

California Energy Demand 2019 Revised Forecast, 2020-2030

DAWG: CED 2019 Revised Forecast Summary



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California Energy Commission



2019 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



2019 Products

Managed Sales and Peak Forecast

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



Method

- **Models**
 - End-use models by sector
 - PV + Storage
 - TEFU - transportation electrification projections
 - Hourly Forecasting Model (HLM)
- **Adjustments**
 - Committed efficiency savings
 - Climate change
 - AAEE



Inputs

Economic and Demographics – Moody's and DOF

- GSP, employment, households, population, employment, etc.

Committed Efficiency Savings and AAEE

- 2019 P&G study
- New programs and standards

Climate change impacts – Scripps IO

- Residential and commercial impacts for peak and energy



Inputs

Rates by Utility and Sector

- 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
- Procurement costs saw insignificant changes – NG forecast remains low



Economic Summary

Mid Case Assumptions

- Unemployment rate will increase through 2022
- Slower wage growth
- Uncertainty around trade limiting business investment
- Weaker GDP – imports vs exports
- Some rebound in the near-term



Economic Summary

Mid Case Economic Drivers

- Similar growth in population but slightly more housing results in declining PPH
- PCPI continues to grow at 1.7% CAGR 2019-2030
- GSP grows slower than CEDU 2018
- Unemployment rate reaches 6% by 2030
- Lower growth in commercial floorspace



Statewide Summary

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

AAEE

- Impacts begin in 2020 at 1,850 GWh
- Grow to 16,000 GWh of savings by 2030 in Mid-Mid
- 12,00 GWH in Mid-Low



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- 12,00 GWH in Mid-Low



Statewide Summary

- **Climate Change**
 - Same projections as with CEDU 2018 incremental to new starting points
 - Applied to High and Mid Cases
 - Additional 1,300 GWh by 2030
- **Ag and water pumping (AGWP)**
 - Adjusted by new cannabis cultivation forecast
 - ~12,400 GWh by 2030, 1% annual growth
 - Allocated to PAs based on population



Statewide Summary

Cannabis Forecast

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



Statewide Summary

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



Statewide Summary

Cannabis Forecast Method

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



Statewide Summary

Year	Estimated Indoor Production Including Exports (Metric Tons)	Electricity Used for Indoor Cannabis Production in California (GWh)	Estimated Greenhouse Production Including Exports (Metric Tons)	Electricity Used for Greenhouse Cannabis Production in California (GWh)	Total Electricity Used for Cannabis Production in California (GWh)	Total California Energy Demand (GWh)	Ratio of Cannabis to Total Energy Demand
2010	660	4009	1226	1861	5871	272703	2.2%
2011	675	4102	1254	1904	6006	275646	2.2%
2012	759	4608	1409	2140	6748	281313	2.4%
2013	779	4732	1447	2197	6929	279172	2.5%
2014	846	5141	1572	2387	7528	281891	2.7%
2015	833	5058	1546	2349	7407	282380	2.6%
2016	921	5592	1710	2596	8189	284060	2.9%
2017	1028	6246	1909	2900	9146	285011	3.2%
2018	1207	7330	2241	3403	10733	288109	3.7%
2019	1248	7581	2318	3520	11101	291154	3.8%
2020	1260	7657	2341	3555	11212	295773	3.8%
2021	1273	7734	2364	3591	11324	300672	3.8%
2022	1286	7811	2388	3627	11438	306203	3.7%
2023	1299	7889	2412	3663	11552	311483	3.7%
2024	1312	7968	2436	3699	11668	315929	3.7%
2025	1325	8048	2460	3736	11784	320375	3.7%
2026	1338	8128	2485	3774	11902	324361	3.7%
2027	1351	8210	2510	3812	12021	328215	3.7%
2028	1365	8292	2535	3850	12141	331910	3.7%
2029	1379	8375	2560	3888	12263	335505	3.7%
2030	1392	8458	2586	3927	12385	339160	3.7%



