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California Energy Commission

2021 IEPR Workshop on Gas Market & Demand Forecasts

Melissa Jones, Senior Energy Policy Specialist

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Goals for Today's Workshop

Gas Track for 2021 IEPR addresses two key areas:

- Situational awareness of emerging topics in natural gas system planning
- Refinement and development of critical analytical products necessary for gas planning

Today's Workshop focuses on Gas Market & Demand Forecast topics:

- Overview of Historic Gas Prices, Rates & Demand, plus Forecast Improvements
- CEC Natural Gas Price and Rate Forecasts
- CEC Burner Tip Price Forecast for Electric Generation in West
- Utility Presentations on Gas Demand Forecasts

Anticipate future 2021 IEPR workshops on:

- Renewable Natural Gas
- Long-term Demand Scenarios
- Gas Demand Forecast

Purpose of CEC Gas Forecasts

CEC provides situational awareness on natural gas market impacts to California. Warren Alquist Act directs CEC to:

- Forecast natural gas demand, supply, transportation, price, rates, reliability, and efficiency.
- Identify impacts on public health and safety, the economy, energy diversity, resources, and the environment.
- Identify emerging trends and impending or potential problems or uncertainties in the electricity and natural gas markets and industry.

Uses of CEC Gas Forecasts

CEC's IEPR forecasts of gas demand, prices, rates, supply and market conditions used in:

- CEC California Energy Demand Forecast (Natural Gas)
- CEC PLEXOS production cost modeling
- CPUC Integrated Resource Planning Proceeding
- CAISO transmission planning
- WECC production cost modeling, policy and planning
- Northwest Power and Conservation Council policy and planning
- California Gas Report

Improvements in Gas Forecasts

- **CEC develops commodity gas prices using it's NAMGas model – captures entire North American Gas Market**
  - CEC expanded the model from an annual to a monthly forecast to capture seasonality
- **CEC used a new model (developed by Aspen) to forecast rates that better incorporate revenue requirements and other factors**
- **CEC made improvements to Burner Tip Prices – developed model that better reflects price formation in the gas market**
  - Realigned transportation rates from "proxy hubs" to actual "market hubs"
- **CEC has identified improvements needed to the gas demand forecast to facilitate long-term gas planning**

