



California Energy Commission

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

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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



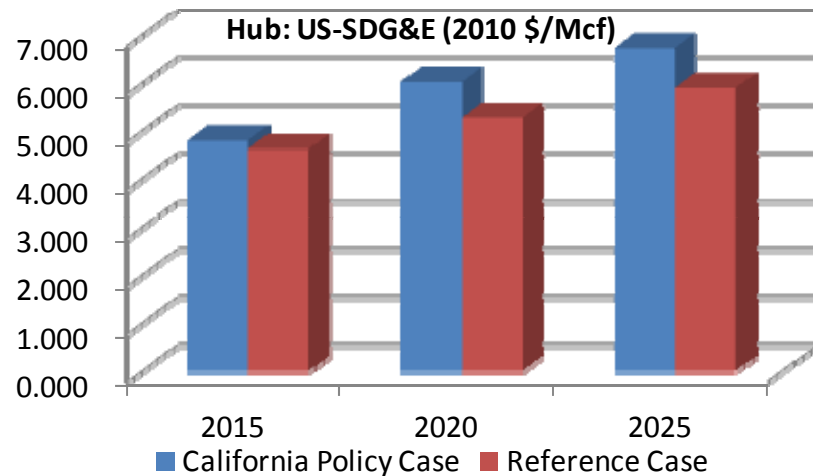
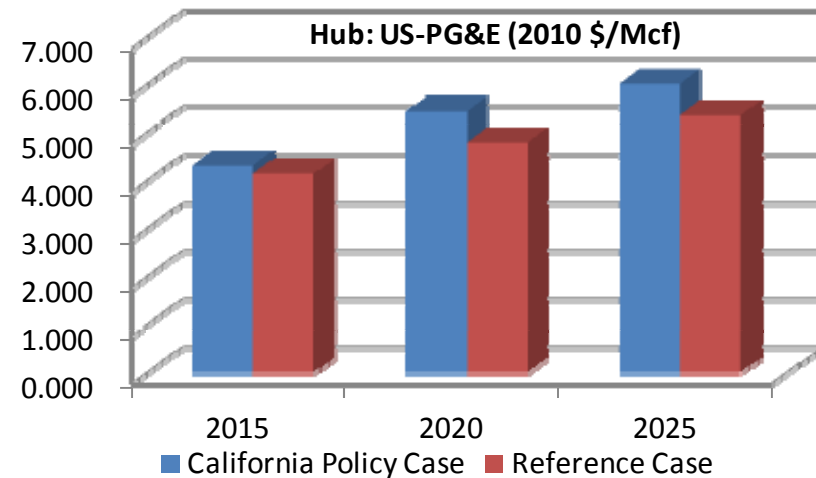
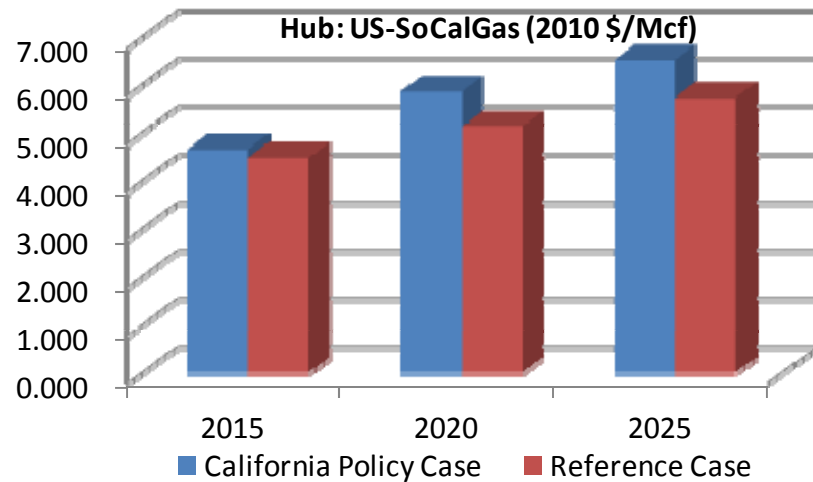
California Policy Case

