

# Unconventional Resources Technology Advisory Committee

Advisory Committee to The Secretary of Energy

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October 23, 2008

The Honorable Samuel W. Bodman  
Secretary of Energy  
Washington, DC 20585

Dear Mr. Secretary:

On behalf of the Unconventional Resources Technology Advisory Committee (URTAC), it is my pleasure to submit our findings and recommendations based on our review of the Unconventional Resources Technology and Small Producers' portion of the Draft Ultra-Deepwater & Unconventional Gas 2009 Research and Development Plan.

The Committee finds that:

The Federal Government oil and gas Research and Development (R&D) and Technology Transfer (TT) programs are extremely important for maximizing domestic production. That said, the Federal Government needs to become more actively involved as an advocate of domestic oil and gas production.

The Advisory Committee commends DOE, NETL and RPSEA for the actions taken in implementing prior Committee recommendations. Both the Consortium and Complementary Programs provided a very comprehensive response to the need to develop a robust technology transfer program and knowledge management system.

The URTAC provides the following key recommendations:

- A national goal of recovering an additional 30% of the existing domestic reserves is achievable and warranted.
  - The creation of a multi-department study (e.g. Energy, Commerce and Interior) to bring together existing information and to assess the potential of the domestic oil and gas industry to meet the nation's energy needs is warranted, so that oil and gas can make its full contribution.
  - DOE must work with various parties including industry, NGO's, state regulators, other federal agencies and others to explore mechanisms to balance environmental responsibility and resource development concerns.
  - That research focus be expanded in the areas of: geosciences; basin analysis and real-time resource exploitation; stimulation and completion; water management; environmental concerns; and other petroleum resources.
  - Technology transfer is an essential part of the program that must: outline the steps necessary to communicate the results of the research and technologies developed;
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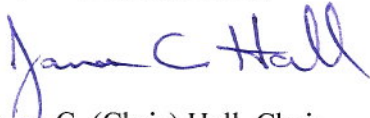
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- develop a Knowledge Management System which should be linked to other knowledge management resources; establish metrics to evaluate and communicate successes; and the program should utilize outside established organizations and conferences to promote the knowledge management system and technology transfer process.
- An emphasis needs to be placed on evaluating funded projects to document “early success”. Those developments need to be rolled out to the industry as soon as possible (prior to completion of the research) so as to encourage industry support.

These key recommendations are addressed in the report along with other observations made by the Committee members.

The URTAC recommends proceeding with implementation of the R&D Plan consistent with the guidelines outlined in our report.

Respectfully submitted,



James C. (Chris) Hall, Chair  
(310) 849-9726

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**Unconventional Resources Technology  
Advisory Committee**

**Comments and Recommendations  
2009 Unconventional Gas  
Research and Development Plan  
(Including Small Producer Programs)**

**OCTOBER 2008**

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## 1.0 INTRODUCTION

The Unconventional Resources Technology Advisory Committee (URTAC) was formed in accordance with provisions of Section 999D(a) of the 2005 Energy Policy Act (EPACT)

The Committee consists of:

- A majority of members who are employees or representatives of Independent Producers of natural gas and other petroleum, including small producers;
- Individuals with extensive research experience, operational knowledge or unconventional natural gas and other petroleum resource exploration and production;
- Individuals broadly representative of the affected interests in unconventional natural gas and other petroleum resource exploration and production, including interests in environmental protection and safe operations;
- Individuals with expertise in the various geographic areas of potential supply of unconventional onshore natural gas and other petroleum in the United States.

The provisions of EPACT excluded from eligibility to participate in URTAC the following: Federal employees and board members, officers and employees of Research Partnership to Secure Energy for America (RPSEA).

The duties of the URTAC under EPACT Section 999 are to advise the Secretary on the development and implementation of programs related to unconventional natural gas and other petroleum resources and to review the draft annual research plan.