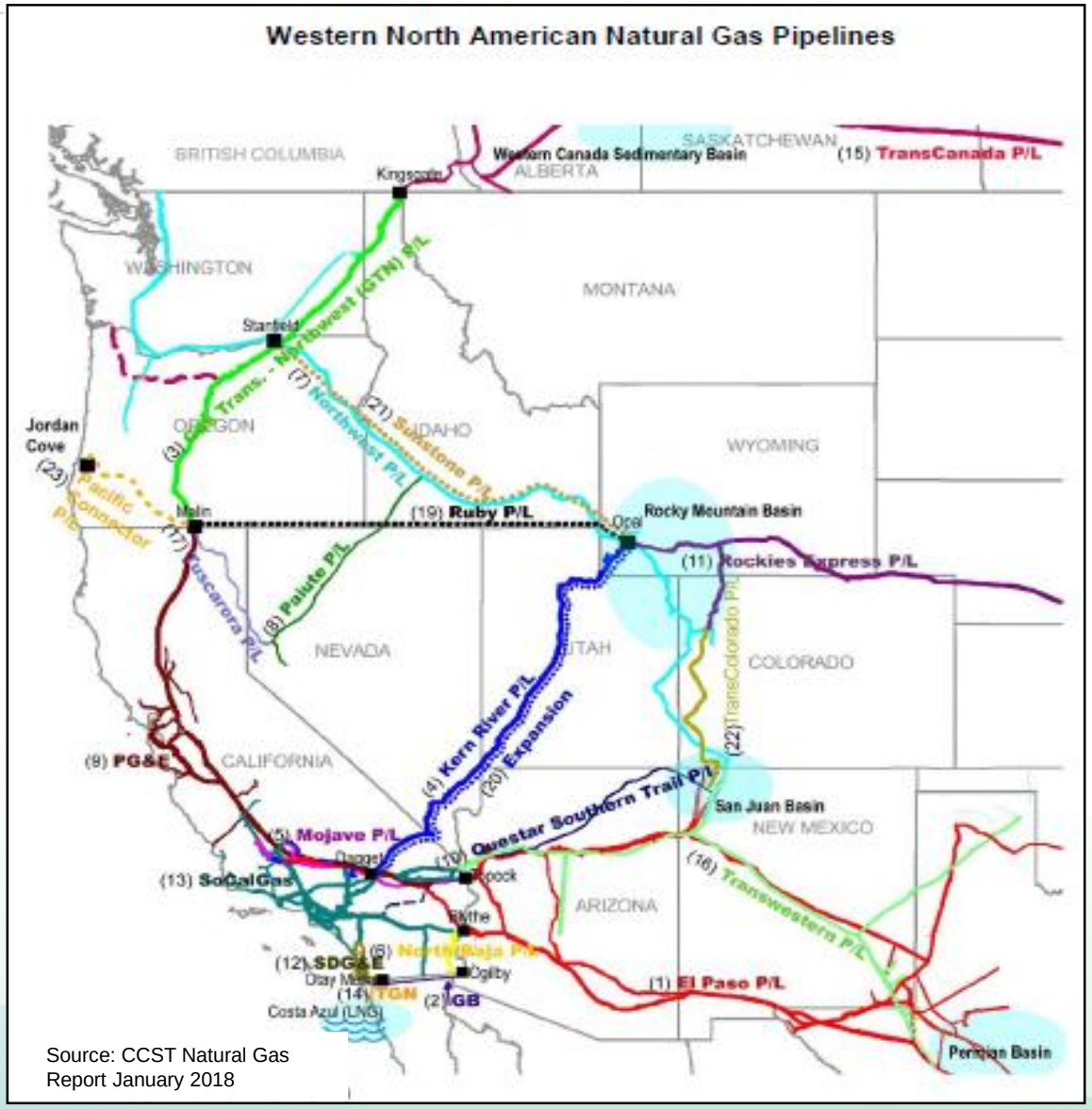
Gas Supply Trends

Out of State Gas Supplies ~ 90%

- 20% Alberta Canada
  - Via Gas Transmission Northwest
- 30% Southern Wyoming
  - Via Ruby Pipeline & Kern River
- 40% San Juan Basin (NW New Mexico)
  - Via El Paso Natural Gas & Transwestern Pipeline
- 10% Permian Basin (West TX & SE New Mexico)
  - Via El Paso Natural Gas & Transwestern Pipeline

