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## The Export of U.S. Coal and Coal Technologies

Joseph Craft

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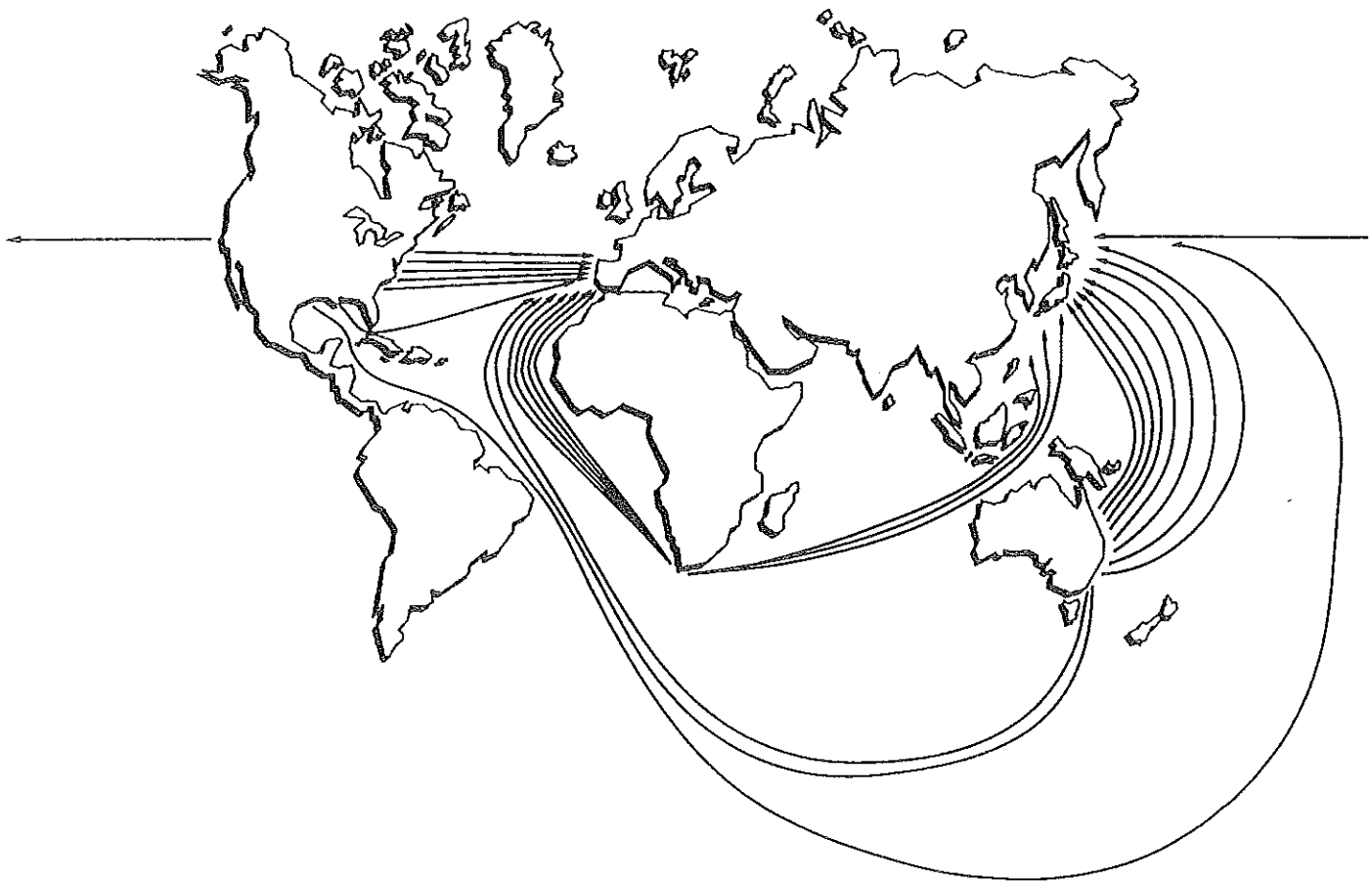
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# The Export Of U.S. Coal And Coal Technologies

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NOVEMBER 1993



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## THE NATIONAL COAL COUNCIL

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# **THE EXPORT OF U.S. COAL AND COAL TECHNOLOGY**

**Mr. Joseph W. Craft III**

**Chairman, Coal Policy Committee  
and  
Work Group Chairman**

**The National Coal Council**

**November 1993**

## **THE NATIONAL COAL COUNCIL**

William R. Wahl, Chairman

John Janak, Vice Chairman

James F. McAvoy, Executive Director

## **U.S. DEPARTMENT OF ENERGY**

Hazel R. O'Leary, Secretary

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The National Coal Council is a federal advisory committee to the Secretary of Energy.

The sole purpose of The National Coal Council is to advise, inform, and make recommendations to the Secretary of Energy on any matter requested by the Secretary relating to coal or the coal industry.

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# THE NATIONAL COAL COUNCIL, INC.

Post Office Box 17370, Arlington, Virginia 22216

(703) 527-1191

November 19, 1993

The Honorable Hazel R. O'Leary  
Secretary  
United States Department of Energy  
Forrestal Building, Room 7A-257  
1000 Independence Avenue, S.W.  
Washington, DC 20585

Dear Madam Secretary:

The National Coal Council is pleased to submit for your consideration the enclosed report, "The Export of U.S. Coal and Coal Technology." This report responds to the January 22, 1992 request of your predecessor, Admiral James Watkins. On January 28, 1992, the Council formally agreed to complete this study.

In 1987, the National Coal Council prepared a report entitled, "Improving International Competitiveness of U.S. Coal and Coal Technologies." By early 1992 it had become apparent that a revised study was needed. Changing geopolitical and economic conditions were having an impact on the demand for and supply of energy worldwide, and these changes also were effecting the export prospects of U.S. coal and coal technologies. The purpose of this new report is to advise you of certain actions that the federal government might undertake to respond to our updated view of future international markets.

The Council believes that the international demand for energy will rise gradually over the next ten years. Opportunities for coal will be greatest in the Pacific Rim, while the market for coal technologies will grow worldwide in response to environmental considerations. Competition in both the coal and coal technologies export markets is expected to be keen.

New initiatives will be needed if the United States is to capture a significant amount of the growth in these markets. Accordingly, the Council specifically recommends that the Department of Energy consider:

1. Continuing to monitor proposed changes in public policy--i.e., new federal and state legislation and regulations--that could impact the competitive positions of U.S. coal and coal-use technologies.
2. Establishing government-industry teams responsible for identifying market prospectives and formulating market development programs.

3. Encouraging U.S. embassies to actively support U.S. coal and coal technologies export programs.
4. Evaluating the benefits of a program that would identify international energy/environmental advisors.
5. Supporting efforts to educate the international community on the benefits of both conventional and advanced coal technologies.

Through the broad experience of the study work group and the members of the Council, our goal has been to provide you with an objective, balanced report. We hope that it will be useful as you and others in the Executive Branch strive to expand our nation's export position abroad, thereby creating growth and jobs in the United States.

We shall be pleased to provide any additional information in this matter that you may desire.

Sincerely,



William R. Wahl  
Chairman

## PREFACE

The National Coal Council is a private, nonprofit advisory group, chartered under the Federal Advisory Committee Act.

The mission of The Council is advisory only, providing guidance and recommendations in the form of reports as requested by the Secretary of Energy on general policy matters relating to coal. The Council is forbidden by law from lobbying or carrying out other such activities. The National Coal Council receives no funds or financial assistance from the U.S. Government. It relies solely on the voluntary contributions of the members for the support of its activities.

The members of The National Coal Council are appointed by the Secretary of Energy for their knowledge, expertise, and stature in their respective fields. They reflect a wide geographic area of the United States. In 1993, there were members from 28 states and the District of Columbia reflecting a broad spectrum of diverse interests as listed below:

*large and small coal producers*

*coal users such as electric utilities and industrial users*

*transportation interests from the rail, waterways, and trucking industries as well as port authorities*

*academia*

*research organizations*

*industrial equipment manufacturers*

*environmental interests*

*state government, including governors, lieutenant governors, legislators, and public utility commissioners*

*consumer groups, including women's organizations*

*consultants from scientific, technical, general business, and financial specialty areas*

*attorneys*

*special interest groups that are regional or state in concentration*



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**The Export Of U.S. Coal And Coal Technology**

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# TABLE OF CONTENTS

Tables and Figures .....	ii
Reference of Acronyms .....	iii
Executive Summary .....	I
Recommendations .....	V
Chapter 1 -- Introduction to U.S. Coal and Coal-Use Technology .....	1
Overview of the U.S. Coal Industry .....	1
Overview of the U.S. Coal-Use Technology Industry .....	3
Chapter 2 -- Current World Coal Export Market and Market Forecasts .....	7
Current World Coal Trade .....	7
Outlook For Coal Market Expansion .....	10
Outlook For Coal-Use Technology Market Expansion .....	20
Chapter 3 -- U.S. Coal-Use Technology Export Market .....	23
Domestic Barriers .....	24
Foreign Barriers .....	27
Export Growth Potential .....	28
Chapter 4 -- U.S. Coal Export Market .....	31
Domestic Barriers .....	31
Foreign Barriers .....	33
Export Growth Potential .....	38
Chapter 5 -- Recommendations .....	41
Appendices .....	49
1 -- Near-Term Coal-Use Technologies .....	51
2 -- Current World Coal Trade .....	53
3 -- World Response To Environmental Concerns .....	63
4 -- Geopolitical Trends .....	69
5 -- Transportation Issues and Comparative Costs .....	73
6 -- Government Programs To Enhance CCT Exports .....	81
7 -- Details of the Export Trading Company Act .....	87
8 -- Description of The National Coal Council .....	89
9 -- The National Coal Council 1993 Membership Roster .....	93
10 -- The National Coal Council Work Group for the Report .....	99
11 -- Correspondence Between The National Coal Council and the U.S. Department Of Energy .....	101

## TABLES AND FIGURES

### Tables

1	U.S. Coal Cost (\$/Ton) . . . . .	3
2	Distribution of 1991 Steam Coal Trade Flows . . . . .	8
3	U.S. Share of Steam Coal Export Market . . . . .	9
4	U.S. Share of Metallurgical Coal Export Market . . . . .	9
5	Distribution of 1991 Metallurgical Coal Trade Flows . . . . .	10
6	DOE and NCC Forecasts of World Steam Coal Imports . . . . .	15
7	DOE and NCC Forecasts of World Metallurgical Coal Imports . . . . .	15
8	Steam Coal Import Forecasts . . . . .	16
9	Forecast Difference -- Western Europe . . . . .	17
10	Forecast Difference -- Pacific Rim . . . . .	18
11	Metallurgical Coal Import Forecasts . . . . .	19
12	Forecast Difference -- Eastern and Western Europe and Pacific Rim . . . . .	19
13	Key Coal Statistics . . . . .	39
14	Forecast World Steam Coal Imports By Country . . . . .	59
15	Forecast World Metallurgical Coal Imports By Country . . . . .	60
16	Coal Requirements For New Power Plants (Selected) . . . . .	61
17	Air Emissions Limits in OECD Countries (New Coal-Fired Boilers) . . . . .	64
18	Air Emissions Limits in OECD Countries (Combined-Cycle Systems) . . . . .	64
19	Estimated Transportation Costs For Representative Steam Coal Movements . . . . .	74
20	Annual Port and Excess Port Capacity By Exporting Country . . . . .	79
21	Comparison of Inland Transportation Rates . . . . .	79
22	Types of Export Coordination . . . . .	82

### Figures

1	Steam Coal -- Key Exporters and Importers (World Map) . . . . .	55
2	Metallurgical Coal -- Exporters and Importers (World Map) . . . . .	56
3	Percentage Distribution of 1991 World Steam Coal Imports . . . . .	57
4	Percentage Distribution of 1991 World Steam Coal Exports . . . . .	57
5	Percentage Distribution of 1991 World Metallurgical Coal Imports . . . . .	58
6	Percentage Distribution of 1991 World Metallurgical Coal Exports . . . . .	58

## REFERENCE OF ACRONYMS

A/E	--	architect/engineer
AID	--	Agency for International Development
AMT	--	alternative minimum tax
CCT	--	clean coal technology
CIS	--	Commonwealth of Independent States
DOC	--	U.S. Department of Commerce
DOE	--	U.S. Department of Energy
ECSC	--	European Coal and Steel Community
EEC	--	European Economic Community
EIA	--	Energy Information Administration
EMC	--	export management company
EPA	--	Environmental Protection Agency
EPRI	--	Electric Power Research Institute
ETCA	--	Export Trading Company Act
FGD	--	flue gas desulfurization
FSC	--	Foreign Sales Corporation
GDP	--	gross domestic product
ICTM	--	International Coal Trade Model (DOE)
IEA	--	International Energy Agency
NCA	--	National Coal Association
NCC	--	The National Coal Council
OECD	--	Organization of Economic and Cooperative Development
OEM	--	original equipment manufacturers
RBCT	--	Richard Bay Coal Terminal (South Africa)
TPCC	--	Trade Promotion Coordination Committee
US&FCS	--	U.S. & Foreign Commercial Service

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The Export Of U.S. Coal And Coal Technology

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## Executive Summary

The Secretary of Energy has requested advice from The National Coal Council on how the United States government can promote the export of U.S. coal and coal-use technology. The Council welcomes the opportunity to present its case for increased export opportunities because of the many positive contributions the domestic coal and coal-use technology industries provide to the national economy.

The Department of Energy is the principal federal agency for U.S. energy production, supply, and utilization. It has a major role in the use of domestic energy resources and technologies in meeting world energy demand. Accordingly, the Department plays a lead role for all government agencies for industrial-competitive enhancement relative to international coal-use technology.

The major benefit to increasing exports of U.S. coal and coal-use technology is the creation of new domestic jobs and income. A creative and active marketing approach is required if the domestic coal production and coal-use technology industries are to preserve and/or increase the U.S. share of the world market throughout this decade and beyond.

United States coal exports have a tremendous positive impact on domestic jobs because they provide work for Americans. In 1991, U.S. coal producers

exported 108.9 million tons, a total that fell to 102.5 million tons in 1992. The U.S. participation rate in the world coal export market declined from 25 percent to 23 percent, representing potentially the equivalent of approximately 11,000 domestic coal-production related jobs (Chapter 1).

If U.S. coal producers simply are to maintain their 1992 world market participation rate (23 percent), they must increase exports by 1 percent per year to 2000, and by 2.7 percent per year from 2000 to 2005. This performance level would be sufficient to add the equivalent of about 19,000 jobs by 2000 and 24,400 jobs by 2005. If U.S. coal exports expand at higher annual growth rates, a substantially larger number of new domestic jobs in mining and coal support industries could be created.

Domestic income from the export of U.S. coal-use technology easily could surpass the income from coal exports by the middle of the next decade. The worldwide demand for electricity is providing market opportunities for clean and efficient coal-use technologies. U.S. technology is as effective, clean, and low-cost as any available.

However, for the export of technology to create a significant number of jobs, technology sales must be linked to the sale of equipment, fuel, and engineering and/or operating expertise. It is critical

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## The Export Of U.S. Coal And Coal Technology

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for the U.S. Government to promote coordination among these components of the U.S. coal and coal-use technology industries because the sale of technology alone frequently has led to the foreign buyer becoming a competitor in the export market and sometimes in the domestic market as well.

Therefore, the export of coal-use technology is most cost-effective for the nation when combined with the sale of coal, equipment, construction services, and operational expertise. Some equipment designs, based on U.S. technology, may not be cost competitive when manufactured in the United States. In these cases, the supply should be through U.S. joint ventures abroad in the region of interest -- not by outright exclusive technology licensing.

Increasing the U.S. share of the coal and coal-use technology export market will not be an easy task. A significant economic and geopolitical transformation is occurring worldwide reflecting the end of the Cold War. Additionally, the world community is dealing with an explosion in information technology and environmental concerns, as well as other changing conditions.

Consequently, The National Coal Council does not entirely agree with the U.S. Department of Energy's assumptions and forecast of the expected level of coal import demands around the world through 2005 (Chapter 2). Economic conditions will improve over the next several years, but probably at a lower rate of expansion than was experienced

in the 1980s. Therefore, the NCC forecast is about 20-to-25 percent lower than DOE's in 1995, 2000, and 2005 (Tables 6 and 7 in Chapter 2).

The NCC forecasts world steam and metallurgical coal imports in 1995 at 423 million tons, in 2000 at 476 million tons, and in 2005 at 545 million tons (Chapter 2). Were U.S. coal producers to capture all of the export increases forecast between 1995 and 2000 (53 million tons) the American work force would gain 81,600 jobs. Job gains for U.S. workers become even more dramatic viewed in terms of increased U.S. coal exports between 2000 and 2005. By providing all of the forecast additional 69 million tons during this period, the domestic coal industry would create an additional 106,300 jobs.

The National Coal Council believes that Pacific Rim importers offer significant market opportunities given the expanded completion of current and planned coal-fired electric generation consumption (Chapter 2). The downside risk to the NCC forecast for world coal imports is that some portion of this coal-fired generation construction could be postponed or cancelled.

While the NCC world coal import forecast may seem pessimistic, The Council believes it should be viewed as an opportunity for creative marketing on the part of U.S. coal and coal-use technology producers.

The participation of the Department of Energy, in conjunction with the activities

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## The Export Of U.S. Coal And Coal Technology

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of other U.S. Government entities, to enhance export opportunities for U.S. industries can only help in the establishment of these creative marketing opportunities.



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The Export Of U.S. Coal And Coal Technology

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## Recommendations

The National Coal Council believes the following support actions, undertaken by the U.S. Department of Energy and the U.S. coal production and coal-use technology industries, will improve America's competitive position in the international coal and coal-use technology market.

**1. Consideration should be given to the impact of government actions on the ability of U.S. coal and coal-use technology industries to compete worldwide.**

By continuing to work closely with the Environmental Protection Agency and the Departments of Interior, Labor, and Transportation, as well as the staff of the Executive Office of the President, the Department of Energy can play a valuable role in achieving economically and environmentally acceptable energy policies that do not inhibit the growth potential of the domestic coal industry in meeting global energy demands.

The National Coal Council recommends the Secretary of Energy ensure that the Department continue to monitor proposed federal and/or state regulations, legislation, and policies which potentially could impact the competitive position of domestic coal and coal-use technologies in the export market. The Secretary of Energy is commended for her on-going efforts and

is encouraged to continue to work with others in the Executive Branch to seek balanced economic solutions to environmental, health, and other issues that may affect the cost of producing domestic energy and energy technologies.

**2. Concentrate efforts on target markets.**

In developing cooperative mechanisms among government agencies, and between such agencies and industry, focus should be on specific emerging demands for coal and coal-use technology exports in specific geographic regions of the world. To help ensure export success, it is critical to choose the appropriate level of technology and to address the environmental concerns of the importing country.

The National Coal Council recommends that coal and coal-use technology export programs, particularly those of the Clean Coal Technology Subgroup of the Trade Promotion Coordination Committee, be made specific in regard to the region of the world in which the country to which we are exporting is located, and the appropriate technology/coal/expertise combination best suited to that country.

### **3. Facilitate the establishment of industry/government teams to compete for export business.**

Federal efforts to promote the export of coal-use technology should not be focused on the sale of technology alone. The export of coal-use technology is most cost-effective for the nation when combined with the sale of coal, equipment, and construction services or operational expertise. The private sector has not been effective in forming appropriate teams, and The National Coal Council strongly supports the initiatives of the CCT Subgroup to facilitate such teaming efforts.

The National Coal Council recommends the Secretary of Energy encourage the assembling of teams from the "Who's Who in the U.S. Coal Technology Industry." Teams should be complete, including an architect/engineer, vendor, coal producer, services company, user such as a utility plant owner, and government agency. The Department of Energy should consider funding project-specific feasibility studies as a vehicle to aid in team formation and project pursuit.

### **4. Sharply focus program objectives.**

Target markets and team building come together in the establishment of specific objectives. In general, The National Coal Council endorses the door-opening and feasibility study/foreign demonstration initiatives, key components of the

Department of Energy plan. However, we believe these initiatives should be defined for specific countries with specific export objectives.

The National Coal Council recommends the Secretary of Energy direct the Department to develop a plan to create a list of prospective markets; establish teams to visit prospective markets; and make recommendations on how such visits might be funded.

### **5. Support U.S. companies faced with unfair business practices or barriers.**

The U.S. Government has been a leader in promoting coal-use technology development since the mid-1980s, but foreign governments also have been active in supporting research, development, and demonstration. In addition, foreign governments frequently provide strong, direct support for export of coal and coal technology.

U.S. coal and coal-use technology companies need stronger diplomatic support from the federal government to eliminate unfair business practices by foreign competitors.

The National Coal Council recommends the Secretary of Energy encourage the Secretary of State to counsel U.S. embassies to be more active in supporting the efforts of U.S. coal and coal-use technology exporters.

**6. The federal government should consider providing financial support where warranted by foreign competition.**

If we are to move beyond assessment and information exchange to specific projects or programs, the federal government must accept an even greater financial burden. We support the initiative of the CCT Subgroup that calls for government support for feasibility studies for specific projects. Such studies should include performance, cost, and availability analyses, and site restrictions.

The National Coal Council recommends the Secretary of Energy encourage the TPCC to consider applying government support to all foreign nations and for any viable project. Once projects are identified, the U.S. Government must provide support to the private sector to ensure that domestic coal and coal-use technology are given adequate consideration by the importing country, particularly by leveling the playing field in terms of financing and lending practices.

**7. Comprehensive information on markets and available support mechanisms should be provided to U.S. companies.**

At least four areas of information transfer need to be emphasized to make sure U.S. coal and coal-use technology companies are aware of the opportunities and support available from the

government: 1) a detailed inventory of coal technology business opportunities in the international market, emphasizing both the energy and environmental needs of each country should be provided to U.S. companies; 2) the CCT initiative to maintain an information database on worldwide export opportunities should focus on specific coal-use technologies that can be brought to the international market; 3) the Department of Energy should continue and expand its efforts and activities to increase awareness by U.S. companies on how to use existing government resources (Department of Commerce, Department of Energy, Trade Promotion Coordination Committee, U.S. & Foreign Commercial Service, U.S. embassies, etc.) in exporting coal and coal technology; 4) the staffs of U.S. embassies and the US&FCS should be aggressively educated on the advantages of U.S. coal-use technologies.

The National Coal Council further recommends the Secretary of Energy explore the development of a program by the Department to locate, for one to two years, up to 50 energy/environmental advisors (from both government and the private sector) in the international marketplace to assist embassy personnel and coal and coal-use technology teams, and to help identify contacts in foreign countries that could benefit from U.S. coal and coal-use technology.

**8. The need for coal and coal-use technologies should be demonstrated.**

Increased use of coal can contribute significantly to the economic future of the world, and technologies are available to use coal cleanly and safely. The outdated concept that coal use is inherently damaging to the environment should be dispelled with information on available conventional and advanced clean coal-use technologies. This message must be delivered convincingly worldwide.

The Department of Energy should support efforts to educate the international community on the virtues of coal and the crucial role it is likely to play in raising the standard of living.

The National Coal Council recommends the Secretary of Energy direct the appropriate offices within the Department to support efforts to educate the international community on the need for both conventional and advanced coal-use technologies and encourage the Environmental Protection Agency and the Administration to aggressively seek an international consensus on the environment recognizing the virtues of efficient and clean coal-use technologies.

**9. The comparative advantages of U.S. coal-use technologies should be demonstrated.**

U.S. coal-use technologies often are recognized as superior to those offered by other countries. However, it is critical that U.S. companies not undersell these technologies.

The National Coal Council recommends the Secretary of Energy encourage the Department to showcase demonstrations of needed conventional and/or advanced coal-use technologies.

Chapter 5 presents a detailed discussion of these and other recommendations.

## CHAPTER 1

### INTRODUCTION TO U.S. COAL AND COAL-USE TECHNOLOGY

The U.S. Government recognizes the importance of a healthy export trade to expanding the domestic economy. The Department of Energy has been contributing to government-wide efforts to promote exports by seeking opportunities to support the private sector in selling coal-use technology. To further these efforts, the Secretary of Energy has asked The National Coal Council how the Department can promote the export of both domestic coal and coal-use technology.

The Council is pleased to respond to this request because we believe increased export opportunities for U.S. coal and coal-use technology will:

- maintain existing and create new high-paying domestic jobs;
- enhance worldwide environmental conditions;
- contribute to worldwide economic growth and provide international partnerships with emerging nations; and
- promote advances in coal-use science and technologies.

