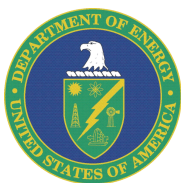
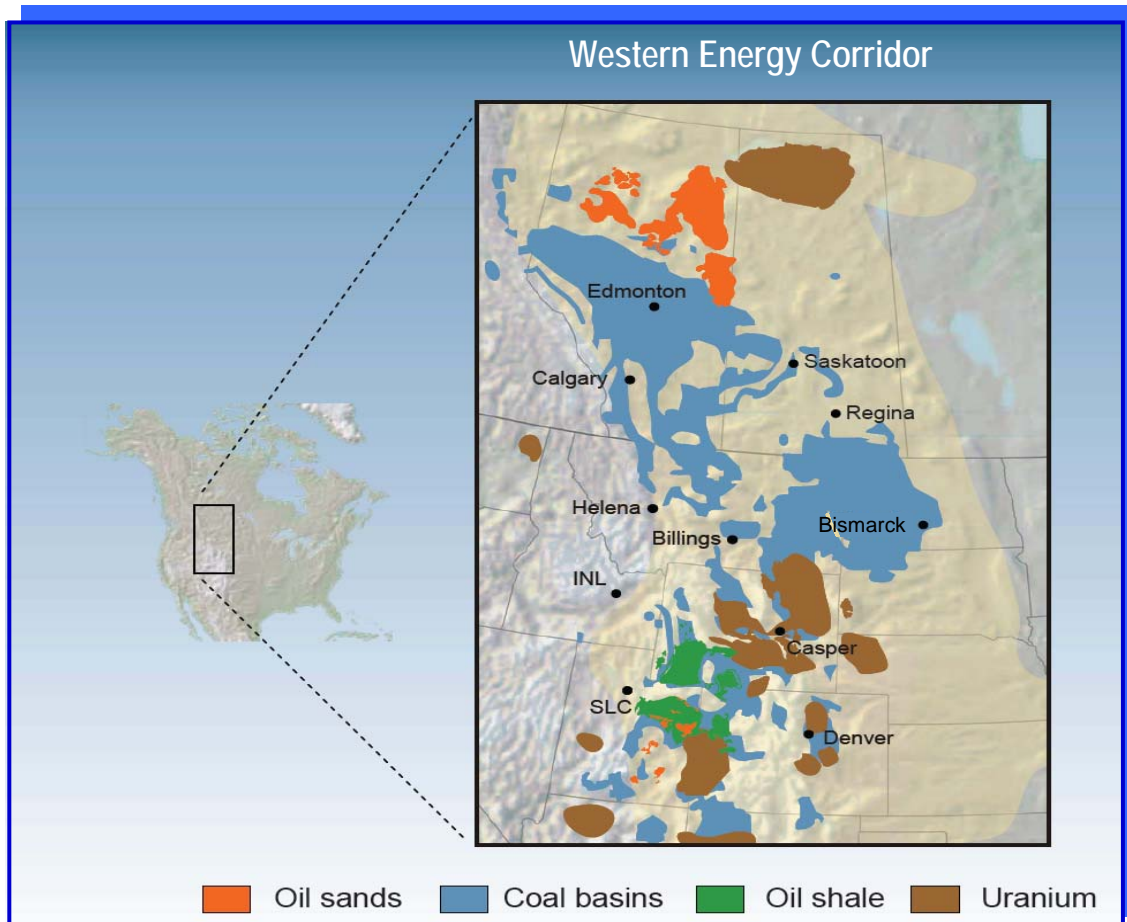


Strategic Plan

Unconventional Fuels Development Within the Western Energy Corridor



***U.S. Department of Energy
Office of Naval Petroleum
and Oil Shale Reserves***

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This Strategic Plan for Unconventional Fuels Development within the Western Energy Corridor was conceived and developed by an ad hoc working group with the support of the Office of Naval Petroleum & Oil Shale Reserves within the Department of Energy's Office of Petroleum Reserves (OPR), pursuant to the requirement for OPR to "coordinate the creation and implementation of a commercial strategic fuel development program for the United States" set out in Section 369(i)(1)(A) of the Energy Policy Act of 2005 (Public Law 109-58). The ad hoc working group is comprised of representatives from industry, government, academia, and national laboratories.

