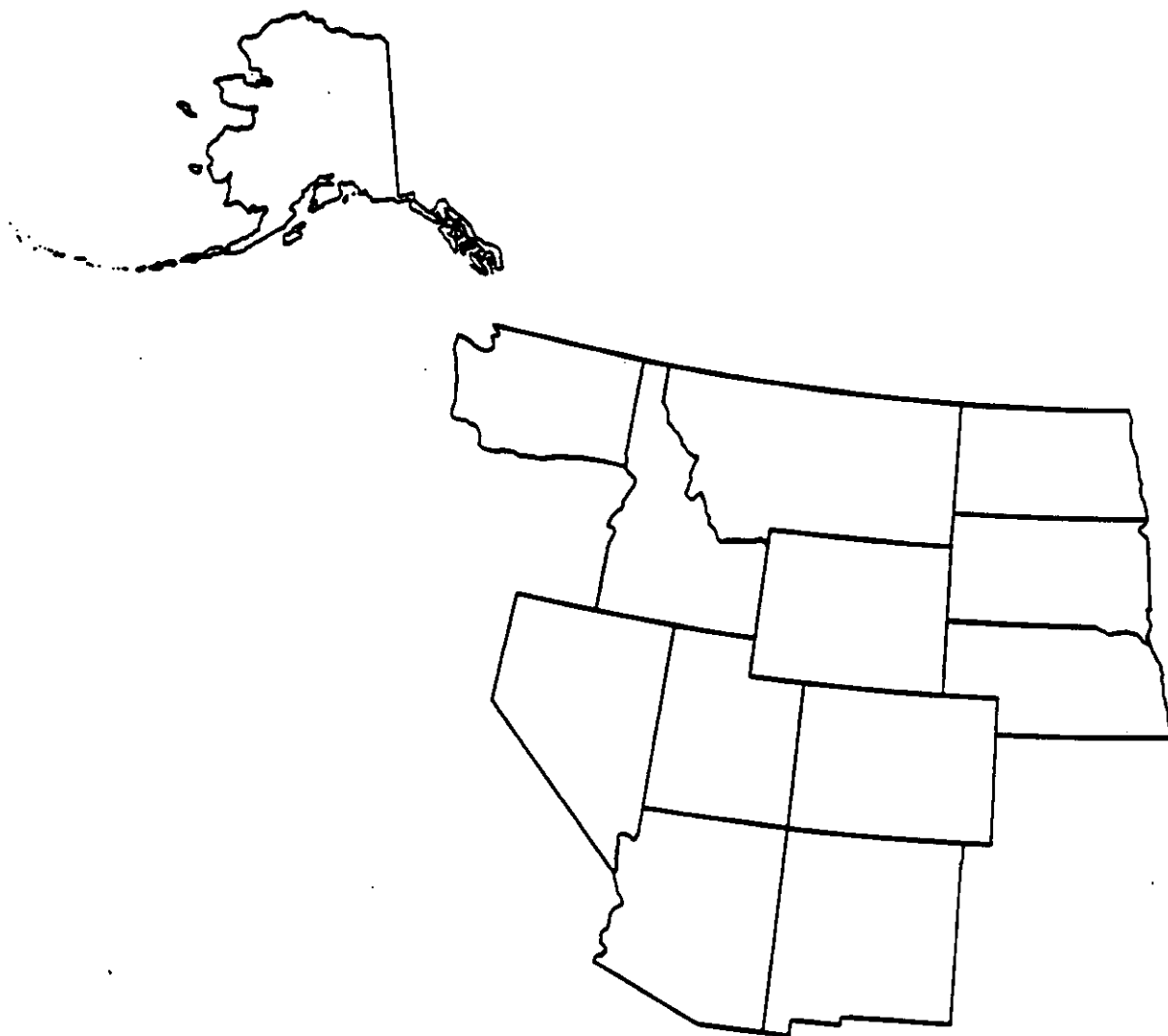


**WESTERN ENERGY:**  
**Production and Transportation Through 1990**



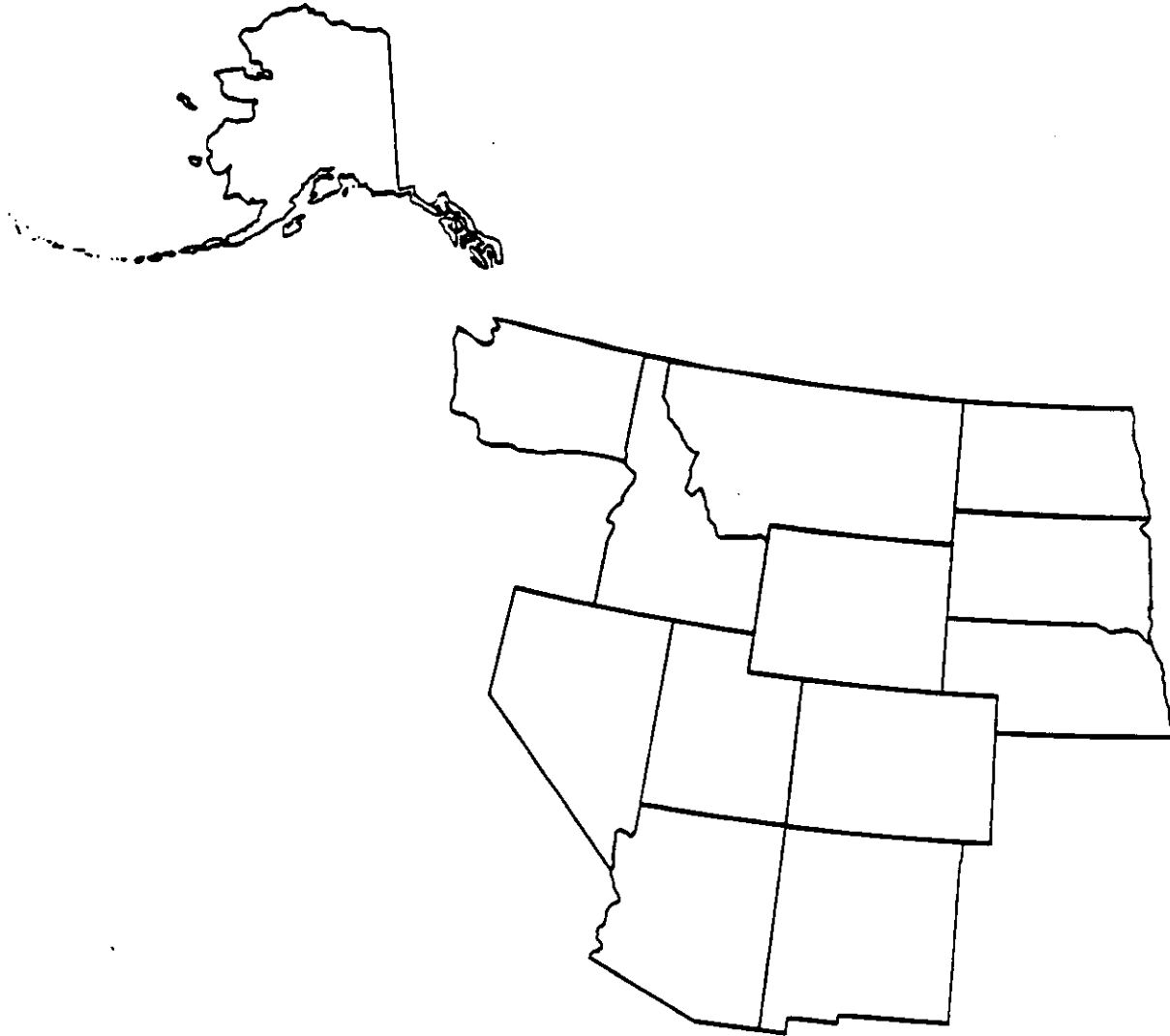
**Governors' Executive Report**



**Western Governors' Association**

# **WESTERN ENERGY:**

## **Production and Transportation Through 1990**



### **Governors' Executive Report**



**Western Governors' Association**

This study of western energy transportation needs and trends was conducted under the auspices of the Western Governors' Policy Office. On February 26, 1984, the Western Governors' Policy Office (WESTPO) merged with the Western Governors' Conference to become the Western Governors' Association (WGA). Most references in this report are to WESTPO. However, when reference is made to policy implications or future activities of the governors, WGA is the appropriate successor organization.

Governor William Janklow (SD) served as WESTPO lead governor for transportation. He appointed his Secretary of Transportation, Jim Myers, to chair a staff advisory committee to provide guidance for this energy transportation study. After reviewing a number of proposals, the staff advisory committee selected the firm of Peat, Marwick, Mitchell & Co. to conduct the technical work of collecting and synthesizing information. Throughout the project, the committee provided oversight and direction.

## WESTERN GOVERNORS' ASSOCIATION

### Chairman

Governor George R. Ariyoshi (HI)

### Vice-Chairman

Governor Richard D. Lamm (CO)

### Members

Governor William Sheffield (AK)	Governor Richard Bryan (NV)
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Governor Richard D. Lamm (CO)	Governor Victor G. Atiyeh (OR)
Governor Ricardo J. Bordallo (Guam)	Governor William J. Janklow (SD)
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Governor John V. Evans (ID)	Governor John Spellman (WA)
Governor Ted Schwinden (MT)	Governor Ed Herschler (WY)
Governor Robert Kerrey (NE)	

### Executive Director

James D. Maddy

WGA is an independent, non-partisan organization of sixteen western states, one Pacific commonwealth, and two territories.

Established in 1984, as a result of the merger between the Western Governors' Policy Office (WESTPO) and the Western Governors' Conference (WGC), its purpose is to strengthen the policymaking and management capacity of member states and their role in the federal system.


It serves the interest of the governors across a range of functional concerns, including energy, agriculture, water, natural resources, international trade, fiscal policy, economic development, and related issues.

Funds for the Western Governors' Policy Office (WESTPO) energy transportation study were provided by the U.S. Department of Energy under grant #DE-FG03-81RA50639.

FOREWORD

This report surveys the many energy production and transportation issues important to WESTPO states. The report provides information for governors to evaluate the issues and develop appropriate energy and transportation policies.

A regional perspective was used for this analysis because the WESTPO member states share the West's transportation network as well as many common interests, issues, and problems relative to producing and transporting energy. Although common approaches to these issues may not be adopted, our states benefit by a comprehensive understanding of our region and its role as a major energy supplier. Further analysis can be conducted by each state to examine issues most important to them and to prepare for continued energy development.



William J. Janklow  
Lead Governor for Transportation,  
Western Governors' Policy Office

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\*The term "WESTPO" refers to the 13-state region of Alaska, Arizona, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Utah, Washington, and Wyoming, not to the organization of the former Western Governors' Policy Office.

## INTRODUCTION

This is the Governors' Executive Report of the Western Governors' Policy Office (WESTPO) study entitled, *Western Energy: Production and Transportation Through 1990*. The study was funded by a Department of Energy grant and consists of two documents: this summary and a comprehensive document containing the detailed information from which this report was prepared.

Significant energy resources are found in states that were members of the Western Governors' Policy Office. Policies regarding production and transportation of these resources influence the region's economy, environment, and role in the country's energy future. To help understand the implications of state and federal energy and transportation policies, western governors undertook this energy production and transportation study. The Governors' Executive Report contains the major findings of the study and addresses:

- the status of the issues confronting western governors;
- the effect these issues have on the states and the region;
- the energy and transportation trends that have implications for the region; and
- the basis for understanding the region's role as an energy supplier.

The study process was developed by WESTPO's Staff Advisory Committee (SAC) and Peat, Marwick, Mitchell & Co., consultants to the SAC. Its major steps were to:

- collect data on current energy resources and markets;
- identify the systems used to transport energy;
- analyze current trends in energy and transportation; and
- determine the implications of these trends for the region.

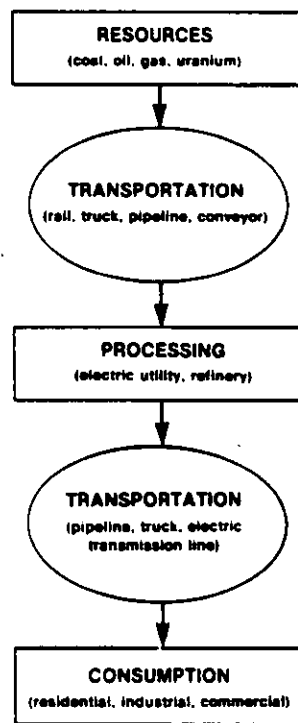
Draft reports of the study were prepared and reviewed with the states and WESTPO. This Governors' Executive Report, and its companion document containing detailed information from which this summary was prepared, represent the collective efforts and contributions of WESTPO, each member state, and Peat Marwick.

To ensure maximum uniformity in these reports, single, nationally available data sources (such as the Department of Energy) were used when possible. Primary data

sources are listed in the bibliography found at the end of this document.