Statewide Summary

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



PG&E Summary

Econ

- GSP and floorspace are down
- PPH declining

PV Energy

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

LDEV

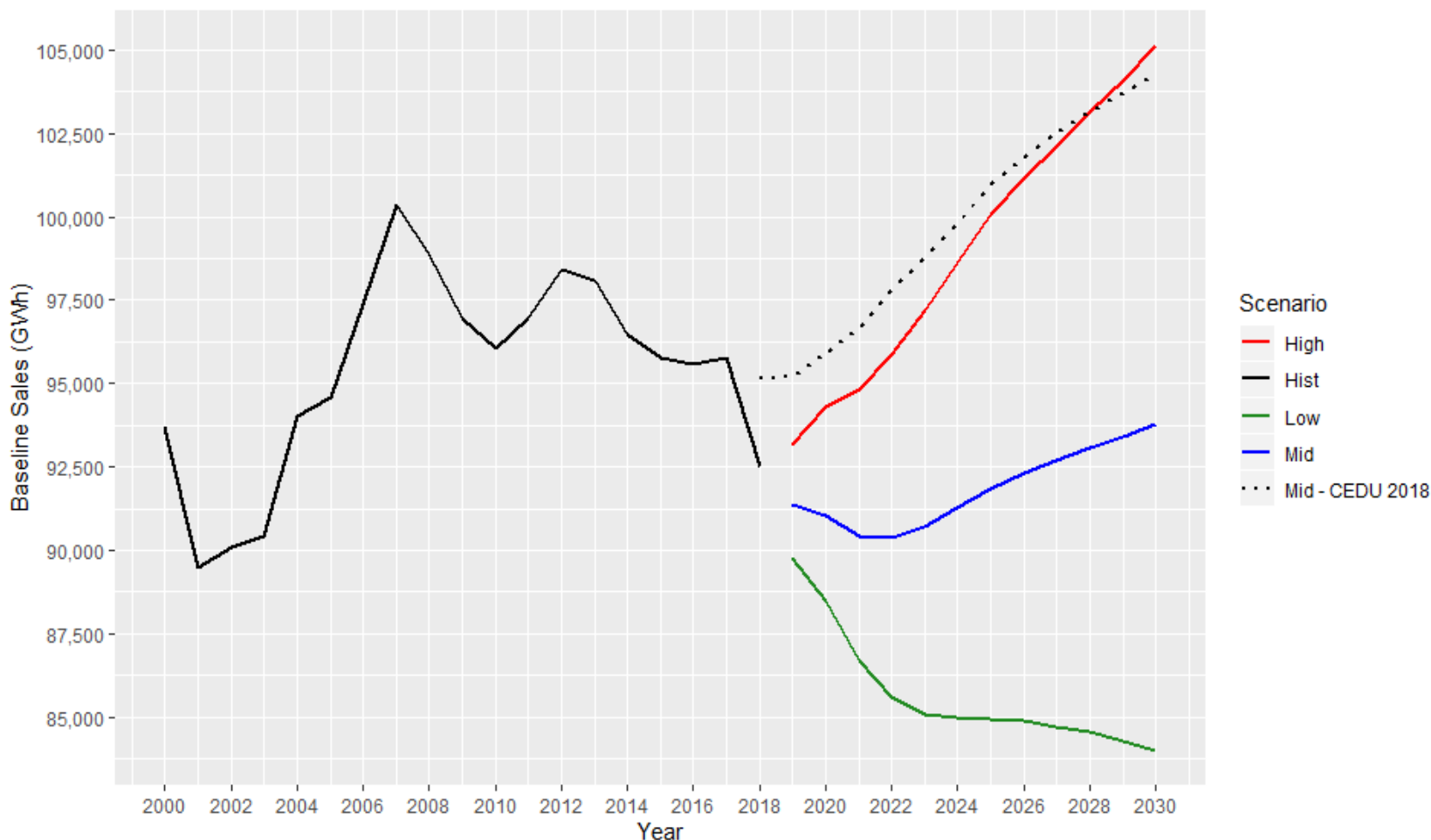
- 6,300 GWh of consumption by 2030

MDHD

- 500 GWh by 2030 in Mid Case



PG&E Baseline Sales Results



- Sales grows at 0.2% CAGR 2019-2030 in Mid Case
- Slightly slower than CEDU 2018 at 0.8%
- Slower growth in residential and commercial sectors



PG&E Baseline Sales Results

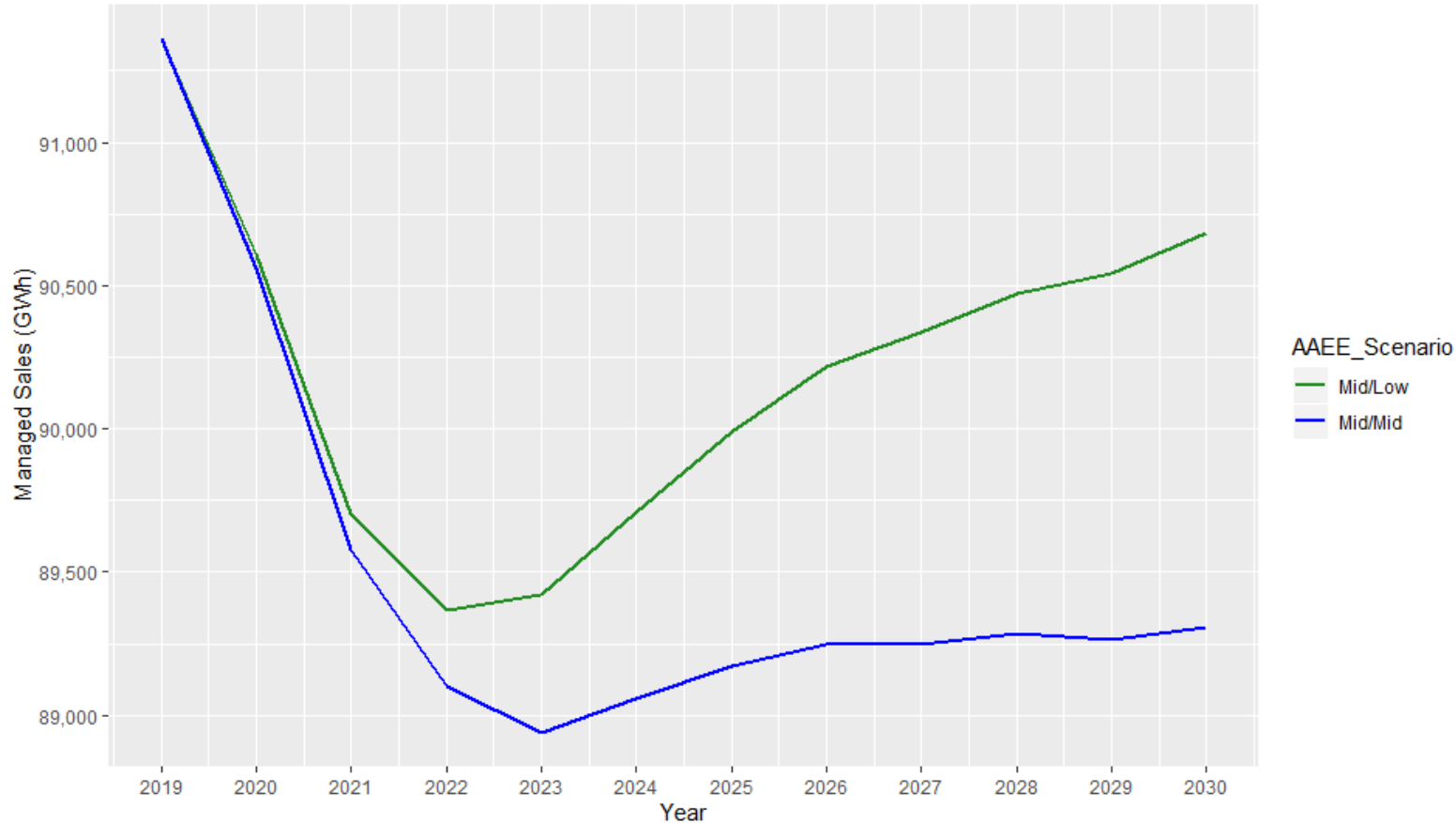
CAGR Years	Residential	Commercial	Industrial	Mining	AGWP	TCU	Street Lighting
2019-2025	0.21%	0.21%	-0.91%	-2.26%	0.61%	0.67%	-0.54%
2025-2030	1.52%	-0.12%	-0.92%	-4.10%	1.08%	0.78%	-0.69%
2019-2030	0.80%	0.06%	-0.91%	-3.10%	0.82%	0.72%	-0.60%

