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CALIFORNIA ENERGY COMMISSION

Natural Gas Use For Electric Generation

Integrated Energy Policy Report Workshop

California Energy Commission

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Angela Tanghetti
Supply Analysis Office
Energy Assessments Division

Topics to Cover

- Production Cost Model (PLEXOS) Updates Since February 2017 Preliminary
- Natural Gas Generation Fleet in California 2017-2030
- Selected Simulation Projections and Trends

Revised PLEXOS Input Assumptions

- Preliminary 2017 IEPR Demand Forecast
  - http://www.energy.ca.gov/2017_energypolicy/documents/2017-08-03_workshop/2017-07-06_pre_demand_forecst.php
- Updated Renewable Portfolios
- Revised Burner-Tip Natural Gas Projections
  - http://www.energy.ca.gov/2014publications/CEC-200-2014-008/index.html
- Diablo Canyon Replacement
  - 2,000 GWh additional AAEE
  - 2,500 GWh additional renewable energy
- Intermountain 1,200 MW Natural Gas Replacement

Production Cost Model Common Case Key Assumptions

Common Case	2017 IEPR Preliminary Load Forecast	2016 IEPR Additional Achievable Energy Efficiency	RPS Target
High Energy Consumption	High	Low	50% by 2030
Mid Energy Consumption	Mid	Mid	
Low Energy Consumption	Low	High	
2xAAEE Case	Mid	2x Mid by 2030	

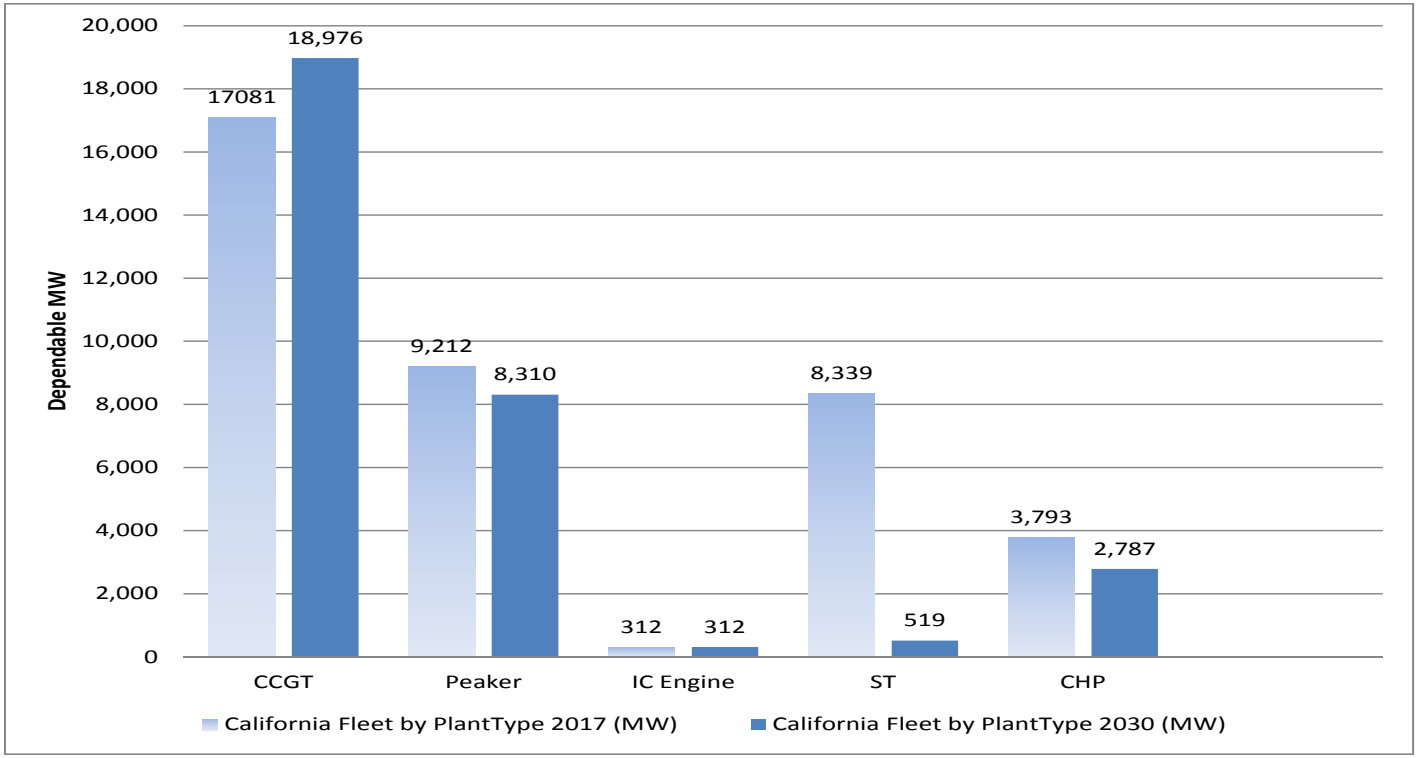
- 2xAAEE Case only simulated in PCM and was not used in the Natural Gas Outlook.
- 2017 IEPR AAEE projections in development by CEC's Demand Analysis Office