The study approach, shown in Exhibit 1, recognizes the interrelationship of energy processing and energy transportation. This interrelationship is particularly important for western energy resources which, typically, are far removed from their markets. Economical transportation is essential to the ability of producers to compete in distant markets.

### EXHIBIT 1 STUDY APPROACH



This report is presented in three parts:

- *Part I* describes energy resources and transportation infrastructures that exist in the region.
- *Part II* describes and analyzes the trends important to energy and its transportation.
- *Part III* describes policy issues important for western governors as they manage energy and transportation in their states.



## PART I: ENERGY RESOURCES AND TRANSPORTATION INFRASTRUCTURE

This part of the report, Energy Resources and Transportation Infrastructure, comprises three sections:

- Section 1 examines each energy form—its available resources, production and markets, and the adequacy of its transportation infrastructure.
- Section 2 compares the energy-producing potential of the region's resources, presents a forecast of the region's future energy demand, and examines the relative roles of the region's transportation modes.
- Section 3 discusses issues important to trade-offs between using different energy forms to produce consumable energy, and summarizes the process of deciding whether energy should be produced close to the market or close to the extraction site.

### SECTION 1: RESOURCES OVERVIEW

Energy forms examined in this Resources Overview section include:

- coal;
- oil;
- natural gas;
- uranium;
- electricity;
- synthetic fuels; and
- alcohol.

Each energy form is outlined as to available resources, current markets and demand, and transportation systems used to access energy markets.

### COAL RESOURCES AVAILABLE

Coal dominates the region's energy resources, with 80 percent of the region's coal in Montana and Wyoming. Only three WESTPO states—Idaho, Nebraska, and Nevada—lack commercial coal reserves. The coal, mostly underground (60 percent), is 77 percent subbituminous, 13 percent lignite, and 10 percent bituminous. Small amounts of anthracite are located in Colorado and New Mexico.

Exhibits 2 and 3 illustrate the states with major subbituminous and lignite coal reserves.

Coal sulfur content is a primary market factor because of the national goal to reduce sulfur emissions from electric generating facilities. Coal from the region is important in meeting this goal because 79 percent contains less than 1 percent sulfur, and 93 percent contains less than 3 percent. The national average sulfur content of coal is approximately 3 percent.

At current production rates, the West's coal supply would last over 1,000 years. The majority of coal produced in the WESTPO states (54 percent) is exported from the region. Although extraction rates are increasing and probably will continue to increase, reserves are sufficient for several hundred years.

### COAL PRODUCTION AND MARKETS

In 1981, the WESTPO region produced 219 million tons for domestic use, 31 percent of the national total. Exhibit 4 illustrates the U.S. Department of Energy districts in which this production occurred.

#### EXHIBIT 2

#### SUBBITUMINOUS COAL RESERVES BY STATE

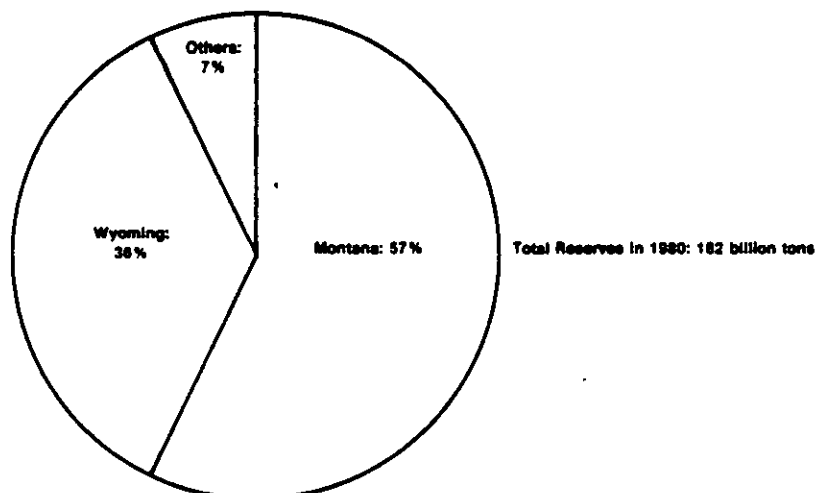


EXHIBIT 3

LIGNITE COAL RESERVES BY STATE

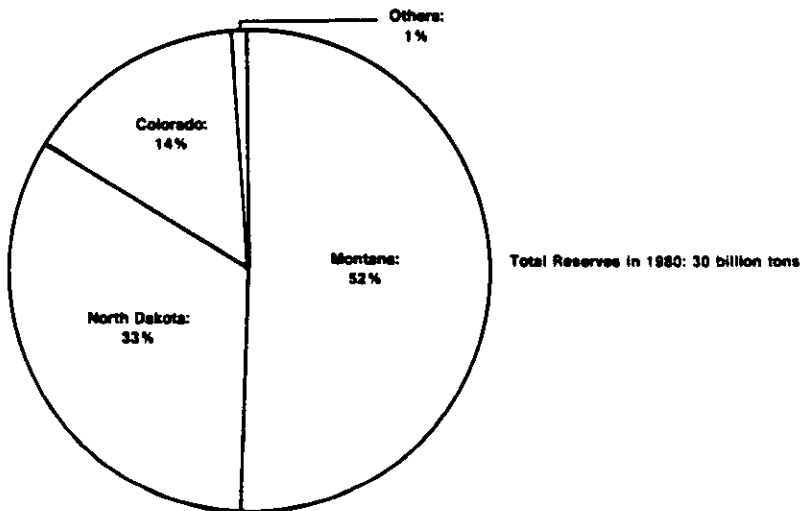
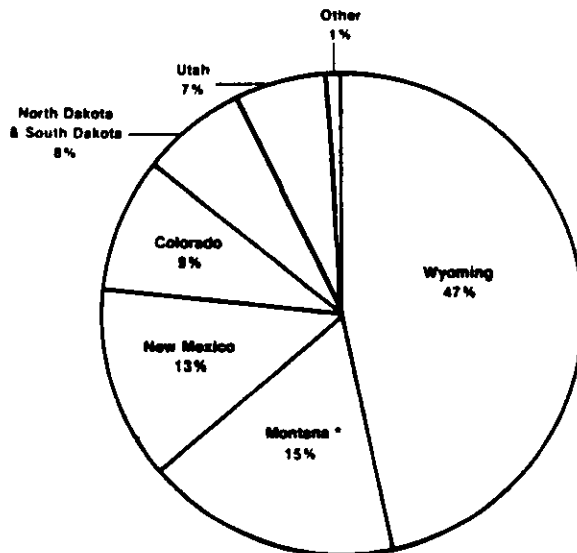


EXHIBIT 4

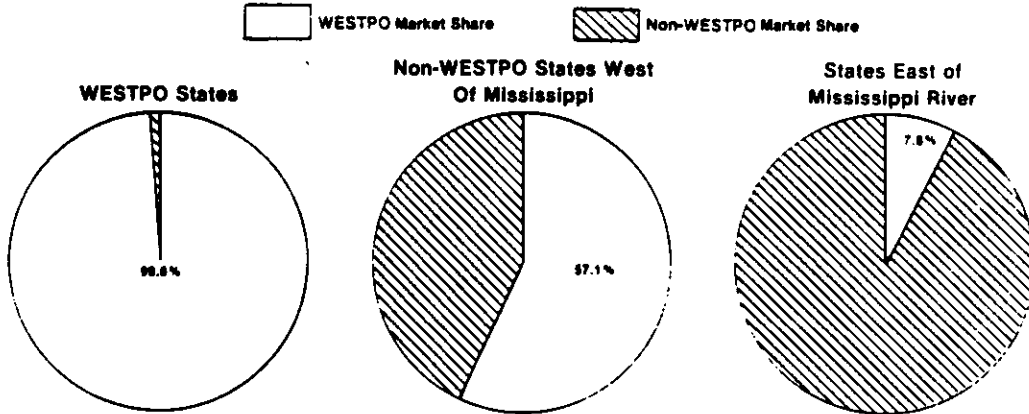
1981 WESTERN COAL PRODUCTION FOR DOMESTIC MARKETS BY DOE DISTRICT



\*Mostly Montana reserves, however a small amount of Washington reserves is included due to DoE/NCA statistics reporting.

**EXHIBIT 5**

**WESTPO\* SHARE OF MAJOR DOMESTIC COAL MARKETS IN 1981**



\*The term "WESTPO" as used in this exhibit and several that follow refers to the 13-state region of Alaska, Arizona, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Utah, Washington, and Wyoming, not to the organization of the former Western Governors' Policy Office.

Exhibit 5 shows the region's coal market share east and west of the Mississippi River.

The region produces almost all its own coal and has a significant share in the coal markets of many other states, as illustrated in the following chart.

State	Coal Market Share
California	99%
Arkansas	95
Oklahoma	95
Oregon	95
Louisiana	91
Minnesota	91
Kansas	78
Iowa	72
Wisconsin	51
Texas	42
Mississippi	41

**COAL TRANSPORTATION INFRASTRUCTURE AND ADEQUACY**

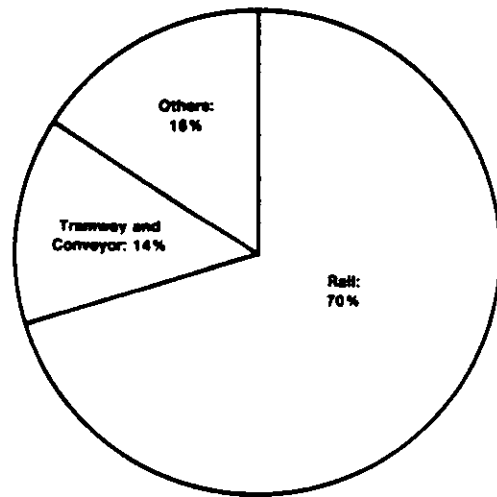
To sell coal in distant markets, transportation services must be available at competitive prices. As shown in Exhibit 6, rail is the transportation mode most often used to deliver coal produced in the West.

Because mode choice depends on the distance to be traveled, rail is preferred for shipping coal to markets outside the region.

Mode	Market	
	WESTPO	Non-WESTPO
Rail	47%	89%
Truck	20	—
Water	—	11
Tramway and Conveyor	29	—
Slurry Pipeline	4	—

**EXHIBIT 6**

**TRANSPORTATION MODES USED TO DELIVER WESTERN COAL TO MARKET, 1981**



When water is used to deliver coal outside the region, rail must be used to deliver the coal to a transloading point. Thus, virtually all coal shipped from the region uses railroads to reach its markets. Major coal hauling railroads serving the region are the Burlington Northern, Denver and Rio Grande Western, Union Pacific, and Atchison, Topeka, and Santa Fe. Railroad lines and feeder lines proposed to extend service to mines planned for development include the Tongue River Railroad in Montana and the Star Lake and Navajo Railroads in New Mexico. Until market conditions improve, proposals for other lines, such as the Denver and Rio Grande Western's Castle Valley feeder line in Utah, have been deferred.

As coal markets increase, sufficient transportation service will be needed to move coal from mine to market. Several coal slurry pipelines are proposed and are trying to acquire the needed right-of-way, financing, and markets. Currently, however, only the Black Mesa pipeline is operating, and prospects for additional lines have dimmed.

### OIL RESOURCES AVAILABLE

The WESTPO region has approximately 35 percent of the crude oil reserves proved to exist in the United States. Alaska has 28 percent of U.S. reserves and 79 percent of the region's reserves, as shown in Exhibit 7. Exhibit 8 illustrates region's reserves in millions of barrels.

