California Energy Commission

North American Market Gas-Trade (NAMGas) Model: Scenarios Addressing Gas Issues Uncertainties

2013 IEPR

July 17, 2013

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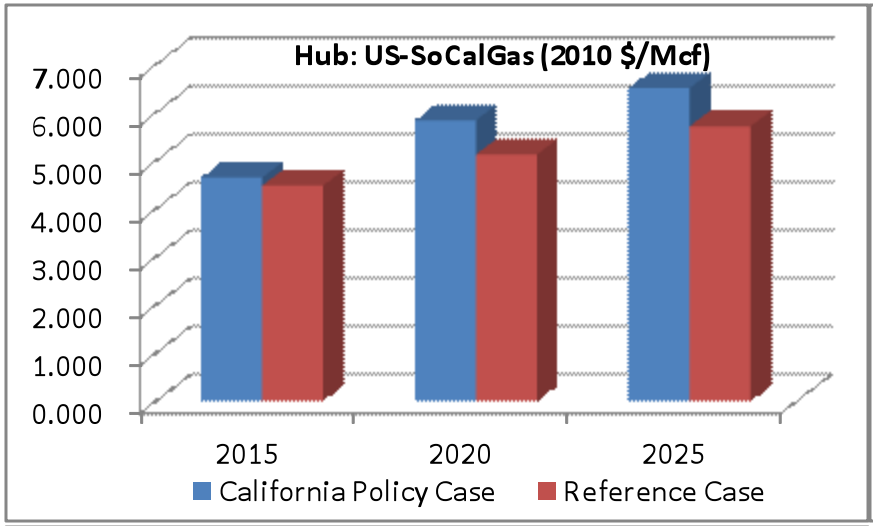
California Policy Case

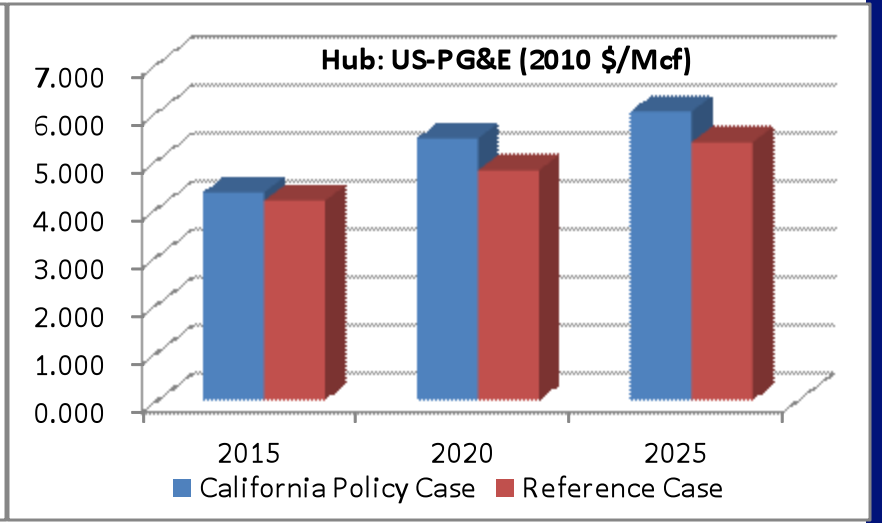
- **Purpose**: Simulate response of natural gas markets to implementation of California policies:
  - energy efficiency
  - renewable resources
  - distributed generation
  - combined heat and power

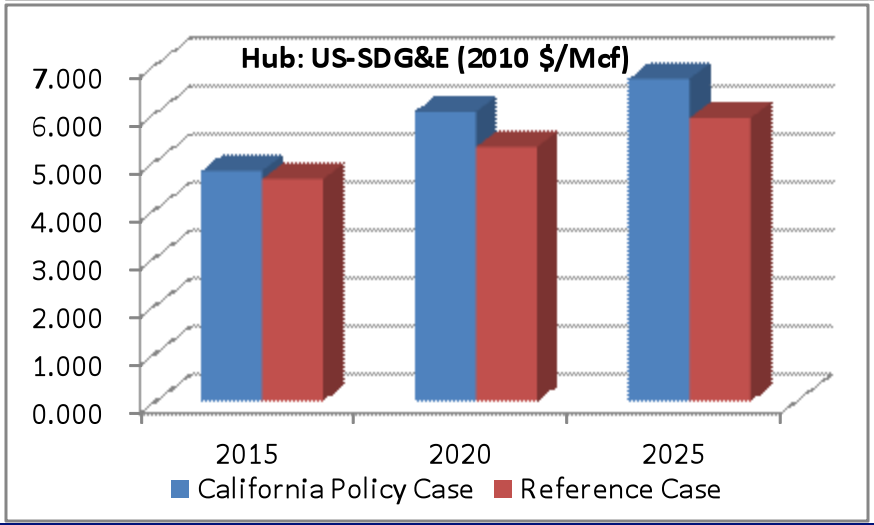
California Policy Case

- **Key Assumptions**:
  - Low Demand/High Price Case, with the following changes:
    - California meets RPS on time; other WECC states delayed 3 years
    - Most optimistic NGV goals are met
    - All energy efficiency goals are achieved
    - Monterey Shale resource is added

