North American Natural Gas Markets in Transition: The Future of Shale Gas

Hillard Huntington
Energy Modeling Forum
Stanford University

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Is Shale Gas Revolution a “Game Changer”?  

• Transforming the Energy Market  
• Boosting the US Manufacturing Sector  
• Endangering Safety (water, earthquakes)  
• Protecting Against Greenhouse Gases  
• Shifting Geopolitical Power Balances
Gas Markets as a System

- How high domestic gas prices will rise as US exports expand
- How competitive will US projects be in the world LNG market
- How long will the Asian-North American price “gap” persist
- How long can Russia act strategically in pricing its gas supplies
Some Environmental Challenges

- Will not increase greenhouse gases unless methane leakages move above current estimates 1.5-3.0%
- Improved well casings could protect groundwater quality
- Better waste water disposal could reduce earthquake risks (Oklahoma)
- Options for protecting pristine rural areas from industrial congestion
Estimated U.S. shale gas production was 50.6 Bcf/d in February 2018, about 63% of total U.S. dry production (80 Bcf/d).

Sources: EIA Natural Gas Monthly, STEO through February 2018 and DrillingInfo.
Response: US Energy Markets

- Relatively permanent reduction in natural gas prices
- Gas principally displaces coal for power
- Broader fuel competition includes
  - Nuclear: earlier retirement, less construction
  - Renewables: greater pressure on costs
  - May have retarded some energy efficiency options
- Modeling teams consider natural gas prices as one of the largest uncertainties with the strongest future impact
US Natural Gas Conditions in 2010 and 2017 AEOs

Source: US Energy Information
Gas + Intensity Shifted US Energy Mix after 2006

Intensity = declining E/GDP ratio.
It assumes growth > 2006 should have grown energy use by 4.3% -- inferred from 1986-2006 experience.
Estimates from Combining EMF Scenarios

Supply Response to Price

Demand Response to Price
US Natural Gas Supply Response to Price

Source: Energy Modeling Forum Study 26
US Natural Gas Supply Response to Price

Source: Energy Modeling Forum Study 26
US Natural Gas Demand Response to Price

Median: High Shale/Reference
Median: High Shale/High Growth
Median: Low Shale/Reference

Source: Energy Modeling Forum Study 26
Natural Gas, Fuel Diversity and North American Energy Markets

• Working group first met in January 2002.
• 2020 prices could range between 58% and 118% of June 2003 level.
• Investments in resources/technologies play a critical role.
• Fuel-substitution opportunities provide a more stable long-run price path.
The New ‘Normal’ for Natural Gas Prices

![Graph showing Citygate natural gas price ($/mcf) from Jan-1990 to Jan-2017]
Concluding Remarks

• Shale gas likely to dominate future US energy markets
• Lower prices help economy but no manufacturing rebirth
• Environmental challenges remain but are surmountable
• Long-run domestic supplies and demands respond to price
  • Estimates from EMF studies suggest an export expansion increasing total demand by 10% would increase prices by less than 7% in the long run
• Models sometimes provide insights, especially when conditions are changing

Thank you