vs. CEDU 2018

- Residential and commercial sales for 2030, 17% and 12% lower
- AGWP slightly higher due to increased demand from crop production and municipal water supply plus cannabis cultivation
 - Nearly 600 GWh of attributed to cultivation by 2030



PG&E Managed Sales Results



AAEE

- 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 Summary

Econ

- PPH declining faster than CEDU 2018
- Income and floorspace growth reduced

PV Energy

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

LDEV

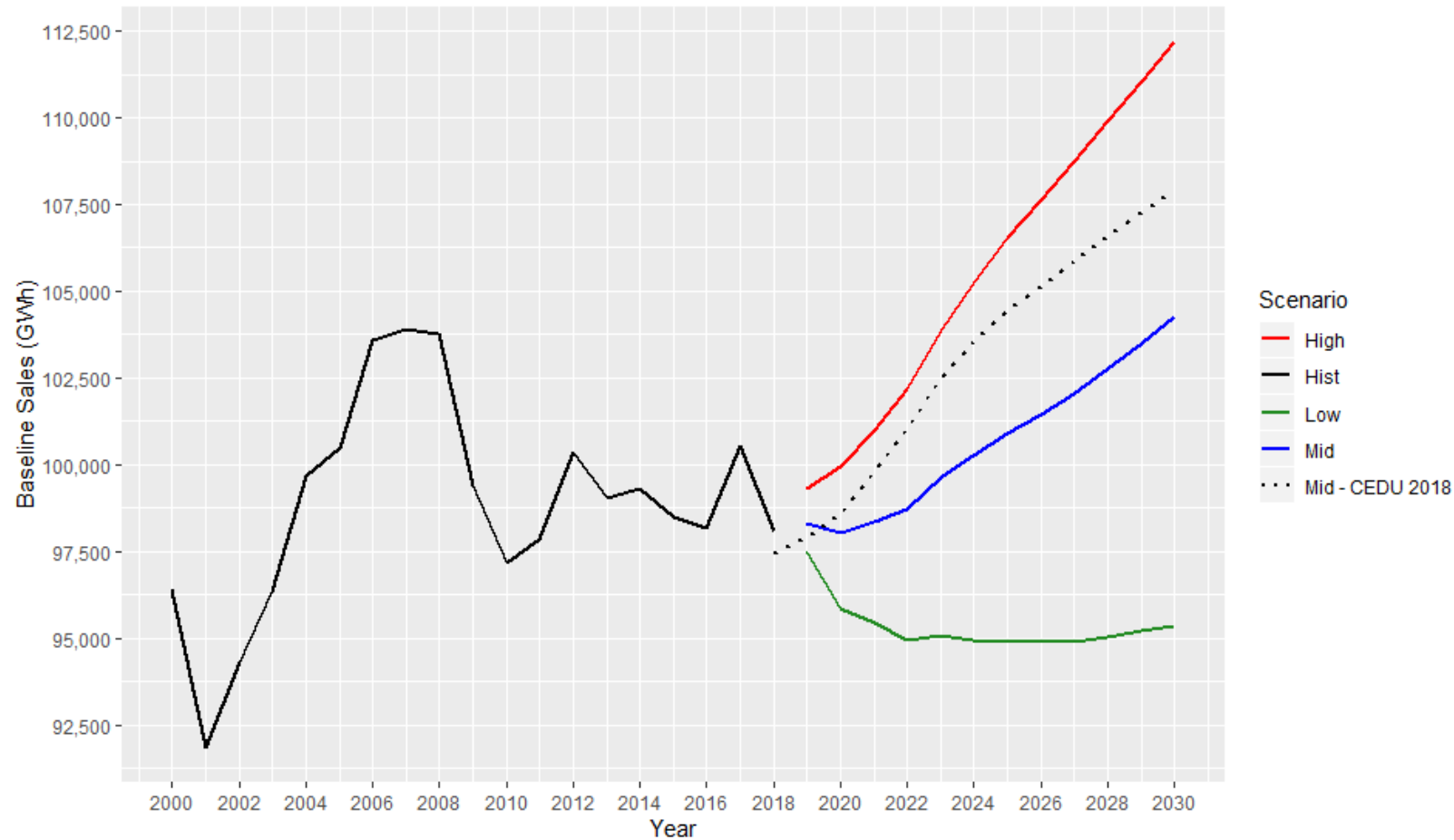
- 4,800 GWh of consumption by 2030

MDHD

- 5 GWh in 2019 to 445 GWh by 2030 in Mid Case