California Policy Case vs. Reference Case: Prices at Major Citygates

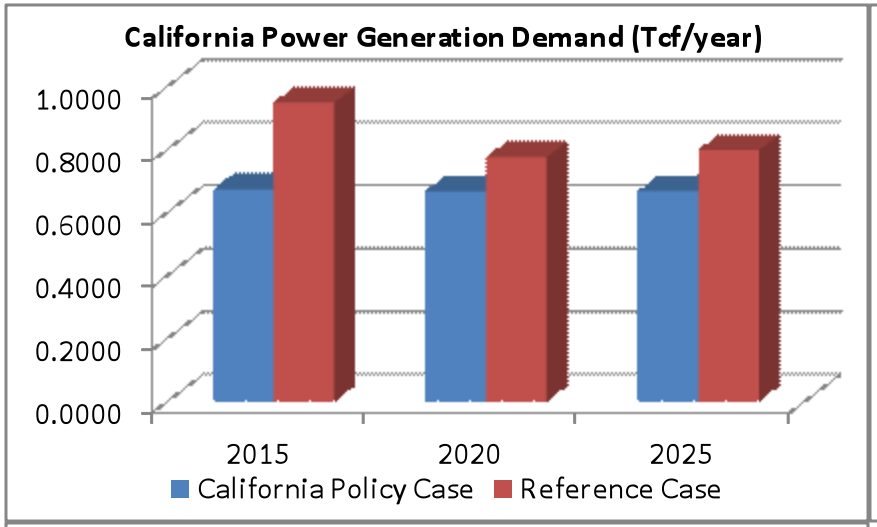


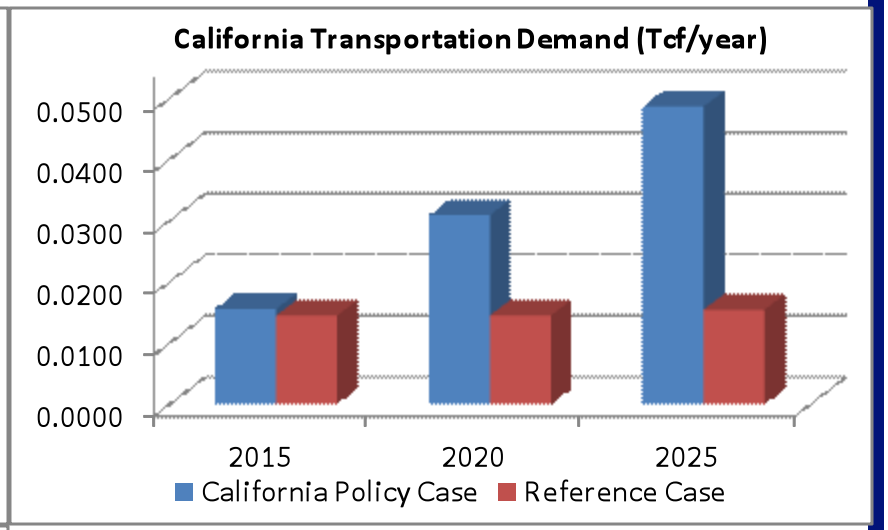


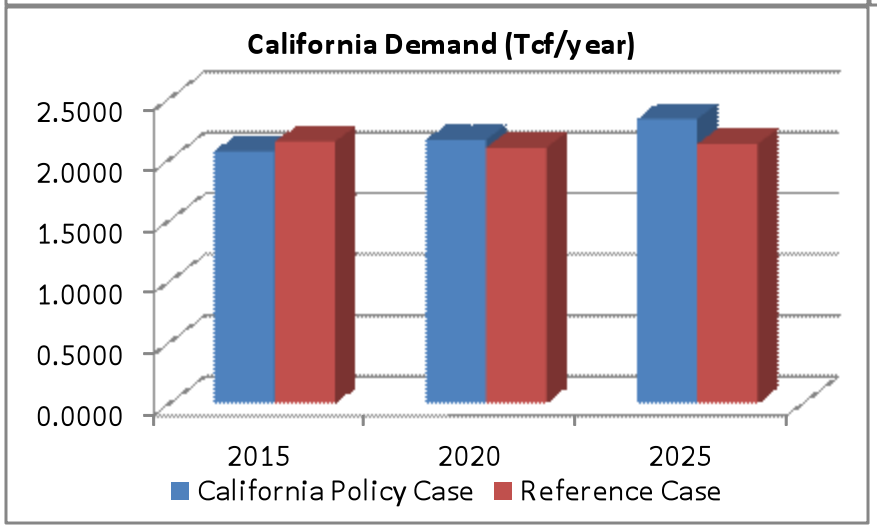


Implementing major energy policies and development of Monterey Shale have modest effect on California prices

California Policy Case vs. Reference Case: Demand in Key Sectors

