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ENVIRONMENTAL POLICY AND REGULATORY CONSTRAINTS TO NATURAL GAS PRODUCTION

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ABSTRACT

For the foreseeable future, most of the demand for natural gas in the United States will be met with domestic resources. Impediments, or constraints, to developing, producing, and delivering these resources can lead to price increases or supply disruptions. Previous analyses have identified lack of access to natural gas resources on federal lands as such an impediment. However, various other environmental constraints, including laws, regulations, and implementation procedures, can limit natural gas development and production on both federal and private lands. This paper identifies and describes numerous environmental policy and regulatory impediments to domestic natural gas production. For each constraint, the source and type of impact are presented, and when the data exist, the amount of gas affected is also presented. This information can help decision makers develop and support policies that eliminate or reduce the impacts of such constraints, help set priorities for regulatory reviews, and target research and development efforts to help the nation meet its natural gas demands.

INTRODUCTION

U.S. demand for natural gas is expected to continue into the future. Further, the U.S. Department of Energy's (DOE's) Energy Information Administration (EIA) has forecast that U.S. annual natural gas consumption will increase from 23 trillion cubic feet (TCF) in 2000 to 35 TCF in 2025 (EIA 2003). The factors driving this demand continue to mount. Foreign oil price instability related to tensions in the Middle East and Latin America could further shift demand from oil to less costly and domestically produced natural gas. Air pollution regulations favor the burning of clean natural gas over coal; while coal is more abundant, its use is of greater environmental concern. Energy price spikes and brownouts, such as those that occurred in California in 2001, could occur again if the delicate supply-demand balance is disrupted. Weather patterns can further increase demand.

In 1999, the National Petroleum Council (NPC) reported that the demand for natural gas was growing and that the resource base was adequate to meet this demand; however, certain factors needed to be addressed to realize the full potential for natural gas use in the United States (NPC 1999). In a 2003 update to the 1999 study, the NPC reported that government policies encourage the use of natural gas but fail to address the need for additional natural gas supplies (NPC 2003). The 2003 report states that a status quo approach to these conflicting policies will result in undesirable impacts to consumers and the economy. The Energy Policy and Conservation Act Amendments of 2000 (EPCA) required federal agencies to conduct an inventory of gas and oil resources beneath federal lands and to identify restrictions to developing these resources. The resulting study found that almost two-thirds of the land surveyed is restricted (DOI, 2003).

A key issue raised but not fully explored in these efforts was how environmental and regulatory policy constraints, which were developed to meet national environmental protection goals, can, at the same time, limit natural gas exploration and production (E&P) and transportation. Recent studies have examined limitations to accessing natural gas, particularly in the Rocky Mountain region, but even after the gas is accessed, numerous additional environmental policy and regulatory constraints can affect production and delivery to consumers. This paper identifies specific existing and potential environmental policy and regulatory constraints on E&P, transportation, storage, and distribution of natural gas needed to meet projected demands.

METHODOLOGY

To identify and assess environmental policy and regulatory constraints, existing studies were reviewed, and detailed issue investigations were conducted by examining existing and proposed statutes. Information published on proposed and final rules in the *Federal Register* was assessed, and issues were discussed with trade associations and industry and with state and federal government officials. Comments on proposed regulations and congressional testimony on issues and legislation that could affect natural gas production were reviewed. Information was also obtained from meetings on environmental policy relevant to natural gas conducted by the U.S. Commission on Ocean Policy, the Interstate Oil and Gas Compact Commission (IOGCC), the Minerals Management Service (MMS), the National Oceanic and Atmospheric Administration (NOAA), the Integrated Petroleum Environmental Consortium, the U.S. Environmental Protection Agency (EPA), and others.