EXHIBIT 7

#### ESTIMATED CRUDE OIL PROVED RESERVES, 1981

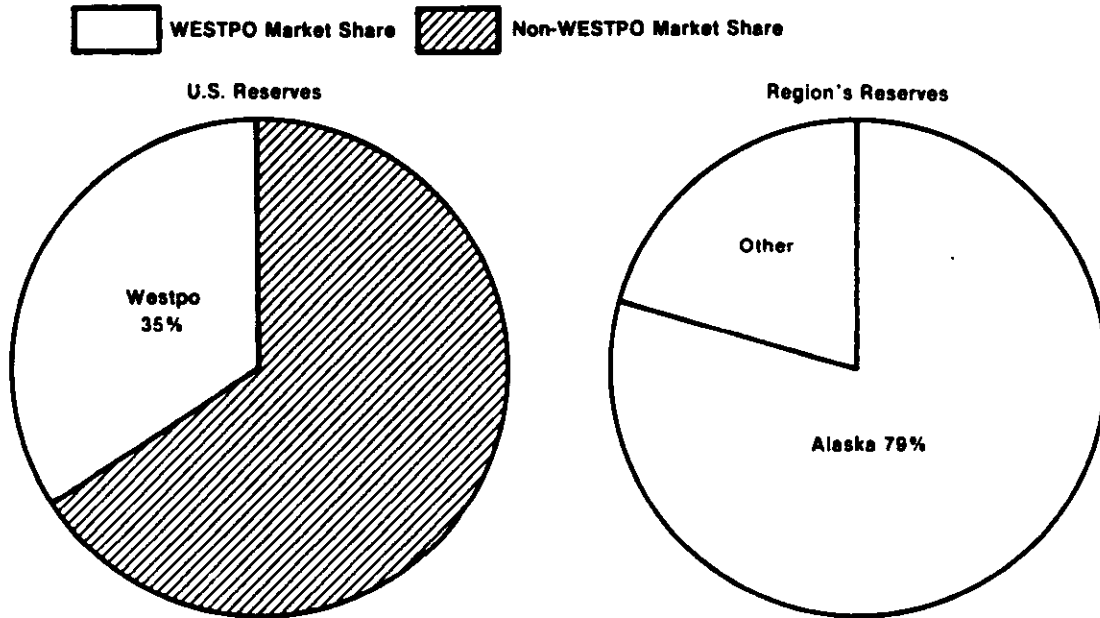
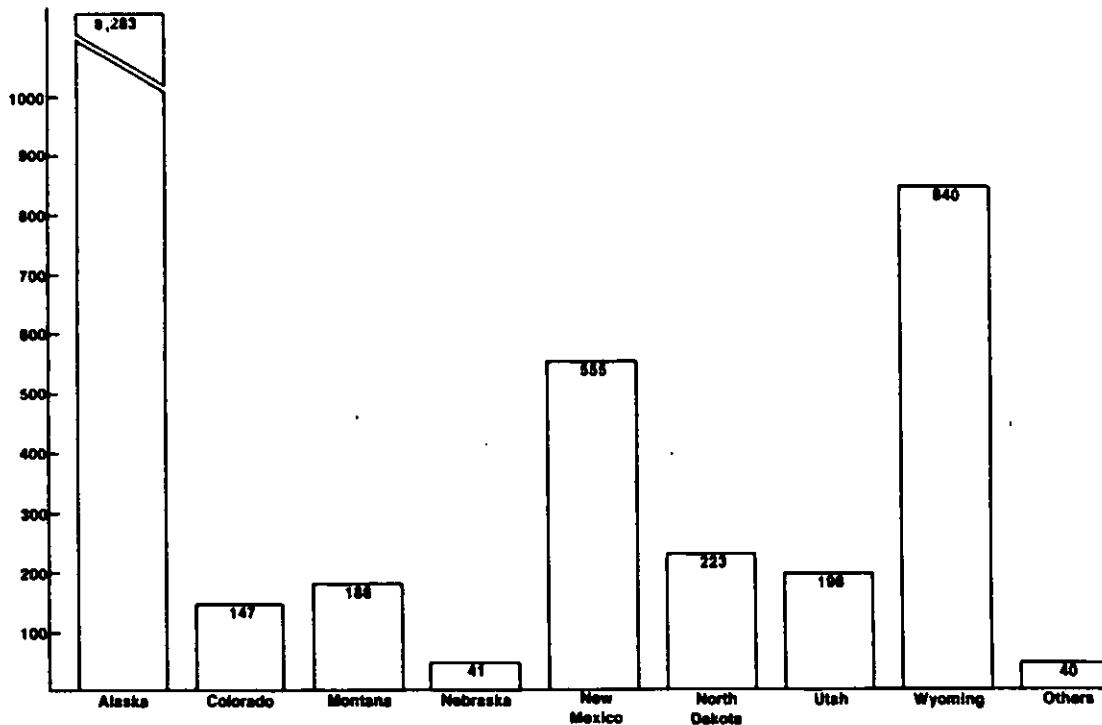


EXHIBIT 8

#### ESTIMATED CRUDE OIL PROVED RESERVES BY STATE, 1981 (Millions of Barrels)



At current production rates, proved oil reserves in the region would last 11 years, Alaskan reserves 14 years, and reserves in other WESTPO states 7 years. However, new discoveries in the region have generally been sufficient to match declines in reserves caused by production. The current reserves-to-production ratio will probably be maintained through the year 2000. Drilling in the Overthrust Belt is particularly active.

## OIL TRANSPORTATION INFRASTRUCTURE AND ADEQUACY

Oil pipelines have been built to keep pace with oil discoveries and production increases. Plans for the Northern Tier pipeline, proposed to transport Alaskan crude oil from Washington to Minnesota, have been cancelled because sponsors were unable to secure the needed right-of-way. Major new pipelines, if built, will probably originate in the Overthrust Belt and connect with existing pipelines. Now, however, the existing infrastructure is sufficient.

## OIL PRODUCTION AND MARKETS

In 1981, WESTPO states produced 915 million barrels of crude oil, 65 percent of which was produced in Alaska (Exhibit 9). Since 1977, when Alaska began producing oil, production in most other states has declined, except in North Dakota and Wyoming. These states have been the sites of much recent exploration, where new discoveries are offsetting production declines of mature wells.

Production in Alaska serves markets in California, whereas production in other states serves markets in the Midwest, Texas, and California.

## NATURAL GAS RESOURCES AVAILABLE

The WESTPO region has approximately 30 percent of U.S. natural gas reserves. Alaska has 51 percent of the reserves, and New Mexico and Wyoming have 39 percent. Exhibit 10 shows these percentages, and Exhibit 11 shows WESTPO natural gas proved reserves in billions of cubic feet. Even though gas reserves have declined nationally, reserves in the region have increased. The largest discoveries in the continental WESTPO states have been in the Utah and Wyoming portions of the Overthrust Belt, and in North Dakota and Montana.

### EXHIBIT 9

CRUDE OIL PRODUCTION BY STATE, 1981  
(Millions of Barrels)

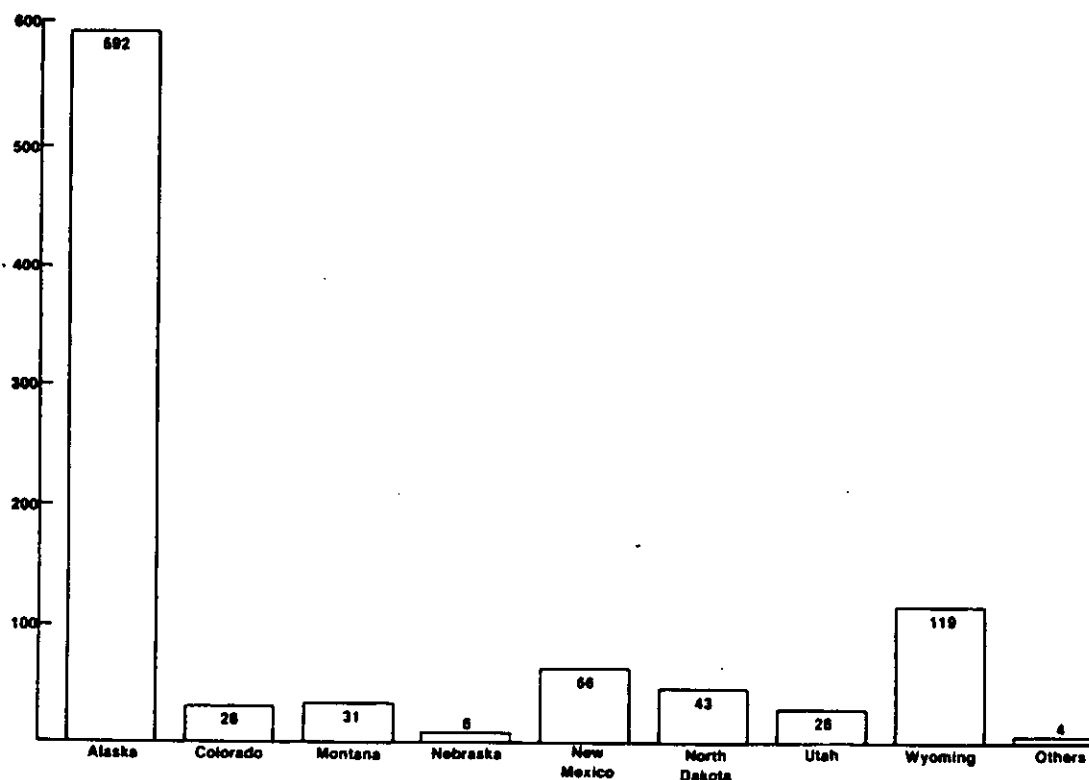


EXHIBIT 10

ESTIMATED PERCENTAGES OF NATURAL GAS PROVED RESERVES, 1981

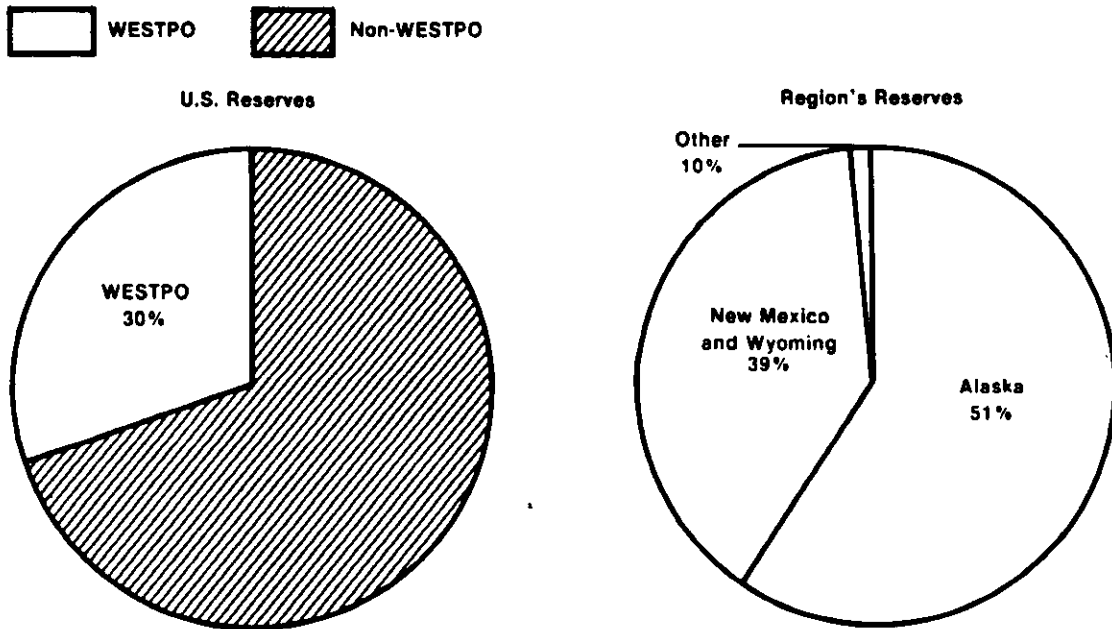
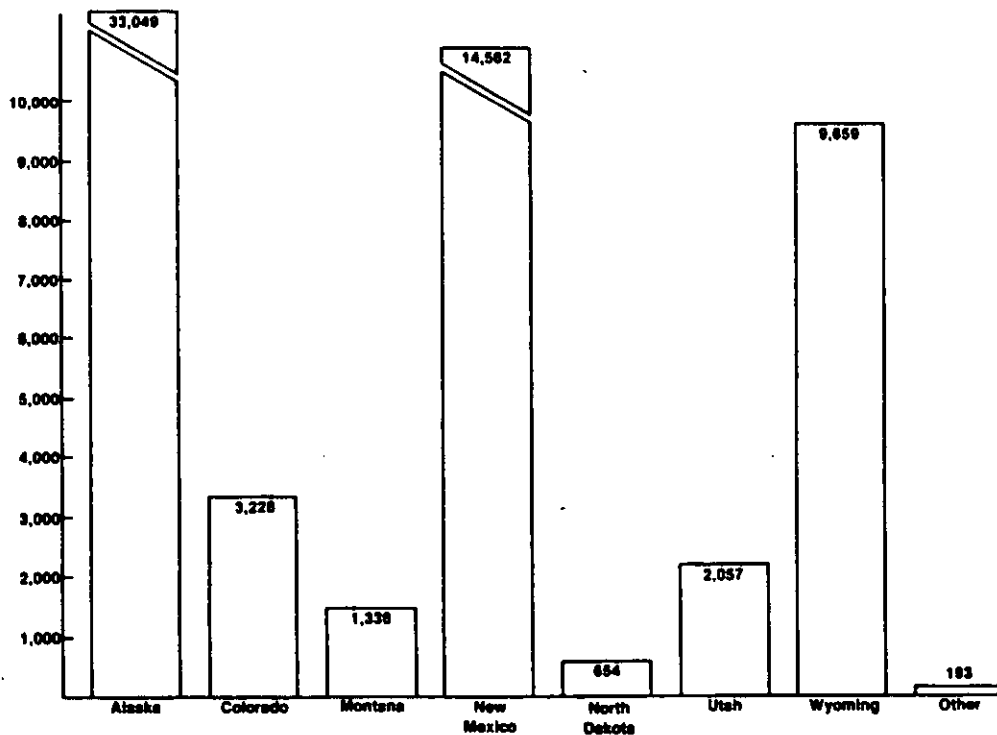


EXHIBIT 11

ESTIMATED NATURAL GAS PROVED RESERVES BY STATE, 1981  
(Billions of Cubic Feet)



At current withdrawal rates, reserves in continental WESTPO states would be sufficient for 16 years, slightly longer than the national average of 10 years. Natural gas exploration is continuing, and discoveries are likely to be sufficient to sustain production at current levels until sometime in the next century. Alaska reserves would be sufficient for 35 years, but this number is artificially high because Alaska does not yet have a transportation system to market its full gas production capacity. When such a pipeline commences operation, the reserves-to-production ratio should be close to the WESTPO average. Continuing exploration will increase available reserves.

