



TASK FORCE ON STRATEGIC UNCONVENTIONAL FUELS

America's Strategic Unconventional Fuels

Oil Shale • Tar Sands • Coal Derived Liquids
• Heavy Oil • CO₂ Enhanced Recovery and Storage

Volume I – Preparation Strategy, Plan, and Recommendations

Completed: February 2007
Published: September 2007

IN RESPONSE TO SECTION 369 OF THE ENERGY POLICY ACT OF 2005 (P.L. 109-58)



Disclaimer

This report was prepared as an account of work by the Strategic Unconventional Fuels Task Force. Neither the United States Government nor any agency thereof, nor any of their employees or contractors, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process or service by trade name, trademark, manufacture, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.



THE STRATEGIC UNCONVENTIONAL FUELS TASK FORCE

Honorable Samuel W. Bodman
Secretary of Energy
1000 Independence Ave SW
Washington, D.C. 20585

Dear Mr. Secretary:

The Task Force on Strategic Unconventional Fuels is pleased to submit its integrated strategy and program plan for *America's Strategic Unconventional Fuels*, as directed by Section 369(h)(5)(A) of the Energy Policy Act of 2005. This document builds on the report of *Initial Findings and Recommendations of the Task Force* that was completed in September 2006 and incorporates new recommendations resulting from the planning process and subsequent analyses.

This report is a product of a Task Force of eleven (11) members including the Secretaries of the Departments of Energy, Defense, and the Interior; the Governors of the States of Colorado, Kentucky, Mississippi, Utah, and Wyoming; and representatives of localities in those states that would be impacted by the development of the unconventional resources located therein. This report does not reflect agreement on all recommendations. However, the report lays out legitimate policy options which the Administration, Congress, States and local governments may consider. Nothing in this report reflects an official position of any member of the Task Force. The views and concerns of the Governors of the States of Colorado and Wyoming are articulated in prepared statements provided in an Appendix to Volume I of this report.

The Task Force concurs that the domestic and global fuels supply situation and outlook is urgent. Increasing global oil demand, declining reserve additions, and our increasing reliance on oil and product imports from unstable foreign sources require the Nation to take immediate action to catalyze a domestic unconventional fuels industry. Responsible development of America's oil shale, tar sands, heavy oil, coal, and oil resources amenable to recovery by carbon dioxide injection, to produce liquid fuels could reduce our dependence on imports and provide reliable and secure sources of strategically important liquid fuels. Aggressive development by private industry, and encouraged by government, could supply all of the Department of Defense's domestic fuels demand by 2016, and supply upwards of 7 million barrels per day of domestically produced liquid fuels to domestic markets by 2035. The Task Force has adopted that level as the objective for the Strategic Unconventional Fuels Program.

The Task Force has evaluated the extent and the potential contributions of each of these resources, and has developed a detailed plan for an integrated program to promote and accelerate their commercial development. In developing its recommendations and plan, the Task Force carefully considered and addressed the crosscutting issues, including environmental protection, water resources, socioeconomic impacts, markets, infrastructure, and carbon management, associated with concurrent development of unconventional fuels. The integrated program could achieve these goals in a sustainable and environmentally sound manner and mitigate against potential adverse impacts on affected states and communities.

This report presents development scenarios to be considered in establishing an unconventional fuels industry.

Respectfully submitted by:

TASK FORCE ON STRATEGIC UNCONVENTIONAL FUELS

CC: Distribution Attached

Distribution

U.S. Senate

The Honorable Harry Reid
Majority Leader

The Honorable Robert C. Byrd
Chairman, Committee on Appropriations

The Honorable Byron Dorgan
Chairman, Subcommittee on
Energy and Water Development
Committee on Appropriations

The Honorable Jeff Bingaman
Chairman, Committee on Energy and Natural
Resources

The Honorable Carl Levin, Chairman
Committee on Armed Services

The Honorable Kent Conrad, Chairman
Committee on the Budget

The Honorable Thad Cochran
Ranking Minority Member

The Honorable Pete V. Domenici
Ranking Minority Member

The Honorable Orrin G. Hatch
United States Senator

The Honorable John McCain
Ranking Minority Member

The Honorable Judd Gregg
Ranking Minority Member

U.S. House of Representatives

The Honorable Nancy Pelosi
Speaker of the House

The Honorable John D. Dingell, Chairman,
Committee on Energy and Commerce

The Honorable David Obey
Chairman, Committee on Appropriations

The Honorable Peter J. Visclosky, Chairman
Subcommittee on Energy and Water
Development
Committee on Appropriations

The Honorable John Spratt, Chairman
Committee on the Budget

The Honorable Rick Boucher, Chairman
Subcommittee on Energy and Air Quality
Committee on Energy and Commerce

The Honorable Ike Skelton, Chairman
Committee on Armed Services

The Honorable Joe L. Barton
Ranking Minority Member

The Honorable Jerry Lewis
Ranking Minority Member

The Honorable David L. Hobson
Ranking Minority Member

The Honorable Paul Ryan
Ranking Minority Member

The Honorable Ralph M. Hall
Ranking Minority Member

The Honorable Duncan Hunter
Ranking Minority Member

PREFACE

Concerning Specific Issues Regarding Commercial Leasing of Federal Lands for Oil Shale Production

Purpose

The purpose of this preface is to clarify the intent of the Task Force and the proposed Unconventional Fuels Strategy and Program Plan as it relates to the development of commercial leasing regulations, the initiation of commercial leasing activities for oil shale, and proposals to streamline permitting processes to facilitate unconventional fuels development.

Issues

The Task Force members from Colorado and Wyoming have expressed legitimate concerns about the timing and sequence of Federal efforts to promulgate commercial leasing regulations for oil shale development and initiate leasing activity. They are concerned that the current state of development of surface and in-situ oil shale development technologies provides insufficient data and understanding of potential oil shale environmental impacts, water supply issues, economics, and socio-economic impacts to support completion of the mandated Programmatic Environmental Impact Statement (PEIS) or subsequent development of meaningful leasing regulations. Unless the development of leasing regulations is deferred until RD&D efforts to be conducted under the current BLM RD&D leasing program are complete, they are concerned that oil shale development might occur that could result in unintended environmental harm and negative social and economic impacts. They cite as an example the unintended impacts of the intensive oil and gas development activity underway in some areas of each of these states. The views and concerns of the representatives of the States of Colorado and Wyoming are further articulated in prepared statements provided in the Appendix to this report.

Other Task Force members believe that deferring development of commercial leasing regulations could inhibit industry investment in RD&D and delay the availability of significant quantities of shale oil for an additional decade or more. Near-term establishment of an initial commercial leasing regulation is needed to define and articulate key leasing parameters, such as royalty rates, application processes, and other requirements that must be known to assess development economics and that influence investment decisions. A commercial leasing regulation is essential, in their view, to provide reasonable assurance to companies considering investments in RD&D and project development that commercial leasing will be available once viable technologies are demonstrated and other environmental, water, socio-economic, infrastructure, and market challenges have been satisfactorily resolved. Establishment of a commercial leasing regulation for oil shale does not mean that leasing activity would be initiated immediately by BLM. They recognize that the oil shale leasing regulation would need to be dynamic. As with existing lease regulations for coal, oil and gas, and other minerals and natural resources, regulations for oil shale leasing would be modified and updated to reflect new information and data that becomes available from RD&D conducted on federal, state, or private lands. The regulation would also be modified, as appropriate, to reflect results of the extensive analysis and planning efforts recommended by Task Force in the Oil Shale Plan provided in Volume II.

Task Force View

Both of these arguments have merit and deserve careful consideration by the policy makers for whom this report has been prepared.

The Task Force wishes to emphasize that the proposed Oil Shale Program Plan anticipates that no commercial leases for oil shale resources on Federal lands would be finalized until project developers can demonstrate to responsible Federal, state, and local authorities that the proposed technology and project is technically, economically, and environmentally viable and that all other requirements for community acceptance can be met.

The RD&D Cycle for new energy technologies is rigorous, lengthy, and expensive. Concepts must be analyzed, tested at bench scale in the lab, and then be engineered and constructed for evaluation in small scale field pilots. If successful, they must then be engineered and scaled up for construction and testing at the semi-works and commercially-representative scales. RD&D is progressively more expensive at each stage of development, but each stage improves technical understanding and reduces the risk that the technology will fail when deployed at commercial scale. Failure at any stage may require a decision to reconsider the concept, reengineer the technology, or abandon the effort. Given the significant investments that must be made for RD&D and for the construction and operation of subsequent commercial scale projects, it is unlikely that *any* company would proceed with RD&D without first knowing the economic, technical, and environmental performance parameters it must achieve. Nor would any company be likely to invest in a commercial-scale project without demonstrating to its management, investors, and regulators that the project will meet all technical, economic, environmental, regulatory, and other criteria required for public acceptance and project success.

Streamlining Permitting for Unconventional Fuels Projects

The Task Force has recommended an effort to “streamline” the permitting process in order to provide a more efficient and predictable permitting process. This recommendation is consistent with provisions of section 369(k) of the Energy Policy Act directing the Department

of Interior to undertake efforts to streamline federal permitting processes associated with energy resources.

It is neither the intent nor the recommendation of this Task Force for “streamlining” to circumvent or dilute any environmental standard or regulation, but, rather, to make the permitting process more efficient and predictable. The Task Force expects that initiation of oil shale, tar sands, heavy oil, coal liquids, and CO₂ Enhanced Oil Recovery efforts would require the significant expansion of Federal and State staff and resources to review permit applications, inspect for compliance, and to enforce environmental and regulatory standards and permit requirements. Such resources will need to be provided concurrent with any commercial leasing activity. The public costs for providing such staff and resources could be paid through revenues received from lease bonuses, royalty payments, severance taxes, or other fees.

Conclusion

The Energy Policy Act of 2005 directed this Task Force to prepare and offer an integrated program to *promote and accelerate* the responsible development of the nation’s strategic unconventional fuels resource, including but not limited to oil shale and tar sands. The proposed program has been crafted with the explicit intent to ensure that due care and diligence is taken to anticipate, assess, prevent or mitigate potentially adverse impacts on the environment, affected communities, or other stakeholders while facilitating development of strategically important domestic energy resources. While this report does not reflect unanimous consensus of the Task Force members on all of its elements, it provides a robust suite of policy options, program elements, and supporting analysis – under three development scenarios – that should be carefully considered by policy makers in Congress and the Administration, and by the states and communities that would be affected by the development of these strategically important energy resources.

TASK FORCE MEMBERS

CABINET OFFICERS AND OFFICIAL REPRESENTATIVES

Hon. Samuel W. Bodman, Secretary, U.S. Department of Energy

Mr. John D. Shages, Deputy Assistant Secretary (Official Representative)

Hon. Robert Gates, Secretary, U.S. Department of Defense

Mr. Paul P. Bollinger Jr., Special Assistant to the Assistant Secretary of the Air Force for Installations, Environment & Logistics (Official Representative)

Hon. Dirk Kempthorne, Secretary, U.S. Department of the Interior

Dr. Foster Wade, Deputy Assistant Secretary, Land and Minerals (Official Representative)

STATE GOVERNORS AND OFFICIAL REPRESENTATIVES

Hon. Bill Ritter, Jr., Governor of the State of Colorado

Mr. Michael King, Deputy Director, Colorado Department of Natural Resources (Official Representative)

Hon. Jon M. Huntsman, Jr., Governor of the State of Utah, Task Force Co-Chair

Dr. Laura S. Nelson, Energy Advisor (Official Representative)

Hon. Dave Freudenthal, Governor of the State of Wyoming

Ms. Mary Flanderka, Director, Wyoming Governor's Office of Planning (Official Representative)

Hon. Ernie Fletcher, Governor of the Commonwealth of Kentucky, Task Force Co-Chair

Mr. William H. Bowker, Director, Kentucky Division of Fossil Fuels and Utility Services (Official Representative)

Hon. Haley Barbour, Governor of the State of Mississippi

Mr. A. D. "Monty" Montgomery, Jr., Office of Natural Resources, Mississippi Development Authority (Official Representative)

REPRESENTATIVES OF POTENTIALLY IMPACTED COMMUNITIES

Mr. Craig Meis, Chairman, Mesa County Commission, Colorado

Mr. Bill Johnson, Executive Director, Uintah County Vernal City Economic Development, Utah

Mr. T. Alan Bates, Community Representative, Choctaw County Economic Development Foundation, Mississippi

CONTENTS

VOLUME I

Transmittal Letter.....	I-i
Preface.....	I-iii
Members of the Task Force	I-v
Task Force Charter and Activities.....	I-ix
Executive Summary.....	ES-1
Introduction	I-1
PART A – Situation Analysis and Program Rationale	I-7
National Energy and Security Concerns	I-7
U.S. Domestic Liquid Fuels Resources	I-13
Potential to Augment Domestic Oil Supply.....	I-20
National Economic Costs and Benefits	I-24
Program Rationale	I-33
PART B – Strategic Unconventional Fuels Strategy	I-39
Major Program Goals	I-39
Program Vision.....	I-39
Factors Constraining Investment	I-40
Strategies	I-42
PART C – Program Structure and Management Plan	I-55
PART D – Conclusions and Task Force Recommendations	I-69
APPENDIX STATEMENTS GOVERNORS OF COLORADO AND WYOMING...I-79	
REFERENCES.....	I-85

LIST OF FIGURES AND TABLES

FIGURES

Figure I- 1. World Oil Discoveries Peaked in the 1960's	8
Figure I- 2. World Remaining Oil Reserves Continue to Shrink.....	9
Figure I- 3. U.S. Liquid Fuels Demand and Imports will Continue to Increase	10
Figure I- 4. World Oil Demand (2005 vs. 2025)	11
Figure I- 5. Department of Defense Fuels Purchases (2002).....	12
Figure I- 6. America's Original Endowment of Solid and Liquid Fuels Resources.....	14
Figure I- 7. U.S. Coal Deposits.....	15
Figure I- 8. Known Oil Shale Deposits of the United States.....	16
Figure I- 9 U.S. Tar Sands Resources (Measured and Speculative).....	17
Figure I- 10. Energy Production Efficiency vs. Production (Trillion Bbl).....	19
Figure I- 11. U.S. Oil Production and Consumption – Base Case.....	22
Figure I- 12. U.S. Oil Production and Consumption – Measured Case	22
Figure I- 13. U.S. Oil Production and Consumption – Accelerated Case.....	22
Figure I- 14. Production Potential for the Base, Measured, and Accelerated Cases.....	25
Figure I- 15. Annual Direct Federal Revenues.....	26
Figure I- 16. Annual Direct State Revenues	27
Figure I- 17. Annual Total Direct Public Sector Revenues	27
Figure I- 18. Annual Value of Imports Avoided.....	28
Figure I- 19. Annual Direct Petroleum Sector Employment.....	29
Figure I- 20. Annual Total Petroleum Sector Employment (Direct & Indirect).....	30
Figure I- 21. Annual Direct Contribution to GDP	31
Figure I- 22. Unconventional Fuels Program Production Objectives (Accelerated Case)	39
Figure I- 23. Preliminary Strategic Unconventional Fuels Development Program	55

TABLES

Table I- 1. Energy Efficiency and Balances for Conventional and Unconventional Fuels.....	20
Table I- 2. Potential Incremental Production (MMBbl/d).....	20
Table I- 3. Summary of Program Elements Proposed.....	24
Table I- 4. Program Costs and Revenues Under Three Development Scenario (Billion 2004\$)	31
Table I- 5. Relevance of Key Constraints Impeding Industry Development.....	40
Table I- 6 Strategic Unconventional Fuels Program.....	43
Table I- 7. Oil Shale Sub Program Goals, Objectives, Strategies, and Major Activities	47
Table I- 8. Coal Liquids Sub Program Goals, Objectives, Strategies, and Major Activities	48
Table I- 9. Tar Sands Sub Program Goals, Objectives, Strategies, and Major Activities.....	49
Table I- 10. Heavy Oil Sub Program Goals, Objectives, Strategies, and Major Activities	50
Table I- 11. CO ₂ EOR Sub Program Goals, Objectives, Strategies, and Major Activities.....	51
Table I- 12. Strategic Unconventional Fuels Program Crosscutting Goals, Objectives, and Strategies	52
Table I- 13. Strategic Unconventional Fuels Program – Program Management Approach.....	57
Table I- 14. Major Program Milestones through 2012.....	62

TASK FORCE CHARTER AND ACTIVITIES

DIRECTIVES FROM CONGRESS

Section 369 (h) of the Energy Policy Act of 2005 (P.L. 109-58), directs the Secretary of Energy to establish a Task Force to:

- "... develop a program to coordinate and accelerate the commercial development of strategic unconventional fuels, including, but not limited to, oil shale and tar sands resources within the United States, in an integrated manner" [Sec 369(h)(1)], and to
- "make such recommendations regarding promoting the development of the strategic unconventional fuels resources within the United States as it may deem appropriate" [Sec 369 (h)(3)]; and to
- "make recommendations with respect to initiating a partnership with the Province of Alberta Canada for purposes of sharing information relating to the development and production of oil from tar sands, and similar partnerships with other nations that contain significant oil shale resources." [Sec 369 (h)(4)]

Congress further directed that:

- Not later than 180 days after the date of enactment, the Task Force shall submit to the President and the Congress a report that describes the analyses and recommendations of the Task Force, and that
- The Secretary [of Energy] shall provide an Annual Report describing the progress in developing the strategic unconventional fuels resources within the United States for each of the 5 years following submission of the [initial task force] report. [Sec 369 (h)(5)]

TASK FORCE ACTIVITIES

As directed by the Act, the Secretary of Energy convened a Task Force on Strategic Unconventional Fuels comprised of the Secretaries of the Departments of Energy (DOE), the Interior (DOI), and Defense (DOD); the governors of key states in which the resources are located; representatives of localities that could be impacted by the development of nearby unconventional fuels resources; and their official representatives.

The Task Force has held eight meetings to date, including a kick-off meeting on March 22, 2006 in Denver, CO; a conference call on April 7, 2006; and formal meetings in Salt Lake City, Utah on May 11, 2006; Lexington, Kentucky on June 28-29, 2006; Shepherdstown, WV on August 23-24, 2006; Denver, CO on September 25, 2006; Oxford, MS on November 3, 2006; and Salt Lake City, UT on December 6, 2006.

The Task Force has evaluated the nation's liquid fuels situation and outlook from an energy supply and geopolitical perspective. The Task Force has concluded that the nation is substantially at risk, from an economic and security perspective, sufficient to warrant development of an unconventional fuels program with attendant policies and government actions to promote and accelerate industry development.

The Task Force has identified a broad scope of domestic unconventional fuels resources, and analyzed the resource-specific and crosscutting issues that constrain their development. The resources analyzed include: oil shale, tar sands, coal-derived liquids, heavy oil, and crude oil amenable to carbon dioxide enhanced oil recovery.

The following report elaborates the Task Force's findings and its proposed program plan, as required by Section 369 of the Energy Policy Act of 2005.

A report of the *Initial Findings and Recommendations of the Strategic Unconventional Fuels Task Force* was completed in September 2006 and has been submitted for review and transmittal to the Congress and the President.

This *Strategy and Program Plan* builds on that report and further provides a strategy and integrated plan for accelerating and promoting the development of domestic unconventional fuels resources to meet the nations' energy needs.

EXECUTIVE SUMMARY

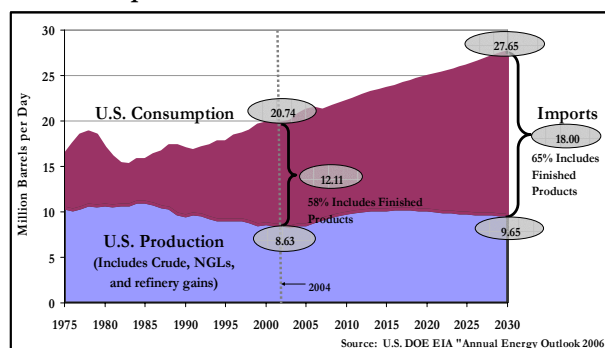
The Energy Policy Act of 2005 (EPACT) directed the Task Force on Strategic Unconventional Fuels to make recommendations and develop an integrated program to coordinate and accelerate the development of fuels from domestic unconventional fuels resources. The Task Force has evaluated the global and domestic oil supply outlook, assessed domestic unconventional fuels resources that could augment supply, analyzed constraints to their development, and crafted an integrated strategy and program plan to expedite development of an unconventional fuels industry.

I. Situation

Global and domestic demand for crude oil and refined products continues to expand, driven by rapid economic growth in developing economies and domestic consumer habits. At the same time, finding and producing oil resources to meet rising demand is increasingly difficult and costly. Companies are failing to replace produced reserves, shrinking the world's conventional oil reserves base. Excess productive capacity is also shrinking, reducing the ability to respond to supply disruptions, increasing price volatility, and driving up prices.

Domestic crude oil production is declining as demand rises, increasing our dependence on imports of oil and refined products. Between 1985 and 2004, U.S. demand for oil and products increased by 25 percent to 20 MMBbl/d and imports more than doubled, reaching over 12 MMBbl/d (58% of demand). The Energy Information Administration projects U.S. oil and refined products imports to increase to 18 MMBbl/d (65% of demand) by 2030. (Figure ES-1)

Figure ES-1. U.S. Liquid Fuels Demand and Imports will Continue to Increase



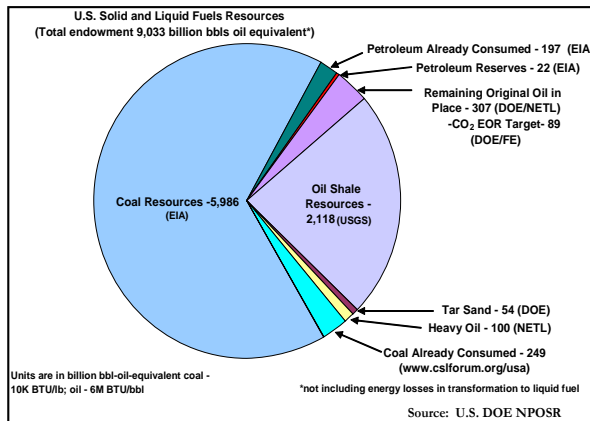
Increasingly, oil and refined products must be imported from nations unfriendly to the United States or threatened by political instability, reducing the security and reliability of supplies critical to our economy, our military, and our national security.

The Task Force finds that America's increasing demand for oil imports in a world of more limited supply from increasingly unstable sources poses strategic risks that the nation can ill afford to ignore. These risks include the reliability of fuels to supply our economy, the availability of assured supplies to fuel our military, and the enormous costs of oil imports to consumers and the economy as a whole. The higher cost and volume of oil and refined product imports combine to exacerbate the nation's trade deficit and weaken the value of the dollar against other currencies. *To address this situation, aggressive action must be taken by government and industry to abate growth in U.S. oil demand and to increase production of fuels from domestic sources.*

II. Potential of Unconventional Fuels Resources

The days of cheap oil are likely over. As discovery and production of conventional oil becomes more difficult and costly, and the

Figure ES-2. America's Original Endowment of Solid and Liquid Fuels Resources



ability of that resource to meet rising global demand becomes less assured, the world and our nation must now begin a transition to the next most economic and energy efficient set of energy resources. As it may take 20 years or more to achieve an industry capable of producing significant volumes of unconventional fuels, urgent action to initiate the transition is needed.

Our nation is endowed with a wealth of resources that can be converted to fuels for transportation, home heating, and other uses. These include coal, oil shale, tar sands, heavy oil, and oil producible by carbon dioxide enhanced recovery. (Figure ES-2) The Task Force finds that, if pursued aggressively by government and industry,

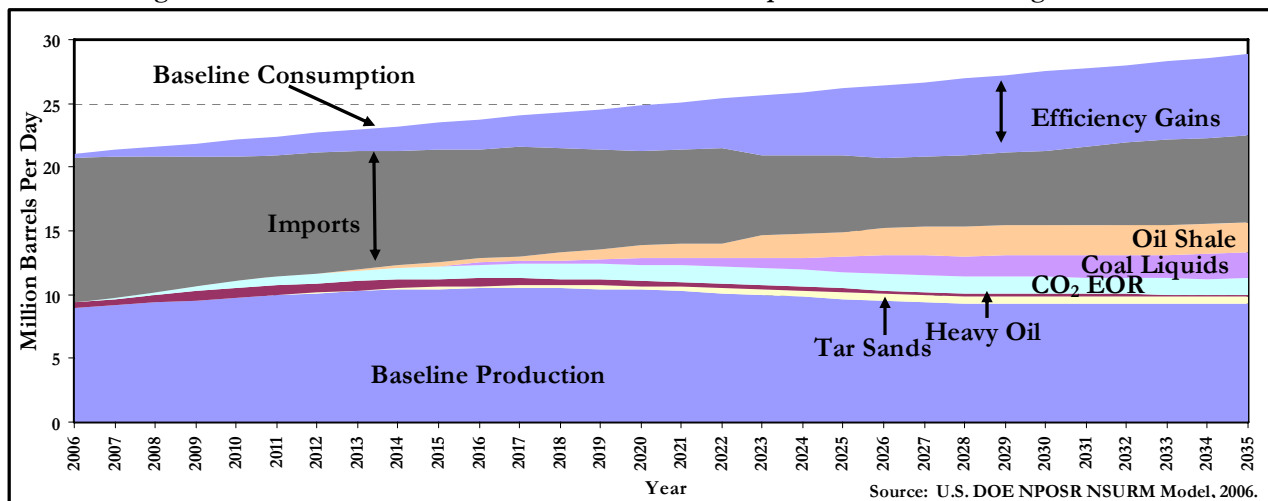
domestic unconventional fuels could exceed 7 MMBbl/d by 2035 (Figure ES-3). However, increased domestic fuels production, alone, will not be sufficient to measurably reduce the volume of imports or our dependence on unreliable foreign sources. Aggressive action by industry, government, and consumers is needed to reduce the growth in America's liquid fuels demand, including enabling more efficient use of fuels and fostering changes in consumer habits. While programs and policies to foster conservation and efficiency improvements exceed the scope of this Task Force's charter, public efforts to achieve these goals are warranted.

III. Factors Constraining Investment

Depending on the resource, commercial development of unconventional resources may be constrained by:

- Access to resources on public lands
- Economics, high capital/operating costs, tax and fiscal regimes, and oil price volatility
- Technologies that require further advancement or demonstration at commercially-representative scale
- Environmental challenges, water supply, air quality, and carbon management

Figure ES-3. Potential U.S. Oil Production and Consumption – Accelerated Program Case



- Uncertain regulation, permitting processes, and timelines that impact planning and increase costs
- Socioeconomic risks/impacts to affected states and communities that must be mitigated before development can begin
- Assured markets and long-term off-take commitments that provide a minimum rate of return to secure project financing
- Infrastructure requirements to support industry development, operations, and population and economic growth

IV. Program Vision and Development Objectives

The Task Force has crafted a commercialization strategy and program plan to:

- Accelerate development of domestic unconventional fuels,
- Promote effective environmental stewardship and impact mitigation,
- Mitigate potential adverse socio-economic impacts on states and localities, and
- Generate substantial public benefits while ensuring government fiscal responsibility.

Three development scenarios involving various levels of government involvement and risk-sharing were analyzed. All of these scenarios yielded net positive fiscal benefits to Federal and state treasuries.

Applying the more aggressive “accelerated” development scenario could enable industry to achieve incremental production beyond 7 MMBbl/d by 2035. However, government must *share* in the early development risk to

Incremental Production Objectives (2035)

- Oil Shale – 2.5 MMBbl/d
- Tar Sands – 0.53 MMBbl/d
- Coal Liquids – 2.6 MMBbl/d
- Heavy Oil – 0.75 MMBbl/d
- CO₂ EOR – 1.3 MMBbl/d*

* Production goals for CO₂ EOR assume expanded use of current state-of-the-art technology. If more advanced technology is developed, the CO₂ objective could increase to 3 MMBbl/d.

achieve the significantly greater public benefits of the accelerated development case.

V. Major Strategies

The overarching strategy for the Strategic Unconventional Fuels Program is to work collaboratively with private industry, affected states and communities, and other stakeholders to overcome the impediments to private investment in industry development and to achieve public and private goals. Oil sands development success in the Province of Alberta, Canada provides a laudable example of industry, government, and stakeholder collaboration that could be emulated. The Strategy reflects the full spectrum of crosscutting socioeconomic and environmental issues. Community involvement will enhance and accelerate industry development while assuring community needs and concerns are addressed.

The Task Force recommends adoption of the following strategies to address major development challenges:

Resource Access: Make unconventional fuels resources on public lands available to industry for sustainable development by leasing of resources on state or Federal lands, land exchanges, and resolving conflicting-use issues.

Technology: Facilitate accelerated private-sector development, demonstration and commercialization of efficient 1st generation and next-generation technologies. The Federal government will work with industry to craft a fast-track technology development and commercialization effort that includes: (1) Assessment of unconventional fuels resources and technologies, (2) Technical assistance to help industry resolve critical issues (3) Cost-shared demonstrations of promising existing technologies; and (4) Other RD&D and outreach efforts aimed at accelerating the advancement of first or next-generation technologies.

Development Economics: Federal and state governments should create a fiscal regime that attracts needed private development capital. Such a fiscal regime should provide incentives that reduce investment risk, accelerate return on investment, and stimulate private investment while minimizing public-sector risks/outlays.

Environmental Protection: The Program will encourage design and demonstration of commercial-scale plants to adopt and advance best available control technologies and apply best management practices to limit or mitigate environmental impacts. Cross-cutting outreach efforts will help solicit and address views and concerns of stakeholders. Basin and resource-specific environmental R&D will include development of effective strategies for carbon management and water management.

Socio-Economic Impacts: The Program will help states and communities prepare to support industry development, operation, and associated growth while mitigating against potential adverse impacts. It will help fund and support impact assessment, development planning, and education and training to maximize state and local employment opportunity, economic growth, and revenue-sharing with affected communities.

Regulatory/Permitting: The Program will help Federal and state agencies establish an inclusive regulatory system and review process that allows expeditious industry development and provides a predictable schedule for permitting approvals, consistent with Section 369(K) and other provisions of EPACT.

Public Infrastructure: The Program will help facilitate the availability of public infrastructure and resources sufficient to support unconventional fuels industry development and associated growth. This will entail crafting an integrated regional and local plan to support efficient development, realize synergies among various unconventional fuels, and reduce duplicative efforts/investments.

Water Resource Stewardship: The Program seeks to assure adequate water supplies to support industry development, community needs, and future water demand, to protect surface and groundwater quality, and to protect existing water rights. The Program will prepare an integrated assessment of water requirements, supplies, infrastructure needs, and water resource management approaches.

Markets: Industry must develop fuels that satisfy market demand. Assured markets for produced fuels are essential to project financing. The Program will identify and implement strategies for expanding the markets for unconventional fuels to public fleets, commercial aviation, trucking, and passenger vehicle use. The Department of Defense (DOD) could serve as a market initiator, if authorized to implement long-term purchase agreements for unconventional fuels that are fit for DOD needs. The Program will analyze expected markets for heavy oil, bitumen, and shale oil feedstocks and coal-derived liquid fuels, and potential impacts on markets for domestic crude oils.

Government Organization: A coordinated government approach to expedite rather than impede industry development will be essential to achieve program goals. The Program will assess the merits of several options for structuring an organization to stimulate industry development, manage and coordinate state, Federal, and local government efforts, provide a “one-stop shop” for permitting, and resolve key issues and impediments. Among the available options, establishing a government-chartered corporation should be given serious consideration.

VI. Program Benefits and Outlays

The Task Force has evaluated the potential production and associated benefits resulting from public actions to stimulate unconventional fuels development under three scenarios. Benefits evaluated include fuels production, net public revenue, value of

imports avoided, jobs, and contributions to gross domestic product (GDP). In all cases analyzed the net public benefits yielded positive results. The accelerated development scenario yields the greatest benefits in all cases analyzed. (Figures ES-4 – ES-6).