The Committee members were appointed by letters from the Secretary on August 19, 2008. Key milestones for the Committee included:

- Committee members received the draft annual plan on August 19, 2008.
- Committee members met on September 11<sup>th</sup> and 12<sup>th</sup>, 2008 in Washington DC. The agenda included a brief status update and overview of the “Draft 2009 Annual Plan”. Committee members provided initial comments regarding the plan at this meeting. The Chair appointed sub-committees to work on sections of the plan.
- During the period from September 15<sup>th</sup> through October 10<sup>th</sup>, the appointed sub-committee members conducted several teleconference calls to develop and consolidate recommendations regarding the draft annual plan.
- The Committee met on October 16, 2008 in Houston, Texas to receive sub-committee reports and to draft the final recommendations of the Committee.
- The Committee met via teleconference on October 23, 2008 in Washington, D.C. to complete final approval of the committee report in accordance with the deadline set by the Secretary and the Designated Federal Officer.

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Section 999 sets the funding for the overall program at a level of \$50-million-per-year over 10 years, provided from Federal lease royalties, rents, and bonuses paid by oil and gas companies. After allocations for program management by NETL and consortium research and development (R &D) administration by RPSEA, the amounts to be distributed for R&D total \$42.56 million (\$32.06 million per year for the Consortium Program R&D and \$12.5 million per year for the Complementary Program R&D). It is anticipated that there will be \$13.89 million available for funding the Unconventional Resources program element during each fiscal year beginning with 2007 and \$3.21 million for funding the Small Producer Program.

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## 2.0 EXECUTIVE SUMMARY AND RECOMMENDATIONS

These findings and recommendations are at a strategic level and address the overall quality of the plan and provide general guidance regarding setting priorities and execution of the plan through the projected 10 year horizon.

The Committee reviewed the recommendations provided by the previous URTAC regarding other petroleum resources that may have a significant future benefit to the U. S. domestic energy supply and, in general, concurs with those recommendations.

The Committee reviewed and discussed the Draft Plan and identified major areas of concern. Subgroups were formed to analyze and compose comments and recommendations for these areas. Subgroup reports were distributed to the entire Committee and each was discussed by the Committee as a whole. Following this discussion, the entire committee agreed on and drafted the comments and recommendations included in this report.

### **Recommendations:**

The committee recommends:

- 1) Policy:
  - a) A national goal of recovering an additional 30% of the existing reserves is achievable and warranted.
  - b) The Federal Government oil and gas Research and Development (R&D) and Technology Transfer (TT) programs are extremely important for maximizing domestic production.
  - c) The creation of a multi-department study (e.g., Energy, Commerce, and Interior) to bring together existing information and to assess the potential of the oil and gas industry to meet the nation's energy needs under less restrictive scenarios, is warranted, so that oil and gas can make its contribution.
  - d) The Federal Government become actively involved as an advocate of domestic oil and gas production.
  - e) DOE work with various parties including industry, NGOs, state regulators, other federal agencies and others to explore mechanisms to balance environmental responsibility and resource development concerns.
- 2) Research focus be expanded in the following areas:
  - a) Geosciences as applied to exploration, drilling, stimulation and re-stimulation
  - b) Basin analysis and real-time resource exploitation
  - c) Stimulation and Completion
  - d) Water Management
  - e) Environmental
  - f) Other Petroleum Resources

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### 3) Technology Transfer

- a) The plan should specifically outline the steps necessary to communicate the results of the research and technologies developed.
- b) The knowledge management system of the Unconventional Resources and Small Producer Program should be linked to other knowledge management resources.
- c) Once a knowledge management system has been developed, metrics are necessary to evaluate and communicate successes.
- d) The program should utilize organizations and conferences to promote the knowledge management system and technology transfer process.

### 4) Near Term Impacts:

- a) An emphasis needs to be placed on evaluating funded projects to document “early success”. Those developments need to be rolled out to the industry as soon as possible (prior to completion of the research) to encourage industry support. This will also allow for early assessment of the technology transfer process and identify areas for improvement.
- b) Encourage researchers to be knowledgeable of prior and on-going research within the industry, academia and national labs. This includes placing emphasis on solicitations which leverage technologies developed by other industries.
- c) The plan needs to ensure, that along with long term research, some short term projects with potential for early application are emphasized.