## NATURAL GAS TRANSPORTATION INFRASTRUCTURE AND ADEQUACY

The western region has a well-developed gas pipeline network that has grown to meet increasing demand caused by new discoveries. The most recently completed projects are the Cities Service Co. line from south central Wyoming to central Kansas and the Trailblazer line from southwestern Wyoming to southeastern Nebraska. A consortium of utilities has proposed constructing the Alaska Highway Gas Transmission line that would link Prudhoe Bay and San Francisco. The line is planned for 1990, but the project is in doubt because financing has not been arranged.

## NATURAL GAS PRODUCTION AND MARKETS

Exhibit 12 illustrates natural gas marketed in 1981 from the WESTPO states. This exhibit does not show gas used to repressure oil wells, a use that consumed 74 percent of Alaska's withdrawals. New Mexico marketed more gas than any other state, but its recent production has been declining. The region consumes 42 percent of its marketed production; remaining gas serves California and the Midwest. Marketed production from Alaska is exported to Japan in liquefied form, and totaled 56 million cubic feet in 1981.

## URANIUM RESOURCES AVAILABLE

Uranium reserves are divided into "forward cost categories" that indicate the cost per pound at which uranium can be recovered. Only the \$30 a pound category is competitive in today's uranium marketplace. On January 1, 1982, the West had 98 percent of U.S. uranium reserves with an estimated forward cost of \$30 a pound (Exhibit 13). At current production rates, reserves in the region should be sufficient for 20 years. If breeder reactors are developed, reserves would last several hundred years.

### EXHIBIT 12

WESTPO\* NATURAL GAS MARKETED PRODUCTION, 1981  
(Millions of Cubic Feet)

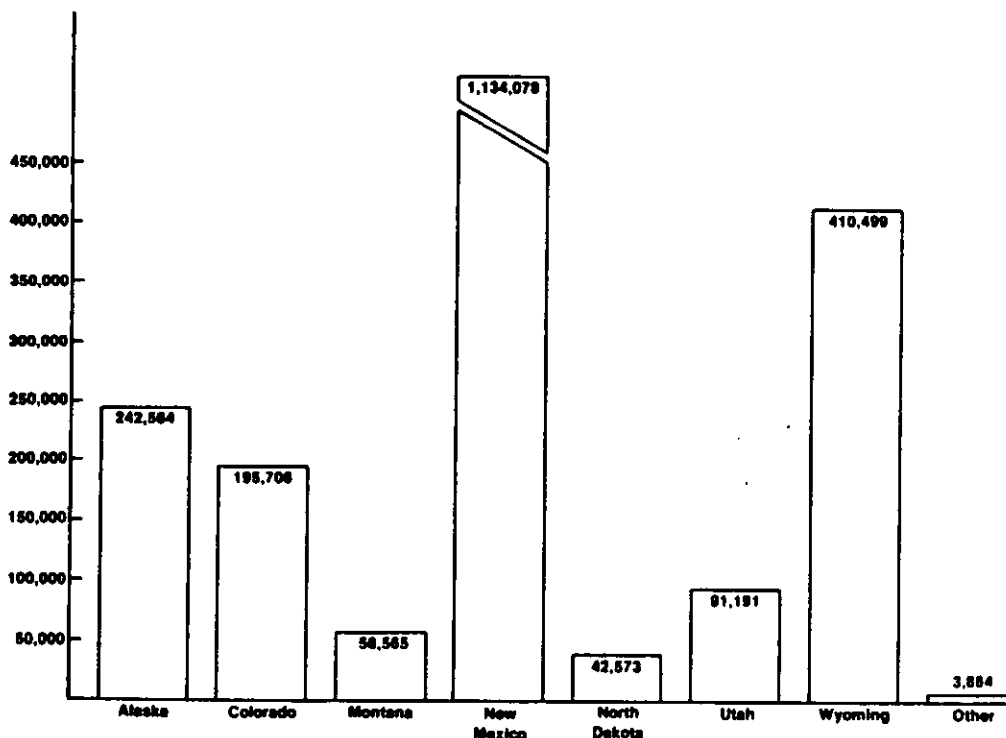
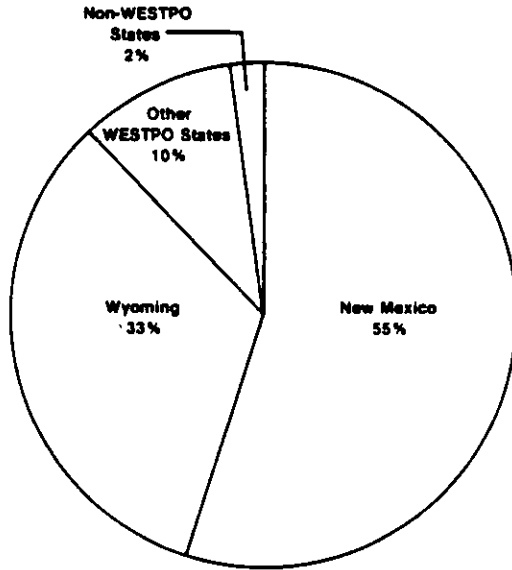


EXHIBIT 13

U.S. URANIUM RESERVES ON JANUARY 1, 1982



URANIUM PRODUCTION AND MARKETS

Exhibit 14 illustrates 1982 production of uranium. Since 1976, more than 50 orders for nuclear generating plants have been cancelled. Such cancellations caused uranium demand, market prices, and production to decrease. In 1980, New Mexico had 45 operating mines; by mid-1983, it had only 11. No new nuclear plant orders have been placed, and existing inventories now are the principal source for uranium. Several foreign countries already have established competitive positions. Thus, it appears that the uranium industry will operate at substantially low levels for the rest of the decade.

EXHIBIT 14

WESTERN URANIUM PRODUCTION, 1981

New Mexico	6,210 tons U <sub>3</sub> O <sub>8</sub> *
Wyoming	4,355
Other WESTPO States	<u>1,924</u>
<b>TOTAL</b>	<b>12,489 tons U<sub>3</sub>O<sub>8</sub>*</b>

\* U<sub>3</sub>O<sub>8</sub>, uranium oxide, is the semi-processed form of uranium commonly known as yellowcake.

URANIUM TRANSPORTATION INFRASTRUCTURE AND ADEQUACY

Trucks transport most uranium ore to mills nearby that produce uranium concentrate. Trucks also transport enriched uranium to nuclear facilities. Railroads transport only a small quantity of ore, and their market share is not expected to increase.

SYNTHETIC FUELS RESOURCES AVAILABLE

The principal non-coal synthetic fuels resources consist of oil shale and tar sands. The West has 592 billion barrels of synthetic liquids, 580 billion barrels of which are oil shale. The region has all the tar sands in the U.S., and virtually all the oil shale. The only other state with oil shale is Kentucky. Colorado has 81 percent of the region's oil shale, and Alaska has 98 percent of the region's tar sands. Coal reserves, examined separately in this report, are also considered to be synthetic fuel reserves when they are gasified or liquefied.

SYNTHETIC FUELS PRODUCTION AND MARKETS

The only synthetic fuels production facility is the Union Oil facility in Colorado, which is designed to produce 10,000 barrels per day. This fuel is shipped to Fruita for refining and shipping to market. The facility is scheduled for expansion to 90,000 barrels per day by the mid-1990s. The Great Plains project in North Dakota is projected to go into operation by 1985, producing roughly 100 million cubic feet per day of coal gas. Both projects have been funded by the Department of Energy and may be the only ones in production before 1990. The Synthetic Fuels Corporation (SFC) was established after the gasoline-line crises of 1980 to stimulate production of 500,000 barrels per day of synthetic liquids and gases by 1984 and 2 million barrels per day in the late 1990s. The SFC is empowered to provide loan and price guarantees as well as other incentives to project sponsors to stimulate commercial development of synthetic fuels and gases. Besides the two projects in development, others such as Santa Rosa (New Mexico tar sands), and Cathedral Bluff (Colorado oil shale) have signed letters of interest. The Exxon oil shale project in Colorado was funded by DOE but withdrawn and closed down in 1983. Synthetic fuels development depends on world oil prices. Currently, a world price of approximately \$60 per barrel is needed to make most synthetic production economically feasible.

SYNTHETIC FUELS TRANSPORTATION INFRASTRUCTURE AND ADEQUACY

Conveyors, tramways, and trucks will be used at synthetic fuels processing facilities, because the facilities will be built close to the resources. Railroads and motor car-



riers will be used to transport the processed oil to refineries which will ship the consumable fuels to market via pipelines. If large projects are built, pipelines will be constructed between processing facilities and refineries. The need for new product pipelines will depend on whether new refineries are built for synthetic fuels.

### **ALCOHOL RESOURCES AVAILABLE**

If producing alcohol from grain becomes more common, the West will be in an excellent position to utilize its vast agricultural resources. These resources are renewable, and the volume available each year will depend on market demand and prices. Of the western states, Nebraska, North Dakota, South Dakota, and Colorado would be best able to take advantage of alcohol fuels opportunities.

### **ALCOHOL PRODUCTION AND MARKETS**

Nebraska has three alcohol production facilities. These facilities serve local markets, and the largest has an annual capacity of 1.5 million gallons. Four additional Nebraska plants are proposed. These plants would have annual capacities ranging from 2.5 to 30.0 million gallons and would serve not only local markets but also Denver markets. If all the proposed plants are built, the industry would then comprise 50 million gallons of production capacity. On an energy basis, this amount is equivalent to 733,000 barrels of crude oil per year or 2,000 barrels per day. New Mexico, in the first half of 1983, produced 820,000 gallons of ethyl alcohol, a significant increase over the 200,000 gallon production for the year 1982. The feasibility of these plants depends on a scenario that includes world oil prices increasing and facilities being able to sell products at compensatory and competitive levels.

### **ALCOHOL TRANSPORTATION INFRASTRUCTURE AND ADEQUACY**

Proposed facilities plan to use railroads and trucks to serve their transportation needs. In selecting sites for these facilities, the sponsors select locations that have ready access to transportation mode(s) that allow them to ship and receive their products. No new transportation infrastructure should be needed for alcohol facilities.

### **ELECTRICITY RESOURCES AVAILABLE**

Even though electricity is not a natural resource, it is included in this report because it is produced from natural resources and marketed outside the region. Electricity is generated from coal (59 percent), oil (5 percent), gas (15 percent), water (19 percent), uranium (1 percent), and

renewable fuels, such as wind and alcohol (1 percent). The region consumes approximately half the electricity it produces and exports 236 million megawatt/hours more than it imports.

### **ELECTRICITY PRODUCTION AND MARKETS**

In 1981, the WESTPO region consumed 205 million megawatt/hours of electricity, representing 9.8 percent of total U.S. consumption. Capacity should increase as new facilities (particularly coal) are completed. Abundant resources and proximity to major electricity markets make the WESTPO region attractive as a location for generating plants. The Intermountain Power Project in Utah, being built to serve California, is an example of a project built close to the resource, but far from the market. California and the Midwest are major recipients of electricity generated in the WESTPO region but not used in the region.

### **ELECTRICITY TRANSPORTATION INFRASTRUCTURE AND ADEQUACY**

Like pipelines, electric transmission lines are built to serve specific markets and demands. When generating stations are planned, connection methods for the power grid system are included in project plans and costs. Some projects, such as the Oahe Dam on the Missouri River, access the grid with extensive transmission systems. Other projects, such as those close to existing facilities, access the grid with only short lines.

## **SECTION 2: ENERGY AND TRANSPORTATION COMPARISON**

This section of the energy resources and transportation infrastructure analysis:

- compares the energy-producing potential of the region's energy resources;
- presents a forecast of future energy demand;
- examines the relative roles of transportation modes in the region; and
- discusses the fuel and transportation selection process.

The result of the analysis is a comparison of the energy and transportation resources of the region and an examination of relative importance of the various resource types and mode types.