SCE Baseline Sales Results



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



SCE Baseline Sales Results

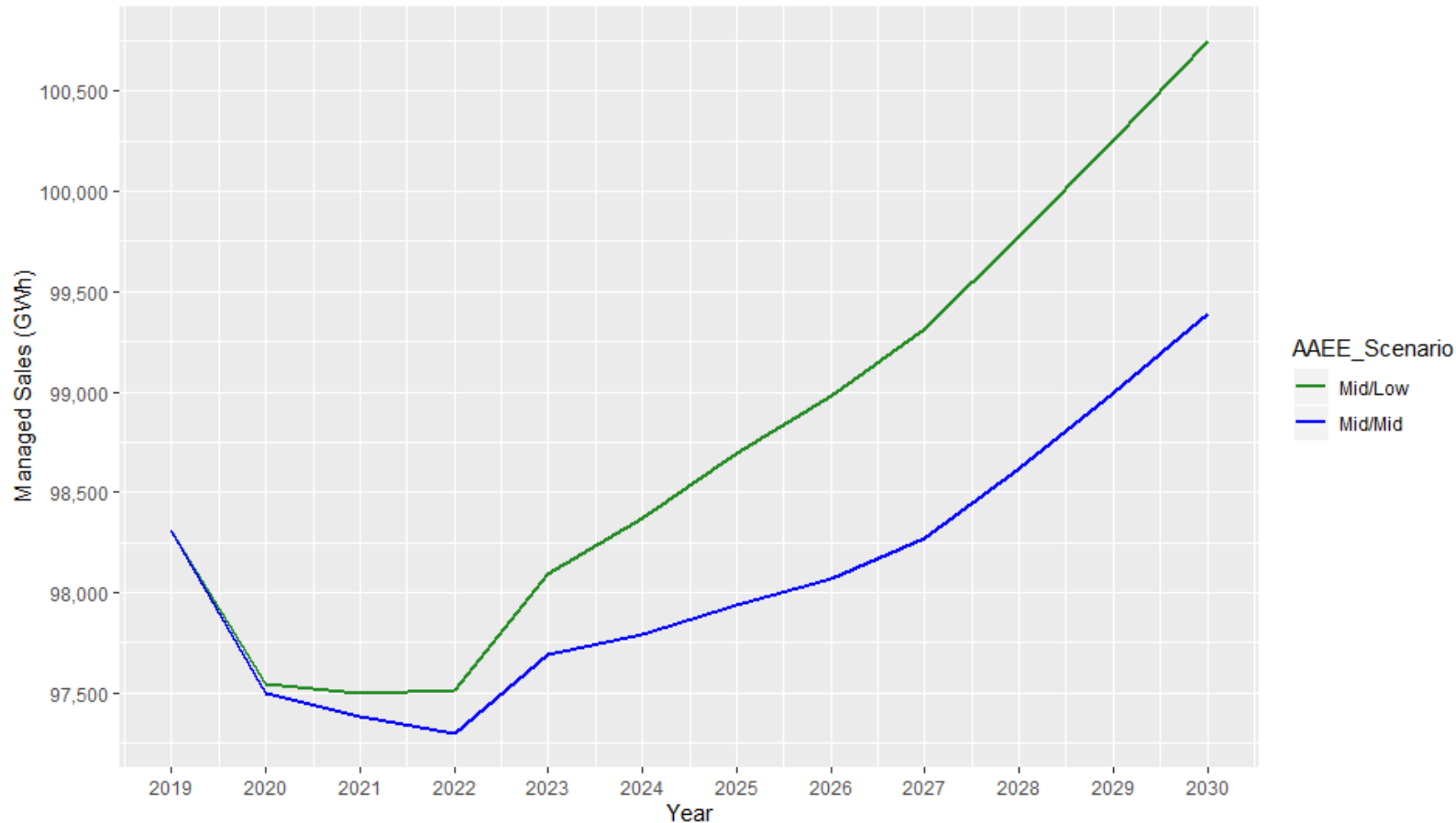
CAGR Years	Residential	Commercial	Industrial	Mining	AGWP	TCU	Street Lighting
2019-2025	0.70%	0.27%	0.20%	-0.99%	0.92%	0.51%	-0.54%
2025-2030	1.41%	0.23%	0.22%	-1.95%	1.02%	0.73%	-0.69%
2019-2030	1.02%	0.25%	0.21%	-1.43%	0.96%	0.61%	-0.60%

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 Managed Sales Results



AAEE

- 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



SDG&E Summary

Econ

- Floorspace down from 1.4% CAGR 2019-2030 to 0.6%
- Income grows at previous rate