Figure ES-4. Annual Total Direct Public Sector Revenues

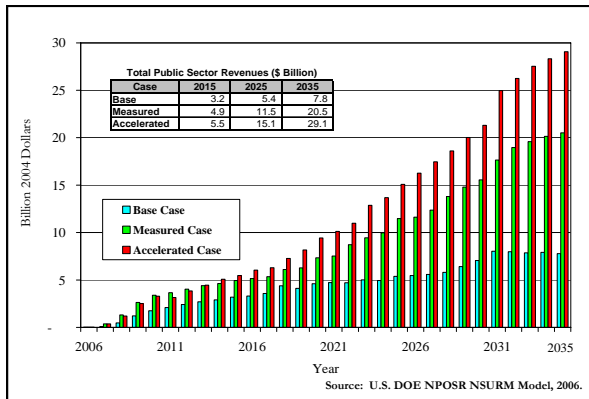


Figure ES-5. Annual Value of Imports Avoided and Direct Contribution to GDP

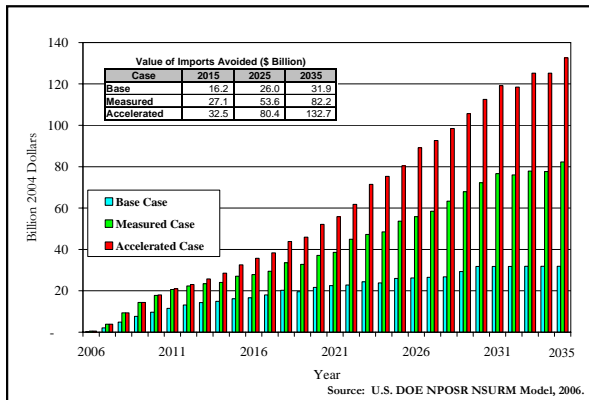
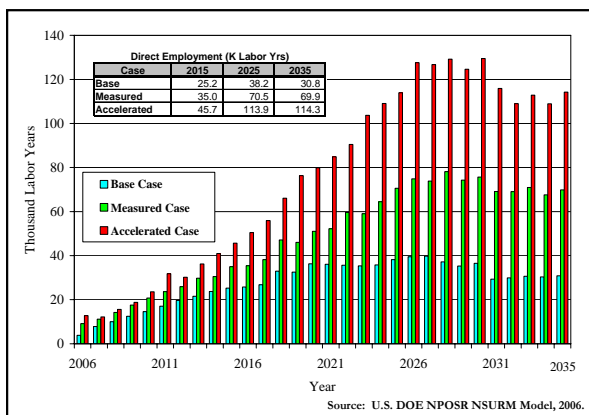


Figure ES-6. Annual Direct Petroleum Sector Employment



By 2035, incremental production of 7 million barrels per day would reduce the annual cost of imported oil and refined products and increase gross domestic product by \$133 billion. Net annual direct public sector revenues (from rents, royalties, and corporate and individual taxes) would exceed \$29 billion. In 2035, more than 114,000 direct petroleum sector jobs would exist; total jobs could exceed 260,000. Expected direct program outlays are estimated to be on the order of \$3 billion.

VII. Conclusions

Based on our analysis, the Task Force concludes that the domestic and global fuels supply situation and outlook is urgent. The Nation is substantially at risk, from an economic and national security perspective, to warrant development of an aggressive integrated unconventional fuels development program, supported by attendant policies to promote expeditious development of these resources.

Responsible development of America's oil shale, tar sands, heavy oil, coal, and oil resources amenable to recovery by carbon dioxide injection, by private industry, supported and encouraged by government actions to reduce uncertainties and stimulate investment, could supply all of the Department of Defense's domestic fuels demand by 2016, and supply upwards of 7 million barrels of domestically produced liquid fuels to domestic markets by 2035.

The challenges to domestic unconventional fuels development are significant, but not insurmountable. Coupled with focused efforts to stimulate improvements in fuel use efficiency and changes in consumer habits, demand growth can be slowed and America's dependence on oil imports can be significantly reduced to the benefit of our economy, our security, and our standard of living.

INTRODUCTION

The United States is endowed with significant unconventional natural resources that can be recovered and converted to liquid fuels for transportation and other uses including:

- Oil shale,
- Coal derived liquids,
- Tar sands,
- Heavy oil, and
- Oil resources amenable to production by injection of carbon dioxide (CO₂).

This document provides a strategy and an integrated program plan for promoting and accelerating development of the most promising of these resources. This document also presents recommendations to the Congress and the Administration for legislative, regulatory, and executive actions that will be necessary to authorize and implement the proposed plan.

The Strategic Unconventional Fuels Task Force has carefully reviewed the size and location of each resource, technologies for accessing and converting raw resources into fuels, and the economics of developing these fuels at commercial scale. The Task Force has also estimated the potential incremental production volumes that could be achieved to increase domestic fuels supplies and decrease oil imports over the next quarter century.

With current oil prices exceeding \$60/Bbl, and expected to remain at high levels, production of these unconventional fuels resources is likely to be economically viable, but requires government action to assure markets, reduce first-generation risk, and stimulate and accelerate private investment.

Technologies for producing these resources exist at different levels of maturity. Enhanced

oil recovery by CO₂ injection and indirect coal-to-liquids (CTL) production by gasification and Fischer-Tropsch processes have been demonstrated at commercial scale. Oil sands production technologies have been proven at commercial scale in Canada, but require adaptation for use in the structurally different U.S. tar sands resources. Oil shale technologies that were developed and tested at pilot scale in the 1970s provide the technical basis for development of more reliable, more efficient and less-costly approaches, as evidenced by new in-situ approaches being pursued in western Colorado by several energy companies. Heavy oil production can also be increased by advancing thermal technologies to enable production from deeper deposits and near-surface deposits in challenging Arctic environments.

Substantial progress has been made over the past three decades to improve the energy efficiency of technologies that will be applied to extract and process unconventional fuels resources, reducing costs and enhancing net energy balances.

To achieve the enormous potential of America's unconventional fuels resources, government and industry must work together to overcome several significant challenges:

- Removing regulatory or institutional barriers to development,
- Improving technology performance,
- Economically competing with conventional fuels,
- Mitigating adverse socio-economic risks in impacted communities,
- Minimizing water demand, while protecting water rights and quality, and

- Managing carbon emissions and other environmental impacts.

While significant, none of these challenges are deemed by the Task Force to be insurmountable. This strategy provides a path forward for addressing these challenges and facilitating development of these strategically important domestic fuels resources.

THE ALBERTA OIL SANDS ANALOG

The experience of the Province of Alberta, Canada in transforming its tremendous oil sands resources from a promising unconventional resource to a thriving multi-million barrel per day oil producing industry, can serve as an analog for the development of America's unconventional fuels resources. An Alberta analog is found for all of the major development challenges described above.

The Alberta experience demonstrated that:

- Oil sands technology, initially supported primarily by government research, development, and demonstration (RD&D), has matured significantly. Today most of the improvements in performance, reliability, and efficiency, are funded by industry with shared public investments in RD&D.
- Per barrel capital costs have dropped by one-third and operating costs by two-thirds through experience and technology improvements. Private investment was effectively stimulated by public fiscal measures that reduced investment risk by deferring royalty and other tax revenues until projects paid back initial investments.
- Net water use requirements have dropped from about five barrels (Bbl) per Bbl of syncrude produced to three Bbl per Bbl as new approaches for use minimization, water conservation, and water re-use have been implemented.
- Energy efficiency has improved to 83 percent from the original 71 percent and

sulfur and CO₂ emissions have been cut, correspondingly.

- Net revenues to Provincial and local communities have provided for schools, utilities, roads, public safety, recreation and other public services and infrastructure. Governments are debt-free, a desirable objective for U.S. locales. Various working groups have been established to facilitate frequent public input on all aspects affecting communities and quality of life. With assurances of long-term investment and employment, public and industry support for community development, communities have granted this unconventional fuels industry their "permission to practice."

Perhaps the most important feature of the Alberta analog is the bond of public-private partnership that has been forged by engaging and valuing the input of all stakeholders having interest in the development of the oil sands resource.

The Alberta analog provides compelling evidence that America's rich endowment of unconventional resources can also be developed efficiently, economically, and with respect for the environment and for the communities and regions where these vital resources exist. Since many U.S. companies are heavily involved in Alberta Oil Sands development, the transfer of technology, information, skilled labor, and other resources to domestic tar sands development may be facilitated.

AN INCREMENTAL APPROACH

The integrated strategy and program plan that follows incorporates lessons from Alberta and the extensive input of a broad range of contributors, stakeholders, and experts. Individual working groups were established for each of the major fuels resources addressed in the plan. Special attention was given to the need for strategies to address

several cross-cutting concerns associated with the concurrent development of multiple unconventional resources, including water resource management, carbon management, infrastructure availability, socio-economic issues, and markets.

In developing the strategy and program plan, the Task Force has anticipated both short and long term development requirements and adopted an incremental implementation approach. This approach moves each resource toward commercialization at its own pace, recognizing various stages of readiness. The plan relies on a detailed analysis and assessment of impediments and identifies and addresses those in most urgent need of attention. Resource access, technology readiness, investment and fiscal regime, environmental challenges, and socioeconomic acceptance are areas of critical interest.

The technology development plan adheres to the classic technology advancement approach, beginning with conceptualization and bench-scale verification, followed by feasibility assessments, and successive scale-up of field pilot, semi-works, and demonstration at commercially representative scales. The plan also provides for feasibility studies and design-level studies to reduce project risk before investing in demonstration facilities at commercially representative scale. Where technologies are already proven, the strategy provides for aggressive technology transfer to demonstrate and accelerate application of the technology to more users in more basins and regions.

The plan contemplates accelerating the industry development timetable through public sharing of a portion of the financial risk at the early high-risk development stages. The private sector takes on a greater portion of the financial risk in the later, more costly stages.

To achieve a meaningful schedule of production, recommendations are made for

improved resource access, mitigating investment risk, and achieving socioeconomic acceptance, and assuring responsible stewardship of the environment.

The Strategy and Program Plan address the full spectrum of cross-cutting socio-economic and environmental issues. Focused outreach to foster community involvement will enhance and accelerate industry development while assuring that community needs and concerns are addressed.

GUIDE TO THE STRATEGY AND PLAN

Volume I – Preparation Strategy, Plan, and Recommendations, explores the potential for development of America’s unconventional fuels resources. It offers three production scenarios: business-as-usual, measured development, and accelerated development, and examines the potential energy supply contributions for each case. National economic and security factors and costs and benefits of pursuing development of these resources are addressed.

Volume I lays out a broad strategy and summarizes the planned application of that strategy for development of each of the five target resources. It summarizes the approach for addressing the major crosscutting concerns for development of each of these industries. Finally, this volume provides a plan for management of this integrated effort and an initial schedule of activities and milestones to be achieved.

Volume II, Resource-Specific and Crosscutting Plans, provides detailed subplans for each of the five target resources and the six cross-cutting areas.

Volume III, Resource and Technology Profiles, provides a compilation of the resource and technology profiles that explore the resource potential in greater detail.

PART A

SITUATION ANALYSIS AND PROGRAM RATIONALE

SITUATION ANALYSIS AND PROGRAM RATIONALE

NATIONAL ENERGY AND SECURITY CONCERNS

World petroleum supply trends indicate that the days of inexpensive oil may be over. In fact, there is growing evidence that it may be only a few years before production shortfalls materially constrain the availability of liquid fuels; driving up prices and eroding demand.

A transition from low cost, high energy content conventional petroleum to the next-most cost effective set of resources is inevitable. Alberta's recent addition of 176 billion barrels of proved reserves from oil sands provides ample evidence that the transition has substantially begun.

U.S. demand for oil and liquid fuels is projected to continue to rise. Without increased domestic production this increased demand will necessarily be met with imports of crude oil and refined products. The increasing dependence of the United States on foreign imports, and the economic and security vulnerabilities that result from that dependence, dictate that we must produce more liquid fuels at home while also slowing the growing rate of demand.

The United States is fortunate to possess large, undeveloped domestic energy resources that have the potential to provide a reliable long-term contribution to our domestic energy needs. These resources include primarily coal and oil shale, as well as domestic tar sands, heavy oil and conventional oil amenable to carbon dioxide enhanced oil recovery (CO₂ EOR).

However, these unconventional fuels resources are not yet significantly contributing to meeting the nation's energy

needs. A number of identified challenges must be met before the private sector will respond to these investment opportunities.

Even with concerted public and private efforts, the earliest commercial production of shale oil or coal liquids is not likely until the next decade away. If the nation desires added production to reduce dependence on imports, private industry will need to initiate multiple first-generation plants within the next 5 to 10 years. These plants would provide a sufficient initial production base that could support major expansion.

THE CENTRAL ISSUE - LIQUID FUELS SUPPLY

Our nation's economic and physical security relies on the availability of fossil fuels, particularly petroleum liquids. By all accounts, our reliance on liquid fuels to meet civilian and military requirements will continue for the foreseeable future.

Rising global demand for petroleum, in the face of peaking global production and geopolitical uncertainties, is *already* causing competition for supplies among consuming countries. Many countries are trying to assure future supplies through long-term purchase contracts with producers and other economic incentives, i.e. China in Sudan.

Escalating oil prices present adverse economic and balance-of-payments effects. Increasing vulnerability to supply disruptions presents urgent strategic, energy and national security challenges for the nation. To address these adverse impacts and vulnerabilities we have little choice but to increase domestic fuels production and improve end-use efficiency of our energy consumption.

GROWING EVIDENCE OF GLOBAL SUPPLY CONSTRAINTS

According to recent Congressional testimony, “Excluding deepwater oilfields, output from 54 of the 65 largest oil-producing countries in the world is in decline. Only a few countries, Saudi Arabia, Iraq, Kuwait, United Arab Emirates, Kazakhstan, and Bolivia, have the potential to produce more oil. By 2010, production from these countries and from deepwater fields will have to offset the decline in 59 countries and the increased demand from the rest of the world”.¹

Most countries outside of the Organization of Petroleum Exporting Countries (OPEC) and the Former Soviet Union (FSU) may have *already* reached peak oil production. Only a few OPEC and FSU countries have the capacity to increase production. Many net exporters now require more of their own oil to meet growing domestic needs, thus limiting volumes available for export.

New conventional oil is harder to find; discoveries are smaller, and the oil quality is diminished. Most of these resources are found in challenging environments or

offshore or frontier areas where the resource is more difficult to produce.

Future oil market tightness experienced by free market consumers will be exacerbated by the fact that only about 15 percent of the world’s oil reserves are controlled by publicly traded companies, the remainder is controlled by national oil companies.

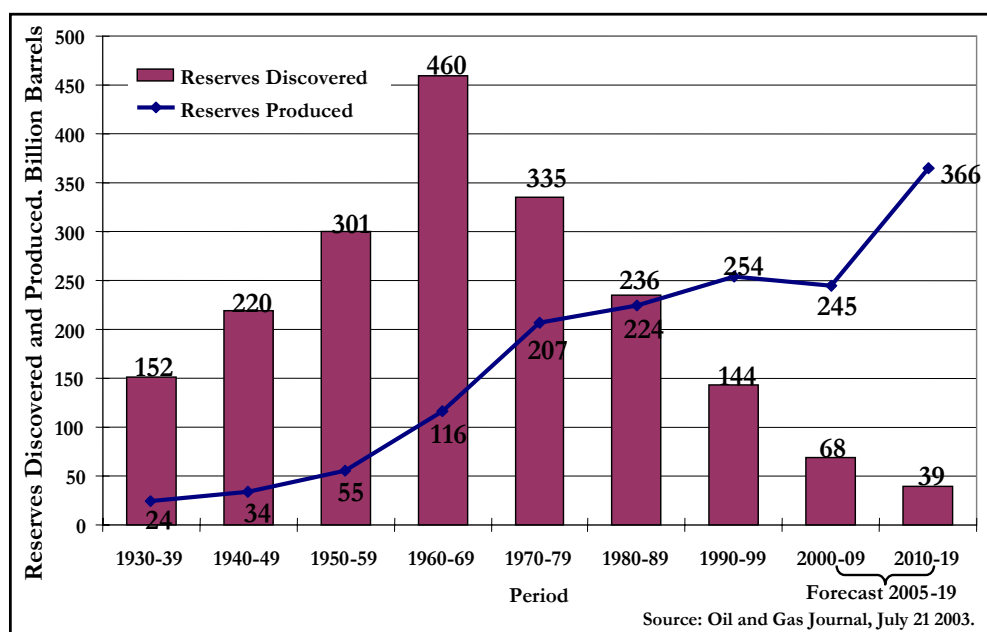
GLOBAL RESERVES DEPLETION

Discovery and production trends support the depletion view. For the past two decades, reserve additions have failed to keep pace with consumption.

Past Discoveries: Worldwide exploration for oil exploded early in the 20th century. Giant fields were discovered in Iran, Iraq, and Kuwait in the 1930’s. Reserve additions peaked in the 1960’s when 460 billion barrels of reserves were added in a single ten-year period (Figure I-1).²

After 1969, giant field discoveries became fewer and smaller. By the end of the twentieth century, industry had discovered nearly 1.9 trillion barrels of reserves.

Figure I-1. World Oil Discoveries Peaked in the 1960’s



Consumption: Worldwide oil production has continued to grow to meet rising demand. Demand has increased nearly ten-fold relative to the modest use of the 1930's. As a result, oil is being produced from past discoveries much faster than it is being replaced with new discoveries. By 1999, cumulative production totaled 0.9 trillion barrels, about half of all of the oil ever discovered until that time.

A Shrinking Reserves Base: The reserve base needed to support future production continues to shrink. The world's remaining reserves declined 28 percent between 1980 and 2000 (Figure I-2).³ By 2009, about 60 percent of the world's cumulative oil reserves will have been produced. The remaining known reserves base is not adequate to meet forecasted future demand through 2019.

GROWING COMPETITION FOR SUPPLY

Increasing oil production from known reserves can have only one outcome: future oil supply will not be sufficient to meet forecasted demand, even if higher oil prices curb the rate of oil demand growth. Limited

oil amid rising global and U.S. demand, and constrained global supply, the world's developing nations are engaging in a worldwide competition to secure long-term sources of supply to fuel their rapidly developing economies. The two strongest examples of this trend are China and India.

More Of America's Oil Demand Will Be Supplied From Imports: Domestic oil production will increase as higher prices justify in-fill drilling, improved recovery, and production from higher-cost resources. However, this increase is not likely to be sufficient to arrest the growth of oil imports that will be required to meet demand.

The U.S. Energy Information Administration (EIA) projects that crude oil and refined product imports will continue to grow, increasing by 50 percent over the 2004 level to 18 million barrels per day, or 65 percent of demand, by 2030 (Figure I-3).

China: China's petroleum demand is expected to double by 2025 to 12.8 million Bbl/d. To assure adequate supply, China is securing supplies through investments, development agreements, and purchase agreements with producing countries.

Figure I- 2. World Remaining Oil Reserves Continue to Shrink

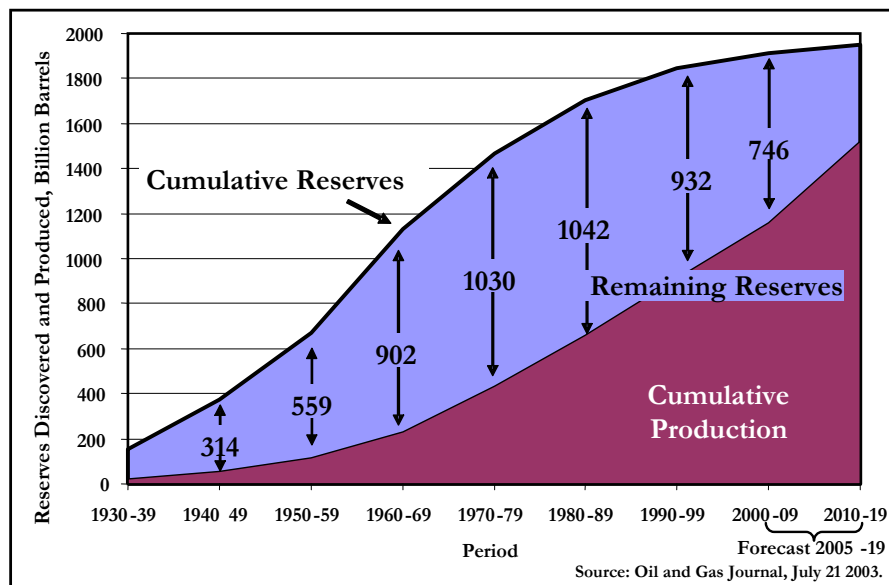
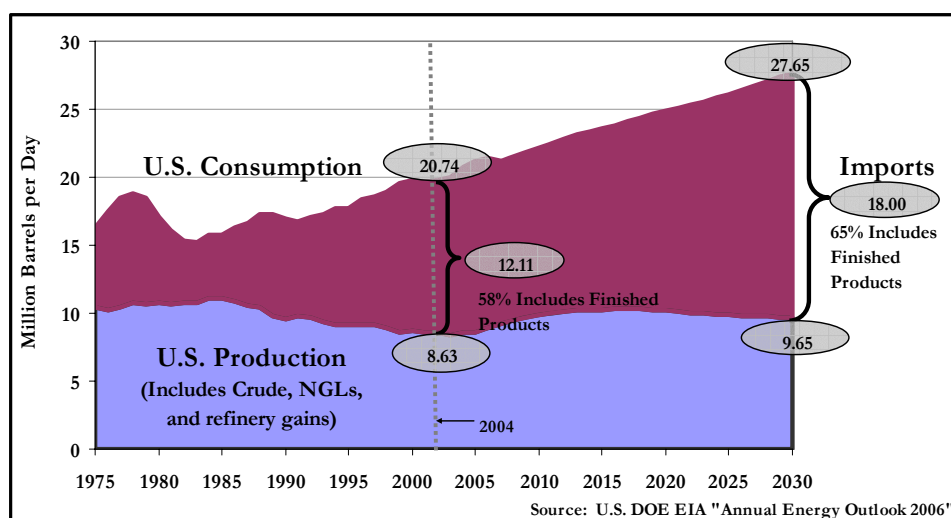


Figure I- 3. U.S. Liquid Fuels Demand and Imports will Continue to Increase



Agreements have been reached to assist the development of synthetic crude oil from Canada's tar sands reserves. China has also agreed to finance a syncrude pipeline from Alberta to the coast of British Columbia that would enable syncrude exports to China.

China already operates two significant oil fields in Venezuela and has offered to assume the maintenance and upgrading of several others in return for dedicated oil export to China. China is also reportedly seeking to negotiate long-term purchase agreements with Mexico's state-owned PEMEX. The impacts of all of these agreements could be to reduce Western Hemisphere oil supplies to the United States, increasing U.S. dependence on non-Western sources, including OPEC.

India: India's rapidly expanding economy is also creating increased demand for petroleum. Imports are projected to rise 28 percent by 2009. Through its partially state-owned Oil and Natural Gas Corporation (ONGC), India is offering technical assistance to oil developers, investment financing, and field services in return for supply guarantees. An oil cooperation and production sharing agreement has been reached with Venezuela, adding to the slate of similar agreements for projects in Russia, Vietnam, the Sudan, Myanmar, and Australia.

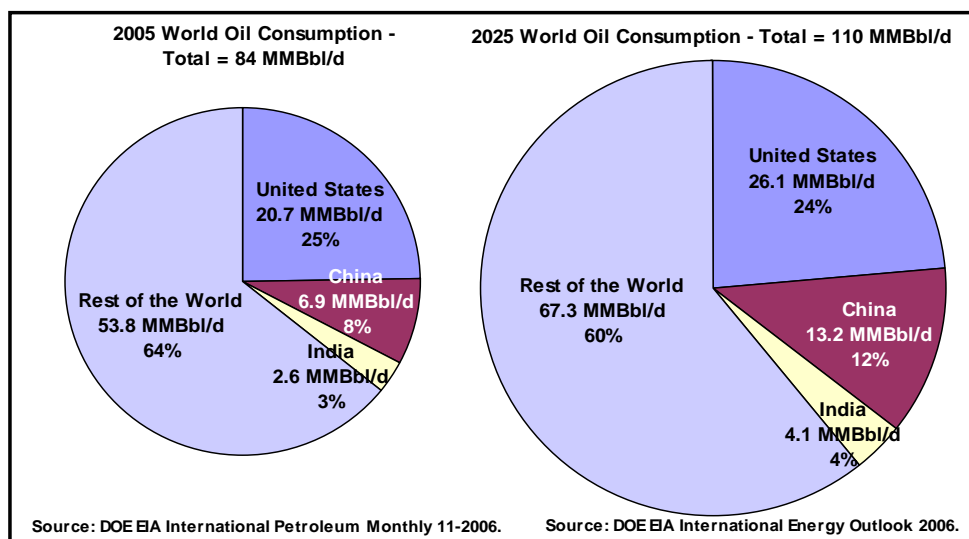
Figure I-4 shows the volume and percentage of oil that China and India consumed in 2005 and the projected volumes that they will consume in 2025. This image clearly illustrates the growing demand in China and India and the increase in the world's supply that these countries will consume.

Implications of Supply Agreements: Long-term supply agreements are increasing in frequency and size around the world as economies in Asia, Europe, and elsewhere seek to lock-in secure sources of supply. Although these "off-market" agreements reduce both supply and demand in the global free market, they increase supply risk to the world's other consuming nations.

By reducing the volumes traded in open markets, and increasing supply risk, these agreements may lead to increased volatility and higher prices in the spot market.

Many countries are pursuing energy supply strategies as explicit high-priority elements of public policy. As such, the fungibility in supply markets is increasingly constrained by economic and geopolitical as well as market factors. Increased competition for limited oil supply will drive oil prices higher and force demand reductions on those who need fuels most and can least afford higher prices.

Figure I- 4. World Oil Demand (2005 vs. 2025)



ECONOMIC CONCERNS

The rapidly changing outlook for global petroleum demand, supply, and markets will pose significant challenges to the U.S. economy and to other economies throughout the world.

Global Oil and Fuel Prices: The most fundamental of these impacts will be an increase in the price of crude oil and refined products. At some point, higher energy costs will result in both energy conservation and fuel switching, slowing the rate of increase in domestic petroleum demand. The price point where fuel demand becomes price-elastic depends on the relative wealth of the consumer, with developing countries feeling a greater impact from escalating prices than wealthier countries. Recent market experience has shown that the price point where U.S. consumers begin to significantly alter consumption patterns is much higher than the recent price of \$65 per barrel for crude or \$2.75 per gallon for gasoline. As prices climb, consumers will be forced to use less fuel or find alternative energy sources. The rate at which this change occurs will depend on market prices, and perhaps more importantly, the rate at which prices change.

Adding new domestic unconventional fuels supplies can reduce oil market uncertainty about future oil supplies and dampen the volatility of world oil prices.

Cost of Imports and Balance of Trade:

The rising volume and price of crude oil and refined product imports will cause import costs to increase significantly. The increased cost of imported energy will likely adversely impact the nation's balance of trade. If oil producing nations do not purchase an equal value of American exports, these costs will further erode the value of the U.S. dollar relative to other currencies.

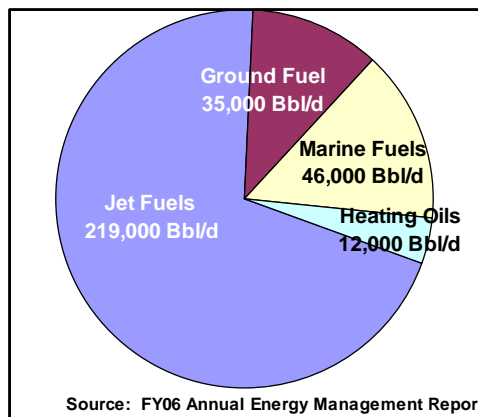
Economic Growth: Higher oil and fuel prices will constrain economic growth and hamper the creation of high value jobs in the domestic economy. Higher domestic energy costs will also contribute to increasing inflationary pressures on the U.S. economy.

The United States must be prepared for higher energy costs as it inevitably transitions from conventional petroleum to other unconventional fossil and renewable fuels. It is imperative that the United States consider the full range of energy options to address these concerns. We must begin development of the most economic and efficient domestic fuels.

NATIONAL SECURITY AND DEFENSE READINESS CONCERNS

The Department of Defense (DOD) needs secure and reliable sources of energy. In 2006, the DOD purchased 312 MBbl/d to meet its defense requirements.⁴ Of the total, 219 MBbl/d were jet fuels, 35 MBbl/d were ground fuels, 46 MBbl/d were marine fuels, 46 MBbl/d were marine fuels, and 12 MBbl/d were heating oils (Figure I-5).

Figure I- 5. Department of Defense Fuels Purchases (2006)



Global oil market trends raise concerns that threaten defense fuel supplies, impede supply logistics, adversely impact defense fuel costs and budgets, and limit the nation's readiness to respond to threats or deploy forces.

Supply Vulnerability: The changing dynamics of the global energy market and the instability of major sources due to increased political instability including Saudi Arabia, Iraq, Venezuela, and Nigeria, raise concerns with DOE/DOD about the security of defense fuels supply and threat of interruptions.

Further, the petroleum industry's concentration of large refineries along the nation's coast and its drive to improve profitability by reducing stored crude oil and products also exacerbates defense supply vulnerability. Any significant supply disruption will likely require an emergency response, including release of oil stored in the Strategic Petroleum Reserve, to keep refineries

operating and fuels flowing to meet military, commercial, industrial, and public needs.

Rising Defense Energy Costs: Rising global oil demand, peaking production, and increasing volatility and uncertainty in major producing areas of the world have recently caused oil prices to exceed \$70/Bbl, with projections that they may go even higher. As a result, military fuels costs have tripled since fiscal year (FY) 2000, impacting both the Federal budget and programs that support the defense mission. Increased fuel and higher fuel prices have caused annual DOD fuel expenditures to rise from \$3.9 billion in FY 2002 to \$13 billion in FY 2006.

As fuel costs increase, DOD is forced to reprogram funds and adjust priorities or seek supplemental funding from Congress. Continuing adjustment of acquisition and logistics programs to compensate for rising fuel costs can reduce availability of military hardware and effect overall readiness.

Rising fuel costs also impact the ability of first responders including police, firefighters, and paramedics to respond to terrorist acts or other disasters. Many municipalities are forced to make decisions affecting availability of services or manpower to offset the rising cost of fuel. These reductions increase the risk to our national security.

Analyses conducted by the DOD conclude that liquid fuels from oil shale, coal, and petroleum coke offer the best near-term solutions to meet defense fuel specifications and requirements. Of these, oil shale and coal represent the nation's largest domestic resources that are likely to be technically and economically viable in the foreseeable future.

DOD Assured Fuels Initiative: The DOD is investigating the potential to certify unconventional fuels for use in a significant portion of its fuels demand. The Air Force is currently testing synthetic fuels combined with conventional JP-8 jet fuel for use in aircraft engines. The B-52 was certified to fly

the 50/50 blend on August 8, 2007. The Air Force goal is to certify the entire fleet by early 2011. Testing will continue for synthetic fuels up to 100%. The Air Force's goal is to acquire 50% of its continental U.S. fuel requirements from domestic sources by 2016. This includes the capture and reuse of the CO₂ produced during the F-T process. In addition, both the Army and Navy have synthetic fuel testing and certification programs underway.

The Commercial Aviation Alternative Fuels Initiative has a goal of certifying the commercial aviation fleet for use of 50/50 blend by 2008, 100% by 2010. Airlines represent 85% of the domestic jet fuel market and their acquisition of synthetics would be significant.