- **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



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



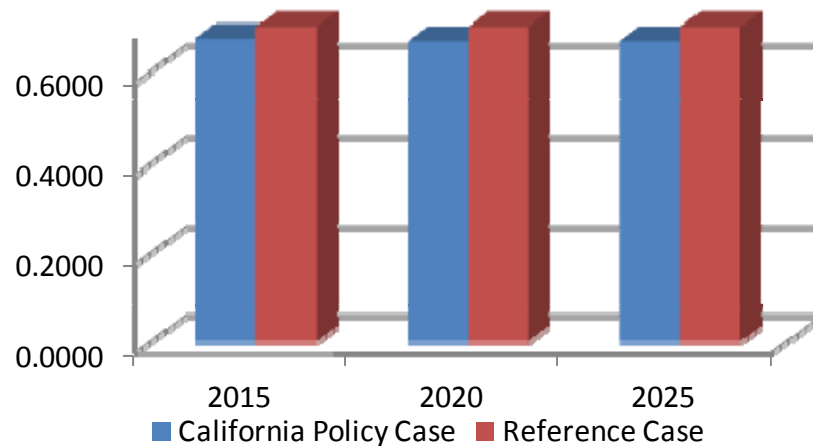
Implementing major energy policies and development of Monterey Shale have modest effect on CA prices.



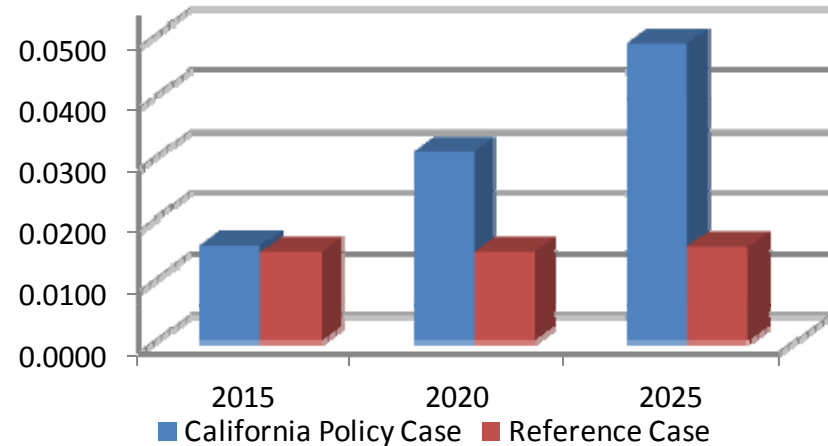
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California Policy Case vs. Reference Case: Demand in Key Sectors

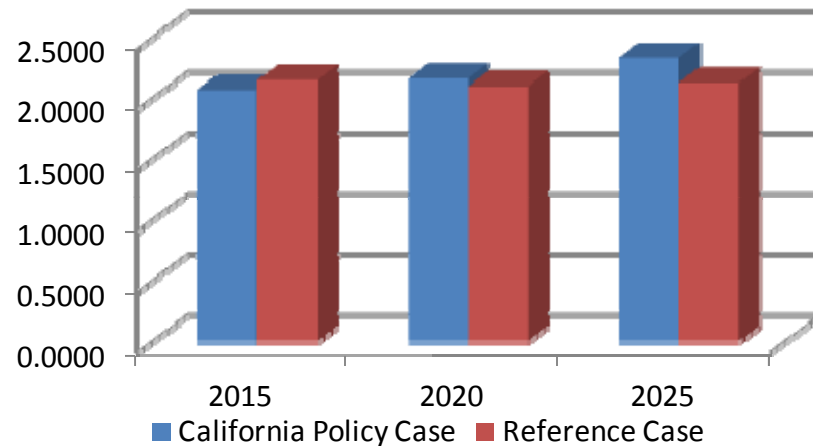
California Power Generation Demand (Tcf/year)



California Transportation Demand (Tcf/year)



California Demand (Tcf/year)

