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United States General Accounting Office

Report to the Chairman, Subcommittee on Fossil and Synthetic Fuels, Committee on Energy and Commerce
House of Representatives

April 1986

PETROLEUM PRODUCTS

Effects of Imports on U.S. Oil Refineries and U.S. Energy Security

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Resources, Community, and
Economic Development Division

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April 15, 1986

The Honorable Philip R. Sharp
Chairman, Subcommittee on Fossil and
Synthetic Fuels
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

In your letter of February 15, 1985, you asked that we examine the effects of petroleum product imports on the domestic oil refining industry and on the nation's ability to react to an oil supply disruption. This report responds to your request and analyzes recent and projected product import trends, the impact of refinery closures on the nation's ability to meet its refining requirements during a major oil supply disruption, and the effects of policy options designed to ensure the availability of adequate refining capacity.

We concluded that it would be difficult at the present time to justify product import restrictions on the basis of U.S. energy security needs. However, trends in both U.S. oil refining capacity and potential U.S. emergency refining requirements should be monitored because (1) U.S. capacity is expected to decline over the next few years and (2) U.S. emergency refining requirements may increase.

We are sending copies of this report to the Secretary of Energy and other interested parties. We will also make copies available to others on request.

Sincerely yours,

J. Dexter Peach
Director

Executive Summary

Over 100 U.S. refineries shut down between January 1981 and January 1986, accounting for a decline of about 3 million barrels per day (16 percent) of U.S. refining capacity. Independent oil refiners and others have alleged that a sharp rise in petroleum product imports has led to many of these closures, and that continued refining capacity losses could leave the nation unable to process all available oil supplies during an oil supply disruption. They have proposed tariffs or quotas on petroleum product imports to help protect U.S. refineries from foreign competition.

Opponents of import restrictions, including the administration and some oil companies, question the seriousness of the problem, claiming that the U.S. refining industry has sufficient capability to handle a major oil emergency. They contend that recent refinery closures resulted mainly from changing oil market conditions (such as declining product demand) rather than imports.

Among the questions GAO analyzed in response to a congressional committee request are (1) whether refining capacity losses caused by product imports could undermine the ability of the United States to respond to an oil supply cutoff and (2) what the impact would be of policy options, such as tariffs and quotas, that could be used to reduce product imports.

Background

Refiners process crude oil into a variety of products for residential heating, transportation, and other purposes. So-called light products, including gasoline, distillate fuel oil, jet fuel and kerosene, are among the highest valued products, and refiners count on them to provide adequate profitability. However, competition from light product imports has grown rapidly. For example, imports of gasoline (and blendstocks used to make gasoline) and distillate fuel oil, the major light products, have risen by about 127 percent between 1980 and 1985.

Results in Brief

GAO found that U.S. crude oil refining capacity would likely be sufficient to process domestic crude oil and crude imports if an oil emergency occurred at the present time (based on data available through March 1986). As an indication of future emergency refining capabilities, GAO found that U.S. capacity would also likely be sufficient to refine domestic supplies if a disruption occurred in 1990, although it is difficult to state conclusively that the capacity would be sufficient to refine all crude imports as well.

A tariff or quota would shift billions of dollars annually from consumers to crude producers and/or refiners, and, in the case of a tariff, to the government. Consumers and the economy could benefit from a tariff or quota to the extent that (1) it induced refiners to preserve a substantial amount of capacity that would otherwise shut down and (2) the additional capacity preserved was actually needed to refine available crude supplies in an emergency.

Based on these findings, it would be difficult at the present time to justify product import restrictions based on a U.S. energy security need to maintain adequate refining capacity, although trends in both U.S. capacity and potential U.S. emergency refining requirements should be monitored because (1) U.S. capacity is expected to decline over the next few years and (2) U.S. emergency refining requirements may increase. This conclusion does not suggest that government action could not be justified on other grounds if it were demonstrated, for example, that (1) the U.S. refining industry was suffering from unfair trade practices by other nations or (2) tariffs were desired to raise revenue in order to reduce the federal budget deficit.

Principal Findings

Rise in Imports

While total product imports are well within the range of historical levels, imports of the major light products—gasoline (and blendstocks) and distillate fuel oil—have risen from about 280,000 barrels per day in 1980 (3 percent of U.S. consumption of these products) to about 640,000 barrels per day in 1985 (about 7 percent of consumption). Among the reasons cited by industry analysts for this sharp increase are increased competitiveness of foreign refiners in the U.S. market, resulting from the end of U.S. oil price controls in 1981, and the ability of some foreign suppliers to reduce their product prices to improve competitiveness.

Causes of Refinery Closures

While imports may pose competitive problems for U.S. refiners, they do not adequately explain the bulk of recent U.S. refinery closures. Other reasons that better explain these closures are (1) a 55-percent expansion of refining capacity between 1970 and 1981, coupled with an unexpected decline in petroleum consumption of about 15 percent between 1979 and 1985 and (2) the elimination in 1981 of a crude oil price and

allocation program that supported operations of many small refiners. (See ch. 2.)

Future Imports and Refinery Closures

GAO's analysis of several projections of light product imports suggests that (1) U.S. imports will be affected by trade policies of other major oil-consuming countries and by the utilization rates of export refineries in the Middle East and (2) U.S. imports of gasoline, distillate fuel oil, jet fuel, and kerosene may increase from about 685,000 barrels per day in 1985 to roughly 1 million barrels per day in 1990.

