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Preliminary Natural Gas Market Results

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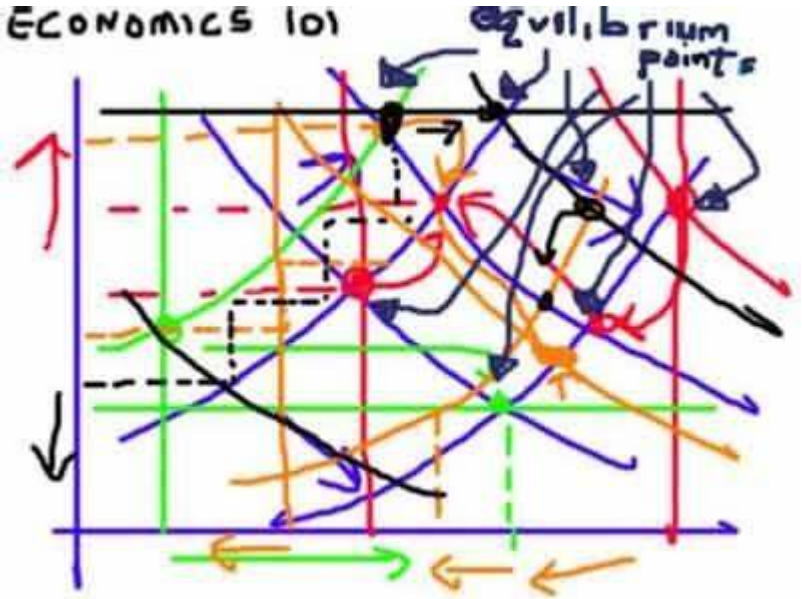
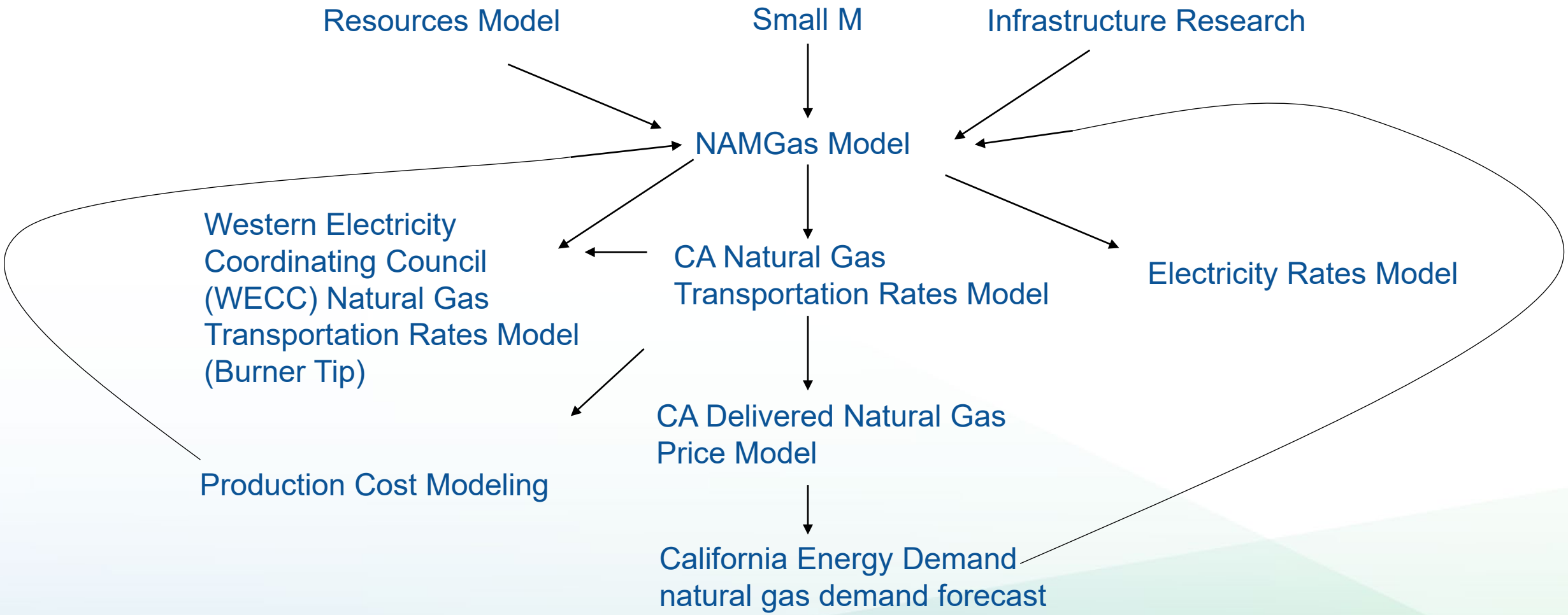
NAMGas Model: Construction

- Created in the MarketBuilder platform
  - Well-vetted general equilibrium modeling logic capturing North American market
- Updates to the 2021 NAMGas model:
  - Demands in North America to reflect current market trends
  - North American pipeline system capacity
  - Newest information on gas reserves and costs
- Vetting of staff assumptions and results



NAMGas Model: Modeling Flow



NAMGas Model:
Simplified View

Natural gas supply basins
Connected to
Interstate and Intrastate pipelines
Connected to
Demand centers

➔

- Supply
- Transmission
- Demand

- **Model iterates among the three components to find economic equilibrium at all nodes at all time periods**
- **Results give prices, demand, and supply at equilibrium**

2021 NAMGas Model Improvements

2021 IEPR Changes:

- NAMGas expanded from an annual model to a monthly model
  - Accounts for seasonal demand patterns
  - Accounts for storage
- New Resources Allocation Model (natural gas supplies)
  - Previous versions of NAMGas used old data given to CEC by consultant
- Streamlined nodes to better capture market trading locations (hubs)

2021 IEPR Common Cases

Staff Scenarios/Common Cases:

- **High-Demand**
- **Mid-Demand (Business as usual)**
- **Low-Demand**

All cases assume Senate Bill 100 - Zero carbon sources for power generation by 2045.