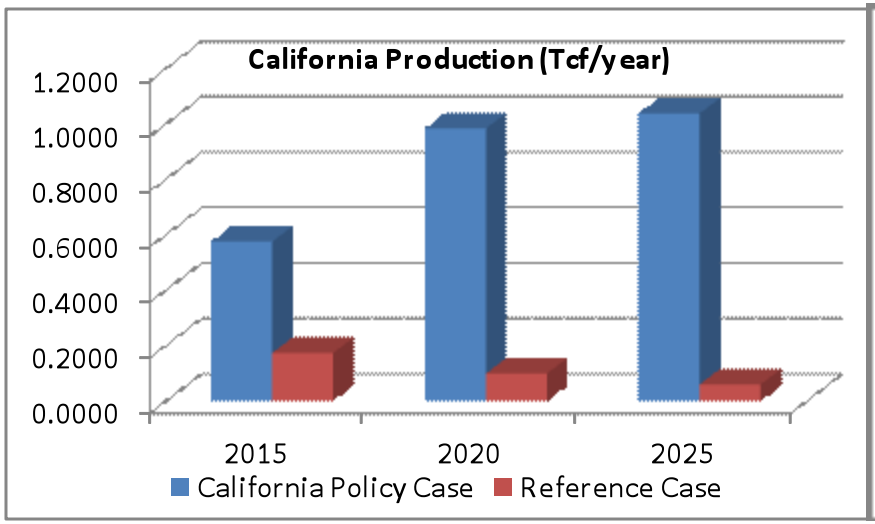


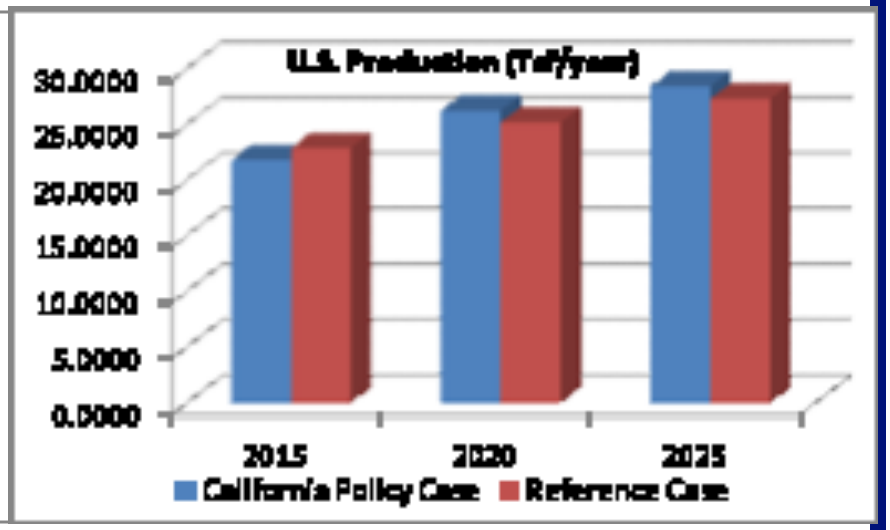




- Power Generation sector gas demand sharply down from Reference Case, but converges in outer years.
- Large increases in Transportation sector demand
- Overall California gas demand changes little

California Policy Case vs. Reference Case: Natural Gas Production in California and the U.S.