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Strategic Plan

Unconventional Fuels Development Within the Western Energy Corridor

1. Overview

Section 369(h) and (i) of the Energy Policy Act of 2005 (EPACT05) directed the Department of Energy (DOE) to develop an Unconventional Strategic Fuels Program. It assigned to the DOE Office of Petroleum Reserves (OPR) the responsibility to “*coordinate the creation and implementation of a commercial strategic fuels development program*” and provide an ongoing program of evaluation, assessment, and recommendations regarding activities required to accelerate the development and manufacturing of strategic fuels from domestic unconventional fuels resources. It also assigned specific responsibilities to the Department of the Interior and to the Department of Defense.

In 2006, the Secretary of Energy convened a Task Force on Strategic Unconventional Fuels consisting of eleven members¹ to develop the required Program. Coordination support for that effort was provided by OPR’s Office of Naval Petroleum and Oil Shale Reserves (NPOSR). The Task Force evaluated the nation’s liquid fuels situation and concluded “...*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*”². Two reports by the Task Force that contain resource-specific recommendations and integrated program development plans³ were finalized in September 2006 and September 2007, respectively, and transmitted to the Congress and the President.

The next challenge facing government and industry is to coordinate, integrate, and organize the scientific and engineering efforts required to determine the potential impacts of this large development activity. To this end, an ad hoc unconventional fuels working group consisting of representatives from industry, government, academia, and national laboratories was organized by NPOSR to develop and execute plans that implement the Task Force’s recommendations for accelerating and promoting the development of domestic unconventional fuels.

Unconventional Fuels Resources in the Western Energy Corridor

The Western Energy Corridor (Figure 1), which extends from Alaska through western Canada and the western United States, contains some of the world’s richest deposits of hydrocarbons and energy minerals, including trillions of barrels of oil equivalent in place (BOE) of conventional oil, natural gas, coal, oil shale, oil sands, heavy oil, and uranium. Development of the world-class unconventional hydrocarbon resources within this corridor could help to alleviate U.S. energy supply vulnerability, providing a strategic source of energy, including liquid fuels and other products far into the future.

¹ Includes 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 that would be impacted by the development of the unconventional resources.

² Task Force on Strategic Unconventional Fuels, 2007, America’s Strategic Unconventional Fuels, Volumes I, II, & III, Completed September 2007. <http://www.unconventionalfuels.org>

³ Ibid

Concurrent development of unconventional fuels and other energy and mineral resources will create increasing competition for limited resources of water, and impacts to air, habitat, and wildlife in the region. Local communities, infrastructures, and economies will face increasing demand for roads, electricity, law enforcement, labor and other services as a result of this development.

The Western Energy Corridor Initiative (WECI) has been conceived as a regionally-focused effort to provide guidance to policy makers, industry, and other stakeholders on possible scenarios for development, including assessing impacts to the environment and local communities.

The impetus for this effort comes from a common theme expressed by a broad spectrum of stakeholders that credible, science-based assessments are needed to quantify potential development impacts and benefits in the context of other conventional and unconventional energy resource development activity. Critical aspects of carbon management and responsible water use in a semi-arid environment must be addressed, as well as planned and ongoing energy resource development, and the environmental, water resource, infrastructure, labor, fiscal and economic demands that could be placed on the region under various development scenarios.

This Strategic Plan for Unconventional Fuels Development specifies an approach for addressing these major development issues and helping DOE and NPSOR to fulfill their program integration responsibilities under the EPACT05 in coordination with other federal agencies including, but not limited to, the Departments of the Interior and Defense. The Strategic Plan:

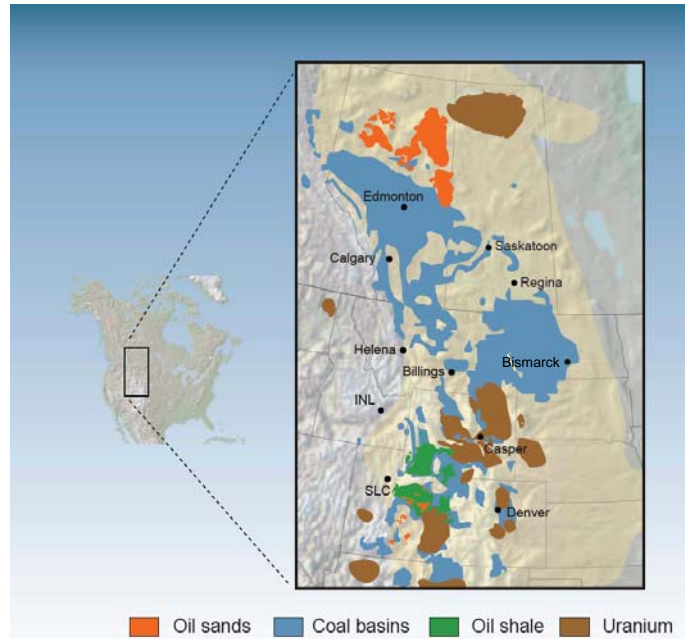
- Articulates the mission of the proposed effort in the context of the current and expected future situation facing the nation, the industry and potentially impacted communities,
- Identifies the challenges to unconventional fuels development,
- Identifies the numerous stakeholders whose interests must be considered,
- Presents major assumptions that influence the path forward,
- Sets forth a vision for the future and articulates goals that must be achieved to fulfill that vision, and
- Lays out a strategy for achieving those goals.

The plan builds on the analyses and plans prepared by the Task Force on Strategic Unconventional Fuels.

2. Mission

Bolster America's future fuel security by facilitating socially and environmentally responsible development of unconventional fuels resources in the Western Energy Corridor. Use sound engineering principles and science-based methods to define and assess benefits, impacts, uncertainties, and mitigation options, and to resolve impediments.

Figure 1. Selected Resources Within a Portion of the Western Energy Corridor



The initiative seeks to apply the principles of sound science and engineering and objective analysis to answer key questions about unconventional fuels development in the Western Energy Corridor that must be addressed to understand the potential benefits and impacts and to prepare the ground work for efficient commercialization of America's strategic unconventional fuels resources. These resources include oil shale, tar sands, coal-to-liquids, heavy oil, and oil that can be produced by carbon-dioxide enhanced oil recovery. Other unconventional fuels resources are not currently addressed by the strategic plan.

A key component of the mission is to provide valuable information to decision makers and other stakeholders to help understand and evaluate these complexities and to provide the objective analytical basis for crafting and implementing development plans.

3. Vision

The nation will benefit from increased supply of domestically produced fuels, reduced imports, economic growth, employment, and public revenues. Industry and policy makers will have the objective scientific and technical information needed to make responsible investment and policy decisions. World-class expertise of national labs, universities, industry, and other organizations will be integrated to address resource, technology, economic, environmental, social, and related issues pertaining to unconventional energy resource development resulting in sound public policy.

The Initiative envisions that government (local, state and federal), industry, environmental interest groups and other stakeholder will be provided with an objective evaluation of the potential impacts and benefits of various development scenarios.

The engineering and science-based analytical basis will be created to support an assessment of the potential for sustainable development of unconventional fuels resources. Policy makers will have access to the best technical resources for assessing how growth of an unconventional fuels industry might benefit the nation and affected regions and how it might impact the environment and local economies. This information will support the development of sound public policies.

By evaluating resource development options and their impacts and benefits under a range of scenarios and variables such as resource type, development pace, expected production levels, investment requirements, urgency, and impacts, this effort will enable the nation, affected states and localities, and private industry to prepare for and facilitate appropriate development.

Proactive communication with and input from a diverse range of public and private stakeholders will ensure that analytical processes and products are focused, timely, useful and dynamic.

4. Situation and Challenges

Situation

The United States faces an unprecedented threat to its national and economic security due to the economic costs and supply risks associated with our increasing dependence on imported oil and gas - commodities for which other nations are competing, and for which future supply may be inadequate to support our fuel needs. This dependence makes the United States vulnerable to numerous potential natural, geopolitical, or market scenarios that could result in acute disruptions to the nation's energy supply.

Recent increases in world oil prices, combined with increasing volumes of imports, have resulted in an enormous transfer of wealth from the United States to foreign oil suppliers, diminishing America's economic strength and stability. This situation suggests that the United States must consider responsible development of additional domestic hydrocarbon energy supplies, including the vast unconventional resources found in the Western Energy Corridor, to augment supply, reduce import dependence, enhance energy supply security, and strengthen the economy.

Unconventional fuels development will take place in an environment affected by internal and external market, economic, political, social, and technological forces and trends.