IEPR Common Cases:
Key Assumptions

Input Category	High Demand	Mid Demand	Low Demand
GDP/GSP	High Case in EIA's 2021 Energy Outlook: 3.4% Annual GDP Growth	Reference Case in EIA's 2021 Energy Outlook: 2.6% GDP Growth	Low Case in EIA's 2021 Energy Outlook: 1.7% Annual GDP Growth
Renewables	CA and Other US States Meeting RPS Targets	CA and Other US States Meeting RPS Targets	CA and Other US States Meeting RPS Targets
US Initial Demand 2021 EIA/2019 CED/PLEXOS	38.40 Tcf	37.87 Tcf	27.86 Tcf

IEPR Common Cases:
Key Assumptions, CA Reference Demand

CA Reference Demands:

- Uses 2019 CED for all CA demand except electric gen
- Electric gen is from July 2021 PLEXOS modeling results
- Elasticities are turned off for CA demand and WECC electric gen demand

CA Total	High-Demand Tcf	% Change	Mid-Demand Tcf	% Change	Low-Demand Tcf	% Change
2020	1.76		1.75		1.73	
2021	1.98	12.15%	1.87	6.89%	1.77	2.38%
2022	1.94	-1.97%	1.84	-1.31%	1.72	-2.72%
2023	1.94	0.23%	1.84	0.03%	1.72	-0.32%
2024	1.94	0.03%	1.83	-0.74%	1.70	-1.33%
2025	1.97	1.50%	1.83	0.14%	1.69	-0.30%
2026	1.99	0.74%	1.82	-0.82%	1.66	-1.80%
2027	2.00	0.78%	1.80	-0.97%	1.65	-0.93%
2028	1.99	-0.43%	1.77	-1.65%	1.63	-1.17%
2029	1.98	-0.71%	1.73	-1.97%	1.62	-0.44%
2030	1.94	-1.85%	1.71	-1.45%	1.61	-0.82%
average % change		1.05%		-0.18%		-0.75%

Continued IEPR Common Cases:

Key Assumptions

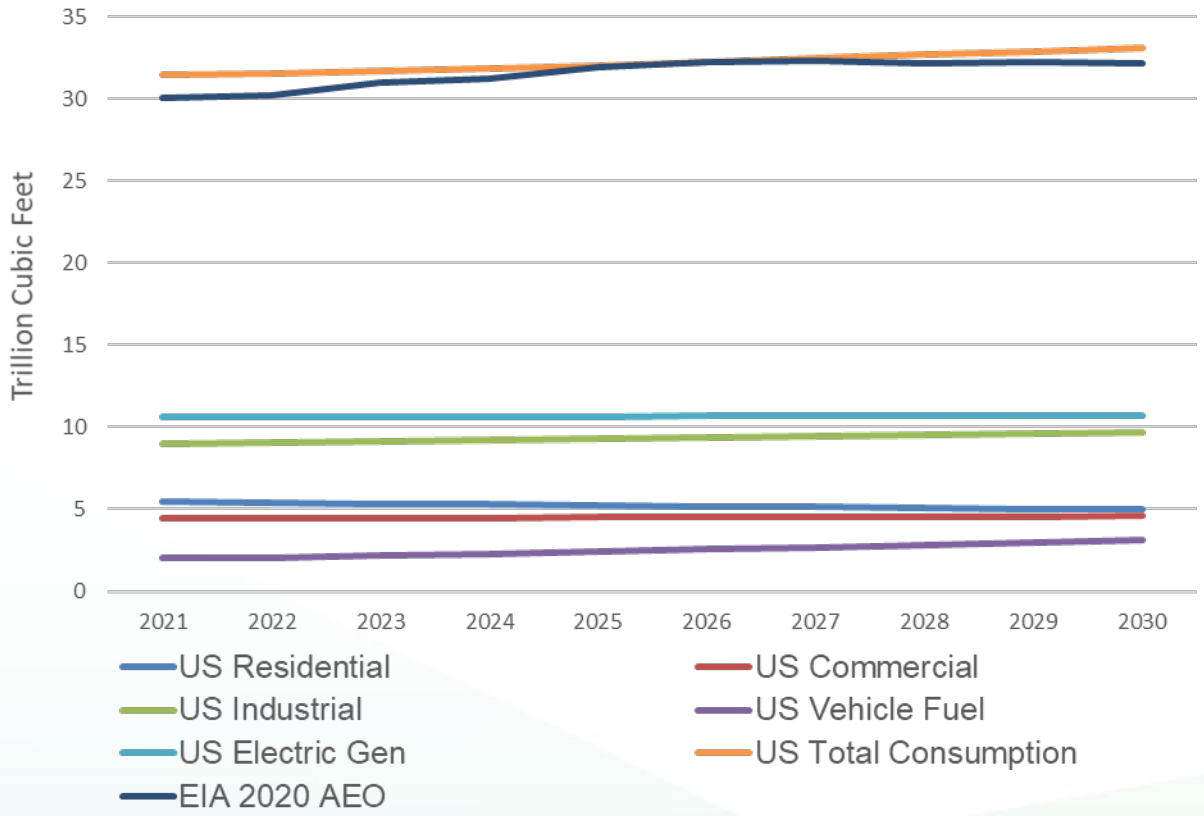
Input Category	High-Demand	Mid-Demand	Low-Demand
US Supplies 2021	Proved: 289 Tcf Potential: 4,304 Tcf	Proved: 289 Tcf Potential: 3,311 Tcf	Proved:289 Tcf Potential: 2,317 Tcf
Resource Capital Costs	30% Lower Than 2020 Inputs	2020 Inputs	30% Higher Than 2020 Inputs
Resource O&M Costs	30% Lower Than 2020 Inputs	2020 Inputs	30% Higher Than 2020 Inputs
Proved Supply O&M Costs	30% Lower Than Mid Case in 2020 and after	Estimated Based on Hub Prices	30% Higher Than Mid Case in 2020 and after