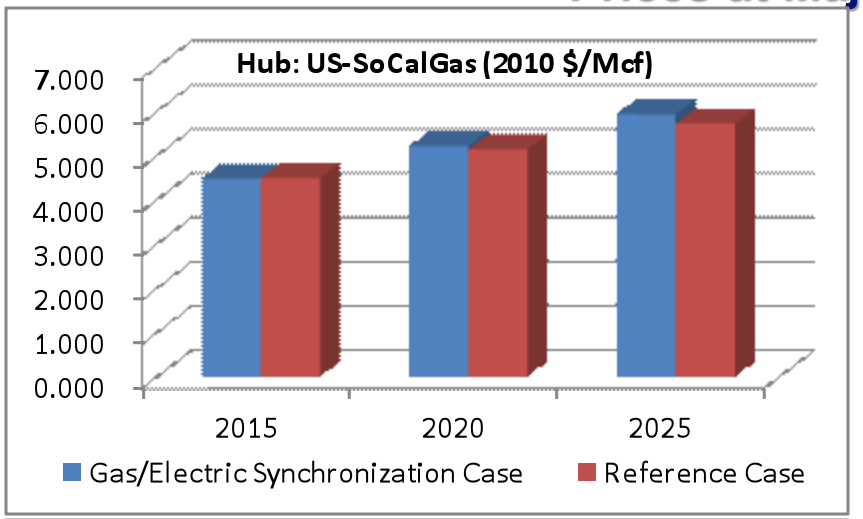


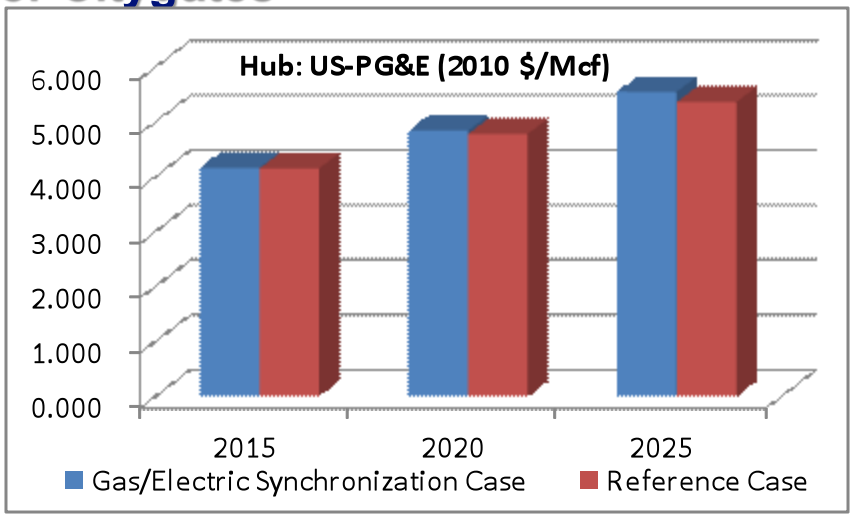
- Monterey Shale adds significantly to California gas production
- Monterey Shale adds little to U.S. production

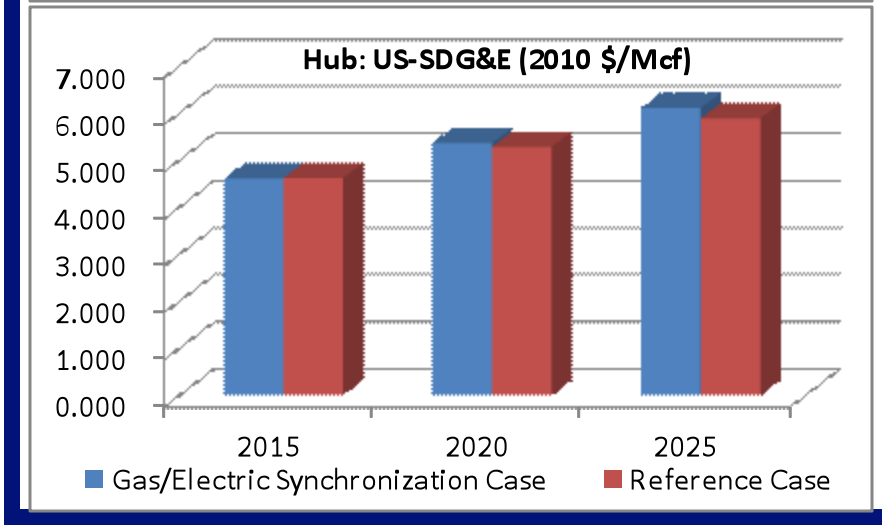
Natural Gas/Electric Synchronization Case

- **Purpose**: NG market response to renewables without electricity demand reductions from incremental energy efficiency.
- **Key Assumptions:**
  - Reference Case, with the following changes:
  - California meets 40% RPS by 2025; all other WECC states meet theirs on time
  - No incremental energy efficiency
  - 80 GW of U.S. coal-fired capacity converted to gas-fired
    - 6 GW of that is in the WECC

Natural Gas/Electric Synchronization Case vs. Reference Case: Prices at Major Citygates