Current testing fuels are sourced from a gas-to-liquids process. However, as fuels made by coal-gasification and Fischer-Tropsch become available, they too will be tested.

DOD envisions its role as that of a "market initiator" providing sufficient demand to absorb initial production volumes of unconventional fuels. Private sector processors and refiners would manufacture the fuels that are "fit to purpose" for defense sector uses with additional production acquired by the private sector.

Accelerating a transition to greater use of diesel fuels in light-duty civilian vehicles would provide further assurances of ample markets for unconventional fuels and contribute to efficiency gains.

The Task Force concludes that it is in the long-term national security interest of the United States to pursue development of secure domestic sources of strategic fuels.

U.S. DOMESTIC LIQUID FUELS RESOURCES

There is no single solution to America's energy needs. For long-term national security, the nation needs to consider the full range of unconventional energy resources that are

available to supplement conventional oil. Fortunately, the nation is endowed with *conventional* and *unconventional* energy resources that can provide a continuing flow of oil or synthetic fuels to the economy.

CONVENTIONAL OIL RESOURCES

Conventional crude oil resources consist of remaining proved reserves and undiscovered oil.

Remaining proved reserves are oil that has already been discovered but not yet produced. This is the oil that can be produced with current technology at current market prices. Current U.S. proved crude oil reserves total about 22 billion barrels. Conventional technology enables about one-third of discovered oil to be produced. The known oil that is left behind is about 307 billion barrels⁵. This oil is the target for advanced secondary recovery (ASR) techniques and enhanced oil recovery (EOR) technologies.

Undiscovered oil remains to be found through extension of existing fields, discovery of new fields, or discovery of new reservoirs in existing oil fields. In 2004, U.S. total discoveries of crude oil reserves were 782 million barrels⁶. The majority of these discoveries were in the Gulf of Mexico. The United States discovered an average of 900 million barrels of new crude oil reserves per year from 1976 through 2004⁷. If this trend continues, 18 billion barrels of discoveries are possible over the next 2 decades.

Conventional oil resources fueled America's economic growth throughout the 20th century. As the nation proceeds through the 21st century, some conventional resources will continue to be found and will be more intensely produced. However, conventional resources alone, even with the recent deepwater discoveries, will be insufficient to support our growing need for liquid fuels. They can, however, be supplemented by using the nation's vast unconventional oil resources.

UNCONVENTIONAL OIL RESOURCES

North America is endowed with substantial unconventional resources that could be produced and converted to liquid fuels. These resources have gone largely undeveloped due to high production costs relative to conventional light crude oil and other uncertainties. These resources vary by region, magnitude, and in technology readiness for commercial production.

Production of fuels from domestic unconventional resources could reduce imports, reduce our nation's vulnerability to supply disruptions, and sustain or grow domestic economic activity.

North America's oil shale and tar sands resources, alone, far exceed the known remaining proved and undiscovered oil resources of the entire world. They represent some 3.5 trillion barrels of resource in place, of which 1 trillion barrels could be ultimately recovered and produced, with existing and advancing technologies under normal economic conditions.

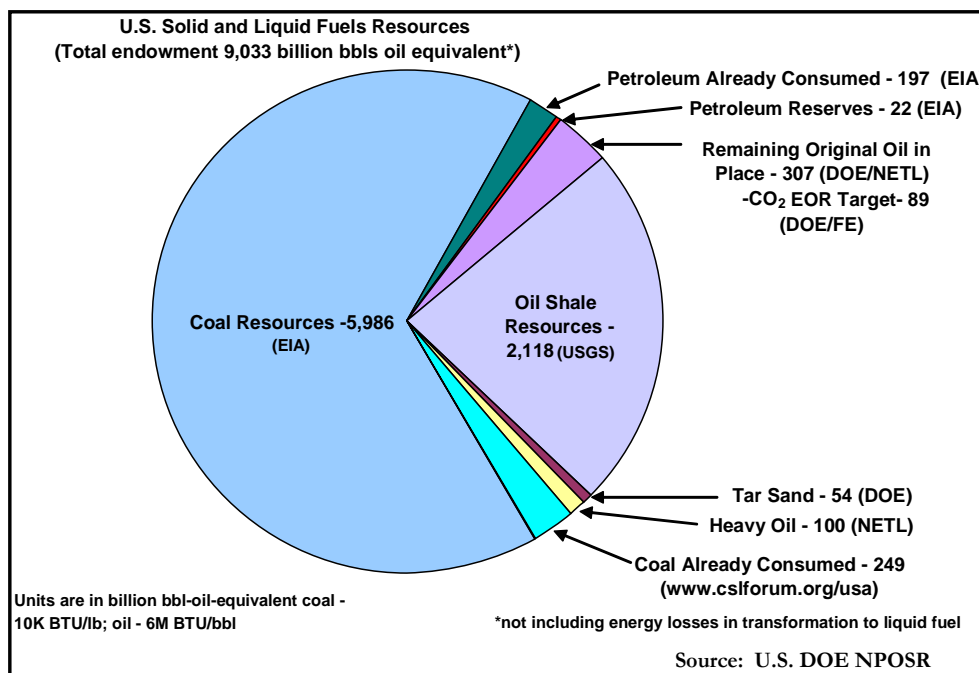
Our nation's endowment of solid and liquid resources that could be used to produce domestic fuels extends well beyond oil shale and tar sands. Principal among these resources are coal-derived liquids, heavy oil, and oil amenable to CO₂ EOR.

Figure I-6 shows the nation's original endowment of solid and liquid fuels resources, including that which has already been consumed.⁸ The extent and locations of the resource-in-place are both well known and largely quantified. For most, there is little if any exploration risk.

Coal-Derived Liquids: Liquid fuels can be produced from America's extensive coal resources by both *direct* and *indirect* liquefaction methods. Mature technologies exist for both approaches, but require demonstration at commercial scale.

Current U.S. proven coal reserves exceed 267 billion short tons – approximately 250 years of supply at current production rates, about 1.1 billion tons in 2005.⁹ Nearly all U.S. coal production is used for electric power generation.

Figure I- 6. America's Original Endowment of Solid and Liquid Fuels Resources



The four types of coal found in the United States differ in composition and energy yield. They rank from anthracite to bituminous to sub-bituminous to lignite, with carbon content and energy yield decreasing with the rank. Figure I-7 shows the geographic distribution of U.S. coal resources.¹⁰ DOE estimates that a 2.6 million barrel per day coal liquids industry would consume between 425 million and 950 million tons of coal per year, depending on coal quality.

The majority of the initial production would come from plants using gasification and conversion by Fischer-Tropsch technology to liquid fuels. Improved economics and environmental benefits may be achieved by integrating gasification, power generation, and liquefaction technologies in a “poly-generation” facility. This approach has not yet been demonstrated in the United States.

Most U.S. coal is suitable for gasification with oxygen and steam. The synthetic gas can be used to generate clean electric power or various other energy carriers such as hydrogen

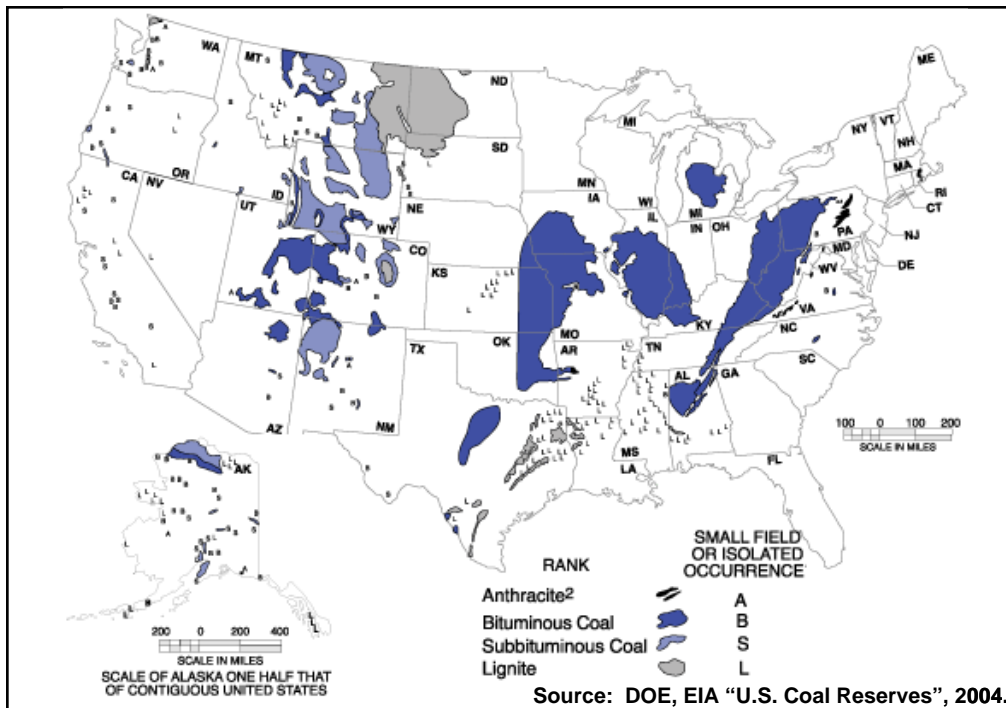
or liquid fuels such as ultra clean diesel, and jet fuels, using Fischer-Tropsch (F-T) synthesis to convert the gas to liquids.

The technology has been demonstrated at commercial scale in South Africa in three facilities operated by Sasol since 1980. The integration of more recent entrained coal gasification technology with F-T synthesis, has not been demonstrated with U.S. coal, but appears promising.

Indirect coal liquefaction plants can be configured to produce liquid fuels or a combination of liquids, power, hydrogen, and/or chemicals. The “co-production” or “poly-generation” plants may offer superior economic or environmental performance.

However, while all of the component technologies (gasification, integrated gasification combined cycle (IGCC) generation, and F-T synthesis to liquids) have been individually demonstrated, no *integrated* plant has yet been demonstrated at commercial scale in the United States.

Figure I- 7. U.S. Coal Deposits



First of a kind domestic coal to liquids plants are likely to have capital costs ranging from \$87,000 to \$98,000 per daily barrel of capacity. Capital costs for a 32,000 Bbl/d plant (excluding financing costs) would be between \$2.6 and \$2.95 billion, depending on the coal type (bituminous vs. lignite) and whether the plant will use carbon capture and compression technologies¹¹. With these economics, produced fuels may be competitive with a world price for light sweet crude oil at or above \$55 to \$58/Bbl (depending on the coal type, plant configuration, and rate of return), excluding tax credits or other subsidies.¹²

Most U.S. plants presently envisioned have capacities of between 10,000 and 50,000 Bbl/d. Plants smaller than 32,000 Bbl/d will have greater per barrel capital costs. Plants larger than 30,000 (up to about 80,000 Bbl/d) will have smaller per barrel capital costs, but may be more difficult to finance.¹³

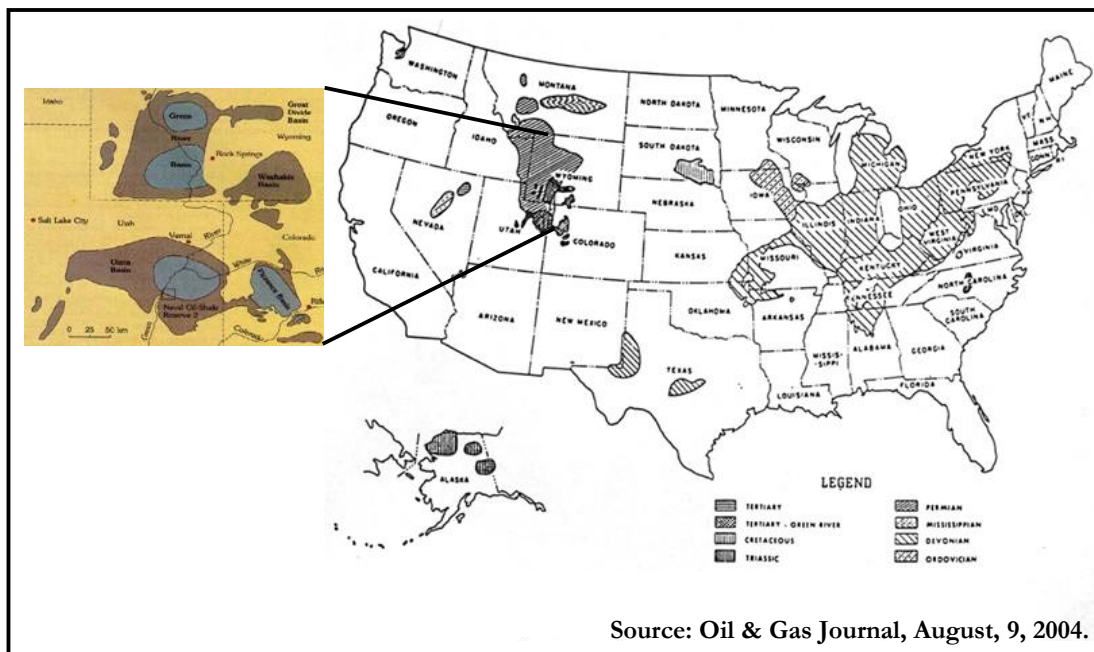
Recently, the National Coal Council estimated that coal liquids production, primarily from *indirect* liquefaction using coal gasification and F-T synthesis techniques, could reach 2.6 million barrels per day by 2025, consuming

475 million tons per year of coal. At least 14 U.S. indirect coal liquefaction projects, ranging in capacity from 2,000 to 50,000 barrels per day were being actively considered at the time of this analysis.¹⁴ Given the magnitude of the domestic coal resource, with more aggressive industry investment, the potential could be significantly higher by 2035.

Direct liquefaction, refined coal, and coal-slurry liquids processes also offer potential for quality transportation and/or boiler fuels. However, additional analysis is required by the Task Force to assess the production potential for various liquid transportation fuels from coal using indirect and direct liquefaction and other coal-liquids technologies.

Oil Shale: Oil shale is extremely well suited for producing premium quality refinery feedstocks for diesel and jet fuels. The manufacturing processes can also yield significant quantities of value-added chemical byproducts. Figure I-8 shows the locations of U.S. eastern and western oil shale deposits, with a detailed view of the Green River Formation.¹⁵

Figure I- 8. Known Oil Shale Deposits of the United States



America's commercial-quality oil shale resources exceed 2 trillion barrels, including about 1.5 trillion barrels of oil equivalent in high quality shales concentrated in the Green River Formation in Colorado, Utah, and Wyoming. Other lower quality and less concentrated resources, totaling about 619 billion barrels, are deposited in several southern and eastern states.

These oil shale resources can be processed in-situ, or mined and processed in surface retorts, to generate ultra-clean, superior quality diesel and jet fuels and other high-value chemicals. Depending on technology and economics, as much as 800 billion barrels of oil equivalent could be recoverable from oil shale resources yielding >25 gallons per ton. Under foreseeable development scenarios, production of fuels from domestic oil shale could potentially exceed 3 million Bbl/d.¹⁶

The sizeable response to the Department of Interior's 2005 offering for oil shale RD&D leases on Federal lands signals that private industry may again be ready to aggressively pursue the potential of the oil shale resources.

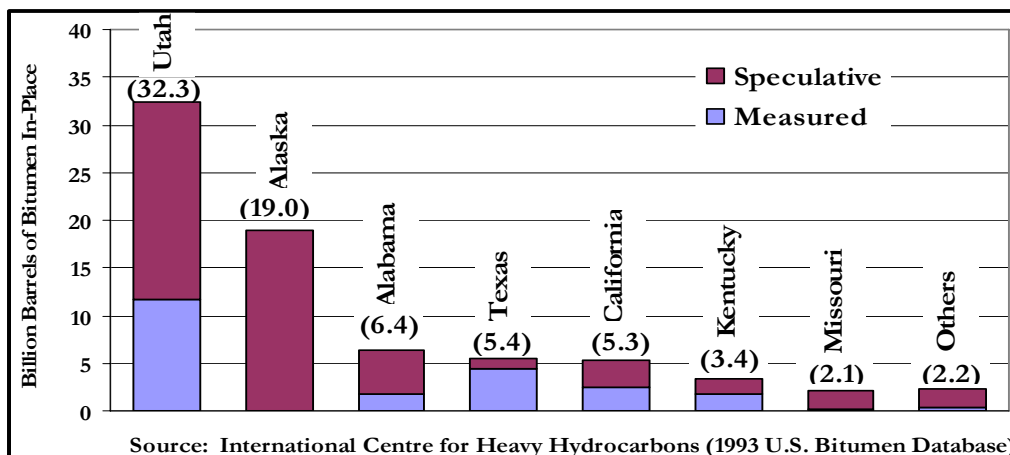
A range of surface and subsurface (in-situ) technologies have been developed for heating and converting oil shale into kerogen oil that can be upgraded to serve as a high quality refinery feedstock. Various technologies have been tested at small-scale, but no technology

has yet been demonstrated at commercially-representative scale in the United States. Considerable private investment will be required to advance, test, and demonstrate successful first generation surface and subsurface technologies leading toward commercial scale production.

Tar Sands: America's tar sands resources exceed 54 billion barrels of which 11 billion barrels could be recoverable. Some 32 billion barrels of the resource are located in Utah, 18 billion in Alaska, and the remainder is distributed in Alabama, Texas, California, Kentucky and other states (Figure I-9).¹⁷

U.S. tar sands are typically found in sandstone. They differ in composition and quality from the more extensive oil sands that are now being aggressively developed in the Province of Alberta. Unlike Alberta oil sands, the grains of sand are often consolidated or cemented. Much of the U.S. resource is also "hydrocarbon-wet" as opposed to "water-wet," making bitumen-extraction by conventional water separation processes less feasible. These characteristics require new technology designs to enable recovery of the bitumen. Although the advances in understanding and technologies for Alberta oil sands development has relevance and applicability to U.S. tar sands

Figure I-9 U.S. Tar Sands Resources (Measured and Speculative)



resources, initial estimates suggest that it is unlikely that domestic production could exceed 0.35 million Bbl/d by 2035. Participation of U.S. companies in Alberta oil sands development may help to facilitate oil sands technology application in the U.S.

Heavy Oil: Estimates of U.S. heavy oil-in-place range from 60 to 100 billion barrels, of which 2 billion barrels are proved reserves and another 20 billion barrels could ultimately be technically recoverable.

The viscosity of heavy oil makes it immobile, requiring heat or solvent gases to make it flow, or direct mining for recovery. Current U.S. heavy oil production by thermal recovery is 302 MBbl/d and approaches 500 MBbl/d when other processes are included.¹⁸ Additional production of 500 MBbl/d may be achieved.¹⁹

Most U.S. heavy oil resources are located in California (73%) and Alaska (20%) with the remainder in the Gulf Coast, Rockies, Mid-Continent, and Permian Basin. In Alaska, the West Sak and Schrader Bluffs fields may contain 10 to 20 billion barrels of resource.²⁰

Technology advances in the United States, Canada, and Venezuela enable production activities to target heavier oils in remote settings; frequently located at shallower depths making them accessible. Advances in steam flooding, vapor extraction, and CO₂ EOR offer promise to increase production. Still, application of the most advanced current heavy oil technology remains limited to the resource in the “best reservoirs.”

CO₂ Enhanced Oil Recovery and Carbon Capture: Some 300 billion barrels of “immobile” conventional oil remains in known reservoirs after primary and secondary production. As reported by the DOE Office of Oil and Natural Gas, the target for CO₂ EOR is 89 billion barrels. A portion of this oil could be recovered, using demonstrated technologies, by injecting CO₂.

Current 2005 domestic oil production by CO₂ EOR techniques is 237 MBbl/d from 82 projects²¹. Production is constrained by economics, the price of CO₂, and infrastructure for delivery of CO₂ to candidate reservoirs. Absent the constraint of CO₂ supply, the number of projects, potential reserve additions, and daily production could be far greater, but would require significant investments in CO₂ pipeline infrastructure that may only be justifiable where target resources are highly concentrated or located close to natural or industrial CO₂ sources.

The DOE Office of Oil and Natural Gas has recently published a series of “basin studies” that estimate potential technical recovery from U.S. reservoirs using state-of-the-art CO₂ EOR technology.²² Potential oil recovery could be enhanced by increased supplies of CO₂ from industrial sources, including unconventional fuels production. Significant potential may exist for synergistic benefits to be achieved from the concurrent development of these unconventional resources and increased CO₂ EOR development providing opportunities for carbon storage in oil reservoirs. The Department of Energy is investigating this potential, in collaboration with states, academia and other industry partners as part of its ongoing Carbon Sequestration Program.

ENERGY BALANCES OF UNCONVENTIONAL FUELS

There has been much debate about the energy balances of various unconventional fuels relative to conventional petroleum. It is imperative that energy balance issues be considered in the deliberations and recommendations of the Task Force. As the world transitions from conventional petroleum to greater use of unconventional oil resources, more energy will be required to convert resources to end-use fuels.

Some years ago, M. King Hubbert, credited with first articulating the ‘peak oil’ phenomenon, observed that:

“So long as oil is used as a source of energy, when the energy cost of recovering a barrel of oil becomes greater than the energy content of the oil, production will cease no matter what the monetary price may be”²³.

Ultimately, there is a constraint on the amount of additional resources that will become categorized as reserves due to increasing oil prices as the economics will begin to fail when the value of the energy consumed in production approaches the value of the energy produced.

More energy will be required to produce unconventional resources than was required in the era of ‘easy oil’. Unlike conventional oil and gas, unconventional fuels cannot be produced without additional process steps to recover the hydrocarbons and convert them to fluids; requiring more energy. Nonetheless, many of these resources can be produced with substantial energy gains.

The energy cost of the additional steps increases as the grade (hydrocarbon content) of the resource declines, with increasing depth, and decreasing thickness. As resources become more difficult to produce, the first-law efficiency will decrease. Figure I-10

shows that the production efficiency for three selected resources declines as oil becomes harder to recover.

Using data from commercial operations, where available, and engineering estimates, Table I-1 illustrates the expected energy efficiencies for various resources. In this calculation only the external energy imported to the process is used to calculate the energy return on investment (EROI), which is to say the volume of energy produced relative to the energy expended to produce it.

It was not long ago that conventional primary petroleum production yielded EROI of 20-to-1 or more. The added energy cost of secondary waterflooding, enhanced oil recovery, and shallow and deepwater offshore exploration and production have reduced the energy return on investment of conventional oil to about 10-to-1. The net 1st law energy efficiency of producing conventional crude oil is about 92 percent for an average major integrated corporation.

Simple economics dictates that resources with a negative net energy balance will not be produced. Hubbert suggests that resources with an EROI less than 50 percent will not be pursued, regardless of economic return. As supplies of the most energy efficient fuels

Figure I- 10. Energy Production Efficiency vs. Production (Trillion Bbl)

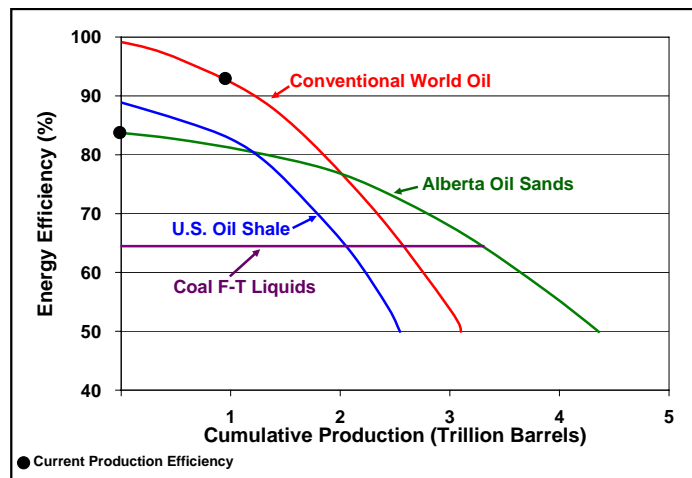


Table I- 1. Energy Efficiency and Balances for Conventional and Unconventional Fuels

Resource and Process	1st Law Efficiency (%)	Energy Return on Investment (EROI)
Conventional Petroleum	92	10.5
U.S. Oil Shale (Surface)	82	>10.0
Alberta Oil Sands (Surface)	82	7.2
Alberta Oil Sands (in-situ) (similar to heavy oil)	86	5.0
U.S. Oil Shale (in-situ, non-electric heat)	89	6.9
U.S. Oil Shale (in-situ, electric heat)	78	2.5
Coal Gasification with Fischer-Tropsch	65*	6.0
Ethanol from Corn Fermentation (Wang)	52	0.34

*The apparent 1st law efficiency assumes a large portion of power generation; with less power generation and corresponding higher liquid yields, 1st law efficiency would be higher than 61%.

become more constrained, industry will move to the next most energy efficient resource. This program’s goal is to accelerate the pace of unconventional fuels development to smooth that transition, rather than waiting for and reacting to a major supply shortage.

POTENTIAL TO AUGMENT DOMESTIC OIL SUPPLY

America’s unconventional fuels resources, in combination, offer the *potential* to increase domestic production and global supply by 2.3 MMBbl/d by 2015, 4.4 MMBbl/d by 2025, and 7.6 MMBbl/d by 2035. *Actual* contributions will depend largely on the pace and level of commitment and investment of government and industry toward promoting and accelerating development. Three scenarios were analyzed to estimate unconventional fuels production potential at various levels of public involvement. Table I-

2 displays the contribution that each of the resources may have under each of the three cases. The assumptions and other details of the cases are described next.

1. Base Case: The base case reflects the Department’s *Annual Energy Outlook for 2006* and provisions of the Energy Policy Act of 2005. It assumes current law – including provisions of the Energy Policy Act of 2005 – but no new legislative or government programs or activities. Base case projections developed using the AEO 2006 show continuing growth in domestic demand and a nearly flat domestic supply.

This case would result in only marginal additions to supply from unconventional resources within 25 years – mostly from heavy oil and CO₂ EOR stimulated by prior government and industry investment and provisions of the Energy Policy Act of 2005.

Table I- 2. Potential Incremental Production (MMBbl/d)

Resource	Base Case	Measured Case	Accelerated Case
Oil Shale	0.5	1.5	2.5
Coal Liquids	0.6	1.6	2.6
Tar Sands	0.0	0.3	0.5
Heavy Oil*	0.3	0.7	0.7
CO ₂ EOR*	0.9	1.0	1.3
Total	2.3	5.1	7.6

The AEO estimates were augmented to reflect modest oil shale production that could occur from activities on BLM RD&D leases in the absence of further incentives or demonstration efforts. Clearly, without a proactive program in unconventional fuels or efficiency gains both extending well beyond the base case scenario, the import gap will continue to widen. Figure I-11 displays the base case production volumes for each of the unconventional fuels analyzed and the impacts of that production on reducing the shortfall between U.S. demand and production that must be filled by imports.

The production levels expected under the base case scenario are not adequate to meet expected increases in domestic demand nor are they sufficient to address national security needs or other strategic imperatives.

2. Measured Development Case: The measured case contemplates that private capital will be attracted to develop unconventional fuels at a measured and logical pace, stimulated by government policy actions and fiscal regimes that require only limited direct Federal expenditures. For the measured case to materialize, conditions must be established that resolve the primary uncertainties for investors, and that provide confidence that government will be a partner in fostering development, especially for the critical first-generation stage. Figure I-12 displays the production of unconventional fuels if the measured case were pursued.

Measured case conditions contemplate actions by government, some of which have already been taken for various resources including:

- Reliable access to unconventional oil resources on public lands.
- Regulatory and permit review processes that provide confidence in permitting timelines and regulatory standards and mechanisms for timely conflict resolution.

- A fiscal regime that improves the attractiveness of capital investment through tax and royalty terms in the early years.
- An organizational structure that expedites Federal actions and decision-making.
- Funding for socioeconomic impact assessment and community infrastructure planning and development.

3. Accelerated Development Case: This case contemplates that a significant global oil supply shortfall is sufficiently probable to warrant development at an accelerated pace. It assumes government leaders conclude that the nation cannot afford to wait for the private sector. The accelerated case (Figure I-13) places a large share of early financial risk on the government.

The acceleration occurs by quickly cost-sharing commercial demonstration of the most plausible existing technologies. The government would support multiple, simultaneous projects. This stimulates faster industry investment, and by so doing shortens the time to establish an industrial base. In this accelerated case, Federal and state governments perform all actions assumed in the base and measured cases, but also set ambitious goals, effectively marshal and commit public resources, and invest and partner with industry to resolve impediments.

Additional elements in this scenario would include a dedicated and integrated government organization, long-term purchase agreements and other price assurances, significant public investment in cost-shared demonstrations at pilot and commercially-representative scales, direct and cost-shared funding for focused research and development, and other actions that reduce risk and encourage near-term commitment and investment by industry.

Competitive solicitations for RD&D and cost-shared demonstration would stimulate potential industry participants to initiate efforts sooner. Restricted periods of eligibility for tax and royalty incentives would also to accelerate industry participation.