US Gas Demand Projections

Total US gas demand to increase 5% by 2030 (at about 1% per year)

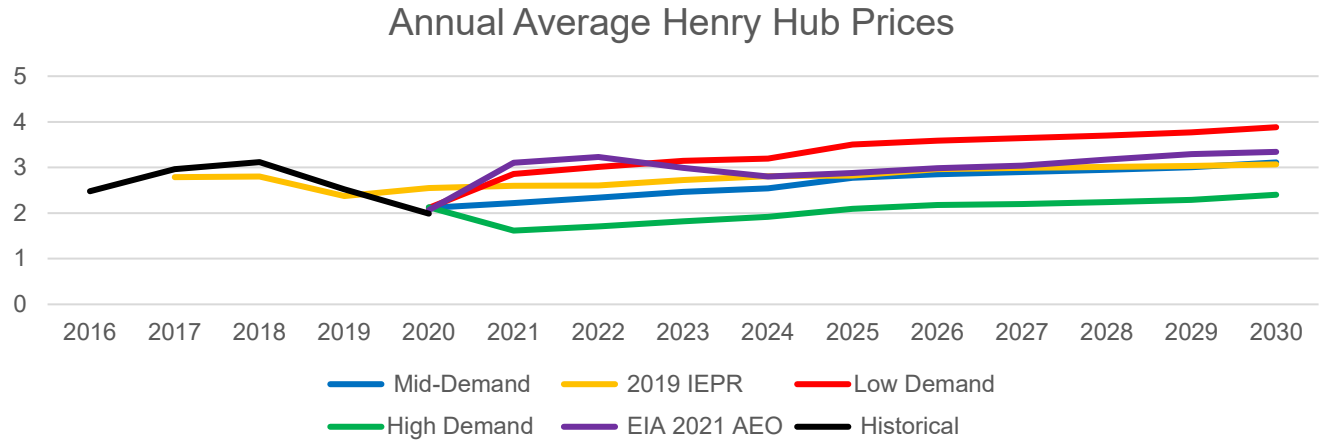
By 2030:

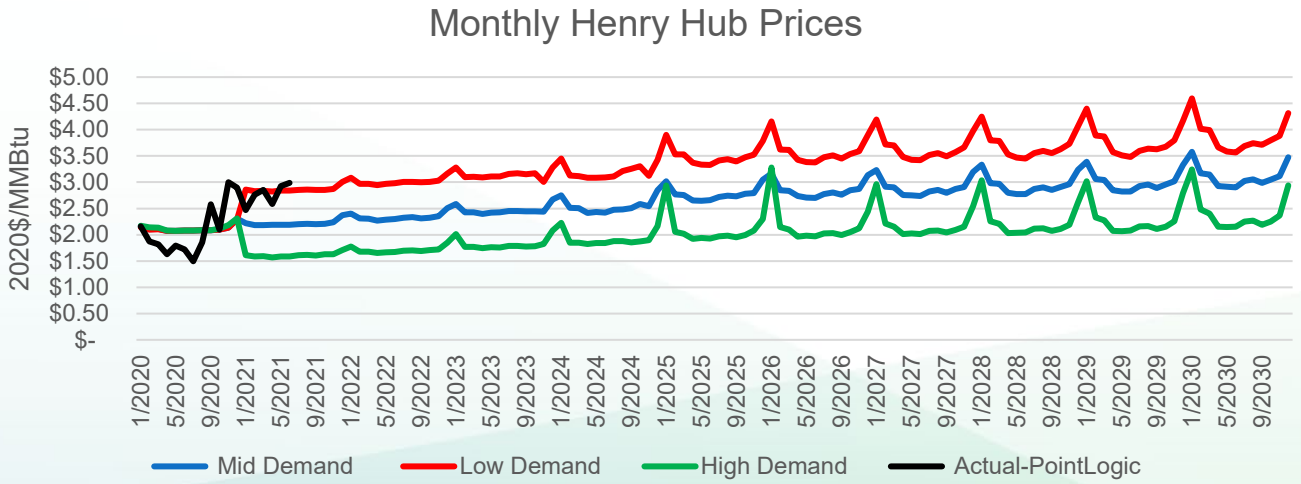
- Residential declines 9%
- Commercial increases 3%
- Industrial increase 8%
- Electric gen increase 1%
- Vehicle use increase 58%