PV Energy

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

LDEV

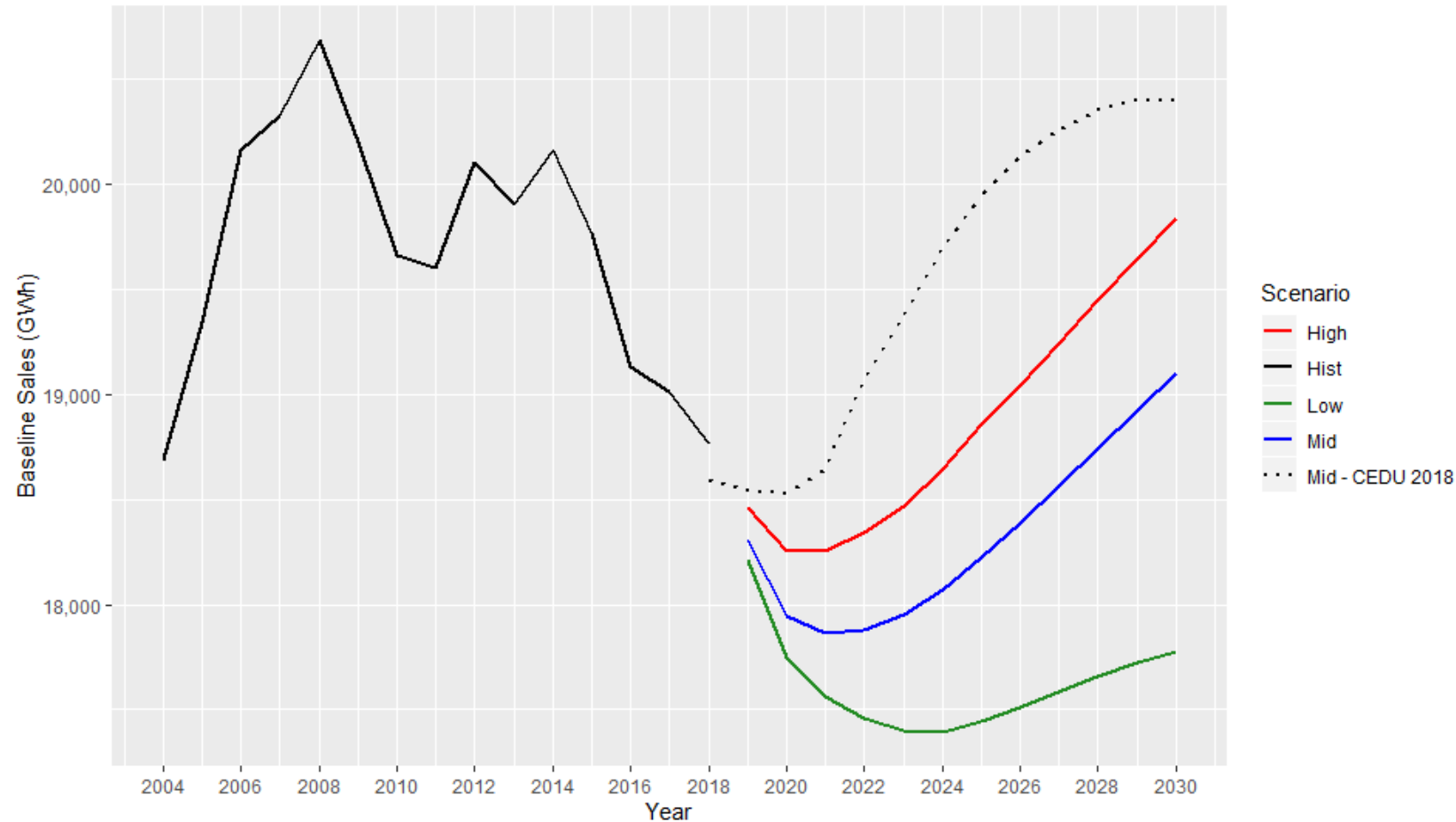
- 1,350 GWh of consumption by 2030

MDHD

- 2 GWh in 2019 to 129 GWh by 2030 in Mid Case



SD&GE Baseline Sales Results



- Mid case sales grows at 0.4% annually
- 6% less than CEDU 2018 in 2030, 19,000 GWh
- 2,500 GWh of new committed savings for 2021



SD&GE Baseline Sales Results

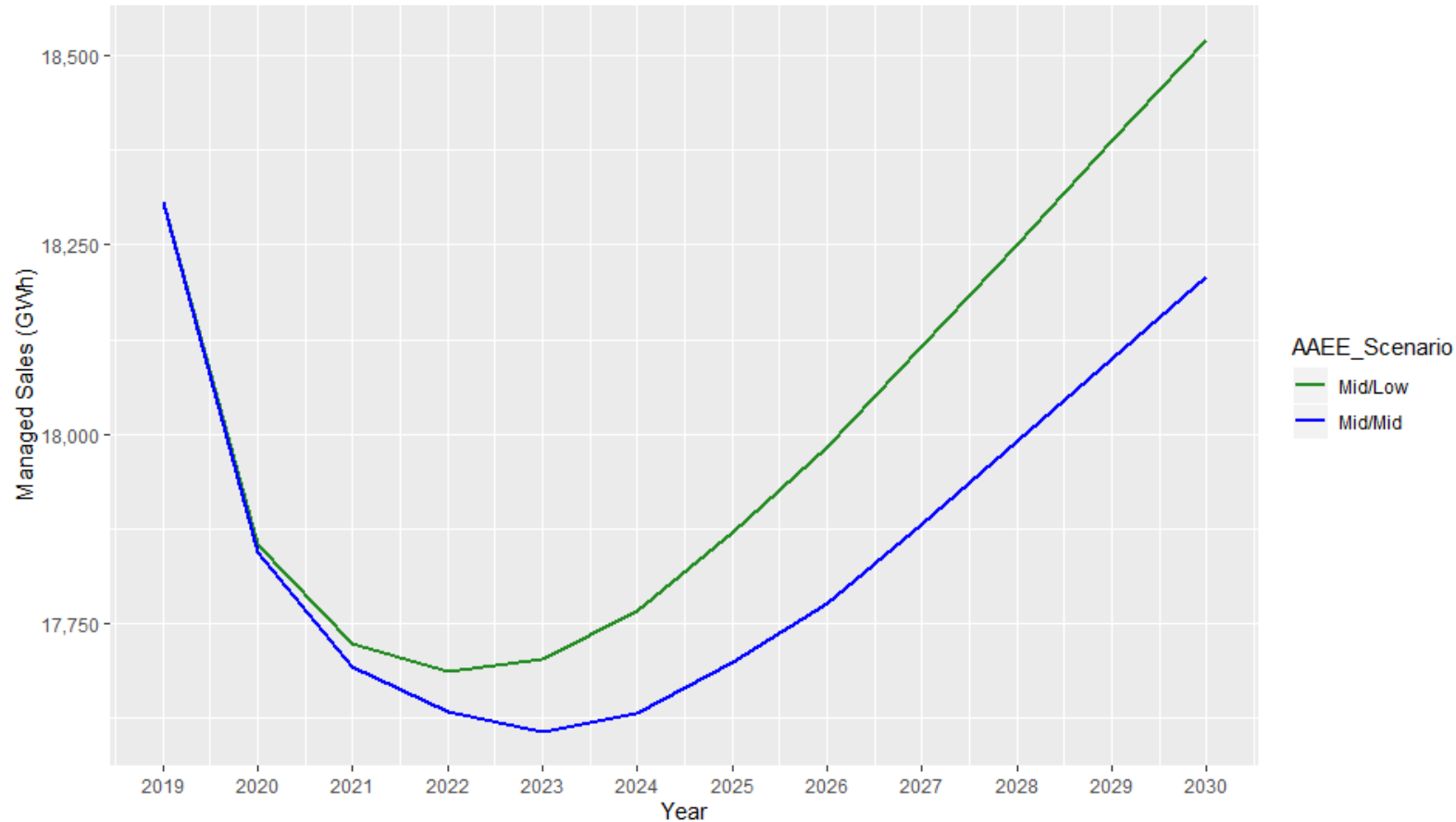
CAGR Years	Residential	Commercial	Industrial	Mining	AGWP	TCU	Street Lighting
2019-2025	-0.49%	0.27%	-0.89%	-0.05%	2.43%	-0.26%	-0.54%
2025-2030	2.85%	-0.07%	-0.35%	-0.23%	2.31%	0.05%	-0.69%
2019-2030	1.02%	0.11%	-0.64%	-0.13%	2.37%	-0.12%	-0.60%