GAO's analysis of these studies also suggests that an additional 1 million barrels per day of U.S. refinery capacity may shut down during the next 5 years, with light product imports expected to contribute to these closures. Fewer closures would be expected, however, if consumer demand for petroleum products increased substantially during this period. (See ch. 3.)

Impact on U.S. Energy Security

GAO found that at the present time, U.S. crude oil refineries would be able to process all domestic crude supplies during an oil emergency and still have about 3 million barrels per day of capacity to refine available crude imports. This would likely be sufficient to refine all imports because (1) available crude imports would probably be lower than this amount during a worldwide oil shortage and (2) excess capacity in other countries could probably process some U.S.-bound crude, if necessary.

U.S. capacity in 1990 would also likely be sufficient to refine available domestic oil, but it is difficult to state conclusively that it could accommodate all imports as well because (1) available crude oil during a disruption could be greater in 1990 than today as the Strategic Petroleum Reserve's maximum drawdown capability increases and (2) the amount of domestic capacity will probably be less. (See ch. 4.)

Impacts of Tariffs

GAO estimated the revenue effects of several tariff options on consumers, refiners, oil producers, and the government. These estimates were based on Department of Energy data and projections related to crude oil and product prices, imports, and domestic production. GAO found, for example, that a $10-per-barrel tariff on product imports coupled with a $5-per-barrel tariff on crude imports would cost consumers about $56 billion annually. This estimate includes only the tariff's direct

effects and does not account for gross national product losses and other economic dislocations that tariffs create. (See ch. 5.)

Recommendation

GAO is making no recommendations.

Agency Comments

The Department of Energy's comments on a draft of this report are included as appendix II. The Department said that the report accurately assesses the causes for the decline in profitability of the domestic refining industry over the past 5 years, but offered several comments about specific assumptions and definitions contained in the report. GAO has considered these comments and has made changes where appropriate. (See ch. 6.)

Contents

Abbreviations

API	American Petroleum Institute
B/D	barrels per day
bbl	barrel
CBO	Congressional Budget Office
CRS	Congressional Research Service
DOE	Department of Energy
EIA	Energy Information Administration
EPA	Environmental Protection Agency
GAO	General Accounting Office
GNP	gross national product
IEP	International Energy Program
ITC	International Trade Commission
MBD	thousands of barrels per day
MMBD	millions of barrels per day
NPC	National Petroleum Council
OECD	Organization for Economic Cooperation and Development
OPEC	Organization of Petroleum Exporting Countries
PIRINC	Petroleum Industry Research Foundation, Incorporated
SPR	Strategic Petroleum Reserve

Introduction

Background

Refineries process crude oil into a variety of products vital for industry, transportation, and other sectors of the economy. Over the past 5 years, the U.S. oil refining industry has experienced financial and competitive problems that have led to the net reduction of 106 refineries (out of 324 refineries existing at the beginning of 1981). Operable refining capacity fell from a high of 18.6 million barrels per day (MMBD) in January 1981 to 15.7 MMBD by January 1986, a drop of about 16 percent. Additionally, in 1985 refineries operated at about 78 percent of capacity, well below their historic average capacity utilization rate of about 90 percent between 1950 and 1979.

A number of sources, particularly independent oil refiners, have alleged that a major contributor to the refinery industry's problems has been a rapid increase in relatively cheap imports of petroleum products into the United States, and have further asserted that much of the increase has resulted from unfair international trade practices. They have asserted, for example, that U.S. refineries are being undercut by oil-exporting countries that sell crude to their own refineries at below-market prices. This practice, they contend, allows these refineries to compete in the U.S. market—even though they might otherwise be uncompetitive with the U.S. refining industry. Other allegations are that

- restrictions on product imports in other major markets, such as Japan and Western Europe, divert imports to the United States and further aggravate the problems of U.S. refiners;
- environmental regulations put U.S. refiners at a competitive disadvantage with foreign refiners, who may not be subject to such controls;
- tariffs collected by the U.S. Customs Service are too low or improperly applied and encourage higher product imports; and
- the situation will worsen when millions of barrels of new refining capacity, primarily in the Middle East, start operating in the next few years.

Some companies have advocated federal intervention to restrict product imports. They argue that, because petroleum product imports are causing the shutdown of many U.S. refineries, domestic capacity may be insufficient to refine crude oil drawn down from the Strategic Petroleum Reserve (SPR) and other domestic oil supplies in an oil supply disruption. Among the corrective measures recommended by this group to deal with this alleged energy security problem are tariffs and quotas on some or all petroleum product imports to help protect U.S. refineries from foreign competition.

Opponents of import restrictions, including some oil companies, oil industry analysts, and the administration, do not agree that product imports have left U.S. refineries unable to refine domestic oil supplies in an oil disruption. They assert that despite recent refinery closings, capacity would be sufficient to meet U.S. refining needs during such an emergency.

Opponents also note that while the volume of petroleum product imports has risen over the past few years, it is too small to account for the bulk of U.S. refinery closures. Rather, they contend that lower demand for petroleum products, competition from other fuels, and deregulation of the domestic oil industry in 1981 led to most of these closures.

Opponents of product import restrictions argue that the actions recommended to deal with imports would do more harm than good. Since they say that product imports are not the main cause of refiners' problems, they doubt that tariffs or quotas would be the right solution. Furthermore, they cite the high cost to the consumer of such measures and assert that these costs, plus the likelihood of trade retaliation against the United States by other countries, would more than offset any possible benefits.