NAMGas Preliminary Results
Henry Hub

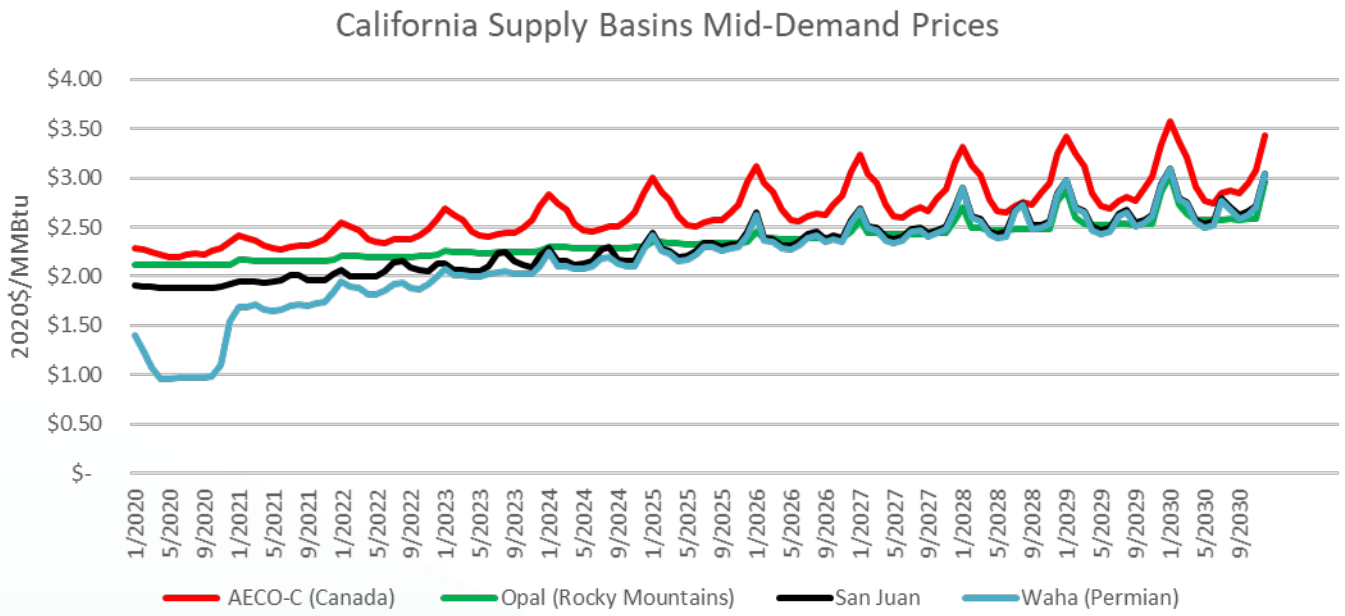
- Henry Hub is National Benchmark Price - Used for NYMEX futures, forwards, and common hedges
- Prices increasing 4% per year, higher increase the first five years (5.6%)
- Prices show greater seasonality in later years
- Prices are lower than 2019 IEPR projections in early years 2021-2024, then within 5% difference 2025-2030





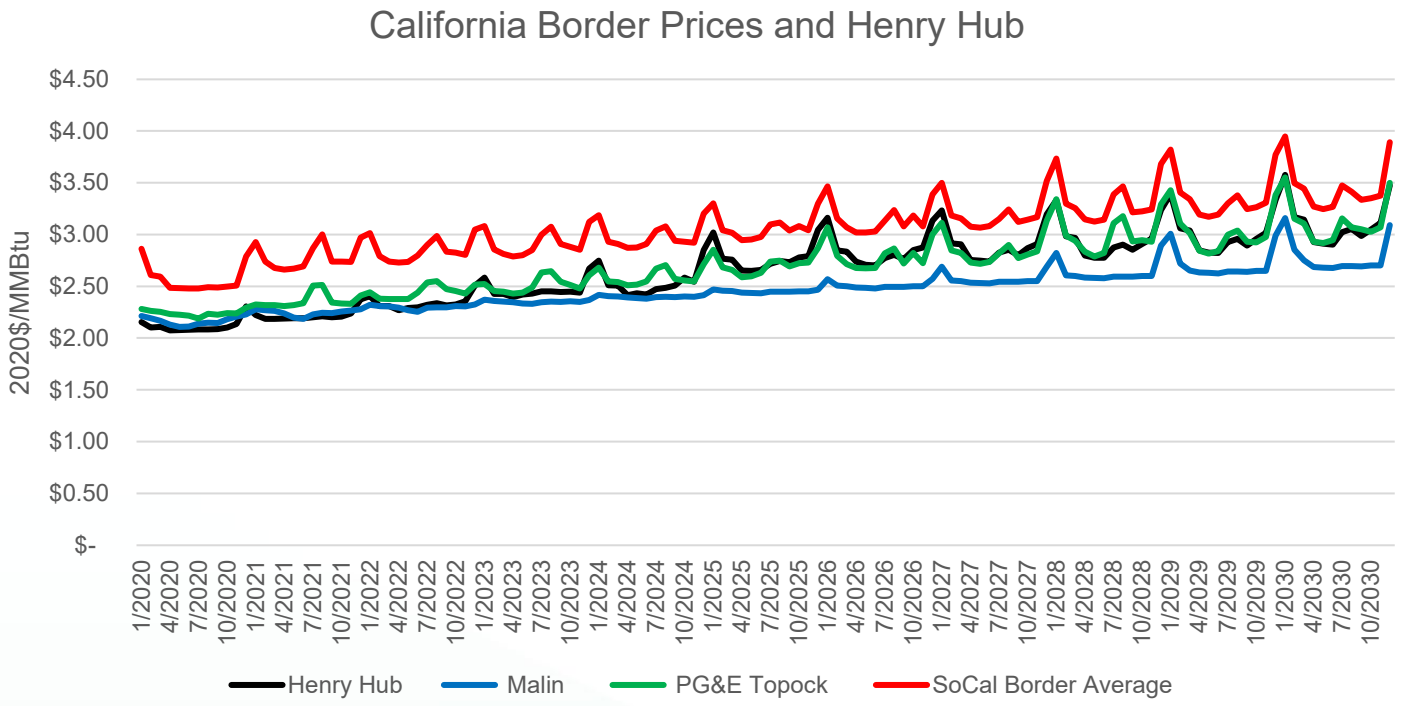
NAMGas Preliminary Price Results
California Supply Basins