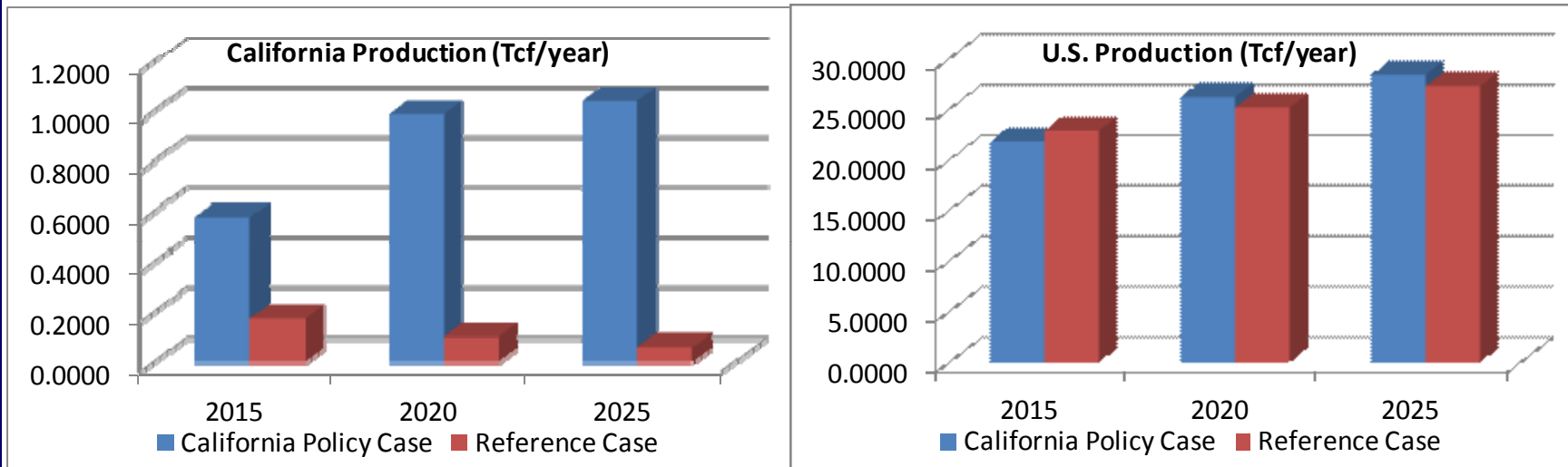


- Small reductions in Power Generation sector demand
- Large increases in Transportation sector demand
- Overall California gas demand changes little



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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



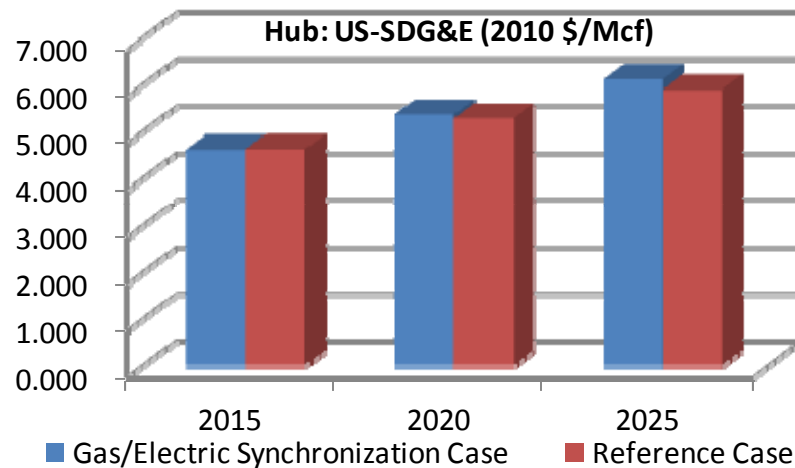
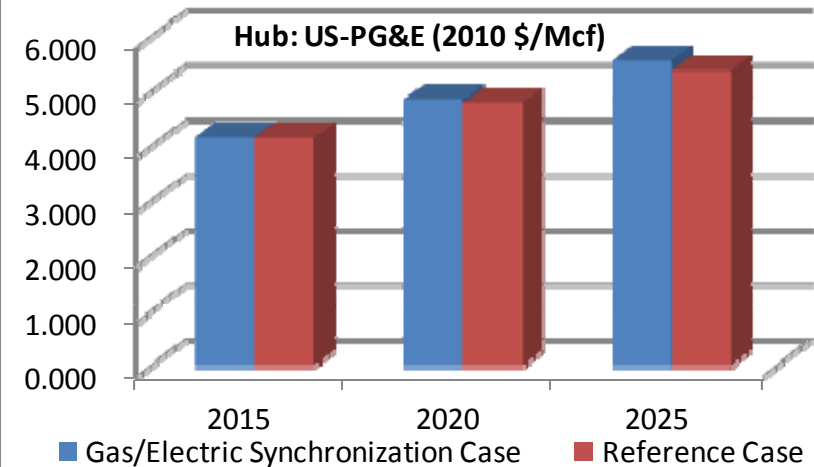
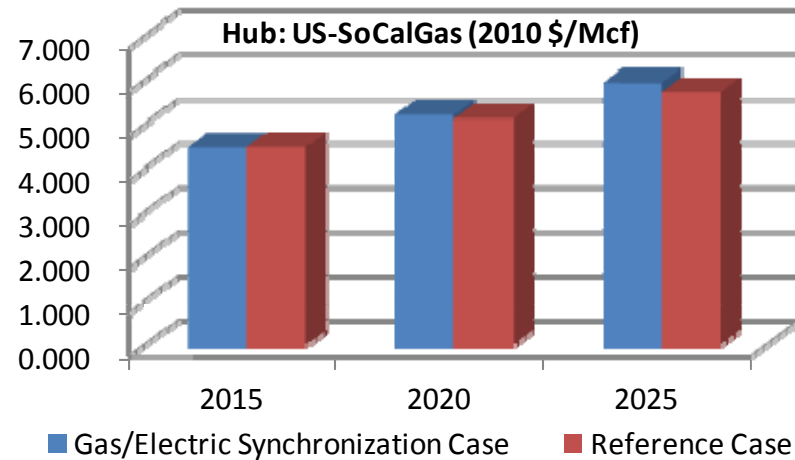
Natural Gas/Electric Synchronization Case