- **Market:** Global fuels markets are increasingly competitive; 77 percent of world proved reserves are controlled by national oil companies. Oil demand in some growing economies, e.g. India and China, is rising faster than industry can increase supply, contributing to rising oil and fuels prices.
- **Economic:** Higher oil prices make unconventional fossil energy resources more competitive and economically attractive. But as with conventional oil and gas, the capital costs for unconventional fuels are also rising due to global and regional competition for materials and workers.
- **Environmental:** Energy resource development must occur in compliance with existing and emerging law and regulation with the objective to minimize impacts on the environment. Pending initiatives to limit carbon emissions and establish “cap and trade” programs challenge industry to reduce carbon-dioxide (CO₂) formation and demonstrate cost-effective carbon capture and management strategies.
- **Technology:** Technologies already exist to recover and process unconventional fossil energy resources; some are already being applied at commercial scale outside the United States. Private industry is investing in research, development, and demonstration (RD&D) to improve process efficiency, reduce energy use, minimize water requirements, and limit environmental impacts.
- **Physical Infrastructure:** Physical infrastructure in the West may be inadequate to support high-volume energy development. Roads, rail, electric power, water systems, pipelines, and other distribution systems must be enhanced to support industry development, and associated growth.
- **Social:** Communities seek assurances that renewed unconventional fuels development will not result in a repeat of the “bust” of the 1980s, which impacted some local economies for many years. A goal is to ensure against the risk of bust, and to dovetail growth opportunities with potential declines in other industries, most notably conventional oil and gas.
- **Stakeholders:** The views and interests of a diverse set of public and private stakeholders will influence the scope and timing of unconventional resources development in the Western Energy Corridor and must be fully considered in the public discourse and subsequent development planning.

Development Challenges

Numerous strategic questions must be answered to facilitate responsible development planning:

- What are the expected impacts of various technologies and approaches for unconventional fuels recovery and processing on the environment (i.e. carbon emissions, air and water quality, surface disturbance, wildlife), and net external energy and water demand? How can these impacts be mitigated? Which approaches are best for sustainable energy production while reducing impacts?
- How will water, carbon, and other impact mitigation and management strategies affect process and project economics and industry development?
- What public infrastructure (including water supply) is needed to support regional unconventional fuels development under different development scenarios?
- How do current regulatory regimes and permitting processes constrain development or investment decisions? How can such processes be modified to facilitate planning without degrading environmental protection or regulatory compliance?
- What can be done to correct distortions and inaccuracies in the public’s perception of unconventional energy resources and potential development impacts?

- What fiscal regimes can be applied to provide development funding to affected communities?
- What organizational structure is needed to integrate analyses and resources and avoid stove-piping issues?

5. Strategic Goals

To achieve its vision, the initiative seeks to achieve several specific goals:

- Increase and diversify domestic fuel production to reduce U.S. dependence on oil imports, create jobs, and stimulate economic growth.
- Produce and provide high quality, credible technical information related to unconventional fuel resources, technologies, energy infrastructure, environmental conditions, and development scenarios
- Understand the potential cumulative resource, environmental, infrastructure, and socioeconomic impacts and benefits of various unconventional fuels development scenarios.
- Assess socio-economic parameters of unconventional fuels development to inform and guide planning for industry development and community growth, avoiding adverse consequences and improving quality of life in affected development areas.
- Foster effective, credible and transparent outreach and communications with and among stakeholders.

6. Strategies

Development of western unconventional fuels resources is largely a “Western States” issue. However, development planning is made more complex by the Federal government’s ownership and stewardship of energy and other resources, and transportation, water, and energy infrastructure in the West; and by federal environmental, fiscal, and other regulatory structures and processes that would apply.

As directed by Section 369 of the Energy Policy Act of 2005, and recommended by the Task Force on Strategic Unconventional Fuels, an integrated program organization and management approach is needed for this initiative to facilitate coordination, interaction and collaboration among federal, state, regional, and local participants, the scientific and technical community, and other participating stakeholders.