**COMPARISON OF NON-RENEWABLE ENERGY-PRODUCING POTENTIAL OF THE REGION'S NATURAL RESOURCES**

The energy-producing potential of the region's energy resources varies according to resource type. To compare their energy-producing potential, each resource was converted to standard British thermal units (Btus), using the following factors:

Resources	Conversion to Btus (000s)
Bituminous coal	23,000 per ton
Subbituminous coal	21,000 per ton
Lignite coal	17,000 per ton
Oil Shale	5,800 per barrel
Tar Sands	5,800 per barrel
Oil	5,800 per barrel
Natural Gas	1 per cubic foot
Uranium	170,000 per pound

Using 1981 proved reserves, two comparisons were prepared:

- Exhibit 15 shows the distribution of non-renewable proved energy resources. Btu values were the basis of the distribution. (Note that coal represents 60 percent of the region's total energy-producing potential.)
- Exhibit 16 shows the distribution of recoverable energy resources in WESTPO states and the types of resources making up the Btus.

Significant portions of coal resources are exported from

the region for consumption in other regions of the U.S. and the world. In 1981, for instance, 47 percent of coal produced in the region for domestic consumption was consumed in WESTPO states, 37 percent was consumed in other states west of the Mississippi River, and 16 percent was consumed in states east of the Mississippi River. WESTPO states have 4.4 percent of the export coal market. Because oil and natural gas are shipped by pipelines, the portions of these resources that are consumed in the region cannot be measured accurately. Nevertheless, the portions are significant.

**FORECAST OF FUTURE ENERGY DEMAND**

Exhibit 17 shows the demand for domestic consumption of energy produced in the WESTPO states, as projected by the Department of Energy.

Export demand will be for natural gas from Alaska and for coal from Alaska and continental states, such as Utah and Colorado. The region's coal competes with coal from Australia and South Africa and with eastern U.S. coal, for markets in Pacific Rim countries. Recent information indicates that Japan overestimated its need for coal and that significant growth in its coal needs will not occur at least until late in this decade. Expansion of coal facilities at West Coast ports is generally postponed until markets improve. The recent decision by South Korea to purchase coal from Alaska indicates that advantages in ocean shipping exist for Pacific Rim countries if they purchase from Alaska rather than from the continental United States, which must pay for rail transportation charges prior to the ocean movement.

**EXHIBIT 15**  
**SHARE OF WESTPO NON-RENEWABLE PROVED ENERGY RESOURCES, BY BTU VALUE**

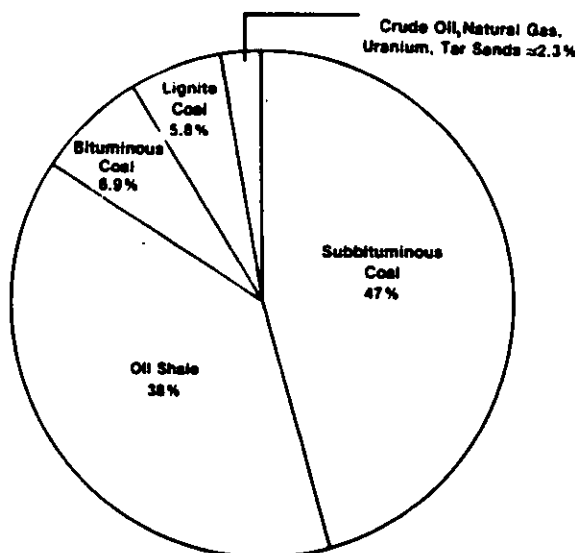
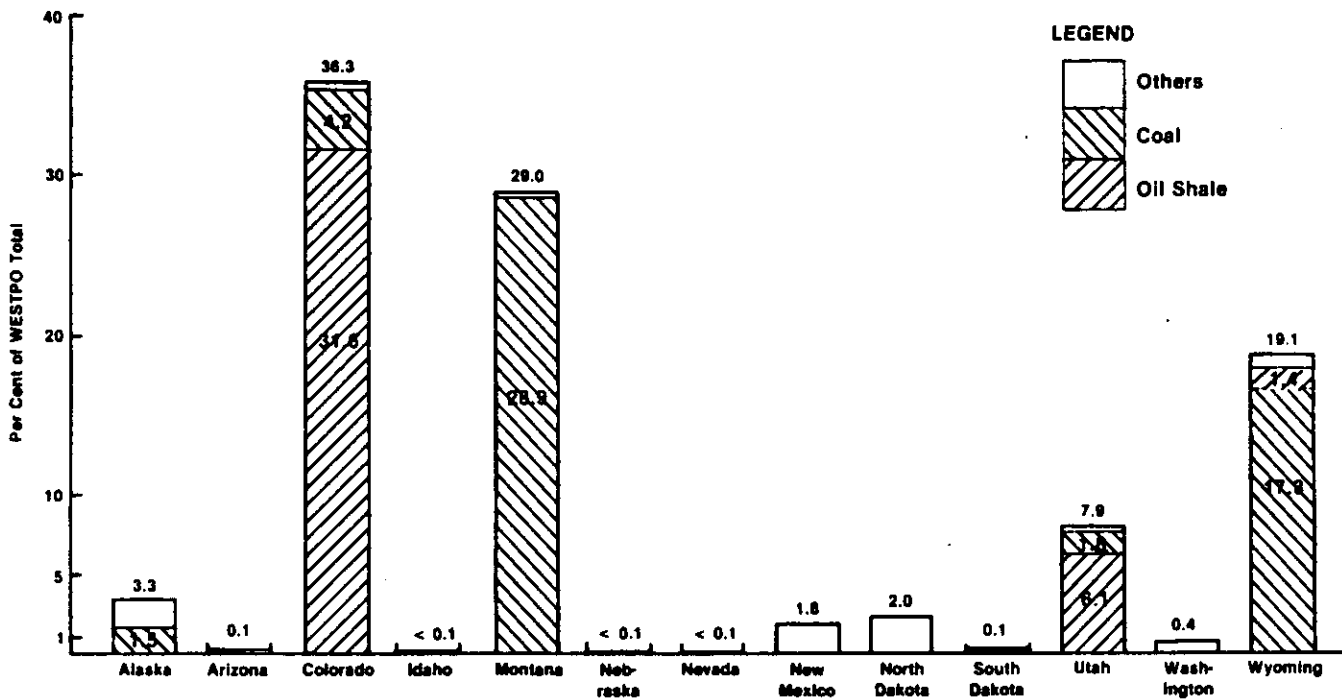


EXHIBIT 16

STATE SHARE OF NON-RENEWABLE PROVED ENERGY RESOURCES  
WITHIN REGION



Note: In the case of Alaska, a large portion of the resources are not recoverable at today's market prices.

EXHIBIT 17

FORECAST OF WESTERN NON-RENEWABLE ENERGY PRODUCTION,  
1985 AND 1990

	1981 <u>Actual</u>	1985 <u>Estimated</u>	1990 <u>Estimated</u>
Crude Oil Production million barrels	929	894	984
Coal Production million tons	210	277	354
Anthracite	4	4	4
Bituminous	39	69	95
Subbituminous	154	178	204
Lignite	17	26	51
Natural Gas Production million cubic feet	2,162	2,180	3,049
Uranium Production tons	12,500	22,500*	17,000

\*Note: In early 1980s, utilities began selling off excess inventories. However by 1985, excess inventories are expected to be sold off, and new production will be required to meet demand.

## ROLE OF TRANSPORTATION MODES

Railroads, pipelines, highways, and electric transmission lines are used in the region to transport energy resources and consumable energy. The following paragraphs describe the role of each.

*Railroads* deliver coal primarily to electric utility plants, particularly if the plant is far from the mine. In 1981, railroads (all rail plus rail/water transfer) transported 75 percent of all coal produced in the region (164 million tons).

The Burlington Northern, Denver and Rio Grande Western, Union Pacific, and Atchison, Topeka, and Santa Fe are the western carriers transporting the most coal. These carriers have invested in track and equipment to enable them to obtain a share of the coal transportation market. Although during the past several years some national carriers have experienced severe financial problems, the West's coal carriers have been able to make needed capital investments. Exhibit 18 presents financial profiles of the major western coal-hauling railroads.

*Pipelines* transport oil, oil products, natural gas, and coal to markets. Oil and gas pipelines crisscross western states, linking resource areas, processing facilities, and markets. Pipelines have been extended to access new resource areas, and capacities of existing pipelines have been expanded as demand has increased. Oil and gas pipelines are regulated, and are permitted rates of return

sufficient to maintain financial viability. Seven new coal slurry pipelines are proposed for the region and, if any are built, they will introduce competition to coal transportation. One coal slurry pipeline, the Black Mesa, currently operates from Arizona to Nevada. Coal slurry pipelines are free to competitively price their services.

*Highways* are used in the transport of oil from small wells not located on pipelines, to transport uranium during its processing cycles, and coal from mines to rail loading points and processing facilities. As synthetic fuel plants are developed, highways may be used to move oil shale and tar sands to the facilities. Alcohol that is produced is generally moved by tank trucks over the highway system. Some roads are built by mining companies specifically to access the site and are used only for energy transportation. State and federal highways are used for transportation over longer distances.

*Electric transmission lines* are used to transport consumable energy from generating stations to markets. New lines are constructed for each project, but these lines vary in length according to the plant's distance from the electric grid system. The cost of new lines is included in the cost of power plants and is borne by the consumers. The operating voltages of transmission lines are increasing, which may increase the concerns of farmers and others located near the lines. When plants can be built in designated areas, opportunities exist to share transmission lines or corridors, thus concentrating the effect of the lines and protecting large regions that might oppose transmission line construction.

### EXHIBIT 18

#### FINANCIAL PROFILE OF MAJOR COAL HAULING RAILROADS IN THE WESTERN REGION, 1981

Railroad	Coal Revenues		Rate of Return on Average Net Investment (Before ITC)	Operating Ratio (Operating Expenses Operating Revenues)	Percent of Total U.S. Class I Railroad Operating Income
	Million \$	% of Total Revenues			
Atchison, Topeka and Santa Fe			5.0%	93.6%	10.1%
Burlington Northern	\$1,030.0	27.5%	4.3	92.0	12.3
Colorado and Southern*	89.8	56.4	4.8	96.0	0.3
Fort Worth and Denver*	97.5	55.0	21.9	85.5	1.2
Denver and Rio Grand Western	139.2	41.6	8.1	85.4	2.3
Union Pacific	334.1	15.9	7.4	86.1	15.8
Missouri Pacific**			8.0	88.0	13.1
Western Pacific**			Deficit	103.0	(0.8)

\* Burlington Northern Subsidiary

\*\* Union Pacific Subsidiary

### **SECTION 3: FUEL AND TRANSPORTATION SELECTION PROCESS**

Utilities select fuel for utility plants according to the purpose that the plant will serve. For base load requirements, coal and nuclear plants are generally less expensive over their life cycles than are oil and gas plants. With many nuclear plants being cancelled and no new plants being ordered, coal will probably assume a larger portion of base load generation responsibility.

Plant sites are selected on the basis of:

- trade-offs between locating near the market or near the fuel supply;
- location relative to electric transmission system;
- environmental standards;
- water availability;
- land use considerations; and
- fuel storage space.

The decision whether to transport fuel to a plant near the market or to transport electricity to the market by the transmission system is, perhaps, the most difficult decision in the plant siting process. Generally, it is less expensive to transmit electricity by wire than to ship coal to a plant near the market. If the transmission system has inadequate

capacity for a new generating plant so that new lines must be installed, it is usually more expensive to build new capacity to transmit electricity by wire than to ship coal to a plant near the market. Even though there are practical limits to the cost-effective, long-range transmission of electricity, several plants in Wyoming and Montana will supply power to users in the Pacific Northwest.

For the above reasons, utilities will try to locate power plants close to both resource deposit and transmission network. Analogous to the oil and gas industry where gathering lines are first built to fields closest to existing pipelines, once a new mine mouth power plant is sited, others may follow. In this way, existing transmission infrastructures may be utilized and hookup costs minimized. The scale economies of power plants dictate that large units be built to achieve minimum cost, which often means local demand will not match local supply. Electric utilities have formed regional councils to plan power generating and transmission assets cooperatively.

As transmission distances and capacities have increased, new technologies have been introduced to reduce the unit cost. Principal among these technologies has been the shift to higher voltages. Although these transmission lines incur higher capital cost, they offer higher capacity and operating efficiencies. Whereas formerly the standard for high voltage transmission was 230 kilovolt (KV), lines are now being constructed for 345 KV and 500 KV service. There is a  $\pm$  400 KV direct current intertie between the Pacific Northwest and California. Transmission lines of even higher voltages are planned.

## PART II: ENERGY TRANSPORTATION TRENDS

This part of the Governors' Executive Report analyzes current energy transportation trends and their effect on the region. The purpose of this analysis is to describe the most important issues that influence the region's energy markets and role as an increasingly important energy supplier. The trend analysis comprises three sections which reflect the most important trends. Section 1 analyzes economic trends, Section 2 analyzes legislative trends, and Section 3 analyzes regulatory and other trends.