However, The Council also believes domestic coal and coal-use technology industries face increasingly strong

competition in the international market. Aggressive support from the Department of Energy is required if the United States is to increase its share of these exports and thereby achieve positive domestic and worldwide economic, environmental, and political benefits.

### OVERVIEW OF THE U.S. COAL INDUSTRY

Since its inception in 1984, The National Coal Council has written reports detailing the importance of the domestic coal industry in meeting the economic, environmental, and energy needs of America and the world. A synopsis of these reports, prepared for the Secretary in February 1993,<sup>1</sup> provides excellent review of the domestic coal and coal-use technology industries and their potential for meeting expanding American and world energy needs.

Pertinent details from these earlier studies are provided here to establish a framework for this report.

According to the NCC's 1992 report, *"The Near Term Role For Coal In The Future Energy Strategy Of The United States,"* coal is the most plentiful fossil energy resource in the United States, representing 95 percent of our fossil fuel

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## The Export Of U.S. Coal And Coal Technology

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reserves. Some 85 percent of domestic coal consumption is used to generate 57 percent of America's electricity. Domestic coal reserves will last for at least the next 250 years, assuring a stable fuel for electricity generation.

Coal consumption by generators is expected to increase by an average 8.6 million tons per year during the 1990s to a level of 859.3 million tons in 2000, a growth rate of 1.1 percent per year.<sup>2</sup> From 2000 to 2010, increased consumption by generators is expected to average 14.6 million tons per year, reaching 1005.8 million tons. This equates to an annual rate of 1.6 percent. Electricity generation will account for 87 and 89 percent of total coal consumption in 2000 and 2010, respectively.

Total U.S. coal production in 1992 was 997.5 million tons valued at almost \$21 billion. Most importantly, the domestic coal-production industry provided 110,196 mining jobs.<sup>3</sup>

More than 20,000 direct coal mining jobs, and approximately 140,000 jobs in U.S. companies supporting coal production, are dependent upon the export of U.S. coal. In 1992, thirteen states exported more than 100,000 tons each, led by West Virginia, Virginia, Kentucky, Pennsylvania, Alabama, and Utah.<sup>4</sup>

A drop in domestic coal export opportunities can result in lost jobs for American workers. The United States is the world's second largest coal exporter behind Australia. In 1991, U.S. coal

producers exported 108.9 million tons, a total that fell to 102.5 million tons in 1992,<sup>5</sup> a world export market decline from 25 percent to 23 percent representing potentially an equivalent loss of approximately 11,000 domestic coal-production related jobs.

Coal clearly is a valuable national resource. It also is a valuable international resource. America's coal reserves account for 23 percent of the world's proved recoverable coal and represent an energy fuel base 43 percent greater than the world's combined known oil and natural gas reserves.<sup>6</sup>

U.S. coal exports also make a positive contribution to the balance of trade. Exports in 1992 were valued at \$4.2 billion,<sup>7</sup> ranking coal exports 24th in terms of value.<sup>8</sup> However, the downward trend in domestic coal exports exacerbates the negative U.S. trade balance and should be a matter of national concern.

For reference, Table 1 shows a representative cost of recovering and transporting one ton of U.S. coal.<sup>9</sup> Labor costs include miner wages (average \$38,000/year), benefits, and payroll taxes. Other direct costs include general and administrative costs, materials/supplies, power, depreciation, capital recovery, and coal royalties.

Among the tax and legislative costs are property taxes, severance taxes, federal income taxes, and fuel taxes. Transportation costs include the movement of coal (usually by rail), the

## The Export Of U.S. Coal And Coal Technology

cost of storage and loading at a port facility, and harbor maintenance tax.

It should be noted that U.S. coal producers maintain a higher degree of commitment to environmental protection and worker health and safety programs than some foreign producers. The total cost reflects such program costs.

**TABLE 1**  
**U.S. COAL COST (\$/TON)**  
(For Eastern Metallurgical Coal)

Labor	\$12.10
Other Direct	14.90
Legislated Environmental Black Lung Taxes	2.30
Inland Transportation/Port	15.90
<b>TOTAL COST AT PORT</b>	<b>45.20</b>

U.S. coal producers do not control two key components that contribute to the cost of coal in a foreign country: the cost of ocean shipping and the cost of transporting coal to the ocean port. Some foreign competitors may have an advantage because their location or the structure of their coal industry gives them some control over these costs.

The most significant factor affecting ocean shipping costs is the distance the coal must be shipped. Because Europe is closer to the United States than Asia,

U.S. shipping costs are lower to Europe than similar costs from Australia or South Africa. But, it costs more to ship U.S. coal than Australian coal to Asian ports.

### OVERVIEW OF THE U.S. COAL-USE TECHNOLOGY INDUSTRY

The concept of technology export as used in this report includes, and indeed emphasizes, the coordinated sale of coal-use technology with fuel, equipment, and/or operating expertise.

The National Coal Council's previous report on coal and coal technology exports<sup>10</sup> was issued three months after former President Reagan announced he would seek funding for the DOE's Clean Coal Program. Therefore the discussion of technology export was brief, but it did make two important points:

1. Packaging U.S. coal and the technology to use coal cleanly and efficiently can enhance America's competitiveness in both markets. Even where environmental concerns are minor, coal use efficiency is important.
2. U.S. technologies in common use often are attractive to less-developed countries whose technologies are less efficient and more polluting.

These points are still valid and frequently overlooked.

Many of the coal-use technologies that can play an important role in the export



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## The Export Of U.S. Coal And Coal Technology

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market were discussed in the January 1992 National Coal Council report, *The Near Term Role for Coal in the Future Energy Strategy of the United States*. They are listed here in Appendix 1, and are divided into five categories:

1. **Precombustion** -- Methods for cleaning coal before it is burned; usually the removal of sulfur and/or mineral matter;

2. **Combustion** -- Technology for modifying conventional powdered coal combustion so that less pollutants end up in the flue gas;

3. **Post-combustion** -- Techniques for removing pollutants from the exhaust gases following burning;

4. **Fluidized Bed Combustion** -- Coal burning equipment that suspends the fuel in oxidizing gas, allowing added control of the generation and fate of gaseous pollutants; and

5. **Coal Gasification Technology** -- Equipment that heats coal with a limited air supply, converting the hydrocarbon to combustible gases. The gases are cleaned before burning, allowing extremely low pollutant emissions and high efficiency fuel use.

Some of these technologies are derived from the Department of Energy Clean Coal Program, but by no means all. The listed technologies are felt to be suitable for commercial application in this decade. Brief descriptions of many of these technologies are in the NCC report. Descriptions of Clean Coal Program

technologies are readily available<sup>11</sup> and need not be repeated here.

In general, these technologies can be classified either as in broad commercial use, such as bag houses, precipitators, scrubbers, etc., or as demonstrated but not yet widely applied. The latter technologies tend to be newer, are frequently part of the DOE Clean Coal Technology Program, and also tend to offer higher efficiency use of fuel. However, they have less attractive economics today.

### ENDNOTES

1. The National Coal Council, *A Synopsis Of The Reports, Prepared For The Office Of The Secretary Of Energy (1986 through 1992)*, February 1993.
2. U.S. Department of Energy, Energy Information Administration, *Supplement to the Annual Energy Outlook 1993*, Table 12, p. 38.
3. Information from a not-yet published Department of Energy report. DOE employment numbers include both surface and underground mines. Underground mines are more labor intensive. Because most exported coal comes from underground mines, The National Coal Council uses the following multiplier to figure jobs created by the domestic coal industry: Each million tons of coal production equals 220 direct mining jobs and an additional 7 jobs for each direct mining job in mining support industries.
4. USDOE, EIA, *Quarterly Coal Report, October - December 1992*, p. 22.
5. *Ibid.*, p. 40.
6. World Energy Council.

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## The Export Of U.S. Coal And Coal Technology

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7. National Coal Association, *International Coal Annual Review 1993*, p.6.

8. The U.S. Department of Commerce.

9. International Energy Agency, *Coal Information 1992*, and The National Coal Council, *Improving International Competitiveness of U.S. Coal and Coal Technologies*, June 1987.

10. The National Coal Council, *Ibid.*

11. USDOE, *Clean Coal Technology, The New Coal Era*, DOE/FE-0217P, March 1992, and USDOE, *Clean Coal Technology Demonstration Program, Program Update 1991*, DOE/FE-0247P, February 1992.

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The Export Of U.S. Coal And Coal Technology

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## CHAPTER 2

### CURRENT WORLD COAL EXPORT MARKET AND MARKET FORECASTS

The international coal trade faces myriad challenges for at least the remainder of the 1990s and perhaps into the early part of the next century. Declining economic growth in mature coal markets and potential political instability in some coal supplying countries contribute to the uncertainty.

Under current domestic and international economic and political conditions, The National Coal Council believes U.S coal producers face a challenge to increasing their share of the export market. In fact, other countries are better able to make inroads into our market share. In addition, imports of foreign coal to meet U.S. domestic coal consumption demands have increased notably in recent years.

While the world situation for enhanced U.S. coal exports may seem pessimistic, The Council believes it should be viewed as an opportunity for creative marketing on the part of U.S. coal and coal-use technology producers. At issue is our ability to position these domestic industries to capture an increased share of the world coal market as it expands.

### CURRENT WORLD COAL TRADE

The major developed nations of Europe and Asia constitute the principal coal importing countries. In 1991, Asian countries imported 205 million tons; western European countries 182 million tons; and eastern European countries 22 million tons compared with the 15 million tons imported into the developing countries of South America. Japan is the single largest coal importing country, but despite its trade imbalance with the United States, Japan imports only one-tenth of its required coal from the U.S.<sup>1</sup>

More than 434 million tons of coal were exported by coal-producing countries in 1991. Almost 76 percent of coal exports were supplied from four coal-producing countries: Australia (30.1 percent), United States (25.1 percent), South Africa (12.1 percent), and Canada (8.7 percent). In 1992, the U.S. market share fell to 23 percent.

The market for coal is divided largely on an oceanic basis. Australia, Canada, and the relative newcomer Indonesia are successful in Asia because of low transportation costs via the Pacific Ocean. The United States has been successful in Europe because of the proximity of domestic mines to the Atlantic Ocean. South Africa has gained

## The Export Of U.S. Coal And Coal Technology

market share as a result of the lifting of sanctions; through its ability to top off vessels that cannot be fully loaded in the United States; and through its proximity to coal consumers.

Tables 2 through 5 show the distribution of 1991 trade flows between major

exporters and importers of steam and metallurgical coal.

Appendix 2 details the international markets for steam (electricity-generating) coal and metallurgical (steel-production) coal in terms of leading importing and exporting countries.

**TABLE 2**  
**DISTRIBUTION OF 1991 STEAM COAL TRADE FLOWS**  
**BETWEEN LARGEST EXPORTERS AND IMPORTERS (Million Tons)**

EXPORTERS									
	Total	Aus*	S.A.*	U.S.	Fmr. USSR	Pol*	China	Col*	Other
<b>IMPORTERS</b>									
Japan	41.4	26.4	2.1	2.3	2.8	0.0	4.3	0.1	3.4
Korea (Rep)	16.1	5.4	3.6	0.8	0.3	0.0	4.1	0.0	1.9
Taiwan	15.8	4.2	5.1	4.1	0.0	0.0	1.7	0.0	0.7
Germany	15.8	1.3	6.1	1.3	0.2	3.7	0.3	0.5	2.4
France	15.6	2.5	1.0	5.1	1.0	0.0	1.9	2.3	1.8
Denmark	13.9	2.1	0.0	5.2	1.6	0.8	0.1	2.9	1.2
Italy	13.5	0.1	5.5	5.2	1.2	0.6	0.3	0.3	0.3
Nether*	11.6	4.0	1.2	3.1	0.0	0.8	0.0	1.8	0.7
U.K.	11.4	0.7	0.6	4.4	1.0	0.4	0.3	2.7	1.3
Hong Kong	11.0	3.9	3.4	0.6	0.0	0.0	1.8	0.0	1.3
Other	67.1	9.4	20.3	12.2	12.3	6.6	1.3	5.3	
<b>Total</b>	<b>233.2</b>	<b>60.0</b>	<b>48.9</b>	<b>44.3</b>	<b>20.4</b>	<b>12.9</b>	<b>16.1</b>	<b>15.9</b>	<b>15.0</b>

\* Aus is Australia, S.A. is South Africa, Pol is Poland, Col is Colombia, Nether is Netherlands.  
Sources for Tables 2 and 3: USDOE, EIA, *Supplement to the Annual Energy Outlook 1993*, Table 35.

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**The Export Of U.S. Coal And Coal Technology**

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**TABLE 3  
U.S. SHARE OF STEAM COAL  
EXPORT MARKET**

	PERCENT	RANK
U. Kingdom	38.6	First
Denmark	37.4	First
France	32.7	First
Netherlands	26.7	Second
Italy	38.5	Second
Germany	8.2	Third
Taiwan	26.0	Third
Japan	5.6	Fourth
Hong Kong	5.5	Fourth
Korea (Rep.)	5.0	Fourth
<b>Worldwide</b>	<b>19.0</b>	<b>Third</b>

**TABLE 4  
U.S. SHARE OF METALLURGICAL COAL  
EXPORT MARKET**

	PERCENT	RANK
Italy	73.3	First
Spain	72.6	First
Belgium	64.8	First
Brazil	58.3	First
France	54.8	First
U. Kingdom	44.6	First
Korea (Rep.)	18.2	Third
Japan	13.4	Third
<b>Worldwide</b>	<b>32.1</b>	<b>Second</b>

## The Export Of U.S. Coal And Coal Technology

**TABLE 5**  
**DISTRIBUTION OF 1991 METALLURGICAL COAL TRADE FLOWS**  
**BETWEEN LARGEST EXPORTERS AND IMPORTERS**  
 (Million Tons)

EXPORTERS							
	Total	Australia	U.S.	Canada	Fmr USSR	Poland	Other
IMPORTERS							
Brazil	12.0	2.0	7.0	1.4		1.5	0.1
Japan	82.1	39.3	11.0	19.3	4.1	0.0	8.4
Korea (Rep)	16.5	7.6	3.0	5.2	0.3	0.0	0.4
U. Kingdom	10.1	4.5	4.5	0.8	0.0	0.3	0.0
Italy	8.6	1.3	6.3	0.3	0.0	0.1	0.9
France	8.4	2.4	4.6	0.4	0.0	0.2	0.8
Belgium	7.1	1.2	4.6	0.4	0.0	0.2	0.7
Spain	5.1	0.8	3.7	0.3	0.0	0.0	0.3
Other	51.5	13.3	19.9	3.6	6.2	4.6	
<b>TOTAL</b>	<b>201.4</b>	<b>72.4</b>	<b>64.6</b>	<b>31.7</b>	<b>10.6</b>	<b>6.9</b>	<b>15.2</b>

Source for Tables 4 and 5: USDOE, EIA, *Supplement to the Annual Energy Outlook 1993*, Table 36.

### OUTLOOK FOR COAL MARKET EXPANSION<sup>2</sup>

The major international markets for coal traditionally have been the developed economies of the European Economic Community (EEC) and Japan. However, in contrast to the currently expected 2.9-percent-per-year expansion in the U.S. economy, the economies of the EEC are experiencing relatively sluggish growth.<sup>3</sup> Unemployment to date in 1993 has risen to an average of 11.5 percent in the EEC, and economic growth has contracted to about 0.7 percent annually from 1.1 percent in 1992.<sup>4</sup> Both France

and Germany presently are considering adoption of a four-day work week to provide increased employment opportunities to their labor forces and to reduce the rate of unemployment even though some portion of personal income would be sacrificed by the employed.<sup>5</sup> While the rate of growth in Japan's economy has declined recently compared to the 1980s, it is expected to recover and may out-perform the U.S. throughout the remainder of the 1990s.

Overall, the current economies of the EEC<sup>6</sup> generally are regarded as being recessionary and characterized by rising

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## The Export Of U.S. Coal And Coal Technology

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labor costs; massive social infrastructure costs; and declining productivity, real incomes, and competitiveness in world markets. These problems appear to be structural rather than cyclical and likely will persist for the remainder of the decade. Unemployment rates are expected to average 10-to-11 percent in the EEC countries for the remainder of this decade, ranging from 7.3 percent in Germany to more than 18 percent in Spain.<sup>7</sup> In contrast, labor demands in Japan are expected to increase as recovery proceeds, producing an average unemployment rate of only 2.4 percent through the end of the decade.<sup>8</sup>

The EEC also is responding to world environmental concerns. As noted in *Coal Information 1992*,<sup>9</sup> the EEC Large Combustion Plant Directive to reduce SO<sub>2</sub> and NO<sub>x</sub> emissions was adopted in November 1988. The directive calls for a three-stage reduction from 1980 levels of SO<sub>2</sub> emissions from existing plants over 50MW<sub>t</sub> with overall community targets of 25, 43, and 60 percent reductions by 1993, 1995, and 2003, respectively. Specific targets have been set for individual countries to account for differences in economic, energy, and environmental situations ( Appendix 3).

These economic, environmental, and planning conditions will constrain both the consumption of coal and rate of growth in coal imports in the EEC markets.<sup>10</sup> However, removal of production and other subsidies by European countries could offset these constraints somewhat.

While not severe by western standards, Japan is currently in the midst of its deepest recession in twenty years.<sup>11</sup> While the economy was expected to begin recovery in fiscal 1993 from its current two-year slump, the Japanese Economic Planning Agency does not foresee recovery commencing until 1994 or 1995.<sup>12</sup> The downturn in the rate of growth in the economy is driven by excessively valued investment portfolios, high real estate values, declining productivity, and increasing production costs. Coupled with its successful nuclear generation program, the projected slow rate of growth of the Japanese economy portends a relatively slow coal import growth rate in the near term.

### Differing DOE and NCC Coal Trade Import Forecasts<sup>13</sup>

The 1993 reference case prepared by the Department of Energy in its forecast of the international coal trade was used as the base case forecast in this study.<sup>14</sup> The principal assumptions applied by the DOE in preparation of the 1993 international trade forecast were:

- Ocean transportation real rates of escalation are 0.8 percent per year from 1995 to 2005.
- Production of coal in the EEC declines as trade barriers are dismantled after 1993.
- Natural gas supplied by Russia to the EEC market is limited, driving up the



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## The Export Of U.S. Coal And Coal Technology

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price of natural gas in real terms through 2005.

- Demand for coal is driven by economic growth in the EEC, Japan, and the developing economies of the Pacific Rim. World economic growth is proportional to the U.S. economy.

- Supply of coal in non-EEC countries possesses a comparative advantage over U.S. and EEC producers.

- EEC countries will adopt SO<sub>2</sub> environmental emission regulations similar to those of the United States.

- Subsidies in EEC producer countries will be phased out by 2005.

The National Coal Council has a number of assumptions differing from DOE's that it believes will characterize and influence world coal trade for the remainder of this decade and into the early part of the 21st century:<sup>15</sup>

- Demand for coal is explicitly responsive to growth in the national economies of each importing country as well as the offering prices of exporting countries, transportation costs, and coal characteristics.

- Little to no change in current EEC subsidies over the next five years, but a phase-out after 1998 at 5-to-10 percent per year.

- Short-run energy growth in the developed economies will be in natural gas demand and will continue until gas

prices begin to rise rapidly in real terms later in the decade. Longer term focus will be on coal-use technology to accomplish environmentally acceptable coal burning.

- As gas prices rise, coal-fired electrical generating plants again will become an attractive and competitive alternative.

- International trade will tend to rely less on General Agreement on Tariffs and Trade (GATT) and move toward regional trade blocks. This will have a significant impact on the world steam coal market in particular.

The Department of Energy's International Coal Trade Model (ICTM) is an optimization model that makes implicit, rather than explicit, use of trends in world economic growth.<sup>16</sup> Its solution maximizes total producer and consumer gains. As economic conditions have deteriorated in both the EEC and Japan in the early 1990s, DOE's implied assumption that the world economy moves proportionally with the U.S. economy no longer is sufficient. Consequently, the world import forecast produced by The National Coal Council and presented here is a downward adjustment in both DOE's reference case steam and metallurgical coal forecasts.

In general, energy growth is directly related to population and economic growth. Over the past twenty years, 20 percent of the growth in energy consumption has been a function of population and its growth, while 80 percent was directly related to economic

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## The Export Of U.S. Coal And Coal Technology

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growth.<sup>17</sup> Energy intensity (energy consumed per unit of income) reached its peak in the western economies in the 1920s and Japan in the 1930s. Energy intensity has been declining ever since, reflecting the adoption of energy efficient techniques and technologies.

In the developing economies, particularly in the Pacific Rim<sup>18</sup> (excluding Japan), eastern Europe, and the countries of the former USSR, energy intensity already is greater than in Japan and is growing. That is, energy is being consumed in greater proportion than income formation. This reflects the lack of adoption of energy-efficient technologies and the heavy subsidization of energy, particularly in China, the former USSR, and eastern Europe.

Growth in real Gross Domestic Product (GDP) through 2000 is expected to be a relatively weak 2.0-to-2.4 percent per year across the EEC.<sup>19</sup> This low growth mirrors expectations of slow industrial growth, averaging about 1.1-to-1.3 percent in most of the EEC. The exceptions are Spain and the Netherlands where industrial production is expected to increase at rates of 1.9 percent per year. Even this rate is lower than the expected 2.0 percent in Japan and 2.4 percent in the United States. German real GDP declined in each of the last three quarters of 1992 and may decline by as much as 2 percent in 1993, which is a classic recession. Interest rates were trimmed in April 1993 in an effort to stimulate growth in the economy.

Real growth in GDP is expected to

recover to 3.8 percent per year in Japan and achieve a strong 6.5-to-7 percent per year across the Pacific Rim.<sup>20</sup> China is expected to experience explosive growth during this period ranging from 7.6 percent to 8.5 percent.<sup>21</sup>

The outlook for population growth in Europe over the next decade is an expectation of a low 0.1 percent per year in Italy ranging to 0.8 percent in the Netherlands. This trend generally reflects the aging of the European population. Population growth in Japan for this decade is barely expected to reach net replacement at a rate of growth of 0.2 percent per year. Across the rest of the Pacific Rim, population growth should average more than 1.5 percent per year.

As noted above, the Department of Energy's ICTM does not implicitly incorporate the effects of changes in economic conditions in the national economies of the importing countries. Demand for goods and services, such as coal and coal-use technologies, are responsive to the growth path of and changes in a variety of economic determinants. These determinants include, but are not limited to, the price of the good or service, real income, industrial output, population, labor force formation and participation rates, productivity, employment and unemployment, prices of competing goods and services, inflation rates, transaction costs, etc.

On a national, or macro basis, when economic conditions deteriorate from previous levels, the expected and usual

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## The Export Of U.S. Coal And Coal Technology

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response is a downward adjustment (or contraction) in either the rate of growth and/or level of aggregate demand. The contraction magnitude depends on the severity of changes in economic conditions and varies with goods and services. Conversely, the growth rate and level of aggregate demand tends to increase in response to a recovery and expansion in the general economy.

To reflect the influence of economic conditions, The National Coal Council applied a simple growth model to produce an alternative coal import forecast for each importing country. The method to forecast steam coal import demands was to construct a weighted growth rate of population and real income (GDP) for each country from the current economic forecasts.<sup>22</sup> The weights were 20 percent of the forecast population rate of annual growth and 80 percent of the forecast GDP annual rate of growth.<sup>23</sup> These weighted rates were applied to the reported actual 1991 steam coal imports of each importing country and extended to 2005 to produce the NCC alternative steam coal forecast.<sup>24</sup>

Recognizing the relationship between demand for metallurgical coal and production of steel, a weighted growth rate was constructed where industrial production (or output) growth forecasts for each country were weighted by current ratios of change in crude steel production.<sup>25</sup> These weighted ratios were applied to the reported 1991 metallurgical coal imports of each importing country<sup>26</sup> and extended to

2005 to produce the NCC forecast.

The import forecasts displayed in Tables 6 and 7 below are alternatives to the DOE reference case forecasts. The steam coal import forecast reflects explicit adjustments for current and expected real GDP and population growth in the EEC, eastern European, and Pacific Rim economies and tends to establish a lower bound on the DOE forecast. The metallurgical coal import forecast reflects explicit adjustments for the industrial production growth expected over the next decade, establishing a lower bound on the DOE forecast, at least in 1995 and 2000.

NOTE: These tables do not show any projections for coal imports into Southern China. Usable data was not available for projection purposes. Imports into this region could be considerable if the Chinese coastal economy continues to grow as it has and new large coal-fired power plants are built as announced.