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### 3.0 TOPICAL REPORTS

The Advisory Committee developed their analysis of the Draft Annual Plan through a series of meetings and sub-groups (as outlined in Section 5.0: Sub-Group Topics and Members). There are four areas of recommendations:

- Executive Summary and Policy
- Research Focus
- Technology Transfer
- Near Term Impacts (Process)

Also of note is that recommendations made by the Environmental Sub-Group were incorporated into the Policy and Technology Transfer reports.

#### **Treatment of Non-Consensus**

In situations where members were divided on agreement with specific recommendations or statements in the report, the following categorization was used:

- **Majority Agreement** – 50% or greater of Committee members were in agreement with the statement.
- **Minority Opinion** – fewer than 50% of Committee members were in agreement with the statement.

In this report, there are no instances of Minority Opinion.

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### 3.1 POLICY

As an advisory committee, the URTAC's focus is on commenting on the Unconventional Natural Gas, Other Petroleum Resources and Small Producers Program 2009 Draft Annual Plan. Nevertheless, URTAC would like to identify outside influences and issues which could adversely impact domestic oil and gas production with the hope that they can be addressed by the Department of Energy or elsewhere in carrying out the elements of the Section 999 Program.

Oil and gas will continue to provide a significant amount of energy to the United States during the next 20 years, even with significant efforts to increase alternative and renewable resources. Therefore, every effort must be taken to ensure that petroleum resources are developed to the maximum extent possible. A national goal of recovering an additional 30% of the existing reserves is achievable and warranted.

The Federal Government oil and gas Research and Development (R&D) and Technology Transfer (TT) programs are extremely important for maximizing domestic production for many reasons: (1) Federal programs serve to develop and transfer technologies that are not proprietary and thus are available to all producers, both large and small; and (2) as a major landowner and tax recipient, the government should actively manage its minerals and revenue streams. Participating in R&D and ensuring the effectiveness of TT mechanisms is an important undertaking to fulfill this responsibility and to be an effective steward.

#### **IMPORTANCE OF DOMESTIC PETROLEUM SUPPLIES:**

##### **Findings:**

Domestic oil and gas production are major sources of energy supply to the United States with national strategic importance. With the now popular focus on renewable energy sources, petroleum supplies are often overlooked and discounted as being easily replaced; nothing could be farther from the truth. Considerable information is available from many sources both from within the Federal Government and the private sector on the state of the domestic oil & gas industry and its importance as an energy supplier during the next 20 years. There needs to be a balance. However, there is no mechanism to gather this information into a unified report that would have credible standing in the eyes of the public and in Washington DC.

##### **Recommendation:**

The Committee recommends:

- The creation of a multi-department study (e.g., Energy, Commerce, and Interior) to bring together existing information and to assess the potential of the domestic oil and gas industry to meet the nation's energy needs is warranted, so that oil and gas can make its contribution. Such a study could also be tasked to assess the impediments to resource development and the effects of changes in tax treatments.

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**DEPARTMENT OF ENERGY AVOCACY IN LOCAL ENERGY RESOURCE ISSUES:**

**Findings:**

Many states are taking action to impose legislation and regulations that could adversely impact the ability to develop oil and gas natural resources. Furthermore, states are developing local regulatory frameworks for the development of unconventional resources that conflict with what has been developed elsewhere. These adversely impact the ultimate recovery of valuable oil and gas resources.

**Recommendation:**

- The Federal Government become actively involved as an advocate of domestic oil and gas production. This could be accomplished by the Department of Energy through their own outreach efforts or through entities (e.g. the Interstate Oil and Gas Compact Commission (IOGCC)). Failure to take action could result in the loss of access to reserves and production capability, off-setting any benefit provided by R&D and Technology Transfer efforts.

**ENVIRONMENTAL CONCERNS**

**Findings:**

Resource development and environmental responsibility are important objectives that should be addressed together; environmental responsibility is a fundamental aspect of resource development.