Once potential policy and regulatory constraints were identified, an attempt was made to determine the nature of the impact and the amount of gas that each constraint could affect. It was

determined that a given constraint could affect the natural gas supply in one or more of the following ways: (1) make natural gas resources unavailable; (2) delay E&P or transportation; or (3) increase costs to the extent that some operators might stop operations, particularly if subjected to multiple costly regulations. To estimate the amount of gas a given constraint could affect, existing resource estimates were used. These estimates were reported in units of TCF and prepared by organizations such as the NPC, EIA, MMS, the U.S. Geological Survey (USGS), and an interagency group that studied U.S. oil and gas resources in five western basins (DOI, 2003). No attempt was made to develop independent estimates for amounts of gas that could be affected by the constraints, nor was an attempt made to normalize the estimates by year or form of estimate (e.g., technically recoverable, economically recoverable). As a result, these estimates can provide an indication of the order of magnitude of impact, but they should not be used to make direct comparisons among the various constraints. Some gas supplies are constrained by more than one factor. Therefore, the estimates are not additive, and eliminating one constraint may leave the gas supply affected by one or more other constraints.

FINDINGS

Numerous environmental policy and regulatory constraints currently affect natural gas E&P and transportation. Additional constraints may accrue as more environmental regulations are written. The constraints take several forms, including individual laws and regulations that directly affect natural gas access or production. They also include presidential policies and actions taken by implementing agencies. No priorities have been assigned to these constraints, and no inferences regarding priorities should be made from the order in which they are presented. Constraints that may limit access to gas supplies include the following:

- Coastal Zone Management Act (CZMA) consistency provisions,
- Endangered Species Act of 1973 (ESA) requirements,
- U.S. Department of Agriculture (USDA) Forest Service (FS) restrictions,
- Outdated Bureau of Land Management (BLM) land use plans,
- Lease stipulations,
- Monument designations,
- Outer Continental Shelf (OCS) moratoria,
- Permit restrictions,
- Bans on drilling in the Great Lakes,
- The “Roadless Rule,” and
- Wilderness Area designations.

Issues likely to produce delays include the following:

- Coal bed methane (CBM)-produced water and potential regulations to manage such water,
- Drilling permit delays,
- Essential fish habitat (EFH) regulations,
- Fracturing operations and the possibility of future rules that could limit this practice,
- Changes in nationwide permits (NWP) issued by the U.S. Army Corps of Engineers (COE),
- National Environmental Policy Act of 1969 (NEPA) requirements,
- Pipeline certification issues,
- Pipeline safety regulations, and
- Wetlands mitigation issues.

Existing and potential issues likely to increase costs include the following:

- Regulations for cooling-water intake structures at offshore extraction facilities,
- Electronic reporting requirements,
- Lack of incentives to go beyond compliance,
- State waste disposal regulations,
- Maximum achievable control technology (MACT) rules,
- Mercury discharge regulations,
- Nitrogen oxides (NO_x) requirements,
- Noise regulations,
- Nonroad diesel regulations,
- Ocean discharge criteria,
- Particulate matter (PM) regulations,
- Pipeline gathering definitions,
- Regional haze rule,
- Spill prevention and control and countermeasures regulations,
- Standards for closing wells,
- Storm water construction permits, and
- Total maximum daily load (TMDL) regulations.

Constraints can arise from statutes; regulations written to implement a statute; Executive Orders; or from agency implementation of the statutes, regulations, or orders. Table 1 lists constraints, grouped by source of constraint, and identifies lead player(s) and production cycle phase(s). The lead player is the agency or other player that has control over the constraint, and can include various federal regulatory agencies (e.g., EPA, BLM, COE), states, the President, or Congress. Table 2 lists constraints, grouped by type of impact, and indicates the estimated TCF affected and the estimate type, date, and reference. Many of these issues have multiple impacts; to prevent duplication in presentation, constraints are grouped according to the impact deemed to be the most significant. Several of the constraints are highlighted or explained in the following paragraphs.

Legislative and Regulatory Constraints

Specific laws, such as the Coastal Zone Management Act (CZMA), whose consistency provisions can allow states to effectively prohibit development already approved by federal entities, and the ESA, whose court-interpreted definitions extend protected areas, can limit development on both private and federal lands. The Antiquities Act allows the President to designate national monuments on which no exploration or production may occur, even if the lands they overlie contain known natural gas resources. EFH regulations, whose requirements can duplicate those of other federal regulations, can delay leasing or permitting decisions, and the Roadless Rule, which prohibits road construction in roughly one-third (58.5 million acres) of the National Forest System, denies access to an estimated 11 TCF in the Rocky Mountain region.

