Facing The Hard Truths About Energy

A Comprehensive View To 2030 Of Global Oil And Natural Gas

US Association of Energy Economists
Houston Chapter
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Andrew Slaughter
The Secretary of Energy’s Questions

- What does the future hold for global oil and natural gas supply?

- Can incremental oil and gas supplies be brought on-line, on time, and at a reasonable price to meet future demand without jeopardizing economic growth?

- What oil and gas supply and/or demand-side strategies does the Council recommend the U.S. pursue to ensure greater economic stability and prosperity?
How This Study Is Different

- **Integrated, In-Depth Analysis**
  - Over 100 studies incorporated to include both public and aggregated proprietary outlooks
  - Not another forecast of supply, demand or price

- **Diversity of Expertise**
  - 350 participants with backgrounds in all aspects of energy including efficiency, economics, geopolitics, environment

- **Technology Assessment**
  - Identified achievable opportunities and likely deployment timing
  - Looked across the energy spectrum, including both supply and demand
The Hard Truth: Demand

Coal, oil, and natural gas will remain indispensable to meeting total projected energy demand growth.

Source: IEA REFERENCE CASE
The world is not running out of energy resources, but there are accumulating risks to continuing expansion of oil and natural gas production from the conventional sources relied upon historically. These risks create significant challenges to meeting projected total energy demand.
Large Oil Resource Base

ULTIMATE RECOVERABLE RESOURCE (MEAN)

TRILLION BARRELS - OIL


UNCONVENTIONAL
CONVENTIONAL

Source: USGS
Global Oil and Gas Study
Risks Reflected in Range of Production Projections

* Source: NPC Data Warehouse.

Global Oil and Gas Study
To mitigate these risks, expansion of all economic energy sources will be required, including coal, nuclear, biomass, other renewables, and unconventional oil and natural gas. Each of these sources faces significant challenges including safety, environmental, political, or economic hurdles, and imposes infrastructure requirements for development and delivery.
Contribution of Unconventional Liquids

Global Production

MILLION BARRELS PER DAY

Source: Data From EIA 2007 Reference.

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Massive Infrastructure Investments Required

Supply

- COAL
- UNCONV. OIL
- CONV. OIL
- BIOMASS
- GAS

- CTL
- UPGRADING
- REFINING
- OTHER MFG.

- MFG
- GTL
- LNG
- REGAS
- GAS PROCESSING
- STORAGE

Demand

- LIQUID FUEL
- BLENDING
- POWER GEN.
- RENEWABLES
- NUCLEAR
- COAL
- NATURAL GAS

Global Oil and Gas Study
"Energy Independence" should not be confused with strengthening energy security. The concept of energy independence is not realistic in the foreseeable future, whereas U.S. energy security can be enhanced by moderating demand, expanding and diversifying domestic energy supplies, and strengthening global energy trade and investment. There can be no U.S. energy security without global energy security.
U.S. Historical Supply and Demand Trends

MILLION BARRELS PER DAY


U.S. FUELS DEMAND

GLOBAL TRADE (NET IMPORTS)

U.S. FUEL SUPPLIES

Source: EIA Reference Case / NPC Global Oil and Gas study survey.
The Hard Truth: Workforce

A majority of the U.S. energy sector workforce, including skilled scientists and engineers, is eligible to retire within the next decade. The workforce must be replenished and trained.

Source: U.S. Dept of Labor.
Policies aimed at curbing carbon dioxide emissions will alter the energy mix, increase energy-related costs, and require reductions in demand growth.
Growing concern that climate is warming and CO$_2$ concentrations in the atmosphere play a role.

The challenge of significantly reducing CO$_2$ emissions is unprecedented and will require:

- Global, broad actions on multiple fronts
- Long time horizons
- Major additional investments
Technology
Technology Pipeline is Robust

- Industry spends $6B+ on Oil and Gas related R&D
  - Achieved many dramatic technology advances
  - Much more to come from “Technology Pipeline”
    - Improved exploration tools
    - Increased recovery methods
- Alternative energy R&D investment increased to $3B
There Is No Single Easy Solution

• Technology “Concept-to-widespread-adoption” is ~16 years

• When Government enables development, technology follows

• DOE oil and gas related technology spend decreasing
  • Impacting U.S. lower 48 and universities
Efficiency Technology Opportunities

• Efficiency significant in supply and demand balance
  • Continued role for government standards
    – e.g., refrigeration efficiency

• Transportation fuel forecasts do not capture cross sector efficiency gains
  • e.g., light duty vehicle to rail shift

• Additional auto efficiency improvements possible
  • Implementation depends upon consumer and government actions
The Five Core U.S. Strategies

• Moderate Demand By Increasing Energy Efficiency
• Expand And Diversify U.S. Energy Supply
• Strengthen Global And U.S. Energy Security
• Reinforce Capabilities To Meet New Challenges
• Address Carbon Constraints

There Is No Single, Easy Solution
Moderate Demand Growth

Improve U.S. car and light truck fuel economy standards at the maximum rate possible by applying economic, available technology.
Expand and Diversify Supply

Reduce declines in U.S. conventional oil and natural gas production.

Increase access for new energy development.
Expand and Diversify Supply

Diversify long-term energy production

• Accelerate development of energy from biomass

• Enable the long-term environmental viability of coal for power, fuel, and feedstock

• Expand domestic nuclear capability
Integrate energy policy into trade, economic, environmental, security, and foreign policies.

Continue to develop the international energy marketplace by expanding the energy dialog with major producing and consuming nations.

Promote an effective global energy marketplace by sustaining and intensifying efforts to encourage global adoption of transparent, market-based approaches.

Assist and encourage global adoption of energy efficiency technologies through technology transfer programs.
Reinforce Capabilities to Meet New Challenges

- Rebuild U.S. science and engineering capabilities.
- Create research and development opportunities.
- Improve the quality of energy data and information.
- Develop a comprehensive forecast of U.S. infrastructure requirements.
Actions to Address Carbon Constraints

Develop legal and regulatory framework to enable carbon capture and sequestration.

As options are considered to reduce CO$_2$ emissions:

- Provide effective global framework for carbon management
- Establish transparent, predictable, economy-wide cost for CO$_2$ emissions
Summary
There Is No Single, Easy Solution

- All Five Strategies Must Be Addressed Together
- Global Cooperation Required
- Begin Now And Plan For Sustained Commitment
All Strategies Are Essential

U.S. LIQUID FUELS DEMAND
GLOBAL TRADE (NET IMPORTS)
EXPAND & DIVERSIFY

MILLION BARRELS PER DAY

2000 2010 2020 2030

Source: EIA Reference Case / NPC Global Oil and Gas study survey.

Illustrative View

Global Oil and Gas Study
“Facing the Hard Truths About Energy”

For information, please refer to the NPC Website for a complete list of available resources:

http://www.npc.org

Send your follow-up questions and comments to:

comments@npc.org