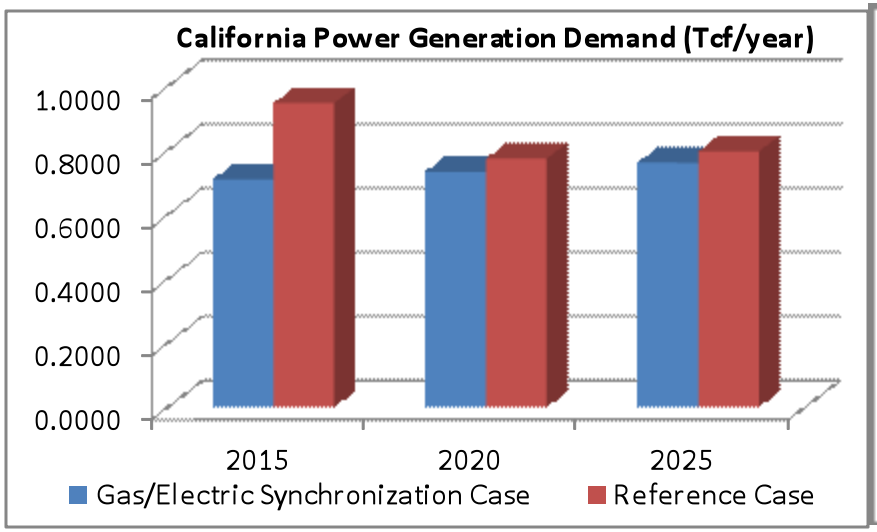


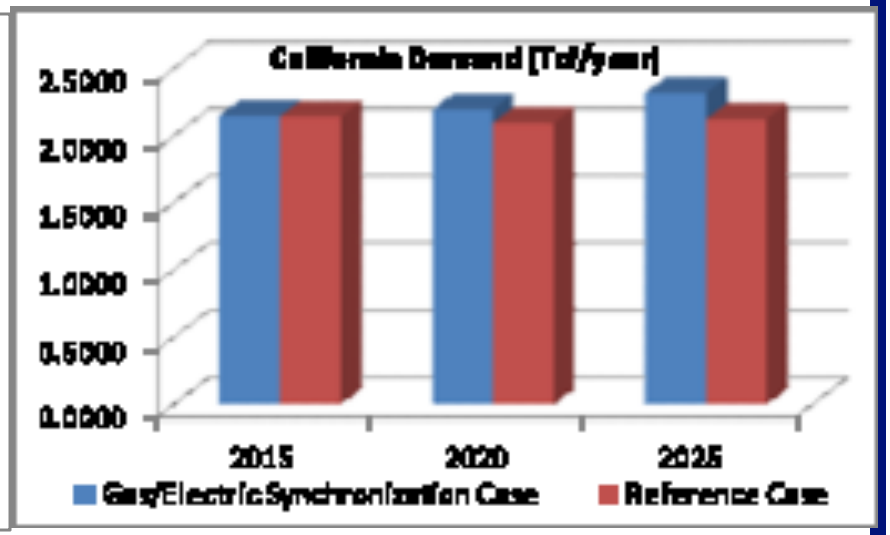




Meeting California and WECC RPS targets will not affect prices.

Natural Gas/Electric Synchronization Case vs. Reference Case: California Demand





Increase in renewables penetration has significant effects on Power Generation gas demand, but not overall demand.