Figure I- 11. U.S. Oil Production and Consumption – Base Case

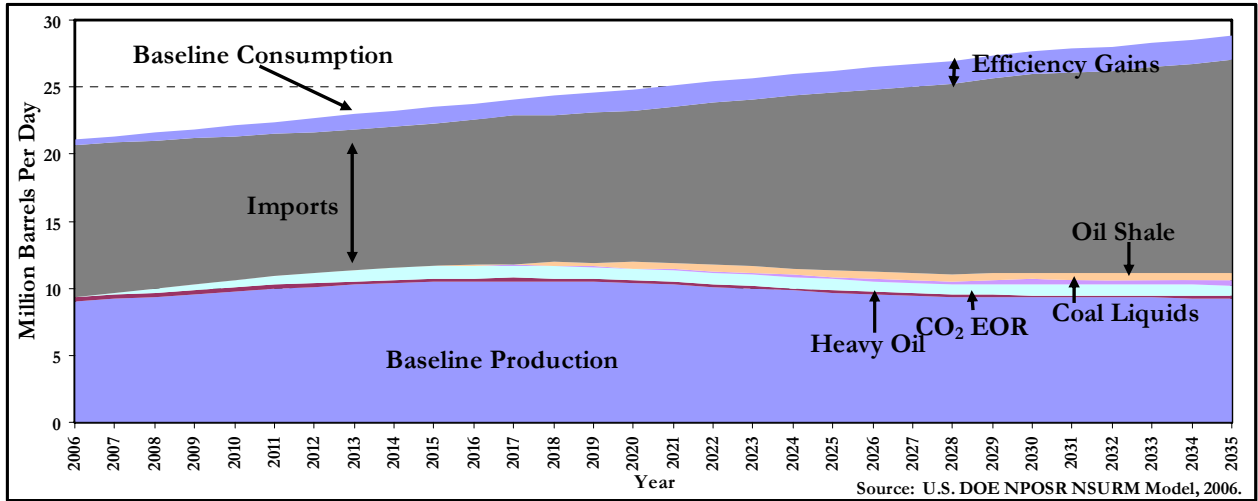


Figure I- 12. U.S. Oil Production and Consumption – Measured Case

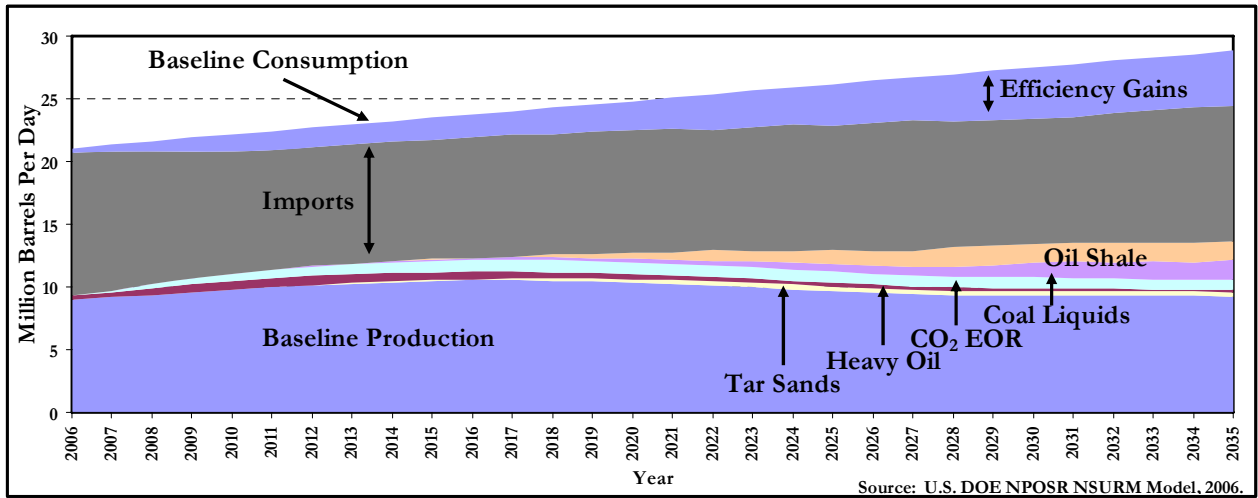
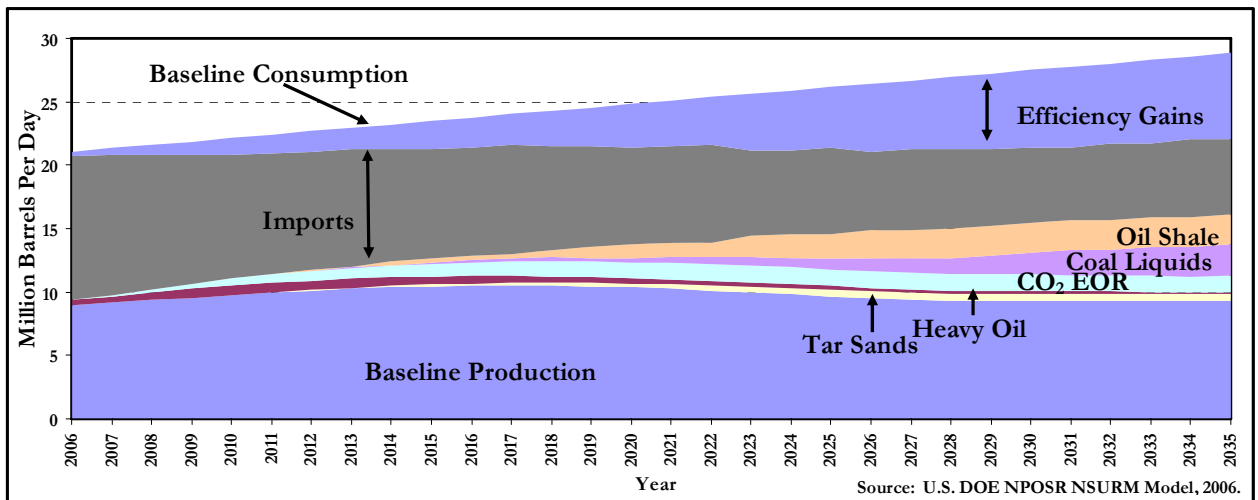


Figure I- 13. U.S. Oil Production and Consumption – Accelerated Case



Improving Efficiency and Reducing Domestic Oil Demand

As previously noted, no single fuel source is likely to be adequate to substantially reduce America's dependence on imported oil. Even with the production of almost 7 million barrels per day of incremental supply by 2035, unconventional fuels development would only *slightly* reduce the volume of net imports, after offsetting expected demand growth. As such, *reducing demand* must also be part of the nation's overall strategy for lowering imports and achieving greater self sufficiency.

Although public policy actions to improve fuel use efficiency and reduce demand *are not* the province of this Task Force, other Federal entities – including the DOE Office of Energy Efficiency and Renewable Energy, and the U.S. Environmental Protection Agency – are pursuing greater fuel efficiencies. The Task Force has attempted to quantify demand-reduction potential based on EIA assumptions, as a means to complete the picture and to assess the relative importance of various production scenarios.

In this context, the term 'efficiency' means performing the same job with less energy (reduction of waste and vehicle efficiency improvements), and 'conservation' means altering the way jobs are performed for the purpose of reducing energy demand.

The most likely place for efficiency gains relative to liquid fuels is in the individual transportation sector. It is assumed that expected efficiency gains in aircraft, trucks, and industrial uses have already been accounted for in the AEO base case. To achieve this objective the public will need to become part of the solution. This will entail:

- Increasing miles per gallon (MPG), through improved engine and vehicle efficiency and consumer choices
- Reducing miles driven, by changing habits, proximity to work, etc and

- Reducing the number of people driving which is a function of total population, carpooling, use of mass transit, etc.

Automobile Efficiency (MPG): With higher fuel prices and a clear public awareness campaign the public might be persuaded to buy a more efficient vehicle at a rate of 20% improvement over 17 years. This is equivalent to each buyer improving mileage by 1.2% for each year of vehicle upgrade. This is the MPG assumption behind the "measured case" efficiency improvement. For the accelerated case one could assume a 30% improvement over 17 years, which would be the equivalent of 1.75% per year. It is assumed that engine efficiency gains and overall vehicle performance improvements will continue as projected by AEO 2005.

Resolving poor driving habits could add about 7% to MPG. The analysis assumes that for each year 3% of the population adopts fuel saving driving habits or 5% adoption in the accelerated case. A 5% improvement translates to an oil demand reduction of approximately 1 MMBbl/day.

Conservation: Reducing net miles driven by 20% in 30 years for the moderate case and by 30% in the accelerated case is done by a combination of car pooling, mass transit (electric powered), telecommuting, and reversal of the commuter culture (jobs closer to homes, or more urban living). The analysis assumes an adoption rate of 3%/yr in the moderate case and 5% in the accelerated case.

Population: The analysis assumes an underlying population growth rate of 0.823% per year.²⁴ Population increase effectively offsets conservation gains, but conservation is needed if there is to be a net decrease in demand as population grows. For non-transportation demand, the analysis assumes 1.4%/year as given by AEO 2005. From these calculations, it is clear that the biggest impact would be from people electing to purchase vehicles with higher MPG.

NATIONAL ECONOMIC COSTS AND BENEFITS

The base, measured, and accelerated cases were further analyzed to determine the relative costs and benefits of various ranges of government efforts to accelerate and promote unconventional fuels development.

All analyses are based on the National Strategic Unconventional Resource Model (NSURM)²⁵ developed specifically for the Task Force by the DOE Office of Petroleum Reserves. The results are not intended to be a forecast of what will occur; rather, they represent estimates of potential benefits and goals under the economic and technological assumptions of each case.

The analysis does not explicitly consider or address other investment tradeoffs or reallocations of labor, materials, or other resources in the macro economy. A detailed discussion of the Model, including all relevant data, assumptions, and limitations, is provided in the *National Strategic Unconventional Resource Model: A Decision Support System*.²⁶

Using NSURM, a number of incentive

packages were evaluated to meet the production goals of the measured development case. The incentives included but were not limited to: accelerated depreciation, investment tax credits of 10% and 20%, production tax credits of \$5/Bbl, \$10/Bbl (and even higher for CTL projects), price floor and guarantees, expensing all costs in the year of outlays, and depletion allowances. Based on this analysis, an incentive package was selected for each resource that maximized the production while minimizing the impact on Federal Treasury.

For the accelerated case options included: RD&D, particularly demonstration of the technology at commercially viable scale for oil shale and tar sands, granting more incentives for CTL plants, development of more cost effective technology for carbon capture, and promoting wider application of CO₂ EOR technology, and R&D and promoting wider application of the state-of-the art steam flooding technology for heavy oil fields.

Table I-3 summarizes the program elements selected for both the measured and accelerated cases for each of the resources.

Table I- 3. Summary of Program Elements Proposed

Resource	Measured Case	Accelerated Case
Oil Shale	Price Guarantee - low 40's (\$/Bbl)	Cost-shared Demonstration Projects
	\$5/Bbl Production Tax Credit*	
Tar Sands	Price Guarantee - low 40's (\$/Bbl)	Cost-shared Demonstration Projects
	\$5/Bbl Production Tax Credit*	
Coal to Liquids	Price Guarantee - 41 to 61 (\$/Bbl)	Additional \$5/Bbl Production Tax Credit*
	20% Investment Tax Credit*	
Heavy Oil	Extension of FY '91 EOR Tax Credit**	R&D - wider application of state-of-art technologies
CO ₂ -EOR	Extension of FY '91 EOR Tax Credit**	R&D - carbon capture and wider application
		Incentives to promote capture and marketing of CO ₂ from industrial sources

* All incentives limited to project payback

** Includes Tax Credit equal to 15% of full investment and injectant purchase costs

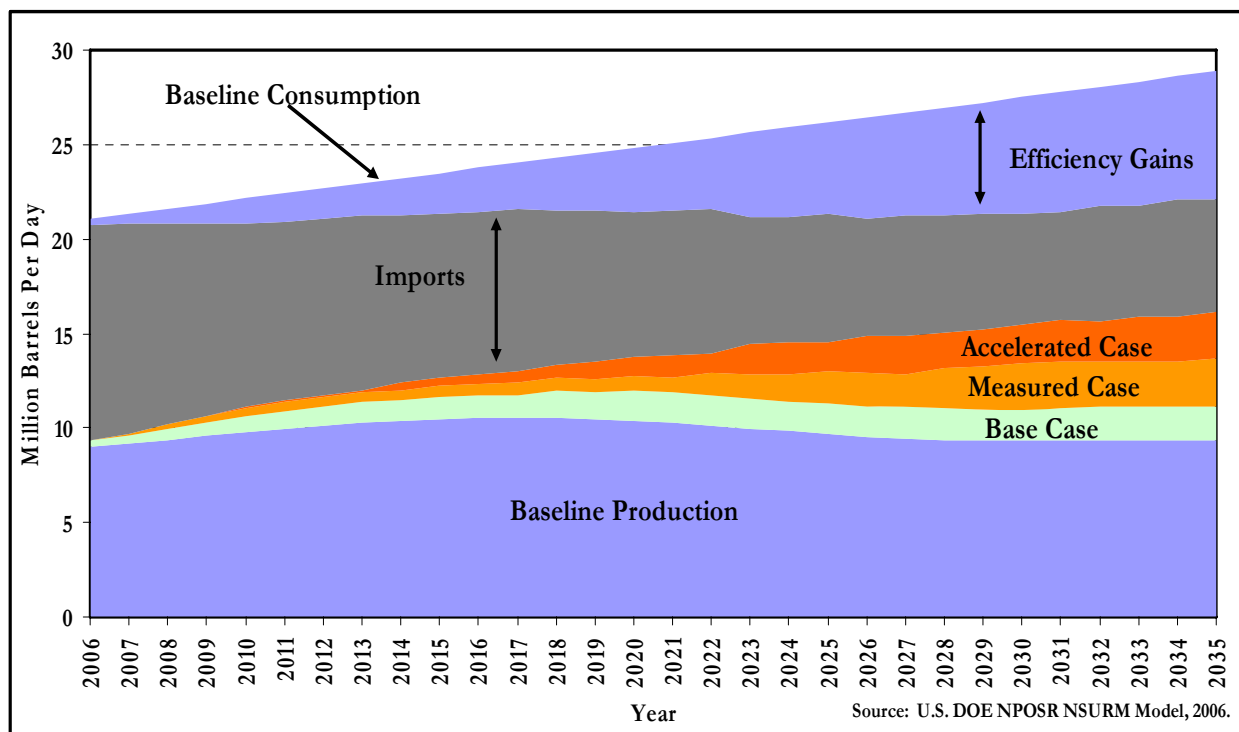
PRODUCTION POTENTIAL

The base case has the potential of producing 1.8 million barrels of oil per day by 2035. As discussed previously, a significant portion of this production is from ongoing CO₂ EOR and heavy oil projects. The balance is attributed to oil shale production based on the recent R&D Leasing Program and envisioned coal to liquids plants.

The analysis indicates that a fiscal regime that improves the attractiveness of capital investment through tax incentives and royalty terms in the early years could make additional projects economic, adding as much as 2.5 barrels per day of production to the base case, for a total of about 4.3 million barrels per day by 2035. But, the probability of these projects being undertaken, in the absence of technology demonstration, is low.

The unconventional fuels technologies will *require* demonstration at a commercially representative scale to prove technical viability and drive down technology risk before any incentive will become effective. Figure I-14 illustrates that the accelerated case, which includes all of the measured case activities, incentives, and cost-shared demonstration projects, could enable as much as 5 million barrels per day of additional production potential to the base case, for a total of 6.8 million barrels per day of unconventional fuels production by 2035. The incremental difference between the measured and accelerated cases clearly demonstrates the importance of technology and its improvement with time through concerted and effective RD&D efforts, particularly demonstration projects at commercially representative scale.

Figure I- 14. Production Potential for the Base, Measured, and Accelerated Cases



INCREASED FEDERAL AND STATE REVENUES

Direct Federal revenues generated in the base case scenario would be \$2.5 billion per year in 2015 and reach \$6.3 billion per year by 2035. These revenues would be doubled, exceeding \$16 billion per year by 2035 as a result of the industry and economic activity stimulated by the measured development scenario case. In the accelerated development scenario, Federal revenues would more than triple over the expected base case revenues, reaching \$21.7 billion per year by the end of the 30 year period of analysis.

Figure I-15 displays the annual direct Federal revenues generated by an unconventional fuels industry.

Direct state revenues generated in the base case scenario would be \$0.7 billion per year in 2015 and \$1.5 billion per year by 2035. These revenues would be more than doubled,

exceeding \$4 billion per year in 2035, as a result of the industry and economic activity stimulated by the measured development scenario case. In the accelerated development scenario, Federal revenues would be quadrupled over the expected base case revenues, reaching \$7.4 billion per year by the end of the 30 year period of analysis.

Figure I-16 provides the annual direct state revenues generated in each of the three cases.

The total public sector revenues (sum of direct Federal and state revenues) from an unconventional fuels industry would reach \$7.8 billion per year by 2035 for the base case. The measured case will stimulate \$20.5 billion per year.

The accelerated case will increase this by \$8.6 billion per year from the measured case, generating \$29.1 billion per year by 2035. Figure I-17 displays the total public sector revenues for each of the three cases.

Figure I- 15. Annual Direct Federal Revenues

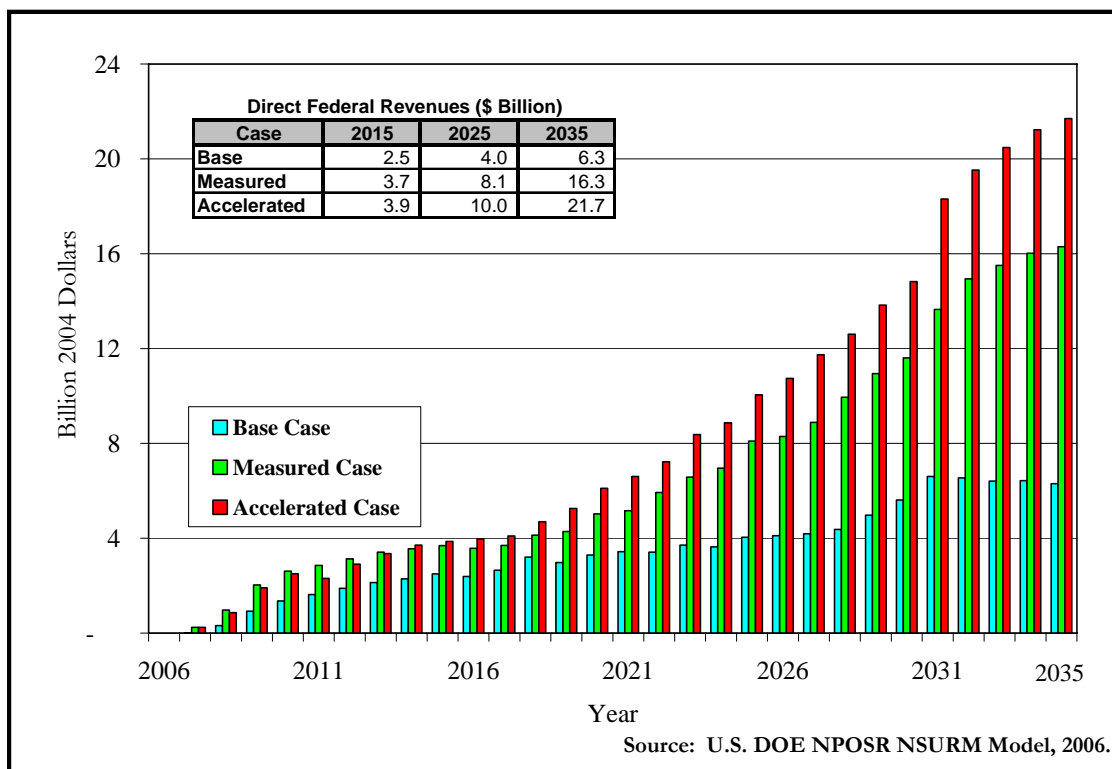


Figure I- 16. Annual Direct State Revenues

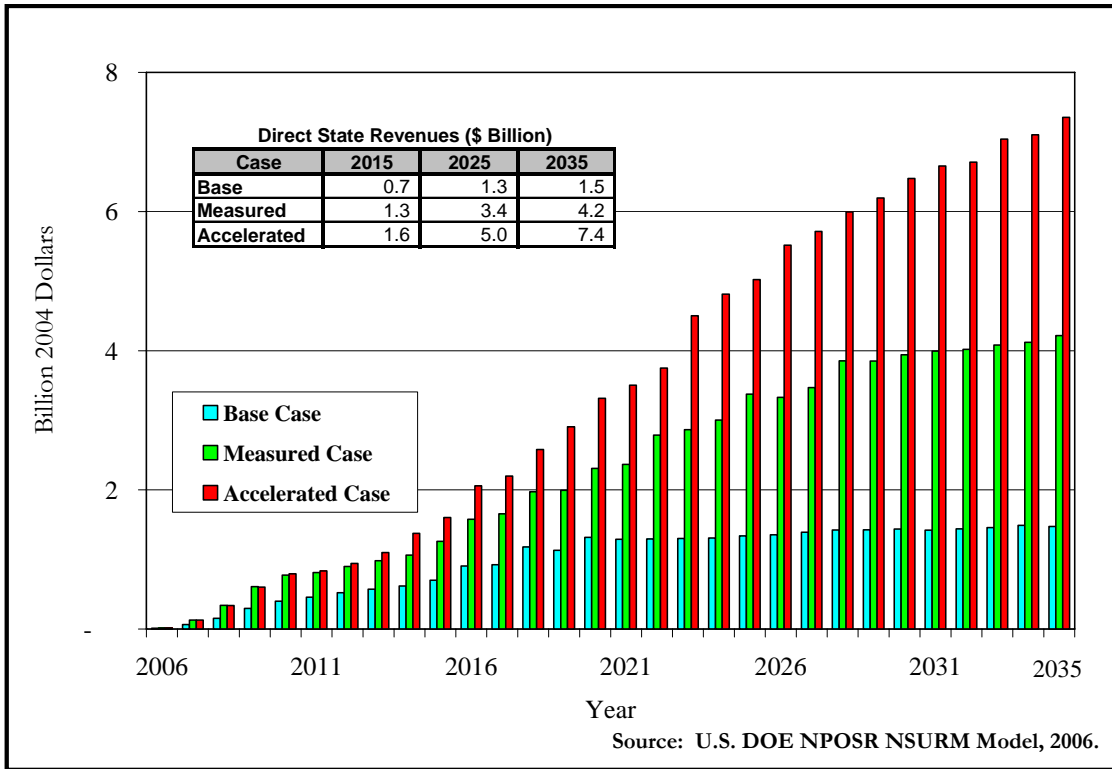
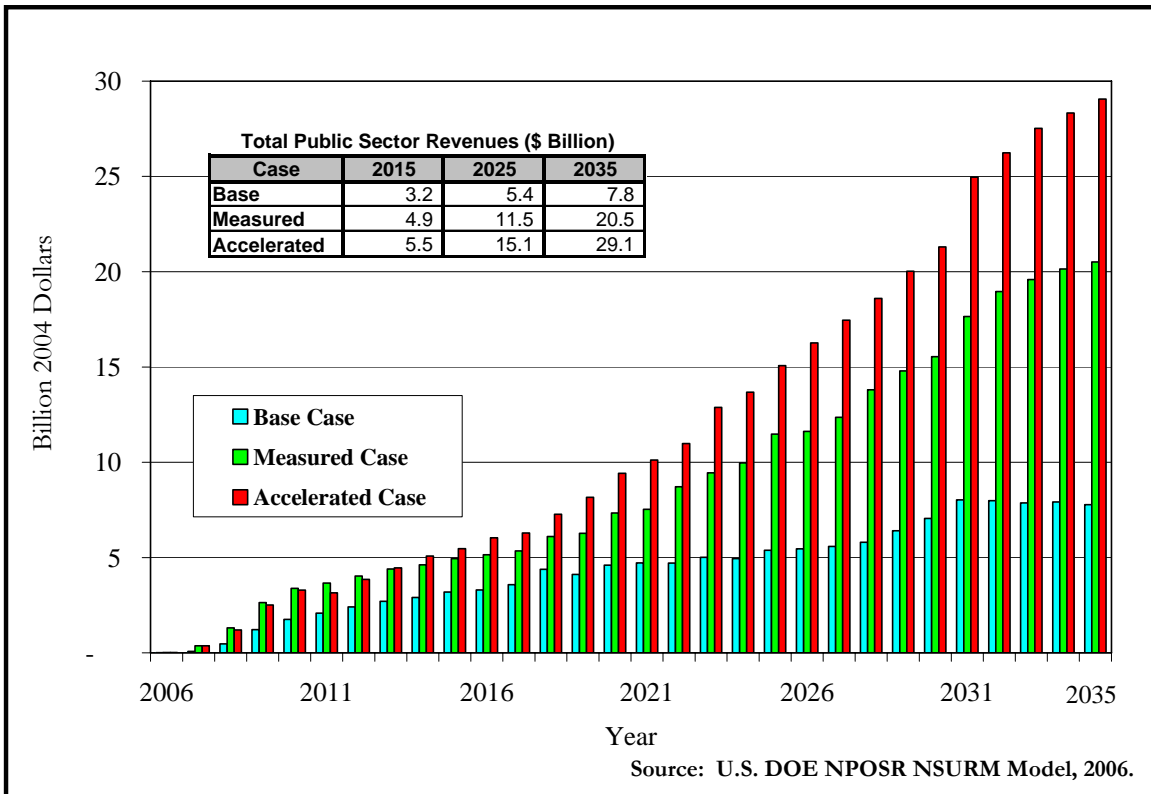


Figure I- 17. Annual Total Direct Public Sector Revenues



NATIONAL ECONOMIC BENEFITS

In addition to providing substantial net public revenues to the state and local treasuries and the Federal government, the unconventional fuels industry development and fuels production supplements domestic supply, reduces the volume and costs of oil imports, creates employment opportunities, and makes a significant contribution to the U.S. gross domestic product (GDP).

Value of Imports Avoided

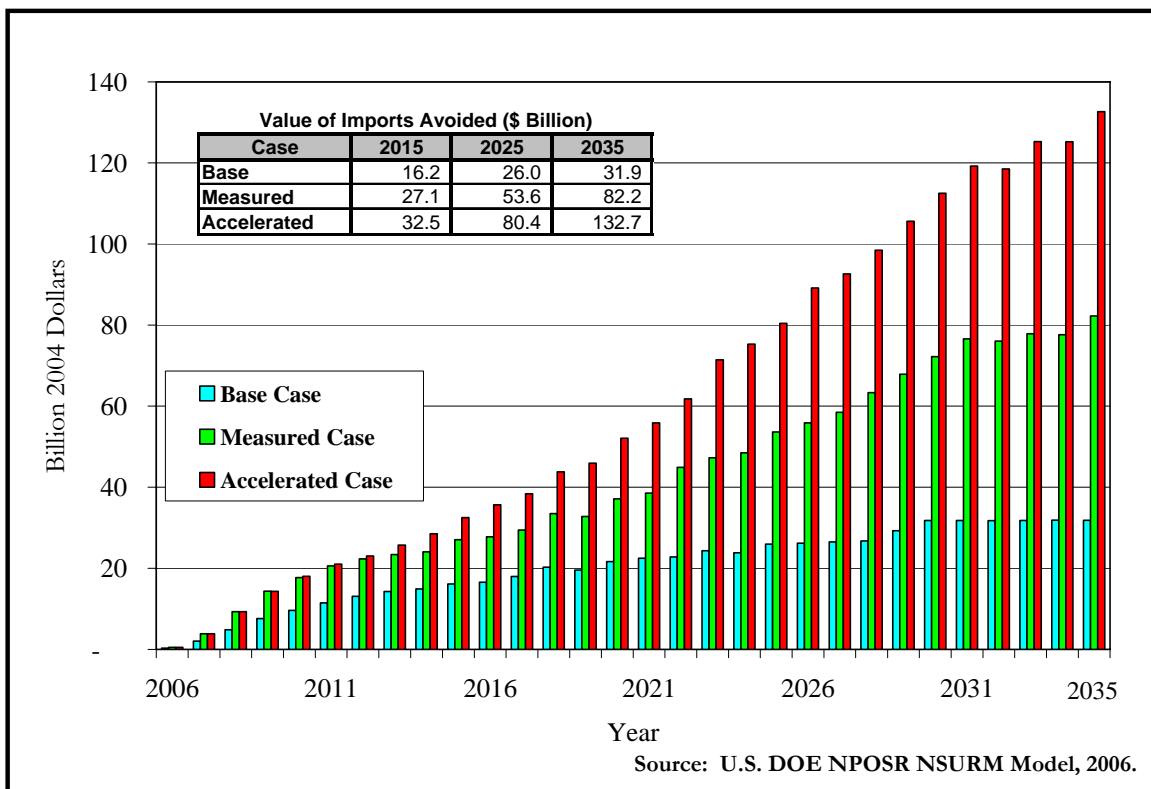
In the base case, it is estimated that domestic production of unconventional fuels could reduce the cost of oil imports by between \$16.2 and \$31.9 billion per year from industry inception to 2035. The measured case would increase these savings to between \$27.1 billion and \$82.2 billion per year (Figure I-18). The

accelerated case would save the United States \$32.5 billion per year in 2015 and \$132.7 billion per year by 2035 that would have otherwise been spent on imports.

Employment

Unconventional fuels development will result in the addition of thousands of new, high-value, long-term jobs in the construction, manufacturing, mining, production, and refining sectors of the domestic economy. The NSURM model estimates direct petroleum sector employment, based on industry expenditures. The model also approximates the total number of jobs that will be created in the petroleum sector. Not all of the direct employment shown will be new jobs to the economy. Some will be filled by workers shifting from one industry sector to another. The jobs will not all be in the

Figure I- 18. Annual Value of Imports Avoided



states where unconventional fuels development sites are located. Other states that manufacture trucks, engines, steel, mining equipment, pumps, process controls, and other elements of the physical complex, as well as states where the projects are designed and managed or where fuel is refined into premium fuels and byproducts, will also share in job creation.

Direct employment could range from 25,200 to 30,800 personnel in the base case. The measured case would directly employ about 35,000 people in 2015 and up to 69,900 in 2035. The accelerated case would stimulate the creation of 45,700 jobs in 2015 and

114,300 jobs in 2035. Figure I-19 displays the direct employment in the base, measured, and accelerated cases.

The total number of petroleum sector jobs (including indirect employment) ranges from 58,100 employees in 2015 to 70,900 in 2035 for the base case. The measured case increases these numbers to 80,500 jobs in 2015 and 160,700 personnel in 2035. The accelerated case will require an even more substantial employment base. In 2015, there will be a total of 105,100 jobs created and almost 262,800 by 2035.

The total petroleum sector employment through 2035 is displayed in figure I-20.

Figure I- 19. Annual Direct Petroleum Sector Employment

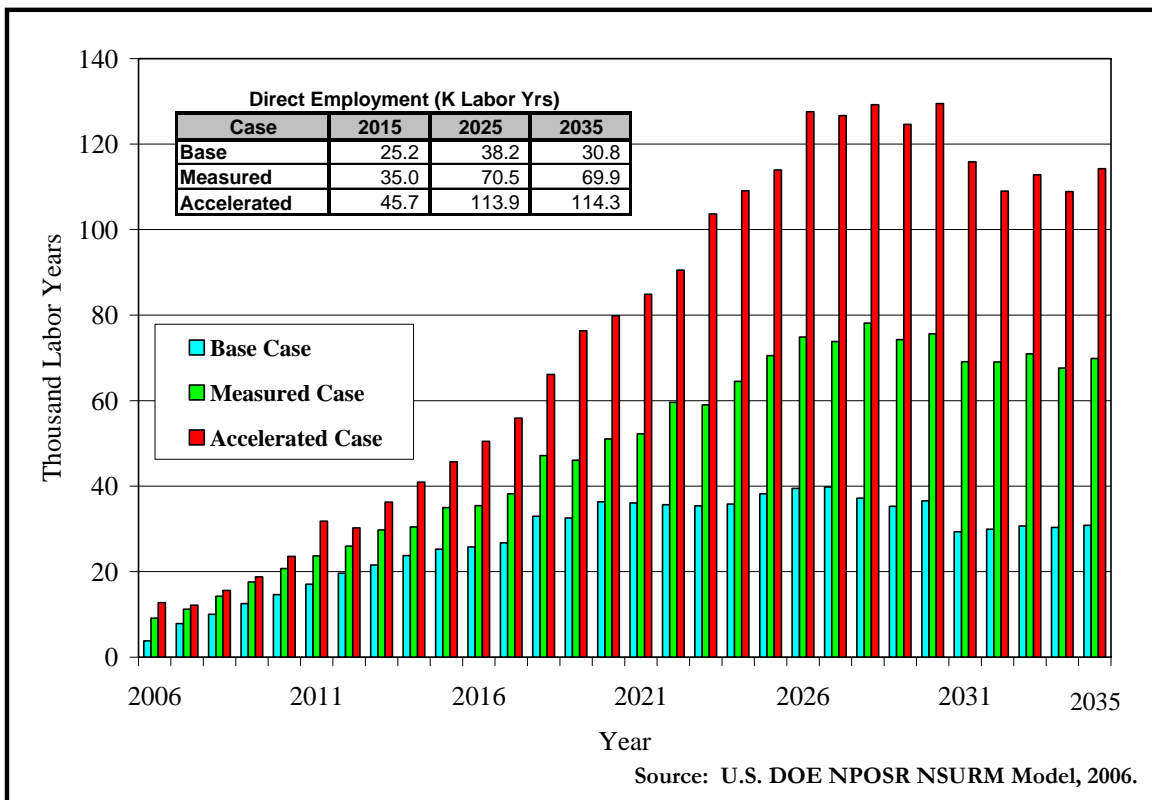
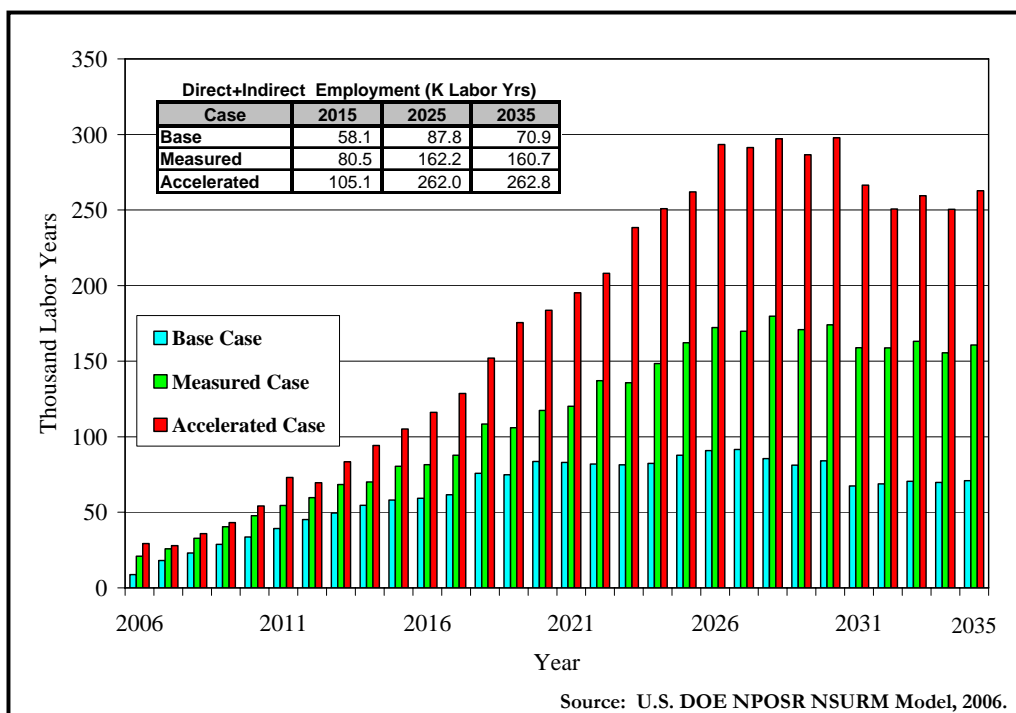


Figure I- 20. Annual Total Petroleum Sector Employment (Direct & Indirect)



Contribution to Gross Domestic Product

In the base case, annual direct contributions to gross domestic product (GDP) would rise from \$19 billion dollars per year in the early years to \$33 billion in 2035 (Figure I-21). With the addition of incentives annual GDP contributions would range from about \$30 billion in the early years to \$84 billion in 2035 (measured case). The accelerated case would contribute \$36 billion in 2015 and \$133 billion in 2035. The cumulative contribution to the GDP for the base case would be \$0.7 trillion through 2035. This would increase to \$1.3 trillion for the base case and \$1.9 trillion if the accelerated case is pursued.