The National Coal Council recognizes that other organizations produce import forecasts reflecting different assumptions that may be higher or lower than the referenced DOE forecast. As a result, in addition to the DOE forecast, this study presents a lower forecast attributed to Dr. Ken Robertson of ICF Resources, Inc., and is referenced by The National Coal Council for comparison only.

Based on the different assumptions applied in the DOE and Robertson forecasts, The National Coal Council Coal Policy Committee believes it would be helpful to the Secretary to consider an alternative forecast which could be used

## The Export Of U.S. Coal And Coal Technology

more as a downside sensitivity to the DOE forecast than as an absolute statement as to what the future world coal import requirements will be.

**TABLE 6**  
**FORECASTS OF WORLD STEAM COAL IMPORTS\* (Million Tons)**

	USDOE			NCC		
	1995	2000	2005	1995	2000	2005
W. Europe	156.4	200.3	264.5	130.4	145.4	159.4
E. Europe	16.9	20.2	26.3	11.9	12.9	14.1
Pacific Rim	119.2	163.0	182.9	109.6	137.2	172.5
Other**	3.0	5.9	8.4	5.8	7.6	10.0
S. America***	2.4	4.2	7.7	2.4	4.2	7.7
<b>TOTAL*</b>	<b>305.3</b>	<b>403.1</b>	<b>500.7</b>	<b>254.3</b>	<b>299.7</b>	<b>353.7</b>

\* Excludes the U.S. and Canada; \*\* Includes India; \*\*\* Includes Mexico. Source: Table 14 in Appendix 2.

**TABLE 7**  
**FORECASTS OF WORLD METALLURGICAL COAL IMPORTS\* (Million Tons)**

	USDOE			NCC		
	1995	2000	2005	1995	2000	2005
W. Europe	55.3	47.3	53.0	56.8	54.7	58.5
E. Europe	23.0	23.0	23.0	11.4	12.3	13.2
Pacific Rim	95.0	90.0	84.2	86.1	94.2	103.2
Other **	5.7	7.7	7.7	10.6	11.3	11.9
S. America***	13.8	16.0	19.0	14.8	15.6	16.4
<b>TOTAL</b>	<b>192.0</b>	<b>180.5</b>	<b>183.2</b>	<b>169.1</b>	<b>176.8</b>	<b>191.3</b>

\* Excludes the U.S. and Canada; \*\* Includes India; \*\*\* Includes Mexico. Source: Table 15 in Appendix 2.

### Steam Coal Import Forecasts

The forecast of steam coal imports presented here is substantially lower than that produced by the Department of Energy, particularly in 2000. The lower

NCC forecast reflects the expected path of economic growth for the remainder of the decade in the economies of the importing countries of western and eastern Europe and the Pacific Rim.

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The Export Of U.S. Coal And Coal Technology

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**TABLE 8**  
**STEAM COAL IMPORT FORECASTS\* (Million Tons)**

	DOE	NCC	DIFFERENCE	PERCENT DIFFERENCE
<b>Western Europe</b>				
1995	156.4	130.4	26.0	16.6
2000	200.3	145.4	54.9	27.4
<b>Eastern Europe</b>				
1995	16.9	11.9	5.0	29.6
2000	20.0	12.9	7.1	35.5
<b>Pacific Rim</b>				
1995	119.2	109.6	9.6	8.1
2000	163.0	137.2	25.8	15.8

\* Individual country detailed forecasts are shown in Table 14 in Appendix 2.  
 Sources: USDOE, EIA, *Supplement to the Annual Energy Outlook, 1993*, Table 38; and The National Coal Council Sub-Workgroup One.

### Western Europe Steam Coal Import Forecast

As shown in Table 8 above, the DOE forecast for steam coal imports into the western European economies implies an increase of 20 percent in 1995 over 1991, an annual growth rate twice as great as the growth in real GDP. Between 1995 and 2000, DOE expects imports to expand by almost 30 percent, an annual growth rate of 5.1 percent. This growth rate is 2.25 times greater than the expected economic expansion during this period.

Given the lack of specific weight to reflect future economic conditions in the DOE forecast, the NCC forecast for

western Europe is lower than DOE's by 26.0 million tons (or 16.6 percent) and 54.9 million tons (or 27.4 percent) in 1995 and 2000, respectively. The NCC did not adjust DOE's coal import forecast for France. Coal import demands are not likely to be different under moderate economic growth conditions from DOE expectations given that approximately 70 percent of French electricity generation is nuclear powered.

The major divergences between the two forecasts are associated with the individual forecasts for Germany, Italy, the U.K., Spain, Finland, Israel, and "other" western European. DOE's classification of western European included in "other" are: Algeria, Austria,

## The Export Of U.S. Coal And Coal Technology

Egypt, Greece, Luxembourg, Morocco, Norway, Sweden, Switzerland, Turkey, and the former Yugoslavia. The NCC forecast is lower than DOE's for each of these economies (Table 9).

**TABLE 9  
WESTERN EUROPE  
FORECAST DIFFERENCE  
DOE less NCC (Million Tons)**

	1995	2000
Germany	1.4	5.0
Italy	7.9	11.9
U. Kingdom	0.5	11.5
Spain	0.8	2.9
Finland	3.2	4.4
Israel	1.3	3.2
Other	8.5	13.9

Source: Table 14 in Appendix 2.

### Eastern Europe Steam Coal Import Forecast

Similarly, the NCC forecast of steam coal imports into eastern Europe is lower by 5 million tons (or 30 percent) and 7.1 million tons (or 36 percent) in 1995 and 2000, respectively.

Economic growth in real GDP in the eastern European economies is expected to average a low 1.8 percent per year for the remainder of this decade. For example, annual growth in real GDP is expected at 2.6 percent in Poland, 1.1 percent in Hungary, 2.1 percent in Czechoslovakia, and minus 2.0 percent

in both Romania and Bulgaria. Even with these relatively low rates of expansion, Poland, Hungary, and the Czech and Slovak economies are challenging western European steel producers with cheap steel exports.

DOE projects steam coal imports to increase between 1991 and 1995 by 5.8 million tons, or 52 percent, in eastern Europe. This implies an annual rate of growth of 11 percent, or more than six times the rate of expansion in GDP. The increase expected by DOE from 1995 to 2000 is 18 percent, or 3.1 million tons. However, the annual rate of import growth implied is 3.4 percent, or almost twice the expected rate of growth in real GDP. This absorption rate implied by the DOE forecast is unlikely to be achieved, and a more realistic expectation is import growth relatively proportional to economic growth.

### Pacific Rim Steam Coal Import Forecast

For the Pacific Rim steam coal importers, the NCC forecast is lower overall by 9.6 million tons (or 8.0 percent) and 25.8 million tons (or 15.8 percent) in 1995 and 2000, respectively. The DOE forecasts higher demands than the NCC for Japan, the Republic of Korea, Taiwan, and Hong Kong. The NCC forecasts higher demand than DOE for the Philippines and the remaining Pacific Rim countries (Table 10).

The DOE forecast projects import growth in the Pacific Rim<sup>27</sup> of about 30 percent from 1991 to 1995, or an average

annual rate of growth of 6.7 percent. This is consistent with the expected rate of growth in real GDP for the region as a whole. While Japanese imports in the DOE forecast expand at about the rate of growth in GDP, the growth rate of steam coal imports expected into the Republic of Korea and Taiwan is about 2.5 times greater than real GDP growth in both these economies. These patterns of import growth in excess of real GDP growth rates also hold for the 1995-2000 period. Adjusted for expected economic growth, the major differences between the DOE and NCC forecasts for the Pacific Rim are associated with higher levels of imports forecast by DOE for Japan, the Republic of Korea, and Taiwan in both 1995 and 2000, and for Hong Kong in 2000.

TABLE 10  
FORECAST DIFFERENCE PACIFIC RIM  
DOE less NCC (Million Tons)

	1995	2000
Japan	2.0	9.0
Korea (Rep.)	7.3	11.2
Taiwan	6.1	7.2
Hong Kong	(0.8)	2.2
Philippines	(2.2)	(2.1)
Other	(2.8)	(1.7)

Quantities in parentheses ( ) indicate the amounts by which the NCC forecast exceeds the DOE forecast. Source: Table 14 in Appendix 2.

### Metallurgical Coal Forecasts

The DOE optimization model forecasts substantial declines in metallurgical coal imports in the principal western European and Pacific Rim economies at levels in 1995 and 2000 that are below 1991 import volumes, but forecasts a doubling of imports in eastern Europe.<sup>28</sup>

Based on the expected modestly increasing level of industrial activity in these economies, the NCC import forecast exceeds the DOE forecast in western Europe and the Pacific Rim but is lower in eastern Europe (Table 11).

The differences in the individual country import forecasts based on the higher NCC forecast are shown in Table 12. The NCC forecast for metallurgical coal imports for Japan is lower than DOE's in 1995 and 2000, reflecting the current decline in Japanese steel production<sup>29</sup> and a subsequent slower recovery rate.

NOTE: DOE and NCC steam and metallurgical coal import forecasts for individual countries are presented in Tables 14 and 15 in Appendix 2.

The Export Of U.S. Coal And Coal Technology

TABLE 11  
METALLURGICAL COAL IMPORT FORECASTS (Million Tons)

	DOE	NCC	DIFFERENCE	PERCENT DIFFERENCE
<b>Western Europe</b>				
1995	55.3	56.8	(1.5)	(2.7)
2000	47.3	54.7	(7.4)	(15.6)
<b>Eastern Europe</b>				
1995	23.0	11.4	11.6	50.4
2000	23.0	12.3	10.7	46.5
<b>Pacific Rim</b>				
1995	95.0	86.1	8.9	9.4
2000	90.0	94.2	(4.2)	(4.7)

Quantities in parentheses ( ) indicate the amount by which the NCC forecast exceeds the DOE forecast. Source: Table 15 in Appendix 2.

TABLE 12  
FORECAST DIFFERENCE -- DOE LESS NCC (Million Tons)

	1995	2000		1995	2000
<b>Western Europe</b>			<b>Eastern Europe</b>	11.6	10.7
U. Kingdom	(0.3)	(1.5)	<b>Pacific Rim</b>		
Italy	0.4	(0.4)	Japan	15.2	3.0
France	0.2	(0.5)	Korea (Rep.)	(3.3)	(2.6)
Belgium	(0.6)	(3.3)	Taiwan	(0.1)	(1.0)
Spain	(1.3)	(1.2)	Other Asian	(4.9)	(3.6)
Netherlands	(1.0)	(3.3)	Quantities in parentheses ( ) indicate the amount by which the NCC forecast exceeds the DOE forecast. Source: Table 15 in Appendix 2.		
Austria	0.4	0.7			
Sweden	(0.4)	(0.6)			
Other	1.1	2.7			



## OUTLOOK FOR COAL-USE TECHNOLOGY MARKET EXPANSION

The export of technology alone is seldom an attractive option for either the exporter or the importing nation. Frequently, the exporter ends up competing with the purchaser for future opportunities. This has been demonstrated repeatedly in a variety of technical areas, including coal utilization. It already is possible to purchase coal technology developed in the United States from foreign vendors.

An example of a U.S. technology appropriated by foreign companies is the catalytic reduction of nitrogen oxides, known as selective catalytic reduction or SCR. This technology was invented in the United States two decades ago but was aggressively commercialized by the Japanese. It began to find application in Europe in the mid-1980s and only now is being applied in designs for the United States. The supplier of technology for these U.S. designs is Babcock Hitachi and Mitsubishi.<sup>30</sup>

The National Coal Council believes the export of coal-use technology is more effective when equipment, fuel and/or operating know-how is part of the overall package. For example, an equipment vendor and (the nonregulated subsidiary of) a utility might cooperate to sell and operate a new power plant in Russia.

Demonstrated technologies not yet widely applied because of cost considerations likely will be of interest

only to nations where carbon dioxide reduction is important (high efficiency fuel use) and where advanced technology can be used without straining the existing infrastructure and labor pool. The market for these U.S. technologies most likely will be in developed countries in western Europe or Japan. In both markets, competition from domestic vendors of these technologies will be strong.

The commercially-used coal technologies such as bag houses, precipitators, or scrubbers can find attractive markets in the less well-developed nations where cost is more important and where avoidance of particulate and acid emissions are the important environmental concerns. In these countries, simple, robust, and low-cost technologies likely will be adopted. U.S. companies are well qualified to provide such technologies.

U.S. corporations frequently are less successful than their foreign competitors in realizing profits from exporting coal technology. This cannot be attributed to weak technology. U.S. environmental technology is as good as or better than that of other countries. Yet the Environmental Technology Export Council, a U.S. private sector consortium, reports<sup>31</sup> that Germany exported 40 percent, or \$10.8 billion of the \$27 billion in environmental goods and services it produced in 1990. Japan exported between 6 and 18 percent of the \$30 billion worth of similar goods and services it produced. In contrast, the United States produced \$80 billion worth

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## The Export Of U.S. Coal And Coal Technology

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of such goods and services that year but exported only 10 percent.

U.S. coal-use technology, which often can be classified as environmental technology, needs immediate attention to ensure significant export sales. There appears to be a growing export market for coal-use technology for about the next 10-to-15 years. After that, there will be substantially less demand because most companies and nations will have committed to the next generation of facilities. The potential world market for coal-use technology is estimated by the Department of Energy<sup>32</sup> to be \$23.4 billion per year through 2010, with perhaps \$6 billion per year of export technology. This export market for technology is larger than the current U.S. export market for coal.

### ENDNOTES

1. Data in this subsection is from USDOE, EIA, *Supplement to Annual Energy Outlook, 1993*.
2. The economic forecasts used by The National Coal Council in this analysis come from The WEFA Group (1992-1998 for the individual economies of western and eastern Europe and Japan) and the Center for Cultural and Technical Interchange Between East and West (The East-West Center) East-West Center Coal Project (1991-2000 for the economies of the Pacific Rim).
3. The WEFA Group, *World Economic Outlook*, April 1993.
4. Patrick Oster, "Recession Dogs EC As Unity Pact Takes Effect," *The Washington Post*, November 1, 1993.
5. William Drozdiak, "Working Less So More Can Work," *The Washington Post*, October 27, 1993.
6. The EEC nations are Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, and United Kingdom.
7. The WEFA Group, *loc. cit.*
8. *Ibid.*
9. International Energy Agency, *Coal Information 1992*, p. 125.
10. *Ibid.*, pp. 85-93.
11. The WEFA Group, *loc. cit.*
12. Paul Bluestin, "In Japan, Reality Overshadows Recovery," *The Washington Post*, November 10, 1993.
13. The methodology used for developing The National Coal Council forecasts was developed and forecasts produced by Dr. Ken Robertson, chairman of the NCC Sub-Workgroup One and member of The National Coal Council.
14. USDOE, EIA, *Assumptions for the Annual Energy Outlook 1993*, January 1993.
15. The National Coal Council Sub-Workgroup One for this report.
16. USDOE, EIA, *Assumptions for the Annual Energy Outlook 1993*.
17. Kirk Smith and John Dixon, seminar on Trends On Population, Resources, and the Environment, Center for Cultural and Technical Interchange Between East and West, (The East-West Center), Washington, D.C., April 29, 1993.
18. Principal economies of the Pacific Rim are Japan, Republic of Korea, Taiwan, Hong Kong, the Philippines, Indonesia, Malaysia, Singapore, and India.

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## The Export Of U.S. Coal And Coal Technology

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19. The WEFA Group, *loc cit.*
20. The WEFA Group, *loc. cit.*, and Center for Cultural and Technical Interchange Between East and West (The East-West Center) East-West Center Coal Project, *Coal and Clean Coal Technologies Information Sheets for Asia-Pacific Economies*, April 1993.
21. IEA, *World Energy Outlook To The Year 2010*, Paris 1993, and The East-West Center.
22. The WEFA Group, *loc. cit.*, and The East-West Center, *loc. cit.* The WEFA forecasts covered 1992-1998 for the individual economies of western and eastern Europe and Japan. The East-West Center forecasts covered 1991-2000 for the economies of the Pacific Rim countries.
23. The forecast method is essentially an "Income Effects" model that reflects the ability of an economy to purchase and consume goods and services. This model does not explicitly account for fuel mix switches, changes in base load fuel resulting from firm and planned generation capacity additions, etc., as these effects are accounted for in the DOE forecast. Consequently, the NCC forecast establishes upper and lower bounds on the DOE forecast based on economic conditions.
24. USDOE, EIA, *Supplement to the Annual Energy Outlook 1993*, Table 35.
25. WEFA and The East-West Center, *loc. cit.*, and the International Iron and Steel Institute. Real income (GDP) was used for the Pacific Rim countries other than Japan as industrial production forecasts were not available. The risk is that the import coal forecasts for these countries may tend to be slightly overstated.
26. USDOE, EIA, *op. cit.*, Table 36.
27. USDOE, EIA, *Supplement to the Annual Energy Outlook 1993*, and The National Coal Council.
28. *Ibid.*
29. International Iron and Steel Institute. Japanese steel production declined from 109.6 million tons in 1991 to 98.1 million tons in 1992.
30. Kent Fickett, U.S. Generating Company, personal conversation.
31. Paula L. Green, "U.S. Group Fosters Environmental Exports," *Journal of Commerce*, December 10, 1992.
32. USDOE, Office of Fossil Energy, *Market Potential for Clean Coal Technology Exports*, a working paper, September 1, 1992.

## CHAPTER 3

### U.S. COAL-USE TECHNOLOGY EXPORT MARKET

The National Coal Council believes cooperative mechanisms among government agencies, and between such agencies and industry, must be developed to ensure economically and environmentally beneficial exports of U.S. coal-use technology.

Export programs should be specific with regard to:

- the region of the world in which the country to which we are exporting is located, and
- the appropriate technology/coal/expertise combination that will work best there.

Most energy forecasts predict that the largest increases in coal use between now and 2010 will be in China and the Pacific Rim countries. Projected increases in coal use, or potential substitution of less expensive imported coal from the United States, offer at least three scenarios which should guide cooperative program directions:

**1. Repowering and retrofit technology markets** -- The immediate need in the eastern European countries and former Soviet Union is for repowering and retrofit clean coal technology. These nations have ample coal reserves; they are not prime targets for U.S. coal

exports, although opportunities exist for blending lower-sulfur U.S. coals with the domestic coals of foreign countries to improve overall coal quality.

**2. New technology markets** -- Both China and southeast Asian countries such as Thailand, India, and Indonesia are greatly expanding their indigenous coal use by adding new generation capacity. The focus for U.S. export cooperative program mechanisms would be clean coal technologies, including coal preparation, advanced coal-use systems, and opportunities for coal-blending. South America also could offer a notable market opportunity as its population continues to grow.

**3. New markets for both coal export and advanced coal-use technologies** -- Because coal production in European OECD countries is highly subsidized, these countries should provide an expanding market for U. S. coal and clean coal technology and advanced coal-use systems.

## DOMESTIC BARRIERS

### 1. Lack of mechanism to promote cooperative efforts

In the spring of 1993, President Clinton launched a vigorous effort to expand overseas markets for U.S. goods. This led to the development and release of a National Export Policy in early fall 1993. The Secretary of Energy, in concert with the Secretary of Commerce, formulated a coordinated approach for the export of energy and energy technologies. The National Coal Council commends and supports the Secretary in these efforts.

However, there is no existing mechanism to promote cooperative effort between coal-use technology owners and fuel suppliers, construction companies, and operators and/or equipment suppliers.

It often is difficult for highly competitive U.S. companies to form teams. U.S. culture and tradition, not to mention legal barriers, make vertical partnerships rare in the coal-use technology business. Buyers know they usually can rely on the competitive marketplace in this country to provide them with lower costs if they purchase each component separately. In many nations there is no competitive marketplace. It is common practice for some governments, for example, to select particular companies to bid on export trade without competition from others.

The National Coal Council does not advocate similar behavior from the U.S. Government. However, the private sector

by itself has not been effective at forming appropriate teams to compete in the export market for coal technology. The federal government can and should catalyze the assembly of such groups for specific projects and/or nations.

One such mechanism suggested for consideration is the funding of project specific feasibility studies by the Department of Energy to be executed by the selected industry team including an architect-engineer, major equipment vendor, coal supplier, environmental services company, and plant operator company (electric utility company).

The federal government's goals and objectives relevant to export and assistance programs are threefold:<sup>1</sup>

1. to develop objectives,
2. to focus on specific actions, and
3. to develop interagency programs to meet objectives.

Coordinating mechanisms also fall into three categories: 1) strategic, 2) operational, and 3) service, shown in Table 22 in Appendix 6. As stated in the *National Energy Strategy's Technical Annex 6*,<sup>2</sup> all three types of coordination are necessary to ensure effective and efficient export assistance.

Target markets and team building come together in the establishment of specific export objectives which are focused on specific countries. For example, industrial teams should visit prospective markets

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## The Export Of U.S. Coal And Coal Technology

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to develop feasibility studies with international counterparts and to define major project opportunities in each target market -- repowering and retrofit technology markets, new technology markets, and new markets for both coal export and advanced coal-use technologies. Teams would be led by representatives of the key production industries -- electricity, steel, and coal -- thus ensuring the offer of best practice expertise as well as coal and coal-use technologies to international counterparts.

Until recently, little coordination took place among individual federal agencies. Former President Bush created the Trade Promotion Coordination Committee (TPCC) in response to corporate testimony during public hearings of the National Energy Strategy that indicated not knowing where to go for help within the government was one of the greatest obstacles to U.S. companies entering overseas markets.

TPCC is an interagency group, led by the Department of Commerce, designed to improve interagency coordination and streamline federal trade promotion activities. TPCC operations are conducted by specific work groups. Until recently, neither this nor any other export promotion program focused on coal-use technology.

Through the Working Group on Energy, Environment, and Infrastructure, a subgroup chaired by the Department of Energy (the Clean Coal Technology Subgroup) has been formed to address

the specific issue of coal technology. This is the first time that representatives of numerous federal agencies have combined their efforts toward a specific type of export.

The National Coal Council strongly supports the CCT Subgroup's initiative to facilitate teaming efforts. We recommend teams be assembled from the Who's Who in the U. S. Coal Technology Industry and that they be complete teams composed of an architect/engineer (A/E), environmental services company, vendor, coal supplier, user (for example, a utility plant owner), a government agency, and financial advisors.

### **2. Lack of aggressive market information transfer**

At present, there is no established method of providing U.S. coal-use technology companies with comprehensive international market information. Lack of such information makes it difficult for U.S. exporters to establish a leading world market presence. Several areas of information transfer should be emphasized to ensure the ability of U.S. coal technology companies to capitalize on export opportunities.

1. The Department of Energy should provide U. S. companies with a detailed inventory of coal technology business opportunities in the international market. The study should be performed by industry experts, emphasizing energy and environmental needs of each country.

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## The Export Of U.S. Coal And Coal Technology

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2. The CCT Subgroup initiative to maintain an information database on worldwide opportunities for the export of coal-use technology should be supported. The effort should focus on specific coal technologies that can be brought to the international market. This information must be disseminated in a timely way.

3. Recent efforts and activities to increase awareness by U. S. companies on how to use existing governmental resources in the Departments of Energy and Commerce, TPCC, U.S. & Foreign Commercial Service (US&FCS), U.S. embassies, etc. in exporting coal technologies need to be continued and expanded.

### **3. Confusion over Export Trading Company and Energy Policy Acts**

**The Export Trading Company Act (ETCA)** is so unclear that few U.S. companies believe it will protect them from antitrust action. Enacted to encourage exporting by small and medium-sized businesses, the Act emphasizes the formation of export trading companies (ETCs), a type of business structure that successfully has been used by Japan and other major exporting nations.

The Act has not been used widely by U.S. coal producers for a number of reasons. Large coal companies generally do not need the services of an ETC because they can handle the regulatory and financing issues with in-house expertise. Such large companies see little benefit in joining with other coal

producers in export activities and thus do not need the limited anti-trust protection of the Act. Smaller firms tend to be highly competitive and are reluctant to act jointly with domestic competitors for purposes of exporting. Both large and small firms fear potential liability from private anti-trust lawsuits associated with joint export ventures because the Act only protects certificate holders from suits for treble damages. It also is likely that many small or medium-sized coal producers simply are unaware of the potential advantage offered by ETC's.

As with the export of coal-use technology, however, increased exports of U.S. coal to some markets probably will require some type of tied-aid financing, involving the blending of official export credits with foreign aid funds in order to offer a financing package for cash-strapped foreign countries.