California RPS Planning Target and Renewable Net Short (TWh)

		2017	2020	2024	2027	2030
Estimated Existing Operational and Out-of-State Contracted Resources		74.90	74.60	73.09	71.03	69.18
RPS Target	Low Consumption	66.79	77.20	92.09	101.45	113.32
	Mid Consumption	67.13	79.06	96.53	108.03	121.18
	High Consumption	67.40	81.41	101.97	116.28	131.28
	2xAAEE Mid Consumption	67.13	78.29	92.96	101.40	109.49
Net Short	Low Consumption	0.00	2.60	19.00	30.42	44.14
	Mid Consumption	0.00	4.46	23.44	37.00	52.00
	High Consumption	0.00	6.81	28.88	45.25	62.10
	2xAAEE Mid Consumption	0.00	3.69	19.87	30.37	40.31

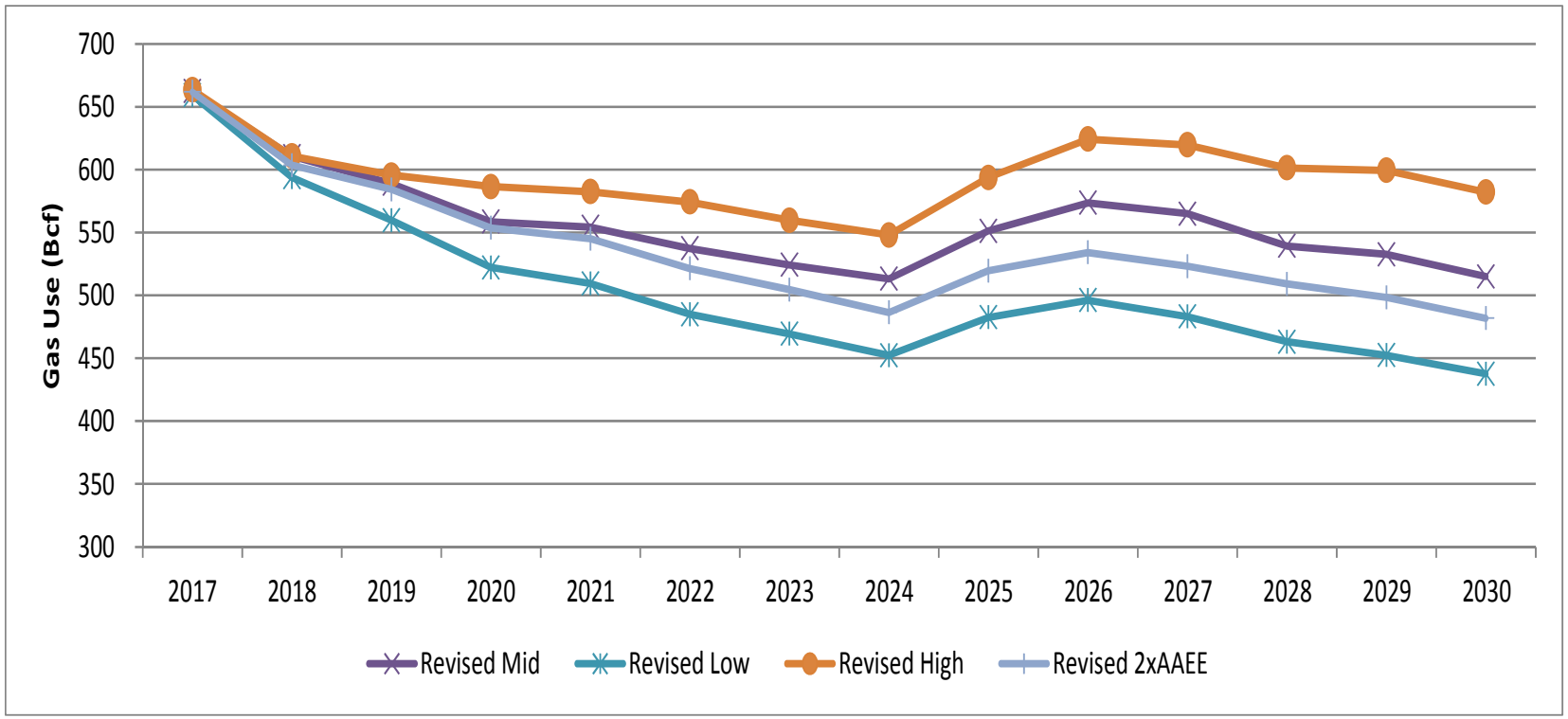
Illustrates assumptions impacts on RPS targets

Natural Gas Fleet Unit Types in California



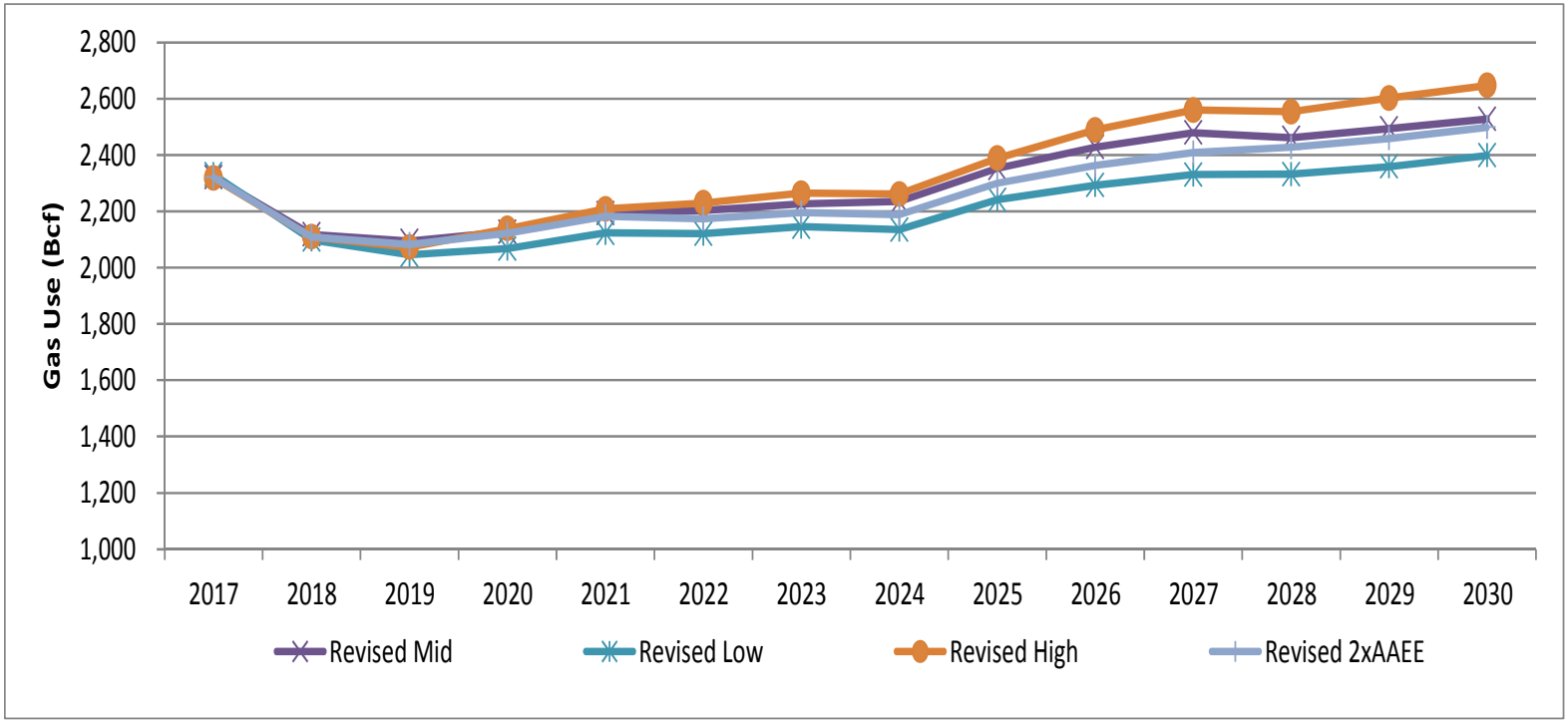
- OTC and announced retirements in addition to 40 year retirement rule
- Replacement capacity based on PPAs and utilities most recent IRP