In a February 15, 1985, letter, the Chairman of the Subcommittee on Fossil and Synthetic Fuels, House Committee on Energy and Commerce, requested that we examine the petroleum product imports issue. Citing allegations that product imports could affect the nation's ability to react to an oil supply disruption, the Chairman asked that we analyze product import trends, causes for the increase of these imports, whether they may cause U.S. refining capacity to be insufficient to refine oil from the SPR in an oil emergency, and the effects of alternative actions (including tariffs and quotas) to deal with the situation (see app. I).

Objective, Scope, and Methodology

Our objective was to examine the effects of petroleum product imports on the U.S. refining industry and U.S. energy security, focusing on the issues raised in the Chairman's letter. This report addresses each of these issues, although we have organized them in such a way as to convey more clearly our findings and conclusions. All of the questions are addressed within the context of (1) recent petroleum product import patterns, reasons for these trends, and their impact on refinery closures, (2) the outlook for U.S. product imports in coming years and their implications for further refinery closures, (3) the impact of refinery closures

on the nation's ability to meet its refining requirements, including an SPR drawdown, during a major oil supply disruption, and (4) the effects of policy options (tariffs and quotas) designed to ensure the availability of adequate refining capacity.

While our report deals with the policy implications of petroleum product imports for U.S. energy security, it does not address possible military requirements for particular products during a future major conflict or mobilization, nor does it deal with other possible justifications for government action. For example, some independent refiners and others have contended that tariffs and quotas are warranted to protect the industry from unfair trade practices by exporting countries. Others have considered tariffs and quotas as potentially large sources of government revenue that could reduce the federal deficit. It was outside the scope of this study, however, to evaluate whether government intervention is warranted for reasons other than energy security concerns.

The following discusses the approach and methods used to address each of the issues covered in our analysis.

Recent Petroleum Product Import Trends

Our analysis of this issue was based upon data published as of March 1986 by the Department of Energy's Energy Information Administration (EIA),[1] independent studies, and by industry sources. Included in this analysis were data on the growth in imports of specific petroleum products, sources of such imports, and the market shares accounted for by imported products. Although much of the concern over increased product imports dates from the early 1980's, we obtained time series data from 1970 through January 1986 so that we could examine the recent data in a historical context.

We relied upon interviews and studies to help identify factors contributing to recent product import trends. Contributing factors (discussed in chapter 2) include the effect of domestic oil price decontrol, internal pricing policies in oil-exporting countries, the value of the dollar, and the indirect effects of government regulatory programs. To analyze these factors, we reviewed government and industry studies, and interviewed officials of the Department of Energy (DOE), the Environmental Protection Agency (EPA), the International Trade Commission (ITC), the Treasury Department's Customs Service, representatives of refining

[1]The EIA data for 1985 are subject to confirmation and revision in June 1986 in EIA's Petroleum Supply Annual, 1985.

companies and industry organizations, and oil security and international trade analysts.

Projected Petroleum Product Import Trends

Concern over projected increases in product imports stems from new refining capacity, primarily in the Middle East, that has been and will continue to be coming on line over the next few years. The problems this capacity may pose for U.S. refiners depends upon what and how much refined products are produced, how much other major oil-consuming regions import, and other factors that are difficult to predict.

We obtained information on the status of the new refineries by examining published accounts of their capacity, output, and of government policies affecting their likely export volumes. We then analyzed forecasts of U.S. product imports and capacity losses, examining these forecasts' results in light of their assumptions about trade policies, product consumption, and other factors. Due to the high level of uncertainty inherent in such forecasts, their results (and hence our analysis and discussion of them) should be interpreted with caution.

Energy Security Implications of Petroleum Product Imports

The energy security implications of the product imports issue are based on the premise that continued shutdowns of U.S. refineries, caused by competition from product imports, may leave the nation without enough capacity to meet domestic refining needs during an oil supply disruption. To address this issue, we derived an estimate of the maximum amount of domestic crude oil that could be available to U.S. refineries during such a disruption. This estimate consists primarily of production (including emergency oil production) and oil drawn down from the SPR. We then compared this oil supply to estimated U.S. refining capacity (after accounting for maximum capacity utilization rates, operability of "idle" capacity, and other factors) to determine how much capacity would be left to refine available crude imports. We made this comparison for the present (January 1986) and projected it for 1990. We also considered other issues, such as access to refining capacity overseas, that could affect whether a shortage of domestic refining capacity might aggravate a shortage of crude oil during a supply disruption.

Data obtained for this assessment included: EIA and American Petroleum Institute (API) figures on current U.S. refining capacity; EIA and National Petroleum Council (NPC) data on domestic crude production and imports; and estimates for worldwide refining capacity.

Impact of Tariffs and Quotas

To analyze the impact of tariffs and quotas on U.S. consumers, refiners, and oil producers, we reviewed literature on crude oil and petroleum product import restrictions (including past GAO reports) and analyzed published estimates of various organizations. As a check on these results and to illustrate how various factors influence the impacts of these import restrictions, we performed our own calculations of these restrictions' effects. While these calculations may be less precise than results derived from large econometric models that have been used for this purpose, they offer one distinct advantage: the assumptions driving the results, and the manner in which the results are obtained, can be clearly presented and more easily understood.

Our calculations involve imposing tariffs on the domestic markets for petroleum products and crude oil and, given projected levels of domestic production, consumption, and imports, estimating how tariffs cause these quantities to change. Given estimates of domestic demand and supply elasticities, tariffs induce increases in domestic production and decreases in domestic consumption and imports (relative to their original projected levels). Once a tariff is imposed, its costs to consumers are calculated as the new consumption level multiplied by the product tariff in question. New industry revenues are calculated as the new production level multiplied by the tariff. These revenues are modified by subtracting increased costs and tax payments to derive net after-tax industry revenues. Finally, new government tariff revenues are calculated as the new import level multiplied by the tariff rate.

