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Where are the Resources?

- Shale gas deposit

Northwestern
High Prices Drive Innovation

- U.S. gas prices volatile since 2000
- Price peaks above $12/MMBtu in 2005 and 2008
- Shale gas pushed price below $2/MMBtu, but currently over $4/MMBtu – Will production respond?

Source: EIA
Technology Unlocks U.S. Gas Reserves

New Technology:

- Geologic imaging
- Advanced drill bits and metallurgy
- Directional drilling
- Hydraulic fracturing

Shale gas deposit

Source: U.S. Department of Energy
Shale Gas Growing in Importance

Perspective on supply key factor for future
- Drives LNG exports and manufacturing renaissance
- Environmental concerns rise with production
- Potential Gas Committee ups estimate again in 2012

Source: EIA

A change in policy would change the projection up or down
Domestic Price Impacts a Key Unknown

Supply-Demand Balance

- Increase in demand due to exports or manufacturing ($D_1 \rightarrow D_2$)
- Same supply ($S_1$)
- Domestic price may rise ($P_1 \rightarrow P_2$)
- How much will production rise ($Q_1 \rightarrow Q_2$)

Slope of lines is key to price rise
Gas Production Grows Despite Prices

Production rising, but industry assets now shifting away from gas → Dec. 2011/12 convergence

U.S. becomes #1 global gas producer in 2009
Prior to 2008, gas and oil prices moved in tandem

- U.S. gas prices now independent of oil price
- Price gap is driving “wet” gas plays (and tight oil)

Source: Bloomberg New Energy Finance
Oil Production Follows Gas

2012 could be the start of things to come
More industry assets moving to oil
Energy independence really an oil issue
Imports down

Source: EIA
Shale Gas projected to be 50% of production by 2036
Tight oil production peaks at 39% in 2024/25
Projected U.S. Tight Oil Production

Changes in policy could change the projection up or down

- Tight oil production sparks independence possibility
- U.S. could become largest oil producer

Source: EIA

Tight Oil | Other
---|---


MMb/d
Continued Dependence on Fossil Fuels

- Fracking concerns
  - Potential impact on water resources
  - Will LNG exports drive more fracking?
  - Will oil production drive more fracking?
  - New infrastructure required

- Greenhouse gas issues
  - Natural gas a cleaner fuel than coal
  - Burning gas still produces CO$_2$
  - Fugitive methane emissions also bad
  - Cheap gas undercuts renewable energy
Unconventional Oil and Gas: Selected Federal Studies


- DOE, DOI, EPA: *Multi-Agency Collaboration on Unconventional Oil and Gas Research Initiative* established under a 2012 MOU. Research plan expected to be available 7/2013. ([http://unconventional.energy.gov/](http://unconventional.energy.gov/))

  
  In 2011, DOE Secretary charged the Secretary of Energy Advisory Board (SEAB) Natural Gas Subcommittee to make recommendations to improve the safety and environmental performance of natural gas hydraulic fracturing from shale formations.


Infrastructure Changes

- U.S. natural gas and oil infrastructure designed to move supply to demand
  - Supply centers have changed
  - New pipelines and other transportation modes

Source: Natural Gas Week
Policy Concerns

Natural Gas
- 28 bills introduced
- Exports vs. Manufacturing
  - Geopolitics
- Prices
- The Economy
  - Trade

Oil
- 99 bills introduced
- Independence/Security
  - Imports
- Military posture

Environment
- Hydraulic fracturing
- Dependency on hydrocarbons
- Fugitive methane emissions
- Cheap gas undercuts renewable energy