California Natural Gas Use For Electric Generation



California average annual gas use for electric generation declines between 2017-2030 by -1% to -3% even with a slight expansion from 2025 to 2026 due to retirements

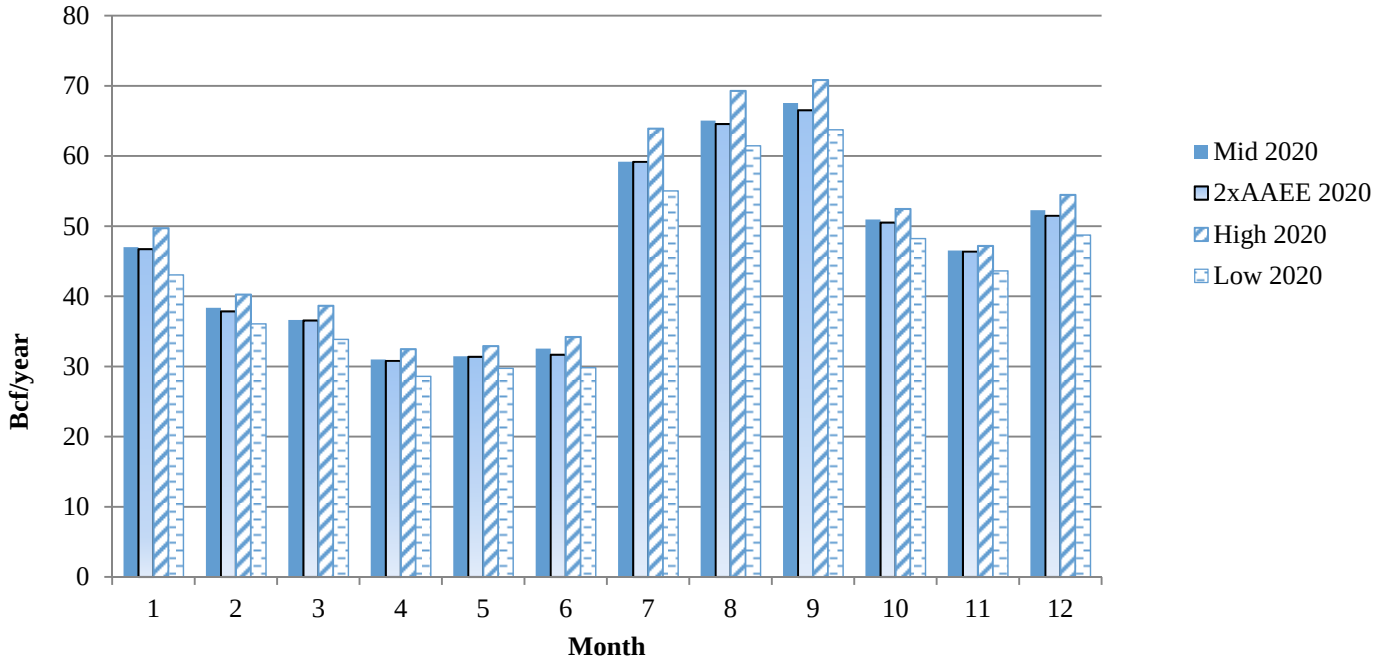
WECC Wide Natural Gas Use For Electric Generation