In performing these calculations, we relied on EIA for estimates of demand elasticities, domestic production, consumption and import levels, and current prices of the various petroleum products potentially subject to the control measures. We performed a sensitivity analysis on our results by using different elasticity assumptions in our calculations.

Have Product Imports Contributed Substantially to Refiners' Current Problems?

Although the issue of U.S. product import dependency has become controversial recently, it was a subject of concern at least as far back as the 1970's. For example, in a 1979 report, we questioned whether "U.S. refineries will be able to maintain the historical relationship between domestically refined and imported products."[1]

Current product import levels are not high by historical standards. However, of concern to refiners has been the dramatic change in the mix of product imports into the United States and its effect on the industry's competitiveness. To better interpret the present situation, we examine (1) current U.S. reliance on all product imports, (2) trends in imports of specific products, particularly the profitable "light" products such as gasoline, and (3) current sources of product imports. We then identify several leading causes for recent import trends and assess other reasons that have been offered as contributing to recent U.S. refinery closures.

Trends in Imports of Petroleum Products

As discussed, product imports, in total, were no higher in 1985 than they were during most of the 1970's. Imports of profitable light products have increased sharply in recent years, but still represent a relatively small share of the U.S. market.

Recent Trends in Total Product Imports

Because U.S. petroleum product demand has exceeded domestic petroleum production for many years, much of the nation's product demand has been met by (1) imported crude oil that was then refined in the U.S. and (2) imported petroleum products refined overseas. One measure of U.S. dependency upon product imports is the relative importance of product to crude oil in meeting U.S. import requirements. Products have accounted for an increasing share of imports in recent years, rising from 24 percent of total crude oil (excluding purchases for the SPR) and product imports in 1980 to over 36 percent in 1985.

However, this trend does not necessarily indicate increased dependency upon product imports. Import data covering the past 15 years show that (1) total product import volumes are no higher today than they were during almost all of the previous decade and (2) product grew as a share of total oil imports in the 1980's only because crude oil imports have dropped so substantially since 1979.

[1] U.S. Refining Capacity: How Much Is Enough? (GAO/EMD-78-77, Jan. 15, 1979), p. 30.

Another measure of U.S. dependence on product imports is their share of total domestic product consumption. Here too, the portion of demand met by product imports has still not reached the share held in the early 1970's. At 11.7 percent of domestic consumption in 1985, product imports were below the 15.5-percent share of demand accounted for in the early 1970's.

Thus, an examination of total product imports and consumption does not show increasing dependence on foreign refined products, but rather that current import levels are well within the range of recent historical levels. As we discuss in the next section, however, imports of certain products have climbed sharply during the past 5 years, becoming a new source of concern for many U.S. refiners.

Product Imports Have Shifted From "Heavy" To "Light" Products

Residual fuel oil, a "heavy" petroleum product used chiefly as a boiler fuel, has historically been the leading product import to the United States. However, demand for residual fuel oil has declined sharply in recent years from 2,508 thousand barrels per day (MBD) in 1980 to 1,194 MBD in 1985, and, accordingly, imports have fallen from 939 MBD in 1980 to 512 MBD in 1985. This drop has not had a large impact on domestic refiners, however. Because it is viewed as a byproduct of the refining process, and because of competition from natural gas in most markets, residual fuel oil is generally sold for less than the cost of the crude oil from which it is made. As a result, refiners seek to minimize yields of residual fuel oil and, as shown in table 2.1, imports are still relied on to meet much of the demand for this product.

Table 2.1: Product Imports as a Percent of Demand for Each Product, 1970-1985

Year	Gasoline and blendstocks	Distillate fuel oil	Residual fuel oil	Other[a] products	Total products
1970	1.2	5.8	69.5	8.4	14.3
1971	1.0	5.8	68.8	10.6	14.8
1972	1.1	6.3	68.9	11.7	15.4
1973	2.0	12.7	65.7	13.4	17.4
1974	3.1	9.8	60.1	12.3	15.8
1975	2.8	5.4	49.7	9.0	12.0
1976	1.9	4.7	50.5	7.4	11.6
1977	3.0	7.5	44.1	7.7	11.9
1978	2.6	5.0	44.9	5.8	10.7
1979	2.6	5.8	40.7	7.7	10.5
1980	2.1	4.9	37.4	8.3	9.6
1981	2.7	6.1	38.3	9.8	10.0
1982	3.7	3.5	45.1	11.8	10.6
1983	4.4	6.5	49.2	12.3	11.3
1984	5.7	9.5	49.7	13.8	12.8
1985	6.5	7.0	42.9	14.2	11.7

[a]Includes liquified petroleum gases and miscellaneous products.
Source: Compiled from EIA data sources.

The decline in residual fuel oil imports, however, has been more than offset by the growth in light product imports in recent years. This category of products is comprised primarily of motor gasoline, blendstocks (finished components used to make gasoline), and distillate fuel oil (used chiefly for space heating and diesel engine fuel). These are among the highest valued products made by refiners, who count on them to provide adequate profit margins. Moreover, U.S. refiners invested over $20 billion between 1980 and 1983 largely to upgrade their facilities with sophisticated conversion capacity to obtain additional yields of light products.

Despite this huge investment, imports of these major light products rose 127 percent between 1980 and 1985. Imports of motor gasoline and blendstocks jumped most sharply, increasing 216 percent since 1980 from 140 MBD to a record high of 442 MBD in 1985. Distillate fuel oil imports almost doubled from 142 MBD in 1980 to 272 MBD in 1984, before dropping to 199 MBD in 1985.