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



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 Summary

Econ

- Declining PPH and GSP
- Slower growth for income and floorspace

PV Energy

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

LDEV

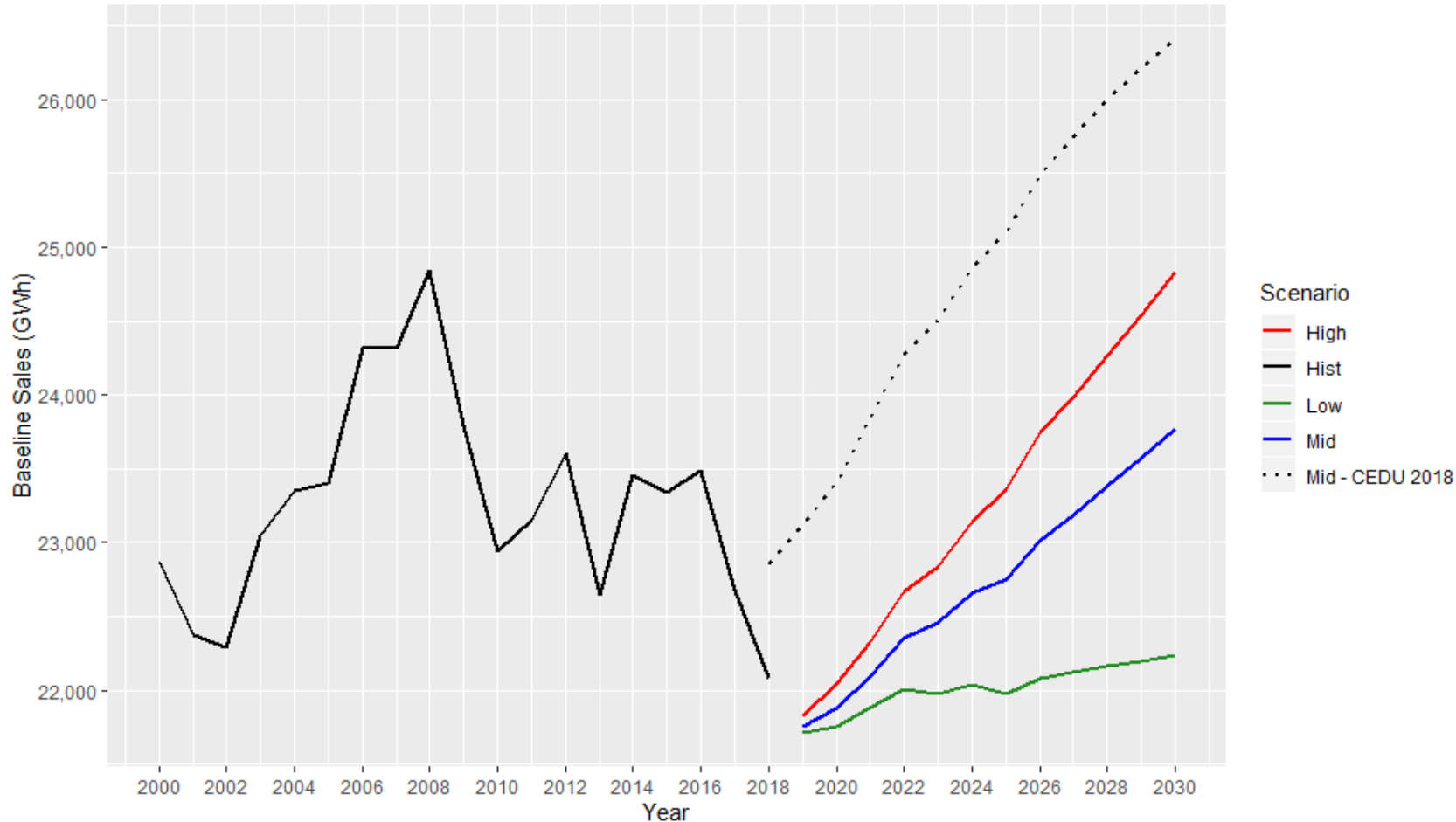
- 1,600 GWh of consumption by 2030

MDHD

- 1.5 GWh in 2019 to 130 GWh by 2030 in Mid Case



LADWP Baseline Sales Results



- Sales growth at 0.8% in Mid Case
- Reaches 23,800 GWh by 2030
- Committed saving lowers 2019 by 1,900 GWh



