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Draft Production Cost Model Common Case Select Results

2019 Integrated Energy Policy Report
California Energy Commission

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Date: October 30, 2019

Topics

- IEPR Draft Common Case Overview
- Load Forecast for California (CED 2019 Preliminary)
- Load Forecast for rest of Western Electric Coordinating Council WECC (Unchanged from April 22)
- Significant Retirements / Additions (Unchanged from April 22)
- Updated Hydro Generation Input (Unchanged from April 22)
- Natural Gas Prices (Updated based on April NAMgas results)
- Select Simulation Results – Draft results compared with April 22
  - Natural Gas Demand for Electric Generation
  - GHG Emissions Projections

2019 IEPR Preliminary
Common Case Assumptions

Common Case	CED 2019 Preliminary Load Forecast	Natural Gas Price	Energy Efficiency* 2018 IEPR Update	RPS Target
High Energy Consumption	High	Low	Low AAEE	60% by 2030
Mid Energy Consumption	Mid	Mid	Mid AAEE	60% by 2030
Low Energy Comsumption	Low	High	High AAEE	60% by 2030

* Adjusted for committed component of AAEE

Load Forecast California and Rest of WECC

- California Loads – CED 2019 Preliminary
  - Approximately 5% lower than IEPR 2018 Update

https://ww2.energy.ca.gov/2019_energypolicy/documents/#08152019

- Rest of WECC Loads –2028 Anchor Dataset

https://www.wecc.org/SystemStabilityPlanning/Pages/AnchorDataSet.aspx

- Years 2029 & 2030 load forecast created using average annual growth rate from 2017-2028 applied to 2028 loads

Preliminary 2019 IEPR

Retirements / Additions

- CA OTC Compliance Schedule
  https://www.energy.ca.gov/renewables/tracking_progress/documents/once_through_cooling.pdf

- CAISO Retired & Mothball List
  http://www.caiso.com/Documents/AnnouncedRetirement-MothballListPosted011019.html#search=retired%20and%20mothballed

- Subscription Database / Trade Press / 40-year “rule” / WECC ADS

Compliance plans are identical across all common cases

CA and WECC Thermal Retirements

Dependable Capacity Retired MW (identical all Common Cases)

Type	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
CA NG	3,051	4,820	179	29	239	201	358	383	276	317	638	1,013	11,504
CA Nuclear						1,140	1,140						2,280
CA Coal					22								22
WECC Coal	3,367	1,288	380	2,121	0	1,660	1,545	1,349	1,449	2,171	1,170	370	16,869

Does not include proposed OTC Compliance date extensions

2019 IEPR Preliminary Retirements / Additions

- Subscription Database / Trade Press / WECC ADS
- “Generic” Renewable Additions for RPS Requirements
- 2018 and early 2019 Utility IRPs

Existing and Projected In-State RPS Renewables
Mid Demand Case

Mid Demand - RPS Capacity Installed MW			
	2019	**2025**	**2030**
Biomass/LFG	**992**	**1,207**	**1,408**
CA	947	1,092	1,293
Out-of-State	45	115	115
Geothermal	**2,964**	**3,188**	**3,629**
CA	2,868	3,038	3,308
Out-of-State	96	150	321
Solar	**14,801**	**19,007**	**24,468**
CA	13,124	16,850	21,943
Out-of-State	1,677	2,157	2,525
Wind	**9,826**	**13,419**	**16,687**
CA	6,742	8,152	9,158
Out-of-State	3,084	5,267	7,529
Small Hydro	**2,073**	**2,073**	**2,073**
CA	1,994	1,994	1,994
Out-of-State	79	79	79
Total MW	**30,656**	**38,894**	**48,265**

WECC-Wide RPS Requirement by State

Mid Demand Case

Mid Demand Annual RPS Targets By State (GWh)				
State	**2020**	**2024**	**2027**	**2030**
Arizona	4,767	7,070	7,911	8,338
California	81,289	108,080	126,408	143,701
Colorado	9,365	9,270	9,199	9,134
Montana	1,147	1,182	1,210	1,238
Nevada	7,101	7,362	8,596	8,832
New Mexico	3,428	3,741	3,994	4,265
Oregon	8,912	9,832	13,415	16,628
Utah	4,026	5,938	7,006	7,852
Washington	11,576	11,792	11,969	12,159
Total	131,611	164,269	189,708	212,148