Normally, production has a negligible and easily mitigated impact on the environment. While the drilling and development phase early in the life of any field has a more visible impact, it lasts only for a short time. All too often, the impact of oil and gas projects is judged solely on the highly visible early phase development, without taking the overall life cycle into account. As a result, many projects are defeated on the local and/or state level, resulting in loss of potentially valuable reserves.

**Recommendation:**

The Committee recommends that:

- DOE with Department of Interior establish an entity of various parties including industry, NGOs, state regulators, other federal agencies and others to explore mechanisms to balance environmental responsibility and resource development concerns. (See Appendix A for additional detail.)

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## 3.2 RESEARCH FOCUS

In order to be comprehensive, the Draft Annual Plan needs to include research related to shale gas and oil, coal gas, heavy oil, unconventional oil and environmental issues.

### **Findings:**

The development of oil and gas from fractured shales continues to expand rapidly. Research related to optimum drilling, stimulation/restimulation and completion techniques, along with real time data evaluation, is needed to optimize hydrocarbon extraction from shales. Some shales are difficult to effectively fracture; fracturing water is a by product of the process which is very costly, may inhibit wellbore completion and needs to be better managed.

Coal gas development continues to increase. However, unlike other hydrocarbon sources, gas from soft coals can have a significant biogenic component. The potential exists for “regeneration” of additional gas during the producing life of a field thus making produced water management a key issue.

During the RPSEA solicitation process, the research proposals should identify technologies, methods or applications to minimize environmental impact in areas such as produced water and reuse, air quality and climate, and surface disturbance (including reclamation); how well the proposals cover this should be considered in the evaluation process.

### **Recommendations:**

The Committee recommends that research areas be expanded to include:

- 1) Geosciences as applied to exploration, drilling, stimulation, and re-stimulation:
  - a) Developing surface-based and borehole-based technologies that identify drilling sweet spots
  - b) Characterizing fracture attributes (orientation, intensity, openness, and type of fluid)
  - c) Optimizing the position and orientation of vertical and horizontal well bores
  - d) Determining stress fields
  - e) Improving the design and implementation of hydraulic fracturing
- 2) Basin analysis and real-time resource exploitation:
  - a) Characterizing geological, geochemical, geophysical, and operational parameters that differentiate high-performing areas or fields
  - b) Developing and demonstrating techniques to analyze large volumes of data in real-time for application during unconventional resource development
  - c) Developing real-time simulation and modeling of reservoirs
- 3) Stimulation and Completion:
  - a) Developing stimulation methods that require less water and other fluids to be injected into the subsurface

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- b) Developing stimulation methods that result in a lower volume of treatment fluids produced to the surface
  - c) Demonstrating approaches for improved treatment, handling, re-use and disposal of fluids produced and/or used in field operations
  - d) Improving fracturing and stimulation techniques in gas and oil shales
- 4) Water Management
- a) Developing methods for the treatment of produced water and fracturing fluids at intermediate and high total dissolved solids (TDS) in order to minimize the potential impact on natural water resources
  - b) Developing techniques to minimize the volume of water produced to the surface
- 5) Environmental:
- a) Developing site selection criteria that minimize the surface footprint and the impact of drilling and production operations
  - b) Developing surface mitigation methods applicable to all environments
  - c) Developing technologies to recycle water
  - d) Developing technologies for detection and capture of emissions from unconventional oil and gas operations
  - e) Assessing environmental impact and viability of oil shale production.
- 6) Novel concepts
- a) Enhancing coal gas production over time
  - b) Developing biological, reservoir engineering / hydrological methods.
- 7) Other Petroleum Resources
- a) Heavy oil, tar sands, tight oil sands and oil shales

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### 3.3 TECHNOLOGY TRANSFER

The most significant benefits of an R&D Program are realized in the transfer of the technology. The mechanism of the technology transfer for this Program must be well defined, implemented early in the program and used often to leverage the benefit of the investment in this program.

#### **Findings:**

The Advisory Committee commends DOE, NETL and RPSEA for the actions taken in implementing prior committee recommendations. Both the Consortium and Complementary Programs provided a very comprehensive response to the need to develop a robust technology transfer program and knowledge management system.