FEDERAL PROGRAM COSTS AND REVENUES

In considering the pace at which America's unconventional resources should be developed, the Task Force considered not only the national need for increased domestic production to reduce future import volumes, but also the costs to the Federal government of stimulating that incremental production,

and the resulting revenues that could be expected to offset those costs. This should not be considered a thorough assessment of all costs and benefits associated with this program. Rather, this analysis is merely an estimation of Federal outlays and revenues. There will undoubtedly be other costs and benefits, both direct and indirect, which are not accounted for here.

Costs are defined as direct outlays for Federally-supported research, development and demonstration efforts and other program activities addressing resource access, development economics, regulatory streamlining, environmental stewardship, infrastructure, and socio-planning and impact mitigation. For the purposes of this analysis, costs include Federal revenues that would be foregone by tax incentives designed to reduce early risk and stimulate private investment.

The results of this analysis are summarized in Table I-3 in five year increments for program years one through twenty, and for the 10 year period encompassing years 21-30.

Figure I- 21. Annual Direct Contribution to GDP

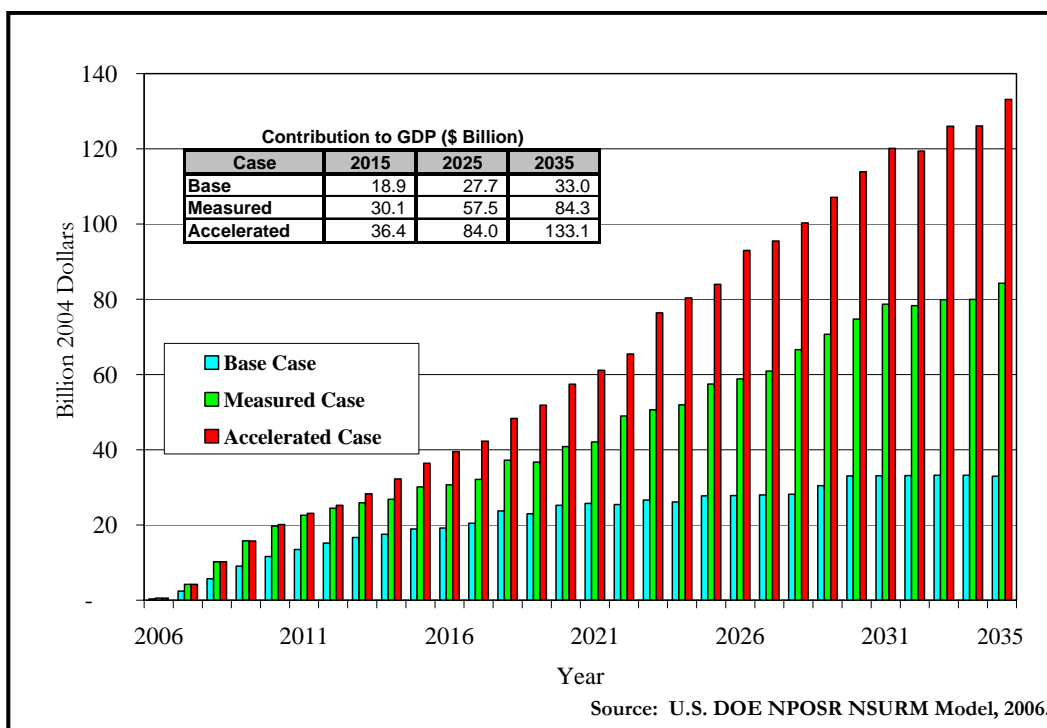


Table I- 4. Program Costs and Revenues Under Three Development Scenario (Billion 2004\$)

Strategic Unconventional Fuels Commercialization Program		Years 1 - 5	Years 6 - 10	Years 11 - 15	Years 16 - 20	Years 21 - 30	Total 30 years
Cumulative Production Per Period (est) (Billion BOE)							
	Base Case	1.1	2.0	2.6	3.0	6.5	15.2
	Measured Case	1.5	2.9	3.8	5.3	14.5	28.0
	Accelerated Case	1.5	3.3	5.2	7.8	22.3	40.1
Direct Federal Outlays Per Period (\$ Billion)							
Program Activities	Base Case	0.02	0.01	0.01	0.01	0.00	0.05
	Measured Case	0.52	0.16	0.08	0.08	0.03	0.86
	Accelerated Case	0.61	0.24	0.10	0.08	0.03	1.06
RD&D Support	Base Case	0.00	0.00	0.00	0.00	0.00	0.00
	Measured Case	0.39	0.17	0.06	0.06	0.00	0.68
	Accelerated Case	1.43	0.32	0.11	0.11	0.00	1.79
Total Direct Outlays	Base Case	0.02	0.01	0.01	0.01	0.00	0.05
	Measured Case	0.91	0.33	0.14	0.14	0.03	1.53
	Accelerated Case	2.04	0.56	0.21	0.19	0.03	3.02
Net Federal Revenues (Adjusted for Direct Outlays and Incentives) (\$ Billion)							
	Base Case	2.66	10.42	14.51	18.23	55.55	101.37
	Measured Case	4.95	16.31	20.57	32.59	126.33	200.76
	Accelerated Case	3.48	15.58	23.92	40.93	164.97	248.88

Source: U.S. DOE NPOSR NSURM Model, 2006.

Oil Production and Imports Avoided

Over the 30 year period of analysis, unconventional fuels production in the base case is likely to produce only 15.2 billion barrels of oil equivalent (BOE) of liquid fuels and feedstocks. By contrast, the stimulatory incentives and other government actions included in the measured development scenario would nearly double that to 28 billion Bbls. The accelerated case would increase production to 40.1 billion Bbls.

Federal Revenues

Federal revenues generated from this incremental production would result from the Federal share of royalties for resources produced from Federal lands, lease bonuses, and corporate and personal income taxes. The Federal revenues are calculated with consideration to the tax incentives necessary to stimulate the volumes of production.

Federal Outlays

In the base case, Federal outlays for unconventional fuels appear to be minimal. The analysis assumes that current law, including the provisions of the Energy Policy Act of 2005, and current program expenditures (principally for clean coal programs), will eventually stimulate modest levels of unconventional fuels production. Expected base case costs over the 30 year period of analysis are \$50 million.

In the measured development case, new expenditures for technical assistance to industry and limited research and development activities, totals about \$1.53 billion over the 30 year period of analysis.

The accelerated development scenario assumes all of the Federal activities and investment stimulus provisions of the base case and the measured development scenarios and supplements it with focused research and cost-shared investments in demonstration projects to prove the technical and economic feasibility of unconventional fuels

technologies at commercially representative scale. The incremental cost of these research and demonstration projects, over the 30 year period of analysis is about \$1.79 billion. Total direct outlays would be approximately \$3 billion compared to \$1.53 billion in the measured development scenario.

Net Federal Revenues

In all of the cases analyzed, when Federal outlays were subtracted from Federal revenues, the net revenues to the Federal government were significantly positive. They range from \$101 billion in the base case development scenario to \$201 billion in the measured development scenario and to a net of \$249 billion in the accelerated development scenario. The Federal revenues are based on the volume of oil produced including the specific tax credits put into place to stimulate that production. The net Federal revenues are net after tax incentives and direct Federal outlays are considered.

Federal revenues are based on the oil price that is assumed in the NSURM model (AEO 2006). If higher oil prices prevail, that would yield higher per barrel Federal revenues.

Clearly, in addition to supplying urgently needed domestic fuels production to offset reliance on imports, development of the nation's unconventional fuels can be a significant revenue generator for the Federal treasury. While the measured case may stimulate more net revenue per barrel produced, the small incremental cost of direct outlays, and tax revenues foregone by the accelerated scenarios seem more than justified by the nearly 12.1 billion barrels of incremental production that would be stimulated over the 30 year period of analysis.

LIMITATIONS OF THE ANALYSIS

The analysis presented in this report has important limitations that should be considered before using its results. The results are primarily intended to provide a baseline

calculation of the potential for government action and market forces to encourage the development of our nation's unconventional resources, rather than a forecast of what is likely to happen over the next 25 to 35 years under current and assumed future economic conditions. These estimates, *although not a forecast*, provide a roadmap for the type and the level of benefits and costs that could be targeted by the industry, and local, state, and the Federal governments through concerted and collaborative efforts.

The success of a domestic unconventional fuels industry depends very strongly on many factors including access to the resources, technology improvement through field demonstration at commercial scale, economic climate assurance, as well as environmental permit streamlining. The assumptions and limitations of the present analysis relative to these areas are discussed below:

- The analysis assumes that current technologies are demonstrated to be viable at commercial scale over the next 5 to 10 years. To the extent that this is not achieved, the development will be constrained.
- The analysis assumes the environmental permitting process for the projects could be completed within 3 to 5 years. To the extent the permitting process is not streamlined the timing will be impacted.
- The analysis is based on the AEO 2006 oil “reference” price projection over the next 25 years. To the extent that the prevailing oil prices over this period are different, the estimated benefits will be impacted. Currently, prices are trending closer to the AEO “high oil price” projection.
- The economics are based on the use of average costing algorithms. Although developed from the best available data and explicitly adjusted for variations in energy costs, they do not reflect site-specific cost variations applicable to specific operators.

To the extent that the average costs (used) understate or overstate the true project costs, the actual results will be impacted accordingly.

- The estimates of potential contribution to GDP, values of imports avoided, and employment do not take into account potential impacts to other sectors of the U.S. economy from altering trade patterns. It is possible that reduction in petroleum imports, depending on where the petroleum was coming from, could reduce the quantity being exported of some other good. It is likely, however, that such effects would be small.
- The analysis assumes that operators have access to capital to start and sustain the projects. The unconventional fuels projects are typically characterized as “capital intensive” and have longer payback period relative to oil and gas development projects. To the extent that capital is constrained, then the potential benefit estimated in this report is overestimated.

None of the above limitations invalidate the results in this analysis if they are viewed for what they are intended, which is an estimate of *upside potential*.

Given the uncertainty of the size and combinations of the biases introduced by these limitations, it is assumed that the approach is valid, and the estimates are reasonable, for what they are intended.

PROGRAM RATIONALE

The economic analysis leads to the following conclusions:

- The domestic unconventional fuels resource could supply a significant volume of oil with substantial benefits to local communities, state and national treasuries, as well as the national economy.
- Numerous hurdles constrain the development of a domestic unconventional fuels industry. Federal actions are required

to accelerate private sector investment in the unconventional fuels industry.

- The most effective policy options are: market assurance through price guarantees, targeted tax incentives, and demonstration of technology performance at a commercially representative scale.
- The positive net revenues outlook for each development scenario suggests that government and industry should pursue the scenario that yields the greatest potential incremental fuels production and corresponding reduction in imports – the accelerated case.
- If properly designed, these incentives could create an opportunity for production over 7 million Bbl/d by 2035.
- This opportunity will require collaborative efforts by industry, local, state, and Federal governments, working together with a common goal.

The Task Force concludes that the nation needs to arrest the growth of energy imports, improve domestic fuels supply, and strengthen the reliability and security of its sources of imports by increasing domestic supply and reducing its end-use demand.

Increased investment in domestic energy production from unconventional resources could reduce currency outflows, stimulate economic activity and GDP growth, create national wealth, and stimulate creation of high value jobs. It is also likely to attenuate world crude oil price increases as global conventional oil production declines and supply and demand tighten.

Improving the efficiency of energy resource development and fuel use can also play an important role in slowing domestic demand and import growth. This requirement, recognized in the President's *National Energy Policy*, must be implemented through executive and legislative actions. Although their development and production are not

explicitly considered here, some domestically produced biofuels will be used as direct fuels, blending agents, and additives, further reducing imports.

In determining what actions state and Federal governments can take to promote and accelerate unconventional fuels development, the Task Force sought to address several key questions

What production levels are needed to offset imports and make a major difference to our energy security?

The Task Force has determined that no single domestic energy resource, conventional or unconventional, is sufficient to meet domestic liquid fuels demand and substantially offset imports. It will require the concurrent development of a suite of the nation's unconventional resources, coupled with effective measures to improve energy efficiency and reduce demand growth to make a long-term difference to our energy security.

Is the *private sector* likely to develop domestic unconventional fuels in a time frame and at a scale that significantly reduces import dependency in the next two decades?

The Task Force has determined that private industry – on its own – is unlikely to demonstrate and advance technologies or invest in development of commercial production facilities *at the pace and scale required to meet the nation's needs within the desired time frame*. Government must act to stimulate industry interest, by removing certain impediments and where appropriate, share financial risk in order to incentivize and accelerate timely private sector development. Government and industry should forge a shared vision and a tacit – if not *de facto* – partnership if the goals of reduced energy import dependence and domestic economic stimulus are to be attained.

Is the *public sector* effectively organized to define, implement, and manage an aggressive unconventional fuels development program?

Government – state and Federal – must also take appropriate measures to facilitate timely project review and permitting and to enable publicly supported research, development and demonstration efforts to move forward expeditiously, while sustaining government’s role to uphold regulations and protect the public interest. Effective governance may require establishing a “mission-oriented” corporation to achieve the public objective.

Could national goals be achieved efficiently if this effort were implemented through a series of independent but concurrent resource development efforts?

Individual “stove-pipe” development programs will likely cause political *competition* among resources. Pitting unconventional resources against one another in a competitive development setting is likely to be counterproductive. Rather, the nation should pursue development of unconventional resources through an *integrated* program that resolves common impediments and combines cross-cutting needs.

To that end, the Task Force has crafted and recommends an integrated program strategy and plan that incorporates resource-specific sub-program areas supported by cross-cutting analyses and activities such as environmental management, infrastructure requirements, resource availability, and socio-economic impacts. An integrated effort is required to stimulate private sector investment and facilitate industry development across the scope of major unconventional fuels resources. It requires the identification, inclusion and engagement of the full range of stakeholders.

Are administrative, regulatory, and fiscal regime changes alone sufficient to stimulate and accelerate significant private investment in unconventional fuels development in the desired time frame?

The Task Force’s analysis of potential contributions to fuel supply under various development scenarios makes it clear that an

aggressive approach is required if unconventional fuels production is to meet levels needed to reduce import dependence within the timeframes envisioned.

Without sharing risk in 1st generation technology demonstration and means of price assurances, other fiscal incentives and streamlined permitting processes will provide little stimulus for major investment. This is particularly true for oil shale and domestic oil sands.

Coal liquids development may advance based on future integration of already demonstrated gasification and FT synthesis technologies and development stimuli already provided for in the Energy Policy Act of 2005.

CO₂ enhanced oil recovery and heavy oil production would continue to be limited without aggressive technology transfer and the introduction and demonstration of technology advances.

It is important to note that cost-shared technology demonstration *alone* would likely be insufficient to stimulate aggressive major private investment in unconventional fuels development. Fiscal, royalty, and regulatory measures will also be needed to make the 1st-generation commercial plants attractive and feasible.

The aggressive Strategic Unconventional Fuels Development Program, characterized in the following pages, offers the potential to increase the nation’s domestic fuels supply by more than 7 million barrels per day by 2035.

If this objective is achieved, this integrated approach could significantly reduce the negative economic and security effects of America’s dependence on foreign oil, improve the availability of energy resources for others, stimulate economic development and growth, and expand education and professional opportunities in high value disciplines as well as numerous other professions and skills that meet the needs of our society.

PART B

UNCONVENTIONAL FUELS STRATEGY

UNCONVENTIONAL FUELS STRATEGY

MAJOR PROGRAM GOALS

Consistent with Section 369 of the Energy Policy Act, the mission of the Strategic Unconventional Fuels Program is to stimulate and accelerate private industry investment in development of a domestic unconventional fuels industry. The Program seeks to:

- Accelerate development of domestic unconventional fuels
- Promote effective environmental stewardship and impact mitigation
- Mitigate potential adverse socio-economic impacts on states and localities
- Generate substantial public benefits while ensuring government fiscal responsibility

DEVELOPMENT OBJECTIVES

The Unconventional Fuels Program envisions that the resulting industry will achieve

incremental production greater than seven million Bbl/d by 2035 (Figure I-22).

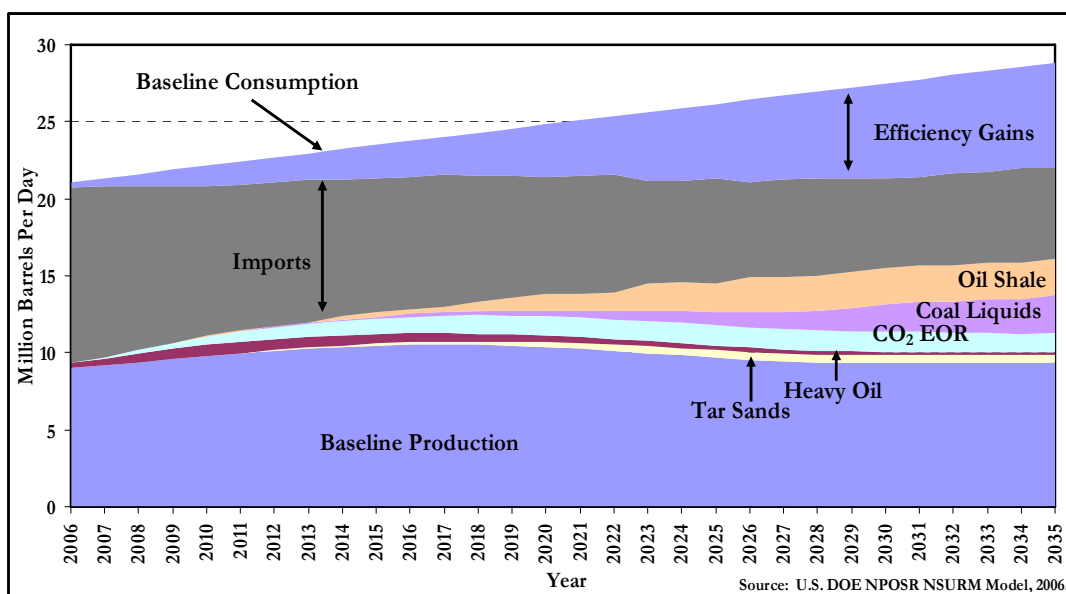
- Oil Shale – 2.5 MMBbl/d
- Tar Sands – 0.53 MMBbl/d
- Coal Liquids – 2.6 MMBbl/d
- Heavy Oil – 0.75 MMBbl/d
- CO₂ EOR – 1.3 MMBbl/d*

* Production goals for CO₂ EOR assume current state-of-the-art technology. If more advanced technology is developed, the CO₂ objective could increase to 3 MMBbl/d.

PROGRAM VISION

The Task Force envisions that as a result of efforts conducted in the program, industry will meet production goals and objectives, contribute to domestic economic growth, responsibly manage and mitigate environmental impacts, and mitigate potential adverse socio-economic impacts to affected states and localities.

Figure I- 22. Unconventional Fuels Program Production Objectives (Accelerated Case)



FACTORS CONSTRAINING INVESTMENT

Private industry investment in domestic unconventional fuels production may be constrained by a variety of critical risk factors and uncertainties, depending on the resource.

Table I-5 summarizes the relative magnitude of key constraints, which are discussed below. It should be noted that these weights reflect the views of the Task Force working groups. They are intended to reflect the situation as it exists today, regardless of ongoing or planned efforts to resolve them. All of the constraints require public attention. However a rating of “5” would reflect an issue that could be considered a potential “show stopper” without significant near-term action.

Access to resources on public lands: Significant portions of some unconventional resources are located on public lands that are restricted from leasing and development. This is particularly true for oil shale, and for some tar sands, and coal resources.

Leasing regulations currently exist for tar sands deposits located in Special Tar Sands Areas (STSAs) in Utah. For Federally managed tar sands resources outside of STSAs in Utah or other states, Federal land

managers expect to apply the same regulations, however precedent for this action remains to be established. For coal-to-liquids, current coal leasing regulations would apply.

Existing Bureau of Land Management Resource Management Plans that were completed in years of ample supply and low oil prices may not have foreseen what is reasonable to develop today. However, leasing and access considerations must consider development economics as well as environmental and land use concerns.

The Department of the Interior’s Bureau of Land Management is moving swiftly to address the directives of the Energy Policy Act of 2005 to initiate or accelerate commercial leasing for unconventional fuels development on public lands.

Technology readiness, performance, and efficiency: Production technologies for unconventional fuels resources exist at various stages of development and reliability. Various elements of coal liquids technologies have been demonstrated, but not at commercial scale in a fully integrated facility in the United States. Demonstrated heavy oil technologies are currently viable for only a small portion of the resource. Both in-situ and surface retorting technologies for oil shale require

Table I- 5. Relevance of Key Constraints Impeding Industry Development
(1 = Low concern, 5 = High Concern)

Constraint	Coal Liquids	Oil Shale	Tar Sands	Heavy Oil	CO ₂ EOR
Access to resources on public lands	1-2	5	2	2	2
Technology readiness, performance, and efficiency	2-3	5	5	2	1
High capital and operating costs; long lead times before payback	4	5	4	2	1
Oil price and market risks	5	4	5	4	2
Assured Markets for products	5	5	5	1	1
Royalty structures and fiscal regimes	3	4	4	2	1
Environmental requirements, permitting processes and timelines	4	4	4	2	2
Infrastructure requirements and availability	1-East 3-West	3	3	3	5
Water requirements and availability	2	4	2	2	1
Socio-economic impacts	1	5	2	2	1

Source: Unconventional Fuels Work Groups, 2006

advanced development, testing, and demonstration at pilot and commercial scales. Oil sand technologies developed in Alberta, Canada are not directly adaptable to tar sand deposits in the United States.

High capital and operating costs: Commercial-scale unconventional fuels projects are likely to have high upfront capital investment costs, particularly for oil shale and CTL. Investment risks related to long lead-times and lengthy payback times can make these projects less attractive relative to other investment opportunities.

World oil prices and market risks: Global prices for crude oil are highly volatile and future world oil prices may decline, increasing investment risk.

Markets for unconventional fuels: Producers of unconventional fuels need reasonable assurance that markets will exist to accept their products at prices that yield a fair return on investment. Financing coal liquids, shale oil, and tar sands projects will likely require long-term (15 year) production offtake agreements from refiners. DOD can serve as a market initiator for limited volumes, but DOD offtake agreements are limited to five years unless Congress authorizes longer terms. Private sector refiners will need to accept synthetic oils from oil shale and tar sands as suitable refinery feedstocks. Potential increases in the supply of diesel vs. motor gasoline in fuels markets may suggest a need for more aggressive transition to diesel fueled vehicles.

Royalty structures and fiscal regimes: In the case of oil shale, Federal royalty structures have not yet been established, making the economics uncertain.

Environmental standards and requirements, permitting processes and timelines: Technology and “best management practices” exist to avoid or mitigate most of the major environmental impacts associated with unconventional fuels

development. Each resource has particular issues that must be addressed. Improvements in process efficiency and performance of environmental technologies can reduce costs and assure environmental protection. Potential future requirements for carbon management pose additional design and economic challenges. Major causes of schedule holdup can include permitting delays. Project costs can grow significantly when development schedules are delayed.

Infrastructure requirements and availability: Infrastructure constraints can limit the pace of project construction and industry development and the ability to transport products to end markets. The availability of adequate road, rail, and air transport infrastructure, and refining capacity, could represent significant constraints on unconventional fuels industry development in some regions.

Water requirements and availability: Unconventional fuels development may require water in significant quantities for communities, recovery processes, and tailings disposal and reclamation purposes. Water requirements can vary widely for differing technologies and resources. Some resources and processes may be net producers of water. Requirements may not be reliably known without the experience achieved through design, development and operation of pilot and demonstration projects.

Socio-economic impacts: Unconventional fuels development can have significant benefits as well as adverse impacts for affected communities. They will vary depending on the intensity of development and the size and characteristics of the existing community. Infrastructure and community services to support industry development and operations typically require significant community planning and investment well before industry-generated revenues are available. Many communities will be unable to shoulder the up-front financial burden of

these requirements. The magnitude of the projects will make them unwilling to accept financial risks without protection from project failure.

The objective of the proposed program is to reduce or eliminate these uncertainties and risks as they apply to specific unconventional fuels resources and to facilitate private sector investment sufficient to achieve industry development and production targets within the desired timeframe.

STRATEGIES

Public Empowerment of Private Investment: The Strategic Unconventional Fuels Development Program will *work collaboratively with private industry, affected states and communities, and other stakeholders* to define and implement public and private sector actions that will reduce risk and address the uncertainties that constrain private investment. Doing so will allow private industry to develop, test, demonstrate and commercialize efficient unconventional fuels processes and technologies and resulting refinery feedstocks, fuels, and by-products.

The Strategic Unconventional Fuels Program will empower and encourage private industry to achieve defined production goals, while complying with environmental and regulatory requirements, mitigating socio-economic risk to communities, and prudently stewarding conservation and development of oil shale resources on public lands.

The Task Force has identified and adopted several key strategies to address the specific uncertainties that inhibit private investment and to achieve the goals and objectives of the Strategic Unconventional Fuels Development Program. The inter-relationship of program goals, objectives and these high-level strategies are shown in Table I-5. Key strategies and approaches are discussed below.

Resource Access: Government should make unconventional fuels resources on

public lands available to industry for sustainable development. Examples of potential actions to implement this strategy could include R&D and commercial leasing of resources on state or Federal lands; land swaps to establish logical development blocks; resolution of conflicting-use issues; and other efforts to ensure efficient development.

- BLM is already moving aggressively to implement leasing provisions detailed in the Energy Policy Act of 2005. BLM has signed five RD&D leases in Colorado to facilitate private sector oil shale research.
- BLM is also preparing a Programmatic Environmental Impact Statement that could lead to commercial oil shale and tar sands leasing in Colorado, Wyoming, and Utah by 2009. The timing of scope of these activities will determine the extent to which sufficient resources on public lands are made available to support industry development.

Technology: To facilitate accelerated private-sector development, demonstration and commercialization of efficient 1st generation and next-generation technologies, the program strategy is to craft a fast-track technology development and commercialization effort that attracts investment without overly taxing public treasuries. Examples of program activities to implement this strategy could include:

- Completing the assessment of unconventional fuels resources and technologies mandated by Section 369(m) and (p) as soon as possible;
- Cost-sharing demonstrations of promising existing technologies at commercially-representative scale;
- Providing technical assistance through DOE labs to help industry resolve critical technical issues;

**Table I- 6 Strategic Unconventional Fuels Program
Crosscutting Goals, Objectives, and Strategies**

Program Goal: Stimulate private industry development of a domestic unconventional fuels industry capable of producing in excess of 7 MMBbls/d of liquid fuels by 2035, while responsibly managing and mitigating environmental impacts, and protecting affected states and localities from adverse socio-economic impacts.								
Development Objectives By 2035: Oil Shale – 2.5 MM B/d; Tar Sands – 0.5 MMB/d; Coal Liquids – 2.6 MMB/d; Heavy Oil – 0.75 MMB/d; CO ₂ Enhanced Resource Recovery / Capture – 1.3 MMB/d								
Major Program Objectives								
Resource Access	Development Economics	Technology	Environment	Socio-Economic	Regulatory /Permitting	Infrastructure	Markets	Government Organization
Assure balanced access to resources on public lands consistent with national goals and industry needs.	Allow fuels projects to compete favorably with other investment options Stimulate industry investment in fuels projects Minimize risks to public treasuries	Enable near-term application of viable technology Improve technology performance and efficiency to drive down costs Ensure availability of skilled labor, services, and resources	Enable industry development and operations while meeting or exceeding public standards and requirements for environmental protection.	Ensure states and communities are ready to support population growth associated with industry development Protect states and communities from adverse impacts.	Provide an inclusive regulatory system and review process that allows expeditious development and a predictable schedule for permitting.	Ensure adequacy of infrastructure to support industry development and economic growth.	Develop fuels production to meet expected market demand	Organize government to expedite rather than impede development
Major Strategies To Address Constraints								
Resource Access	Development Economics	Technology	Environment	Socio-Economic	Regulatory /Permitting	Infrastructure	Markets	Government Organization
Make unconventional fuels resources on public lands (Federal and state) available to industry for sustainable development on an equitable basis	Identify, analyze, and propose a fiscal regime of royalty, tax, and pricing structures that will attract private development capital..	Craft a fast-track technology program to attract investment but not break the bank. Facilitate demonstration of efficient 1st generation technologies	Design and monitor facilities to minimize air, land, water, and wildlife impacts Craft and evaluate effective strategies for water resource management and carbon management .	Support development planning, funding, and training to avoid or mitigate adverse local impacts and maximize state and local job opportunities and economic growth.	Streamline permitting to accelerate development and ensure regulatory compliance	Create an integrated local and regional infrastructure plan that supports development, realizes synergies, and avoids duplicative costs.	Identify and analyze current market capacities including refinery capacities and pipeline capacities.	Create an organizational structure at state, local, and Federal levels to promote and accelerate unconventional fuels development in an efficient manner.

- Improving geoscientific understanding of resources through basin-focused studies and analysis where appropriate.
- Evaluating and testing novel concepts.

Supporting other RD&D and outreach efforts aimed at accelerating the advance of 1st or next-generation technologies and industry understanding of unconventional resources and technologies.

Development Economics: The program will help create a fiscal regime that attracts needed private development capital, provides incentives that reduce investment risk, accelerates return on investment, and stimulates private investment while minimizing public-sector risks and outlays.