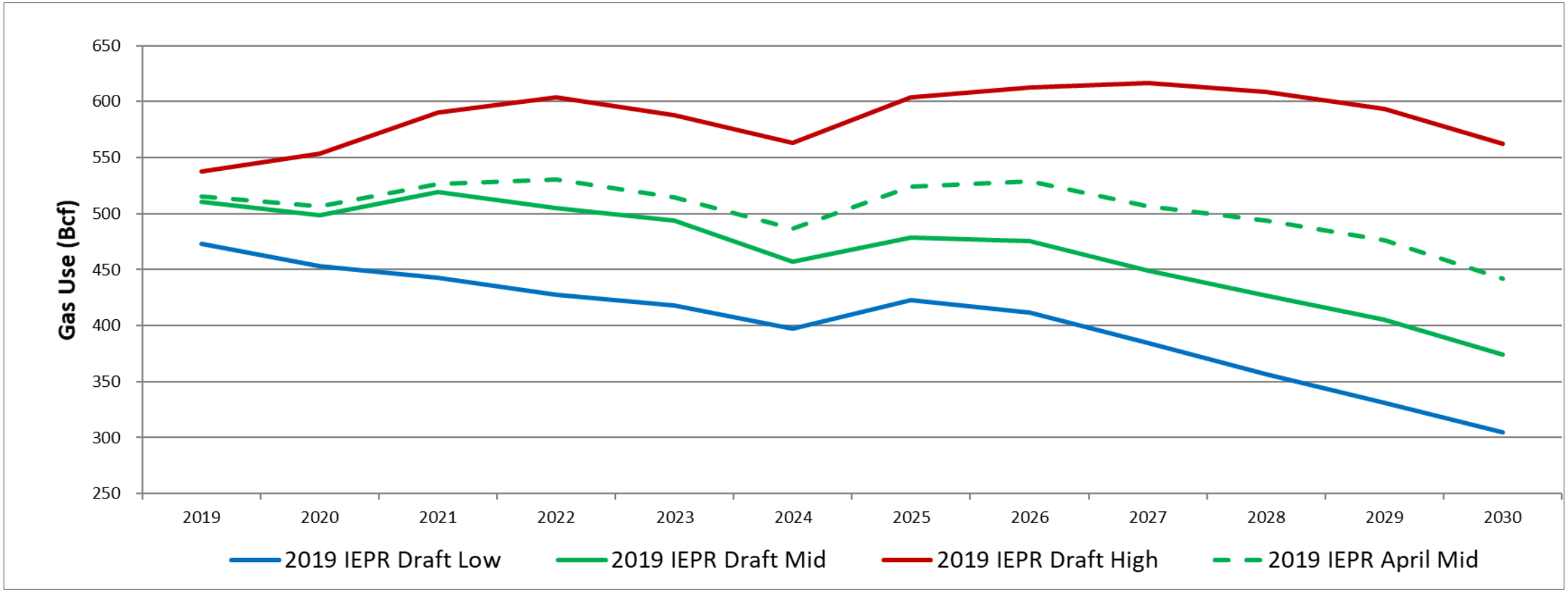
Existing state regulations as of January 2019

WECC Wide Average Annual Burner-Tip Prices
High-Mid-Low 2019 IEPR Preliminary

	Burner-Tip Fuel Price (Nominal $/MMBTU)					
	High Demand Case		Mid Demand Case		Low Demand Case	
Year	Coal	Gas	Coal	Gas	Coal	Gas
2019	$ 1.47	$ 2.80	$ 1.51	$ 3.06	$ 1.51	$ 3.30
2020	$ 1.40	$ 2.67	$ 1.42	$ 3.11	$ 1.43	$ 3.51
2021	$ 1.47	$ 2.63	$ 1.49	$ 3.19	$ 1.49	$ 3.65
2022	$ 1.50	$ 2.70	$ 1.52	$ 3.23	$ 1.54	$ 3.69
2023	$ 1.56	$ 2.74	$ 1.58	$ 3.28	$ 1.59	$ 3.75
2024	$ 1.62	$ 2.80	$ 1.62	$ 3.34	$ 1.65	$ 3.84
2025	$ 1.63	$ 2.88	$ 1.62	$ 3.43	$ 1.65	$ 3.95
2026	$ 1.70	$ 2.94	$ 1.70	$ 3.50	$ 1.72	$ 4.04
2027	$ 1.73	$ 3.00	$ 1.72	$ 3.57	$ 1.74	$ 4.13
2028	$ 1.80	$ 3.06	$ 1.80	$ 3.64	$ 1.83	$ 4.23
2029	$ 1.84	$ 3.11	$ 1.84	$ 3.70	$ 1.87	$ 4.33
2030	$ 1.85	$ 3.16	$ 1.85	$ 3.77	$ 1.87	$ 4.41