In-State Supplies ~ 10%

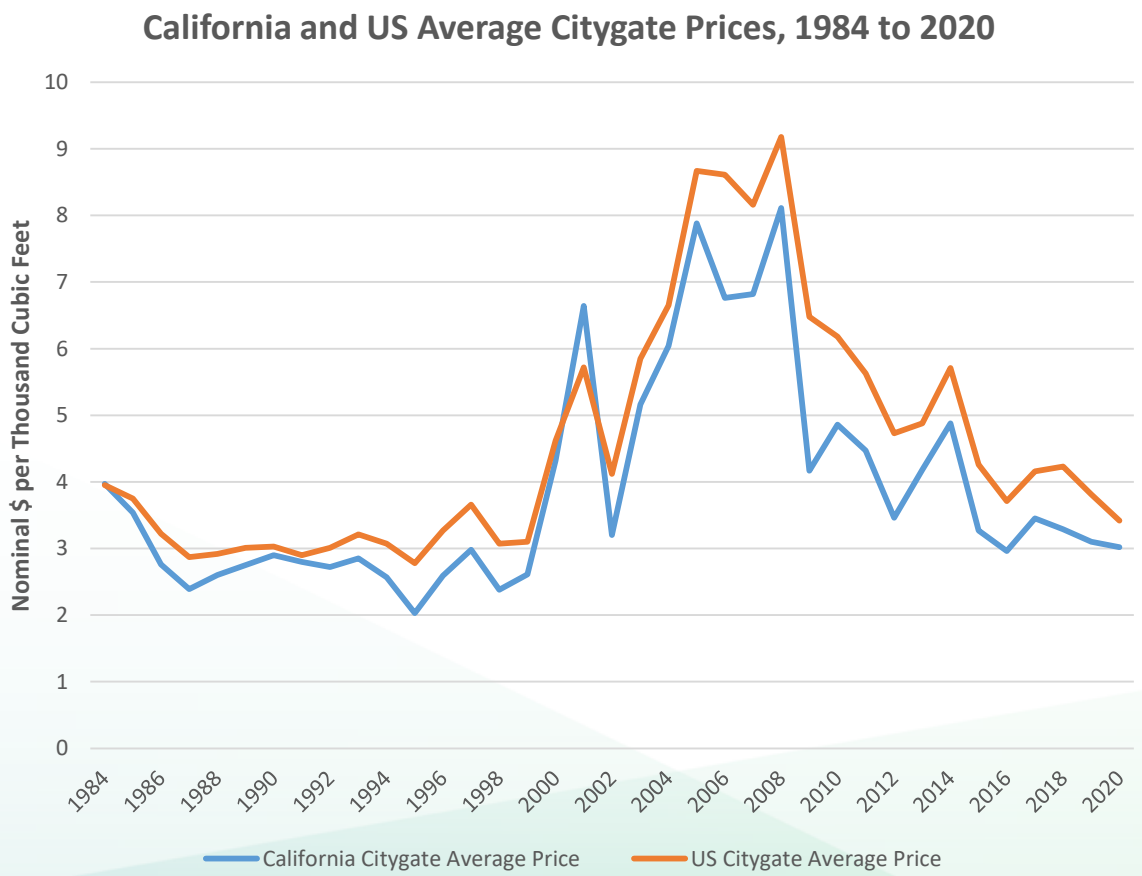
- Production Declining since 1980s



Source: CCST Natural Gas Report January 2018

Gas Price Trends: CA vs US

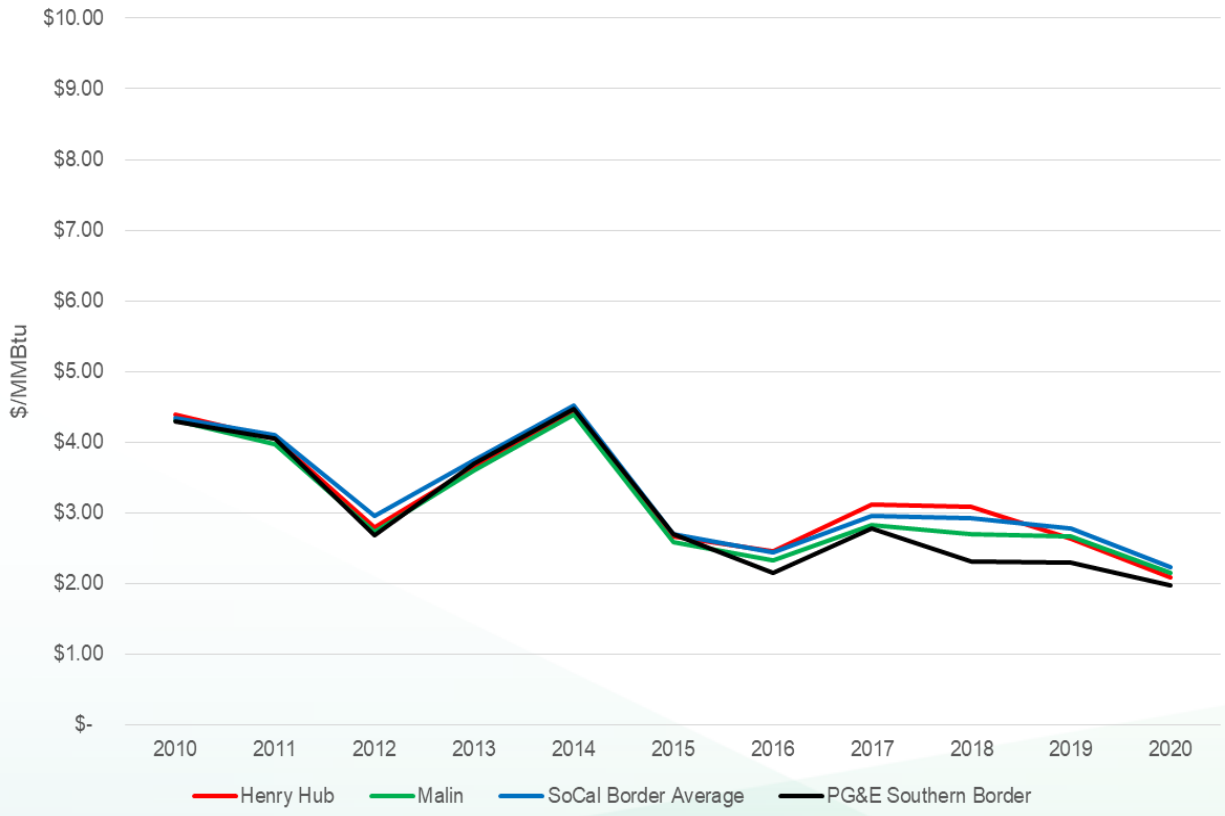
- Gas prices low from mid-1980s to 2000 and peaked in 2010
- Declining production in traditional gas basins drove up prices
- LNG facilities proposed and constructed to import gas
- Shale gas has produced low-priced gas replacing LNG imports
- California average Citygate Prices slightly lower than US