- **California Supply Basins**
  - Canada (AECO-C)
  - Rocky Mountains (Opal)
  - Four Corners Area (San Juan)
  - West Texas/Eastern New Mexico (Permian)
- **Supply Basin Prices Remain Low**
  - Low cost of “fracking”
  - High proved and potential supplies
  - Prices see more seasonality in later years
    - As demand increase, winter demand increases more compared to other seasons leading to less slack capacity pushing prices higher



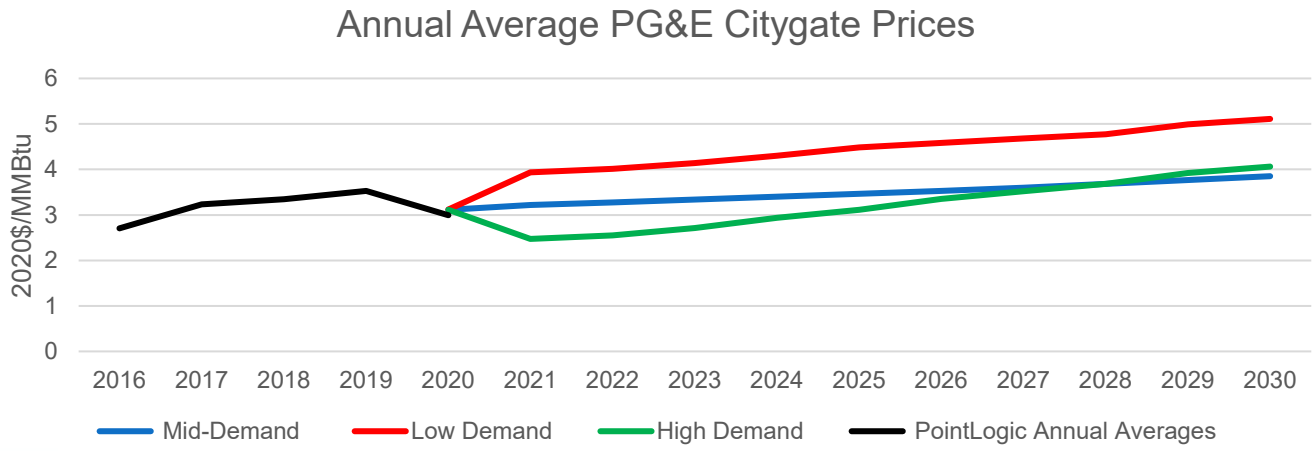
NAMGas Preliminary Results
California Border

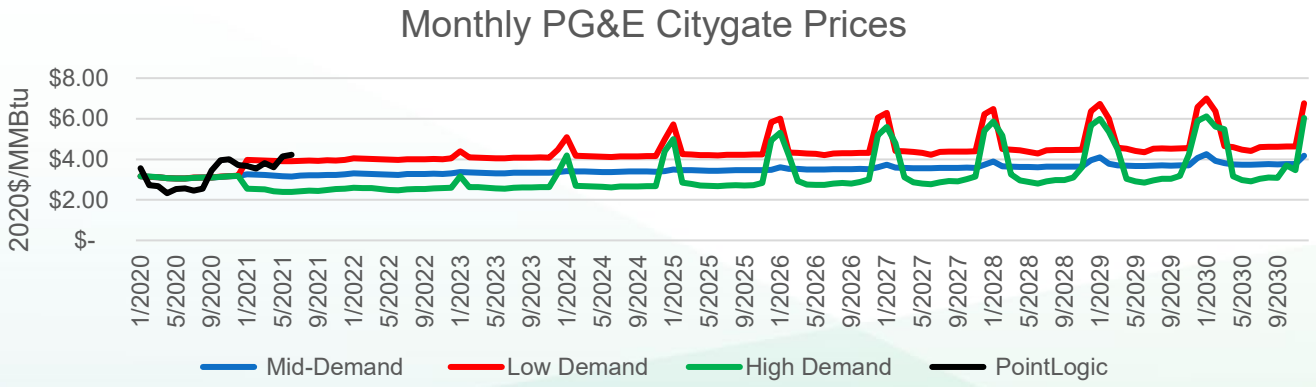
- Increased seasonality
  - Less slack capacity
- Border prices follow Henry Hub prices
- These prices exclude extreme events (polar vortex, heat waves)