A more detailed discussion of the ETCA is in Appendix 7.

**The Energy Policy Act of 1992**, signed by former President Bush on October 24, 1992, officially established the CCT Subgroup of the TPCC. Section 1331 of the Act requires coordination of the Subgroup's activities with industry, specifies the duties of the Subgroup, and requires development of a data base for foreign market assessment. Section 1332 of the Act establishes an innovative Clean Coal Technology Transfer Program. This section requires the Department of Energy and the Agency for International Development

(AID) to work with the CCT Subgroup to establish an international commercial demonstration program. It requires the definition of mechanisms to identify foreign projects (ideally using industry input through proposals to DOE) and the establishment of means for providing funding.

Section 1333 allows conventional coal-use technology to be used when other clean coal technology is not practicable, provided that the conventional technology improves efficiency, costs, and environmental performance over existing facilities.

The Department of Energy must establish a firm plan for coal-use technology export within one year and is soliciting industrial input and proposals. Decisions need to be made on which countries are to be eligible, how financial assistance is to be structured, and other details of the program.

Unfortunately, for companies that want to export coal-use technology, implementation of the Act is not keeping pace with its mandates. Because the Act is likely to be a primary vehicle on which various branches of the bureaucracy must rely for support and direction if there is to be substantive assistance in improving coal-use technology export programs, the private sector must find ways to offer its time, advice, and service to help get back on track in the interest of realizing coal-use technology export objectives.

## **FOREIGN BARRIERS**

The Department of Energy's National Energy Strategy<sup>3</sup> identified the following significant foreign barriers to the export of U.S. coal-use technology:

### **1. Financial export assistance by foreign governments**

Direct government assistance for exports through concessionary financing (i.e., significantly lower interest rates or extended grace periods for repayments) is a normal business practice in some countries. U.S. businesses are forced to deal with these government subsidies on large, international projects. Some foreign governments also limit internal competitive bidding by providing support to one bidder in the specific country. U.S. companies must compete with one another as well as with foreign companies.

### **2. Lack of overseas CCT demonstrations**

Foreign countries and companies likely will remain skeptical about the applicability of U.S. technologies to their coals and their needs unless there is solid evidence that the proposed technology will work as promised. A limited, focused program similar to the U.S. Clean Coal Demonstration program could overcome this hurdle.

The National Coal Council encourages joint activity by the Department of Energy and AID under the auspices of



the Energy Policy Act to put an international commercial demonstration program into place.

### **3. Ineffective international intellectual property rights protection**

It is not within The National Coal Council's purview to deal substantively with this issue, but protection of intellectual property rights is crucial to the development of an integrated government/industry approach to coal-use technology exports. The Council urges the Department of Energy to keep the question of intellectual property rights in mind during its discussions with appropriate government agencies.

### **4. Outdated laws and practices slow U.S. market response**

Laws and practices that previously adequately met the pace needed in the marketplace now are deemed to be less responsive. Examples include the deliberate pace of the Export-Import Bank and some of the provisions of the Corrupt Foreign Business Practices Act.

### **5. Need for guidance from Washington to American embassies on supporting U.S. coal and CCT exports**

The staffs of U. S. embassies and the US&FCS are to be commended for their efforts to neutralize the adverse impacts of unfair foreign government intervention in the export area.

However, American embassy staffs and US&FCS personnel usually are not well-equipped to meet the needs of coal-use technology exporters today and will be even less well-equipped as this trade grows in importance unless substantially more attention is paid to providing them with expertise to deal with the expected problems.

## **EXPORT GROWTH POTENTIAL**

The potential for the export sales of electric power generation technology is enormous. It has been estimated that at least 300,000 megawatts of capacity in 50 countries will be required during the next eight years, and less than 55,000 megawatts of this is in advanced development today.<sup>4</sup> Donaldson, Lufkin & Jenrette Securities Corporation believes that no more than 15-20 percent of this requirement will be met by expansion or upgrading of existing state-owned plants. The rest will come from new grass-roots construction. All of these facilities, refit or grass-roots, are candidates for the application of U.S. coal-use technology.

Donaldson, Lufkin & Jenrette also enumerates critical differences between the domestic and international markets: 1) returns on new contracts currently appear to be significantly higher in the international market despite higher equity requirements; 2) risks in the international market include political, currency, and contract risks that are not a factor in the domestic market; and 3) contracts usually are negotiated rather than

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## The Export Of U.S. Coal And Coal Technology

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determined by competitive bidding, which has become prevalent in the United States. U.S. companies must adapt their operating methods to participate effectively in the export market.

Prospects for new coal facilities in the United States are much less extensive. A recent survey of utility executives<sup>5</sup> reveals that virtually all of the expected new capacity before the year 2000 is likely to be for peaking, rather than base load, and little of that capacity will rely on coal as the fuel. The slow economy, coupled with demand side management, limits the demand for capacity increases. Coal appears to be the current fuel of choice for new base load capacity, but significant expansions of this type are likely only after the turn of the century.

The combination of strong overseas market prospects and weak domestic demand for coal-fired facilities make export sales a critical factor for success in near-term commercialization of modern coal-use technologies.

### Europe

The immediate need in the eastern European countries and former Soviet Union is for repowering and retrofit coal-use technology. Because coal production in European member countries of the Organization of Economic and Cooperative Development (OECD) is highly subsidized, these countries should provide an expanding market for U. S. coal, coal-use technology, and advanced coal systems.

AID, working through the U.S. Energy Association, has established a program to help central and eastern European utilities enhance system performance and operations.<sup>6</sup> This program does not focus on export of repowering and retrofit or coal-use technologies *per se*. However, improved use of coal, including environmental cleanup of stack gases, is a key component of the program. Appendix 6 discusses program details.

While not as broad in scope as the CCT Subgroup concept, this enhancement program already has made significant progress. The Southern Company partnership with Slovak Power Enterprise, for example, is a five-year program to modernize the coal-fired, 1,320-megawatts Vojany generating plant in the eastern sector of the Czech and Slovak Federal Republics. The modernization effort is intended to increase the reliability of electrical output and reduce pollution while extending the facility's operating life.<sup>7</sup>

### Asia

Based on information developed from EIA data<sup>8</sup>, the largest increases in coal use between now and 2010 will be in China and the developed and developing Pacific Rim nations. These projected increases in coal use represent new technology markets for the U.S. coal-use technology industry.

Both China and southeast Asian countries such as Thailand and Indonesia are greatly expanding their indigenous coal use by adding new generation

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## The Export Of U.S. Coal And Coal Technology

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capacity. The focus for our export cooperative program mechanisms would be clean coal technologies, including advanced coal systems.

### ENDNOTES

1. Executive Office of the President, Office of Science and Technology Policy, *U.S. Technology Policy*, September 26, 1990.
2. USDOE, *National Energy Strategy, Annex 6*, Washington, D.C., September 1992.
3. USDOE, *National Energy Strategy, First Edition*, Washington, D.C., February 1991.
4. D.S. Moore and A. Agha, "*Independent Power. Attractive Growth Prospects in an Evolving Industry*," Donaldson, Lufkin & Jenrette Securities Corp. Industry Viewpoint Report 0485-92, March 31, 1992.
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## CHAPTER 4

### U. S. COAL EXPORT MARKET

The United States competes in international coal trade with other major exporters on the basis of such criteria as quality, reliability, diversification of supply, delivered costs, and political issues. With vast high-quality coal reserves, state-of-the-art technology, and a skilled work force, the U.S. coal industry should be well positioned to be a leading world exporter.

However, U.S. coal producers face myriad domestic and foreign barriers to increasing their share of the world coal export market.

#### DOMESTIC BARRIERS

The environment; the domestic infrastructure, including transportation and labor; and legislation, regulation, and taxes all influence the domestic coal industry's ability to produce and export U.S. coal.

##### 1. Environment

Maintaining a healthy environment is an important objective of The National Coal Council and U.S. coal production industry. Some examples of industry response to environmental issues range from mine land reclamation, to restoring wetlands, to public lands access, to protecting endangered species, to

supporting programs to reduce emissions generated by coal-burning electric utilities, including the development of clean coal technologies. Many of these concerns are being addressed worldwide as well. The National Coal Council recognizes the need for constructive environmental policies but cautions that some proposed actions could have significant negative impacts on our ability to produce coal economically for both domestic and export markets.

##### 2. Infrastructure, Transportation, and Labor

Coal export opportunities are determined primarily by mine cost and transportation cost. U.S. coal companies have achieved mine costs that are competitive in a global marketplace. Further lowering of inland transportation costs, if feasible, could create additional export opportunities.

A primary disadvantage for domestic coal producers is the inland nature of the coal deposits. U.S. coals generally travel many times the inland distances of other exporting countries. The United States possesses a well-developed rail system which has the capacity to move much larger export volumes. The nation's well-developed inland waterway system is substantially under-utilized by international standards. There is a stable,

reliable, well-trained labor force throughout the infrastructure, and a capital structure that is capable of funding major development projects. Moreover, ocean shipping distances for U.S. coal to the Pacific Rim countries, except for Alaska, are greater than shipping distances from Australia, the leading coal exporter to the Pacific Rim.

Within a framework of private ownership of railroads, inland waterway equipment and operations; local public ownership of ports; and private ownership of transloading facilities, the trend for public policy has been toward the deregulation of rates accompanied by user fees to support construction and operation of public facilities.<sup>1</sup> There also has been acceptance of inter- and intra-modal consolidation and mergers within the transportation industry.

However, there is no national policy regarding coal export transportation. U.S. Government policy generally has favored transportation deregulation on the assumption that product and geographic competition exists in all cases. Where direct competition to serve a coal mine operation does not exist, government policy stands on the position that indirect competition exists in the form of other coal-producing areas and/or other energy sources. This distinction is disputed among some coal producers and coal transporters.

### **3. Taxes, Legislation, and Regulation**

In the United States, federal and state governments influence mining costs both directly and indirectly and therefore share responsibility with industry for the international competitiveness of domestic coal. Legislative burdens increase costs and reduce export opportunities. Regulations pertaining to mining and transportation of coal have an indirect cost impact and are somewhat difficult to quantify. Direct cost influences, such as royalties and taxes, are much more evident in the cost structure.

Among the state and federal taxes included in the total cost of domestically-produced coal are property taxes, severance taxes, income taxes, and fuel taxes (Table 1, page 3). Other federal taxes on coal mining are the Black Lung Tax, the Federal Reclamation Fee (abandoned mine lands tax), and vessel tonnage taxes. Individual states also levy various taxes.

A significant burden for U.S. companies is the alternative minimum tax (AMT). It adds between 20 and 100 percent to the federal income tax liability. The Foreign Sales Corporation (FSC) Tax Provisions were enacted to encourage U.S. exports. Unfortunately, coal-exporting companies, which are subject to the AMT, derive no federal tax benefit from FSC. Therefore, a reduction or removal of the AMT would reduce cost and help coal exports.

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## The Export Of U.S. Coal And Coal Technology

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Additional state or federal tax or regulatory burdens on coal would be anti-competitive in the international coal market.

Domestic coal producers also must contend with legislative initiatives and changing governmental policies at the state and federal levels.

The constraining impact on coal-mining efficiency of some regulatory policies is exemplified in longwall mining. Longwall mining is one of the safest and most cost-effective methods of underground coal production available. A National Coal Council survey<sup>2</sup> indicates that longwalling is the lowest average-cost underground coal production method in Appalachia. Additionally, longwall mining provides for greater recovery of coal reserves than any other method.

However, adoption of longwall mining has been hindered to some extent and in the future may be blocked by regulations relating to subsidence. The 1977 Surface Mining Control and Reclamation Act recognized the benefits of planned and predictable subsidence caused by longwall mining over the somewhat unpredictable subsidence produced by other mining methods. Unfortunately, regulations in some states, primarily with regard to the recognition of mining and subsidence rights held by coal companies, limit areas that might be mined by the longwall method.

Regulations should allow for the expanded use of longwall mining while maintaining the environmental protection

afforded by surface mining laws and balancing the interests of all involved parties.

### FOREIGN BARRIERS

Challenges facing U.S. coal producers in the international market include growing world-wide awareness of environmental issues, coal-producing competitors, unfair government subsidies and trade practices, and infrastructure advantages.

#### 1. Environment

The 1980s ushered in an era of world-wide environmental sensitivity. While the United States clearly has been in the forefront in achieving reductions in coal-fired pollutant emissions, other countries also established emission standards in the mid-to-late 1980s for new generating facilities.<sup>3</sup> Recently, these standards have been extended in some nations to existing capacity.

In general, these standards apply to emissions of sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), and particulate matter. Emission standards for new generating plants generally are based on the availability of control and cleaner-process technologies. Standards for older plants tend to be based on the concept of gradual adoption of the Best Available Technology, given costs.

Markets exist for technology allowing the cleaner, more efficient burning of coal, and the scientific and technical communities in many nations are moving

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## The Export Of U.S. Coal And Coal Technology

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ahead to meet these technology demands.

Individual national approaches to emission standards, as well as goals for some of the key importing countries are summarized in Appendix 3.

### 2. Coal-Producing Competitors

Several major coal-exporting countries include coal exports as a national priority. In the case of Australia and Colombia, coal production was developed primarily as an export business. In the case of South Africa and Poland, a certain percentage of planned annual production is dedicated to the export market.

**Australia**<sup>4</sup> -- Australia enjoys large, high-quality coal reserves close to the Pacific coastline. A period of intensive national effort to develop these reserves, and a more liberal policy for foreign investment, has helped Australia become the world's largest coal exporting nation. During 1988, the coal industry and organized labor agreed to new labor practices that have been recognized as a significant boon to the industry. In 1991, Australia exported about 133 million tons, more than two thirds of its overall production.

Queensland, in the northeast of Australia, is the more recently developed mining area for the export market and supplies about 55 percent of all coal exported from Australia. Two-thirds of the coal is of coking quality, with most of the coal mined in large surface mines.

Some producers have followed the coal seams to a depth where surface mining is no longer economical and are changing to underground operations, which are typically higher-cost.

New South Wales, in the east and south coasts, produces for export about two-thirds of Australia's total steam coal and one-third of its metallurgical coal. While the great majority of coal production from NSW once came from underground operations, surface and underground mining are now more equally represented, primarily because large new surface mines have been constructed, and small, inefficient underground mines have been closed.

**Canada**<sup>5</sup> -- Of the four major coal exporting nations, Canada is the highest cost producer, largely because of difficult mining conditions, poor weather, high labor costs, and long transportation distances to port facilities. Despite these obstacles, the Canadians have been successful in exporting most of their coal production.

In 1991, nearly all of Canada's 32 million tons of metallurgical coal production was exported. This is premium quality coal and commands a higher price than many other coal types, helping offset high production costs. Additionally, Japanese coal consumers have invested in Canadian mines and still maintain an interest in some of the properties, ensuring Canadian coal a portion of the important Japanese market. About half of the country's 12 million tons of annual steam coal production is exported.

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## The Export Of U.S. Coal And Coal Technology

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Several of Canada's largest coal producers have had financial difficulties and, in 1992, two major coal companies severely reduced or halted production because of labor or financial difficulties brought on by poor operating results. Accordingly, near-term Canadian coal exports likely will be adversely affected.

**Colombia**<sup>6</sup> -- Colombia has significant high-quality coal reserves in surface mines relatively close to the Atlantic Ocean. Exxon, in joint venture with the Colombian government, built and put into operation a large dedicated export mine, El Cerrejon, that currently ships about 14 million tons of steam coal into world markets. Total exports from Colombia in 1991 were 16 million tons. Colombia also has high additional export potential. With limited investment, El Cerrejon can be expanded significantly. A number of other existing projects could increase total exports to 44 million tons or more by the year 2000, provided some major infrastructure investments in port and railroad capacity are completed in time. However, at current coal prices the large investment in the El Cerrejon mine cannot be quickly recovered.

Most Colombian exports are steam coal and compete with U.S. production for imports into Europe and the Mediterranean countries. It also is important to note that Colombia has lower environmental protection costs than the U.S.

**Venezuela**<sup>7</sup> -- While Venezuela hard-coal production at 2.5 million tons in 1992 still is well below other Latin American

countries such as Colombia, Mexico, and Brazil, the industry within Venezuela shows signs of stirring. An increased level of interest has been shown by several U.S. and European coal companies. The future potential for Venezuela to become a player in the coal export community cannot be discounted.

**South Africa**<sup>8</sup> -- South Africa has a total annual production of 174 million tons, including 48 million tons for export. It is the third-largest exporter of coal in the world, and almost all exports are steam coal.

South Africa's vast coal reserves are mined principally by surface methods. Lower quality coal is burned in local power stations, and only higher quality coal is exported, usually after being washed to reduce ash.

South Africa is exporting coal at a level approaching its port capacity. Two competing port expansion projects are under review, with only a limited amount of new capacity needed for further exports. South African rail transportation is among the lowest cost coal transportation on a per mile basis worldwide.

The Richard Bay Coal Terminal (RBCT) was expanded to handle approximately 60 million tons of coal for export. Each of the ten RBCT members receives an export allocation which controls the level of South African coal exports. RBCT members have been opposed to further terminal expansion, and as a result a competing consortium has announced



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## The Export Of U.S. Coal And Coal Technology

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plans for a new terminal, the South Dunes Coal Terminal.

**Poland, CIS, China<sup>9</sup>** -- Large quantities of coal from Poland, the Commonwealth of Independent States (CIS), and China are exported for the benefit of foreign currency income. However, a lack of port capacity and internal consumption needs restrict the flow from these countries.

The competitiveness of these countries in the world market will be determined by the degree to which they are able to restructure and keep their costs within the range of world prices.

Considering its vast mining reserves, China, in the long term, has the potential to become a major exporter and competitor in the export coal field. However several factors, including high inland transportation costs, make China's future role uncertain.

**Indonesia<sup>10</sup>** -- Indonesia is a rapidly developing newcomer in the coal export trade. Indonesian coal production increased from 10.5 million tons of production in 1990 to more than 20 million tons in 1992, of which 70 percent was exported. Coal exports more than doubled from 1991 to 1992, from 8.3 to 17.4 million tons exported.<sup>11</sup>

Indonesia's coal development is targeted both at its own internal industrial and electricity generating needs and at the export markets. However, as production capabilities grow, the export market will become increasingly important.

Production is expected to reach 35 million tons in 1995, and capacity is expected to be 55-to-60 million tons by the year 2000. Most of the new coal projects are in Kalimantan Province, although some reserves are also located in Sumatra. At least one new coal mine is planned for that area.

The coal is produced in large part by privately-owned companies usually operating in consortium with Indonesian firms. There is a state-owned coal company, Bukit Aasam, but its production is targeted primarily for the Indonesian market.

Indonesia has major coal fields near the surface with relatively easy access to deep ocean waters well suited for export ports. Mining companies aggressively are developing coal resources here, as they are close to the Asian market. While often lower in heat content and not suitable for coking purposes, some of Indonesia's coal has the lowest sulfur content of any known coal in the world. Indonesia also has a significant transportation cost advantage for Pacific Rim markets, which have the greatest foreseeable growth potential.

### 3. Unfair Government Subsidies and Trade Practices

The United States Government is opposed to subsidies and continues to advance that position. However, as countries with substantial domestic production face both economic pressure to eliminate the production and political pressure to provide subsidies to assist

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## The Export Of U.S. Coal And Coal Technology

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with nationalization or with retention of a portion of the production, the United States government must be aware of the impacts of these pressures on U.S. coal exporting markets.

The European Coal and Steel Community (ECSC) Treaty prohibits state aid to the coal industry. Nevertheless, the European Economic Community has approved assistance to EEC coal industries on a transitional and exceptional basis since 1965. The current coal aid scheme (decision No. 2064/86/ECSC) is scheduled to expire at the end of 1993. The EEC is considering a draft policy on the authorization of coal aid to be granted by member states from 1994 until mid 2002, when the ECSC Treaty is expected to expire. The EEC would like to see more transparency in the granting of state aid. Whether this is accomplished will not be known until a policy is adopted.

It is important that the U.S. Government work with industry before taking any steps as the new schemes in the subsidy area become clearer and the impacts are evaluated.

Also of concern to U.S. coal exporters is the lack of government staff assigned to cover coal in an active manner. Coal exports contribute more than \$4 billion annually to the positive side of the trade balance. As the subsidy and other coal-related issues arise, it is important for the United States Trade Representative's office, the Department of Commerce, the State Department, and the Department of Energy to be fully aware of the

significance of this vital U.S. energy export. As efforts are mounted at the Executive Branch level to assist the CIS with its oil and gas industries, opportunities for coal and coal-use technology to play a role also should be put forward.

A discussion of government subsidies and other trade practices in the United Kingdom, Germany, Spain, and other European countries is in Appendix 4.

### 4. Infrastructure and Transportation

The total cost of transporting export coal is a significant factor affecting international competitiveness of the U.S. coal industry. Because U.S. coal typically moves longer inland distances than coal in other exporting countries, absolute U.S. transportation costs on average are highest, even though the per-ton-miles costs and terminal fees are comparable with those of other exporting countries.

Although definitive information is not available, the volume of U.S. export coal moving under rail contract most likely exceeds 85 percent. Since 1980, it appears that most major coal exporting countries, including the United States, have lowered their terminal fees and real (inflation adjusted) per-ton fees for inland transportation to adjust to the intense competition in coal exports.

The economics of moving coal from mine to final export destination vary widely among the major exporting countries (see Table 19 in Appendix 5). In general,

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## The Export Of U.S. Coal And Coal Technology

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however, for the countries with lowest mining costs, transportation rates appear to be set on the basis of the total production/transportation package rather than on the economic cost of the transportation component. In particular, Australia, which has low-cost coal resources, has charges for inland transportation and terminal fees that are 25-to-40 percent higher on a ton/mile basis than similar facilities in the United States.<sup>12</sup> In addition, many of these governments also charge export tariffs and fees not seen in the United States.

Similarly, in South Africa and Poland, where longer inland transportation distances are involved, rail and terminal facilities appear to be priced much closer to the margin. For both of these countries, coal is a significant source of foreign currencies.<sup>13</sup>

Estimated costs charged for transporting steam coal assembled from information submitted by various National Coal Council members is in Appendix 5.

### EXPORT GROWTH POTENTIAL

The more promising markets for longer term expansion of coal and coal-use technology trade are the economies of eastern Europe and the Pacific Rim. In the past, declines in the developed economies pulled the rest of the world into recession as the less developed economies lost their markets for raw materials. In contrast to the EEC and Japan, the eastern European and other Pacific Rim economies are experiencing

increasing intensiveness of energy use and industrial growth sufficient enough to begin capturing markets from the EEC and Japan, particularly in basic commodities such as steel.

These economies offer growth markets for coal to fuel the economic growth and increased standards of living for their expanding populations.

Competing in a global economy creates new opportunities for U.S. coal producers. Lower domestic mine costs have been achieved by installing state-of-the-art technology and educating employees. However, transportation costs continue to represent a significant part of the total cost of U.S. export coal.

The average cost to produce a ton of coal is presented in Table 13. These costs include labor and other direct and legislated costs. A 15 percent capital recovery charge is included.

## The Export Of U.S. Coal And Coal Technology

**TABLE 13  
KEY COAL COST STATISTICS**

	U.S	Australia	Canada	South Africa
<b>COST (U.S. \$/Ton)</b>				
Total Mine Cost	29.30	30.70	29.80	12.50
Inland Trans/Port	15.90	12.10	19.50	11.70
<b>Total Cost at Port</b>	<b>45.20</b>	<b>42.80</b>	<b>49.30</b>	<b>24.20</b>
Heat Content (BTU/lb.)	12,500	11,400	11,500	11,000
Productivity (Ton/man hour)	4.10	3.40		1.10

Source: IEA, *Coal Information 1992*.

Relative heat content and productivity also are competitive considerations. Overall, U.S. coal has a higher heat content than the coal of other world exporters, giving domestic coal a competitive advantage. Mines in the United States are among the most productive in the world.

It is assumed that on a long-term basis, investors must receive a return on their investment. However, in 1993 world coal prices were low, and many producers cannot recover capital.

Transportation and port costs include the cost to move a ton of coal from the mine to the port and to load it onto the ship. Average inland transportation and port cost is included in Table 19 in Appendix 5 for comparative purposes.