Because the rise in imports has exceeded the growth in demand, light product imports, particularly motor gasoline and blendstocks, have captured a larger share of domestic consumption. As table 2.1 shows, during the 1970's, gasoline and blendstock imports supplied an average of about 2 percent of gasoline consumption. In 1985, their market share rose to 6.5 percent. While the data demonstrate rapid growth, however, they also show that imports still account for a relatively small share of U.S. light product consumption.

Sources of U.S. Product Imports

Although the United States imports petroleum products from over 35 countries, table 2.2 shows that a relatively small number of them provide most of the supply. Almost all of these countries lie outside of the Middle East, the area that has proven to be most vulnerable to an oil supply interruption. In 1985, the countries listed in table 2.2 accounted for about 63 percent of U.S. gasoline and blendstock imports, 86 percent of distillate imports, and 66 percent of residual fuel oil imports. About 3.5 percent of total product imports were imported directly from the Persian Gulf.

Table 2.2: Leading Sources of Petroleum Product Imports, 1985
(Percent)

Country	Gasoline and blendstocks	Distillate fuel oil	Residual fuel oil	All[a] products
Algeria	0.1	3.0	10.8	5.7
Brazil	7.0	1.4	4.3	3.4
Canada	9.1	19.3	5.7	16.4
Mexico	3.2	4.6	3.0	5.5
Netherlands	10.8	0.6	0.4	3.1
Neth. Antilles	0.4	1.5	4.9	1.9
Romania	6.6	0.0	0.2	2.6
Saudi Arabia	6.6	0.0	0.6	1.9
Venezuela	12.1	37.6	16.4	16.1
U.S. Virgin Islands	7.2	18.1	20.0	13.5
Total, top 10	**63.1**	**86.1**	**66.3**	**70.2**
	100.0	**100.0**	**100.0**	**100.0**

[a]Includes finished petroleum products, natural gas liquids, and unfinished oils.
Source: EIA, Petroleum Supply Monthly, (Dec. 1985), p. 44.

The three largest foreign suppliers of petroleum products in 1985—Canada, Venezuela, and the U.S. Virgin Islands (which EIA counts as an exporter to the United States)—accounted for 28 percent of U.S. gasoline and blendstock imports, 75 percent of distillate fuel oil imports, and

42 percent of residual fuel oil imports. Relative newcomers on the list of foreign gasoline and blendstock suppliers were Brazil, Romania, and Saudi Arabia.

Thus, our analysis of product import trends shows that (1) total product imports today are no higher than they were during most of the 1970's, (2) imports of light products have increased sharply since 1980, although they still account for a relatively small share of U.S. light product consumption, and (3) a large proportion of U.S. product imports come from relatively secure countries in the Western Hemisphere.

Reasons That Might Explain the Increase in Light Product Imports

Several reasons have been suggested by oil industry analysts and industry representatives for the recent rapid increase in light product imports. Among them are (1) the effect of decontrol of domestic oil prices on the competitiveness of foreign refiners in the U.S. market, (2) the way in which some foreign suppliers price their products for export, (3) the high value of the U.S. dollar compared to other currencies, (4) tariff classification and enforcement by the U.S. Customs Service, and (5) EPA's rules to reduce the lead content in gasoline.

U.S. Oil Price Decontrol

During the 1970's, U.S. oil policy benefited refiners by keeping most foreign refined products out of the U.S. market. Regulations were developed under the Emergency Petroleum Allocation Act of 1973 (Public Law 93-159) that limited prices on most U.S. crude oil below foreign crude oil prices. Since U.S. refiners' crude oil acquisition costs were a composite of price-controlled domestic crude and market-priced imports, their average crude costs were lower than those faced by most foreign refiners. When imports of light products had to compete with domestic supplies refined from lower cost crude oil, it was much more difficult for foreign supplies to penetrate the U.S. market.

The lifting of oil price controls in 1981, which corresponds roughly to the start of the rapid growth in light product imports, took away this economic advantage for U.S. refiners. Thereafter, they were forced to pay market prices for crude oil and to reflect these higher crude acquisition costs in their product pricing strategies. The elimination of this crude cost advantage led one industry study to conclude that ". . .to

some extent the increase in light product imports since 1980 was a logical consequence of the previous period when U.S. refiners had an edge over foreign competitors."[2]

Pricing Policies of Foreign Product Exporters

Allegations have been made that some foreign refineries, particularly state-owned refineries, benefit from various forms of government subsidies that allow them to undercut U.S. refiners' product prices and thereby gain entry into the U.S. market. Testifying before the House Subcommittee on Fossil and Synthetic Fuels in September 1985, a spokesperson for the Independent Refiners' Coalition (a trade organization advocating protection against product imports) asserted that

> "In order to penetrate the U.S. market, [oil-producing governments] discount the price of crude oil to their own refineries, while charging U.S. refiners higher market prices. They also can sell refined products at a loss and simply absorb refining losses in their crude oil profits. Using this practice, they can undercut U.S. prices in the U.S. marketplace, shutting down U.S. refineries until their market share finally equals their production capacity."

The ITC recently investigated the potential effects of foreign governments' policies for pricing natural resources. While it found few instances of a formal written government policy for such dual pricing of crude oil, it concluded that ". . . the prices of both crude petroleum and natural gas for domestic use are commonly set below the export or world market levels."[3] Specifically, ITC concluded that while crude oil for export was priced at about $29 per barrel in 1984, domestic users in Mexico obtained crude at $6 to $7 per barrel, in Venezuela for $6 to $8 per barrel, and in China for $5 to $7 per barrel. The report noted that these lower priced raw materials can confer a comparative advantage to refiners in these countries.