NAMGas Preliminary Results
PG&E Citygate

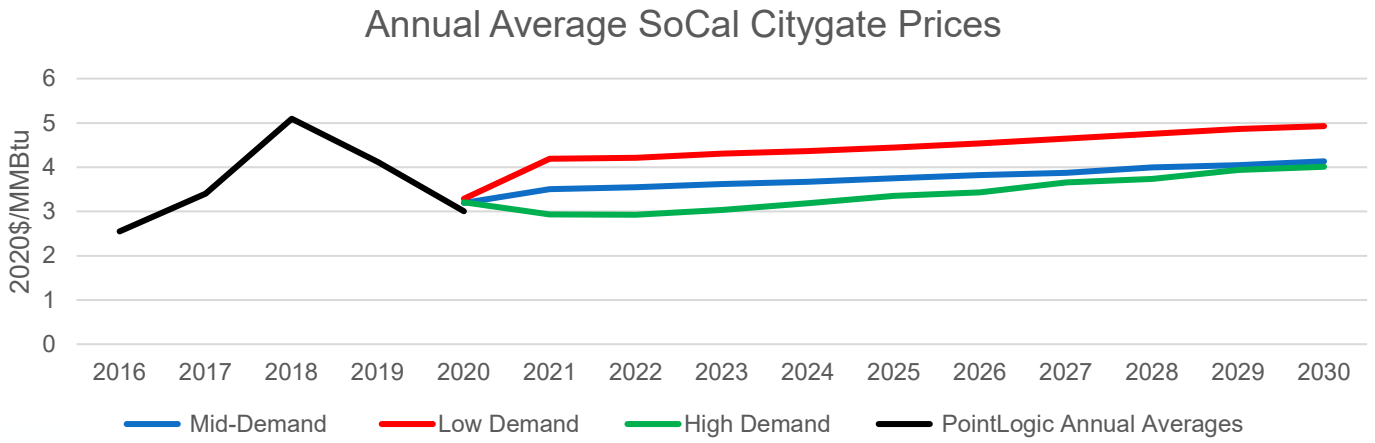
- PG&E Citygate prices climb steadily in all three case
- High-demand case prices exceed the mid-demand case
  - Less slack capacity in higher demand months

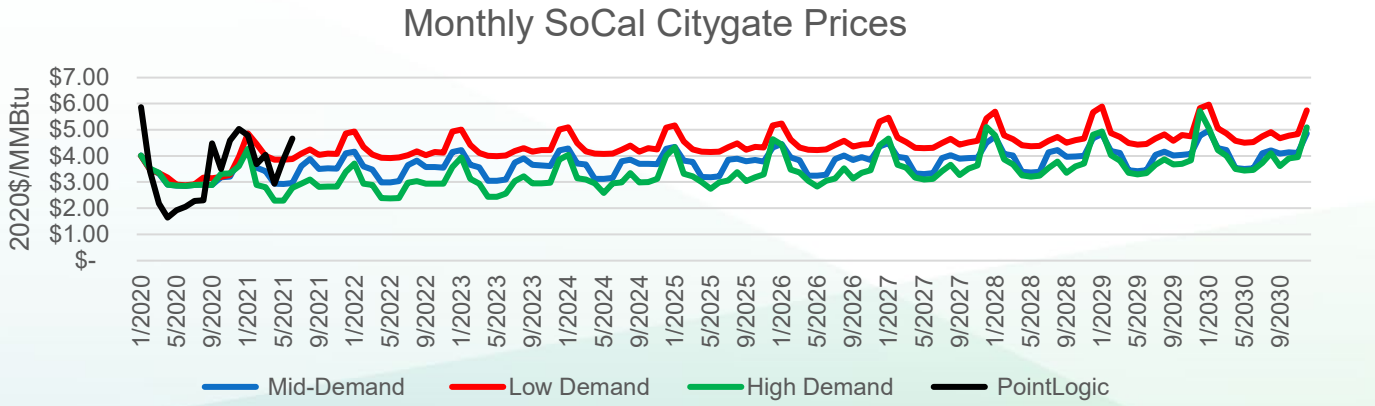




NAMGas Preliminary Results
SoCalGas Citygate

- SoCal Citygate prices climb steadily in all three case
- High-demand case prices exceed the mid-demand case
- Summer seasonal impacts





NAMGas Preliminary Results
IEPR Common Cases

Methodology Revisions:
Transportation Rates

Overview of Transportation Rates

NG market differentiates transportation from commodity procurement service

- Gas utilities purchase gas only for core customers
- Noncore customers must buy their own gas
- Commodity procurement price is set in an open, liquid market
- Delivered cost to ratepayers – procurement price plus the rate charged by gas utility to transport gas
- Delivered cost is also called a “burner tip” price

CEC Need for Transportation Rates

CEC applies transportation rates in modeling and analysis

- CEC demand forecast, gas price forecast, production cost modeling
  - CED Demand Sectors: Residential, Commercial, Industrial
  - Electric Generation Demand derived from PLEXOS modeling
- Old method took published rates from tariffs
  - New method computes average rate for each class like what utilities do in calculating rates for rate cases
- Appears non-EG rates escalated in 2019 IEPR but EG did not – goal to improve logic and consistency

Transportation Rate Methodology
New Rates Approach: Six Steps

1. Start with transportation-only revenue requirement
2. Divide class dollars by total RR to get allocation (spread) factors
    3. *Check step: divide those dollars by class demand to confirm 2021 baseline rates*
4. Escalate revenue requirement for each year
5. Multiply by 2021 allocation factors
6. Divide by class *forecast annual demand*

*(2021 Transp RR * Escalator * Class Spread Factors) / Class Demand = Class Average Rates*