Planning Assumptions

- World oil supply and demand realities require the United States to consider all domestic energy resources.
- Hydrocarbon fuels will continue to be needed even as alternatives are developed and commercialized.
- Timely development of Western hydrocarbon resources is essential.
- Canadian unconventional fuels support U.S. energy security and will increasingly supply U.S. markets.
- Development of Western unconventional resources must be considered in the context of conventional hydrocarbon resources, renewable energy, and other resource development.
- Development must comply with existing law and regulation.
- Effective carbon management strategies are necessary and likely to be required.
- Planning and analysis must integrate ongoing CO₂ sequestration programs.
- Population growth in the West will increase water demand and competition for agriculture, energy, and other uses.
- Power generation or transmission capacity within the corridor may not be sufficient to support energy development and associated economic growth and may require expansion.
- Commercial leasing regulations may be needed before industry will invest significantly in oil shale development.
- Royalty and tax structures are needed to facilitate development planning and stimulate investment and should balance risks, needs and interests of investors, impacted communities, and the public.
- Many public perceptions about energy resource developments are not supported by sound engineering and science; more effective communication is required.
- Planning efforts must consider and integrate various responsibilities and activities of multiple federal agencies including DOI, DOE, EPA and EPA.

This initiative will fully consider and build upon the analyses, recommendations, and plans that were developed by the Task Force on Strategic Unconventional Fuels. Its scope will include unconventional fuels, including: oil shale, tar sands, heavy oil, coal-to-liquids, and oil producible by carbon dioxide enhanced oil recovery methods in the Western Energy Corridor.

The strategies to achieve the mission and associated strategic goals are described below:

Work Through Effective Partnerships

The activities to be performed will be conducted through an integrated partnership of government, national laboratories, and universities with input and collaboration of other stakeholders, including appropriate organizations in the Canadian provinces of Alberta and Saskatchewan, and other countries engaged in unconventional fuels development.

- **Conduct Outreach Efforts:** Develop a proactive and effective communications outreach program to seek input to program development, analysis, and planning.
- **Partner with National Laboratories and Universities:** NPOSR will establish partnerships with key regional national laboratories and universities with the scientific and engineering expertise to carry the initiative forward.
- **Work with International Partners:** NPOSR will partner with appropriate organizations in Canada (including Alberta and Saskatchewan) and other nations to facilitate information sharing regarding unconventional fuels development.
- **Facilitate Collaboration:** Support and facilitate effective and constructive interactions among program participants and stakeholders that help to build consensus. Interagency and intra-agency collaborative efforts will be pursued among responsible federal agencies (including DOE, DOI, and DOD), as well as offices and agencies of the relevant state and local governments. Coordination with DOI efforts would include, but not be limited to, resource assessment, data collection, and mapping.
- **Share Information:** Communicate activities, results, and products to stakeholder audiences through workshops, newsletters, websites, and other appropriate means.

Establish an Effective Program Governance Organization

- **Governance:** An Executive Committee will be comprised of representatives of the national laboratories, universities, and government. The Executive Committee will organize, lead, evaluate progress, and ensure achievement of goals and objectives. It will be supported by working groups focused on unconventional resources and crosscutting technical, environmental, and economic issues.
- **Budget and Funding:** Identify resource requirements; create a budget that combines available funding from participating organizations and congressional appropriations. The Executive Committee will seek and coordinate the allocation of funding for activities to be performed under this strategy.
- **Consider Forming a Western Unconventional Fuels Center:** Unconventional fuels development analysis and research fits within the scope and context of other research activities regarding energy development in the West. The potential attributes and benefits of a center of excellence focused on integrated assessment of western energy resources development issues and benefits will be evaluated.

Conduct Analysis to Resolve the Uncertainties Affecting Development

The study will pursue a multi-phased analytical approach consisting of three overlapping phases:

Phase I – Comprehensive Baseline Assessment: To enable accurate and quantitative evaluations of environmental and economic impacts of unconventional fuels development, predevelopment or baseline conditions must be established. Baseline information will include

various data encompassing energy and other natural resources, air quality, water quality and quantity, technology, policy, economics, population dynamics, regulations, etc.

Phase II – Analytical Tools and Framework: Assessing the cumulative impacts of unconventional fuels development will require the application of sophisticated modeling tools to characterize processes and activities at multiple scales and to consider the complex interdependencies of multiple alternative development scenarios involving diverse energy resources.

Phase III – Integrated Impact Assessment of Development Scenarios: Potential impacts will be assessed within the context of other social, energy, economic, and infrastructure development in the region unrelated to unconventional fuel development. Participants will use the analytical frameworks and tools developed in Phase II to facilitate a regional decision-making mechanism that will focus local, state, and federal governments on basin and intra-basin impacts, benefits, and costs. The developed tools will support preparation of energy development plans by integrating the results of scenario comparisons and future development trajectories arising from the Phase II activities.