### Eastern Europe<sup>14</sup>

Exports are an important source of western currency, and coal production also represents an important resource to the former Eastern Bloc countries. Poland is well positioned by its proximity to western Europe, high-quality coals, and package pricing of coal on a delivered, competitive price basis to be a leading eastern European coal supplier. High production costs and limited transportation structures are disadvantages. Polish exports historically have been controlled by government policy, and Polish participation in the European market is perceived as variable. The rates charged for infrastructure have little to do with direct costs. They appear to be related directly to coal export market conditions and political considerations.

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## The Export Of U.S. Coal And Coal Technology

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### Pacific Rim

Pacific Rim nations will see explosive population growth and demand for energy through 2010 and beyond. Throughout this period, the International Energy Agency predicts economic growth in China will average 7.6 percent per year.<sup>15</sup> An official of the World Bank predicts growth above "2 percent per capita with demand 3-to-5-times current estimates."<sup>16</sup> Another prediction expects the economy to grow at over 4 percent per year in East Asia.<sup>17</sup>

This region should provide a lucrative market for the increased use of coal as well as coal-use technologies. The Department of Energy's EIA predicts increased growth of coal consumption between 1990-2010 of 74.8 percent in China and 74.4 percent in the Asia-Pacific region.<sup>18</sup> Most forecasts expect the bulk of the increase in demand will be for thermal (steam) coal. Coking coal demand is expected to decline.

The National Coal Council generally concurs with the forecasts for a substantial increase in energy demand for the Pacific Rim. As new power plants are built or planned to meet this demand, a notable market opportunity for U.S. coal and coal-use technologies should exist. However, the downside risk is that some portion of these new plants could be postponed or cancelled.

### ENDNOTES

1. IEA, *Coal Research*, London, August 1993.

2. The National Coal Council, *Improving The International Competitiveness Of U.S. Coal And Coal Technology*, June 1987, pp.40-41.

3. IEA/OECD, *Emission Controls in Electricity Generation and Industry*, 1988.

4. IEA, Coal Research, "Current and Prospective Australian Coal Supply," February 1990.

5. IEA, Coal Research, "Major Coal Fields Of The World," January 1993.

6. *Ibid.*

7. *Ibid.*

8. IEA, Coal Research, "African Coal Prospects," February 1991.

9. IEA, Coal Research, "Coal Prospects In Eastern Europe," December 1990, and "Prospects For Polish and Soviet Coal Exports," June 1989.

10. The Fieldston Company, Inc., Washington, D.C.

11. *SS&Y Monthly Shipping Review*, September 1993, p.4.

12. IEA, *Coal Information 1992*.

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15. IEA, *World Energy Outlook To The Year 2010*, Paris 1993.

16. Tony Churchill, The World Bank, presentation to Americans for Energy Independence Conference, Washington, D.C., July 16, 1993.

17. CONOCO, Inc., *World Energy Outlook Through 2000*, 1993.

18. USDOE, EIA, *International Energy Outlook 1992*, DOE/EIA-0484 (92).

## CHAPTER 5

### RECOMMENDATIONS

U. S. businesses continue to encounter problems in the export trading arena. The Department of Energy Coal Technology Initiative can be extremely beneficial in enhancing the international marketplace for American businesses engaged in coal production and coal-use technologies. Flexibility and innovation are keys to the ability of U.S. companies to capitalize on export opportunities.

The federal government can assist industry by providing services in comprehensive export market counseling and grants and loans to facilitate project-specific financing. Most importantly, U.S. companies must be impressed by the quality and viability of such government services; that is, companies must be confident enough in program quality to participate.

To assist U. S. coal production and coal-use technology industries in the international marketplace, the following support actions should be undertaken by the Department of Energy:

1. Consider the impact of government actions on the ability of the U.S. coal and coal-use technology industries to compete worldwide.

2. Concentrate efforts on target markets.

3. Facilitate the establishment of industry/government teams to compete for export business, and fund project-specific studies as one vehicle to aid in team formation.

4. Sharply focus program objectives.

5. Support U.S. companies faced with unfair business practices or barriers.

6. Consider providing financial support where warranted by foreign competition.

7. Provide comprehensive information on markets and available support mechanisms to U.S. companies.

8. Demonstrate the need for coal and coal-use technologies.

9. Demonstrate the comparative advantages of U.S. coal-use technologies and provide funding for a commercial-scale demonstration program on a cost-share basis in selected foreign countries for specific U.S. technologies.

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## The Export Of U.S. Coal And Coal Technology

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**1. CONSIDERATION SHOULD BE GIVEN TO THE IMPACT OF GOVERNMENT ACTIONS ON THE ABILITY OF U.S. COAL AND COAL-USE TECHNOLOGY INDUSTRIES TO COMPETE WORLD-WIDE.**

The National Coal Council consistently has taken the position in its previous reports to the Secretary of Energy that while it recognizes the need to address current and future environmental, safety, health, and economic concerns at the federal and state levels, the impact on the production and use of domestic energy should not be ignored. Previous studies have explored the potential negative impacts of a wide variety of activities on the economic competitiveness of the coal producing and equipment supply industries.

The environment, safety, health, surface mining and subsidence, and taxes are just a few of the concerns that have this potential.

By continuing to work closely with the Environmental Protection Agency and the Departments of Interior, Labor, and Transportation, as well as the staff of the Executive Office of the President, the Department of Energy can play a valuable role in achieving balanced solutions that do not inhibit the growth potential of the domestic coal industry in meeting global energy demands.

**THE NATIONAL COAL COUNCIL RECOMMENDS THE SECRETARY OF ENERGY ENSURE THAT THE DEPARTMENT CONTINUES TO**

**MONITOR PROPOSED FEDERAL AND/OR STATE REGULATIONS, LEGISLATION, AND POLICIES WHICH COULD POTENTIALLY IMPACT THE COMPETITIVE POSITION OF DOMESTIC COAL AND COAL-USE TECHNOLOGIES IN THE EXPORT MARKET. THE SECRETARY OF ENERGY IS COMMENDED FOR HER ONGOING EFFORTS AND IS ENCOURAGED TO WORK WITH OTHERS IN THE EXECUTIVE BRANCH TO SEEK BALANCED ECONOMIC SOLUTIONS TO ENVIRONMENTAL, HEALTH, AND OTHER ISSUES THAT MAY AFFECT THE COST OF PRODUCING DOMESTIC ENERGY AND ENERGY TECHNOLOGIES.**

**2. CONCENTRATE EFFORTS ON TARGET MARKETS.**

A structured approach is needed that will allow expansion of U.S. trade according to world needs. This approach to reaching world markets is the basis of our proposed coordination and assistance plan, and is not explicit in the current CCT Subgroup initiatives.

In developing cooperative mechanisms among government agencies, and between such agencies and industry, focus should be on specific, emerging demands for coal and coal-use technology exports, broken down by geographic areas of the world. Appropriate cooperative mechanisms and their cooperating institutions should focus on the particular nature of the demands for coal and/or coal-use technology.

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## The Export Of U.S. Coal And Coal Technology

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**THE NATIONAL COAL COUNCIL RECOMMENDS THAT COAL AND COAL-USE TECHNOLOGY EXPORT PROGRAMS, IN PARTICULAR THOSE OF THE CCT SUBGROUP OF THE TPCC, BE MADE SPECIFIC WITH REGARD TO:**

**a. THE REGION OF THE WORLD IN WHICH THE COUNTRY TO WHICH WE ARE EXPORTING IS LOCATED, AND**

**b. THE APPROPRIATE TECHNOLOGY/COAL/EXPERTISE COMBINATION BEST SUITED TO THAT COUNTRY.**

**3. THE ESTABLISHMENT OF INDUSTRY/GOVERNMENT TEAMS TO COMPETE FOR EXPORT BUSINESS SHOULD BE FACILITATED.**

The National Coal Council believes that export of coal-use technology is most cost-effective when combined with the sale of fuel, equipment, construction services, and/or operational expertise. In today's increasingly competitive world market, this not only is attractive; it is necessary.

However, it often is difficult for highly competitive U.S. companies to form teams. American culture and tradition, not to mention legal barriers, make vertical partnerships rare in the coal-use technology business. Buyers know they usually can rely on the competitive marketplace in this country to provide them with lower costs if they purchase each component separately. In many foreign nations, however, there is no competitive marketplace. It is common

practice for some governments, for example, to select a single group of companies to bid on export trade without competition from others.

While we do not advocate similar behavior from the U.S. Government, there is a need to provide a mechanism for U.S. companies to form teams to compete in the export market for coal and coal technology, and The Council strongly supports the CCT Subgroup's initiative to facilitate teaming efforts.

**THE NATIONAL COAL COUNCIL RECOMMENDS THE SECRETARY OF ENERGY ENCOURAGE THE ASSEMBLING OF TEAMS FROM THE "WHO'S WHO IN THE U.S. COAL TECHNOLOGY INDUSTRY." THESE SHOULD BE COMPLETE TEAMS COMPOSED OF AN A/E, VENDOR, COAL SUPPLIER, ENVIRONMENTAL SERVICES COMPANY, USER (FOR EXAMPLE, A UTILITY PLANT OWNER), AND GOVERNMENT AGENCY. THE DEPARTMENT OF ENERGY SHOULD CONSIDER FUNDING PROJECT-SPECIFIC FEASIBILITY STUDIES AS A VEHICLE TO AID IN TEAM FORMATION AND PROJECT PURSUIT.**



#### 4. PROGRAM OBJECTIVES SHOULD BE SHARPLY FOCUSED.

Target markets and team building come together in the establishment of specific objectives. In general, The National Coal Council endorses the door-opening initiative and the feasibility study/foreign demonstration initiative, key program components of the Department of Energy plan.<sup>1</sup> However, The Council believes these efforts should focus on specific countries, with specific export objectives.

To focus these objectives, industrial teams should be funded to visit each prospective market, develop feasibility studies with their international counterparts, and define a few major project opportunities in each general region (repowering and retrofit technology markets, new technology markets, and new markets for both coal export and advanced coal-use technologies).

The teams should be led by representatives of the key production industries: electricity, steel, and coking coal, to ensure that we are offering best practice expertise as well as coal and coal-use technology to our international counterparts. The industrial teams also would have representatives from A/E firms, original equipment manufacturers (OEMs), financial/banking experts, and perhaps technical staff from the Electric Power Research Institute or the appropriate research laboratories.

THE NATIONAL COAL COUNCIL RECOMMENDS THE SECRETARY OF ENERGY DIRECT THE DEPARTMENT TO DEVELOP A PLAN TO CREATE A LIST OF PROSPECTIVE MARKETS; ESTABLISH TEAMS; AND MAKE RECOMMENDATIONS ON HOW SUCH TEAM VISITS MIGHT BE FUNDED.

#### 5. THE GOVERNMENT SHOULD SUPPORT U.S. COMPANIES FACED WITH UNFAIR BUSINESS PRACTICES OR BARRIERS.

The U.S. Government has been a leader in promoting coal-use technology development since the mid-1980s, but foreign governments also have been active in supporting research, development, and demonstration. In addition, foreign governments frequently provide strong, direct support for export of coal and coal technologies. Some procedures used by foreign competitors cannot be used by U.S. corporations for various reasons. Typical examples include:

- Direct assistance or exports from the government through concessionary financing (i.e., significantly lower interest rates or extended grace periods for repayments). This is a normal business practice in some countries, and U.S. businesses must deal with it on large, international projects.

- The practice by some foreign governments of limiting internal competitive bidding by providing governmental support to only one bidder

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## The Export Of U.S. Coal And Coal Technology

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from all the potential bidders in that specific country. U.S. companies must compete with each other as well as with foreigners.

■ Foreign governmental support by political means in the purchasing countries. The tying of aid and other forms of credit purchase of exports from the supporting government-based companies is not uncommon. U.S. embassies work to neutralize such forces, but these efforts tend to be reactive rather than proactive.

U.S. companies also must conduct business within the guidelines of the U.S. Foreign Corrupt Practices Act. Foreign competitors face no such barriers or regulations. U.S. coal and coal-use technology companies need stronger diplomatic support from the federal government to eliminate unfair business practices by foreign competitors.

**THE NATIONAL COAL COUNCIL RECOMMENDS THE SECRETARY OF ENERGY ENCOURAGE THE SECRETARY OF STATE TO COUNSEL U.S. EMBASSIES TO BE MORE ACTIVE IN SUPPORTING THE EFFORTS OF U.S. COAL AND COAL-USE TECHNOLOGY EXPORTERS.**

**6. THE GOVERNMENT SHOULD CONSIDER PROVIDING FINANCIAL SUPPORT WHERE WARRANTED BY FOREIGN COMPETITION.**

If we are to move beyond assessment and information exchange to specific

projects or programs, the federal government must accept an even greater financial burden.

The National Coal Council supports the initiative of the CCT Subgroup of the TPCC calling for government support for feasibility studies for specific projects. Such studies should include performance, cost, and availability analyses, and site restrictions. That would provide the basis for determining the efficacy/risk associated with any individual project. Project financing, financial incentives, revenue requirements, and other key financial issues also should be addressed.

Once viable projects are identified and evaluated, the federal government should provide assistance to prospective A/Es, OEMs, and others to ensure that U.S. technology and coal are given adequate consideration by the importing country. This support should include careful review of foreign financing and lending practices to ensure that U.S. industry has a level playing field. This support is implicit in the initiatives defined by the CCT Subgroup.

The need for improvement in government support for financing CCT projects has been discussed at some length in the CCT Subgroup's draft report, "*Clean Coal Technology Export Finance Programs*".<sup>2</sup> This report recommends that the U.S. Government: 1) help project developers focus efficiently on key markets, 2) help host countries in transition to capitalism adapt to the requirements of privately-owned power

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## The Export Of U.S. Coal And Coal Technology

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generation, 3) encourage funding from private sources, and 4) make U.S. Government assistance programs more effective.

The National Coal Council supports these recommendations. The Council's only concern is the narrow focus of the recommendations. The program is directed only at undeveloped nations or those under transition to market economies and has a tendency to emphasize the financing of a few showcase projects.

**THE NATIONAL COAL COUNCIL RECOMMENDS THE SECRETARY OF ENERGY ENCOURAGE THE TPCC TO CONSIDER APPLYING GOVERNMENT SUPPORT TO ALL FOREIGN NATIONS AND FOR ANY VIABLE PROJECT.**

A review of the Energy Policy Act of 1992, technical papers, reports, and other material dealing with the issues attendant to the export of coal-use technology indicates that many plans for the promotion, coordination, and implementation of exporting coal-use technology have been established. Unfortunately, federal funding necessary to put these plans into operation has not been made available.

Section 1332(m) of the Act "authorize[s] to be appropriated to the Secretary to carry out the program required by this section, \$100,000,000.00 for each of the fiscal years 1993, 1994-1998." Although the authorization is there, the appropriations apparently have not kicked in. Many scheduled activities have

been delayed and given new, undetermined due dates.

**THE NATIONAL COAL COUNCIL RECOMMENDS THE SECRETARY OF ENERGY CONSIDER THE USE OF THIS REPORT AS A BASIS FOR BRIEFING THE CONGRESS AND APPROPRIATE PARTIES IN THE EXECUTIVE BRANCH TO FOCUS ATTENTION ON THE NEED FOR GOVERNMENT PARTICIPATION IN MAKING COAL AND COAL-USE TECHNOLOGY EXPORTING A MORE PLAUSIBLE VENTURE FOR ECONOMIC PURPOSES, BOTH TO THE U.S. GOVERNMENT AND THE PRIVATE SECTOR.**

**7. COMPREHENSIVE INFORMATION ON MARKETS AND AVAILABLE SUPPORT MECHANISMS SHOULD BE PROVIDED TO U.S. COMPANIES.**

At least four areas of information transfer need to be emphasized to make sure U.S. coal and coal-use technology companies are aware of the opportunities and support available from the government:

1. A detailed inventory of coal-use technology business opportunities in the international marketplace, emphasizing both the energy and the environmental needs of each country, should be provided to U. S. companies.

2. We support the initiative defined by the CCT Subgroup to maintain an information database on worldwide opportunities for the export of coal-use

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## The Export Of U.S. Coal And Coal Technology

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technology. The effort should focus on specific coal technologies that can be brought to the international market. This information must be disseminated in a timely way.

3. The federal government, and the Department of Energy in particular, has done an excellent job in assembling information on the resources available to support coal-use technology export. Recent efforts and activities to increase awareness by U. S. companies on how to use existing governmental resources (DOC, DOE, TPCC, US&FCS, U.S. embassies, etc.) in exporting coal technologies need to be continued and expanded.

4. The staffs of U. S. embassies and the US&FCS should be aggressively educated on U.S. coal and coal technologies.

**THE NATIONAL COAL COUNCIL RECOMMENDS THE SECRETARY OF ENERGY EXPLORE THE DEVELOPMENT OF A PROGRAM BY THE DEPARTMENT TO LOCATE, FOR ONE TO TWO YEARS, UP TO 50 ENERGY/ENVIRONMENT ADVISORS (GOVERNMENT AND PRIVATE SECTOR) IN THE INTERNATIONAL MARKETPLACE TO ASSIST EMBASSY PERSONNEL AND INDUSTRY EXPORT TEAMS, AND TO HELP IDENTIFY CONTACTS IN FOREIGN COUNTRIES THAT COULD BENEFIT FROM U.S. COAL AND COAL-USE TECHNOLOGY.**

### **8. THE NEED FOR COAL AND COAL-USE TECHNOLOGY SHOULD BE DEMONSTRATED.**

The recent National Coal Council report, *Improving Coal's Image: A National Energy Strategy Imperative*, outlined the need to educate the public about coal -- how important coal is to America's economy and way of life. Coal's poor image is not confined to the U.S.; it is worldwide.

**THE NATIONAL COAL COUNCIL RECOMMENDS THE SECRETARY OF ENERGY DIRECT THE APPROPRIATE OFFICES WITHIN THE DEPARTMENT TO:**

- a. **SUPPORT EFFORTS TO EDUCATE THE INTERNATIONAL COMMUNITY ON THE NEED FOR BOTH CONVENTIONAL AND ADVANCED COAL-USE TECHNOLOGIES, AND UTILIZE NOTED POLITICIANS, SCHOLARS, AND OTHER PUBLIC FIGURES TO PUBLICIZE THE NEED FOR AND ADVANTAGES OF LOW-COST, CLEAN COAL TECHNOLOGY.**
- b. **ENCOURAGE THE EPA AND THE ADMINISTRATION TO AGGRESSIVELY SEEK AN INTERNATIONAL CONSENSUS ON THE ENVIRONMENT THAT RECOGNIZES THE VIRTUES OF EFFICIENT AND CLEAN COAL UTILIZATION TECHNOLOGIES.**

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The Export Of U.S. Coal And Coal Technology

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**9. THE COMPARATIVE ADVANTAGES OF U.S. COAL-USE TECHNOLOGIES SHOULD BE DEMONSTRATED.**

U.S. technologies often are recognized as superior to those offered by others. It is critical that U.S. companies not undersell these technologies and that these technologies be protected against appropriation by foreign companies.

**THE NATIONAL COAL COUNCIL RECOMMENDS THE SECRETARY OF ENERGY ENCOURAGE THE DEPARTMENT TO UNDERTAKE THE FOLLOWING:**

**a. ASSESS THE COMPETITIVENESS OF SUPPLYING ADVANCED FLUE GAS DESULFURIZATION, RETROFIT NO<sub>x</sub>, AND AFBC/PFBC TECHNOLOGIES RELATIVE TO FOREIGN SUPPLIERS. INCLUDE IN THIS ANALYSIS THE FINANCIAL COST AND SUPPORT PROVIDED BY THE RESPECTIVE GOVERNMENT.**

**b. SHOWCASE DEMONSTRATION OF NEEDED CONVENTIONAL AND/OR ADVANCED COAL TECHNOLOGIES, USING THE TEAMING APPROACH, IN FOREIGN COUNTRIES. PROVIDE FUNDING TO ENSURE THESE PLANTS ARE ON-LINE BY 1997 OR 1998. GUARANTEE PERFORMANCE. THIS WOULD INCLUDE THE PRESENTATION OF NEW U.S. TECHNOLOGIES THROUGH INTERNATIONAL SYMPOSIA.**

**c. ENCOURAGE PROGRAMS TO FACILITATE EQUITY OWNERSHIP BY U.S. PARTNERS (TEAMS).**

**d. IN CONJUNCTION WITH OTHER APPROPRIATE FEDERAL ENTITIES, ASSIST U.S. COMPANIES IN OBTAINING INTERNATIONAL PATENTS ON PROCESSES AND EQUIPMENT.**

**ENDNOTES**

1. USDOE, Office of Fossil Energy, *World Markets for U.S. Clean Coal Technologies*, September 1, 1992.

2. Resource Dynamics Corporation, *Clean Coal Technology Export Finance Programs*, working draft report to the U.S. Congress by the Department of Energy, May 14, 1993.

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## APPENDICES

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**The Export Of U.S. Coal And Coal Technology**

## APPENDIX 1

### NEAR-TERM COAL-USE TECHNOLOGIES

#### PRECOMBUSTION TECHNOLOGIES

Micronization  
Advanced Froth Floatation  
Heavy-Media Cyclones  
Microbubble Flotation  
Organic Solvent  
Self-Scrubbing Coal  
Spherical Agglomeration  
Fuel Blending

#### COMBUSTION TECHNOLOGIES

Low NO<sub>x</sub> Combustion Technologies  
Reburning  
Coal-Gas Co-Firing  
Coal-Water-Gas Co-Firing  
Rotary Cascading Bed Combustors  
Biomass Co-firing  
Municipal Solid Waste Co-firing

#### POST-COMBUSTION TECHNOLOGIES

In-duct Sorbent Injection  
In-furnace Sorbent Injection  
Spray Dryers  
Advanced Limestone Forced Oxidation  
Wet Scrubbing  
Promoted (DBA or formate) Limestone  
Forced Oxidation Wet Scrubbing  
Inhibited (thiosulfate) Limestone Wet  
Scrubbing  
Magnesium Enhanced Lime Wet  
Scrubbing  
Regenerable Scrubbers  
Selective Catalytic Reduction (SCR)

Selective Non-Catalytic Reduction  
(SNCR)  
Combined SO<sub>2</sub>/NO<sub>x</sub> Removal  
Electrode Precharger Enhancements to  
Precipitators  
High Temperature Bag Houses

#### FLUIDIZED BED COMBUSTION TECHNOLOGIES

Atmospheric Bubbling Fluidized Bed  
Combustion  
Pressurized Fluid Bed Combustors  
Circulating Fluid Bed Combustion  
Bubbling-Circulating Fluid Bed  
Combustion

#### COAL GASIFICATION TECHNOLOGY

Integrated Gasification Combined Cycle  
Externally Fired Combined Cycle

#### OTHER

Externally Fired Combined Cycle  
Direct Coal Fueled Gas Turbine



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The Export Of U.S. Coal And Coal Technology

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## APPENDIX 2

### CURRENT WORLD COAL TRADE

The accompanying maps demonstrate the flow of the world's two principal types of coal. The flow of steam coal, used in the production of electricity, is displayed in Figure 1. Australia is the largest supplier of steam coal and dominates the large Asian market. The U.S. and South Africa are the largest suppliers of steam coal to Europe, due to low production costs and favorable ocean transportation rates. South African coal producers are moving aggressively to increase steam coal sales to Europe.

The flow of metallurgical or coking coal, used in the production of steel, is displayed in Figure 2. The United States is the second largest exporter of coking coal, with the European countries the largest customers. Although the leading world coal exporter, Australia, supplies a notable amount of coking coal to Europe, its major market is Asia. Canada is the world's third-largest supplier of coking coal and maintains a strong market position in Japan.

#### STEAM COAL TRADE<sup>1</sup>

**Importers** -- In 1991, more than 91 percent of the 233.2 million tons of world steam coal trade was imported into western Europe and Asia. Western Europe accounted for the largest share, at 52 percent. The ten largest importers accounted for almost three-quarters of

the trade in-flows. Six of these were western European and four were Asian. The three largest individual trading partners, however, were Japan, the Republic of Korea, and Taiwan, accounting for a third of total world steam coal imports (see Figure 3).

Table 14 presents DOE and NCC forecasts for world steam coal imports by importing country.

**Exporters** -- Nearly 90 percent of the 1991 world steam trade flows was provided by only six producing exporters. Almost half, 47 percent, was exported by Australia (25.8 percent) and South Africa (21 percent). U.S. producers provided slightly less than 20 percent of the total steam coal exports (see Figure 4). As shown in Table 2 (page 8), Australian and South African exporters supplied the majority of imports to Japan, the Republic of Korea, Taiwan, and Hong Kong. American exporters, along with South Africa, were the major suppliers to the largest EEC importers, except for the Netherlands. This distribution of trade flows clearly demonstrates the comparative advantage of close location to markets and resulting low transportation costs.