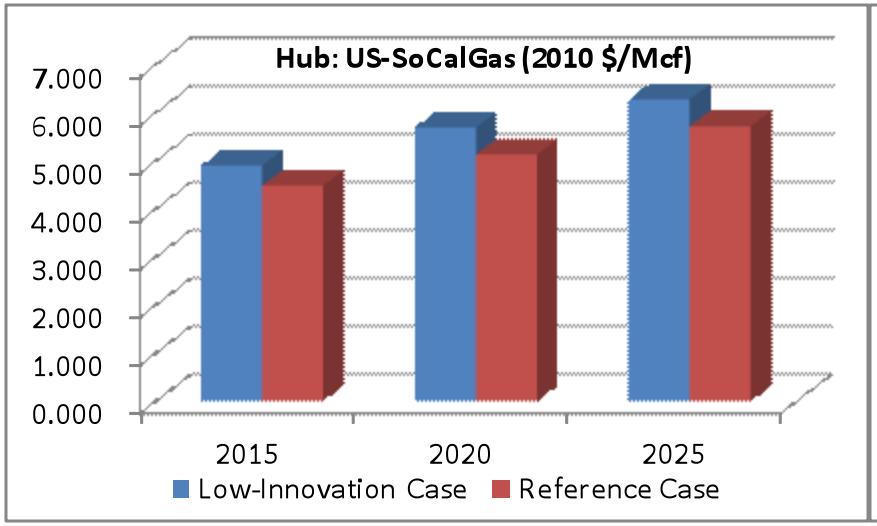
Low-Innovation Case

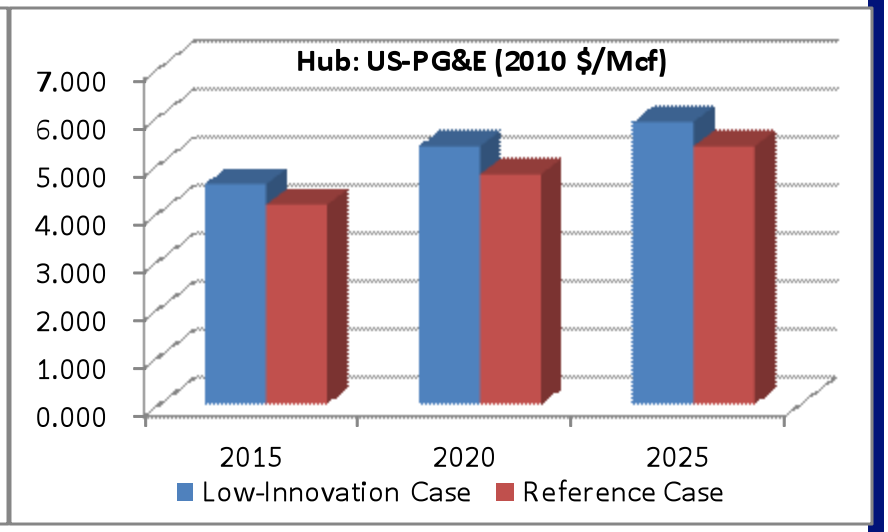
- **Purpose**: Response of natural gas markets to slowdown in gas production:
  - Lower gas reserves
  - Lower exploration and production technology proliferation
  - Higher water use and disposal costs in drilling
- **Key Assumptions**:
  - Reference Case, with the following changes:
  - No incremental energy efficiency
  - Natural gas resource base shrinks by 12.5%
  - Regulatory costs of $0.50/Mcf added to shale resources; $0.30/Mcf added to conventional resources

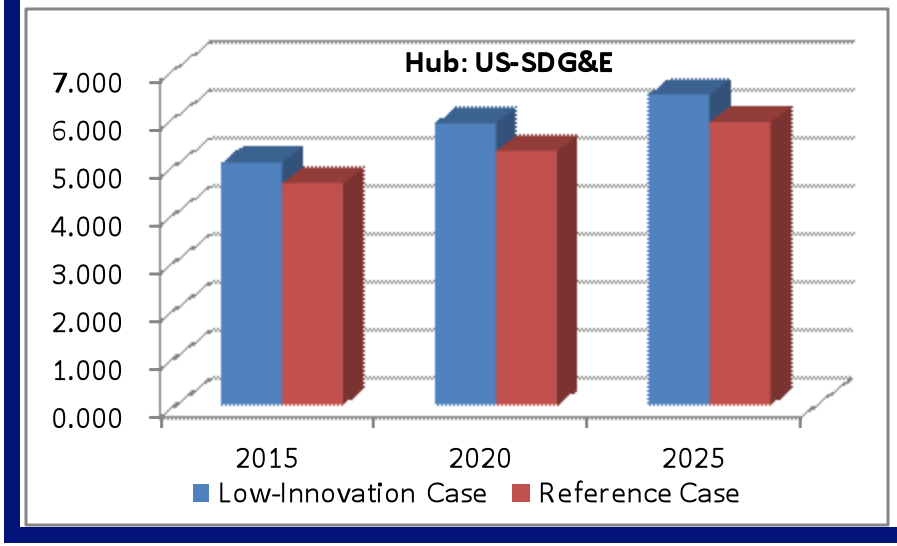
Low-Innovation Case

- **Key Assumptions (continued)**:
  - Technology improvement rate set at 0.5% per year, or half the Reference Case rate
  - Backstop gas price increased to $20/Mcf