- WECC wide average annual gas use for electric generation increases between 2017-2030 by 0.2% to 1%
- Due to projected load growth and about 16,000 MW of coal retirements over the forecast period

Monthly Natural Gas Consumption for Electric Generation in California During 2020

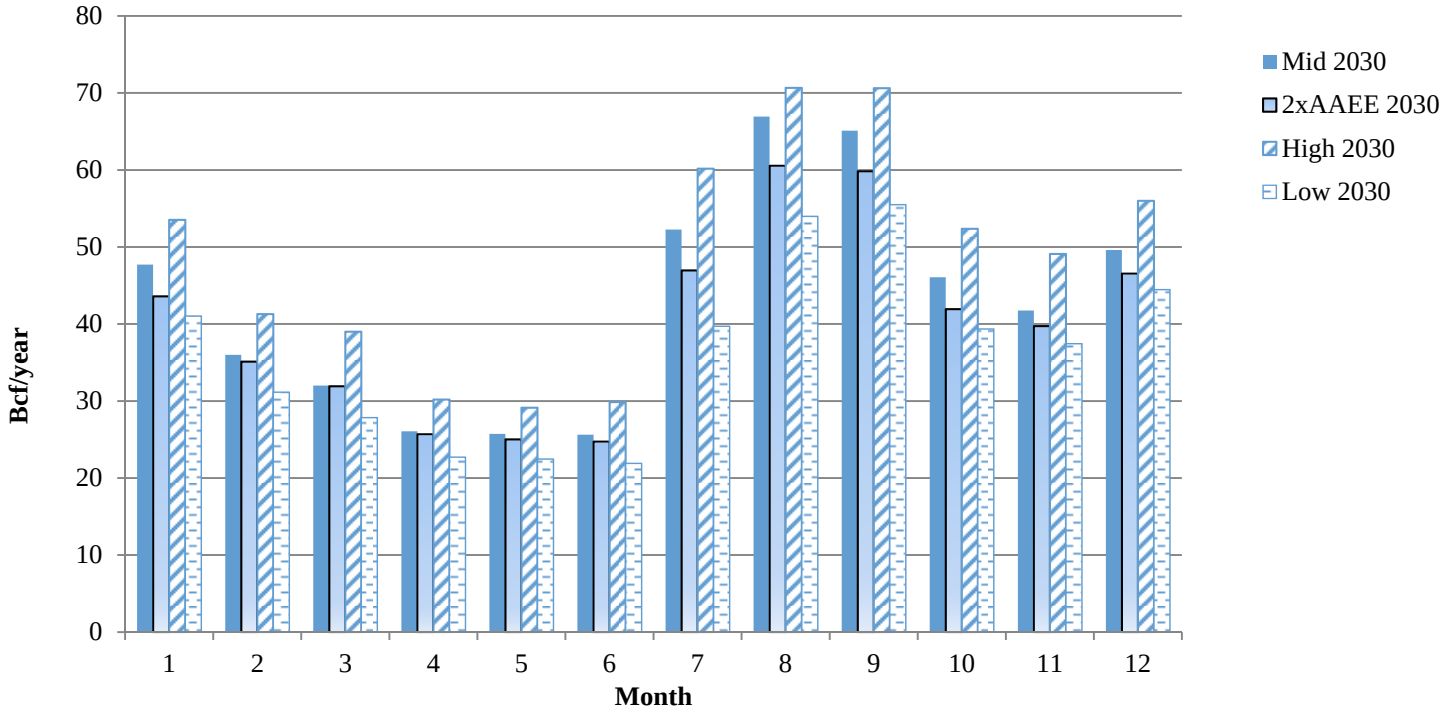
(Billion Cubic Feet)