## METALLURGICAL COAL TRADE<sup>2</sup>

**Importers** -- Eighty-five percent of the 201.4 million tons of metallurgical coal in the 1991 world trade was imported into western Europe and Asia. The majority, 56 percent, was accounted for by Asia. The seven largest importers accounted for about 70 percent of the trade inflows. Two of these were Asian and the other five were western European. The two largest importers were Japan and the Republic of Korea (see Figure 5).

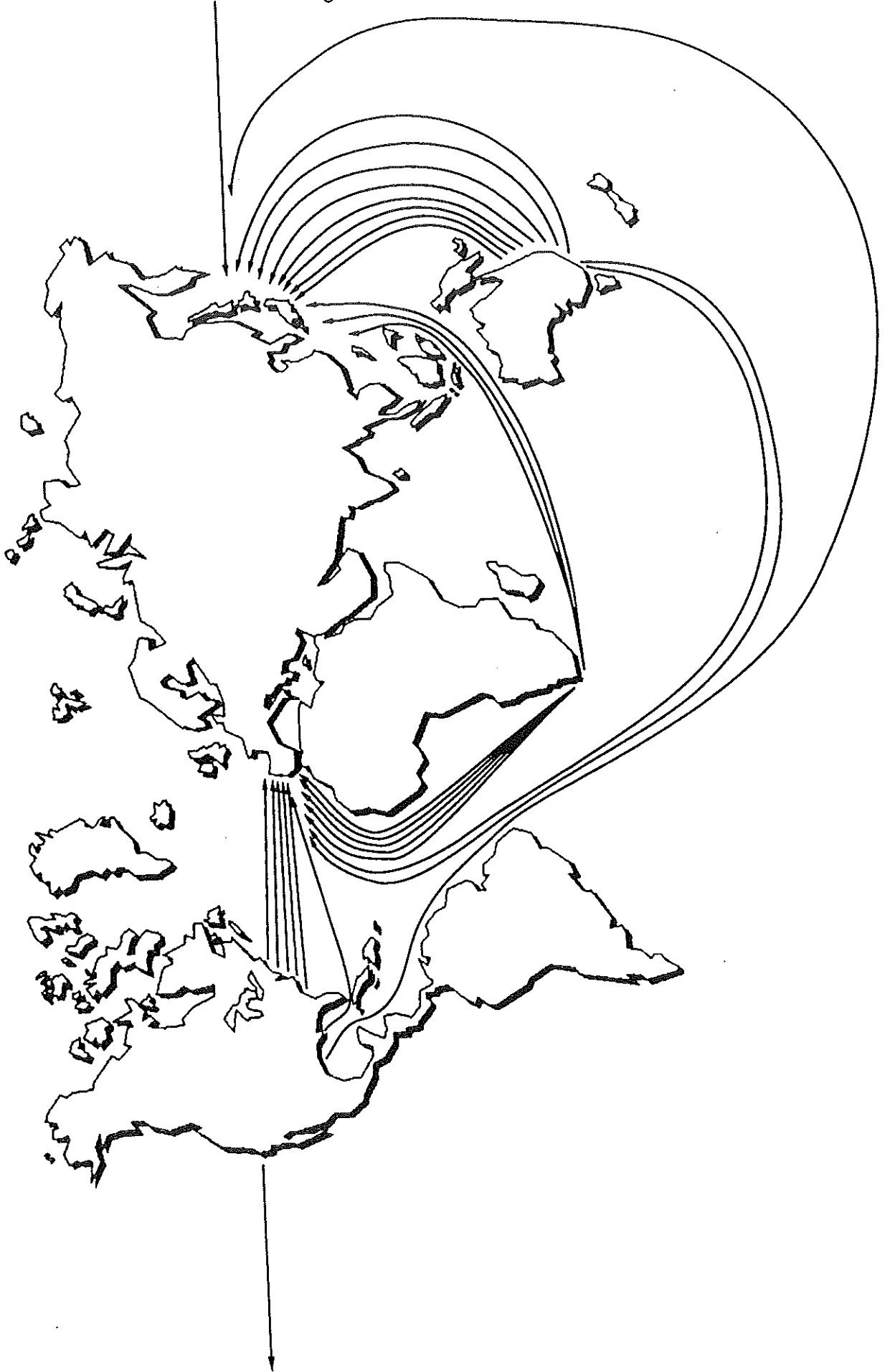
**Exporters** -- A little over 90 percent of the 1991 world trade in metallurgical

coal was provided by five producing exporters, about 70 percent being supplied by Australia (35 percent) and the U.S. (31.8 percent) (see Figure 6). As Table 5 (page 10) indicates, Australia and the U.S. supplied the largest shares to the western European importing economies. Australia and Canada were the two largest suppliers to Japan and the Republic of Korea, with the U.S. supplying less than 20 percent of the imports.

Table 15 presents DOE and NCC forecasts for metallurgical coal imports by importing countries.

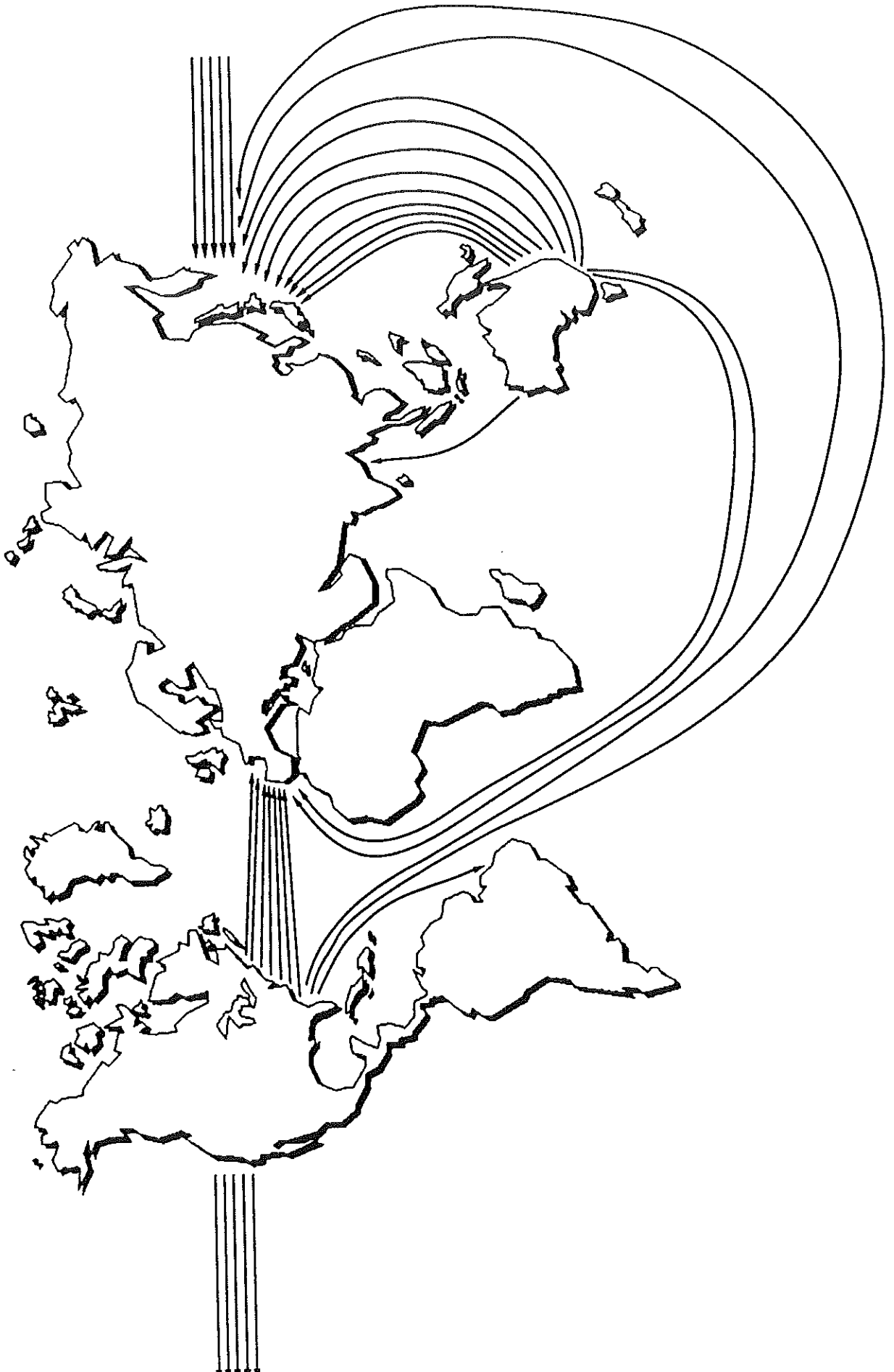
# Steam Coal - Key Exporters and Importers

Fig 1



# Coking Coal - Key Exporters and Importers

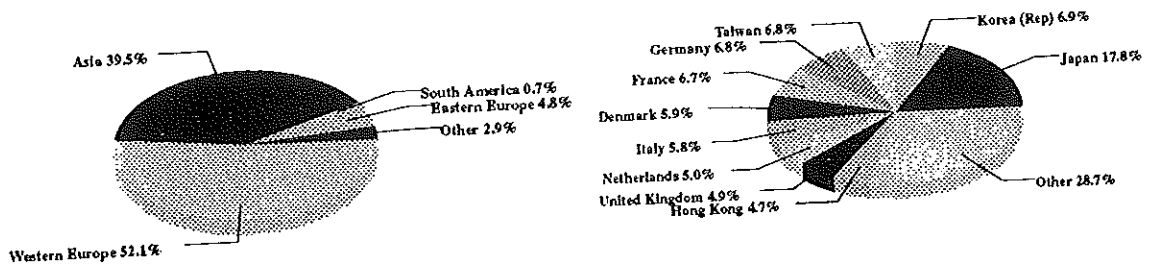
Fig 2



# The Export Of U.S. Coal and Coal Technology

Figure 2.3

## PERCENTAGE DISTRIBUTION OF 1991 WORLD STEAM COAL IMPORTS



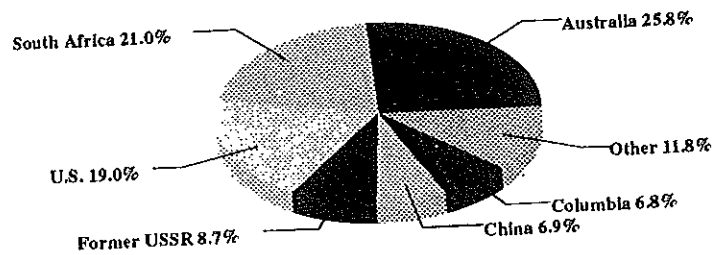
By Region

By Country

Source: U.S. DOE, EIA, *Supplement to the Annual Energy Outlook, 1993, Table 35.*

Figure 2.4

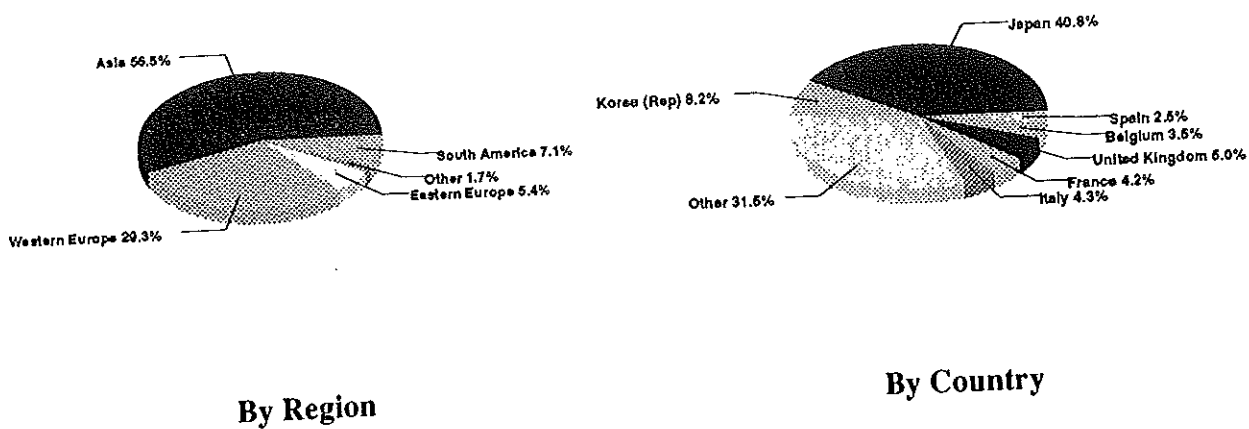
## PERCENTAGE DISTRIBUTION OF 1991 WORLD STEAM COAL EXPORTS



Source: U.S. DOE, EIA, *Supplement to the Annual Energy Outlook, 1993, Table 35.*

**Figure 2.5**

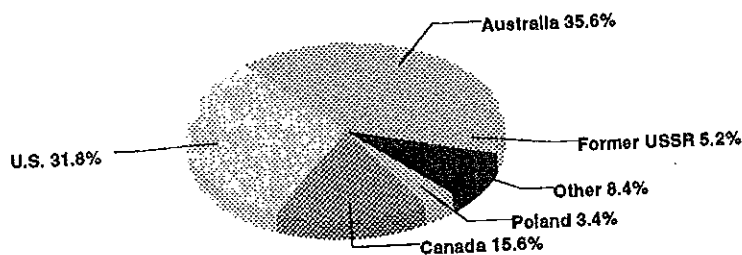
**PERCENTAGE DISTRIBUTION OF 1991 WORLD METALLURGICAL COAL IMPORTS**



Source: U.S. DOE, EIA, *Supplement to the Annual Energy Outlook, 1993, Table 36.*

**Figure 2.6**

**PERCENTAGE DISTRIBUTION OF 1991 WORLD METALLURGICAL COAL EXPORTS**



Source: U.S. DOE, EIA, *Supplement to the Annual Energy Outlook, 1993, Table 36.*

The Export Of U.S. Coal And Coal Technology

TABLE 14  
FORECASTS OF WORLD STEAM COAL IMPORTS\* (Million Tons)

	USDOE			NCC		
	1995	2000	2005	1995	2000	2005
<b>W. Europe</b>	156.4	200.3	264.5	130.4	145.4	159.4
Germany	18.4	21.6	52.2	17.0	18.6	20.3
France	7.1	10.1	11.2	7.1	10.1	11.2
Denmark	16.6	18.9	18.4	15.0	16.5	18.1
Italy	22.3	27.5	33.5	14.4	15.6	16.8
Netherlands	12.8	13.8	16.2	12.5	13.8	15.1
U. Kingdom	12.8	25.1	32.2	12.3	13.6	15.0
Spain	10.7	13.8	18.5	9.9	10.9	12.0
Belgium	10.0	11.4	13.6	9.7	10.7	11.7
Finland	9.3	11.1	12.3	6.1	6.7	7.4
Israel	6.2	8.5	10.1	4.9	5.3	5.9
Portugal	4.6	5.4	6.2	4.3	4.7	5.2
Ireland	3.9	4.6	5.2	3.9	4.3	4.7
Other	21.7	28.5	34.9	13.3	14.6	16.0
<b>E. Europe</b>	16.9	20.2	26.3	11.9	12.9	14.1
<b>Pacific Rim</b>	119.2	163.0	182.9	109.6	137.2	172.5
Japan	48.8	63.5	72.4	46.8	54.5	63.5
Korea (Rep.)	28.1	39.8	39.9	20.8	28.6	39.3
Taiwan	25.9	33.5	37.8	19.8	26.3	34.9
Hong Kong	12.3	18.6	21.8	13.1	16.4	20.4
Philippines	1.1	1.7	2.6	3.3	3.8	4.4
Other**	3.0	5.9	8.4	5.8	7.6	10.0
<b>S. America***</b>	2.4	4.2	7.7	2.4	4.2	7.7
<b>TOTAL*</b>	<b>305.3</b>	<b>403.1</b>	<b>500.7</b>	<b>254.3</b>	<b>299.7</b>	<b>353.7</b>

\* Excludes the U.S. and Canada; \*\* Includes India; \*\*\* Includes Mexico  
Sources: USDOE, EIA, *Supplement to the Annual Energy Outlook*, Table 38 and details provided April 1993.



## The Export Of U.S. Coal And Coal Technology

**TABLE 15**  
**FORECASTS OF WORLD METALLURGICAL COAL IMPORTS\* (Million Tons)**

	USDOE			NCC		
	1995	2000	2005	1995	2000	2005
<b>W. Europe</b>	55.3	47.3	53.0	56.8	54.7	58.5
U.Kingdom	8.7	6.3	7.2	9.0	7.8	8.2
Italy	8.7	7.5	6.4	8.3	7.9	8.3
France	7.8	6.2	7.9	7.6	6.7	7.1
Belgium	6.8	4.5	5.8	7.4	7.8	8.4
Spain	3.4	3.0	3.1	4.7	4.2	4.6
Netherlands	3.9	1.9	3.3	4.9	5.2	5.7
Austria	2.4	2.2	2.1	2.0	1.5	1.7
Sweden	1.3	1.2	1.2	1.7	1.8	1.9
Other	12.3	14.5	16.0	11.2	11.8	12.6
<b>E. Europe</b>	23.0	23.0	23.0	11.4	12.3	13.2
<b>Pacific Rim</b>	95.0	90.0	84.2	86.1	94.2	103.2
Japan	67.9	61.0	54.7	52.7	58.0	64.2
Korea (Rep.)	13.9	15.6	15.2	17.2	18.2	19.2
Taiwan	5.5	5.7	6.6	5.6	6.7	7.9
Other **	5.7	7.7	7.7	10.6	11.3	11.9
<b>S. America***</b>	13.8	16.0	19.0	14.8	15.6	16.4
<b>TOTAL*</b>	<b>192.0</b>	<b>180.5</b>	<b>183.2</b>	<b>169.1</b>	<b>176.8</b>	<b>191.3</b>

\* Excludes the U.S. and Canada; \*\* Includes India; \*\*\* Includes Mexico  
Sources: USDOE, EIA, *Supplement to the Annual Energy Outlook 1993*, Table 38, and details provided by DOE in April 1993, and the National Coal Council Sub-Workgroup One.

**The Export Of U.S. Coal And Coal Technology**

**Future Electrical Generation Capacity**

for electrical generation at new plants in the Far East, the EEC, European countries outside the EEC, the former USSR, Africa, and South America.

Table 16 shows the coal requirements

**TABLE 16  
COAL REQUIREMENTS FOR NEW POWER PLANTS IN SELECTED MARKETS**

	Under Construction		Planned		New Capacity By 2005	
	Gigawatts	Coal Per Year (MST)*	Gigawatts	Coal Per Year (MST)	Gigawatts	Coal Per Year (MST)
Far East**	35***	78	46****	102	81	180
EEC	8	16	9	19	17	35
Rest of Europe	--	--	--	--	30	66
Fmr USSR	--	--	--	--	60	135
Africa	--	--	--	--	15	34
S. America	--	--	--	--	25	56

\* MST is Million Short Tons

\*\* The Far East here includes Australia and India.

\*\*\* Of this total, 10 gigawatts are under construction in China, Indonesia, and Australia. These plants are unlikely to consume imported coal.

\*\*\*\* Of this total, 9 gigawatts are planned in China, Indonesia, and Australia. These plants are unlikely to consume imported coal.

**ENDNOTES**

1. USDOE, EIA, *Supplement to the Annual Energy Outlook 1993*, Table 35.

2. *Ibid.*, Table 36.

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The Export Of U.S. Coal And Coal Technology

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## APPENDIX 3

### WORLD RESPONSE TO ENVIRONMENTAL CONCERNS

#### GLOBAL CLIMATE CONCERNS

At the time of this writing (Fall 1993), countries around the world are in the process of ratifying the framework convention of climate change as a result of the Rio Conference in June 1991.

Accordingly, these countries are evaluating the development of national action plans for reducing various types of emissions that may impact on global climate change. In fact, as this report was being prepared, the United States had become one of the first nations to produce such a plan.

Because the contents of most plans currently remain unknown, it is difficult to predict the impact of these efforts on the ability of fossil fuels in general, and coal in particular, to meet world energy demand.

One thing, however, is relatively certain: the demand for new technologies to improve coal-use efficiency is certain to rise and, in turn, produce notable markets for those who develop them.

#### OECD EMISSIONS REDUCTIONS STANDARDS

The EC Large Combustion Plant Directive to reduce SO<sub>2</sub> and NO<sub>x</sub> emissions was adopted in November 1988. The

directive calls for a three-stage reduction from 1980 levels of SO<sub>2</sub> emissions from existing plants over 50MW<sub>t</sub> with overall community targets of 25, 43, and 60 percent reductions by 1993, 1995, and 2003 respectively. Specific targets have been set for individual countries to account for differences in economic, energy, and environmental situations.

Tables 17 and 18 list the air emissions limits for new large coal-fired boilers and combined-cycle systems in OECD countries.

The Export Of U.S. Coal And Coal Technology

TABLE 17  
AIR EMISSIONS LIMITS IN OECD COUNTRIES  
FOR NEW LARGE COAL-FIRED BOILERS

	SO <sub>2</sub> Limits			NO <sub>x</sub> Limits		
	mg/Nm <sup>3</sup>	g/GJ	lb/10 <sup>9</sup> Btu	mg/Nm <sup>3</sup>	g/GJ	lb/10 <sup>9</sup> Btu
Australia	2000	700	1630	500	175	410
Austria	200	70	165	200	70	165
Belgium	400	140	325	650	230	530
Canada	740	258	600	740	258	600
Denmark	400	140	325	200	70	165
Germany	400	140	325	200	70	165
Italy	400	140	325	200	70	165
Japan	223	78	180	411	145	335
Luxembrg	1700	595	1385	450	160	365
Nether*	200	70	165	200	70	165
Spain	2400	840	1955	none	none	none
Sweden	285	100	233	145	50	116
Switz**	400	140	325	200	70	165
Turkey	1000	350	815	800-1800	280-630	650-1465
U. King.	400	140	330	650	230	530
U.S.A.	1820	520	1200	570-740	200-260	465-605

Conversion Factors: 100 mg/Nm<sup>3</sup> = 35 g/GJ, and 1 lb/MBtu = 430 g/GJ.

Sources: IEA/OECD *Emission Controls in Electricity Generation and Industry*, 1988, Table p.45, and IEA Secretariat.

TABLE 18  
AIR EMISSIONS LIMITS IN OECD COUNTRIES  
FOR COMBINED-CYCLE SYSTEMS<sup>1</sup>

COUNTRY	NO <sub>x</sub> STANDARDS	
	Mg/Nm <sup>3</sup>	ppmv
Australia <sup>2</sup> (until 1994) 1995	250 90	122 43.9
Canada <sup>3</sup>	240(gms/GJ)	140
Germany <sup>4</sup>	100	48.8
Italy	200	97.6
Japan <sup>5</sup>	---	28.4
Netherlands <sup>6</sup>	65 (gms/GJ)	38
Switzerland <sup>7</sup>	100	48.8
United Kingdom <sup>8</sup>	60	29.3
EEC (proposed)	150	73.2
United States <sup>9</sup>	---	25-42

References: 1-- All values are for combustion turbines operating on gaseous fuel. The numerical values are corrected to 15% O<sub>2</sub>. 2-- Australian Emissions Limits for New Stationary Sources. Publication 278, EPA, SECV, and DIEP. 3-- Canadian Council of Ministers, October 1992. 4-- TA. Luft. 5-- Meeting worldwide NO<sub>x</sub> regulations for industrial gas turbines under 20MW. A&WMA 92-136.02. 6-- Implementation of NO<sub>x</sub> emission standards in the gas transmission company in the Netherlands. AW&MA 92-136.03. 7-- Personal communication between Swiss Government and Allison Division of General Motors Corp. in 1991. 8-- BPM Publication by HM Inspectorate of Pollution Control. 9-- U.S. EPA emission standards for combustion turbines.

## **BELGIUM**

Overall, SO<sub>2</sub> emissions from utility and industrial boilers must be reduced by 50 percent of their 1980 levels by 1995. Policy objectives to reach this goal relied on increased use of nuclear generation, conversion of oil-fired plants to coal, and fuel switching to reduce emissions between 1973 and 1984. New boiler regulations requiring reductions in NO<sub>x</sub> emissions through combustion control started in 1987. Oil-fired plants will be shut down to reach 1995 target levels.