Agency Actions

Once Congress passes a law and the responsible agencies have written the implementing regulations, local enforcement agencies can, through their own policies and procedures, delay or prohibit gas production. Federal land management agencies, such as the BLM and the FS, control development on their respective lands through land use planning documents. If these documents do not specifically provide for oil and gas drilling, the agencies can prohibit such drilling until the plans are updated, adding

months or years to the time before extraction from a leased site can begin. Similarly, when granting drilling permits, the land management agencies can impose stipulations, which, when added together at a given site, can narrow or effectively close the window of opportunity to drill. Compounding these problems are requirements to gain approval from other federal, state, and local agencies before a permit can be issued. As the number of permit applications grows, the ability to coordinate among the various agencies in a timely fashion diminishes, further increasing delays. This concern is particularly important for interstate natural gas pipelines, which are critical for transporting gas to users. Federal Energy Regulatory Commission grants certifications to build new pipelines, but only after it has received approval from other federal, state, and local agencies that have environmental jurisdiction.

Legal Constraints

The legal system can compound environmental regulatory constraints. When issues cannot be resolved among participating agencies, or when special-interest groups challenge a gas-related activity, legal action can delay projects for months or years. For example, the tendency for organizations to sue over Environmental Impact Statements has led agencies to prepare “appeal-proof documentation,” which further delays the approval process.

Congressional and Presidential Actions

Typically, laws are developed after congressional debate, and regulations require a prescribed notice and comment period. However, at times, Congress and the President can impose constraints that may not follow the formal procedures designed to allow for the expressing of concerns by all interested parties. These initiatives can significantly decrease access to natural gas. For example, Congress has enacted and presidents have extended offshore drilling moratoria. These actions not only deny the extraction of natural gas, but also deny federal agencies and others the ability to determine the extent of the resources in waters off the coasts of most of the United States. Recently enacted congressional bans on drilling in the Great Lakes and lack of congressional action to determine the status of Wilderness Study Areas preclude the extraction and production of gas in these areas.

New Environmental Regulatory Constraints

A number of environmental rules are currently under development, and the potential impacts of these rules require active monitoring. For example, the EPA’s “nonroad diesel engine” rule could increase costs for new engines used in natural gas E&P to ensure that they meet the required emissions reductions. The EPA is also writing regional haze rules designed to protect visibility in national parks and Wilderness Areas, which could apply to drilling and production equipment and affect the ability to produce natural gas in a timely and cost-effective manner. The Office of Pipeline Safety within the Department of Transportation is writing rules to ensure “integrity management,” or structural safety of gas transmission lines. The implementation of these rules could disrupt supplies, as companies are forced to meet certain inspection deadlines using specific technologies that may not be available when needed. The EPA may require oil and gas E&P facilities covering 1 to 5 acres to obtain storm water permits under the Clean Water Act.

State and federal agencies are determining whether and how to address emerging environmental issues, many of which could affect or limit cost-effective production of natural gas. For example, the U.S. Commission on Ocean Policy, established under the Oceans Act of 2000, has developed recommendations that could include new policies and authorities to address the development of ocean resources, potentially including natural gas. Other issues are closer to regulation. For example, some states have written rules to address potential impacts of discharging produced water from CBM operations

to the environment. Others may follow, and such actions could severely restrict development of this source of gas, which many believe to be a significant future contributor to the nation's energy supply. A related issue is the use of hydraulic fracturing to increase the flow of gas, particularly CBM gas. This practice has been the subject of regulatory and legal action, and further regulatory activity can be expected. Other environmental regulations with potentially significant impacts on natural gas development include regulations for minimizing adverse environmental impacts from cooling-water intake structures at offshore oil and gas platforms; mercury regulations that could affect the use and discharge of mercury-containing drilling muds; and regulations to reduce noise generated by engines, drills, and compressors used in natural gas E&P and transportation.