In principle, industries alleging injury due to unfair trade practices can seek relief through antidumping and countervailing duty laws. Antidumping duties are imposed if the Department of Commerce determines that foreign petroleum products were being sold in the United States at less than fair market value, whereas countervailing duties are imposed if the Department of Commerce determines that a country is providing a subsidy on goods imported into the United States. In either

[2]Petroleum Industry Research Foundation, Inc., Outlook for Light Product Imports Into the United States (June 1985), pp. 2 and 3.

[3]U.S. International Trade Commission, Potential Effects of Foreign Governments' Policies of Pricing Natural Resources (May 1985), p. xvi.

case, the ITC must usually find that a domestic industry is threatened with material injury by the imports in question.

Whether foreign refined products should be subject to import relief has been a matter of debate. The Department of Commerce has ruled that under current U.S. law, foreign government programs that are generally available to all industries in a country are not countervailable. For example, the pricing of crude oil to Saudi refiners, even if sold below the world market level, would not be countervailable as long as the below-market priced crude was available to all Saudi industries. Proponents of product import restrictions, however, have supported legislation that would impose countervailing duties when crude oil subsidies to foreign refiners are used to penetrate the U.S. market.

Effect of the Relative Value of the Dollar

The relative strength of the dollar has also played a role in the rise in U.S. product imports. Unlike other commodities, crude oil and petroleum products are priced in dollars in international trade. Therefore, any appreciation in the value of the dollar relative to other currencies makes oil imports relatively more expensive in other oil-consuming markets. This has the effect of lowering their import demand, thereby putting downward pressure on the price of petroleum products on the world market. In the United States these reduced prices have led to higher demand for imported products.

The World Bank estimated in 1985 that the effect of exchange rate shifts from 1979 to 1983 was to lower petroleum consumption in Western Europe by 15 percent and in the Japan/Australia/New Zealand region by 6 percent. Similarly, the Federal Reserve Bank of Dallas estimated that the dollar's appreciation reduced the total petroleum consumption of France, the United Kingdom, West Germany, and Japan by 9.8 percent, or 1 million barrels per day in 1983. Lower petroleum product demand in these and other oil-consuming countries has led to downward pressure on prices. Falling product prices, in turn, have increased imports to the U.S. market, which has relatively higher demand (particularly for the profitable light products) and few import restrictions.

EPA's Lead Phasedown Program

"Lead phasedown" refers to a regulatory program designed to reduce levels of atmospheric lead by lowering the percentage of lead content in gasoline. Lead is used as a low-cost octane enhancer in gasoline. However, health concerns over lead have prompted increasingly stringent

standards for lead content in gasoline in recent years. Allowable limits have decreased from 1.1 grams per leaded gallon set in 1982 to 0.5 grams in July 1985, and to 0.1 grams in January 1986.

Meeting lead phasedown requirements has increased costs for U.S. refiners. EPA has estimated that unleaded gasoline costs about 2 cents per gallon more to manufacture than leaded gasoline meeting the 1.1-gram standard. Lead phasedown's effects on total gasoline import levels, however, are less clear. On one hand, the ITC suggested in an April 1985 report that "EPA's phaseout and eventual ban of lead in gasoline is expected to result in a dramatic decline in the volume of imports of lead-containing gasoline and blending stocks . . .."[4]

On the other hand, various incentives related to lead phasedown may be increasing imports of unleaded gasoline and certain gasoline blendstocks. Industry analysts have suggested, for example, that refiners from countries without stringent lead standards are able to add lead to the low-octane gasoline they produce for domestic consumption, leaving the higher octane unleaded stocks they produce available for export to the United States where it is more highly valued. One study suggests that this could give U.S. gasoline importers a competitive advantage, noting that "This lower cost of octane production will make [U.S.] importers relatively low-cost suppliers of gasoline."[5]

It has also been alleged that allowing refiners to "bank" lead rights has also encouraged imports of low-lead gasoline. Under this practice, refiners that used less lead in gasoline than the EPA standard allowed during 1985 could exceed the standard by the same amount of lead or sell credits earned to other refiners (until 1988). The banking of lead rights, while allowing industry more flexibility in meeting lead phasedown requirements, may have encouraged imports by domestic refiners who could import low-lead gasoline cheaper than producing it. These refiners may have imported low-lead gasoline in 1985 in order to "bank" lead rights while the more lenient 0.5-gram standard was still in effect, and could then use these lead rights after January 1986 when the more stringent 0.1-gram standard took effect.

[4]U.S. International Trade Commission, Potential Effects of and Recommendations Concerning the Proposed Tariff Reclassification of Catalytic Naphtha and Other Motor Fuel Blending Stocks (Apr. 1985), p. 53.

[5]Purvin and Gertz, Inc., Impact of Refined Product Imports on the U.S. Refining Industry (n.d.), p. 156.

Thus, the lead phasedown program has provided incentives to shift gasoline imports from leaded to unleaded gasoline, although its effect on total gasoline import levels is unclear. EIA data show that unleaded gasoline imports have risen from about 49 percent of total gasoline imports in 1983 to about 68 percent in 1985. However, this shift in unleaded gasoline imports is consistent with the shift in U.S. unleaded gasoline consumption (rising from 55 to 65 percent of gasoline consumption during the same period), indicating that imports thus far have not been disproportionately relied upon to meet lead phasedown requirements. In any event, the effect of lead phasedown is expected to begin decreasing in 1987 as the market readjusts to the new lead standards.