Low-Innovation Case vs. Reference Case: Prices at Major Citygates

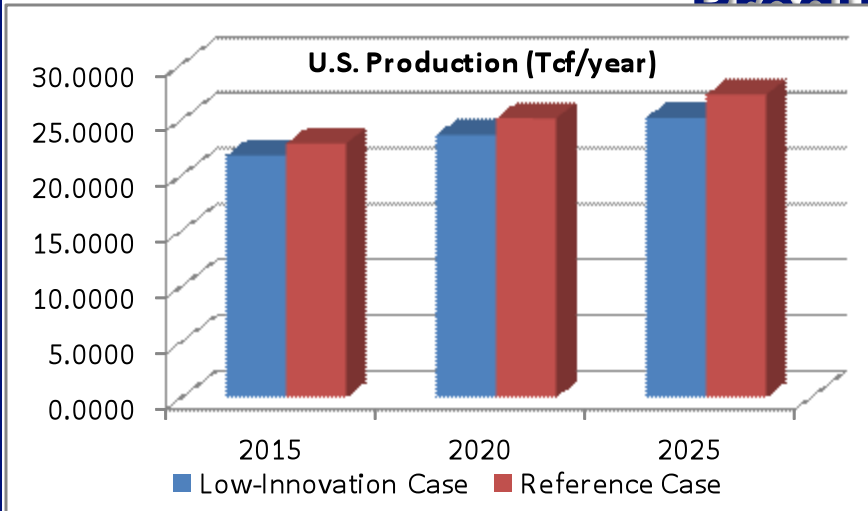


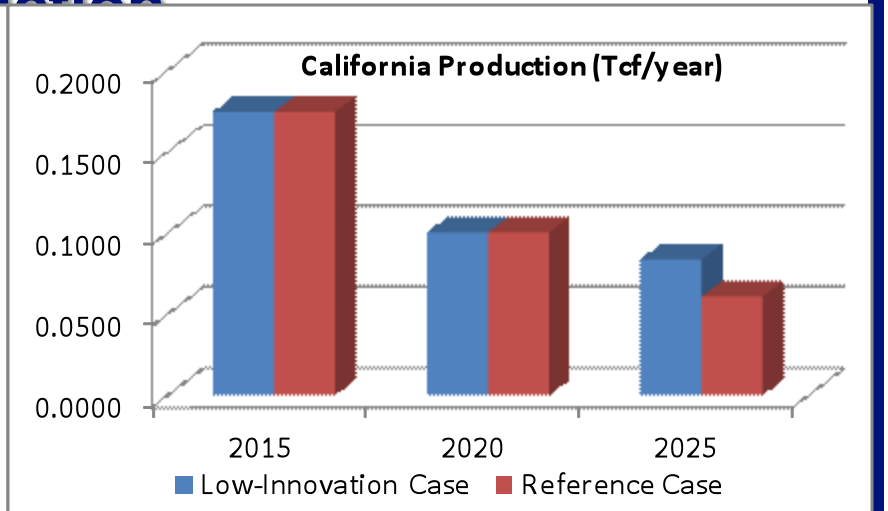


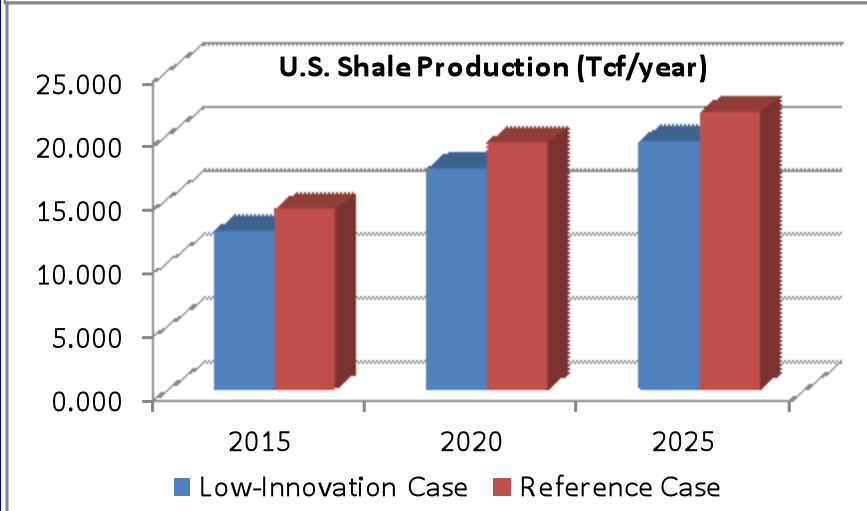


Cutting gas reserves by 12.5%; reducing technology improvement to 0.5%, and adding costs for gas production, push prices up a modest $0.42/Mcf to $0.53/Mcf.