CONCLUSIONS

A variety of environmental policy and regulatory constraints currently affect natural gas E&P and transportation, and more are likely to accrue as new regulations are written. The constraints take several forms, including individual laws, regulations, presidential policies, and implementing-agency actions. Some of these constraints can have significant impacts on natural gas production on an individual basis. Others, taken alone, may not have as great an impact, but when combined with other regulations or policies, could be so costly or produce so many delays that many small, independent operators may cease production. Whether the gas produced by these independents would then be extracted by other, larger firms, at an increased cost to them, or whether the gas would not be produced until prices increased sufficiently to warrant reentry into the market is not known. However, mitigation approaches should be developed to address not only the major impediments, such as access restrictions, but also to address the other regulations and implementing practices so that the ability to extract and distribute the gas to users in a cost-effective and environmentally protective fashion can be maintained, if not increased.

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Table 1. Environmental Regulatory Constraints, by Source of Constraint^a

Source of Constraint	Constraint	Lead Player	Phase
Statutory/ regulatory/agency implementation	CZMA consistency provisions	NOAA	E&P, transportation
Statutory	Bans on Great Lakes drilling	COE, states	E&P
	Wilderness Areas	BLM	Exploration
Regulatory	CBM-produced water management	EPA, states	Production
	Cooling-water intake structures	EPA	Production
	Electronic reporting and record-keeping requirements	EPA	Production
	Fracturing operations	EPA, states	Production
	Lack of incentives to go beyond compliance	BLM	Production
	Louisiana E&P waste disposal regulations	State	Production
	MACT rules	EPA	Production, transportation
	Mercury discharge regulations	EPA	E&P
	Nationwide permits	COE	Production, transportation
	NEPA integration and lawsuits	States, BLM, FERC	E&P, transportation
	NO _x PSD increment consumption	EPA, states	Production
	Nonroad Diesel Rule	EPA	E&P
	Ocean discharge criteria	EPA	Production
	Particulate matter regulations	EPA, states	Production
	Pipeline gathering line definition	OPS	Production, transportation
	Pipeline safety (integrity management)	OPS	Transportation
Regional haze rule	States, EPA	Production	
Roadless Rule	FS	Exploration	

Source of Constraint	Constraint	Lead Player	Phase
	Spill prevention control and countermeasures	EPA	Production
	Standards for decommissioning or closing wells	States	Production
	Storm water construction permits	EPA	E&P
	TMDL regulations targeting oil and gas wells	EPA	E&P
	Wetlands mitigation	COE, states	Production, transportation
Presidential, statutory	OCS Moratoria — Atlantic Ocean	President, Congress	E&P
	OCS Moratoria — Eastern Gulf of Mexico	President, Congress	E&P
	OCS Moratoria — West Coast	President, Congress	E&P
Presidential	Monument designations	President	Exploration
	Ocean policy	President, Congress	E&P, transportation
Agency implementation	Drilling permits	BLM	Production
	ESA	USFWS	E&P
	Essential fish habitat	NMFS	E&P, transportation
	Forest Service restrictions	FS	Production
	Outdated BLM land use plans	BLM	E&P
	Lease stipulations	BLM, FS	Production
	Permit restrictions	BLM	E&P
	Pipeline certification	FERC, others	Transportation

^a BLM = Bureau of Land Management; CBM = coal bed methane; CZMA = Coastal Zone Management Act; COE = U.S. Army Corps of Engineers; E&P = exploration and production; EPA = U.S. Environmental Protection Agency; ESA = Endangered Species Act; FERC = Federal Energy Regulatory Commission; FS = USDA Forest Service; MACT = maximum achievable control technology; NEPA = National Environmental Policy Act of 1969; NMFS = National Marine Fisheries Service; NOAA = National Oceanic and Atmospheric Administration; NO_x = nitrogen oxides; OCS = Outer Continental Shelf; OPS = Office of Pipeline Safety; PSD = Prevention of Significant Deterioration; TMDL = total maximum daily load; USFWS = U.S. Fish and Wildlife Service.