Tariff Classifications

Oil companies have also asserted that product imports, particularly gasoline and blendstocks used to make gasoline, have been inadvertently encouraged by the Customs Service's tariff classification system. Although these products may be used for the same purpose, confusion over their proper classification has caused Customs officials in different ports of entry to classify them as different products and assess them different tariffs. API commented in March 1985 to the ITC that

> "It appears that while certain Customs officials assessed cargoes of these blendstocks at the motor fuel tariff rate (1.25 cents per gallon), others dutied them at the lower naphtha rate (0.25 cents per gallon), and still others at a higher ad valorem rate."

This problem may have contributed to higher import levels to the extent that confusion over classification has allowed buyers to import products similar to gasoline at the lower 0.25-cents-per-gallon tariff rate. Imports of products EIA identifies as "motor gasoline blending components" have jumped from 24 MBD in 1981 to 65 MBD in 1985. While this amount still represented only 1 percent of gasoline consumption in 1984, it is difficult to estimate the total effect of the classification problem on imports. On one hand, the 65-MBD figure may understate blending component imports because some products other than those officially classified as "motor gasoline blending components" (such as unfinished oils that must be upgraded) may also be used for gasoline blending. On the other hand, it may overstate the effect of the tariff differential in that much of these blending components may still have come in regardless of the penny-per-gallon tariff differential.

Impact of Product Imports on Recent U.S. Refinery Closures

We noted in chapter 1 that petroleum product imports have surfaced as an issue largely because of their alleged effects on the U.S. refining industry. Having analyzed the composition, volumes, and sources of these imports, and factors that have contributed to these trends, we now assess whether product imports can explain the recent capacity losses sustained by the industry. As discussed in the next section, increased product imports do not adequately explain the bulk of recent U.S. refinery closures.

This conclusion stems in part from the relatively small volume of product imports that have been entering the country in the past few years. As we have indicated, total product imports are no higher now than they were during most of the 1970's. Between 1980 and 1985, the volume of major light product imports (gasoline, gasoline blendstocks, and distillate fuel oil), those most important to refiners' profitability, increased by 360 MBD. While this demonstrates rapid growth in light product imports, it cannot account for the closure of 3 million barrels per day of refining capacity during the same period.

The timing of product import increases also conflicts with the notion that they contributed significantly to recent refinery closures. Of the 106 refineries shut down between 1981 and 1985, 66 had already closed by January 1, 1983 (as shown in table 2.3), and capacity had declined by almost 2 million barrels per day. Imports of light products, however, had only begun their steep growth by this time. In 1981 and 1982, major light product imports averaged only 343 MBD; in 1983 and 1984, they climbed to an average of 560 MBD.

Thus, levels of product imports, and the timing of their growth in relation to the bulk of capacity losses, suggest that other reasons might better account for recent U.S. refinery closures.

Other Reasons Can Better Explain Recent Refinery Closures Than Product Imports

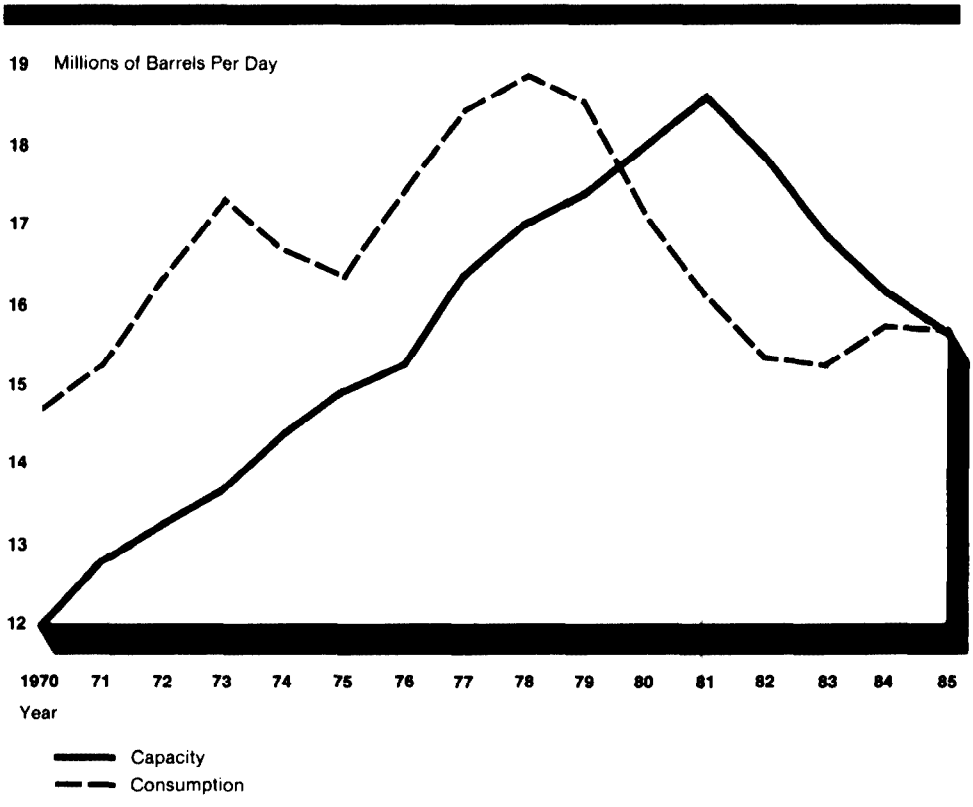
A review of other possible causes for recent U.S. refinery closures surfaces more convincing explanations than product imports. Among them are (1) an unexpected sharp decline in petroleum product demand during the early 1980's and (2) total decontrol of crude oil prices by early 1981.

