMUD PV Forecast

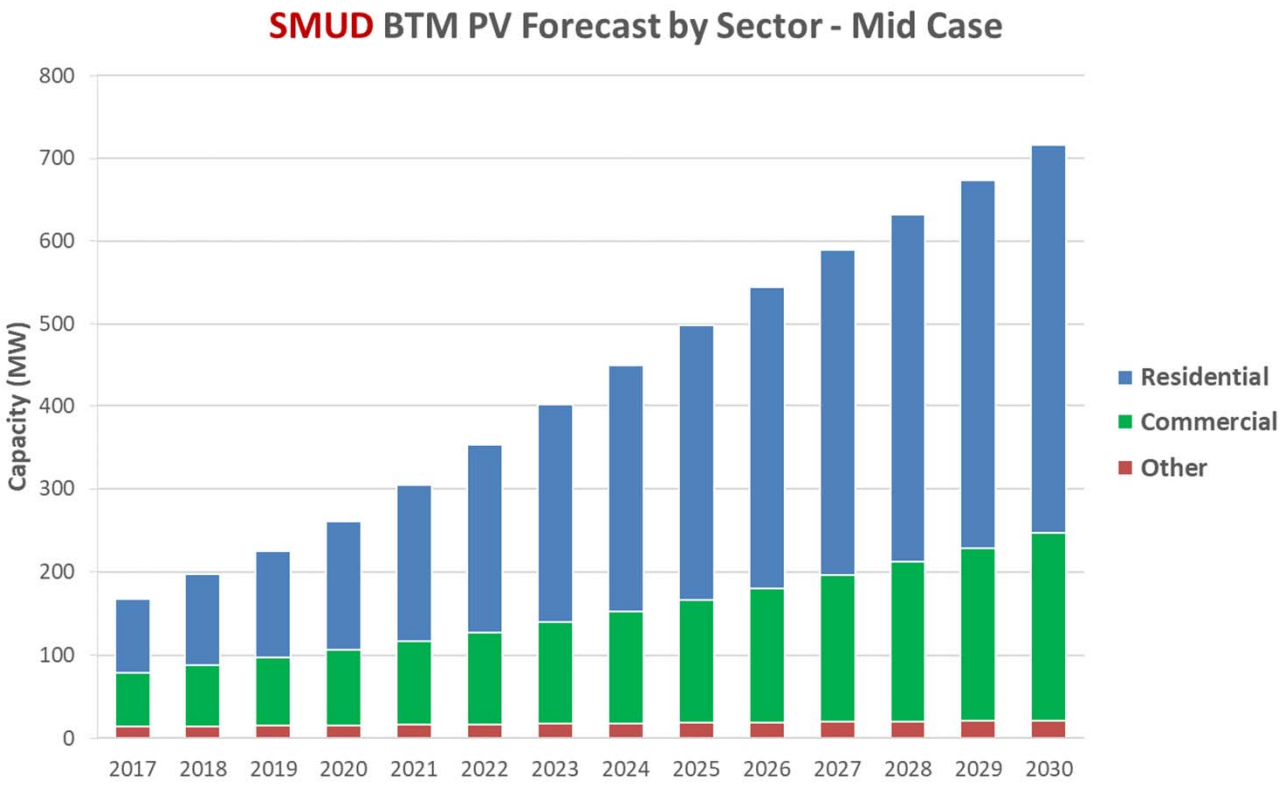
- PV Generation forecast to grow to 1,200 GWh by 2030 in mid-case



NOTE: 2018 forecast includes AAPV forecast results.

SMUD PV Forecast by Sector

- Faster growth in BTM PV
  - Lower initial PV penetration, fastest residential household growth



Capacity (MW)

Sector	2018	2030	CAGR
Residential	109	469	12.9%
Commercial	74	226	9.8%
Other	15	21	3.0%
Total	197	716	11.3%

Energy (GWh)

Sector	2018	2030	CAGR
Residential	180	809	13.4%
Commercial	125	383	9.8%
Other	21	31	3.4%
Total	326	1,224	11.6%