LADWP Baseline Sales Results

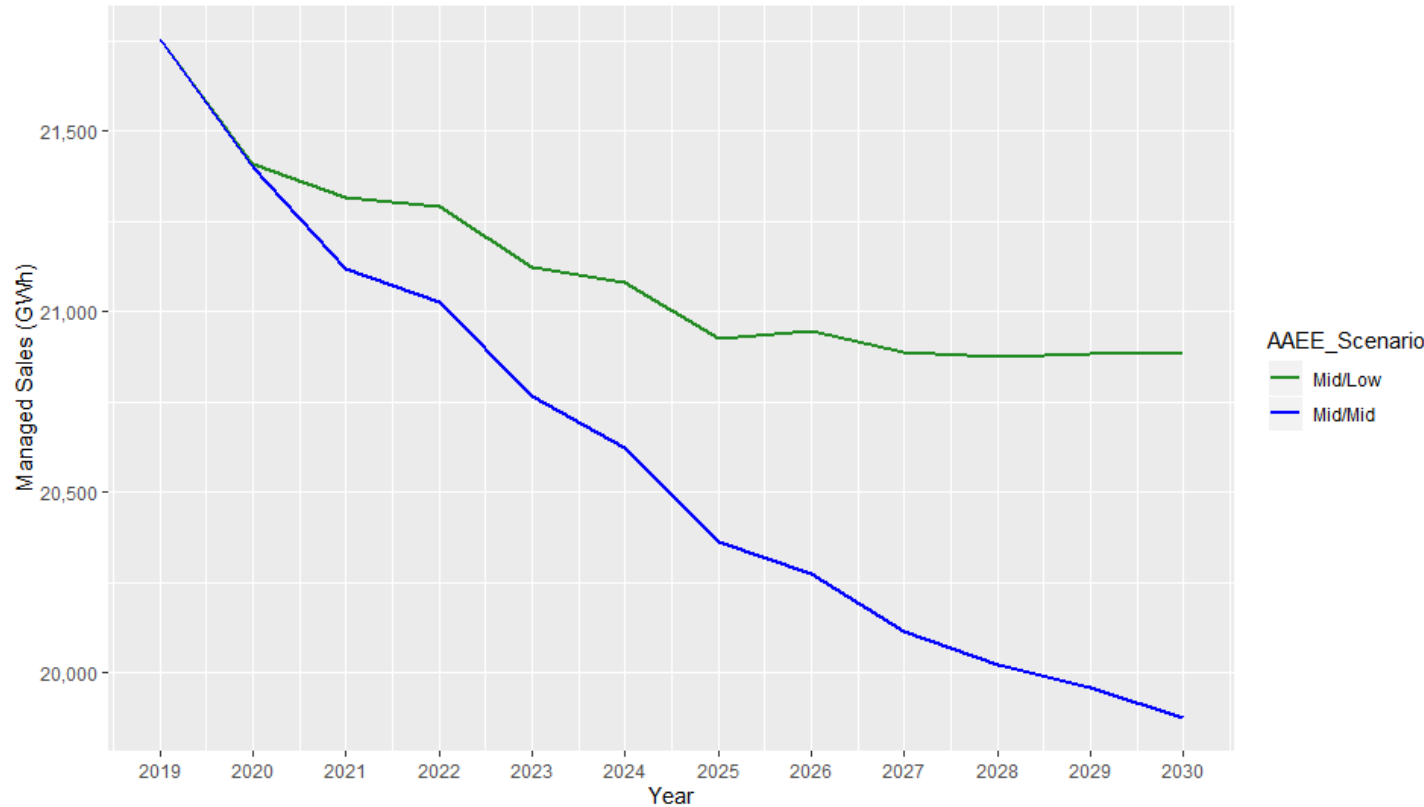
CAGR Years	Residential	Commercial	Industrial	Mining	AGWP	TCU	Street Lighting
2019-2025	1.39%	0.43%	-0.82%	-0.19%	14.54%	0.80%	-0.54%
2025-2030	1.46%	0.48%	-0.07%	-0.41%	8.01%	1.28%	-0.69%
2019-2030	1.42%	0.45%	-0.48%	-0.29%	11.52%	1.02%	-0.60%

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 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