## **DENMARK**

Emissions of SO<sub>2</sub> from power plants are required to be reduced by 40 percent from 1980 levels by 1995, and by 60 percent of 1980 levels by 2005. NO<sub>x</sub> emissions are to be reduced by 50 percent of their 1980 levels by 2005. Low sulfur coal is to be used in existing power plants, and all new plants are to be fitted with flue gas desulfurization (scrubber) equipment.

## **FRANCE**

Standards for SO<sub>2</sub> and NO<sub>x</sub> emissions are determined case-by-case and negotiated by local authorities. However, the high reliance on nuclear power, which accounts for 70 percent of generation, has led to significant reductions in both SO<sub>2</sub> and NO<sub>x</sub> emissions without the installation of scrubbers or NO<sub>x</sub> reduction equipment.

## **GERMANY**

Stringent limits on SO<sub>2</sub> and NO<sub>x</sub> emissions have been set for both existing and new power plants. Generation facilities with capacity larger than 300 MW are required to install scrubbers with a minimum removal efficiency of 85 percent. Generation plants with capacity of 100-to-300 MW are required to install scrubbers achieving 60 percent removal efficiency. Plants of any capacity not retrofitted with scrubbers must be removed from service by 1993.

West German emission standards were effectively applied to all fossil power plants in the former GDR in 1990. Plants not retrofitted must be removed from service by 2001.

## **ITALY**

Sulfur content of coal burned in generating plants is limited to 1 percent by weight, and SO<sub>2</sub> emission reductions are targeted at 30 percent of 1980 levels by 1993 and 63 percent of 1980 levels by 2003. The use of scrubbers is implied, not specified, by legislation relating to new and converted coal-fired plants. NO<sub>x</sub> emissions must be reduced by 30 percent from 1980 levels by 1998.

## **JAPAN**

Very strict and comprehensive emission controls are in place in Japan. Standards are set for 28 regions and vary between regions depending on local air quality and specific emissions sources. Virtually all existing coal-fired generation plants are fitted with scrubbers, which also are required for all new facilities.

## **NETHERLANDS**

Existing power plants and new power plants operating after 2000 are required to install scrubber units with at least 85 percent removal efficiency, no later than 1994 for existing facilities. New generating plants are required to install combustion control equipment to limit NO<sub>x</sub> emissions, and existing plants may be required to retrofit low-NO<sub>x</sub> burners.

## **SPAIN**

Spain limits the sulfur content of imported coal, and domestic pricing policy encourages washing high-sulfur coal. Emissions standards for both SO<sub>2</sub> and NO<sub>x</sub> for stationary sources are in the development stage. Spain also has adopted the EC emissions limitations.

## **UNITED KINGDOM**

In 1990, the UK adopted the EC Large Combustion Plant Emission Standards, based on Best Available Technology. The standards require reductions in 1980 SO<sub>2</sub> emissions of 25, 43, and 60 percent by 1993, 1995, and 2003, respectively. NO<sub>x</sub> emissions are to be reduced from 1980 levels by 20 percent by 1993 and 36 percent by 1998. A minimum of 8 GW of flue gas desulfurization capacity also is to be installed at coal-fired power plants.



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The Export Of U.S. Coal And Coal Technology

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## APPENDIX 4

### GEOPOLITICAL TRENDS<sup>1</sup>

#### UNITED KINGDOM

The old contract between British Coal Corporation and the generators, Powergen and National Power, expired in March 1993. Negotiations for a new contract began in the summer of 1992 and continued into the fall. In the late 1980s, the British Government announced plans to privatize British Coal, and several studies were done evaluating the validity of such privatization.

In order to put British Coal in the best shape for privatizing, the British Government announced in October 1992 that 31 pits would be closed, and 20,000 miners would lose their jobs. The public outcry was tremendous. A series of studies was initiated, including a complete study by the government on the energy situation in the United Kingdom and the role for coal.

At the end of March 1993, the British Government announced the main points of its "Coal White Paper":

- Twelve pits to be closed, 12 to be rerieved, six to be mothballed; one to have development work only.

- Generators to buy 160 million tons from British Coal over the next five years -- 40 million tons in the first year and 30 million tons in years two through five.

- Government will subsidize additional sales.

- Privatization of British Coal to be speeded up.

- Subsidies to be phased out before privatization; all pits to be offered for sale or lease before being closed.

- Financial aid totalling 200 million pounds to be made available to help areas affected by closure.

- Magnox nuclear review to be brought forward by a year.

- No restrictions placed on gas-fired power stations; three projects to proceed.

- Government to publish an annual energy review.

- More money to be allocated for research into coal-use technology.

Estimations suggest there is an additional market for 15-to-20 million tons of coal above the amount contracted with the utilities. At this time, however, coal stockpiles at the generators and mines are estimated to be nine to 12 months. Coal is continuing to be produced and British Coal stockpiles are estimated to grow by about 8 million tons by late fall.

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## The Export Of U.S. Coal And Coal Technology

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Negotiations have not begun with the utilities for the additional coal, nor has a system been approved to cover costs associated with the additional coal. At this point, the situation is very unclear and many questions remain to be answered.

It is clear to U.S. coal exporters that the optimistic projections for substantial steam coal imports into the United Kingdom during the 1990s will not materialize. At this time, it appears that any substantial amounts of coal will not be imported into the United Kingdom until the end of this decade or the early part of the next century.

### GERMANY

Since the 1987 National Coal Council report, *"Improving International Competitiveness of U.S. Coal and Coal Technologies,"* Germany has been unified and currently is dealing with the economic and political pressures arising from unification.

In 1992, the German hard coal industry produced 72.2 million tons. State subsidies totaled 4,335 million ECU (the new EEC unit of currency), or about 60 ECU per ton. (Federal Reserve average 1992 exchange rate was \$1 equals 1.3 ECU).

Germany has proposed a new coal aid plan to the EEC. This plan addresses the heavily subsidized hard coal production in the former West Germany. This plan, called *Coal Plan 2005 (Kohlekonzept 2005)*, lays out production requirements

for the four coal-producing areas in the former West Germany.

- In the Aachen coal district, the 1.6 million tons of production will be eliminated by 1997.

- In the Saar coal district, 1.2 million tons will be eliminated, bringing coal production to 8.2 million tons.

- In the Ruhr coal district, the principal coal-producing region, 11 million of the current 48-million-ton production will be eliminated.

- In the Ibbenburen coal region, the current production of 2 million tons will continue.

Current press reports indicate that the coal fund used to subsidize German hard coal production may run a deficit at the end of this year. The current German hard coal production of 50 million tons annually costs about \$128 (DM 200) per ton more to produce than the world market price for coal. The average Federal Reserve exchange rate in 1992 was \$1 equals DM 1.56. To support its inefficient domestic production, Germany taxes electricity consumers 7.5 percent and uses the money to provide utility companies with coal at subsidized prices. In theory, utility companies would pay the world market price, coal companies would receive a price covering their costs and the coal fund would cover the difference.

However, world oil prices have fallen since Germany instituted the current

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## The Export Of U.S. Coal And Coal Technology

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plan; and utilities have decreased their use of coal, even at world prices. The subsidy, or tax on electricity, has to be increased to make German coal competitive with the cheaper oil.

The deficit is estimated to run as high as DM 5.8 billion at the end of 1995, when the current plan expires. The Economic Minister has proposed a tax on energy consumption which would be used to finance the high costs of the German coal industry. The income from the coal financing tax would be paid from the federal budget directly to the mining companies. The final outcome of this proposal will not be known for several months.

### SPAIN

In 1992, Spain's domestic coal industry produced 18.6 million tons. State aid to the hard coal industry was 483.3 million ECU, or 26 ECU per ton. Further closures of underground mines and the restructuring of others have taken place as a result of the restricting plan. This current plan, which is in effect until 1993, covers both the private and public mining companies. The plan calls for a 25 percent reduction in production and about one-third fewer jobs.

Spain's entry into the EEC caused the government to liberalize the prices of domestic coal, which previously had been established each year. In 1986, an agreement was reached between CARBUNION (The Spanish Federation of Coal Producers) and UNESA (Spanish Association of Electric Utility

Companies). This agreement defined the New System for Contracting Thermal Coal, which provides for the sale of domestic coal from underground and surface mines to electric utilities. The agreement provides reference prices for production from underground mines. The reference price is calculated using a formula linking prices to the consumer price index and to the average price of coal used in the EEC, including coal imported from non-member countries. The price for coal from surface mines is set freely between the producers and consumers. These prices are not subject to any pre-established formula.

The average price of domestically subsidized coal is about \$146 (15,000 pesetas) per ton. The Federal Reserve average exchange rate for 1992 was \$1 equals 102.4 pesetas.

The EEC has asked the Spanish government for a new plan to reduce coal subsidies. Even though the quality of Spanish coal is not very good and it is expensive to produce, production will continue for political and social reasons.

### BELGIUM AND FRANCE

The other major European coal-producing countries mentioned in the 1987 report are France and Belgium. Belgium has not mined coal since 1992 and currently is recovering coal only from slag heaps. France produced 12 million tons of coal in 1992, representing 33 percent of the nation's coal consumption. However, the cost of French coal is more than twice the cost of imported coal, the largest

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## The Export Of U.S. Coal And Coal Technology

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part of which is from the United States. France will begin to curtail domestic coal production in 1999 and eliminate it by 2005.

### OTHER COUNTRIES OF NOTE

Elsewhere in this report, the potential of various countries such as China, South Africa, the former USSR, and Poland to contribute to meeting worldwide energy demand has been discussed. The ability of these countries to meet that demand will be impacted significantly by geopolitical factors.

Predicting the geopolitical future of any country, but especially those mentioned above, is beyond the scope of this study and the capabilities of The National Coal Council. However, The Council has had discussions with several entities such as the State Department, the World Bank,

the Atlantic Council, and the Economist of London, and has reviewed information supplied by them.

It is highly impracticable for The Council to predict what the future may hold, and therefore recommends that U.S. companies contemplating doing business in these countries closely monitor the activities within their borders on an ongoing basis. Such analyses also will bear on determining the possible impact of the ability of these countries to compete with the United States in meeting world energy demands.

### ENDNOTE

1. U.S. Department of Commerce, International Trade Administration, Office of Energy.

## APPENDIX 5

### TRANSPORTATION ISSUES AND COMPARATIVE COSTS

One of the most significant factors in determining the competitiveness of coal in the international market is transportation and its associated cost. Countries competing in the international coal market all have the necessary transportation infrastructures to support the movement of coal, but there are significant differences in the physical characteristics of the various delivery systems. Also, it is important to note that the national policies established by each country reflect important differences in the regulation, development, and support of these systems. In addition, the policies and systems put in place by one country may directly impact the relative economics and competitiveness of other countries.

After the direct costs associated with the mining and processing of coal, and the impact of exchange rates, the competitiveness of export coal is primarily affected by:

- physical geographical constraints;
- national transportation policies; and
- national coal export policies, specifically those policies that are directed at overcoming inherent transportation disadvantages.

This report does not attempt to cover the various national policies associated with transportation, but it is important to be aware that policies do exist in other countries that impact the competitiveness of U.S. coal in the world market.

In general, transportation and comparative cost data is extremely difficult to obtain and verify, but the numbers included in Table 19 are believed to represent current charges. Transportation and terminalling charges are lower than several years ago in nearly all countries. These costs are the price of transportation included in total delivered price, not necessarily the costs of the provider of the transportation service.

**TABLE 19**  
**ESTIMATED TRANSPORTATION COSTS FOR REPRESENTATIVE STEAM COAL MOVEMENTS**  
(\$/TON)

	Inland Trans.	Terminal Fees	Ocean Trans. Far East	Ocean Trans. Europe	Total Trans.	
					Far East	Europe
<b>UNITED STATES:</b>						
East Coast	14.00	2.00	10.00	5.00	26.00	21.00
West Coast	19.00	2.50	6.00	9.50	27.50	31.00
Gulf (barge)	13.00	2.00	11.00	7.50	26.00	22.50
<b>AUSTRALIA:</b>						
New South Wales	5.20	2.60	7.00	9.00	14.80	16.80
Queensland	9.00	3.00	6.50	8.50	18.50	20.50
<b>COLOMBIA</b>	3.50	2.75	10.00	5.00	16.25	11.25
<b>SOUTH AFRICA</b>	9.20	2.50	7.00	6.00	18.70	17.70
<b>CANADA</b>	15.75	3.50	6.00	10.00	25.25	29.25
<b>INDONESIA</b>	4.50	3.25	--	--	--	--

The costs shown in Table 19 are estimates of representative movements of export coal. They do not represent actual commercial transactions. Particularly for the United States, the range of transportation costs may be quite large. The costs for inland rail transportation are estimates. The U.S. East Coast movement is via Hampton Roads, a non-railroad-owned terminal; similar total for railroad-owned terminal but different component costs. The Gulf movement is by barge via New Orleans, including truck or rail origination and inland terminaling.

Sources: CSX Corp., Union Pacific Railroad, Midland Enterprises, and IEA Coal Research. Ocean freight rates were compiled from published data on vessel fixtures for 1990s; Source, Simpson, Spence & Young Shipbrokers.

## COAL EXPORT TRANSPORTATION INFRASTRUCTURE<sup>1</sup>

The structural characteristics of the coal export infrastructure fall into two categories: 1) inherent advantages and disadvantages (e.g., distances from mine to port, natural deep draft ports, ocean shipping distances); and 2) national transportation and export policies which create advantages and disadvantages.

The infrastructure required for coal exports is much the same for competing countries and, with few exceptions, sufficiently developed to support likely volumes for all countries throughout the 1990s. The major components are inland transportation (rail, barge, and truck), transloading facilities, ports, and ocean transportation. For each major exporting country, a summary of the inherent advantages and disadvantages, and the various national policies applied to these attributes, is presented.

Infrastructure strengths and weaknesses in the United States were addressed in Chapter 2.

### AUSTRALIA

Australia is one of the most competitive coal producers in the world. Its large, developed coal deposits are within 200 miles of deep water ports and move on a relatively new, well-organized, and efficient dedicated transportation system.

Australia's export production has no potential internal market and is directly subject to major international market

risks. Australian rail systems are built on a narrower track gage than U.S., which ultimately will limit per-train capacity. Australian labor, although well-trained, has a history of long, disruptive strikes.

Australia's coal capacity was developed with export intentions. Transportation infrastructures are financed through a combination of public and private funds, although new capacity additions are determined by the Australian national railway system. Mines are assessed rail rates and user fees at all points of the transportation system that have little to do with the cost of capital or operations. The states appear to capture, through high transport charges, some of the economic rent provided by low-cost mines. The government reviews all export contracts. Although rail rates in Australia are among the highest of all coal exporting countries on a ton-mile basis, rates have been adjusted downward since 1980 to reflect the more competitive world coal trade.

### SOUTH AFRICA

South African coal deposits are relatively far from the export terminals (310 miles). However, the country has one of the lowest-cost transportation systems for coal on a ton-mile basis, as dedicated rail service is provided roughly at cost by a consortium of coal producers to deep water port facilities at Richard's Bay. A major contributor to this low cost is, however, the high density of coal traffic.

Coal is South Africa's primary source of internal fuel. It is used domestically to



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## The Export Of U.S. Coal And Coal Technology

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produce electricity, gasoline, synthetic oil, natural gas, and a variety of chemical precursors. As such, it is a resource that is controlled by public policy and is considered a resource to be preserved. Coal producers are allowed to export coal in excess of production quotas for the state-owned South African electric company.

The shipping of coal for export is covered under long-term take-or-pay transportation agreements with SPOORNET, the government-owned rail company which is dedicated largely to exports. The railroad is electrically powered and can be expanded to increase its capacity. The Richard's Bay Coal Terminal is privately owned and operated by a consortium of coal export companies. The facility is capable of loading 250,000 DWT vessels.

### CANADA

Western Canadian mines provide large quantities of premium metallurgical coal for export to the Pacific Rim countries, much of it destined for Japan because many of the Japanese mills have invested in Canadian mines. Western coal to Pacific markets and eastern coal to European markets has relatively shorter transportation distances than similar U.S. deposits.

The Canadian Government publicly encourages coal mining in western Canada as a way of increasing employment and providing the economic base of the various mining districts. As an example, the development of the

Peace River coal fields was undertaken at the urging of Japanese purchasers who, at that time, were looking for more diverse and more secure coal supplies within Canada. This project required an estimated investment of \$1.9 billion, of which approximately \$1 billion was invested by the Canadian Government in rail, port, and road facilities.

Specifically, the Ridley Island Terminal, costing \$173 million, was built by a subsidiary of the federal government's Canada Ports Corporation. The British Columbia Provincial Government spent approximately \$500 million on an electric branch line of British Columbia Railway to access new mines in the Peace River coal fields. This example illustrates the degree of integrated involvement by the Canadian Government on both the federal and the provincial level.

The railroads in Canada are tightly regulated by the government.

### COLOMBIA

The development of Cerrejon North (16 million tons ultimate annual capacity) has made Colombia one of the most competitive sources of steam coal in the world. There are approximately one billion tons of reserves within 95 miles of the eastern Colombian coast. Cerrejon North is served by a dedicated railroad and dedicated deep water port facilities.

The mine is located in a remote part of Colombia. The dedicated rail line and port facilities at Puerto Bolivar are one of the only viable means of exporting coal,

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## The Export Of U.S. Coal And Coal Technology

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although smaller quantities of coal are transported up the Inland Waterway System and transferred into vessels at other ports. Production bound for the Pacific Rim must pass through the Panama Canal (in vessels limited in size to about 60,000 tons) or take the much longer route around the Cape of Good Hope, South Africa.

The development of Cerrejon was a joint venture between a Colombian Government-sponsored company (Carbocol) and Exxon, with each partner supplying half the capital. The Colombian Government provided initial capital to Carbocol, and Carbocol obtained Export-Import Bank credits to help finance its share of the project. The development of this mine is considered to be a major thrust in diversifying from dependence on coffee exports. The mine, rail line, and port facilities are run as an integrated operation.

### **POLAND**

Advantages for Poland are proximity to western Europe; high-quality coals; and package pricing of coal on a delivered, competitive price basis. High production costs and limited transportation structure are disadvantages.

Polish exports have historically been controlled by government policy. While exports are an important source of western currency, coal production also represents an important resource to the former Eastern Bloc countries. Polish participation in the European market is perceived as variable. The rates charged

for infrastructure have little to do with direct costs. They appear to be related directly to coal export market conditions and political considerations.

### **CHINA**

Proximity to Asian markets is a distinct advantage to China that is somewhat offset by very long inland distances and inadequate rail or port capacity. Economic development policies have been variable. Transportation of coal from the northern provinces, often in mountainous and inaccessible regions, has placed a burden on the existing single-track, nonelectric, steam powered railroad system. With financial assistance from the Japanese, China is modernizing the coal ports of Qinhuangdao and Shijiusuo.

China is expanding coal production with a commitment to construction of rail and port infrastructure to support exports. Through its control of the economy, the country is able to coordinate construction of infrastructure and compete for exports at whatever price it deems appropriate to maintain volumes at mines and on the rail system.

### **INDONESIA**

Coal exports from Indonesia generally move inland by truck or conveyor (the only rail line handles coal from the state-owned Bukit Aasam mine for shipments primarily to the Suralaya power station). The coal is trucked or shipped by conveyor to river or shallow water coastal terminals and then loaded aboard

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## The Export Of U.S. Coal And Coal Technology

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barges for movement to a deep water location where it can be transloaded to larger ships or shipped by barge directly to nearby markets. Transloading is currently accomplished using floating cranes or a geared vessel that handles the transfer and acts as a storage facility.

In late 1991, Kallim Prima completed its deep water port and can load 180,000-ton vessels. Arutmin is expected to complete its port in 1993 and will be able to load 150,000-ton vessels. The proposed PT Indonesia Bulk Terminal is planned for Pulau Laut on Kalimantan. Barges and self-discharging vessels will deliver coal to the terminal from the mines located in eastern and southern Kalimantan. Coal can be blended at the facility and shipped by vessels of up to 200,000 DWT once the terminal is completed.

The inland transport distances for truck movements range from about three to 40 miles to reach water. The inland river movements may range up to 120 miles to reach the ocean. Ocean barge movements to the proposed terminals may be several hundred miles reaching the deep water port. These movements may occur in barges of 3,500 to 7,000 DWT.

### VENEZUELA

Venezuela's role as a coal exporter depends primarily upon its ability to expand the Guasare Basin. There are a number of joint ventures under investigation in this area. These mines

are located 60 miles from Maracaibo, and while trucks currently are used to haul coal to the ports, rail lines are considered the likely ultimate means of transport. The rail distances to deep water may be considerably longer (100+ miles) than the trucking distances. The rail lines will be constrained so that the tons/car and cars/train will be less than in the United States.

### COMPARATIVE TRANSPORTATION COSTS

The following tables demonstrate the impacts of various transportation-related costs, as well as the annual capacity and excess capacity by the major coal-exporting countries.

On a ton-mile basis, the United States is one of the most efficient movers of coal. Ton-mile rates in part are a function of distance, with fixed charges spread over more miles for a longer haul. Other things being equal, a shorter haul would have a higher ton-mile rate.

United States coal export volumes make up about 10 percent of the total coal production and transportation. And, export volumes are typically not supported by long-term contracts or purchase commitments.

### ENDNOTE

1. Sources for information on the transportation and infrastructure systems of coal-exporting countries include: CSX Corporation; USDOE, EIA; Fieldston Company; IEA Coal Research; MAPCO COAL Inc.; and SS&Y Research Services, Ltd.

## The Export Of U.S. Coal And Coal Technology

**Table 20**  
Annual Port Capacity and Excess Port Capacity By Coal-Exporting Country

(in million tons)	Port Capacity	1991 Throughput	Excess Capacity
<b>United States</b>			
East Coast	137.0	74.0	63.0
West Coast	22.0	3.0	19.0
Gulf Coast	110.0	38.0	72.0
<b>TOTAL</b>	<b>269.0</b>	<b>115.0*</b>	<b>154.0</b>
Australia	171.0	124.0	47.0
Colombia	21.0	16.0	5.0
South Africa	61.0	53.0	8.0
Canada	65.0	36.0	29.0
Indonesia	24.0	15.0	9.0
<b>TOTAL</b>	<b>611.0</b>	<b>359.0</b>	<b>252.0</b>

\* Includes tonnage transloaded for vessel or barge delivery to continental U.S. customers.  
Tables 20, 21 sources: SS&Y Research Services Ltd., IEA Coal Research, Fieldston Co. Inc.

**Table 21**  
Comparison of Inland Transportation Rates

(U.S. dollars/ ton-mile*)	Distance Miles	Rates \$*
<b>UNITED STATES</b>		
LA/Long Beach	1250	0.015
New Orleans**	1565	0.008
Hampton Roads	524	0.026
<b>AUSTRALIA</b>		
New South Wales	90	0.057
Queensland	162	0.055
<b>COLOMBIA</b>	95	0.036
<b>SOUTH AFRICA</b>	310	0.029
<b>CANADA</b>	700	0.023
<b>INDONESIA</b>	150	0.030

\* Rates on a ton-mile basis are estimates only. These rates should not be interpreted as average or contract rates. \*\* New Orleans data is for barge, including truck or rail origination. Sources: CSX and MAPCO COAL Inc.

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The Export Of U.S. Coal And Coal Technology

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## APPENDIX 6

### U.S. GOVERNMENT PROGRAMS TO ENHANCE CCT EXPORTS

A number of federal programs provide the types of export assistance that would be effective in assisting the private sector and coal-use technology vendors. Some of the agencies involved are AID, Department of Commerce and its International Trade Administration, Department of Energy, Department of State, and the U. S. Trade and Development Program. These agencies provide a range of services from market information to financing feasibility studies.

An excellent source of information on programs designed to assist industry in the export of coal-use technology is available from the Department of Energy. Titled *The Guide to U.S. Coal and Coal Technology Export Assistance Activities*, the most recent edition was published in 1992. It includes both federal and state programs and provides a guide to available assistance in export counseling, overseas market assessment, trade opportunities identification, feasibility studies, export financing, insurance, export licensing, trade regulations, and training and technical assistance.

#### EXPORT PROMOTION AND ASSISTANCE PROGRAMS

The federal government's goals and objectives relevant to export and assistance programs are threefold: 1) to develop objectives, 2) to focus on specific actions, and 3) to develop interagency programs to meet objectives.<sup>1</sup> Coordinating mechanisms fall into three categories: strategic, operational, and service, shown in Table 22. As stated in the *National Energy Strategy's Technical Annex 6*,<sup>2</sup> all three types of coordination are necessary to ensure effective and efficient export assistance.