### SECTION 1: ECONOMIC TRENDS

Section 1 of the energy transportation trends analysis examines three economic trends that affect the region:

- recent changes in energy forecasts;
- the relationship between coal transportation and the transportation of other commodities; and
- the effect of coal transportation on communities.

The discussion of each trend emphasizes the current and potential effect on the region's energy role.

#### CHANGES IN ENERGY FORECASTS

During the past year, two major changes have affected energy forecasts. The first results from changes in oil and natural gas prices, and the second from the recession which was severe enough to reduce expectations of economic growth during the recovery period.

#### Oil and Gas Prices

During the 1970s, oil supplies were subject to disruptions that resulted in substantial price increases. The last such increase followed the Iran-Iraq war, and contributed significantly to the worldwide recession. The recession reduced consumption, led to worldwide oversupply, and caused the recent reduction in oil prices. Declining oil prices have led to substantial reductions in forecasts of coal exports, since coal was previously regarded as a substitute for oil.

During the 1970s, oil prices increased faster than gas prices, but current projections indicate the gap is closing. Even though natural gas consumption has been reduced by the recession, deregulation and contract procedures are causing prices to increase. Substantial price increases above inflation were authorized in the 1978 Natural Gas Policy Act to allow gas prices to achieve parity with oil

prices. A number of categories of gas are already exempt from price controls. Many utilities and pipelines, recalling the natural gas shortage of 1976-1977, negotiated take-or-pay contracts for these high priced supplies. As demand declined during the recession, gas distributors were forced to curtail lower cost supplies that were not under take-or-pay contracts. As such, a significant portion of delivered gas now comes from high priced supplies. Therefore, gas prices are continuing to increase, and the price differential between gas and oil is expected to disappear several years sooner than previously anticipated.

#### Recession

The other major change affecting energy forecasts is the slower growth anticipated during recovery from the recession. The depth and duration of the recession surprised many economists, who originally projected only a slight cutback before growth resumed. Instead, several industries permanently reduced their manufacturing capacity. The overall effect has been to delay, by several years, previously forecasted increases in energy consumption and production. This delay has reduced growth estimates for coal and oil production. Slight declines in oil consumption have led to major reductions in current expenditures for oil and gas exploration. The effect shown in the latest DOE forecast of energy production and consumption for the year 1985 is a reduction of approximately 5 percent.

Faced with reductions in overall demand, projections of supplemental resources that close the gap between consumption and conventional supply have been significantly reduced. These resources include oil imports, synthetic fuels, and renewable resources. Abandonment of several large synthetic fuel projects, along with permanent closings of manufacturing plants in industries hit hard by the recession, have contributed to excess near-term capacity of electric utilities. Utilities are therefore scaling back their plans for intermediate-term capacity expansion.

#### EFFECT OF COAL TRANSPORTATION ON THE TRANSPORTATION OF OTHER COMMODITIES

During recent years, coal traffic has increased and assumed a larger portion of total rail traffic. Some coal moves via rail in all western states with North Dakota, Nebraska, and Colorado experiencing extremely high amounts. Of these states, only Nebraska does not produce coal; it receives high traffic levels as coal is shipped to markets farther east. Western states have varying problems (such as grade crossings, noise, and dust) that are created by rail traffic, and they are searching for effective and affordable solutions. To date, no comprehensive strategy exists for addressing these problems, and the

problems may worsen as the United States places more dependence on coal for its electric generating needs.

Three issues affect coal transportation in the region and, in turn, affect the transportation of other commodities through:

- equipment supply;
- transportation priority; and
- pricing.

### **Equipment Supply**

Coal is transported in specialized open-top hopper or gondola cars that are not used to transport other commodities. Thus, increases in coal transportation do not result in equipment shortages for other types of traffic. Utilities often own the cars needed to transport their coal, thereby relieving the railroads' investment requirements. Railroads purchase special locomotives specifically for use in coal unit train service and often place them in "pools." Pool size is determined by the railroad's commitment (through contracts and tariffs) to provide coal transportation services. Because coal transportation is predictable, unexpected or large changes in volume are unusual. The ability to plan equipment requirements minimizes the effect on other commodities.

### **Transportation Priority**

Trains traveling over a railroad's system are assigned priorities. For example, some intermodal (piggyback) trains may have the highest priority, causing other trains to wait in sidings or yards until they have passed. Unit coal trains, which are rarely assigned highest priority, affect other traffic on some lines because the number of coal trains using the lines is large.

Some railroads, such as the Burlington Northern, tend to segregate their lines by whether they are used for coal or for general merchandise traffic. In North Dakota, the BN line serving Bismarck is used for coal; the line serving Minot is used for general merchandise. The advantages of separating coal trains include better train control, fewer train delays, and more efficient track use.

### **Pricing**

The method of pricing coal traffic relative to other types of traffic has been widely debated, particularly because electric utilities and coal producers believe they are contributing a disproportionate share of railroad revenues. Lack of competition is often blamed for high coal freight rates, and the purpose of the higher rates is, allegedly, to "subsidize" other commodities that have lower rates because they also have economical alternatives. Coal is

a lower rated commodity per ton handled than chemical or general merchandise traffic. In fact, the average revenue per ton of coal traffic is significantly lower than the revenue per ton of most other commodities. Therefore coal revenues as a proportion of total revenues are significantly less than the corresponding tonnage proportion. Nevertheless, the railroads do charge compensatory rates for hauling coal, and it is profitable business for them.

### **EFFECT OF COAL TRANSPORTATION ON COMMUNITIES**

Growth in coal traffic has adversely affected communities located on rail lines. Unit trains are usually more than one mile long, and some lines have more than 15 unit coal trains per day. Combined with other types of trains (grain, general merchandise, and local), some lines, Nebraska for example, have more than 40 trains daily. Not all rail-highway crossings are grade-separated, causing frequent and sometimes lengthy delays for highway traffic while the trains pass. The implications of large volumes of rail traffic include:

- pedestrian safety;
- vehicle safety;
- emergency vehicle delay;
- delays in traveling to and from work and school;
- delays in traveling to and from shopping and recreation;
- noise, air pollution, and other environmental disturbances; and
- community development problems.

Emergency vehicle delay is often perceived to be the most severe problem.

Grade-separation and rail-relocation projects are often cited as primary solutions to these problems, but are expensive. Grade-separation projects typically cost well over \$1 million each, and in 1979, the average rail relocation cost was \$55 million.

Governors can work directly with railroads and communities in trying to reduce the effect of rail traffic on communities. Less expensive methods of addressing the problems include:

- allowing trains to move through communities at higher speeds, thereby reducing the length of delay;
- rerouting highway traffic;

- scheduling trains to avoid periods of increased highway traffic density;
- installing track protection devices; and
- managing development to minimize rail/highway conflicts.

Although this issue will not inhibit energy development, it presents significant safety and quality of life problems to some communities.

## SECTION 2: LEGISLATIVE TRENDS

Section 2 of the energy transportation analysis discusses four legislative issues and their effect on the region's energy market share:

- the Clean Air Act and acid rain amendments;
- coal slurry pipeline legislation;
- oil import fee proposal; and
- the Surface Transportation Act.

The discussion of each issue focuses on how it affects western states and energy transportation.

### CLEAN AIR ACT AND AMENDMENTS

The Clean Air Act establishes, among other policies, requirements for large coal-fired boilers, such as electric generating facilities. Policies contained in the Act significantly affect the economics of burning different coals, and thereby significantly influence the western states' share of the national coal market. Western coal is characterized by its low sulfur content, and any new policies affecting the attractiveness and economic feasibility of using this coal to generate electricity is important to the region.

Under current Clean Air Act requirements, boilers licensed before 1978 may burn either high or low sulfur coal, but if they choose to burn high sulfur coal they must install scrubbers to remove the sulfur from utility plant emissions. With the added requirement for scrubbers, low sulfur coal, while more expensive on a Btu basis, is cheaper to burn than high sulfur coal. Emission requirements for utility boilers licensed after 1978 pose even more of an economic penalty to western low sulfur coal, because these boilers are required to scrub all their coal, regardless of the sulfur content. This requirement discriminates against the burning of low sulfur coal in markets where high sulfur coal is available.

In addition to the current requirements for coal burning contained in the Clean Air Act, Congress is now considering other proposals with the potential to restrict even further the markets for low sulfur coal consumption. These

proposals are aimed at finding a solution to the problem of acid rain.

Acid rain is an atmospheric pollutant linked to increasingly high levels of acidity in lakes, streams, and soils, primarily in the 31 states east of the Mississippi River. Effects on the western states are, for the most part, undocumented although several research efforts are now underway. A recently completed report by the National Academy of Sciences (NAS) has concluded that a direct linear and causal relationship exists between sulfur dioxide (SO<sub>2</sub>) emissions from coal-fired utility and industrial sources in the Midwest and high levels of acidity in the Northeast. The NAS report projected that a reduction in SO<sub>2</sub> emissions (which are estimated to be the source of two-thirds of acid deposits) would lead to a proportional reduction in acid rain.

The Office of Technology Assessment (OTA) has estimated that in 1980 utility plants accounted for 74 percent of the approximately 24 million tons of SO<sub>2</sub> emissions in the United States, with the 50 worst polluters located in 14 eastern and midwestern States. The 50 worst polluting utility plants in the United States receive most of their coal from Illinois, Indiana, Ohio, and Pennsylvania. Canada's SO<sub>2</sub> emissions, which also contribute to the acid rain problem in the Northeast, totaled another 5 million tons, primarily from nickel smelters in the province of Ontario.

For the last several years Congress has considered legislation to deal with acid rain by requiring reductions in SO<sub>2</sub>. Failure to enact an acid rain control bill is attributed to the lack of a political consensus on important issues such as: 1) what the size is of required reductions; 2) how to pay for reductions (financing and regional cost-sharing schemes); and 3) what costs to cover and within what regions of the country.

No fewer than 15 proposals were introduced in the last session. In June 1983, Representative Waxman (D-CA) introduced HR 3400, a 10-million ton SO<sub>2</sub> reduction program. No action was taken on the bill. The Waxman proposal required a nationwide 1 mill/KWH tax on all non-nuclear electricity generation, with the fee used primarily to finance installation of scrubbers on the top 50 polluters. The bill met with strong opposition from the western members because:

- It mandated scrubbers rather than allowing the cost-effective alternative of switching to low-sulfur coal.
- It proposed a nationwide tax without providing commensurate western benefits.
- It failed to provide an exemption of hydroelectric power.



In the Senate, the Environment and Public Works Committee has reported an ammended version of S.768, introduced by Senator Stafford (R-VT). This bill would require 10 million tons of SO<sub>2</sub> reductions in a 31-state eastern region. The bill does not have a mechanism to fund the required reductions and has met with considerable western coal state support. Other significant Senate proposals to be considered include Senator Durenberger's (R-MN) S 2001, which places a nationwide tax on emissions, and Senator Glenn's (D-OH) S 2215, which taxes coal-fired electricity production only in a 31-state eastern region.

The Administration seems unlikely at this point to come out with a detailed SO<sub>2</sub> reduction proposal of its own. Environmental Protection Agency Administrator Rucklshaus is reported to favor a limited control program of 2-4 million tons in a 4-6 state midwestern region, but the Cabinet Council on Natural Resources and the Environment has not been able to reach an agreement regarding the EPA proposal. To date, the Administration's program for dealing with acid rain consists only of a doubling to \$55 million of federal research efforts for the clean burning of high sulfur coal and the liming of acid-affected lakes.

## **COAL SLURRY PIPELINE LEGISLATION**

Companies proposing to construct coal slurry pipelines believe federal legislation is needed to grant them the power of eminent domain, which they would use to assemble the necessary right-of-way. The Coal Distribution and Utilization Act of 1983 was approved in April 1983 by the Senate Committee on Energy and Natural Resources. Similar legislation, the Coal Pipeline Act of 1983, was approved by the House Committee on Public Works and Transportation. The major issues addressed by both bills were state water law and eminent domain. In October 1983, the House of Representatives defeated the Coal Pipeline Act, and it is not likely that new legislation will be considered before 1985. This action makes the 98th Congress the 7th consecutive Congress to consider, but fail to pass, coal pipeline legislation.

Coal pipelines will be built if long-term (e.g., 30-year) transportation contracts can be signed and if water and right-of-way problems can be resolved. Both coal pipeline bills established the primacy of state water law. The Senate committee report states that the intent is to:

Establish the primacy of state water laws relating to the control, appropriation, use, disposal, or export, etc. of water and the protection and enforcement of water rights with respect to water used in interstate coal pipeline distribution systems through a delegation of Congressional power under the Commerce Clause of the United States Constitution.