Identify and Prioritize Focused RD&D

- **Identify RD&D needs and priorities** that must be pursued to facilitate responsible unconventional fuels development in the Western Energy Corridor.
- **Prioritize RD&D based on objective criteria.**
- **Support planning for an integrated technical program** that responds to both industry and public sector needs and priorities implemented through competitive solicitations.

7. Conclusion

The substantial unconventional fuels resources in the Western Energy Corridor will play an increasingly important role in addressing our Nation's energy security vulnerability. Developing these resources comes with significant technical, socio-political, environmental, economic and infrastructural challenges, and is interrelated with other resource developments in the region. To address these challenges, NPOSR has developed a strategy to provide the technical foundation for assessing various development scenarios that will be used to craft a regional energy development plan.

8. The Path Forward

This Unconventional Fuels Development Strategic Plan will be forwarded by the members of the Initial Executive Committee to the Secretary of Energy for his consideration and approval. To address the challenges identified above and implement this strategic plan, a more detailed implementation plan is required. To this end, NPOSR and its national laboratory partners have developed an approach for implementation planning. While this broad strategy applies to all unconventional fuel resources in the Western Energy Corridor, implementation will initially focus on oil shale resources.

The multi-phased effort is expected to take three years to complete. It is urgent that work begin quickly. Thus an Initial Implementation Plan for Oil Shale will be developed to identify and conduct baseline analyses that can be accomplished with available program resources. Additional program funding will be required to initiate and complete the full multi-year effort. The scope of work will be expanded to the full implementation plan for oil shale when additional resources become available.

Summary of the Unconventional Fuels Development Strategic Plan

Within the Western Energy Corridor

<p>Mission Bolster America’s future fuel security by facilitating socially and environmentally responsible development of unconventional fuels resources in the Western Energy Corridor. Use sound engineering principles and science-based methods to define and assess benefits, impacts, uncertainties, and mitigation options, and to resolve impediments.</p>
<p>Vision The nation will benefit from increased supply of domestically produced fuels, reduced imports, economic growth, employment, and public revenues. Industry and policy makers will have the objective scientific and technical information needed to make responsible investment and policy decisions. World-class expertise of national labs, universities, industry, and other organizations will be integrated to address resource, technology, economic, environmental, social, and related issues pertaining to unconventional energy resource development resulting in sound public policy.</p>
<p>Goals and Objectives</p> <ul style="list-style-type: none"> • Increase and diversify domestic fuel production to reduce U.S. dependence on oil imports, create jobs and stimulate economic growth. • Produce and provide high quality, credible technical information related to unconventional fuel resources, technologies, energy infrastructure, environmental conditions, and development scenarios • Understand the potential cumulative resource, environmental, infrastructure, and socioeconomic impacts and benefits of various unconventional fuels development scenarios. • Assess socio-economic parameters of unconventional fuels development to inform and guide planning for industry development and community growth, avoiding adverse consequences and improving quality of life in affected development areas. • Foster effective, credible and transparent outreach and communications with and among stakeholders.

Major Strategies and Efforts

<p>Work Through Partnerships</p> <ul style="list-style-type: none"> • Conduct outreach efforts • Facilitate effective collaboration • Create partnerships with or among: <ul style="list-style-type: none"> -- National laboratories and universities -- Federal, state, and local government -- International partners (Provinces of Alberta and Saskatchewan; Estonia; Others) • Share information with participants and stakeholders 	<p>Establish an Effective Analysis and Planning Governance Organization</p> <ul style="list-style-type: none"> • Create Executive Committee • Initial and long-term funding strategies • Planning and evaluation • Consider creation of a Western Unconventional Fuels Center 	<p>Conduct Analysis to Resolve Uncertainties Affecting Development</p> <ul style="list-style-type: none"> • Assess resources, technology development characteristics, constraints / opportunities • Define / prepare decision support / and analysis tools • Assess basin characteristics and potential impacts • Conduct regulatory / permitting analysis • Prepare development plans 	<p>Identify and Prioritize, Focused RD&D Needs</p> <ul style="list-style-type: none"> • Identify RD&D needs • Prioritize RD&D • Support planning for an integrated RD&D program to address needs / priorities
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