Prudent Development

Realizing the Potential of North America’s Abundant Natural Gas and Oil Resources

A Comprehensive Assessment to 2035 with Views through 2050

COGA EnGen
May 10, 2012
<table>
<thead>
<tr>
<th><strong>Origins</strong></th>
<th>Continuation of WWII government / industry cooperation</th>
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<tbody>
<tr>
<td><strong>Purpose</strong></td>
<td>Sole purpose of NPC is to advise U.S. Secretary of Energy and Executive Branch by conducting studies at their request</td>
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<td><strong>Organization</strong></td>
<td>A Federally chartered, self-funded Advisory Committee; Not an advocacy group, does not lobby</td>
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<td><strong>Membership</strong></td>
<td>Broad and balanced. Approximately 200 members from all segments of the oil and gas industries and many outside interests</td>
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<td><strong>Study Participants</strong></td>
<td>Diverse interests and expertise relating to the topic being addressed</td>
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<td><strong>Study Reports</strong></td>
<td>All NPC advice is provided in reports approved by its members and is available to the public. Reports can be viewed and downloaded at no cost from the NPC website – <a href="http://www.npc.org">www.npc.org</a></td>
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Prudent Development Study Objectives

• Assess the N. American resource base – natural gas and oil
  – Conventional
  – Unconventional

• Describe the role of technology
  – Environmental
  – Operational

• Assess N. American supply and demand
  – Through 2035
  – With a view to 2050

• Identify the potential role of natural gas to lower emissions

• Meet national objectives: economic, environmental, security
Study Committee, CSC, Task Groups, Subgroups

Over 400 Participants

Diverse Study Participation

- Oil & Gas Industry: 47%
- Government – Federal and State: 14%
- Consultant/Financial/Legal: 14%
- NGO: 12%
- Academia: 7%
- End Users: 7%
- Academia and Professional Societies: 6%

Figure 2. Study Participant Diversity
Four Major Findings

• First, the potential supply of North American natural gas is far bigger than was thought even a few years ago

• Second – and perhaps surprising to many – America’s oil resources are also proving to be much larger than previously thought

• Third, we need these natural gas and oil resources even as efficiency reduces energy demand and alternatives become more economically available on a large scale

• Fourth, realizing the benefits of natural gas and oil depends on environmentally responsible development
North American Natural Gas Resource Estimates have Transformed the Supply Outlook

Recent Estimates of Natural Gas Resources

- **Estimates:** 10 Years Ago
- **Current Estimates**

### Notes:
- Minerals Management Service (MMS) no longer exists; its functions are now administered by the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE).
- For a detailed discussion of the survey that the NPC used to prepare these "low," "mid," and "high" estimates, see the Preface as well as the Resources and Supply chapter.
N.A. Oil Supply Has Upside Potential But Risk of Decline

High production opportunities enabled by access frameworks
North American Natural Gas Can Meet Even the Highest Potential Demand

North American Resource Development Study
High demand, advanced technology, moderate development cost

North American Natural Gas Resources Have Potential to Supply the Market for Decades

Resource/Supply

North American Resource Development Study

3,000
2,000
1,000
0
3
4
5
6
7
8
9
10
TRILLION CUBIC FEET

LOW DEMAND
HIGH DEMAND
RANGE OF CUMULATIVE DEMAND 2010–2035

MIT MEAN RESOURCE CASE
MIT ADVANCED TECHNOLOGY CASE
MIT HIGH RESOURCE TECHNOLOGY CASE

WELLHEAD DEVELOPMENT COST (2007 DOLLARS PER MILLION CUBIC FEET)
Greenhouse Gas Emissions

**Reduction Pathways**
- Coal displacement
- Natural gas end-use technologies
- EPA non-GHG regulations
- Price on carbon

**GHG Emissions Are Rising – But Natural Gas Can Be Part of the Solution to Help to Lower GHG Emissions**

**Figure 4-1. Greenhouse Gas Emissions – 2005 Baseline and Projections**

- **REFERENCE CASE**
- **REFERENCE CASE (AEO2011)**
- **2005 BASELINE**

YEAR
- 2005
- 2010
- 2020
- 2030
- 2040
- 2050

MILLION METRIC TONS OF CO₂ EQUIVALENT
- 6,500
- 7,500
- 8,500
- 9,500
Range of Potential GHG Emissions Reductions in End-Use Sectors through Natural Gas Technologies

![Chart showing range of potential GHG emissions reductions in end-use sectors through natural gas technologies.](chart)

- **Minimum**: Power - 70, Residential - 15, Commercial - 34, Industrial - 126, Total - 231
- **Maximum**: Power - 571, Residential - 150, Commercial - 84, Industrial - 59, Total - 900

**Million MtCO₂e per year (2030)**
Prudent Development

In order for the U.S. to realize the benefits of substantial resource abundance, development must be done prudently.

Prudent development is:

• Essential for public trust and confidence
• Required for continued and expanded access
• Fundamental for long term industry success
Core Strategies and Recommendations

• Support prudent natural gas and oil resource development and regulation
• Better reflect environmental impacts in markets and fuel/technology choices
• Enhance the efficient use of energy
• Enhance the regulation of markets
• Support the development of intellectual capital and a skilled workforce
1. Support Prudent Development

- Establish Regional Councils of Excellence to share effective environmental, health, and safety practices
- Adopt policies for more effective regulation of natural gas and oil reduction and operations
- Commit to and carry out community engagement
- Measure and reduce methane emissions
- By supporting prudent development, provide access to resources
2. Better Reflect Environmental Impacts in Markets & Choices

- Develop and use tools to better analyze and compare the full environmental impacts of fuels and technologies
- Consider options for internalizing the cost of carbon impacts into fuel prices
- Keep open technology options for reducing GHG emissions from gas in the long run
3. Enhance the Efficient Use of Energy

- Encourage mechanisms to support greater adoption of energy efficiency in buildings and appliances
- Remove barriers to utilities’ promotion of efficiency and combined heat and power
4. Enhance the Regulation of Markets

- Allow utilities to effectively manage their natural gas price risk
- Harmonize interactions between natural gas and power markets
- Provide greater certainty in environmental regulations affecting the power sector
5. Support Needed Talent and Know-How

- Support intellectual capital and a skilled workforce:
  - Increase the Number of Qualified Natural Gas and Oil Professionals
• We have enormous oil and gas resources – of potential value and importance to the nation.
• There’s enough supply to support national objectives – including our economic, environmental and security interests.
• The lynchpin to realizing these benefits is prudent development – We have to do this right.
• And our recommendations help us move toward these outcomes.