- **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



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

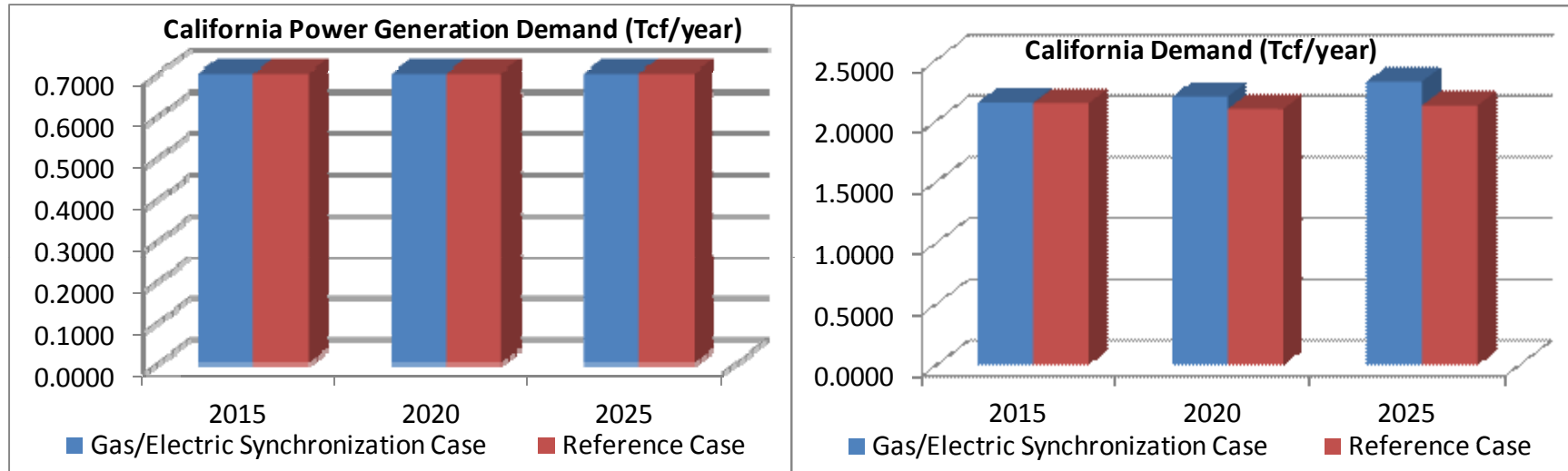


Meeting California and WECC RPS targets will not affect prices.