The power of eminent domain may be used to acquire land needed for the pipeline's right-of-way, but may not be used to acquire rights to water supplies. Companies desiring to construct coal slurry pipelines believe that federal eminent domain is the only method of acquiring the needed right-of-way, and that granting eminent domain for coal pipelines is consistent with granting eminent domain for railroads, electric transmission lines, natural gas pipelines, and oil pipelines.

If coal slurry pipelines can service distant markets more efficiently than they are now being serviced, they could increase the region's share of the national coal market. Some of these markets have shown a preference for western coal. If pipelines are less expensive than railroads, some customers might use western coal instead of either coal from a closer mine or another energy resource, such as oil. The actual effect of coal pipelines will depend on the number, location, capacity, and customers of the lines.

Coal slurry pipelines would introduce new competition into selected coal markets. This competition could restrain rate increases otherwise caused by monopoly conditions and give coal producers access to distant markets. If coal pipelines provide competitive transportation rates, they could increase western share of the national coal market. It is very doubtful that any new line will operate before 1990, and then only after right-of-way, water, and financing issues are resolved.

## **OIL IMPORT FEE PROPOSAL**

In 1982 and early 1983, Congress considered a \$5 per barrel tax on imported crude oil and petroleum products as a measure to:

- limit the market dominance of the OPEC producers; and
- raise revenues for the Federal Treasury.

This bill modified a Carter Administration proposal to tax all oil consumption. Despite declining oil prices, the bill encountered significant opposition from Congressmen representing major oil importing regions, such as the Northeast. The tax appeared to fall disproportionately on residents in these regions, and was considered politically undesirable.

From time to time, it is likely that bills will be proposed that seek to overcome objections to previous bills. New provisions may include some inter-regional transfer of payments and a several year delay in implementation. Passage of some form of energy tax legislation and the subsequent effect on western resource production becomes more of a possibility as concerns about federal deficits continue mounting.

The effect of such legislation would depend on the size of the tax eventually selected and on the relative strength of the economy when the measure takes effect. Such legislation, however, might stimulate exploration for new crude oil reserves and reinforce the desire to lessen dependence on foreign oil through alternative sources.

## **SURFACE TRANSPORTATION ACT**

Of growing concern over the past decade has been the rapid deterioration of our nation's highways and bridges. Current estimates place nearly 17 percent of the existing interstate highway system beyond its planned 20-year life. In addition, 45 percent of all bridges inventoried by the DOT in 1982 were reported as either deficient or obsolete. The current estimate to replace or rehabilitate these structures and surfaces is \$56 billion.

Motor carriers have traditionally borne most of the responsibility for highway deterioration but have paid less than their estimated fair share of use taxes, registration fees, and other excise taxes. However, public support has mounted steadily for increasing the motor carrier industry's share of highway maintenance and repair costs. As a result of this pressure, Congress passed the Surface Transportation Assistance Act of 1982 as an effort to procure additional tax revenues. As a result, the motor carrier industry received an immediate increase in size and weight standards in exchange for a sizable increase in taxes to be phased in over the next six years. Amendments to the Surface Transportation Assistance Acts (STAA) will be proposed by the American Trucking Association and groups interested in correcting inconsistencies they see in the Act. An active debate is expected to continue regarding the proper level of motor carrier taxes and the method by which they should be levied.

Size and weight increases allowed by the STAA were not sufficient to competitively position motor carriers in the field of energy transportation. Tank trucks did not benefit at all from the size increases and, at least within the region, not from the weight increases. (Some advantage may have been gained with the removal of the barrier states' weight limitations.) The same holds true for dry vans, as the weight limitations would have to rise above the 100,000-pound level before trucks could transport any energy products economically.

## **SECTION 3: REGULATORY TRENDS**

Section 3 of the energy transportation analysis examines energy transportation regulatory trends and their effect on the region's ability to compete in energy markets. The trends analyzed are in the following areas:

- railroads;
- motor carriers;
- natural gas; and
- routing.

Transportation is a key in enabling energy producers to penetrate any market, and efficient transportation must be available before it is feasible to develop any resource.

## **RAILROADS**

The Staggers Rail Act of 1980 took steps to deregulate railroads and, particularly, rail rates. Railroad ratemaking in a deregulated environment places new responsibilities on shippers. In negotiating, shippers must understand railroad costs and be aware of the leverage they have that could ensure that the agreed-on rate is competitive. Rate-making, in cases in which the shipper is not captive or the railroad does not have market dominance, is now more similar to the "normal business" of negotiation than at any time since passage of the Interstate Commerce Act.

Coal shippers argue that they contribute more to railroad profits than do shippers of other commodities. Coal trains require premium quality track, but shippers believe that the share was borne by general merchandise and other commodities. Railroad market dominance is often claimed by coal shippers as the only reason why they pay higher rates. Entry of the Chicago and North Western in the Powder River Basin will reduce market dominance by BN for some coal shippers, giving them the benefits of competition.

The ICC still regulates shipments of coal where there is no effective competition (captive shipper or market dominant situations). Two major issues that have developed since passage of the Staggers Act in 1980 are: (1) what constitutes a captive shipper/market dominance situation; and (2) how should coal rail rates in these situations be set.

The ICC has taken a broad view of what constitutes effective competition. If there are geographic modal or product substitutions available, then, in the ICC's determination, there is no need to regulate rail rates for coal. Geographic modal substitutions refer to the availability of alternative modes of transportation in geographic proximity. Rail competition can come from barge, truck, or slurry pipeline. Product substitution refers to the availability of alternative products such as oil or natural gas that the recipient of the shipment could use in place of coal. In most cases neither mode nor product substitution is economically feasible.

The ICC has proposed guidelines for setting coal rail rates (Ex Parte 347-Sub No. 1) for captive shippers. These guidelines would allow railroads to increase their cost of service by 15 percent per year above inflation as long as:

- the railroad is judged to be revenue inadequate;
- the shipper is not bearing the cost of obvious mismanagement; and
- the shipper is not paying more than the "stand alone" costs.

Should these regulations take effect, the production of western coal is forecast to drop significantly from base case scenarios.

Competition is an effective method of controlling rate increases and can be encouraged by states through policies permitting construction of alternative transportation infrastructures. Constructing coal slurry pipelines would give shippers a more dramatic transportation alternative.

Running counter to increased competition, however, several railroad mergers have occurred during the past few years that created large systems such as Burlington Northern, Union Pacific, and Norfolk Southern. Current proposals are for Southern Pacific and Santa Fe to merge and for the Milwaukee Road to be acquired by either Grand Trunk Western, Chicago and North Western or the Soo Line. Most railroad analysts believe that the merger trend will continue and that larger regional or transcontinental rail systems will result. The improving economy is helping to increase railroad traffic and may be stimulating serious merger analysis.

The Denver and Rio Grande Western is believed to be an attractive acquisition candidate for a western railroad, and major eastern and western railroads are studying each other to determine the feasibility of various transcontinental systems. Conrail passed its first profitability test and is being studied by the Santa Fe (and probably by other railroads, such as the Union Pacific) for acquisition. Conrail's employees offered to buy Conrail, and other offers are expected.

Rail line abandonment is another trend in the region caused by carrier bankruptcies and system rationalizations. The Rock Island and the Milwaukee Road abandonments have reduced rail service in the West.

- The Chicago, Rock Island, and Pacific ceased operation in 1979 and in January 1980 was ordered by the bankruptcy court to liquidate the estate.
- The Chicago, Milwaukee, St. Paul, and Pacific Railroad ceased operation in June 1980 on much of its system, including the portion west of Miles City, Montana. Since then, it has withdrawn completely from the region. Portions of the abandoned Milwaukee Road system were purchased and are operated by other railroads, principally the Burlington Northern Railroad.

Carriers have been reducing the size of their systems because motor carriers offer competition, and light density branch lines are often unprofitable. Many lines provide grain service and do not affect the transportation of energy resources. As motor carrier service, highway construction, and pressure from large facilities that load unit trains increased, the justification for railroads to serve individual country grain elevators decreased.

Abandonment of light density branch lines will continue as carriers attempt to eliminate unprofitable portions of their systems. Physical deterioration of these lines often precipitates reduced service and abandonment; their unprofitability has typically not permitted normalized maintenance, and safe operation eventually becomes impossible. If abandonments result in significant increases in highway traffic, some roads could be adversely affected. Maintenance requirements of these roads could exceed expectations and divert funds from other roads, some of which might be used in energy transportation.

Governors face the unique need to retain essential, affordable rail service while allowing and encouraging competition. It is more difficult to attain these goals in the transportation of energy than in the transportation of other commodities. Each shipper of energy resources typically is dependent on one transportation method. Shippers are often captive to the rates established by the transportation company. Furthermore, any reduction in use may eventually force abandonment of a non-publicly supported infrastructure.

## MOTOR CARRIERS

For nearly 45 years, the motor carrier industry was subject to strict economic and operational regulations. The Motor Carrier Act of 1980 set the groundwork for abolishing many of those regulations.

Current legislation carries on this trend and is geared toward abolishing the remaining regulations. In fact, the motor carrier industry may soon face total deregulation.

The most apparent effect of this legislation has been downward pressure on carrier rates because competition has increased. This pressure has forced carriers to reduce operating costs wherever possible.

The most immediate effect has been on fuel consumption. Carrier emphasis on fuel efficient vehicles, energy conscious drivers, and increased load factors has drastically reduced fuel consumption within the industry. Many carriers have begun to use the additional freedoms granted by recent legislation to further increase operating efficiencies. A number of carriers are using railroad piggyback service to move trailers cross-country, thereby eliminating fuel consumption on the linehaul portion of the truck movement while taking advantage of the inherent fuel efficiencies of rail.

Numerous mergers are taking place within the motor carrier industry, and several mergers are being considered between rail and motor carriers as a result of deregulation. The intent is to increase operating efficiencies and take advantage of economies of scale to reduce energy costs.

The effect of motor carrier deregulation on the West's energy resources will probably be decreased energy needs from the transportation industry, as many of the barriers to intermodalism and operating efficiency are removed.

## NATURAL GAS

Under current provisions of the Natural Gas Policy Act (NGPA) of 1978, existing controls on the U.S. wellhead price of certain types of natural gas will be removed in 1985. The NGPA instituted price controls after 1978 on intrastate as well as interstate gas and established escalation factors based on oil prices that, in 1978, were anticipated for 1985. However, the 1979 Iran-Iraq conflict sent world oil prices soaring in 1980. Even with the price decline of the past year, oil prices are still higher now than originally predicted for 1985. The schedule for natural gas price decontrol will allow a substantial increase in 1985, when approximately 50 percent of domestic gas will be free of controls.

In the interim, pipeline companies that experienced significant difficulties in obtaining adequate supplies of gas before passage of the NGPA entered into take-or-pay provisions with producers of gas from new deep formations, gas which was deregulated by the Act. Prices for these new high cost gas supplies were included in the pipeline's overall price to utilities.

The recent economic recession severely affected the large users of gas, such as the steel, auto, and pulp and paper industries. The result has been substantial demand reductions. To bring supply into balance with demand, pipeline companies reduced purchases of gas. Because the high-priced suppliers were under take-or-pay contracts, pipelines have reduced their purchase of low-cost "old" gas. High cost gas now represents a significantly larger portion of total gas deliveries, and overall prices have risen rapidly, even though prices on a variety of gas categories are still controlled.

Numerous proposals have been put forth in recent sessions of Congress to either extend price controls or rescind them immediately. Previously, it appeared that accelerated decontrol along with a windfall profit tax would pass. More recently, there has been difficulty forging a compromise acceptable to both producing and consuming states.

In the wake of these developments, natural gas contracting has become an extremely complex process. The following is excerpted from DOE/EIA's recent *1982 Annual Energy Outlook* to attempt to provide some perspective on deregulation of future gas prices:

"The effects of decontrol on prices will probably depend as much on existing contract provisions as upon underlying supply and demand conditions. Some contracts contain provisions providing that in the event of decontrol the price of gas will be established at a price equivalent to number 2 fuel oil, residual fuel oil, or some other commodity. In 1980, approximately 46 percent of the volume of gas delivered was covered by contracts containing "most-favored nation" clauses, which would come into play upon decontrol. These require that the gas covered by the contract receive a price as high as that received by other producers in the area. The extent to which these contract provisions will raise gas prices to artificially high levels is very much uncertain at this point for several reasons. Two of these are the presence of "market out" clauses in some contracts, which give the purchasing pipeline relief if the gas cannot be resold, and the possibility that many contracts will be renegotiated. EIA is currently undertaking a detailed analysis of gas markets to resolve, and better represent, some of the issues presented by natural gas contracts.

During the last 2 years, there has been much public debate concerning the NGPA and its relationship to recent and continuing price increases. Many bills have been introduced in Congress to modify the Act and address perceived problems. On February 28, 1983, the Administration submitted the proposed "Natural Gas Consumer Regulatory Reform Amendments of 1983" to Congress. This proposed legislation would modify the NGPA to create a system in which prices may be more responsive to market pressures. Some provisions of the proposed bill are intended to protect consumers from sharp price increases and provide incentives to suppliers and pipelines to renegotiate contracts."