Recent Henry Hub and Border Prices

Prices remained very closely correlated until 2016 with slight divergence to 2020

- Excess Permian gas production caused prices to drop in San Juan basin, which led PG&E Southern Border prices to fall
- SoCal Border prices did not fall due to pipeline outages

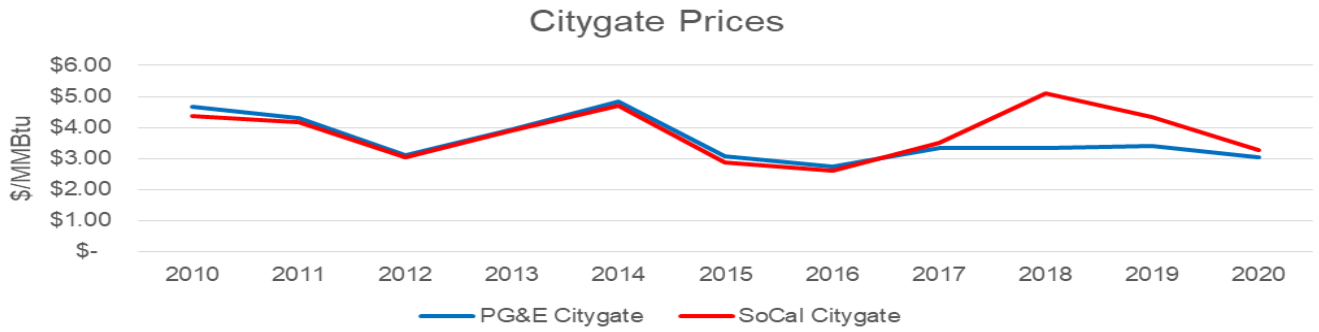


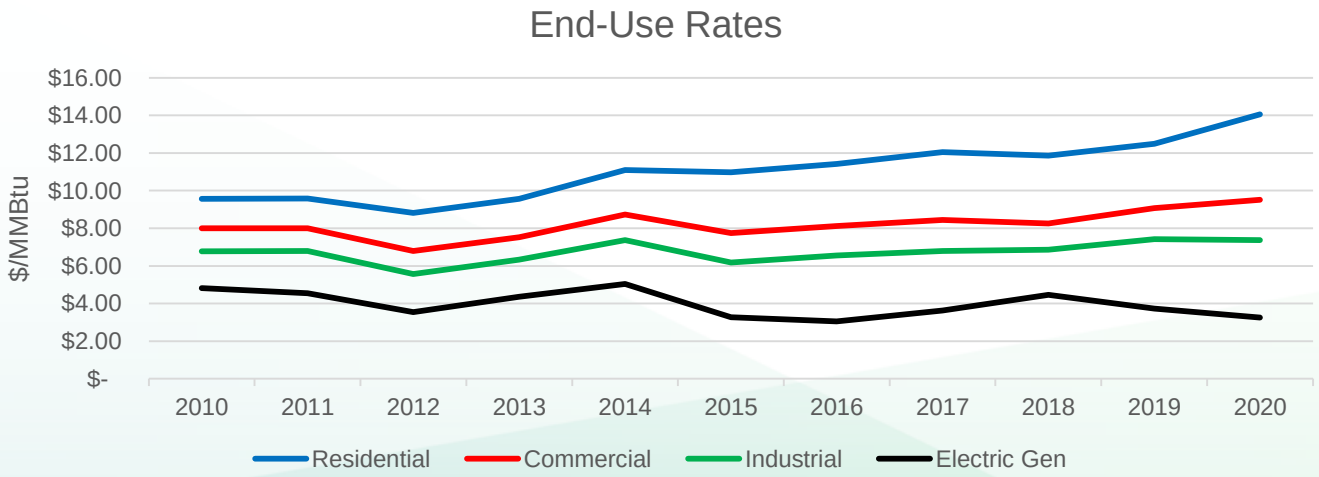
Recent Citygate Prices & Rates

PG&E and SoCal Citygate prices were close until October 2017

Gas Rates (2010-2020)

- Residential rates increased an average of 4.1% per year
- Commercial rates increased an average of 2.2% per year,
- Industrial rates increased an average of 1.4% per year,
- Electric Gen rates decreased an average of 1.8% per year – Spike in Citygate in 2018