A robust knowledge management system is not enough. We are concerned about the effectiveness of any knowledge management or technology transfer system which is adopted. It is imperative that technology be transferred effectively to all producers, especially small producers.

#### **Recommendations:**

- 1) The plan should specifically outline the steps necessary to communicate the results of the research and technologies developed. Specifics should include:
  - a) Communication to industry of the existence of a Knowledge Management System.
  - b) Organization of the communication plan such that it has the widest possible dissemination yet leverages the networking ability around basins.
  - c) Access protocol to the Knowledge Management System so as to provide the necessary metrics to monitor and evaluate the system.
  - d) Implementation of supply chain improvements to provide greater access and to minimize the costs for small producers.
- 2) The Knowledge Management System of the Unconventional Resources and Small Producer Program should be linked as soon as possible to other knowledge management resources, including other programs managed by DOE (such as the Ultra Deepwater Program). The databases should have a similar taxonomy look and feel.
- 3) The Section 999 Plan stipulates that a portion of every research project be dedicated to technology transfer. The Advisory Committee recommends that this effort not be done solely within the individual projects but through established knowledge management and technology transfer systems, thereby leveraging the funding by consolidating the efforts and maximizing the benefits to the end users.
- 4) When awards are made, RPSEA must clearly identify the expectations of researchers for the dissemination of information for use in the knowledge management system and technology

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transfer efforts, including implementation of the consolidated knowledge management and technology transfer systems.

- 5) Utilize the latest and most appropriate-to-task communication technologies to launch and promote the Knowledge Management System, including electronic resources such as web based seminars and computer based education systems. These are proven cost effective systems to deliver or push information to the communities that can best benefit.
- 6) Once a knowledge management system has been developed, metrics are necessary to evaluate and communicate successes. The program should consider:
  - a) Knowledge management entries
  - b) Readership or subscription trends and totals
  - c) Multiple user or access trends and totals
  - d) Transfer successes, case studies, and testimonials
  - e) Peer review functionality
- 7) The program should utilize organizations and conferences to promote the knowledge management system and technology transfer process. The program should focus on early knowledge application and transfer successes by communicating these successes through the consortium system itself as well as outside organizations, industry publications and conferences. The database cannot replace the effectiveness of regionally focused workshops organized through local producers and small producer organizations. These must be worked in tandem.

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### 3.4 NEAR TERM IMPACTS

**Finding:**

An emphasis needs to be placed on building credibility, demonstrating value and enhancing projects through feedback. Exposing early results will provide both an opportunity for feedback to current projects and stimulate ideas for further research.

**Recommendations:**

- 1) An emphasis needs to be placed on evaluating funded projects to document “early success”. Those developments need to be rolled out to the industry as soon as possible (prior to completion of the research) to encourage industry support. This will also allow for early assessment of the technology transfer process and identify areas for improvement.
- 2) Encourage researchers to be knowledgeable of prior or on going research within the industry, academia and national labs. This includes placing emphasis on solicitations which leverage technologies developed by other industries.
- 3) The plan needs to ensure, that along with long term research, some short term projects with potential for early application are emphasized.