- Historically, natural gas use peaked in August
- 2020 and beyond projections show September slightly above or equal to August

Monthly Natural Gas Consumption for Electric Generation in California During 2030

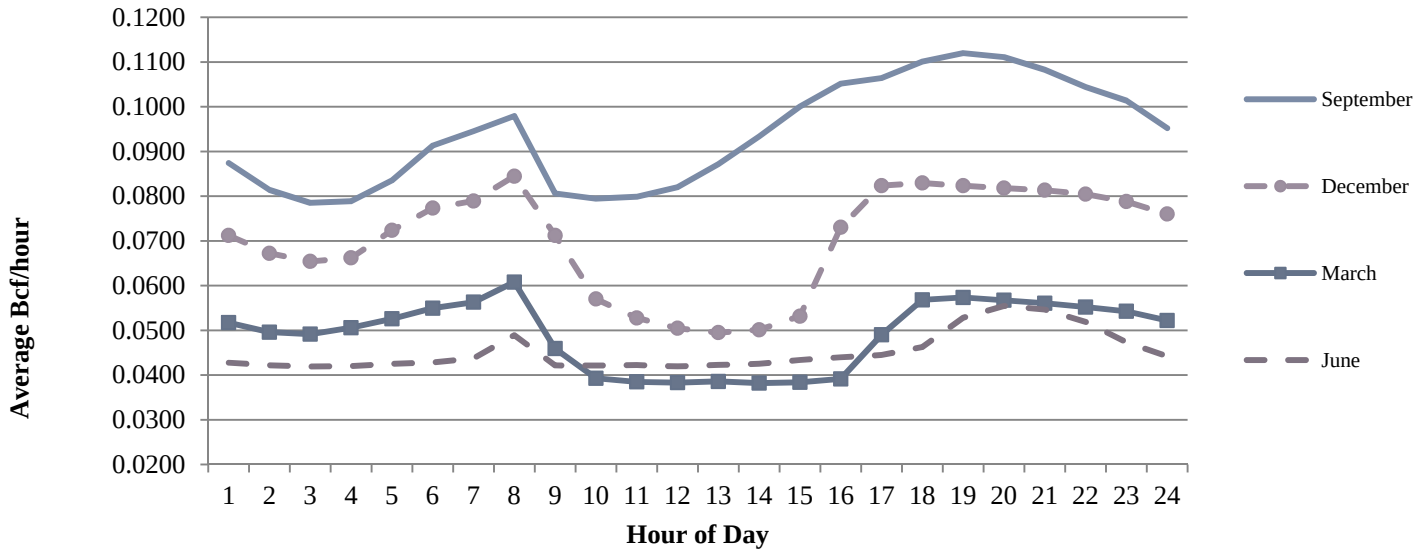
(Billion Cubic Feet)



By 2030 the projected impacts of AAEE and the shifting peak are more pronounced compared to 2020 simulation results for monthly natural gas use