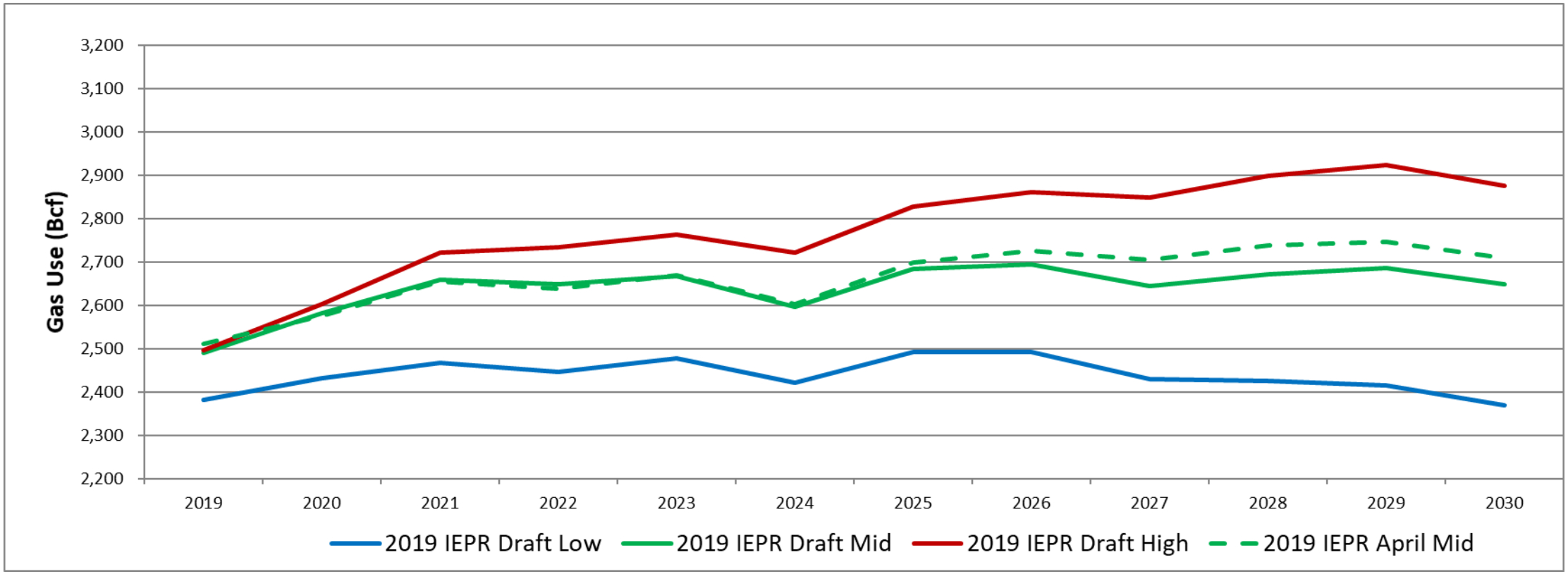
Source: CEC Burner-Tip Natural Gas Model, coal prices based on EIA 2019 Annual Energy Outlook

CA Natural Gas Use for Electric Generation
2019 IEPR Draft and 2019 IEPR April Results



