Facing The Hard Truths About Energy

A Comprehensive View To 2030
Of Global Oil And Natural Gas

Rod Nelson

USAEE Sept 17, 2007
Today’s Discussion

- Study Approach
- What We Learned: The Hard Truths
- Recommended Strategies For The U.S.
The Secretary’s Suggested 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

Global Oil and Gas Study
What We Learned:
The Hard Truths
Coal, oil, and natural gas will remain indispensable to meeting total projected energy demand growth.
Coal, Oil, and Natural Gas Will Remain Indispensable

1980
288 QUADRILLION BTU

2004
445 QUADRILLION BTU

2030
678 QUADRILLION BTU

Source: IEA REFERENCE CASE

Global Oil and Gas Study
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.
Global Oil Resource Base

Ultimate Recoverable Resource (Mean)

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.
Massive Infrastructure Investments Required

Global Oil and Gas Study

Supply

- COAL
- CONV. OIL
- BIOMASS
- GAS

Processing:
- LNG
- GTL
- UPGRADED

Mfg.:
- CTL
- OTHER MFG.

Demand

- LIQUID FUEL
- POWER GEN.
- NATURAL GAS
- COAL

Renewables
- NUCLEAR
- RENEWABLES

Storage
- DISTRIBUTION
- REGAS

Global Oil and Gas Study

NPC
"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.
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.
U.S. Human Resources Challenge

OVER HALF OF THE WORKFORCE ELIGIBLE TO RETIRE IN NEXT 10 YEARS

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 CO₂ concentrations in the atmosphere play a role.

The challenge of significantly reducing CO₂ emissions is unprecedented and will require:

- Global, broad actions on multiple fronts
- Long time horizons
- Major additional investments
Five Core U.S. Strategies
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.
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.
Promote Global and U.S. Energy Security

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.
Rebuild U.S. science and engineering capabilities.

Create research and development opportunities.
Reinforce Capabilities to Meet New Challenges

Improve the quality of energy data and information.

Develop a comprehensive forecast of U.S. infrastructure requirements.
Develop legal and regulatory framework to enable carbon capture and sequestration.
As options are considered to reduce CO\textsubscript{2} emissions:

- Provide effective global framework for carbon management
- Establish transparent, predictable, economy-wide cost for CO\textsubscript{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
Thank you for listening to this presentation of the NPC Report: “Facing the Hard Truths About Energy”

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

www.npc.org