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## 4.0 COMMITTEE MEMBERS

<u>Title</u>	<u>Last Name</u>	<u>First Name</u>	<u>Employer</u>	<u>City</u>	<u>State</u>
Mr.	Anderson	A. Scott	Environmental Defense Fund	Austin	TX
Dr.	Brown	Nancy J.	Lawrence Berkeley National Laboratory	Berkeley	CA
Ms.	Cavens	Jessica J.	EnCana Oil & Gas (USA)	Denver	CO
Dr.	Cline	Jeffrey T.	Cline Energy Consulting	Houston	TX
Mr.	Daugherty	William S.	NGAS Resources, Inc	Lexington	KY
Mr.	Dwyer	James P.	Baker Hughes INTEQ	Houston	TX
Ms.	Falkner	Juliette A.	The Nature Conservancy	Arlington	VA
Mr.	Hall	Jeffrey D.	Devon Energy Corporation	Oklahoma City	OK
Mr.	Hall	J. Chris	Drilling & Production Co.	Torrance	CA
Dr.	Hardage	Bob	University of Texas at Austin	Austin	TX
Mr.	Julander	Fred C.	Julander Energy Company	Englewood	CO
Dr.	Levey	Raymond A.	University of Utah	Salt Lake City	UT
Dr.	Mark	Sandra D.	Black Hills Exploration and Production	Evergreen	CO
Dr.	Mohaghegh	Shahab D.	West Virginia University	Morgantown	WV
Mr.	Sparks	Don L.	Discovery Operating, Inc.	Midland	TX
Dr.	Tew	Berry H. (Nick)	State Oil and Gas Board of Alabama	Tuscaloosa	AL
Ms.	Weiss	Janet	BP America, Inc.	Houston	TX
Ms.	Zinke	Sally G.	Ultra Petroleum	Englewood	CO

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## 5.0 SUBGROUP TOPICS AND MEMBERS

At the September 12, 2008 meeting in Washington DC the following Subgroups and Schedule were established for developing the Subgroup analyses and reports. Following the Subgroup conference calls, the Environmental subgroup recommended that its recommendations be incorporated into the Technology Transfer and Policy sections of the reports.

### **Five Sub-Group Areas of Analysis and Reports:**

- Executive Summary and Policy
- Research Focus
- Technology Transfer
- Near Term Impacts (Process)
- Environmental (incorporated into Policy and Technology Transfer topics)

### **Schedule**

9/19 – Recommendations to leaders  
9/22-10/10 – Subgroup conference calls  
10/10- Subgroup reports to Chair  
10/13- Subgroup reports distributed to Committee  
10/16 – Meeting in Houston  
10/23- Teleconference and formal vote on final URTAC Report

### **Sub-Group Members for the Five Recommendation Areas:**

#### **Executive Summary and Policy**

Lead – C. Hall  
Members-Anderson, Cavens, Falkner, Julander, Mark, Tew

#### **Research Focus:**

Lead – Cline  
Members – Anderson, Brown, Dwyer, Levey, Hardage, Julander, Mohaghegh, Sparks, Tew

#### **Technology Transfer**

Lead – James Dwyer  
Members – Cline, Daugherty, C. Hall, Hardage, Weiss

#### **Near Term Impacts (Process):**

Lead – Cavens  
Members- Dwyer, J. Hall, Julander, Zinke

#### **Environment:**

Lead – Weiss  
Members- Anderson, Brown, Cline, Falkner, Julander

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## APPENDIX A

### ENVIRONMENTAL POLICY RECOMMENDATION

#### Issue

Access to oil and gas resources on public lands and federal waters is typically impeded for years by land use decisions made outside of the DOE, and a process for permitting that allows special interests to greatly influence outcomes. In addition, acquiring access to unconventional resources on public lands is an inefficient process that can stop development all together or make access/development too costly to pursue. Competing land use initiatives are on the rise. Development delays are a key energy security issue. Unconventional resources can be developed on public lands by application of appropriate technology in an environmentally responsible manner as evident by responsible development on private lands. The temporal footprint impacts based on well-founded science should feature more in multiple use decision making. While this dilemma directly affects the energy security of the US, the Committee recognizes that a solution is larger than the mandate of the DOE.

#### Proposal

With the variety and demand of uses increasing on our public lands, new mechanisms are needed to create a framework that will optimize development and other uses, including conservation. Addressing the issues around multiple land use requires a reasoned and sound scientific approach that integrates the views of the various users and governing bodies. Conservation of scarce or sensitive biological resources can occur in conjunction with land-use activities that meet the energy, social, and economic needs of people.

The Committee recommends that the DOE work with various parties including other federal agencies (this Committee recommends the inclusion of the Department of the Interior), industry, NGOs, state regulators, and others to explore/develop mechanisms to resolve these conflicts. These mechanisms should more fully incorporate the industry's ability to effectively develop in an environmentally responsible manner founded on sound science.