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



Increase in renewables penetration has negligible effects on both power generation and 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



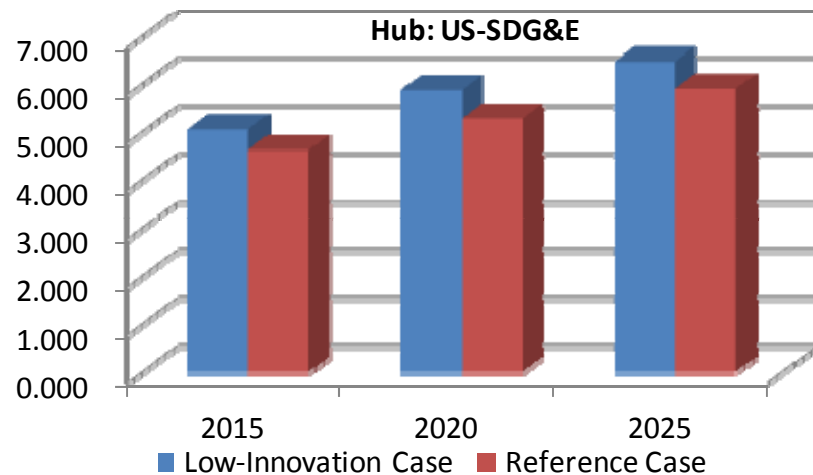
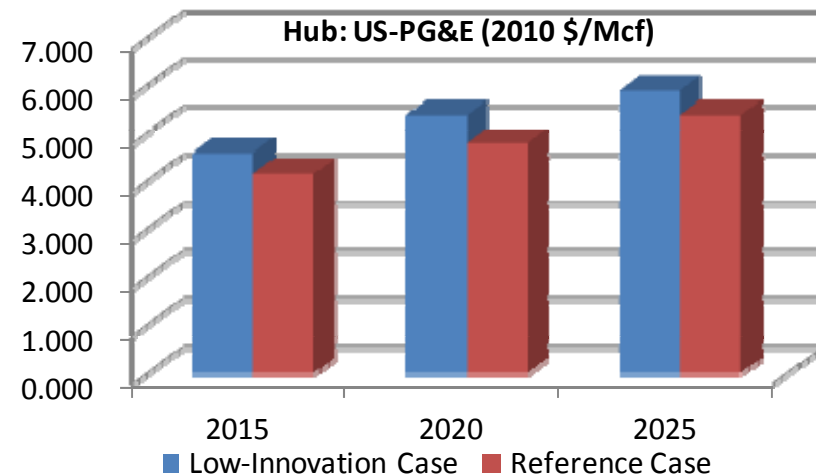
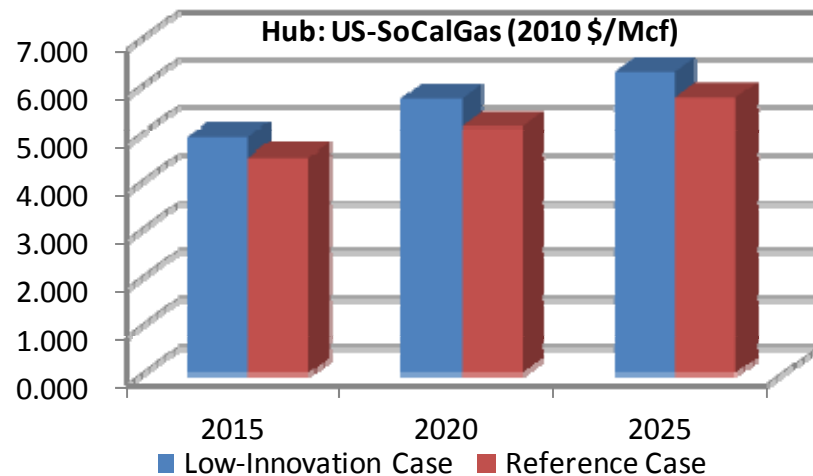
Low-Innovation Case