Examples of government actions that could be taken to implement this strategy could include adoption of investment or production tax credits; depletion allowance; accelerated depreciation; or royalty relief -- structured to phase out above specified oil prices or limited to specific time frames or volumes of production to reduce risk and cost to public treasuries. Such actions would require state and/or Federal legislation to initiate. Program activities supporting such efforts could include cost-benefit and other supporting analysis.

Environmental Protection: The program will encourage industry to design demonstration and commercial-scale plants and operations to apply and improve on best available control technologies (BACTs) and best management practices to limit or mitigate environmental impacts. The program will monitor regulatory agency reports of compliance for research and demonstration permits and identify opportunities for efficiency improvements and impact reductions to facilitate continuous improvement in plant designs and operations.

Examples of program activities to implement these environmental strategies could include:

- Completing the programmatic environmental impacts statement for oil shale and tar sands leasing now under development by DOI/BLM;
- Engaging in focused environmental outreach to solicit and address views and concerns of stakeholders.
- Establishing basin-specific environmental R&D efforts to assess impacts and identify and advance environmental management practices and mitigation technologies that facilitate unconventional fuels resource development.
- Identify and quantify potential carbon emissions from unconventional fuels production and craft and evaluate effective strategies for capturing CO₂ for use in EOR or other use or storage.

Regulatory / Permitting: The program seeks to provide an inclusive regulatory system and review process that allows expeditious industry development and a predictable schedule for permitting approvals, consistent with Section 369(K) and other provisions of the Energy Policy Act of 2005, and recognizing the authorities assigned by law to the Secretary of the Interior. Examples of program activities to implement this strategy could include:

- Documenting Federal and state environmental standards that apply to unconventional fuels development;
- Preparing and publishing a roadmap of existing Federal and state permitting processes and timelines, including NEPA;
- Identifying Federal regulatory authorities that could be delegated to states;
- Establishing a Joint Review Process (Federal, state and local representatives) to coordinate concurrent permitting processes and compress permit timelines;
- Working with state regulatory bodies to craft streamlined permitting process

- Applying web-based technologies to facilitate application and review processes acceptable to both industry and permitting agencies.

Public Infrastructure: The program seeks to ensure the adequacy of public infrastructure and resources to support unconventional fuels industry development and associated growth.

The Program Strategy to achieve this objective is to create an integrated local and regional infrastructure plan that will support efficient development, realize synergies among infrastructure requirements for various unconventional fuels, and reduce duplicative investments. Example program activities to implement this strategy could include:

- Identifying major infrastructure requirements in affected regions (i.e., roads, railroads, airports, pipelines, power, water supply and storage);
- Accelerating public investments to coincide with integrated industry development schedule;
- Allowing industry to fund or assist infrastructure development in advance of commercial-scale industry development, allowing a credit against future taxes or royalties until infrastructure expenditures are recovered.
- Performing an integrated assessment of water requirements, supplies, infrastructure and management approaches to assure adequate water supplies to support industry development, community needs, and future water demand, protect surface and groundwater quality, and protect water rights.

Markets for Fuels and Feedstocks: The program seeks to help align unconventional fuels production with expected market demand. The strategy for achieving this objective is to identify and analyze current and expected future market capacities for unconventional feedstocks and finished fuels

including, diesel, jet fuel, and motor gasoline, as well as for domestic crude oils of varying quality. Understanding pipeline and refinery capacities and compatibility with various feedstocks, will help determine the market path and market impacts of introducing new feedstocks.

The Department of Defense may serve as a market initiator for initial production volumes. The integrated program will need to identify and implement strategies for expanding markets for unconventional fuels to Federal fleets, commercial aviation and trucking, and passenger vehicle use.

Socio-Economic Effects: The program seeks to ensure that states and communities are prepared to support industry development, operation and associated growth while mitigating against adverse impacts of rapid growth or industry turndown.

The strategy for achieving this objective is to support development planning, funding, and education and training that mitigates adverse local impacts and maximizes state and local employment opportunities, economic growth, and revenue-sharing with impacted communities. Activities to implement this strategy could include:

- Providing immediate planning assistance funds for affected communities;
- Assisting affected communities to identify and assess potential development impacts and services and infrastructure that will be required to support industry development and associated economic and population growth.
- Assisting financing of infrastructure development that is needed before industry revenue flows become available (such as low-rate loans, loan guarantees, and bonds);
- Assessing requirements and ensuring the availability of skilled labor, services, and

resources to achieve industry development goals.

- Creating and supporting university and vo-tech education and training programs within existing educational institutions so that essential professional and skilled labor is available, when needed, for industry development and operation.

Government Organization: The program seeks to coordinate and organize Federal, state, and local government efforts to expedite rather than impede industry development. The program strategy is to create an organizational structure at state, local, and Federal levels that will promote and accelerate unconventional fuels development in a reasoned and efficient manner. Potential program activities to implement this strategy could include:

- Creating a joint government organization to expedite unconventional fuels development, providing a “one-stop shop” for permitting and for management of government efforts and resolution of issues and impediments.
- Establishing a dedicated task force, government chartered corporation, or outsource mechanism to manage and accelerate government actions supporting domestic unconventional fuels development.
- Tasking an environmental advisory panel to support the Task Force’s cross-cutting environmental work group and provide input to inform program development and implementation.
- Creating similar panels to address the other crosscutting issues.

MAJOR UNCONVENTIONAL FUELS PROGRAM ELEMENTS

To implement these strategies and to achieve key program goals and objectives, the

proposed integrated Strategic Unconventional Fuels Program will be comprised of 11 major program elements, five of which focus on resource-specific requirements such as resource access, technology, and economics.

Six other program elements support the resource-focused areas by addressing common concerns and issues. These “crosscutting” areas enable evaluation of issues and development of solutions from the perspective of an integrated unconventional fuels industry rather than a specific resource.

Resource-Specific Program Elements

- Oil Shale
- Coal-derived Liquids
- Tar Sands
- Heavy Oil
- CO₂ Enhanced Oil Recovery

Cross-Cutting Program Elements

- Socio-Economic Impact Mitigation
- Carbon Management
- Water Resource Management
- Environmental Outreach
- Unconventional Fuels Markets
- Infrastructure Development

The program will be supported by an integrated program management function for planning, evaluation, supporting analysis, and stakeholder outreach and communications. The goals, objectives, strategies, and major activities of the various program elements are summarized in Tables I-6 through I-10. Table I-11 summarizes the goals, objectives, strategies, and major activities of the cross-cutting program elements. Program management is discussed in Part C of this volume. Detailed subplans for resource-specific and crosscutting program elements are provided in Volume II.

Table I- 7. Oil Shale Sub Program Goals, Objectives, Strategies, and Major Activities

Subprogram Goal: Stimulate private industry development of a domestic oil shale industry producing 2.5 MMB/d of shale oil by 2035							
Development Objectives by Program Element							
1. Resource Access	2. Technology	3. Development Economics	4. Environmental Protection	5. Regulatory / Permitting	6. Infrastructure	7. Markets	8. Socio-Economic
1.1. Assure access to oil shale on public land	2.1. Enable near-term application of viable current oil shale technology 2.2. Improve performance /efficiency to reduce costs 2.3 Accelerate next generation technology	3.1 Allow fuels projects to compete favorably with other investment options 3.2 Stimulate industry investment in fuels projects. 3.3 Minimize risks to public treasuries and assure market for initial shale oil	4.1. Enable industry development and operations while meeting or exceeding public standards and requirements for environmental protection	5.1 Provide an inclusive regulatory system and review process that allows expeditious development 5.2 System that provides a predictable schedule for permitting	6.1 Ensure adequacy of infrastructure to support industry development and economic growth	7.1 Develop fuels production to meet expected market demand.	8.1 Ensure states and communities are ready to support population growth associated with industry development and mitigate adverse socio-economic impacts
Major Strategies							
1.1.1 Establish commercial leasing program	2.1.1 Craft a fast-track technology program to attract capital investments 2.2.1 Facilitate demonstration of efficient 1st generation technologies 2.3.1 Carry out parallel efforts to develop and demonstrate next generation technology	3.1.1 Identify, analyze, and propose a fiscal regime of royalty, tax, and pricing structures that will attract private development capital	4.1.1 Support research to reduce, manage and mitigate environmental impacts 4.1.2 Craft/evaluate effective carbon management strategy 4.1.3 Craft/evaluate water management plan 4.1.4 Design and monitor oil shale facilities that minimize air, land, water, and wildlife impacts	5.1.1 Streamline permitting to accelerate development and ensure regulatory compliance 5.2.1 Provide an effective means for resolving disputes	6.1.1 Evaluate requirements and create an integrated local and regional infrastructure plan that supports development, realizes synergies, and avoids duplicating costs	7.1.1 Understand fuels markets, demand for shale oil, refinery capacities to accept and use shale oil 7.1.2 Provide support to the Department of Defense Assured Fuels Initiative	8.1.1 Support development planning, funding, and training to mitigate adverse local impacts and maximize state and local job opportunities and economic growth
Key Sub-Program Activities							
1.1.1.1 Prepare and implement leasing strategy in consultation with all stakeholders	2.1.1.1 Develop a plan to establish technology support centers in Utah and in Colorado	3.1.1.1 Establish royalty rate structure	4.1.1.1 Complete PEIS	5.1.1.1 Review existing local, state, and Federal standards and permit requirements	6.1.1.1 Assess infrastructure requirements	7.1.1.1 Assess public and private markets for shale oil derived fuels and products	8.1.1.1 Support local planning efforts by direct funding and by providing technical and analytical support
1.1.1.2 Prepare leasing rules that maximize oil shale resource recovery	2.2.1.1 Develop and implement a process for providing cost-shared technical assistance	3.2.1.1 Examine costs/benefits of various tax incentives	4.1.1.2 Develop oil shale environmental management plan	5.1.1.2 Develop streamlined permitting process	6.1.1.2 Prepare an integrated local and regional infrastructure support plan	7.1.1.2 Analyze infrastructure needed to support a growing shale oil industry	8.1.1.2 Identify funding sources for community development.
1.1.1.3 Prepare use plans that alleviate conflicts over minerals or surface uses of land	2.2.1.2 Develop and issue competitive cost-shared procurements for industry-led R&D projects	3.2.1.2 Implement high potential incentive	4.1.2.1 Prepare carbon management plan	5.1.1.3 Conduct a trial run of the streamlined permitting process	6.1.1.3 Evaluate feasibility of a regional upgrading facility	7.1.1.3 Prepare a market plan to resolve distribution and refining bottlenecks	8.1.1.3 Recommend legislation as required to implement funding
1.1.1.4 Identify and complete land exchanges to comprise logical development tracts	2.3.1.1 Identify next-generation research priorities	3.2.1.3 Conduct supporting economic analyses	4.1.3.1 Prepare water management plan	5.1.1.4 Implement new permitting process, improving over time	6.1.1.4 Support permitting of major pipelines	7.1.1.4 Support cross-cut analysis	8.1.1.4 Identify labor requirements, shortages
1.1.1.5 Initiate competitive leasing activities		3.3.1.1 Analyze market assurance options	4.1.4.1 Define and implement R&D plan				8.1.1.5 Plan for vocational training

Table I- 8. Coal Liquids Sub Program Goals, Objectives, Strategies, and Major Activities

Subprogram Goal: Stimulate private industry development of a domestic Coal-Derived Liquid Fuels industry producing 2.6 MMB/d of coal liquids by 2025							
Development Objectives by Program Element:							
1. Resource Availability	2. Technology Advancement	3. Development Economics	4. Environmental Protection	5. Regulatory / Permitting	6. Infrastructure	7. Markets	8. Socio-Economic
1.1. Assure access to sufficient coal resource to meet future demand.	2.1. Enable near-term application by industry of viable current commercial technologies.	3.1. Enable CTL projects to compete favorably with other investment option 3.2 Stimulate timely private industry investment 3.3. Minimize cost / risk to public treasuries 3.4 Assure markets for initial CTL production	4.1. Enable CTL industry development that meets or exceeds public standards for environmental protection.	5.1 Allow expeditious project permitting while ensuring compliance. 5.2 Add certainty to timelines for permit review and approvals.	6.1 Ensure adequate infrastructure to support CTL development, industry growth, and associated community infrastructure needs 6.2 Ensure resources to support community planning	7.1 Align fuels production (volumes and specs) with expected local and regional market demand	8.1 Ensure state/ local ability to support growth from CTL development 8.2 Assess and mitigate against adverse impacts to affected states and localities. 8.3 Maximize state/local jobs / economic growth
Major Strategies							
1.1.1 Fully evaluate the coal resource base.	2.1.1 Facilitate limited early learning commercial experience. 2.1.2 Establish the foundation of a strategically significant CTL domestic industry.	3.1. 1Identify, analyze and proposes a fiscal regime of tax and pricing structures 3.2.1 Share cost/risk on 1 st generation efforts (2.1.3) 3.2.1. Encourage fiscally prudent state incentives 3.3.1 Limit incentives	4.1.1 Use feasibility design to better understand and minimize CTL emissions and impacts 4.1.2 Prepare effective strategies for carbon management and water resources management 4.1.3 Continue R&D to reduce impacts of gasification and CTL	5.1.1 Streamline permitting processes and timelines 5.2.1 Identify and propose effective methods for more expeditious resolution of permitting disputes	6.1.1 Analyze coal policy, mine siting, permitting and safety issues 6.1.2 Assess feasibility of expand U.S. coal mining capacity 6.1.2. Prepare regional infra-structure plan	7.1.1 Understand market capacities, specifications, and trends 7.1.2 Support DOD Synthetic Fuels Initiative 7.1.3 Assure markets for initial production 7.1.4 Foster CTL use by other public and commercial fuel consumers	8.1.1 Support development planning and funding. 8.1.2 Expand training in skilled trades essential for industry development
Key Sub-Program Activities							
1.1.1.1 Update U.S. coal resource base assessment using latest methodologies (USGS).	2.1.1.1 Co-fund up to 5 site- specific CTL engineering design studies	3.1.1 Public purchases of initial fuels for DOD, DOE/SPR, Clean Cities, State Fleets, home heating, etc.	4.1.1.1 Assess environmental impacts in site-specific CTL design studies (2.1.1.1)	5.1.1.1. Review and document existing Federal, state, and local regulatory requirements impacting CTL development	6.1.1.1 Identify and assess infrastructure impacts of increased coal production for CTL under various scenarios	7.1.1.2 Survey refining and product markets and trends; prepare market analysis	8.1.1.1 Support local planning efforts
	2.1.1.2 Implement cost-shares authorized in EPACT and other legislation	3.2.1.1 Identify, analyze and propose royalty, tax, and price incentives; Identify and assess corresponding state incentives	4.1.2.1 Assess carbon capture and storage in deep saline aquifers and other approaches.	5.1.1.2 Review permit ting processes and develop a methodology for streamlining	6.1.1.2 Assess feasibility of mining capacity expansion to meet CTL and power demand	7.1.2.1 Support preparation of DOD fuel specifications; support CTL testing	8.1.1.2 Identify funding sources for community infrastructure development
	2.1.1.3 Conduct / support R&D in gasification, F-T, and clean-up technology.	3.2.2.1 Implement loan guarantees authorized by EPACT Sec. 1703.	4.1.2.2 Support development of cross-cutting water resources management strategy.	5.1.1.2 Assess potential for joint or concurrent state-Federal review; Study web-based approaches	6.1.2.1 Support preparation of cross-cutting id regional infrastructure development plans	7.1.3.1 Authorize and craft purchase agreements with floor prices and collars	8.1.2.1 Identify labor needs and potential shortages; craft vocational training plan.
	2.1.2.1 Provide fuels to DOD through supported facilities (Headwaters / Syntroleum)	3.3.1.1 Assess and propose limitations that stimulate investment but limit public cost / risk.	4.1.3.1 Identify additional R&D needs and priorities to reduce environmental impact	5.1.1.4 Implement revised process on a trial basis; modify as needed		7.1.2.2 Engage potential commercial users for CTL testing and evaluation	

Table I- 9. Tar Sands Sub Program Goals, Objectives, Strategies, and Major Activities

Subprogram Goal: Stimulate private industry development of a domestic tar sands industry producing 0.53 MB/d of oil by 2035							
Development Objectives by Program Element:							
1. Resource Access	2. Technology	3. Development Economics	4. Environmental Protection	5. Regulatory / Permitting	6. Infrastructure	7. Markets	8. Socio-Economic
1.1. Continue process for commercial leasing of tar sands on public land; 1.2 Enable delineation of logical development units 1.3 Ensure land use plans and regulations favor development	2.1. Ensure efficient and reliable technology to produce a broad range of tar sands resources 2.2 Enable processing of consolidated ores	3.1. Create investment climate favorable to 1 st generation development. 3.2 Reduce investment risk 3.2 Stimulate timely private investment 3.3. Minimize cost / risk to public treasuries	4.1. Enable tar sands development that meets public standards for environmental protection.	5.1 Allow expeditious project permitting while ensuring compliance. 5.2 Add certainty to timelines for permit review and approvals.	6.1 Ensure adequate public infrastructure to support Tar Sand development, industry growth, and associated community infrastructure 6.2 Ensure resources to support community planning and impact mitigation.	7.1 Align fuels production (volumes and specs) with expected local and regional market demand 7.2 Encourage use of domestic feedstocks over foreign sources	8.1 Ensure state/ local readiness to support growth from industry development 8.2 Protect states and localities from adverse socio-economic impact.
Major Strategies							
1.1.1 Complete PEIS process and issue a commercial leasing program for tar sands 1.1.2 Improve resource characterization in terms of reservoir and bitumen properties 1.1.3 Prioritize deposits for development	2.1.1 Promote early field experimentation and development 2.1.2 Pursue 2 in-situ and 2 surface technologies 2.1.3 Cost-share pilot and demonstration projects 2.2.1 Sponsor supporting research	3.1.1 Propose tax and royalty measures to speed investment payback, reduce oil price risk, and address 1 st generation hurdles. 3.2.1 Share cost/risk on 1 st generation efforts (2.1.3) 3.2.1. Encourage state incentives 3.3.1 Limit incentives	4.1.1 Encourage technology that minimizes impacts. 4.1.2 Apply best available control technologies for air, water, reclamation, other s. 4.1.3 Support tar sands environmental R&D 4.1.4 Coordinate tar sands effort and crosscutting SUF carbon strategy 4.1.5 Support BLM PEIS	5.1.1 Streamline permitting processes and timelines 5.2.1 Identify and propose effective methods for expeditious resolution of permitting disputes	6.1.1 Assess tar sands infrastructure requirements 6.1.2 Coordinate State, Local, and Federal government efforts 6.1.3 Engage industry to define plans and infrastructure needs 6.1.2. Prepare regional infrastructure plan	7.1.1 Support DOD Clean Fuels Initiative 7.1.2 Understand market capacities, specifications, and trends 7.1.3 Evaluate market flow patterns 7.1.4 Identify /address transport needs	8.1.1 Support development planning and funding. 8.1.2 Expand training in skilled trades essential for industry development
Key Sub-Program Activities							
1.1.1.1 Expand Tar Sands Working Group	2.1.1.1 RFI / BAA to determine capabilities and gauge industry / institutional program interest.	3.1.1 Evaluate costs and benefits of public purchases of initial fuels	4.1.1.1 Assess impacts of small scale tar sands development	5.1.1.1 Review local, state, Federal permit processes to identify decision points; perform risk assessment.	6.1.1.1 Identify and assess infrastructure requirements	7.1.1.2 Survey refining and product markets and trends	8.1.1.1 Support local planning efforts
Survey resources, compile data, and develop screening criteria.	2.1.1.2 Fund cooperative university/industry research for basic and bench scale studies (SBIR/STTR)	3.2.1.1 Identify, analyze and propose royalty, tax, and price incentives	4.1.2.1 Integrate BACT technology and standards in cost-shared pilot, semi-works, and demo projects	5.1.1.2 Identify means of mitigating risks.	6.1.2.1 Prepare integrated local and regional public infrastructure development plan	7.1.2.1 Analyze price risk and define mitigation approaches	8.1.1.2 Identify funding sources for community infrastructure development
1.1.1.2 Identify, recommend and prioritize field /basin study targets; Conduct core and assay studies	2.1.2.2 Cost-share field pilot plants	3.2.1.1 Identify and assess corresponding state incentives	4.1.4.1 Support reclamation R&D	5.1.1.2 Develop methodology for joint or concurrent state-Federal review; Study web-based approaches	6.2.1 Assure funding for long-lead time infrastructure needs	7.2.1 Analyze impacts of bitumen and syncrude on other domestic oil / fuels	8.1.2.1 Identify labor needs and potential shortages; craft vocational training plan.
1.1.1.4 Recommend basis for delineation of logical development blocks	2.3.1.1 Cost-share Semi-works and demonstration projects	3.3.1.1 Assess and propose limitations that stimulate investment but limit public cost / risk.	4.1.5.1 Identify water needs; develop supply / re-use management approach	5.1.1.4 Implement revised process on a trial basis; modify as needed	6.2.2 Provide grants to support community participation and planning efforts		

Table I- 10. Heavy Oil Sub Program Goals, Objectives, Strategies, and Major Activities

Subprogram Goal: Stimulate and accelerate expanded private industry development of domestic heavy oil resources, resulting in incremental domestic heavy oil production of 0.75 MMB/d of heavy oil by 2035.						
Development Objectives by Program Element						
1. Resource Access	2. Technology	3. Development Economics	4. Environmental Protection	5. Regulatory / Permitting	6. Infrastructure	7. Socio-Economic
1.1 Resource access not a major constraint to domestic heavy oil development	2.1 Wide scale deployment of state-of-the-art heavy oil technologies 2.2 Accelerate development of advanced heavy oil technologies	3.1 Reduce capital risk in investing in high cost heavy projects 3.2 Reduce fuel price risk associated with the costs of heavy oil projects	4.1 Reduce the air emissions impact associated with heavy oil development 4.2 Reduce the risks of heavy oil development on permafrost	5.1 See discussion under 4.1 and 4.2	6.1 Ensure infrastructure to support heavy oil development and economic growth;	7.1 Ensure state/ local readiness to support development / growth 7.2 Protect states and localities from adverse socio-economic impact.
Major Strategies to Achieve Objectives						
Not applicable	2.1.1 Development and implementation of "basin strategies for deploying state-of-the-art heavy oil technologies 2.2.1 Support public private partnerships to enhance heavy oil technology performance	3.1.1 Assess potential fiscal incentives to encourage investment in heavy oil projects 3.1.2 Pursue demos to reduce operator risk in pursuing heavy oil projects	4.1.1 Proactively work with state regulatory agencies to cost-effectively address environmental concerns 4.1.2 Support efforts to minimize the impact on of heavy oil recovery technology the permafrost	5.1.1 Facilitate discussions between states with history of heavy oil development with those with potential but little or no established development	6.1.1 Evaluate heavy oil infrastructure requirements 6.1.2. Prepare local / regional infra-structure plan	7.1.1 Support development planning 7.1.2 Expand training in skilled trades essential for industry development
Key Sub-Program Activities to Implement Strategies						
Not applicable	2.1.1.1 Develop a "basin-specific" set of public/private partnerships in key heavy oil basins	3.1.1.1 Assess potential fiscal incentives to encourage investment in heavy oil projects	4.1.1.1 Proactively work with states to address air quality concerns	5.1.1.1 Review local, state, federal permit requirements	6.1.1.1 Identify infrastructure requirements	7.1.1.1 Support local planning efforts
	2.1.1.2 Develop ANS basin strategy to jointly pursue heavy oil and CO2-EOR potential	3.1.2.1 Demonstrations to reduce operator risk in pursuing heavy oil projects	4.2.1.1 Work with Alaska to address concerns of heavy oil impacts on the permafrost	5.1.1.2 Develop methodology for joint state / federal review	6.1.2.1 Evaluate feasibility of regional upgrading	7.1.1.2 Identify fund sources for community infrastructure
	2.3 Pursue collaborative Canadian/U.S. efforts for sharing technology and conducting jointly-funded field R&D	3.2.1.1 Cross-cutting analyses of incentives for all strategic unconventional fuels.	4.1.4.1 Identify / assess cost and benefits of carbon management options		6.1.2.2 Prepare integrated regional infrastructure plan	7.1.2.1 Identify labor needs and shortfalls; promote vocational training.
	2.1.1.3 Design/implement portfolio of resource characterization studies and field demonstrations to reduce risks					

Table I- 11. CO₂ EOR Sub Program Goals, Objectives, Strategies, and Major Activities

Subprogram Goal: Expansion and diversification of a CO₂-EOR industry producing over 1.3 MMB/d of incremental domestic oil by 2035 using mostly anthropogenic CO₂						
Development Objectives by Program Element						
1. Resource Access	2. Technology	3. Development Economics	4. Environmental Protection	5. Regulatory / Permitting	6. Infrastructure	7.Socio-Economic
1.1 Resource access not a major constraint to domestic CO ₂ -EOR development	2.1 Wide deployment of state-of-the-art CO ₂ -EOR technologies 2.2 Development of advanced CO ₂ -EOR technologies 2.3 Development of "EOR-Ready" CO ₂ supplies	3.1 Reduce capital risk in investing in high cost EOR projects 3.2 Reduce price risk associated with CO ₂ supplies	4.1 Acceptable, cost effective strategies to cost-effectively address environmental concerns	5.1 See discussion under 4.1 and 4.2	6.1 Ensure infrastructure to support CO ₂ -EOR development and economic growth;	7.1 Ensure state/ local readiness to support development / growth 7.2 Protect states and localities from adverse socio-economic impact.
Major Strategies to Achieve Objectives						
Not applicable	2.1.1 Pursue of "basin strategies for deploying state-of-the-art CO ₂ -EOR technologies 2.2.1 Support partnerships to enhance CO ₂ -EOR technology 2.3.1 Pursue programs to promote development of "EOR-ready" CO ₂	3.1.1 Assess potential fiscal incentives to encourage investment in CO ₂ -EOR projects 3.1.2 Pursue demos to reduce operator risk in pursuing CO ₂ -EOR projects	4.1.1 Proactively work with state regulatory agencies to cost-effectively address environmental concerns	5.1.1 Facilitate discussions between states with history of CO ₂ -EOR development with those with potential but little established development	6.1.1 Evaluate infrastructure requirements 6.1.2. Prepare local / regional infra-structure plan	7.1.1 Support development planning 7.1.2 Expand training in skilled trades essential for industry development
Key Sub-Program Activities to Implement Strategies						
Not applicable	2.1.1.1 Implement "basin-specific" partnership to encourage CO ₂ -EOR, from natural & industrial CO ₂ sources	3.1.1.1 Assess potential fiscal incentives to encourage investment in CO ₂ -EOR projects	4.1.1.1 Work collaboratively with ongoing efforts to address environmental concerns with CO ₂ injection	5.1.1.1 Review local, state, federal permit requirements	6.1.1.1 Identify infrastructure requirements	7.1.1.1 Support local planning efforts
	2.2.1.1 Support public private partnerships to enhance CO ₂ -EOR technology performance	3.1.2.1 Demos to reduce operator risk in pursuing CO ₂ -EOR projects		5.1.1.2 Develop methodology for joint state / federal review	6.1.2.2 Prepare integrated regional infrastructure plan	7.1.1.2 Identify fund sources for community infrastructure
	2.1.3.1 Pursue partnership to lower cost of CO ₂ co-production and "ready for EOR" capture from high concentration CO ₂ vents	3.2.1.1 Cross-cutting analyses of incentives for all strategic unconventional fuels.				7.1.2.1 Identify labor needs and shortfalls; promote vocational training.

Table I- 12. Strategic Unconventional Fuels Program Crosscutting Goals, Objectives, and Strategies

Subprogram Goal: Address Crosscutting Issues that Impact Multiple Unconventional Resources					
Development Objectives by Program Element					
1. Socio-Economic Impacts	2. Carbon Management	3. Water Resources	4. Environmental Outreach	5. Fuels Markets	6. Infrastructure
1.1 Ensure states and communities are prepared to handle the social and community impacts associated with industry development.	2.1 Foster development and adoption of technologies for capturing and concentrating CO ₂ . 2.2 Support development of markets or sequestration opportunities for CO ₂ from unconventional fuels production.	3.1 Understand water requirements for concurrent development of unconventional fuels 3.2 Identify strategies to reduce needs and manage resources 3.3 Identify strategies for effective groundwater protection	4.1 Solicit, understand, and address issues and concerns of key stakeholders relative to environmental impacts associated with unconventional fuels development	5.1 Support the introduction of unconventional fuels into future private and public markets.	5.1 Facilitate public infrastructure development needed to support community development 5.2 Facilitate private infrastructure development needed to support industrial unconventional fuels growth
Strategies					
1.1.1 Support development planning, funding, and training to avoid or mitigate adverse local impacts and maximize state and local job opportunities and economic growth.	2.1.1 Improve understanding of emissions and mitigation potential of various unconventional fuels 2.1.2 Integrate Technology and Program Goals and Activities 2.2.1 Foster Use of CO ₂ for EOR or other beneficial uses 2.2.2 Develop Diverse Markets	3.1.1 Assess gross / net water needs for unconventional fuels resources and technologies 3.1.2 Assess water availability to support fuels development and meet other local/regional needs 3.2.1 Assess options for augmenting water supply and /or reducing project water demands. 3.3.1 Identify likely surface and ground water quality impacts and protection and remediation approaches	4.1.1 Establish organizational structure to manage outreach 4.1.2 Facilitate improved understanding of unconventional fuels viability and potential roles in U.S energy supply. 4.1.3 Identify and assess issues and interests of key stakeholders 4.1.4 Develop and implement tools for Outreach and Collaboration	5.1.1 Align unconventional fuels production from multiple, dispersed unconventional fuels resources with refining and transport infrastructure and markets.	5.1.1 Encourage public/ private input 5.1.2 Identify existing industry and community-related infrastructure 5.2.1 Identify industry infrastructure required 5.1.3 Identify community infrastructure required 5.1.4 Prepare a plan that will facilitate the timely development of the incremental infrastructure
Key Activities					
1.1.1.1 Support local planning activities	2.1.1.1 Craft CO ₂ profiles 2.1.1.2 Support demonstration of existing processes, and RD&D for novel technologies.	3.1.1.1 Analyze net process water requirements for SUF processes	4.1.1.1 Establish environmental advisory committee to define process and guiding principles	5.1.1.1 Evaluate fuels markets (private and public)	5.1.1.1 Develop a comprehensive stakeholder plan
1.1.1.2 Assess vocational training requirements	2.1.2.1 Support sequestration demonstration activities of industry and DOE partnerships; Develop regional CM plans	3.1.2.1 Perform baseline analyses of water supplies and supporting infrastructure in SUF development regions	4.1.2.1 Develop outreach and education materials , including studies, fact sheets, plans, etc.; available on website	5.1.1.2 Analyze potential of current and planned refineries to absorb expected production.	5.1.2.1 Identify sites likely to be impacted by unconventional fuels development
1.1.1.3 Coordinate community funding	2.2.1.1 Conduct joint (industry, DOE, and partnerships) R&D needs assessment for CCC /CCS.	3.2.1.1 Support RD&D on technology or approaches for water use minimization or e-use	4.1.3.1 Convene workshops to address key area- or resource-specific issues 4.1.3.2 Provide input to plans	5.1.1.3 Assess pipeline capacities/flows, identify dislocations in feedstocks, transport, refining, and markets	5.2.1.1 Define the industrial infrastructure needed to develop each resource
	2.2.2.1 Identify potential CO ₂ markets and storage options; support siting, assess costs, infrastructure requirements; support development/demonstration of analytical and monitoring techniques.	3.3.1.1 Develop approach for estimating and monitoring water quality conditions and impacts of SUF development	4.1.4.1 Craft website for outreach, input and information sharing	5.1.1.4 Support resource-specific subgroups in developing effective market strategies.	5.1.3.1 Define community infrastructure needed to support industrial development

PART C

PROGRAM STRUCTURE AND MANAGEMENT PLAN

PROGRAM STRUCTURE AND MANAGEMENT PLAN

The Strategic Unconventional Fuels Program focuses on five specific unconventional resources, supported by six cross-cutting management and analysis functions (Figure I-23). The overall program strategies are applied to each of the subprograms, to the extent they are applicable, and the cross-cutting functions are managed as common to all.