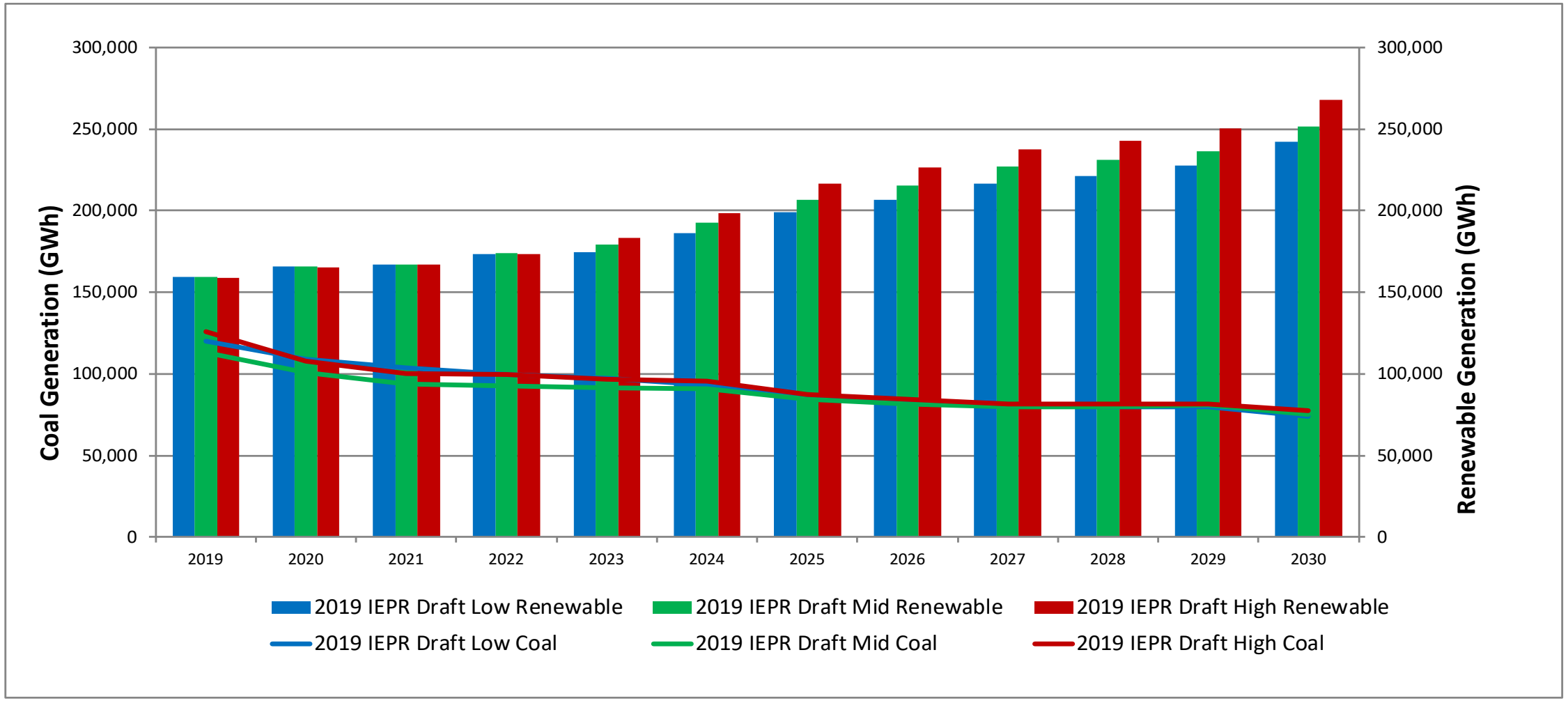
2019 IEPR Draft Mid Demand projections are lower due to CED 2019 Preliminary lower energy demand and slightly higher California burner-tip natural gas price projections

WECC Natural Gas Use for Electric Generation 2019 IEPR Draft and 2019 IEPR April Results