- **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



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

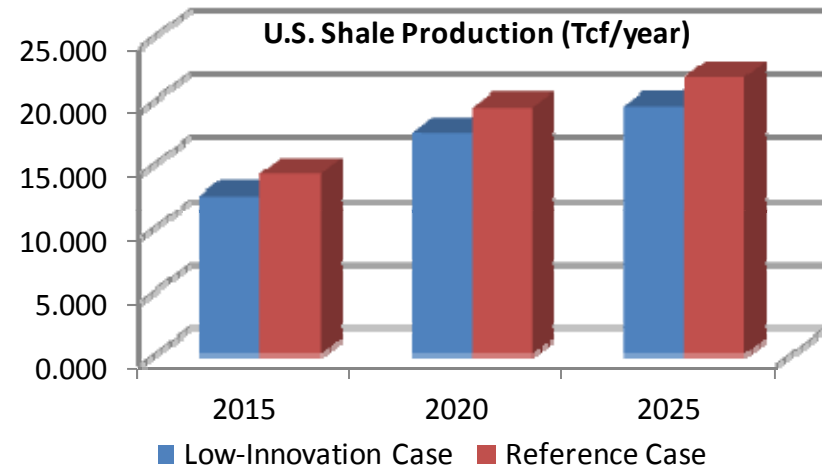
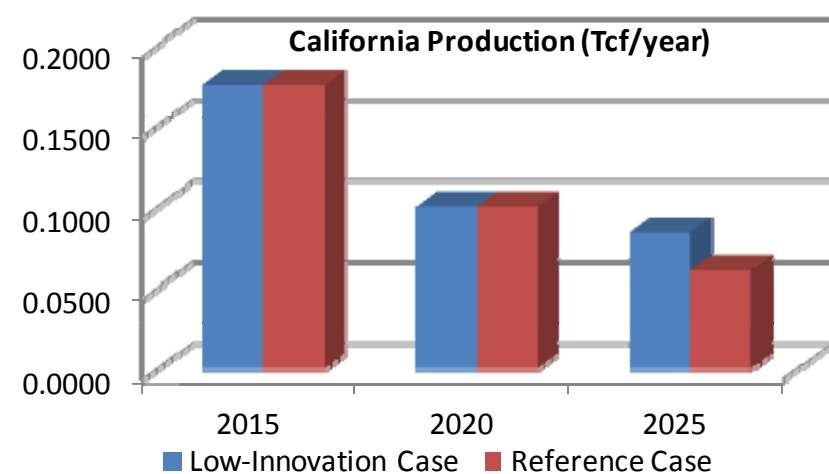
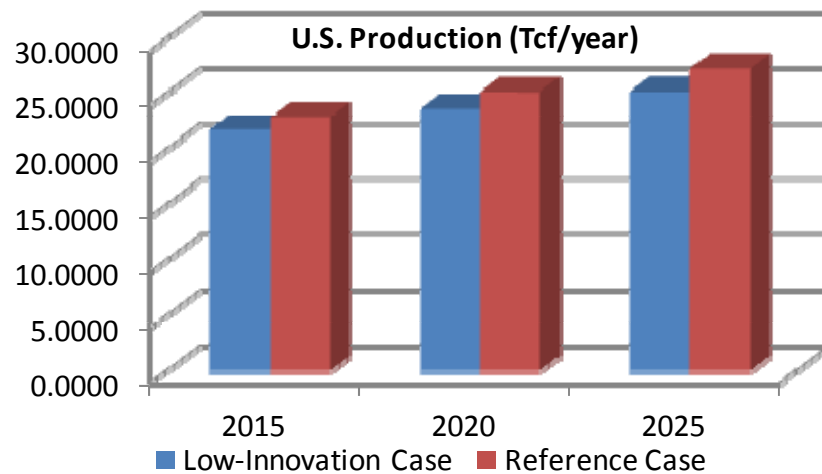


Cutting gas reserves by 12.5%; reducing technology improvement to 0.5%, and adding costs for gas production, push prices up a modest \$0.42/Mcf to \$0.53/Mcf.