Program Management Goals:

- Manage program activities and efforts efficiently.
- Achieve production goals on schedule.

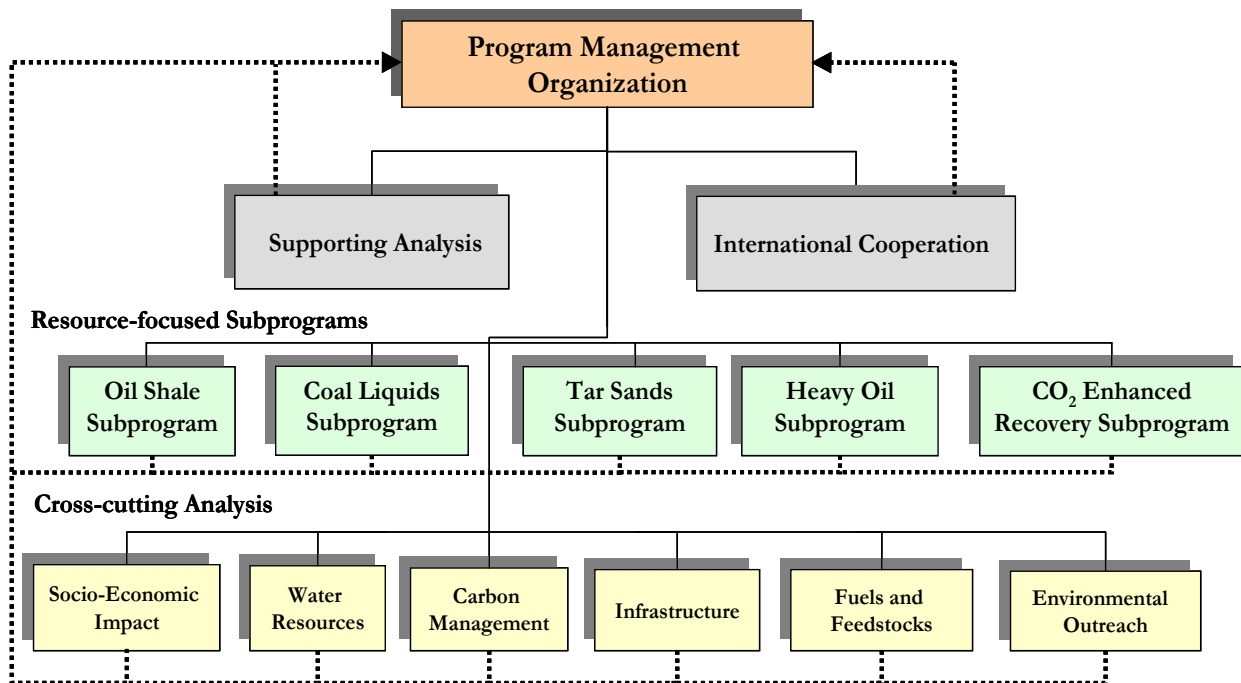
activities that are required under the Government Performance and Results Act and other program accountability standards.

Importantly, the program management function will conduct analyses, develop alternative strategies and recommendations and communicate this information to decision-makers. The program will also assess cross-cutting issues that impact all strategic unconventional fuels development efforts.

PROGRAM ORGANIZATION

An effective program management structure is essential to coordinate and facilitate interactions among the diverse program participants, keep the mission on schedule, manage program resources, and perform dynamic program planning and evaluation

Figure I- 23. Preliminary Strategic Unconventional Fuels Development Program



Source: Unconventional Fuels Task Force, 2006.

Task Force Recommendation: In the Initial Report to Congress detailing our *preliminary* findings and recommendations, the Task Force noted the critical importance for effective organization of government to carry out the program mission.

Achieving the program goal will require extensive governmental interaction, within and between the Departments of Energy, Interior, and Defense, between the Federal government and the states to assess needs and options, and coordinate program activities, and with the private sector to assure the program is meeting the needs of the developing industry.

The Task Force suggests several options for Congress and the Administration to consider, including a mission-focused government corporation. This concept should be explored through a credible entity such as the National Academy for Public Administration.

It remains our view that to accelerate achievement of national objectives and program goals this program should be managed and conducted through a government entity dedicated solely to this critical national mission. Such an authority could enable accelerated solicitation and contracting of key program activities, ensure consistent and effective outreach and communications to key stakeholders, and facilitate streamlined project reviews and permitting fully consistent with state and Federal requirements and standards.

Such an entity would have autonomous budget authority, with close monitoring and accountability standards. It would be managed and staffed by experienced, highly qualified personnel drawn from senior levels of government and from private industry. To expedite implementation, it would be

supported by qualified technical and management experts, drawn from the private sector as management deems appropriate.

The Program Management Plan that follows describes management goals and objectives, and provides an effective structure for managing program activities to achieve production objectives. It addresses five (5) key functions (Table I-12):

- Program Planning, Integration, and Evaluation, and Implementation
- Research and Analysis
- Outreach and Communications
- Task Force Support
- International Cooperation

Program Planning, Integration, Evaluation and Implementation: The most critical area of responsibility for Program management encompasses program planning, integration of all of the independent and crosscutting program elements, implementation of recommendations and legislative mandates, and the critical evaluation of program performance relative to program goals and objective performance metrics.

Objectives:

- Effectively plan, manage, and evaluate the integrated program on a consistent basis
- Achieve mission goals on-time and within allocated resources
- Identify, understand and address cross-cutting issues impacting mission success
- Manage resources efficiently
- Meet program performance and accountability standards

Table I- 13. Strategic Unconventional Fuels Program – Program Management Approach

Program Goal: Stimulate Unconventional Fuels Industry Development Achieving 7 MMBbl/d by 2035				
Program Management Objectives				
Planning, Integration, and Evaluation	Strategic Analysis and Support	Outreach and Communications	Task Force Support	International Cooperation
1.1 Effectively plan, manage, execute and evaluate integrated program on a consistent basis 1.2 Achieve mission goals on-time and within allocated resources 1.3 Understand and address cross-cutting issues impacting mission 1.4 Manage program resources efficiently 1.5 Meet performance and accountability standards	2.1 Provide objective analytical basis for program management and policy makers 2.2 Provide analytical basis for subprogram planning and analysis 2.3 Provide consistent analytical basis for evaluating program impacts and benefits	3.1 Effectively seek and consider input to program plans and activities by key stake-holders 3.2 Communicate program plans, activities, and progress to government and public audiences 3.3 Communicate program results, including effective technology transfer, to appropriate audiences	4.1 Provide an effective mechanism and venue for key Federal agencies, states, and impacted communities to interact to identify and discuss issues and concerns, provide input to program management, and develop and communicate key recommendations to policy makers and other audiences, consistent with EFACT 2005.	5.1 Inform U.S. unconventional fuels development, based on experience of other countries in similar endeavors.
Major Strategies				
1.1.1 Establish integrated program management office (PMO) 1.1.2 Craft mission-focused program structure 1.1.3 Coordinate resource-focused and crosscutting program elements 1.1.4 Integrate strategies and plans 1.4.1 Identify synergies to accelerate progress or reduce costs 1.5.1 Craft / monitor measurable, goal-oriented performance metrics 1.1.5 Centralized project management, tracking and reporting system 1.1.6 Craft and manage major program solicitations and procurements	2.1.1 Establish supporting analysis function within the PMO 2.2.1 Assess strategic issues associated with domestic and global fuels supply, demand and use 2.3.1 Develop and apply analytical tools and approaches to assess issues and program elements on a consistent basis	3.1.1 Establish communications and outreach function within PMO 3.2.1 Conduct focused outreach efforts stakeholders to solicit input 3.2.2 Work through established industry, community, and NGO entities 3.2.3 Use web-based approaches to solicit and share information as appropriate 3.2.4 Prepare and distribute briefings	4.1.1 Ensure effective administrative, technical, and analytical support for Strategic Unconventional Fuels Task Force 4.1.2 Provide dedicated staff to support Task Force scheduling and logistical requirements	5.1.1 Establish international cooperation function within the PMO 5.1.2 Focus activities on areas beneficial to achieving development program goals and objectives
Key Activities				
1.1.1.1 Convene PMO 1.1.4.1 Review and refine sub-program strategies and subplans 1.1.2.1 Develop implementation plans 1.5.1.1 Develop sup-program and integrated program metrics and implement 1.5.1.2 Conduct annual plan and performance reviews 1.1.6.1 Support budget process	2.1.1.1 Complete integrated model of domestic unconventional fuels resources, economics, and program benefits 2.2.1.1 Assess potential program benefits relative to fuels supply, imports, and economic indicators 2.3.1.1 Prepare analyses, reports, and other materials	3.2.1.1 Stakeholder Outreach 3.3.1.1 Reports to Congress	4.1.1.1 Plan and support Task Force meetings 4.1.1.2 Manage meeting logistics 4.1.1.3 Provide supporting analysis as appropriate 4.1.1.4 Support development of reports, recommendations and other Task Force products 4.1.1.5 Assist development of annual reports required under EFACT	5.1.1.1 Initiate Oil Sands Task force with Alberta 5.1.2.1 Identify and assess candidate nations for oil shale partnerships 5.1.2.2 Define areas for collaboration 5.1.2.3 Define and plan scope of activities consistent with program goals and objectives 5.1.2.4 Craft and implement collaborative agreements

Strategy:

To achieve these objectives, the Task Force has defined several strategies.

Integrated Program Structure and Program Management Office: The Task Force recommends an integrated mission-focused program structure. An integrated program management office (PMO) should manage and conduct the key planning, integration and evaluation functions, and other management functions addressed in the Program Management Plan.

The PMO should be comprised of qualified managers for each of the major PMO functions and include representation from the managers of each of the major resource-focused and cross-cutting subprogram areas. Integration of sub-program strategies and plans will allow the PMO to identify critical interdependencies that can impact program schedules and costs. It can also avoid duplication of efforts and identify potential synergies that can accelerate progress or reduce costs.

CENTRALIZED PROJECT MANAGEMENT, TRACKING AND REPORTING SYSTEM:

The Task Force recommends establishment of a project management and performance tracking system that integrates information from various subprogram elements and allows the PMO to identify critical issues of performance, schedule, or outcome early on.

The progress and performance of the Strategic Unconventional Fuels Development Program must be monitored and evaluated on an ongoing basis to assure timely achievement of critical objectives and milestones. Performance metrics will be established for sub-program elements as well as the overall program. These metrics will be objectively measurable. They will measure both performance relative to schedule as well as the effectiveness of the activity relative to

expected outcomes. Overall, the program will adapt to new insights and lessons learned from program activities or external sources.

Craft and manage major program solicitations and procurements:

The Task Force is concerned that contracting bottlenecks within Federal agencies may delay key procurement activities and impact mission schedule relative to the plan.

The Task Force recommends that the PMO be authorized and staffed to develop, issue and issues solicitations, evaluate proposals, and award grants and contracts. The ability to conduct expedited procurements that fully comply with Federal contracting requirements and standards, is an attractive feature of the government corporation structure, should this approach be adopted.

Initial Activities:

- Convene PMO
- Review and refine sub-program strategies and subplans
- Develop implementation plans
- Develop sup-program and integrated program metrics
- Conduct annual plan and performance reviews
- Support budget process

RESEARCH AND ANALYSIS

The Strategic Unconventional Fuels Program will require a range of analytical efforts to support planning functions, assess the relative costs and benefits of the program, and determine program effectiveness relative to various measures of performance. The Energy Policy Act of 2005 also directed DOE's Office of Petroleum Reserves to analyze strategic issues associated with unconventional fuels development.

Objectives:

The objectives of this program area are to:

- Provide objective analytical basis for program management and policy makers
- Provide analytical basis for subprogram planning and analysis
- Provide consistent analytical basis for evaluating program impacts and benefits

Strategy:

To achieve these objectives, the Research and Analysis support function will:

- Establish consistent supporting analysis tools and methodologies
- Assess strategic issues associated with domestic and global fuel supply, demand and use.
- Assess and quantify impediments to investment on a resource/projected site-specific basis and offer recommendations to mitigate the impediments
- Develop and apply analytical tools and approaches to assess issues and program elements on a consistent basis

Initial Activities:

- Complete integrated model of domestic unconventional fuels resources, economics, and program benefits.
- Assess potential program benefits relative to fuels supply, imports, and economic indicators.
- Vet findings with the private sector and seek feedback on results.
- Prepare analyses, reports, and other materials.

OUTREACH AND COMMUNICATIONS

Development of the nation’s strategic unconventional fuels resources will affect a broad range of stakeholders and interests in government, private industry, and affected communities, requiring effective mechanisms to solicit stakeholder input and communicate program news, plans, activities, and results.

Community involvement will enhance and accelerate industry development while assuring community needs are addressed.

Objectives:

The Outreach and Communications function seeks to:

- Effectively seek and consider input to program plans by key stakeholders.
- Communicate program plans, activities, and progress to government and public.
- Communicate program results, including effective technology transfer, to appropriate audience.

Strategy:

To achieve these objectives, the PMO will:

- Establish a communications and outreach function within PMO
- Conduct focused outreach efforts with key stakeholders to solicit input
- Engage established industry, community, and NGO entities
- Use web-based approaches to solicit and share information as appropriate
- Prepare and distribute briefings

Initial Activities:

- Stakeholder Outreach
- Reports to Congress
- Program website

TASK FORCE SUPPORT

Objectives:

The objective of the PMO is to provide an effective mechanism and venue for key Federal agencies, states, and impacted communities to interact to identify and discuss issues and concerns, provide input to program management, and develop and communicate key recommendations to policy makers and other audiences, consistent with EPACT 2005.

The Strategic Unconventional Fuels Task Force provides an effective organization for Federal, state, and local governments to communicate and share concerns regarding unconventional fuels development. The Task Force is directed by the Energy Policy Act of 2005 to report annually for the five years following enactment on the nation's progress in accelerating and promoting development of domestic unconventional fuels.

To fulfill its responsibilities and perform its duties and functions, the Task Force requires ongoing logistical and analytical support.

Strategy:

To achieve this objective, the program management function will:

- Provide effective administrative, technical, and analytical support for Strategic Unconventional Fuels Task Force.
- Provide dedicated staff to support Task Force scheduling and logistics.

Initial Activities:

Specific support activities will include:

- Plan and support Task Force meetings
- Manage meeting logistics
- Provide supporting analysis as appropriate
- Support development of reports, recommendations and other products
- Assist development of annual reports required under EPACT

INTERNATIONAL COOPERATION

Effective international cooperation and collaboration can provide access to valuable insights that inform and influence program activities, technology development and commercialization, and public policies affecting industry development. They can have synergistic benefits, resulting increased fuels production not only in the United States but in other parts of the world as well.

In response to directives from the Energy Policy Act of 2005, the Task Force evaluated the advisability of establishing information sharing partnerships with the Province of Alberta relative to tar sands development, and with Estonia and other oil shale bearing countries relative to domestic oil shale development. The Task Force determined that these partnerships were not only advisable, but quite timely and recommended their immediate implementation. Similar partnerships already exist for the development and commercialization of coal liquids, heavy oil, and CO₂ enhanced oil recovery and CO₂ storage. These partnerships may be extended to multi-nation cooperative agreements as mutually agreed.

Objective:

The objective of this program management activity is to coordinate efforts to inform U.S. unconventional fuels development, based on experience of other countries in similar endeavors.

Strategy:

To achieve this objective, the PMO will:

- Establish international cooperation function within the PMO
- Focus activities on areas beneficial to achieving development program goals and objectives

Key Activities:

Specific activities to be initiated will include:

- Initiate collaboration with Alberta
- Identify and assess candidate nations for oil shale partnerships
- Define areas for collaboration
- Define and plan scope of activities consistent with program goals and objectives
- Craft and implement collaborative agreements.

PROGRAM SCHEDULE

The Task Force has focused on those impediments to development that can and should be addressed by government. The plan offers a long-term vision and is structured for incremental implementation.

This approach moves each resource toward commercialization at its own pace, recognizing various stages of readiness. By necessity, the plan calls for analysis and assessment of resources, technologies, economics, challenges, and impacts to be conducted ahead of investments in demonstration projects or pilot plants.

The plan provides for feasibility studies and design-level studies to reduce project risk before investing in demonstration. Where technologies are proven, the strategy provides for aggressive technology transfer to demonstrate and expand application of the technology to more users in more basins and regions.

Table I-13 describes the major milestones to be achieved by the program in the first six years of activities. These milestones and the activities required to achieve them are discussed in greater detail in the program subplans provided in Volume II of this plan document.

Table I- 14. Major Program Milestones through 2012

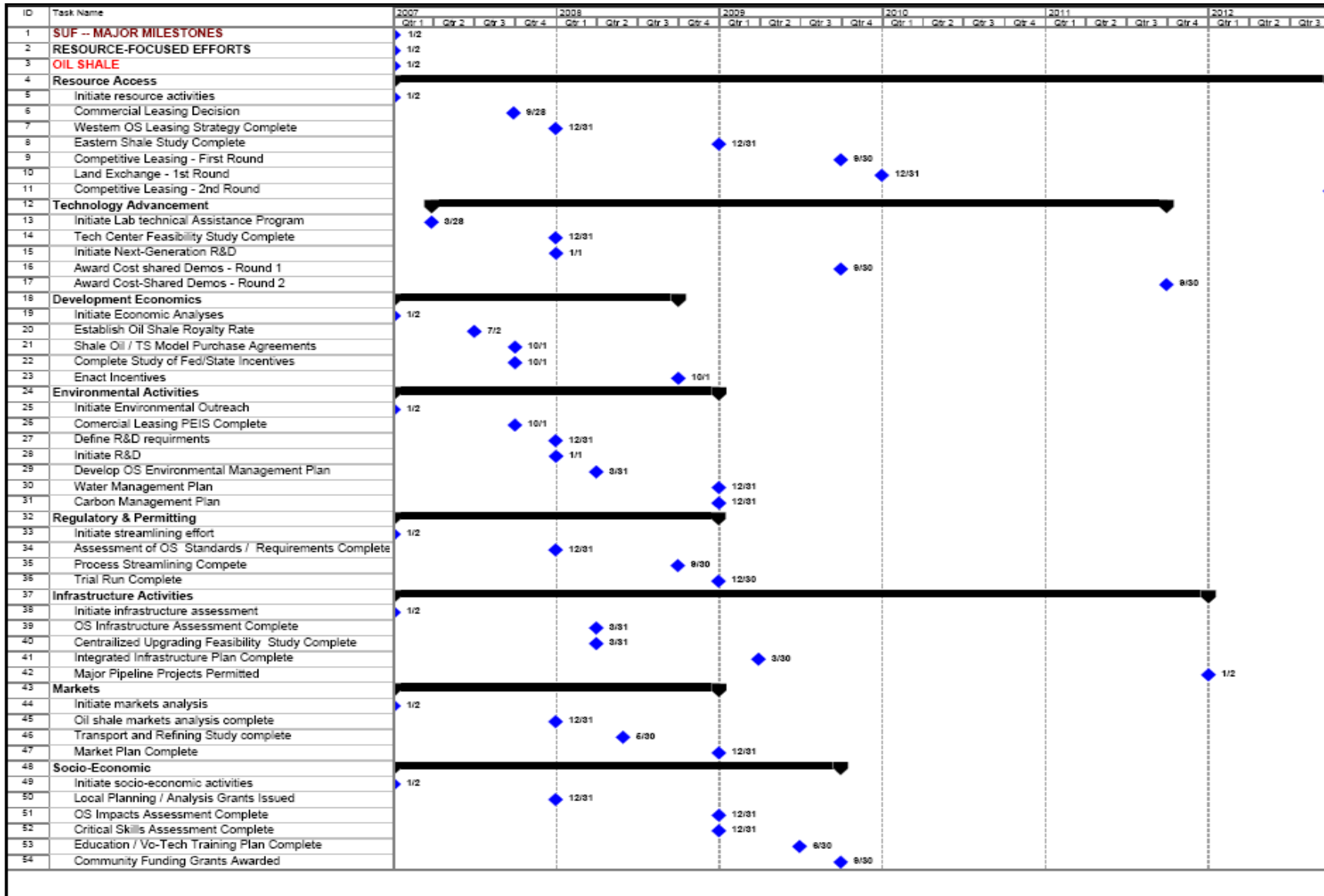


Table I- 13. Major Program Milestones through 2012 (Continued)

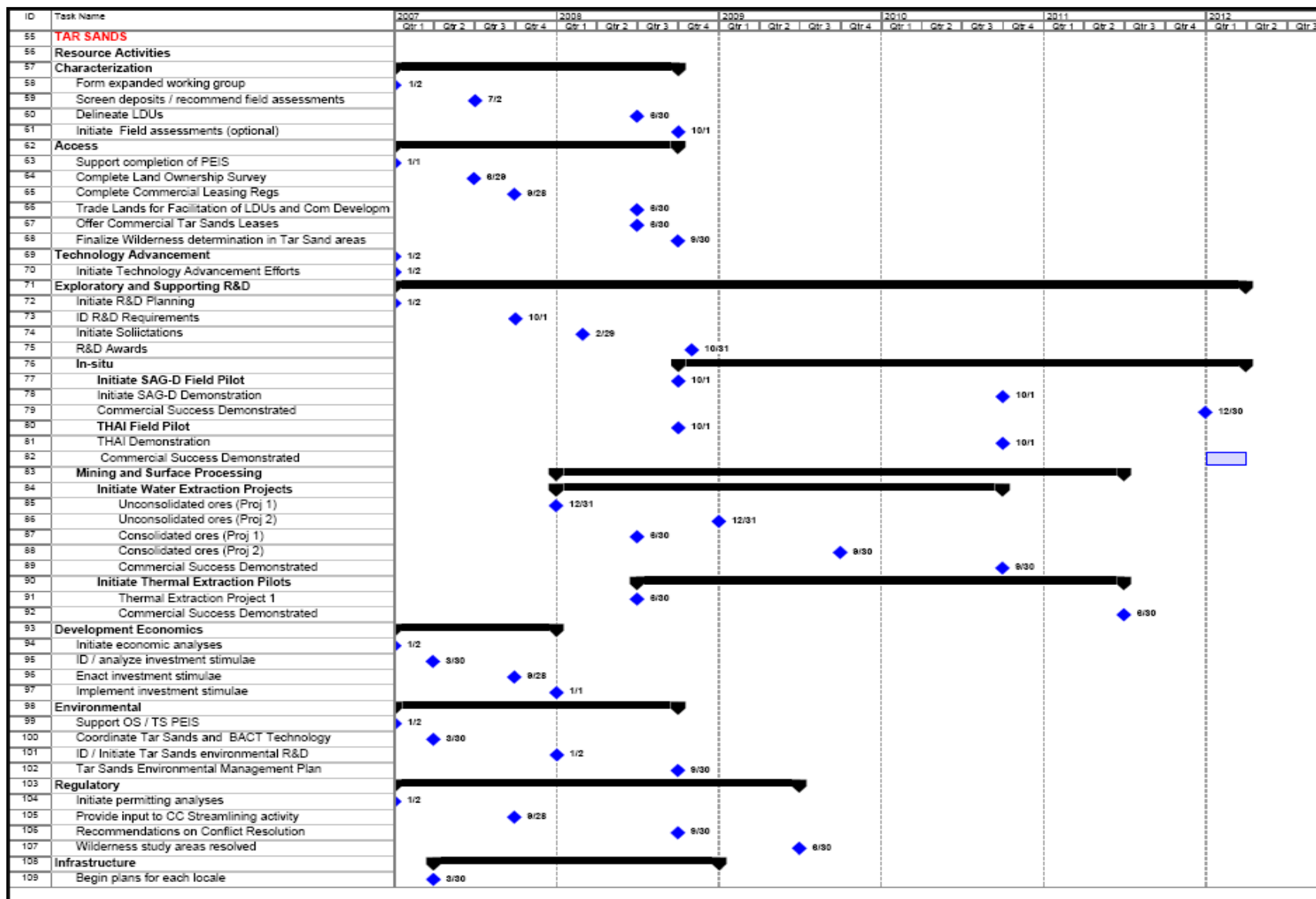


Table I- 13. Major Program Milestones through 2012 (Continued)

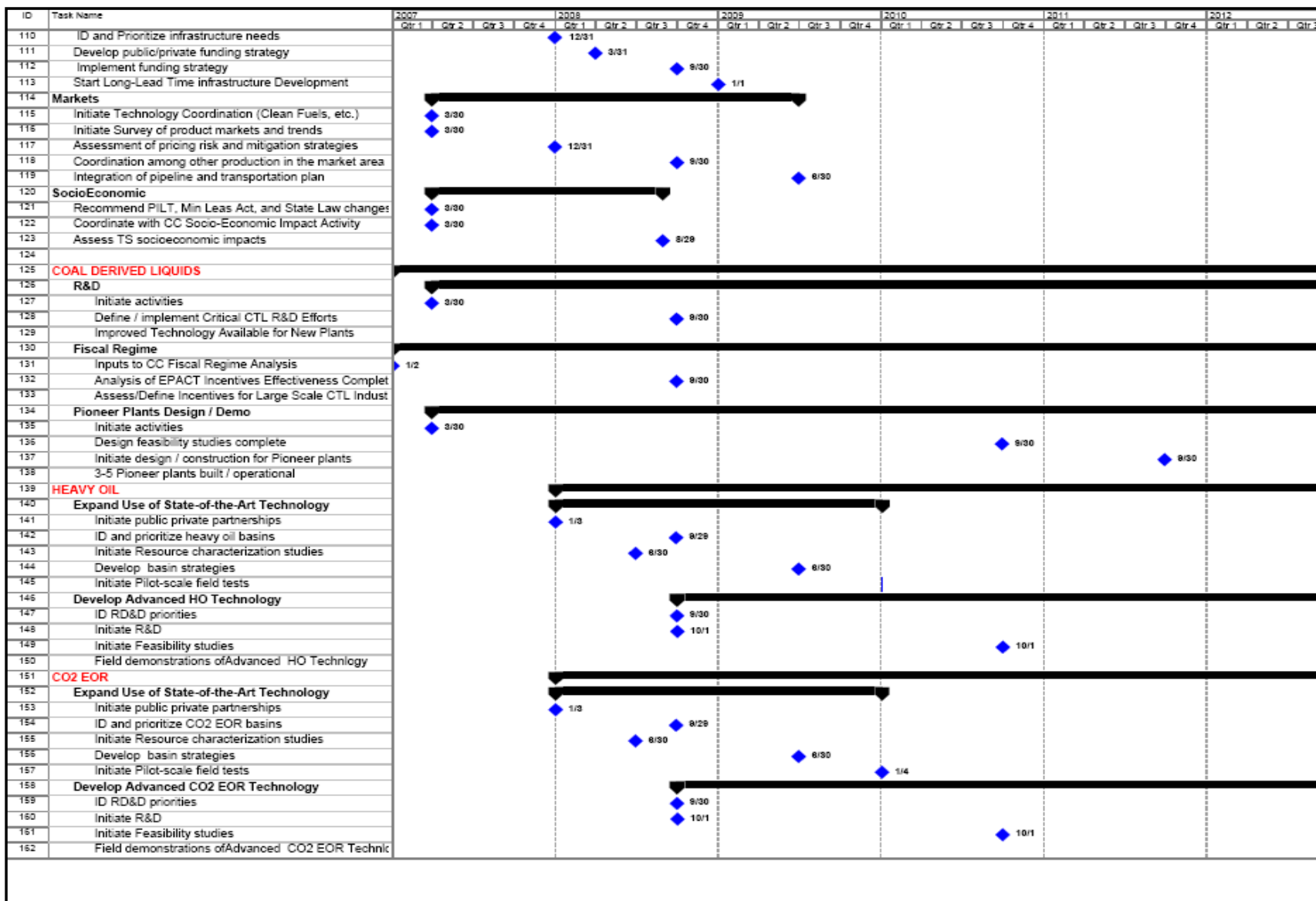
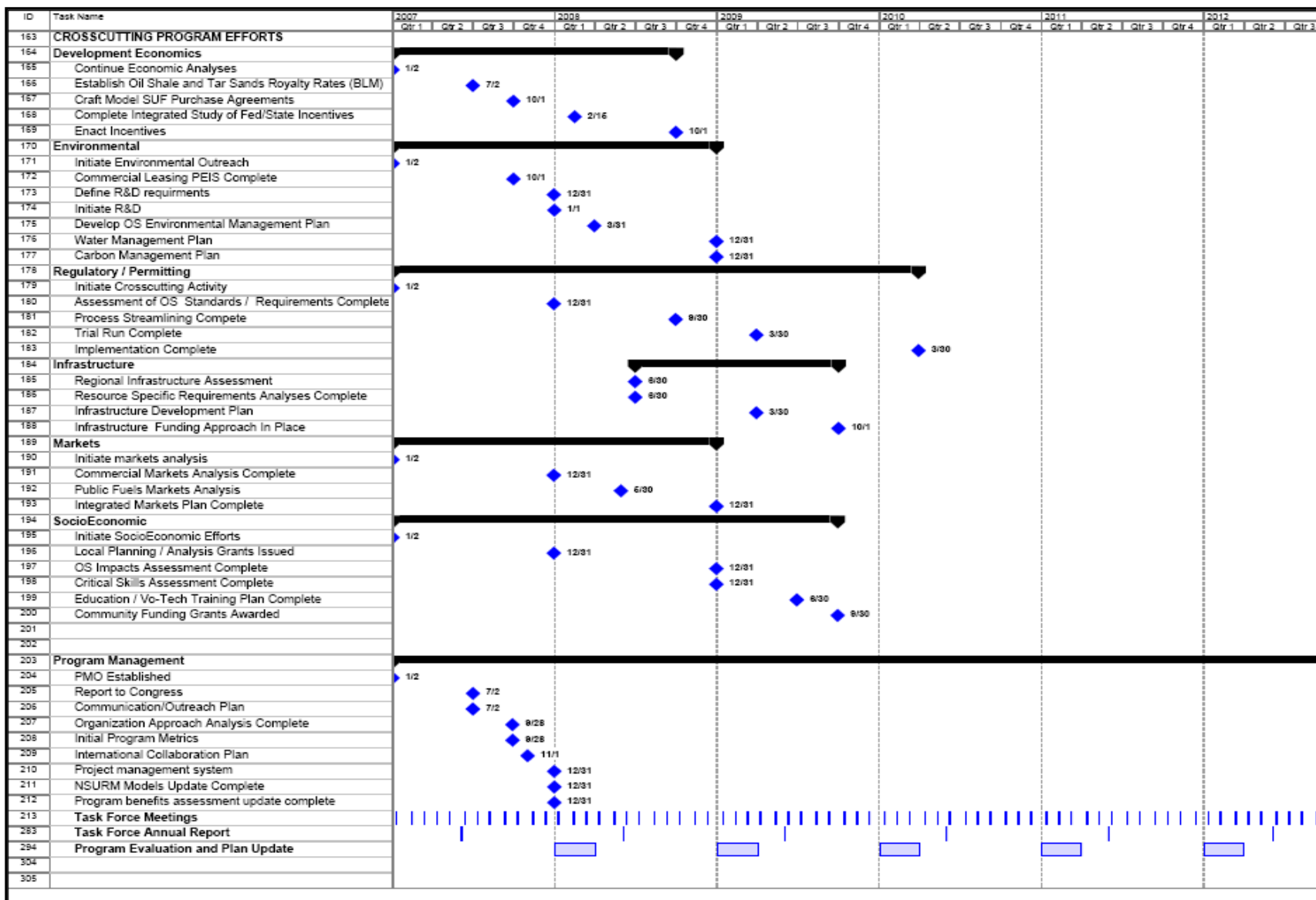


Table I- 13. Major Program Milestones through 2012 (Continued)



PART D

CONCLUSIONS AND TASK FORCE RECOMMENDATIONS

CONCLUSIONS AND TASK FORCE RECOMMENDATIONS

The Task Force recognizes the need for enabling legislation and executive branch actions to authorize and fund the program and to facilitate its implementation in a timely and effective manner.

