REGULATORY AND INFRASTRUCTURE CHALLENGES

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Regulation of Hydraulic Fracturing

• Exploration and production of oil and natural gas from shale formations is regulated by a myriad of federal, state and local agencies
State Regulation

• In the U.S., oil and gas operations are typically regulated at the state level
• State regulation of hydraulic fracturing varies from state to state
• In some states, multiple agencies have jurisdiction over hydraulic fracturing
Local Regulation of Hydraulic Fracturing

- In many areas of the U.S., local governments have passed ordinances that directly and indirectly impact drilling and production operations.
- Some municipalities have gone further and adopted measures to ban hydraulic fracturing altogether on a temporary or permanent basis.
Key Environmental Risks and Challenges

- Water use
- Land use
- Soil / groundwater contamination
- Air emissions
- Methane emissions
- Waste disposal

- Seismicity
- Infrastructure
- Species
- Wetlands
- Local issues
  - Roads
  - Noise
  - Traffic
Challenges in the Marcellus Shale

• Flowback and produced water management
• Naturally occurring radioactive materials (NORM)
• Pipeline construction and expansion
  • National Environmental Policy Act (NEPA) compliance
    • Cumulative impacts
    • Environmental assessment vs. environmental impact statement
Challenges in Eagle Ford Shale and Permian Basin

Water

• Water supply
• Deep well injection vs. recycling

Threatened and Endangered Species
Challenges in Woodford Shale

Induced Seismicity

- 2,270 earthquakes in Oklahoma in 2014 (as of 6/4)
- Over 100 in past week

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Challenges in the Bakken Shale

- Flaring
- Characteristics of crude oil
- Lack of infrastructure
- Federal and Indian lands
Challenges in the Monterey Shale

• Largest shale play in U.S. but also the most complex
• The rock is there – the technology is not
• California’s rigid regulatory regime
Hydraulic Fracturing Fluids

• Hydraulic fracturing fluids are composed of 99.5% water and sand
• Hot-button issue: What’s in the other 0.5%?
Hot-Button Issue: Chemical Disclosure

• In 2010, only 1 state out of 33 where oil and gas operations abundant required public disclosure of hydraulic fracturing chemicals

• As of October 2014, at least 24 states either require disclosure or have proposed rules that would require disclosure of chemicals in hydraulic fracturing fluids

• Federal requirements on the horizon (EPA and BLM)
Conclusion

• Shale gas revolution is just beginning
• Federal, state and local governments playing catch-up
• Challenges can be navigated to reach energy independence in the U.S.
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