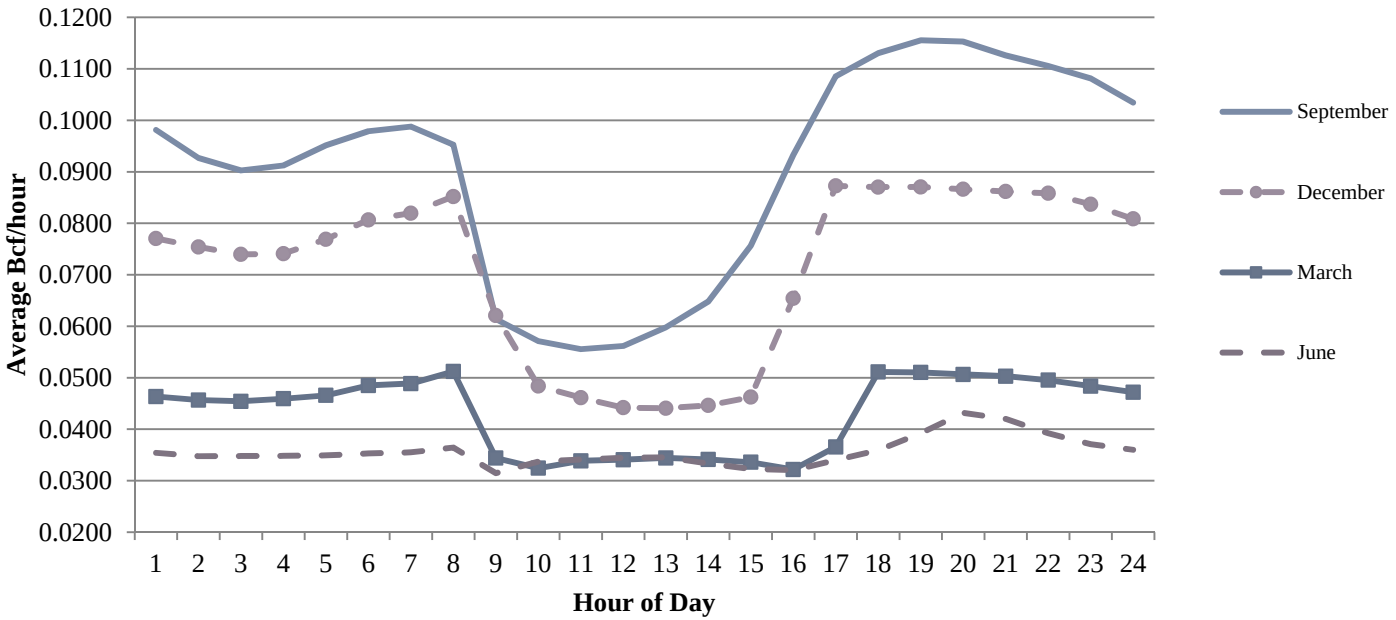
California Average Hourly Natural Gas Use For Electric Generation Mid Demand Case

Year 2020 Billion Cubic Feet



- Months with the greatest natural gas demand for electric generation also projecting the greatest ramping need
- Projected hour of ramp varies by month

California Average Hourly Natural Gas Use For Electric Generation
Mid Demand Case
Year 2030 Billion Cubic Feet



By 2030 projected hourly ramp for natural gas use by electric generators becomes steeper

Other Interesting Simulation Results

- In 2030 renewable energy curtailment is projected between 0.5% - 1.4% depending on case. Low Demand Case highest due to higher BTM PV assumptions
- Trends in gross imported energy increase (8%-15%) while net imports decrease (2%-15%) in all cases. California is projected to always depend on imported power. However, the net imports would decrease more if the hourly net export limit is relaxed.
- Relaxing this net export limit could impact the natural gas use for electric generation on a WECC wide basis.

Questions

angela.tanghetti@energy.ca.gov

916 654 4854