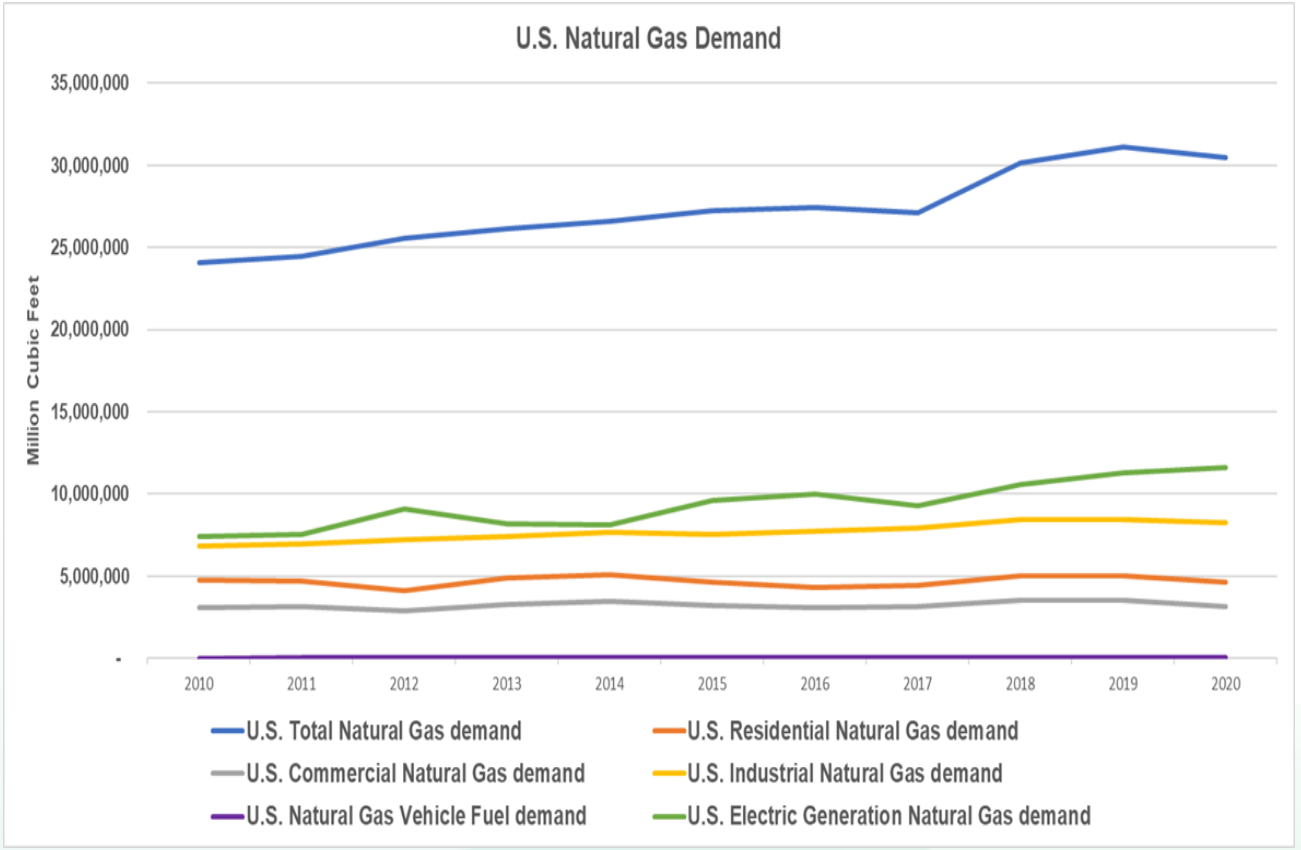
Recent US Gas Demand

Changes in Gas Demand Since 2010:

- U.S. total gas demand increased 27% to just over 30 trillion cubic feet in 2020
- Residential declined 3%