SMUD Summary

Econ

- Further decline in PPH
- Slower growth for income, GSP, and floorspace

PV Energy

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

LDEV

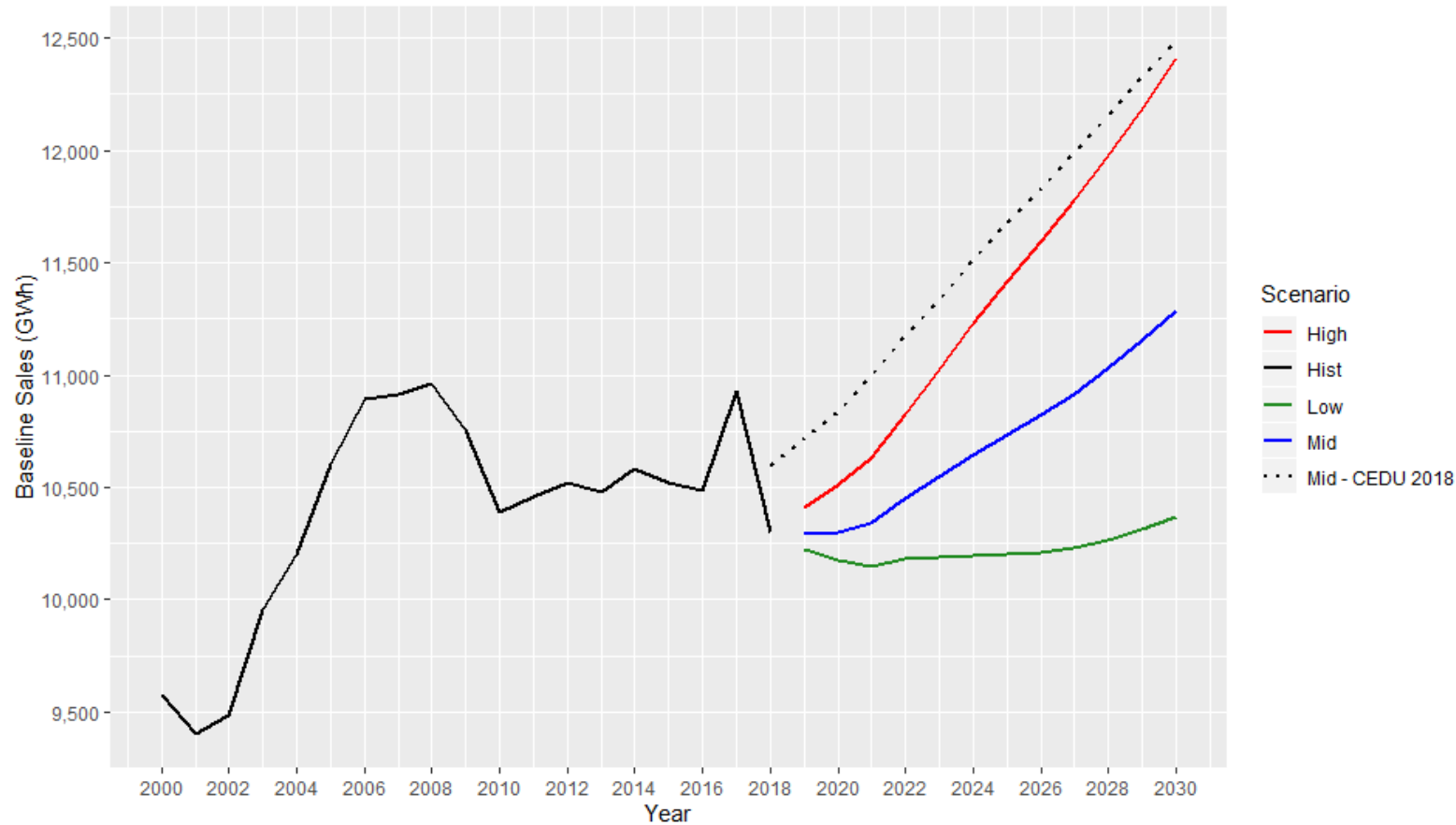
- 470 GWh of consumption by 2030

MDHD

- 43 GWh by 2030 in Mid Case



SMUD Baseline Sales Results



- 11,300 GWh by 2030 in Mid Case
- CAGR 2019-2030 0.8% vs 1.4% in CEDU 2018
- 1,300 GWh of committed savings in 2019



SMUD Results

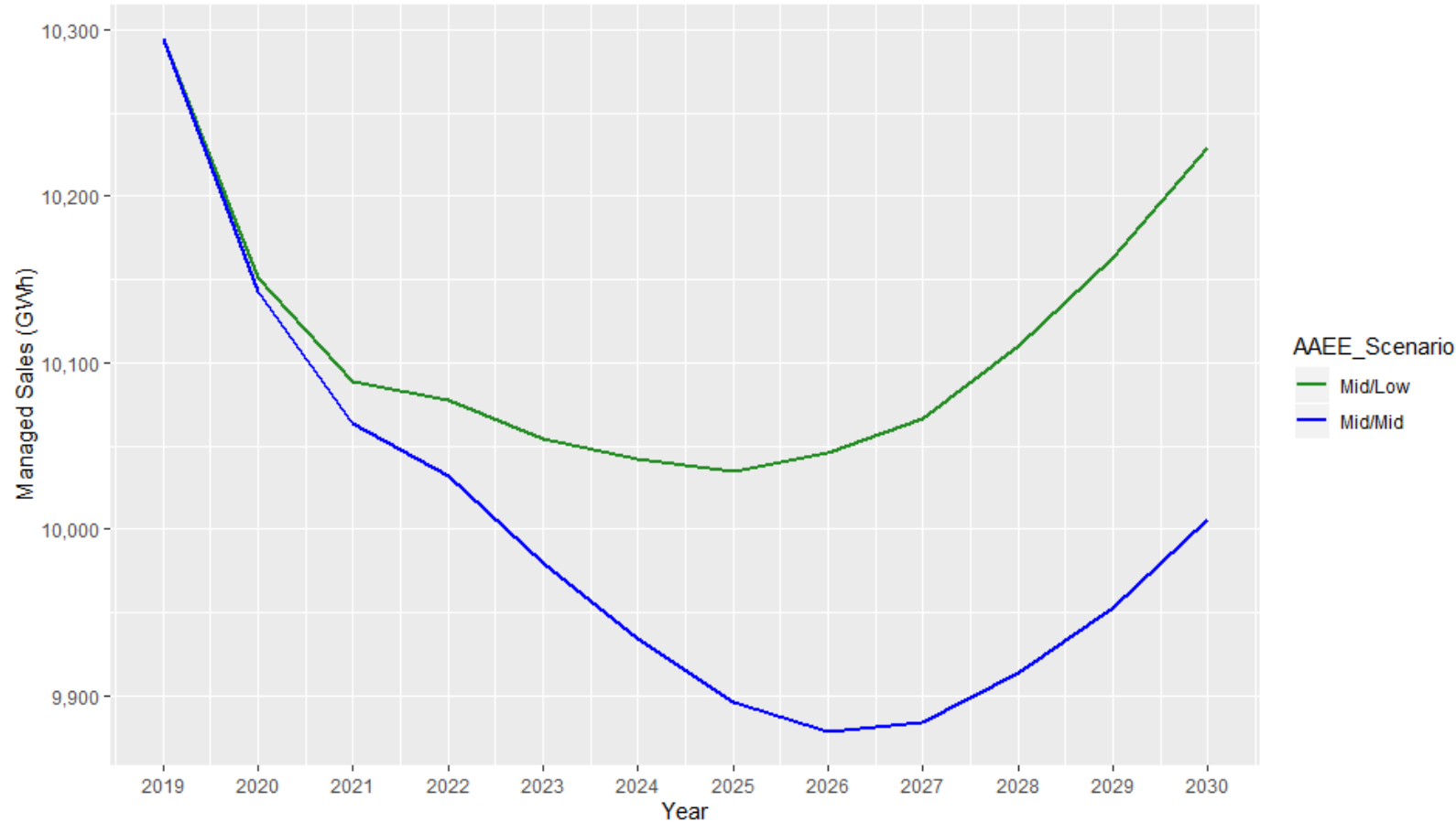
CAGR Years	Residential	Commercial	Industrial	Mining	AGWP	TCU	Street Lighting
2019-2025	0.91%	0.54%	-0.15%	-0.10%	3.30%	0.48%	-0.54%
2025-2030	1.32%	0.65%	0.76%	-0.28%	3.20%	0.61%	-0.69%
2019-2030	1.10%	0.59%	0.26%	-0.18%	3.25%	0.54%	-0.60%

vs. CEDU 2018

- Residential and commercial sector growth reduced from 1.7 and 1.4% CAGR, respectively
- Cultivation adds ~70 GWh by 2030 to AGWP



SMUD Results



AAEE

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

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