Transportation Rate Drivers

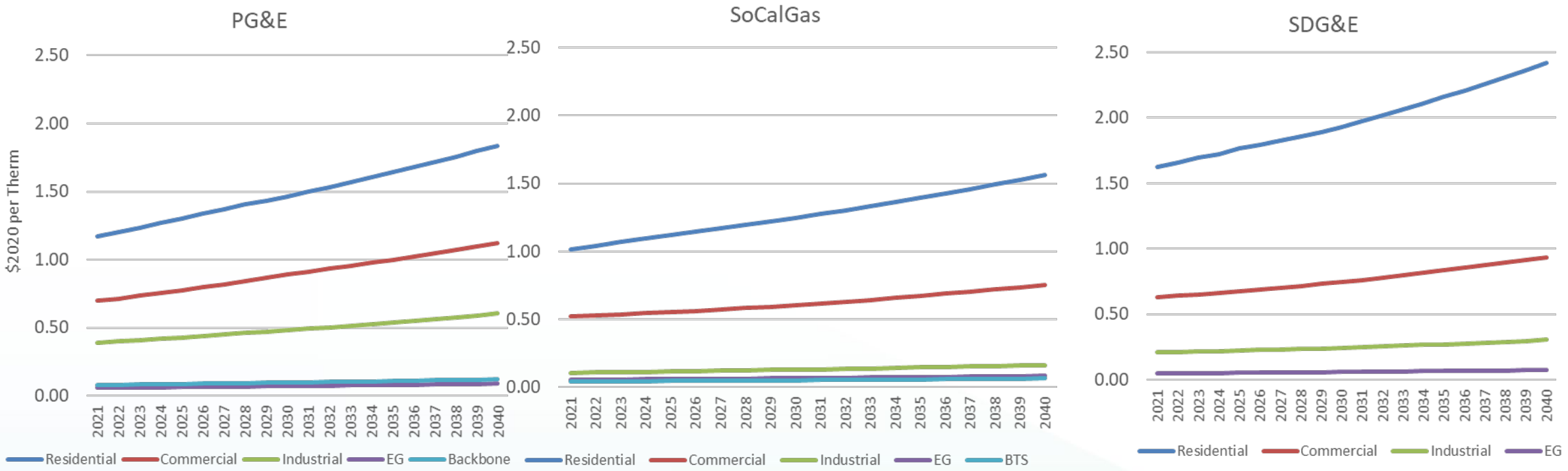
Three key variables drive forecasted rates:

1. Revenue requirement annual escalator
2. Class revenue allocation factors
3. Forecast annual demand by class

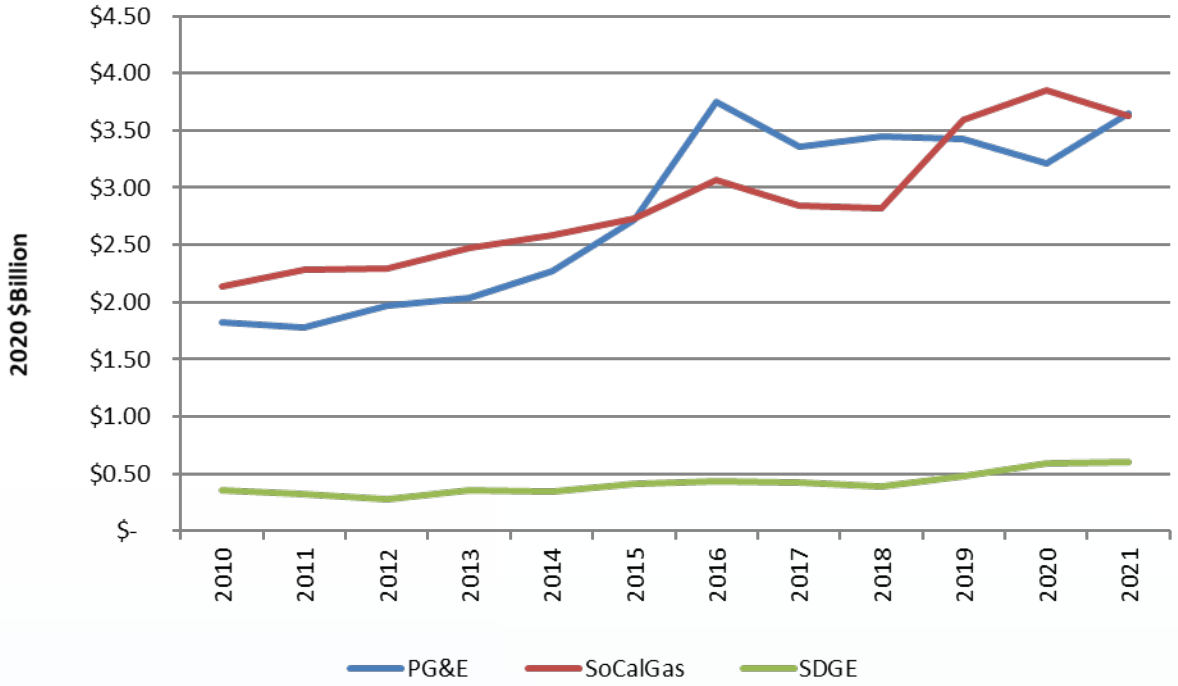
Notes on forecasted rates:

- If RR is constant & demand declines, then rates increase
- CEC demand differs from utilities' forecasts, so rates don't exactly match
- 2019 IEPR forecast only went to 2030. So held demand constant afterwards for preliminary rates

Transportation Rate Projections



Transportation Rate Escalation



Last 12 Years:

PG&E	5.96%
SoCalGas	4.50%
SDGE	6.58%

Last 6 Years:

PG&E	-0.47%
SoCalGas	2.85%
SDGE	5.26%

Data series on transportation revenue requirement from CPUC Gas & Electric Utility Cost Reports and the 2020 and 2021 “January 1” advice letters.

Transportation Rates: Seeking Public Input

What should we use as escalator on revenue requirements?

- 2.3% (real) in this iteration. Too conservative?
- Switch to the 12-year recorded escalation? Too aggressive? Trend seems to change in 2016
- Want to ID specific programs driving cost and sound logic to switch; not arbitrary or trend

How should we treat revenue allocation to customers classes?

- Held constant in this iteration?
- On what basis should they change?