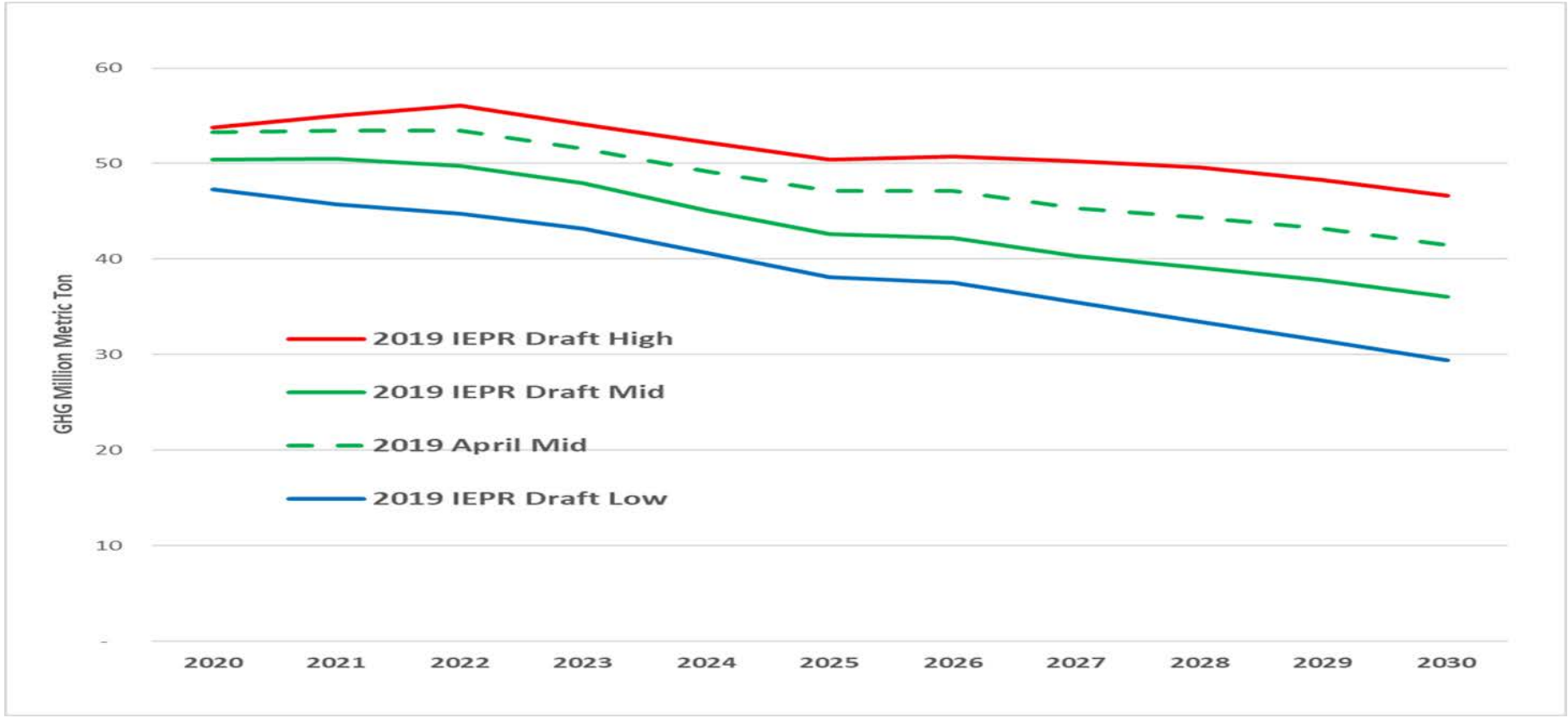


2019 IEPR Draft Mid Demand projections are lower due to CED 2019 Preliminary lower energy demand and slightly lower near term WECC wide burner-tip natural gas price projections

WECC Renewable and Coal Generation
2019 Draft IEPR



California GHG Emission Projections
2019 IEPR Draft and 2019 IEPR April Results



Source: PLEXOS 2019 IEPR Draft Results September 10, 2019. April Results: https://www.energy.ca.gov/2019_energypolicy/documents/2019-03-04_workshop/2019-03-04_presentations.php

California GHG Emission Projections

2019 IEPR Draft and 2019 IEPR April Results

Total California Emissions MMT	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
2019 IEPR Draft Low	47	46	45	43	41	38	38	35	33	31	29
2019 April Mid	53	53	53	52	49	47	47	45	44	43	41
2019 IEPR Draft Mid	50	50	50	48	45	43	42	40	39	38	36
2019 IEPR Draft High	54	55	56	54	52	50	51	50	50	48	47
Import Emissions MMT	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
2019 IEPR Draft Low	23	22	22	20	19	15	15	15	14	14	13
2019 April Mid	26	25	25	24	23	19	18	18	18	17	18
2019 IEPR Draft Mid	23	22	22	21	20	17	16	16	16	16	16
2019 IEPR Draft High	24	23	23	22	22	18	18	17	17	16	16
In State Emissions MMT	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
2019 IEPR Draft Low	25	24	23	23	22	23	22	21	19	18	16
2019 April Mid	28	29	29	28	26	28	29	27	27	26	24
2019 IEPR Draft Mid	27	28	27	27	25	26	26	24	23	22	20
2019 IEPR Draft High	30	32	33	32	31	33	33	33	33	32	31

Source: PLEXOS 2019 IEPR Draft Results September 10, 2019. April Results: https://www.energy.ca.gov/2019_energypolicy/documents/2019-03-04_workshop/2019-03-04_presentations.php

WECC Wide GHG Emissions
2019 IEPR Draft and 2019 IEPR April Results

WECC Wide GHG Emissions (Million Metric Ton)			
WECC Wide	2020	2025	2030
2019 IEPR Draft Low	240	222	202
2019 April Mid	252	242	230
2019 IEPR Draft Mid	241	231	219
2019 IEPR Draft High	249	241	234

2019 IEPR Draft WECC wide GHG emissions differ from 2019 IEPR April

- ✓ Less near-term variability between Mid, Low and High burner-tip gas price projections
- ✓ More consistent use of natural gas generation in both long-run and near-term due to less variation between the coal and gas burner-tip gas price projections

Thank You

Questions and Comments:

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