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Low-Innovation Case vs. Reference Case: Production

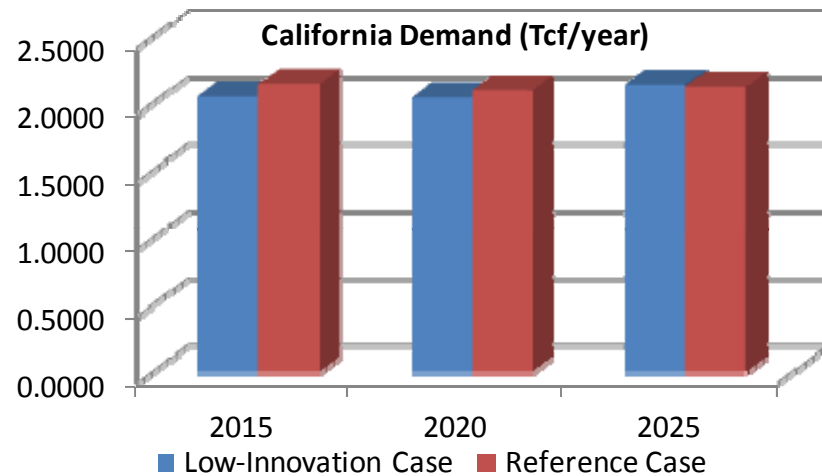
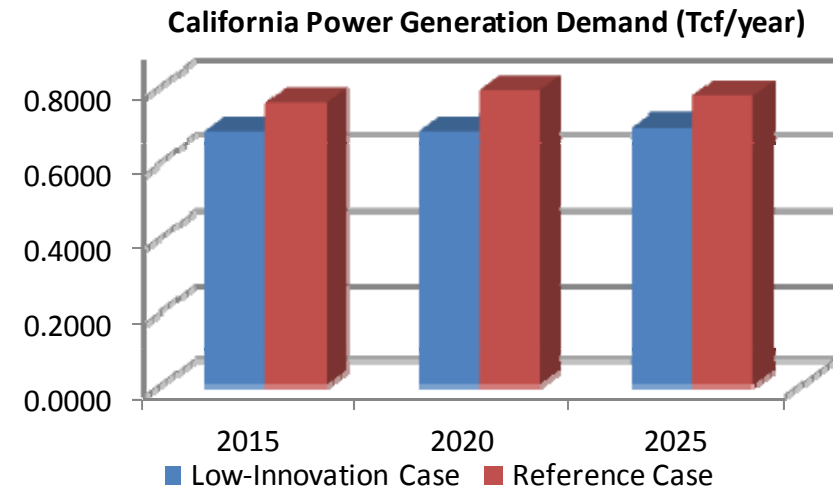
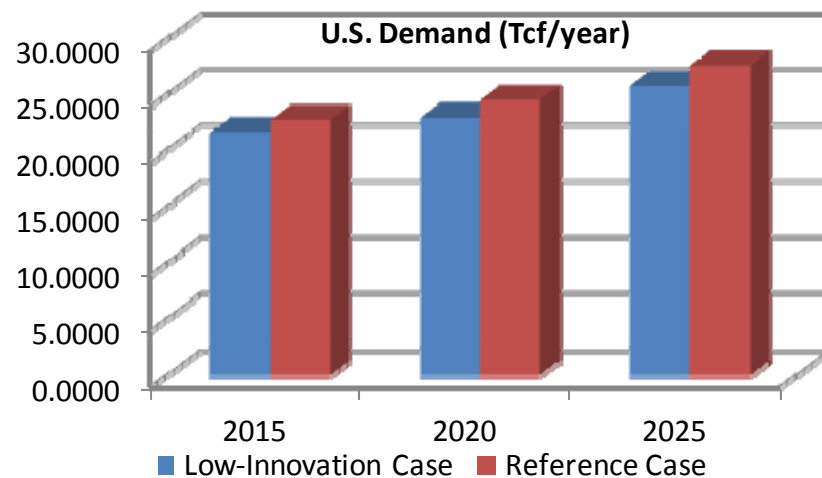


- U.S. total production slightly lower
- U.S. shale production modestly lower
- California production largely unchanged



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Low-Innovation Case vs. Reference Case: Demand



Total U.S. California, and California power generation demand are modestly lower.



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Questions and Comments?