## ROUTING

As energy resources and markets develop, transportation infrastructures must be constructed. An extensive rail system already exists, and only feeder lines will be added to connect existing lines to resource developments.

Pipeline and electric transmission line systems may

need more extensive additions. New gas and oil pipelines will be built wherever feasible in existing energy transportation corridors, often alongside existing lines.

The difficulty of obtaining required approvals for new pipelines is exemplified by the Northern Tier (crude oil) Pipeline and the Alaskan Natural Gas Transportation System. Both proposed pipelines would cross large stretches of public land. Even though using public land allows a pipeline sponsor to obtain long sections of right-of-way from one landowner, special environmental requirements and permitting processes can delay (as in Alaska) or deny (as in the Northern Tier) pipeline development. These problems can be more severe than those encountered when trying to acquire private land by using the power of eminent domain, although many believe that eminent domain is often unfair to private landowners.

Significant oil or gas discoveries in the West will probably be in the Overthrust Belt. The need for new pipelines will depend on the location and type of the discovery and the capacity of existing pipelines. Pipeline sponsors will probably consider the difficulties encountered by the Northern Tier Pipeline as they develop plans to construct new transmission facilities. Pipelines that are planned but never built result in high costs for sponsors and consumers. These costs motivate sponsors to plan only necessary pipelines and to choose routes that can most likely be assembled with minimal difficulty.

The routing of electric transmission lines can become a sensitive issue, and requirements for locating long distance transmission lines are usually more limiting than those for pipelines because:

- The distances involved are frequently long.
- The land disturbances are permanent.

The directness of the route, the terrain covered, and the nature of the land use all affect cost. The choice of public or private lands can affect cost and schedule. Because federal landholdings throughout the West are large, major transmission line projects can cross lengthy corridors owned by a single entity, and consequently cash payments and staff effort would be lower than for projects dealing with several private landowners. Because of the environmental review process, the inclusion of a federal parcel in a corridor may cause project uncertainties. However, the federal government is such a large landholder throughout the West that it is doubtful that a major transmission project could avoid federal property entirely. Most states require a Certificate of Need for land use, and obtaining this certificate can raise issues similar to those in the federal environmental review process.

A number of long distance systems are being developed to provide electricity transmission capacities from resource areas to electricity market areas.

The issue of routing pipelines and transmission lines will be important as long as energy demand increases and new resource areas are developed. Governors must work closely with those building and those affected by new infrastructure to select routes that minimize environmental and social impacts and efficiently serve the builder's needs. Coordination between states is also important to speed development, protect each state's interests, and ensure that projects are consistent with long-term development goals.

## PART III: POLICY ISSUES AND IMPLICATIONS

This section projects what may be this decade's most important energy and transportation issues and discusses their implications for policymakers in western states. State and federal policies will affect the way in which western resources can compete in the national and international marketplace. Four issues are particularly important to western resource development:

- foreign oil prices;
- natural gas deregulation;
- acid rain; and
- transportation availability and affordability.

These issues can be influenced by states collectively or individually. To assist governors in policy development, information regarding each subject and its potential effect on western states and energy is presented in the following pages.

### FOREIGN OIL PRICES

During 1982, oil prices declined 20 percent to \$29 a barrel. This price remained stable through mid-1983 and is expected to remain relatively unchanged during the next few years. However, demand is once again increasing and prices will ultimately rise again, probably after OPEC's two-year moratorium on price increases expires. Oil price increases provide an opportunity for further western resource development.

In 1982, Congress debated a proposal to levy oil import fees. These fees would affect western states by increasing foreign oil prices, thereby encouraging domestic energy exploration and production. However, oil import fees probably will not be adopted in the near future.

Foreign oil prices affect western states and governors in the following ways:

- Price fluctuations will influence the rate of traditional domestic energy development, both for oil and its substitutes.
- Price increases will encourage the search for new alternative sources to lessen dependence on foreign oil.

Because of the potential for expanded exploration, governors will have to decide whether they wish to encourage or discourage development in their states and implement policies that achieve their goals. In particular, states with abundant federal coal resources that have gained a strong role in developing reserves will face such decisions.

If governors decide to encourage development of coal resources, they can adopt policies that make approval of

environmental impact statements and licensing of coal development projects more feasible and less time consuming.

If governors should decide to control the pace of coal development, certain licensing procedures can be adopted that require new projects to meet some defined criteria and also guarantee that resource development occurs in a manner consistent with overall state objectives. Controlling development minimizes the "boom and bust" cycles that have characterized the past.

As oil prices rise, alternative fuel sources, particularly oil shale and grain alcohol, will be in demand. This demand will mean important policy decisions for western governors.

The nation's oil shale reserves are extensive and are concentrated in the states of Colorado, Utah, and Wyoming. If shale reserves are utilized, large facilities must be constructed near the reserves to separate the oil from the rock. By virtue of their size and emissions, these facilities will place additional demands on the environment. If oil shale becomes an economically viable energy source, states will face decisions regarding the roles they wish to play in this development.

As oil prices increase, grain alcohol is also expected to become an economically feasible alternative. The significant quantities of grain which are produced and which could be produced in the region make the area well suited for alcohol production facilities.

Alcohol facilities do not have the environmental effects of oil shale facilities and will probably not present the same level of immediate policy challenges to the states in which they are proposed. However, significant expansion of grain consumption for alcohol poses longer term questions of the availability of grain for food, the price of grain, and the cost of increased water development needed for growing additional grain supplies.

### NATURAL GAS DEREGULATION

Proposed legislative amendments would further deregulate prices for all natural gas produced in the United States. If enacted, this legislation is expected to permit prices to fluctuate according to market conditions and to initially result in moderate price increases. Exploration activity is also expected to increase, maintaining the historic ratio of reserves to production.

Deregulation presents governors with policy alternatives. Supporting deregulation indicates a willingness to accept moderate price increases and the possible negative effects it may have on gas consumers. The implicit

assumption in supporting deregulation is that only moderate price increases will occur and that the increases are justified by the benefits of increased exploration and supply.

Opposing deregulation tends to place a higher priority on price control and indicates a belief that, under current circumstances, sufficient exploration will occur to maintain needed supplies.

## ACID RAIN

The controversy over acid rain continues to grow. New legislation is pending before Congress to diminish the problem of acid rain by implementing tighter emission control standards on sulfur dioxide (SO<sub>2</sub>).

One approach would use a tax on kilowatt hours of electricity produced to finance installation of expensive scrubber systems. Another approach would place a tax on actual emissions of SO<sub>2</sub>.

WESTPO states have abundant supplies of low sulfur coal which is scarce elsewhere in the United States. Most of such coal has less than 1 percent sulfur content. Currently, using low sulfur coal is less expensive than installing scrubbers to reduce sulfur emissions, despite the higher transportation costs that result from transporting coal for the West.

The 1978 Clean Air Act mandated minimum levels of sulfur removal for new boilers, irrespective of the actual sulfur content. Much of the proposed legislation to control acid rain would perpetuate this policy and perhaps require special uniform taxes that are imposed, irrespective of the coal's actual sulfur content. Any policy that fails to consider the inherent environmental benefits of burning low sulfur coal diminishes the economic and market attractiveness of western coal. Policies that focus on actual sulfur emissions will encourage utilities to burn western coal.

The issue of clean air is a national matter and somewhat beyond the control of the WGA governors. Nevertheless, the impact on national energy markets and production in the WGA region is great and should be considered.

It is important for WGA governors to focus on the implications of proposed amendments to the Clean Air Act. To maximize the region's participation in coal markets, amendments should be discouraged that mandate coal scrubbing requirements, while not allowing utilities the flexibility of switching to low sulfur coal. Similarly, amendments that would impose a nationwide electricity tax on utilities to fund mandatory emission controls would:

- encourage continued use of high sulfur coal in those states;

- require western states to pay for clean-up efforts in other regions of the country; and
- would tend to preclude western coal from competing in those other markets.

Western governors should recognize the need for a program to control acid rain, while opposing legislative proposals which impose significant direct and indirect costs on western states without providing commensurate benefits. The western governors should support several provisions to be included in an acid rain control program, including:

- encouragement of cost-effective control strategies;
- reliance primarily on the states for implementation of these strategies;
- imposition of no costs without provisions of benefits; and
- recognition of the high and complex terrain and unique climate of the West.

## TRANSPORTATION AVAILABILITY AND AFFORDABILITY

Transportation, more than any other single factor, determines the marketability of energy resources. In 1980, rails and motor carriers were deregulated, significantly changing the manner in which transportation services are bought and sold.

Prices for high volume coal transportation services are usually negotiated and included in long-term contracts between railroads and utilities. These prices can exceed 70 percent of the total cost of coal delivered to customers outside the West, illustrating the importance of reasonable transportation rates.

Competition is the most effective force in moderating rail transportation rates. Several methods of improved competition are currently underway in the region.

Generally, addition of new transportation service in a region already served by existing service is the easiest way to improve competition. Rail mergers, however, while improving transportation efficiency, may reduce competition. The most significant addition in rail service to the region is the Chicago and North Western's entry into the Powder River Basin. The proposed ETSI coal slurry pipeline would provide an alternative method of coal transportation. Private industries are developing new short-line railroads to serve new coal fields, such as the Tongue River Railroad project in Montana. Governors should monitor proposals for new service, rail mergers, abandonments, and slurry pipelines.

The Staggers Rail Act of 1980 recognized the unique situation of most coal shippers and continued to regulate transportation costs for captive shippers or for a single railroad that had market dominance. The Interstate Commerce Commission (ICC) makes determinations of market dominance or captive shippers. The ICC, in making these determinations in a proposed decision (Ex Parte 320-Sub No. 2), has taken a broad view of what constitutes market dominance and captive shippers.

Current ICC determinations are based on the availability of geographical modal or product substitutions. Geographical modal substitutions include shipment by pipeline, truck, or barge. Product substitutions include the use of oil or natural gas instead of coal by the recipient of the coal shipment.

If, in the ICC's determination, geographical modal or product substitutions are available, then a situation of market dominance or captive shipper is not deemed to exist, and rail rates are therefore not regulated.

Legislation was introduced in 1983 in both the House and Senate to clarify these provisions of the Staggers Act. The bills would tighten the determination of captive shipper situations, and would address the issue of rail rates in captive shipper situations.

In addition to determining when a captive shippers situation exists, the ICC has issued a proposed decision (Ex Parte 347-Sub No. 1), which lays the foundation for coal rail-rate guidelines in captive shipper situations. The guidelines, if implemented, would allow railroads serving captive shippers to increase costs of service by 15 percent per year above inflation as long as the carrier was determined to be revenue inadequate, the shipper was not bearing the costs of any obvious mismanagement, and the shipper was not paying more than the "stand alone" costs.

Revenue adequacy would be determined pursuant to another ICC proposed decision, Ex Parte No. 393. A fourth ICC proposal (Ex Parte 346 Sub No. 7), would deregulate all coal bound for export. The outcome of these proposed guidelines will affect western coal production enormously in the coming years and should be monitored closely by the governors.

The 1980 Motor Carrier Act, coupled with recent ICC action, has deregulated the motor carrier industry and provided far-reaching operating and pricing freedom to carriers. The 1982 Surface Transportation Assistance Act

imposes new heavy-use taxes on the trucking industry and permits larger and heavier trucks on the nation's highways.

The trucking industry, due to the combined effects of competition, recession, and deregulation, has experienced a significant decrease in earnings and financial viability. Although trucks are used largely in short hauls (under 100 miles) of energy products (coal and oil), they are important links in the energy transportation system.

Governors and their states participate in the motor carrier industry through truck size and weight regulations, and tax programs. Increased national uniformity exists in truck size and weight law, but little uniformity exists in state tax methods.

The taxation problem is receiving national attention and is a major concern of industry associations, interest groups, and state transportation departments. Improving the efficiency of motor carrier operations, whether through simpler tax methods or size and weight regulations, can benefit transportation users by lowering carrier costs and enabling carriers to reduce their rates.

## CONCLUSION

The western region, with its substantial energy resources, will play a vital role in the nation's future and its independence from foreign energy resources. The existing transportation network, which serves the West's energy resources, except for small pieces, is adequate and has the capacity to meet substantial new demands.

However, when energy demands or the price of oil hits a certain threshold level, the situation changes. At that time, demand will turn to coal and oil shale as substitutes for oil. Those two resources may have substantial bulk transport requirements, and both could be captive to their transportation modes. The proper focus for energy transportation concerns is on pricing, competition, and the development of transportation alternatives—not on infrastructure.

Governors can play an important role in drawing attention to the need for competitive pricing, for transportation to further states' and the region's resource sales. Separately and together, governors will need to use political and market powers to keep prices and level of service responsive.



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Western Systems Coordinating Council  
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