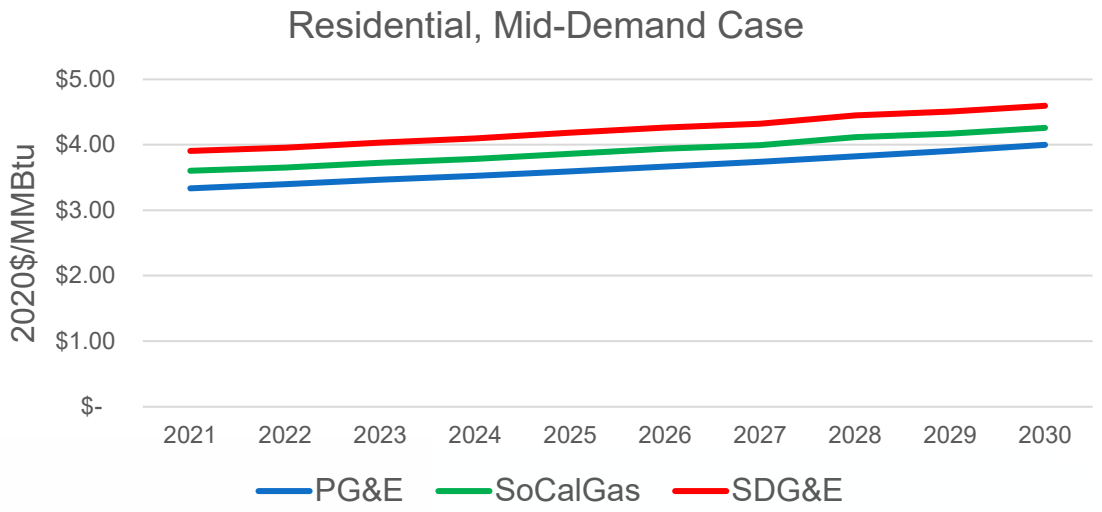
Delivered Price Calculation

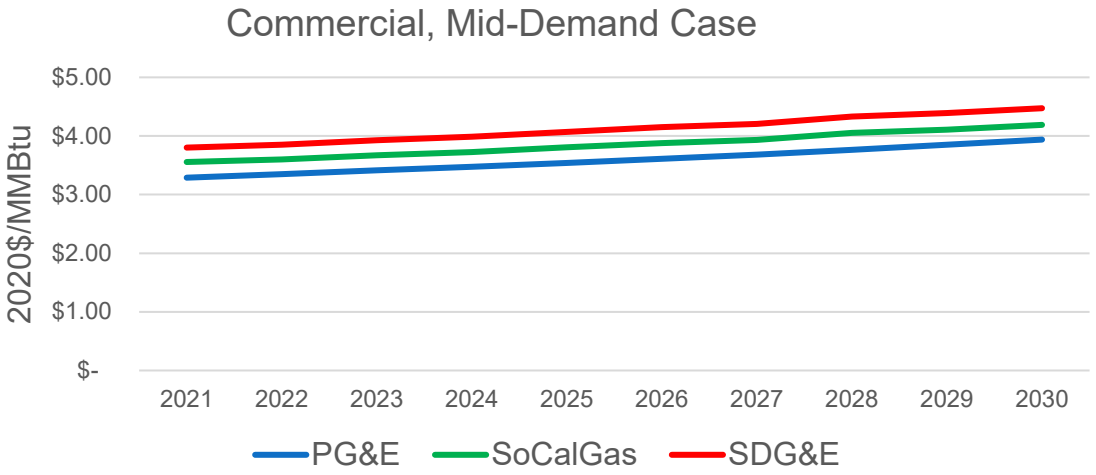
Delivered price calculation:

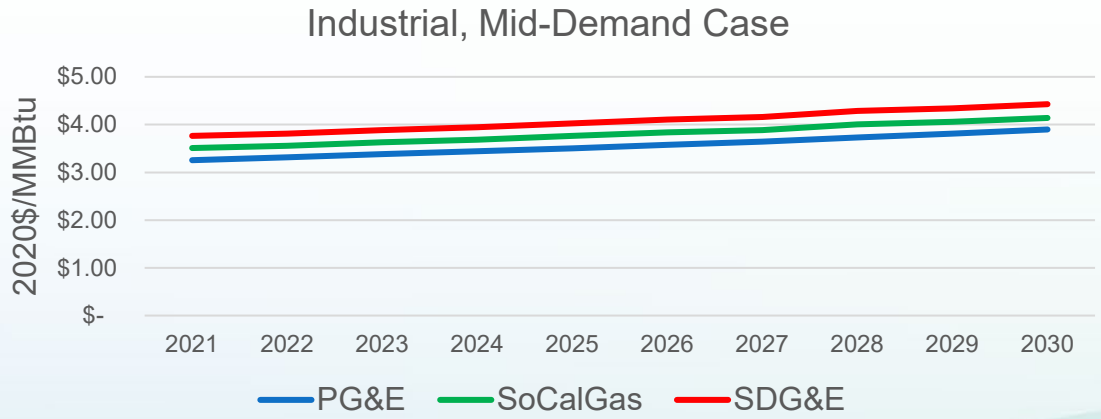
Delivered Price = Commodity Price (NAMGas Citygate Price) + Transportation Rate (New Model)

- Input to IEPR California Energy Demand Forecast (Natural Gas)
- Results for PG&E, SoCalGas, and SDG&E service territories include:
  - Residential, commercial, and industrial classes

Delivered Price Projections







All rates in mid-demand case grow at an average of about 2% per year, close to revenue requirement escalation factor.

Preliminary Natural Gas Market Results Conclusion

Thank You

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