In our Initial Report to Congress, completed in September 2006, the Task Force presented the following recommendations and strategies for consideration by the Administration and Congress.

These recommendations have since been amplified with a list of recommended executive and legislative actions necessary to implement the Program based on the results of further analyses and new information received and considered during the planning process.

INITIAL FINDINGS

The Task Force finds that there is substantial growth in domestic and global demand for oil but world supply conditions are uncertain. To address this, the Task Force finds that demand reduction, coupled with increasing and diversifying domestic liquid fuels supply derived from unconventional resources, is necessary for national security.

RECOMMENDATIONS

The Task Force recommends that the Administration and Congress:

- Support the affected states and localities in conducting initial socio-economic impact analyses and assessments of investments that will be required to support increased populations resulting from unconventional fuels industry development, during construction and operating phases.

- Fund and support DOD's Assured Fuels Initiative to define, test and acquire unconventional fuels within the scope of the Task Force's mission and charter.

OPTIONS FOR ADDRESSING DEVELOPMENT CONSTRAINTS

Access to Resources on Public Lands

Provide an effective land tenure system.

- Identify resource access barriers for oil shale, coal, and tar sands.
- Prepare regional resource development plans for oil shale and tar sands. However, current BLM Resource Management Plans should adequately meet this need. For oil shale and tar sands, these plans will be amended by the programmatic leasing EIS presently being prepared as directed by the Energy Policy Act.
- Consider an open nomination process for oil shale commercial leasing, similar to processes for oil, gas, and coal leasing.
- Provide sufficient budget/staff to enable DOE, DOI, and DOD to comply with EPACT Section 369.

Regulatory and Permitting

Provide an inclusive regulatory system and review process that encourages expeditious development and a predictable schedule for permitting and approvals, consistent with Section 369(k) and other provisions of the Act.

- Document Federal and state environmental standards that apply to oil shale and other unconventional fuels development as part of the DOI's implementation of Section 369(k) of the Energy Policy Act of 2005.

- Prepare and publish a roadmap of existing permitting processes and timelines in major oil shale states (CO, UT, KY, and WY) and Federal permitting processes, including NEPA.
- Examine which Federal regulatory responsibilities could be delegated to states.
- Consider statutorily granting regulatory agencies quasi-judicial powers to arbitrate and resolve issues where regulations are ambiguous or non-existent.
- Create a Joint Review Process (Federal, state and local representatives) to coordinate permitting processes and compress the permitting timeline.
- Work with state regulatory bodies to craft a streamlined uniform permitting process (DOE, DOI, EPA, Governors Associations, and Regional councils of government) as DOI moves toward implementation of Section 369(k).
- Consider establishing joint Federal/state offices, similar to the Pilot offices established through EPACT, in the affected states to expedite permits while assuring regulatory compliance.
- Enact legislation to better define which parties have standing in legal disputes and to establish time limits on decisions relative to permit application completeness and acceptability.
- Define royalty rates and bonuses for converting RD&D leases to commercial leases in order to facilitate RD&D investment decisions; conversion bonuses should provide fair market value to the public and encourage investment in R&D, demonstration and industry development.
- Provide R&D tax credits for technology development and testing relative to unconventional fuels.
- Craft production tax credits designed to establish parity with oil.
- Authorize and implement long-term (15 - 20 years) purchase agreements for fuels produced from unconventional resources
- Incentivize first-generation projects that have higher risks but demonstrate commercial feasibility and lead the way for next-generation investors.
- Limit incentives to point of project payback or net positive cashflow where appropriate to protect public treasuries.
- Allow industry a credit against future royalty payments for advance investments to develop socio-economic infrastructure needed to support future unconventional fuels facilities construction and operations in the areas of impact.
- Provide loan guarantees or other assurances to reduce risk-premiums on debt and encourage lenders to provide financing for first-generation projects.
- Consider applying savings achieved from eliminated energy tax incentives as offsets for the cost of incentives and outlays proposed to stimulate unconventional fuels development.

Economic

Create a fiscal regime that attracts needed private development capital, including but not limited to the following options.

- Allow capital costs for unconventional fuels to be expensed in the year incurred or accelerate depreciation.
- Set royalty rates for unconventional fuels on Federal lands at a level that captures fair market value for the taxpayers and encourages private investment.

Technology

Craft a fast-track technology program to attract investment but not break the bank.

- Complete the assessment of unconventional fuels resources and technologies mandated by Section 369(m) and (p) as soon as possible.

- Fund and initiate cost-sharing to move the best available technologies toward demonstration and commercial development as quickly as possible to urgently initiate fuels production.
- Analyze the adequacy of domestic and global design, engineering, manufacturing, and fabrication to support domestic unconventional fuels industry development, and potential impacts on development schedules and costs.
- Focus RD&D and technical assistance efforts on current and next generation technologies, resolve technical issues, and evaluate and test novel concepts.
- Examine the feasibility of establishing research parks at or adjacent to existing western oil shale sites to enable RD&D and testing using shared infrastructure and to provide a source for mined shale.
- Consider the establishment of regional coal to liquids research parks adjacent to major coal deposits.
- Consider establishment of basin-specific environmental R&D efforts to assess environmental impacts and identify and advance environmental management practices and mitigation technologies that facilitate unconventional fuels resource development.
- Provide cost-shared technical assistance from DOE laboratories or other Federal facilities with directly relevant skills, expertise, and resources.
- Cost-share bench-scale and pilot testing for new technologies.
- Cost-share demonstration projects at commercially-representative scale.

Public Infrastructure

Create an integrated local and regional infrastructure plan that will support efficient development, realize synergies among infrastructure requirements for various unconventional fuels, and reduce duplicative investments.

- Identify major infrastructure requirements in affected regions – roads, railroads, airports, pipelines, power, water supply and storage, among others.
- Accelerate infrastructure development investments to coincide with an integrated industry development schedule.
- Allow industry to fund or assist infrastructure development in advance of commercial-scale industry development, allowing a credit against future taxes or royalties until infrastructure expenditures are recovered.

Socio-Economic

Establish a program for development planning, funding, and training that mitigates adverse local impacts and maximizes state and local employment opportunities and economic growth. Consider ways to direct mineral revenues to address local impacts.

- Provide immediate planning assistance funds for affected communities.
- Encourage and assist financing of infrastructure development that is needed before industry revenue flows become available (such as low-rate loans, loan guarantees, and bonds).
- Immediately create and support university and vocational training programs within existing institutions so that essential skilled labor is available when needed.
- Assess regional labor and infrastructure needs.

Government Organization

Ensure the appropriate organizational structure at state, local, and Federal levels exists that will promote and accelerate unconventional fuels development in a reasoned and efficient manner.

- Implement the proposed integrated Strategic Unconventional Fuels Program Plan.
- Consider creating a joint government organization to expedite unconventional

fuels development while looking after the public interest and providing a “one-stop shop” for management of government efforts and resolution of development issues and constraints.

- Consider establishing a dedicated task force, government chartered corporation, or outsource mechanism to manage and accelerate government actions supporting domestic unconventional fuels.
- Craft and task an environmental advisory panel to support the Task Force’s cross-cutting environmental work group and provide input to inform further program development and implementation.

International Partnerships

Initiate partnerships that can advance and accelerate understanding and development of unconventional fuels resources, issues, and technologies.

- DOE should pursue a partnership with the Province of Alberta for the purposes of sharing technology information and public policy approaches.
- DOE should craft partnerships with other oil shale bearing countries to exchange technology information and engage in other collaborative efforts that can accelerate oil shale development.

EXECUTIVE AND LEGISLATIVE ACTIONS REQUIRED TO IMPLEMENT THE STRATEGIC UNCONVENTIONAL FUELS PROGRAM

The Task Force finds that *“The Nation is substantially at risk, from an economic and security perspective, to warrant development of an unconventional fuels program with attendant policies and government actions to promote and accelerate industry development”*.

The Strategy reflects the full spectrum of crosscutting socioeconomic and environmental issues. Community

involvement will enhance and accelerate industry development while assuring community needs and concerns are addressed.

Congress and the Administration will need to take deliberate action, including authorizations, budget, legislation, and modifications to existing law to implement the proposed program. The Task Force recommends these actions be taken in the current legislative session to expedite program implementation and industry development.

Resource Access

- Support DOI efforts to define the royalty structures for oil shale and tar sands – mined or produced in-situ.
- Establish and fund resource characterization and economic evaluation efforts for oil shale and tar sands in concert with USGS and State Geological surveys.
- Initiate effort to enable land exchanges with private, state, or tribal holders of oil shale and tar sands lands for the purpose of establishing logical development units.
- Resolve the status of wilderness study areas to facilitate resource development planning.

Fiscal Regime

- Enact a \$5/Bbl production tax credit, for shale oil and tar sands and coal liquids production that has the effect of placing a soft-floor under prices.
- Allow percentage depletion to apply to oil shale and tar sands production.
- Extend the FY1991 Enhanced Oil Recovery Tax Credit and modify to phase out at higher prices.
- Extend and update tax incentives for unconventional fuels development in Section 43 (formerly Section 29) of the U.S. Tax Code to apply to oil shale, tar sands, heavy oil, and CO₂ enhanced oil

recovery; extend phase out dates and oil prices.

- Authorize tax incentives to defray incremental capital costs associated with the capture of industrial CO₂ emissions, including those from unconventional fuels processes.
- Implement loan guarantees and costs shares authorized for CTL projects under the Energy Policy Act of 2005.
- Consider incentives and tax regime provisions similar to those contemplated in S.155 (The Bunning-Obama Bill) and HR370 for FT coal-to-liquids plants.
- Authorize and fund DOD long-term (15-20 year) direct purchase guarantees for fuels produced from CTL, oil shale, and domestic tar sands facilities for use in Federal and military fleets.

Regulatory Streamlining

- Authorize and fund a Federal regulatory streamlining activity, in collaboration with impacted states and communities, to make standards, permit procedures, schedules, appeals, and conflict resolution more transparent and predictable for project developers and to expedite permitting processes through such processes as delegated authority to states and/or joint review and web based applications.
- As directed in Section 369(e) of EPA Act, the DOI has promulgated regulations for commercial tar sands development. It is currently developing regulations for commercial oil shale leasing/ development, (expected to be promulgated by November 2008.) These regulations can serve as a model for other domestic unconventional fuels development.

Technology Advancement and Commercialization

- Authorize and fund qualified national labs to provide technical assistance to industry

on a cost-shared basis to resolve critical technical problems constraining effective application of unconventional fuels technology.

- Authorize and fund a program of feasibility studies engineering design, and permitting support for first-of-a-kind integrated CTL plants.
- Authorize and fund a program of cost-shared demonstration programs for oil shale and tar sands technologies, including feasibility and design studies.
- Authorize and fund expansion of existing efforts for CO₂ enhanced oil recovery and heavy oil to extend analyses to additional basins, demonstrate state-of-the-art technologies, and initiate RD&D efforts for “next-generation” CO₂ and heavy oil technologies
- Direct, authorize and fund international collaboration on unconventional fuels development with appropriate nations.

Socio-Economic

- Immediately authorize and provide funding support for socio-economic impact assessment and planning for communities that will be impacted by development of unconventional resources.
- Authorize and fund development of an assessment of potential labor requirements for and availability of skilled labor to plan, construct, and operate unconventional fuels facilities.
- Authorize future funding of education and vocational training grants to attract and train skilled labor to meet these requirements in impacted communities.
- Amend PILT law PL 97-258, 31 USC Chapter 69 –
 - Repeal Sec. 6903 (a) (1) Payment Clauses, and renumber.

- Delete the words “reduced (but not below 0) by amounts the unit received in the prior fiscal year under a payment law” at the end of Sec. 6903 (b)(1)(A)

Repealing this clause will have the effect of releasing Mineral lease funds to the counties and ensuring fair allocation of Federal revenues from unconventional fuels development. It will also help solve the soon-to-expire exemption for the forest payment issues in the Pacific Northwest.

- Fully fund PILT – Current appropriations are only about 2/3 the PILT authorization. Fully funding PILT will assure that no local government is harmed by the proposed repeal of the Payment Laws, which, if not fully funded, will cause some redistribution of current funds, with winners and losers the result.
- Amend Mineral Lease Act to directly disperse a portion of Federal Mineral Lease revenues from oil shale and tar sands to communities. To ensure communities are properly funded to mitigate socioeconomic impacts amend the Federal Mineral Lease Act to directly disperse 25% of lease revenues (from oil shale and tar sands leasing only) directly to the localities of origin, 25% to the State and 50% to the Federal Government.
- Amend Mineral Leasing Act to provide for a royalty credit to producers of unconventional fuels against expenditures made for socio-economic impact mitigation and community infrastructure development that may be expended prior to initiation of commercial plant operations and generation of the royalty revenue stream. Stipulations may include: a) definition of capital infrastructure as having a useful lifetime of 10 yrs or greater, b) formal approval by cognizant elected officials as being required for a

public purpose, c) recoupable as a credit against future royalties on a dollar for dollar basis but not to exceed 50% of royalties due and payable in any given year, d) must be recouped within 12 years from actual investment, e) no alternative Federal credits for such investments shall be recognized.

- Assist areas in western states that are landlocked by government land to acquire BLM land through sales or exchanges.
- Allocate lease-bonus payments to impacted communities for infrastructure development, as may be appropriate
- Direct resources to generate economic diversity in regions of unconventional fuels development. It is recommended that the Department of Agriculture be directed to use a portion of their rural development funds to provide money for economic diversity in the areas targeted for unconventional fuels development.

Infrastructure

- Authorize and provide funding support for assessment and planning of public and industry infrastructure impacts and requirements in Colorado, Wyoming, and Utah and other states that may be impacted by development of unconventional fuels resources.

Environmental

- Authorize and fund development of cross-cutting analysis of water resource management strategies and solutions, on a regional and water-shed basis, related to integrated development of oil shale, tar sands, and coal liquids.
- Authorize and fund development of cross-cutting carbon management strategies and solutions, related to integrated development of oil shale, tar sands, and coal liquids including the potential for carbon reduction and carbon

management and storage in deep saline aquifers, candidate reservoirs for CO₂ enhanced oil recovery, and coal seams that may be beneficiated for coalbed methane development, among others.

- Authorize and fund a program of stakeholder-targeted communications and environmental outreach to inform program development and evolution and assure focus on critical environmental and socio-economic issues, impacts, and concerns associated with unconventional fuels development, particularly coal liquids, oil shale, and tar sands. This activity should collaborate with and augment but not duplicate environmental responsibilities under the jurisdiction of the Department of the Interior and the Bureau of Land Management as relate to commercial leasing of resources on public lands.
- Establish and fund an environmental research effort focused on integrating best available control technologies (BACT) in oil shale and tar sand development, and improving reclamation technologies,
- Fully fund BLM field offices to complete necessary environmental studies and permitting reviews and analyses.

Markets

- Fund and support DOD's Synthetic Fuels Initiative to define, test, and acquire unconventional fuels with the scope of the Task Force's mission and charter.
- Initiate DOD purchase agreements and

procurements of fuels and feedstocks from unconventional resources for fuels testing and qualification purposes.

- Modify and expand DOE's "Energy Corridors" activity to include rights of way for pipelines and rail transportation corridors for efficient movement of materials, feedstocks, and products to unconventional fuels development areas and intermediate and end-use product markets. Coordinate efforts with permit streamlining efforts to expedite review and approval of pipeline and other transport rights of way.

Authorize and Appropriate

- Provide multi-year funding to initiate program implementation including planning, resource-focused subprograms, and cross-cutting activities; Fund activities to assess, test, and implement streamlined permitting processes in collaboration with affected states; Authorize and appropriate funds for technical assistance, research, and cost-shared technology demonstration projects for oil shale and tar sands

Program Management

- Direct DOE OPR to assess, through an independent, third party element such as the National Academy for Public Administration, alternative program management and organization structures, including a mission-oriented autonomous government-sponsored corporation, for the promotion and acceleration of unconventional fuels development.

APPENDIX

STATEMENTS OF GOVERNORS OF COLORADO AND WYOMING

STATE OF COLORADO

OFFICE OF THE GOVERNOR

136 State Capitol Building
Denver, Colorado 80203
(303) 866 - 2471
(303) 866 - 2003 fax



Bill Ritter, Jr.
Governor

To the Members of the Task Force on Strategic Unconventional Fuels:

The State of Colorado appreciates the opportunity to comment on the Unconventional Fuels Strategic Task Force's plan for commercialization of our nation's unconventional fuels. Colorado is one of five states specifically designated in the Energy Policy Act of 2005 to participate in this process and we take this obligation very seriously. As part of this obligation, I respectfully submit Colorado's statement regarding the Unconventional Fuels Strategic Task Force Plan and request that it be included within any final plan submission.

Colorado will play an active role in the development of our unconventional fossil fuels. My administration has placed the development of renewable sources of energy at the top of our list of priorities but we understand that traditional and unconventional fossil fuels will continue to play an important role in supplying our nation's energy needs as we move to a more renewable based energy supply.

The draft Preparation Strategy, Plan and Recommendations (Volume 1), Resource-Specific and Cross-cut Plans (Volume 2), and Resource and Technology Profiles (Volume 3)(collectively referred to hereafter as "The Plan") is dated February 2007. I was inaugurated on January 9 2007. The fact that the draft Commercialization Plan was written almost entirely before I took office presents a unique issue for Colorado that the other participants in this process do not have to address. As Colorado's Governor, I am committed to ensuring that all energy development in Colorado, and oil shale development in particular, occur in a manner that protects Colorado's unique environment and that the impacted communities are protected before, during and after the development.¹

It is important to understand the social and environmental circumstances in Colorado. We are currently experiencing an unprecedented energy boom in many portions of our state. We also have the memories of the prior oil shale boom and bust and we are certainly mindful of the lessons from our prior experience. The proposed oil shale development overlaps areas with increasing tourism and recreational opportunities. Oil shale leasing on top of this existing network of energy development and changing land uses will put more pressure on an already fragile ecosystem and public temperament.²

¹ While oil shale is the primary area of concern for Colorado, it should be assumed that the concerns articulated in this letter are also applicable for any other development of unconventional fuels that may be developed in Colorado.

² Russell George, testimony on behalf of Governor Bill Owens in the Oil Shale and Oil Sands Resources Hearing, Tuesday April 12, 2005; testimony for the Committee on Energy and Natural Resources.

Colorado has consistently articulated a desire to move forward slowly with the development of oil shale. As the epicenter of the oil shale resource in the United States, Colorado has the most to gain if this resource is developed responsibly and the most to lose if the risks are not managed appropriately. The five Research, Development and Demonstration projects (RD&D) located in Colorado will form the foundation for further analysis relative to the economic viability and environmental impacts resulting from oil shale development. Colorado supports the RD&D approach and is concerned that movement toward commercial leasing regulations and ultimately commercial leasing prior to evaluation of the RD&D projects will not be in the best interest of the state or our nation. Further, another failed attempt at oil shale development could preclude development of this resource for decades. Industry leaders are publicly saying that they will likely refrain from making a decision on commercial leasing until 2014. No RD&D applications are expected to be received by the state until fall of 2009. While Colorado does not wish to unnecessarily impede the development of oil shale, it seems premature to promulgate commercial leasing regulations six or seven years prior to any demand from industry for such regulations. Once data begins to become available from the RD&D projects, it is likely that regulatory modifications will be required to address impacts and issues that arise during that process. Promulgating regulations in the absence of the data from the RD&D projects will likely create an illusion of “regulatory certainty” rather than a comprehensive set of regulations that will be viable for commercial leasing and development.

In evaluating the Plan it is critical that Colorado’s energy policy be understood and incorporated into the final draft. Colorado will not support any commercialization plan that calls for the promulgation of commercial leasing regulations, or commercial leasing itself, prior to a meaningful evaluation of the RD&D projects. The proposed oil shale development will utilize as yet untested technology with potential long-term negative impacts to Colorado’s communities and environment. Adverse impacts to Colorado’s ground and surface water, wildlife and air quality must be avoided wherever possible and mitigated to an acceptable level where avoidance is not possible.

The three primary areas of concern relative to the draft Plan relate to “Resource Access,” and “Regulation/permitting” and “Socio-economic impacts.” The Plan that is currently under consideration is by necessity a “high level” view of an accelerated oil shale development plan. After a thorough review of this document, it is apparent that while most of the objectives don’t necessarily preclude the considerations that Colorado considers paramount, neither does the draft expressly recognize our concerns or assure that our considerations will be reflected in the more detailed planning yet to come. It is imperative that the federal government and industry understand and address these concerns as development moves forward.

Resource Access

Colorado’s vast oil shale reserves are located primarily on federal land within our state. We have actively participated as a “cooperating agency” on most major National Environmental Policy Act (NEPA) evaluations within Colorado. We are currently a cooperator on the Programmatic Oil Shale Environmental Impact Statement (PEIS). We believe this process is valuable and look forward to participating on all oil shale proposals as development proposals arise. Extensive NEPA analysis will be critical to

gaining public support for oil shale development. Attempts to fast track environmental analysis have resulted in public criticism, lawsuits and community opposition. We believe that representatives from the state can contribute valuable insight into the environmental and technical analysis as well as the socio-economic impacts of oil shale development. In addition, the Governor will continue to provide the consistency review as required by law.

Given the density of natural gas and coal development in some areas of Northwestern Colorado, the need for recreational, wildlife habitat and undeveloped areas and the network of privately held oil shale lands that did not exist in the last boom, the federal government must determine those areas where oil shale development could be accommodated in a manner that is least disruptive to communities and existing activities. Not all types of resource development can occur everywhere. The carrying capacity of the land, communities and infrastructure must be evaluated.³ The cumulative impacts to the environment and the socio-economics of impacted communities from energy development pose a huge risk if not addressed and managed effectively.

The development of one type of energy development today may preclude or limit another type of resource development tomorrow. This is even more problematic where the extraction of a finite resource (gas or oil shale) has the potential to adversely impact a sustainable activity (hunting, fishing, wildlife viewing or other forms of recreational tourism). We cannot forget the consequence of the oil shale pull-out of the 1980's, and the transformation of the Northwest Colorado economy from an energy base to a tourism, retirement and recreation based economy.⁴

Regulation/permitting

Colorado cannot and will not support any proposal that would result in the state abdicating any portion of its independent regulatory authority. While we agree that an evaluation of options to streamline the process may be appropriate, we will retain the existing authority the state has to permit oil shale development. In addition, we will continue to assert that local governmental agencies within Colorado retain their full jurisdiction during the permitting process. The state has reviewed the permitting structure within Colorado and would welcome the opportunity to share that evaluation with the Task Force.

Colorado is concerned that the development of technologies without adequate oversight will result in unacceptable impacts to Colorado's environment and communities. By retaining our regulatory authority we will ensure that impacts to Colorado are acceptable. Colorado will not support any attempt to streamline regulations and permitting through such process as were proposed by the Energy Mobilization Board during the last oil shale boom.

Socio-economic impacts

A financial safety net for local governments that allows for growth to pay its way, and allows front-end financing of some infrastructure is essential. Bonus lease payments from federal leases for local government facilities and services will help mitigate impacts

³ Id.

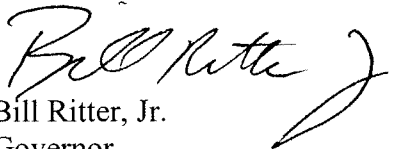
⁴ Id.

to local communities and build public acceptance for oil shale developments. This economic cushion is essential to community stability, and the ability to withstand the economic shock of project termination.⁵

Colorado strongly believes that state representatives can best evaluate the comprehensive and cumulative impacts to Colorado's residents and economy. As stated previously, Colorado is experiencing an unprecedented energy boom with a significant amount of the current development occurring in the same area as the richest oil shale deposits. The timing of evaluation of the socio-economic impacts will be critical to a meaningful review. Colorado is on the cusp of having over 45,000 gas wells included in the various Reasonable, Foreseeable Development scenarios for Resource Management Plans (RMP) currently under revision. These include the Little Snake, Roan, White River, Glenwood Springs/Kremmling RMPs. Industry leaders have stated publicly that they will refrain from a decision to pursue commercial development until 2013/2014 and no RD&D applications expected until 2009. A significant amount of the conventional fuel development will occur between now and the time when industry will make their decision regarding commercial viability. We believe that a cumulative socio-economic impact for energy development will be largely obsolete unless conducted at a time much closer to the commercialization decision. Colorado will continue to expect that cumulative impact analyses (both environmental and socio-economic) will include all energy related impacts and not be segmented by discreet products.

In conclusion, we believe that successful oil shale development may be possible if it is pursued with diligence and significant oversight. The effective commercialization of oil shale requires more data than is currently available. The RD&D program will provide the necessary data and should be allowed to proceed. Commercialization of oil shale should proceed only after a thorough evaluation of the RD&D development. Colorado looks forward to working with our federal and local governments to ensure that we receive the benefits of oil shale development while minimizing the risk presented by development of this unconventional fuel.

Sincerely,


Bill Ritter, Jr.
Governor

⁵ Id.

DAVE FREUDENTHAL
GOVERNOR



STATE CAPITOL
CHEYENNE, WY 82002

Office of the Governor

September 18, 2007

Strategic and Unconventional Fuels Task Force
c/o U.S. Department of Energy
1000 Independence Ave., SW
Washington, DC 20585

Dear Task Force Members,

I am aware of the general nature of the comments being offered by the governor of Colorado. Rather than repeat many of the concerns raised by Governor Ritter, I will simply say I agree with the tenor and nature of his comments.

It seems apparent that this task force effort, as it relates to oil shale, has been a pre-determined federal policy in search of analytic and public support. Neither of which seem to exist. This circumstance is attributable to the lack of technical knowledge and/or understanding of the path to commercial oil shale development.

The abundance of oil shale makes it an attractive candidate for research and development. This is why Wyoming supports small-tract, Research Development & Demonstration (RD&D) leasing to enable companies to identify the most promising methods to extract keragen from oil shale, and to problem-solve the still very unsettled questions regarding inputs and impacts – not the least of which relate to the amount of water and energy required for such production.

The report frequently veers toward assuming that the time for oil shale has come. That is not yet clear. Development is not limited by available leasing; but rather, commercial leasing is limited by proven technology. Even the industry spokesmen decline to commit to exact dates for major financial commitments to commercial scale plants. The uncertainties cited by the private sector are similar to the uncertainties referenced by the states and lead to the same conclusion – oil shale leasing and full scale commercial development should proceed no faster than the development of the technology and information necessary to support sound private investment decisions and responsible public policy.

Best regards,

A handwritten signature in black ink, appearing to read "Dave Freudenthal", written over a large, stylized flourish.

Dave Freudenthal
Governor

DF:pjb

REFERENCES – VOLUME I

- 1 Aleklett, Kjell. Testimony on Peak Oil before the House Subcommittee on Energy and Air Quality, Dec 7, 2005, p.5.
- 2 “Future Energy Supply-1: Oil Depletion”, Williams, Bob. Oil and Gas Journal, July 21 2003, p.18, and p.38.
- 3 “Future Energy Supply-1: Oil Depletion”, Williams, Bob. Oil and Gas Journal, July 21 2003, p.18, and p.38.
- 4 FY06 Annual Energy Management Report, produced by the Deputy Under Secretary of Defense for Installations and Environment, January 2007.
- 5 Comprehensive Oil and Gas Analysis Model (COGAM) DOE National Energy Technology Laboratory, 2004.
- 6 DOE EIA, “U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2004 Annual Report”, 2004, p.9.
- 7 DOE EIA, “U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2004 Annual Report”, 2004, p.9.
- 8 Data in Figure is derived from the following sources:
 - Petroleum Already Consumed – Energy Information Administration, “Annual Energy Review”, http://www.eia.doe.gov/emeu/aer/pdf/pages/sec4_5.pdf.
 - Petroleum Reserves – Energy Information Administration, Annual Energy Outlook 2006 (U.S. DOE).
 - Remaining Original Oil in Place - Comprehensive Oil and Gas Analysis Model (COGAM) DOE National Energy Technology Laboratory, 2004.
 - Oil Shale - J. R. Dyni, Oil Shale, USGS 2003.
 - Tar Sands - Lewin and Associates, Inc. “Major Tar Sand and Heavy Oil Deposits of the United States”, Interstate Oil and Gas Compact Commission, July 1983 – as reported by the U.S. Department of Energy, Office of Oil and Gas, February 2006. p. 18-20.
 - Heavy Oil - Comprehensive Oil and Gas Analysis Model (COGAM) DOE National Energy Technology Laboratory, 2004.
 - Coal Consumed - <http://www.cslforum.org/usa.htm>.
 - Coal Resources – ‘Identified resources’ from publication DOE/EIA-0529(97)
- 9 EIA’s Annual Coal Report, 2004, Tables 1 and 15, http://www.eia.doe.gov/cneaf/coal/page/acr/acr_sum.html and personal correspondence from Richard Bonskowski, U.S. EIA to Darren Mollot, February 16, 2006.

-
- 10 United States Geological Survey, Coalfields of the United States, 1960-1961; Texas Bureau of Economic Geology, Lignite Resources in Texas, 1980; Louisiana Geological Survey, Near Surface Lignite in Louisiana, 1981; Colorado Geological Survey, Coal Resources and Development Map, 1981; and Mississippi Bureau of Geology, 1983.
- 11 Scully Capital Corp., “The Business Case for Coal Gasification with Co-Production – Tasks 1 and II Final Report” November 8, 2006.
- 12 Ibid, pg. 28.
- 13 Plant size data provided and updated by U.S. Air Force, Assistant Secretary for Environment, Infrastructure, and Logistics, December 2006.
- 14 Strategic Unconventional Fuels Task Force, Coal to Liquids Subgroup, February 2007.
- 15 Oil and Gas Journal, “Hubbert Revisited-5”, August 9, 2004, PennWell Energy.(3-State Map); and “Final Environmental Impact Statement for the Oil Shale Prototype Leasing Program”, U.S. Department of the Interior, 1973.
- 16 Bartis, James. “Oil Shale Development in the United States”, Rand, 2005.
- 17 International Centre for Heavy Hydrocarbons, 1993 U.S. Bitumen Database, <http://www.oildrop.org>.
- 18 Ibid
- 19 Heinemann, Robert, “Presentation to National Academy of Sciences Workshop on Unconventional Fuels” April 2005.
- 20 DOE NETL COGAM, 2004.
- 21 Moritis, Guntis “CO₂ Injection Gains Momentum”, Oil and Gas Journal, April 17, 2006.
- 22 Undeveloped Domestic Oil Resources: The Foundation for Increased Oil Production and a Viable Domestic Oil Industry” DOE Office of Fossil Energy, February 2006. <http://www.fe.doe.gov/programs/oilgas/eor/ten_basin-oriented_co2-eor_assessments.html>
- 23 M. King Hubbert, personal communication to Buzz Ivanhoe, 1982, posted on: <http://www.hubbertypeak.com/hubberty/to_nissen.htm>
- 24 Cf. <http://www.npg.org/popfacts.htm>
- 25 DOE NPOSR NSURM, 2006.
- 26 DOE National Strategic Unconventional Resource Model: A Decision Support System, 2006. http://fossil.energy.gov/programs/reserves/npr/NSURM_Documentation.pdf