Low-Innovation Case vs. Reference Case: Production

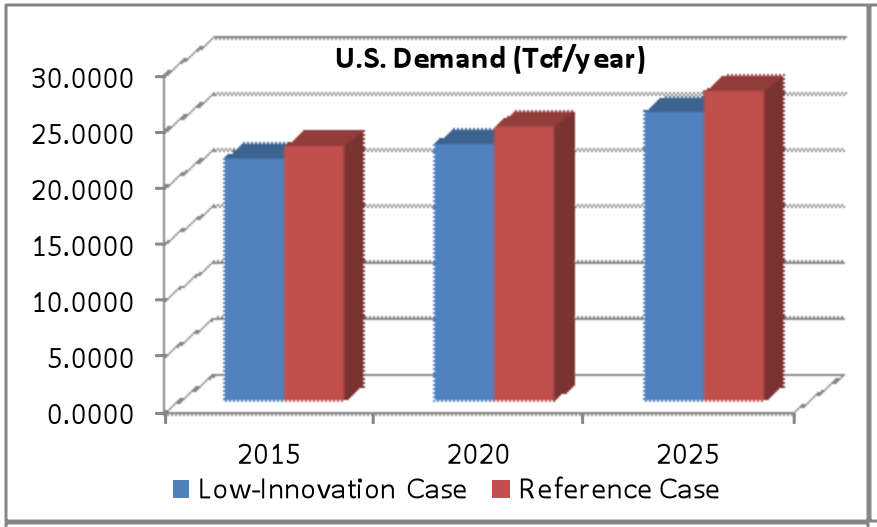


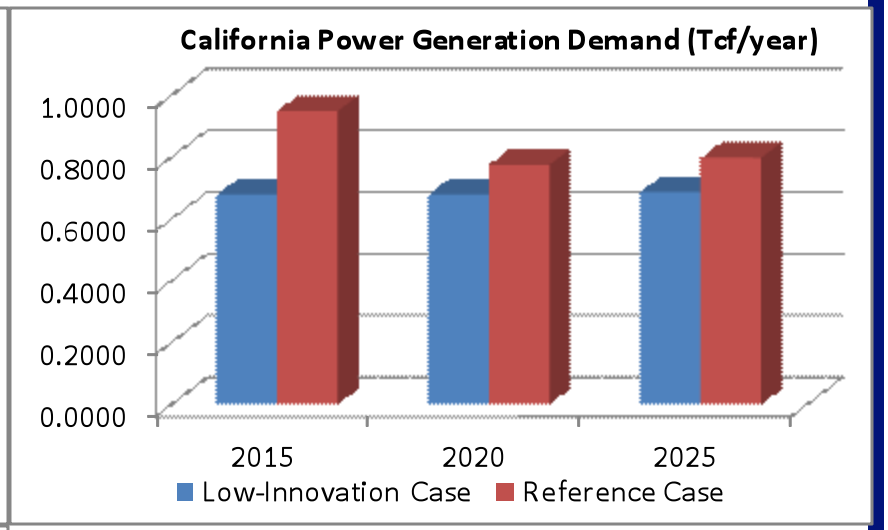


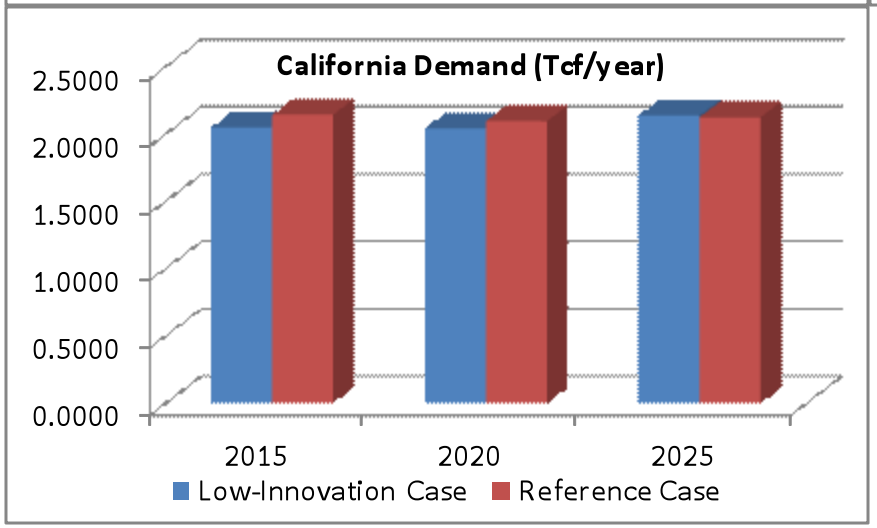


- U.S. total production slightly lower
- U.S. shale production modestly lower
- California production largely unchanged

Low-Innovation Case vs. Reference Case: Demand







- **Total U.S. and California demand are modestly lower**
- **Power Generation sector gas demand sharply down from Reference Case, but converges in outer years**

Questions and Comments?