Table 2. Environmental Regulatory Constraints and Estimated Amounts of Gas Affected^a

Issue Impact	Constraint	TCF Affected	TCF Type	TCF Date	TCF Reference
Unavailable gas, delay, cost	Ocean policy	Not estimated	NA	NA	NA
	Lease stipulations	108	Undeveloped gas resources	01/1998	NPC (1999)
Unavailable gas, delay	CZMA consistency provisions	362.2	Undiscovered conventionally recoverable resources	01/1999	MMS (2000)
	ESA	Not estimated	NA	NA	NA
	Outdated BLM land use plans	120.3	Technically recoverable	01/2003	DOI (2003)
Unavailable gas	Forest Service restrictions	10–30	Natural gas resources	01/2001	Fisher (2001)
	Monument designations	1	Technically recoverable	01/1995	Wilderness Society (2002)
	OCS Moratoria — Atlantic Ocean	28.0	Technically recoverable	01/2000	EIA (2001b)
	OCS Moratoria — Eastern Gulf of Mexico	11.3	Technically recoverable	01/2000	EIA (2001b)
	OCS Moratoria — West Coast	18.9	Technically recoverable	01/2000	EIA (2001b)
	Permit restrictions	86.6	Technically recoverable	01/2003	DOI (2003)
	Bans on Great Lakes drilling	1.1	Possible and probable reserves	09/2001	Shirley (2001)
	Roadless Rule	11	Technically recoverable	11/2000	Eppink (2000)
	Wilderness Areas	9	Technically recoverable	01/2003	DOI (2003)
Delay, cost	CBM-produced water management	74	Technically recoverable	01/1998	NPC (1999)
	Fracturing operations	293	Unproved technically recoverable	01/2000	EIA (2001b)
	Pipeline safety (integrity management)	Not estimated	NA	NA	NA

Issue Impact	Issue	TCF Affected	TCF Type	TCF Date	TCF Reference
	Wetlands mitigation	Not estimated	NA	NA	NA
Delay	Drilling permits	311.2	Assessed additional resources	01/1998	NPC (1999)
	Essential fish habitat	174.5	Technically recoverable	01/2000	EIA (2001b)
	Nationwide permits	Not estimated	NA	NA	NA
	NEPA integration and lawsuits	464.5	Technically recoverable	01/2000	EIA (2001a)
	Pipeline certification	23.3	Annual gas consumption	01/2003	EIA (2003)
Cost	Cooling-water intake structures	Not estimated	NA	NA	NA
	Electronic reporting and record-keeping requirements	Not estimated	NA	NA	NA
	Lack of incentives to go beyond compliance	86.6	Technically recoverable	01/2003	DOI (2003)
	Louisiana E&P waste disposal regulations	Not estimated	NA	NA	NA
	MACT rules	Not estimated	NA	NA	NA
	Mercury discharge regulations	Not estimated	NA	NA	NA
	NO _x PSD increment consumption	Not estimated	NA	NA	NA
	Noise regulations	Not estimated	NA	NA	NA
	Nonroad Diesel Rule	Not estimated	NA	NA	NA
	Ocean discharge criteria	Not estimated	NA	NA	NA
	Particulate matter regulations	7.2	Technically recoverable	01/1995	Whitney (2001)
	Pipeline gathering line definition	Not estimated	NA	NA	NA
	Regional haze rule	Not estimated	NA	NA	NA
	Spill prevention control and countermeasures	Not estimated	NA	NA	NA

Issue Impact	Issue	TCF Affected	TCF Type	TCF Date	TCF Reference
	Standards for decommissioning or closing wells	Not estimated	NA	NA	NA
	Storm water construction permits	5.75 per year	Economically recoverable	09/2002	Texas Alliance of Energy Producers (2003)
	TMDL regulations targeting oil and gas wells	Not estimated	NA	NA	NA

^a Abbreviations: BLM = Bureau of Land Management; CBM = coal bed methane; CZMA = Coastal Zone Management Act; E&P = exploration and production; DOI = U.S. Department of the Interior; EIA = Energy Information Administration; ESA = Endangered Species Act; MACT = maximum achievable control technology; MMS = Minerals Management Service; NA = not applicable; NEPA = National Environmental Policy Act of 1969; NO_x = nitrogen oxides; NPC = National Petroleum Council; OCS = Outer Continental Shelf; PSD = Prevention of Significant Deterioration; TCF = trillion cubic feet; TMDL = total maximum daily load.