TABLE 22  
TYPES OF EXPORT COORDINATION

<u>Type</u>	<u>Focus</u>	<u>Types of Activities</u>	<u>Examples</u>	<u>Decision-making Involvement</u>
Strategic	Government wide Broad objective	Setting broad objectives Developing plans and policies Allocating resources and responsibilities	Multi-agency Export initiatives (e.g., CORECT) Trade negotiations	High-level Political
Operational	Individual agencies Specific activities	Information exchange Activity coordination	Ad hoc efforts TPCC working groups	Mid-level Administrative
Service	Exporters Individual problems	One-stop shopping Information exchanges	CORECT one-stop Trade info. center	Staff

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## The Export Of U.S. Coal And Coal Technology

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Until recently, little coordination took place among individual agencies. Many companies that provided testimony during the public hearings of the National Energy Strategy indicated that not knowing where to go for help in the United States was one of their greatest obstacles to entering overseas markets. Therefore, former President Bush created the Trade Promotion Coordination Committee (TPCC).

### TRADE PROMOTION COORDINATION COMMITTEE

The TPCC is an interagency group, led by the Department of Commerce, designed to improve interagency coordination and streamline federal trade promotion activities. TPCC operations are conducted by specific work groups. Until recently, neither this nor any other export promotion program focused on coal technology. Through the Working Group on Energy, Environment and Infrastructure, a subgroup chaired by the Department of Energy has been formed to address the specific issue of clean coal technology (CCT). This is the first time that representatives of numerous federal agencies have combined their efforts toward a specific type of export.

The CCT Subgroup began as an ad hoc interagency effort led by the Department of Energy after the release of the 1987 National Coal Council study on coal and coal technology exports.<sup>3</sup> In response to requirements of the Clean Air Act Amendments of 1990, the ad hoc group issued a report to Congress in February 1992 that catalogued and evaluated

U.S. Government programs for promoting coal technology export.<sup>4</sup>

In July and August 1992, meetings between government and industry took place to discuss the draft strategic plan for further actions by the Subgroup. These discussions helped to pave the way for the various present and future activities of the CCT Subgroup to be of benefit to business. There are, to date, five major initiatives planned:<sup>5</sup>

1. The "market information" initiative is designed to focus and increase the effectiveness of current programs by developing ongoing procedures for information collection in foreign countries, with the intent of establishing information bases needed by exporters and their customers, and effective dissemination of that information. This activity was a common priority among the industry groups.

2. Door-opening programs are intended to bring the U.S. Government's influence to bear in enabling domestic firms to bring their technologies to the attention of and gain the active consideration of international customers.

Industry's observation of this program is that the strategic approach to each country must be distinct, as the individual needs of each country vary widely. However, a goal of the Subgroup should be to ensure that all U.S. Government agencies speak with one voice.



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## The Export Of U.S. Coal And Coal Technology

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In 1990-1991, France, Germany, and the United Kingdom had a total of thirty-four experts in science and technology staffing their diplomatic missions in Washington, D.C. The U.S. State Department, by contrast, had only two Foreign Service science and technology positions in France and one each in Germany and the United Kingdom.

3. Project Development Teams will be assisted by the CCT Subgroup in developing well-qualified teams to gain acceptance by international customers for U.S. coal and coal technology projects. The strategy of the teams should be to utilize currently commercialized environmentally sound coal-use technologies over which the U.S. has a technological and developmental lead. A two-step approach, beginning with current technologies and only going to advanced technologies for economies that have been sufficiently developed, is the best strategy.

4. The feasibility studies/foreign demonstration initiative seeks to provide government assistance and support for project development in higher risk areas through cost-shared feasibility studies and high visibility CCT demonstrations. This needs to be a distinctly separate activity from the above mentioned area, with visibly close cooperation between government and industry.

5. Financial support will help overcome barriers such as tied-aid and concessional financing incentives offered by U.S. competitors. Federal trade

finance programs must be coordinated and reflect the realities of coal-use technology projects. The CCT Subgroup can help develop alternatives to grant assistance programs that recognize fiscal constraints, assure financial viability of projects, and eliminate financial risks to U.S. taxpayers.

The Subgroup reports progress on all five initiatives.<sup>6</sup> Notable activities have included completion of a trade mission to Thailand and Indonesia and a preliminary assessment of the worldwide demand for CCT exports.

### TRANSFER OF UTILITY MANAGEMENT EXPERTISE

AID, working through the U.S. Energy Association, has established a program to help central and eastern European utilities enhance system performance and operations. This program does not focus on export of retrofit or clean coal technologies *per se*. However, improved use of coal, including environmental cleanup of stack gases, is a key component of the program. The program includes four mechanisms to effect transfer of understanding and capability from the U.S. power industry to specific eastern European countries:

1. Industry contracts to utilities and A/Es to define new electricity tariff systems, power plant and other electricity structures, and rehabilitation/modernization requirements. New England Electric System Companies and Southern Company have formed partnerships with eastern European

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## The Export Of U.S. Coal And Coal Technology

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companies under this mechanism.<sup>7</sup>

2. A utility partnership program, including exchange of key management personnel from the U.S. to their foreign counterparts and vice versa for periods of three to six months. This provides adequate time for each to develop an understanding of the others' design decision making, procurement, construction, and maintenance and generation practices. To date, four major U.S. utilities have been coupled with their counterparts in Poland, Hungary, and the Czech Republic.

3. Interagency agreement between AID, the DOE, and the Nuclear Regulatory Commission to assess clean coal, nuclear safety, and energy efficiency opportunities in these eastern European countries. Some funds have been allocated to facilitate information exchange between EPRI and its colleagues within these countries.

4. An American business component focused on capital development initiatives, independent power projects, and joint ventures.

4. USDOE, *Clean Coal Technology Export Programs*, a report to the U.S. Congress, February 1992.

5. USDOE, Office of Fossil Energy, *World Markets For U.S. Clean Coal Technologies*, September 1, 1992.

6. Resource Dynamics Corporation, *Clean Coal Technology Export Finance Programs*, working draft report to the U.S. Congress by DOE, May 14, 1993.

7. USDOE, Office of Fossil Energy, *World Markets For U.S. Clean Coal Technologies*, September 1, 1992.

### ENDNOTES

1. Executive Office of the President, Office of Science and Technology Policy, *U.S. Technology Policy*, September 26, 1990.

2. USDOE, "National Energy Strategy, Annex 6," Washington, D.C., September 1992.

3. NCC, *Improving International Competitiveness of U.S. Coal and Coal Technologies*, June 1987.

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The Export Of U.S. Coal And Coal Technology

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## APPENDIX 7

### DETAILS OF THE EXPORT TRADING COMPANY ACT

Export trading companies (ETCs) simply provide firms with an alternative to either in-house exporting departments or export management companies (EMCs) as a way to organize an export venture. Small or medium-sized firms may not be able to afford the high start-up costs of forming an in-house exporting department or may not have the volume of exports necessary to achieve economies of scale. EMCs are generally smaller firms that act as international manufacturers' representatives, working on a sales commission basis rather than taking title to goods or financing exports.

ETCs, by contrast, take title to goods in the United States and undertake complete responsibility for their sale overseas. ETCs serve as an intermediary for smaller firms who would otherwise have difficulty in dealing with foreign business practices, differences in foreign product or consumer standards, export regulations, transportation and insurance, and financing.

A producer may either form its own ETC (either as sole owner or with other producers as partners) or use the services of an established, independent ETC. Economies of scale are attained by exporting large volumes of products from many sources through an established network of overseas offices, transportation networks, insurance

providers, warehouses, etc. ETCs are designed to provide the expertise and financing that will allow many small and medium-sized firms to participate in export markets.

The anti-trust provisions of the ETCA apply to all exporters, not just export trading companies. The act provides a certification procedure under which firms engaged in export trade can determine in advance whether proposed export conduct qualifies for specific anti-trust protection. This is accomplished by means of a "certificate of review" issued by the Secretary of Commerce with the concurrence of the Department of Justice. Such a certificate protects firms or individuals from private treble damage actions and from criminal or civil suits under federal and state anti-trust laws for the specific export conduct described in the certificate. To receive a certificate, an applicant must show that its proposed export trade, export trade activities, and methods of operation will:

- Result in neither a substantial lessening of competition or restraint of trade within the United States nor a substantial restraint of the export trade of any competitor of the applicant.
- Not unreasonably enhance, stabilize, or depress prices within the United States of goods, wares, merchandise, or

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## The Export Of U.S. Coal And Coal Technology

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services of the class exported by the applicant.

- Not constitute unfair methods of competition against competitors engaged in the export of goods, wares, merchandise, or services of the class exported by the applicant.

- Not include any act that may reasonably be expected to result in the sale for consumption or resale within the United States of the goods, wares, merchandise, or services exported by the applicant.

While such anti-trust clearance for individuals or firms engaged in joint export activities is clearly useful, it should not be construed as providing blanket immunity from anti-trust prosecution.

In addition, the Act clarifies the application of the Sherman Act and the Federal Trade Commission Act to export trade by providing that these acts apply only to export-related conduct that has a "direct, substantial, and reasonably foreseeable effect" on domestic or import commerce or on the export commerce of U.S. exporters.

## APPENDIX 8

### DESCRIPTION OF THE NATIONAL COAL COUNCIL

Recognizing the valuable contribution of the industry advice provided over the years to the Executive Branch by the National Petroleum Council and the extremely critical importance of the role of coal to America and the world's energy mix for the future, the idea of a similar advisory group for the coal industry was put forward in 1984 by the White House Conference On Coal. The opportunity for the coal industry to have an objective window into the Executive Branch drew overwhelming support.

In the Fall of 1984, The National Coal Council was chartered, and in April 1985 The Council became fully operational. This action was based on the conviction that such an industry advisory council could make a vital contribution to America's energy security by providing information that could help shape policies leading to the increased production and use of coal, and, in turn, to decreased dependence on other less abundant, more costly, and less secure sources of energy.

The Council is chartered by the Secretary of Energy under the Federal Advisory Committee Act. The purpose of The National Coal Council is solely to advise, inform, and make recommendations to the Secretary of Energy with respect to any matter relating to coal or the coal industry that may be requested.

Members of The National Coal Council are appointed by the Secretary of Energy and represent all segments of coal interests and geographical disbursement. The National Coal Council is headed by a Chairman and a Vice Chairman who are elected by The Council. The Council is supported entirely by voluntary contributions from its members and receives no funds from the federal government. By conducting at no cost studies which might otherwise have to be done by the Department of Energy, The Council saves money for the government.

The National Coal Council does not engage in any of the usual trade association activities. It specifically does not engage in lobbying efforts. The Council does not represent any one segment of the coal or coal-related industry nor the views of any one particular part of the country. It is instead a broad, objective advisory group whose approach is national in scope.

Matters which the Secretary of Energy would like to have considered by The Council are submitted as a request in the form of a letter outlining the nature and scope of the requested study. The first major studies undertaken by The National Coal Council at

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## The Export Of U.S. Coal And Coal Technology

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the request of the Secretary of Energy were presented to the Secretary in the summer of 1986.

The reports of The Council completed through 1993:

<u>Date</u>	<u>Title</u>
June 1986	<i>Coal Conversion</i>
June 1986	<i>Clean Coal Technologies</i>
June 1986	<i>Interstate Transmission of Electricity</i>
June 1986	<i>Report on Industrial Boiler New Source Performance Standards</i>
June 1987	<i>Reserve Data Base: Report of The National Coal Council</i>
June 1987	<i>Improving International Competitiveness of U.S. Coal and Coal Technologies</i>
November 1988	<i>Innovative Clean Coal Technology Deployment</i>
December 1988	<i>The Use Of Coal In The Industrial, Commercial, Residential, And Transportation Sectors</i>
June 1990	<i>Industrial Use Of Coal And Clean Coal Technology -- Addendum Report</i>
June 1990	<i>The Long Range Role of Coal in the Future Energy Strategy of the United States</i>
January 1992	<i>The Near Term Role for Coal in the Future Energy Strategy of the United States</i>
January 1992	<i>Improving Coal's Image: A National Energy Strategy Imperative</i>
May 1992	<i>Special Report On Externalities</i>
February 1993	<i>The Role Of U.S. Coal In Energy, The Economy, And The Environment -- Special Report</i>
February 1993	<i>A Synopsis Of The Reports (1986-1992)</i>
November 1993	<i>The Export Of U.S. Coal And Coal Technology</i>

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The Export Of U.S. Coal And Coal Technology

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The members of The National Coal Council who have served as Chairman:

June 1985 - June 1986	The late Honorable John N. Dalton, former Governor of Virginia, and B.R. Brown President, Consolidation Coal Company
June 1986 - June 1987	James W. McGlothlin Chairman, The United Companies
June 1987 - June 1989	James G. Randolph former President, Kerr-McGee Coal Company former Assistant Secretary for Fossil Energy, U.S. Department of Energy
June 1989 - May 1991	William Carr President, Jim Walter Resources, Inc.
May 1991 - May 1992	W. Carter Grinstead, Jr. former Vice President, Exxon Coal and Minerals Company
May 1992 - Present	William R. Wahl Vice President, AMAX, Inc.



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**The Export Of U.S. Coal And Coal Technology**

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## APPENDIX 9

### THE NATIONAL COAL COUNCIL MEMBERSHIP ROSTER -- 1993

DR. SY ALI\*  
Manager  
Industrial Engine Technology  
Allison Gas Turbine Division  
General Motors Corporation

JOHN Q. ANDERSON  
Executive Vice President  
Burlington Northern Railroad

CHARLES J. BAIRD  
Baird, Baird, Baird & Jones, P.S.C.

THE HONORABLE GERALD BALILES  
Hunton & Williams

JOHN BARKER, P.E.\*  
Consultant

GLEN BARTON  
Group President  
Caterpillar, Inc.

JACQUELINE F. BIRD\*  
Director  
Ohio Coal Development Office  
Ohio Department of Development

DR. SANDY BLACKSTONE\*  
Natural Resources Attorney/Consultant

WILLIAM H. BOWKER\*  
Executive Director  
Kentucky Coal Marketing and  
Export Council

B.R. BROWN\*  
Chairman, President, and CEO  
CONSOL Inc.

DONALD P. BROWN\*  
President  
Cyprus Coal Company

DR. DONALD CARLTON\*  
President  
Radian Corporation

WILLIAM CARR\*  
President and Chief Operating Officer  
Jim Walter Resources, Inc.

FRED CLAYTON  
Chairman and CEO  
Shand Mining, Inc.

WILFRED CONNELL\*  
Vice President  
Illinois Power Company

ROBERT P. COOPER\*  
Executive Vice President  
Farrell-Cooper Mining Company, Inc.

JOSEPH W. CRAFT III\*  
President  
MAPCO COAL Inc.

JAMES B. CRAWFORD  
Chairman and CEO  
James River Coal

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The Export Of U.S. Coal And Coal Technology

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DAVID C. CRKELAIR  
Vice President  
Texaco Inc.

DR. H. DOUGLAS DAHL\*  
President and Chief Operating Officer  
Drummond Company, Inc.

ROBERT G. DAWSON  
Vice President, Power Generation  
Mississippi Power Company

ROBERT J. DOYLE  
Vice President  
Exxon Coal and Minerals Company

JOHN DWYER\*  
President  
Lignite Energy Council

IRL F. ENGELHARDT\*  
Chairman, President, and CEO  
Peabody Holding Company, Inc.

DR. ROBERT H. ESSENHIGH  
Professor of Mechanical Engineering  
Department of Mechanical Engineering  
The Ohio State University

JOHN C. FAY, JR.  
President  
Empire Coal Sales, Inc.

MASON FOERTSCH  
President  
Foertsch Construction Company

JOSEPH A. FRANK  
President  
Centralia Coal Sales Company

THE HONORABLE KENT FRIZZELL  
Director  
National Energy Law & Policy Institute

GEORGE FUMICH, JR.  
George Fumich Associates, Inc.

PETER M. GARSON  
President  
PMG Advisory Group

SONDRA J. GILLICE  
Vice President  
Guest Services, Inc.

DR. ALEX E. S. GREEN\*  
Graduate Research Professor  
University of Florida

WAYNE E. GRESHAM  
Vice President  
Law and Governmental Affairs  
AMAX, Inc.

DR. BILL HARRISON\*

BRIAN Y. HARRISON  
President and CEO  
Metropolitan Stevedore Corp.

J. BRETT HARVEY  
President and CEO  
Interwest Mining Company

H. RICHARD HORNER\*  
Allan F. Dow & Associates, Inc.

RICHARD W. INCE\*

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\* Denotes Member of Coal Policy Committee

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## APPENDIX 10

### The National Coal Council Work Group For The Report *The Export Of U.S. Coal And Coal Technology*

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**Frank Lennox**  
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Executive Director  
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**ADDITIONAL SUPPORT**

The Council gratefully acknowledges  
notable support from the following:

Tony Churchill  
The World Bank

Frederick W. Maerke  
U.S. Department of State

\* Denotes National Coal Council member

## APPENDIX 11

CORRESPONDENCE BETWEEN  
THE NATIONAL COAL COUNCIL  
AND  
THE U.S. DEPARTMENT OF ENERGY

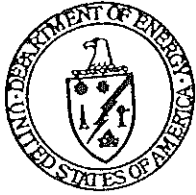
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**The Secretary of Energy**

Washington, DC 20585

January 22, 1992

Mr. W. Carter Grinstead  
Chairman  
National Coal Council  
P.O. Box 17370  
Arlington, Virginia 22216

Dear Carter:

This is to request the National Coal Council (NCC) to conduct three new studies. The studies, which are summarized in the enclosed, are on topics of high interest to the Department of Energy (DOE).

The externalities project is intended to gather information on State actions that have been taken to value externalities and the impact they may have on coal markets. Because the issue is the focus of great attention by DOE, many States, and other countries, placing this study on a fast track would be appreciated.

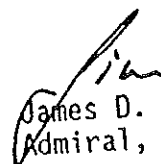
The second study relates to coal and coal technology export. It is requested because many significant world events that will likely affect exports have occurred since the NCC's fine report on the subject was completed in 1987. An update of the report will be of value in properly focusing our export program.

The third study relates to the effect of the Clean Air Act on coal markets. This study is intended to provide critical information on potential impacts that regulations currently being drafted by the Environmental Protection Agency (EPA) could have on the coal industry. This information is currently lacking in our deliberations with EPA on the subject.

Henson Moore and Linda Stuntz briefed me on your most recent and highly successful NCC meeting. I appreciate your action to respond to my request to set up a mechanism to provide quick turnaround responses on items of critical, near-term interest to DOE. Also, I look forward to receiving the two studies you are currently completing.

Thank you for your continued and valuable support.

Sincerely,

  
James D. Watkins  
Admiral, U.S. Navy (Retired)

Enclosure



# THE NATIONAL COAL COUNCIL, INC.

Post Office Box 17370, Arlington, Virginia 22216

(703) 527-1191

February 14, 1992

The Honorable Admiral James D. Watkins  
Secretary of Energy  
Forrestal Building  
1000 Independence Avenue, S.W.  
Washington, D.C. 20585

Dear Mr. Secretary:

We have received your request of January 22, 1992 asking that the National Coal Council conduct three new studies. At our meeting on January 28, 1992, the members of the Council concurred in undertaking these three new studies.

The externalities project is already underway utilizing the fast tract or expedited response procedures adopted by the Council in November.

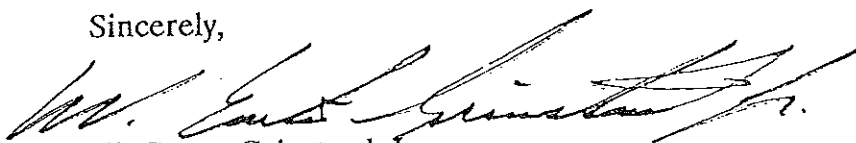
The other two studies, relating to Coal and Coal Technology Export and to the Effect of the Clean Air Act on Coal Markets, will be addressed in our standard manner. We will keep you advised as soon as a schedule is established for these studies.

In a background briefing at the Department in early December, several members of the Council were made cognizant of the joint DOE/CEC study on External Costs of Fuel Cycles. This meeting provided information to the Coal Council for use in our externality study. We were particularly interested to learn that coal is the first fuel cycle to be studied and that a draft was nearing completion.

As a result of discussions at that time and subsequently, we believe that the Council could make a valuable contribution by conducting a peer review of the Coal Fuel Cycle Report. We believe that our make-up uniquely qualifies the Coal Council to do such a review. Accordingly, we respectfully request that we be provided the opportunity to review the draft Coal Fuel Cycle Report.

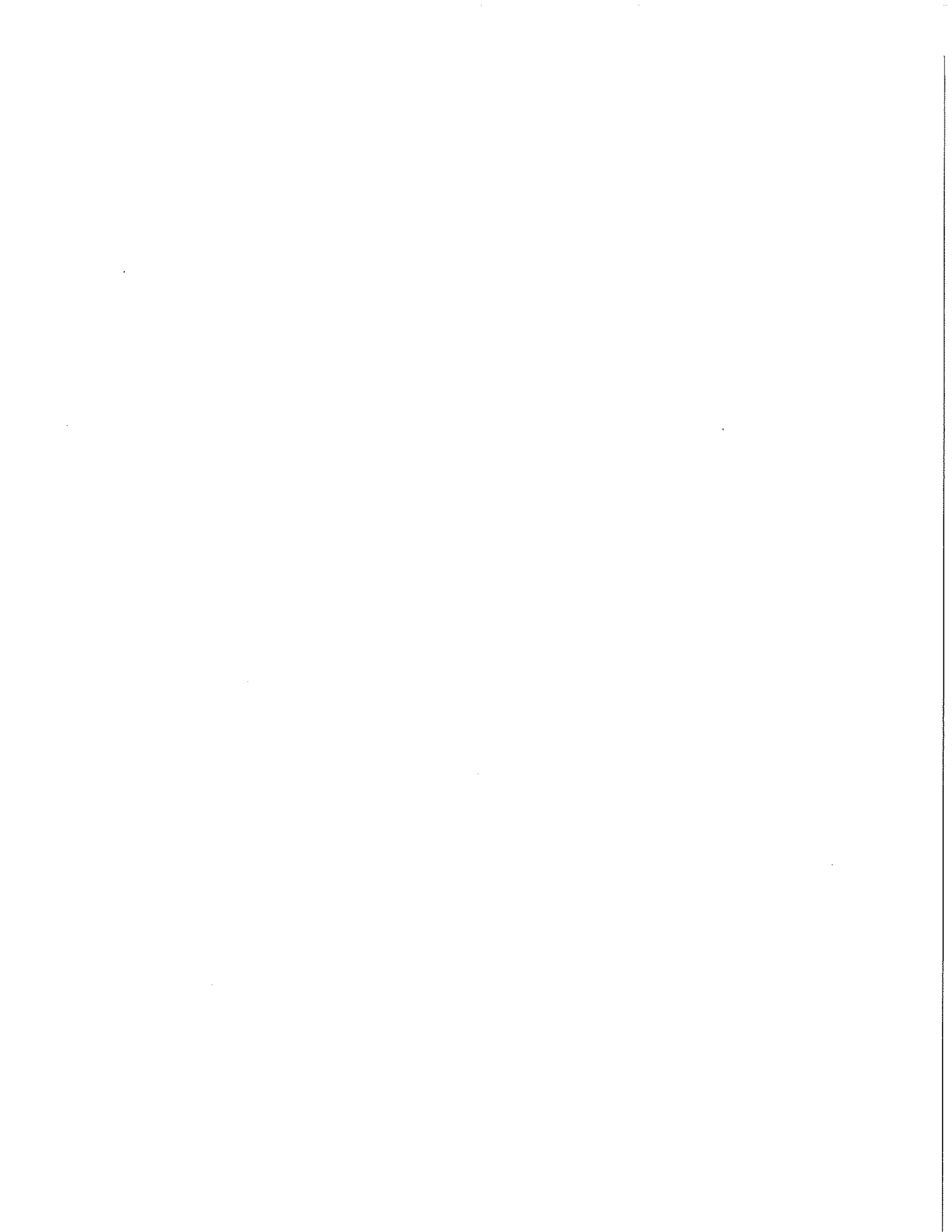
Thank you for the opportunity to continue to be of service to you.

Sincerely,



W. Carter Grinstead, Jr.  
Chairman







**THE NATIONAL COAL COUNCIL**  
**P.O. Box 17370**  
**Arlington, Virginia 22216**  
**(703) 527-1191**