- Commercial increased 1%
- Industrial increased 21%
- Transportation Use increased 106%
- Electric Generation increased 57%

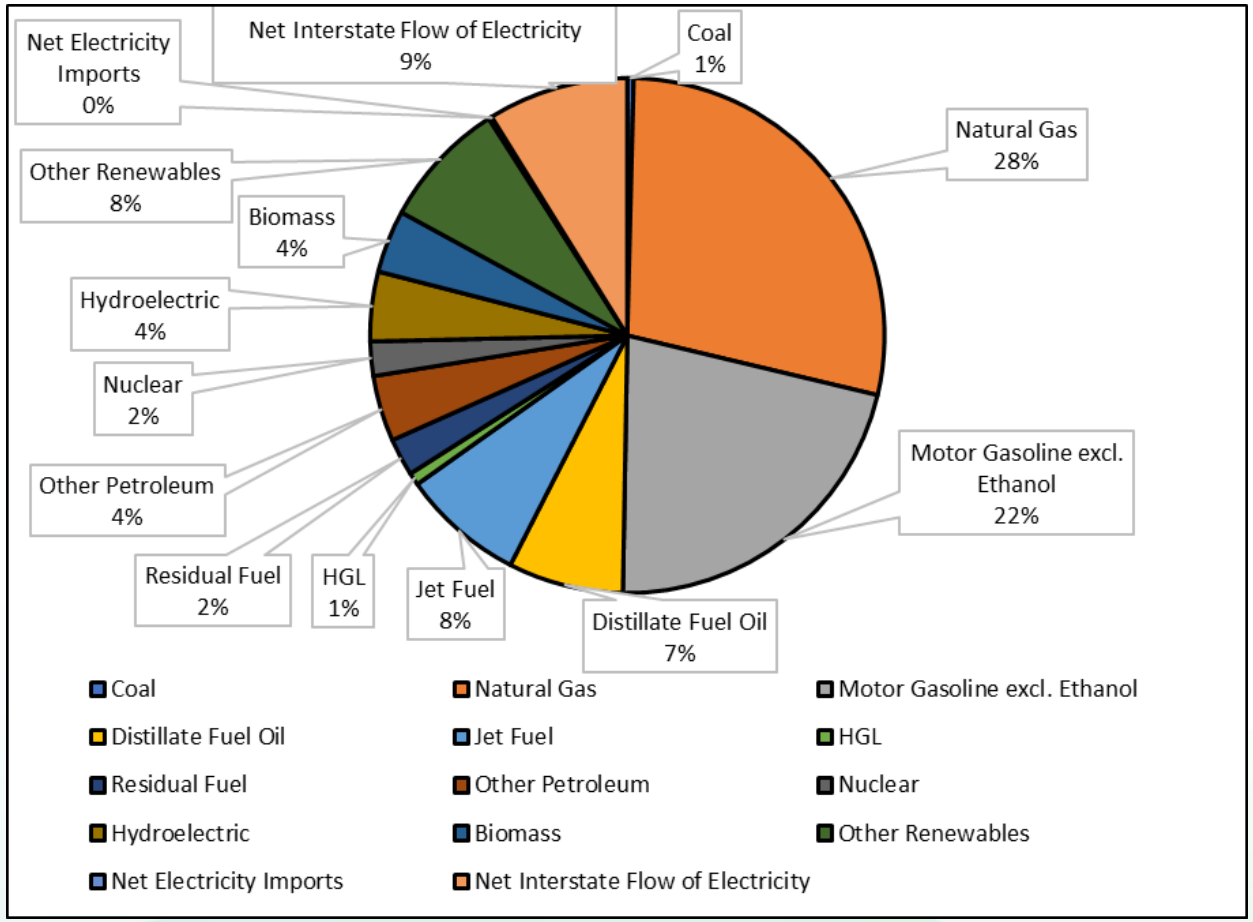
Recent Changes:

- 2020 2% lower than 2019
- 2021 total U.S. gas consumption is 0.6% lower than same time in 2020



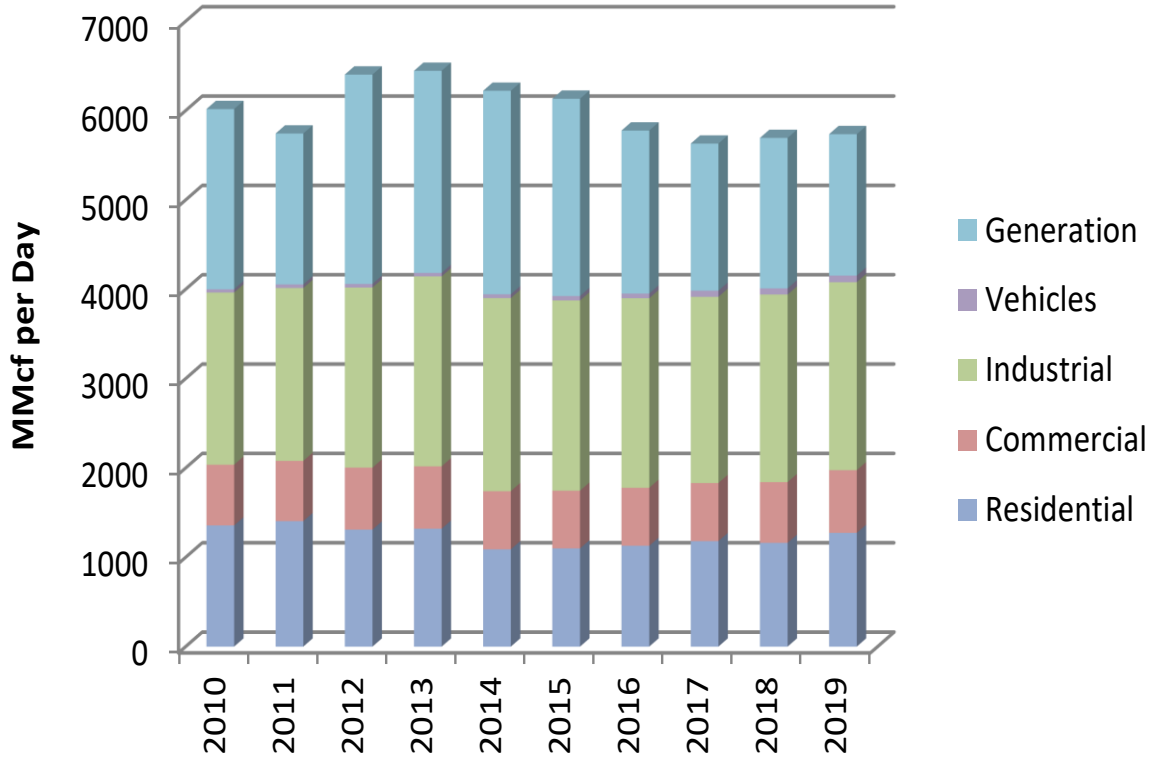
CA Total Energy Consumption

- Natural gas accounts for 28% of CA total energy consumption
- In Btu equivalent, more natural gas used in CA than gasoline
- Natural gas is a dominant energy source for:
  - Building space and water heating
  - Industrial feedstock and fuel
  - Electric generation



Recent California Gas Demand

- CA Gas Demand Declining since 2012-13
- PG&E forecasting decline of 1% per year out to 2035
- SoCalGas forecasting decline of 1% per year out to 2035
- Weather is biggest driver for residential, commercial and power generation
- Renewable integration likely to increase EG gas demand in near-term



CEC Gas Demand Forecast

- The CEC has long produced a gas demand forecast as part of the California Energy Demand (CED) forecast (each odd year)
- With the increased focus on long term gas planning the CEC recognizes the new needs and uses for the gas demand forecast
- 2021 IEPR: 1st time CEC collected detailed inputs and assumptions for utilities' demand forecasts and detailed cost information used in their rate forecasts
- CEC convened an Expert Panel, similar to review a decade ago that of the Electricity Demand forecast and the Transportation forecast in 2018
- The Expert Panel is composed of recognized experts in the fields of energy forecasting and modeling

Expert Panel Review

- **Expert Panel found forecast methodology is reasonable**

- Notes natural gas demand forecast uses the same methodology as for electricity, which they had previously reviewed.

- The forecast should continue its formal tie to the electricity forecast; the importance of this tie will increase with anticipated acceleration of electrification in California.

- The CEC should improve transparency via increased stakeholder engagement, better model documentation, and making the model code more accessible and replicable.

Near-Term Improvements

- Vet and make forecast results transparent via DAWG
- Transfer of the Residential and Commercial end-use models to modern platform
- Incorporate most recent survey results (2019 RASS and CEUS) into the natural gas forecast
- Re-examine econometric specifications of natural gas models and re-estimate equations routinely with updated data
- Break out into a separate planning area (or at least re-label) the gas delivered by interstate pipelines directly to end-users in California
- Greater collaboration within the Energy Assessments Division to discover and correct data errors (or misinterpretations) and industry changes

Mid-Term Improvements

- Develop approach for forecasting under different weather conditions (i.e., 1-in-10, 1-in-35, 1-in-90) to assess CPUC reliability standards
- Craft usable, simple model to calculate natural gas transportation rates that logically increase in real terms and expand capability over time
- Continue to issue and expand “forms and instructions” to collect forecast information from gas utilities under subsequent IEPRs
- Enhance understanding of industrial uses of gas and other end uses that cannot electrify

Long-Term Improvements

- Develop forecast for Hot, Dry Summer
  - Initial thoughts presented in July 9 workshop
- More granular disaggregation to support hydraulic modeling of gas systems
  - Geographically
  - Hourly, especially the electric generation gas burn
- Capture climate change impacts on temperature and occurrence of extreme events (heat dome, polar vortex)
- Ensure time in process to iterate between price and quantity
- Get daily (and hourly) gas sendout data by customer class.
- Continue collaboration with utilities in developing more sophisticated forecasting methods corresponding to new circumstances

Thank You!