Unexpected Sharp Decline in Petroleum Product Demand

Figure 2.1 shows that while both petroleum consumption and refining capacity increased rapidly during the 1970's, consumption exceeded capacity each year by an average of 2.25 MMBD. With consumption growth projected to remain strong into the 1980's, refiners continued with plans to expand capacity. However, the expectation that consumption would continue to rise rapidly proved to be wrong. In the wake of the Iranian oil cutoff and ensuing oil price increases, petroleum consumption dropped sharply, from 18.5 MMBD in 1979 to about 15.7 MMBD in 1985.

Nevertheless, as figure 2.1 illustrates, additions to refining capacity continued until 1981, by which time capacity far exceeded consumption. This led to an inevitable decline in refinery utilization rates, from over 90 percent during the early 1970's to 68.6 percent in 1981. Largely in response to this overcapacity problem, refiners began to shut down distillation capacity. Nearly 3 MMBD of operable capacity was closed in the following 4 years.

Figure 2.1: U.S. Refining Capacity and Petroleum Consumption, 1970 to 1985 (MMBD)



Oil Price Decontrol Aggravated the Overcapacity Problem for Many Independent Refiners

Oil price decontrol in 1981 compounded this problem for many refiners. While we noted that decontrol may have increased product imports, it had a much more direct and sizable effect—particularly on smaller and less efficient refiners—by eliminating guarantees of low-cost crude and profitable margins.

Federal oil market regulations encouraged the construction of small, simple refineries during the 1970's. These facilities were less able to obtain high yields of profitable light products and had to rely on lighter grade, more expensive crude oil. However, price controls and other federal regulations helped to equalize the cost of crude oil for all refiners, and a "small refiner bias" subsequently lowered smaller refiners' average crude oil costs below those of larger refiners. The effect of these regulations was to assure profits for efficient and inefficient refiners alike by allocating the benefits of price-controlled crude oil to all refiners. Indeed, many of the relatively simple "teakettle" refineries were built specifically to take advantage of the entitlements program and the small refiner bias.

With oil decontrol, the certainty of below-market crude oil prices was eliminated, as were assurances that product prices received by smaller and less efficient refiners would always exceed their crude oil costs. Table 2.3 shows that 90 of the 106 net refinery shutdowns between January 1981 and December 1985 were small refineries with capacities below 30,000 B/D. Almost half were built since the entitlements program began, and few of these had the sophisticated downstream capacity needed to enhance yields of valuable light products and handle cheaper, heavier-grade crudes.

Table 2.3: Number of Operable Refineries by Size, in Barrels Per Day of Capacity, January 1, 1981 Through December 31, 1985

Year	Under 10,000	10,001-30,000	30,001-100,000	Over 100,000	Total
1981	91	93	86	54	**324**
1982	82	80	87	52	**301**
1983	67	59	84	48	**258**
1984	63	55	82	47	**247**
1985	56	43	77	47	**223**
1986	52	42	77	47	**218**
Shutdowns[a] 1981-85	39	51	9	7	**106**

[a]Data on shutdowns represent the net reduction in the number of facilities. During the years shown, 122 refineries closed, and 16 plants started operations.

Sources: EIA, Petroleum Supply Annual,1984, vol. 1, p. 79, and Petroleum Supply Monthly (Nov. 1985), p. xv.

Thus, the combined effects of the decline in petroleum product demand and overexpansion of capacity, coupled with the elimination of the crude oil price and allocation program that supported operations of many small refiners, appear to explain the recent closures of U.S. refineries better than competition from foreign suppliers of petroleum products. While imports of light products may have contributed to refineries' problems, (1) the volumes do not correspond to the magnitude of refinery closures and (2) the bulk of the refinery closures began before light product imports began to gain a noticeable share of the U.S. market.

With most of the inefficient refineries already gone, however, and with the fall in product demand leveling off, attention has focused increasingly on the impact of product exports from new OPEC refineries as the primary cause for U.S. refinery closures during the next several years. Expected imports of light products from these and other sources, and their implications for further U.S. refinery closures, are the subjects of chapter 3.

What Is the Outlook for Product Imports and Refinery Closures in the Future?

We noted in chapter 2 that an unanticipated decline in petroleum product consumption and the effects of oil decontrol were primarily responsible for the shutdown of about 3 MMBD of refining capacity during the past 5 years. The U.S. refineries that have stayed in business are generally among the most competitive, efficient, and sophisticated refineries in the world. However, they face new challenges that may result in some of these facilities shutting down as well. Foremost among these challenges is new refining capacity, primarily in the Middle East, that has been and will continue to be coming on line over the next few years. These refineries are adding competitive pressures to a worldwide refining industry already burdened by about 20 MMBD of overcapacity. They have heightened concern over potentially increased product imports into the United States, Western Europe, and other oil-consuming nations, which could lead to additional closures of refining capacity in these areas.

We examine in the next section the issues that will affect future petroleum product imports into the United States, analyze projections of U.S. product imports over the next few years, and discuss the implications of higher import levels for further U.S. refinery closures. Chapter 4 then examines the potential effects of these additional capacity losses on the nation's energy security.

Key Issues Affecting Future U.S. Petroleum Product Import Levels and Capacity Losses

EIA projects that declining oil prices, increased domestic oil consumption, and declining domestic production may cause net U.S. imports of crude oil and petroleum products to increase from 4.2 MMBD in 1985 to at least 6.7 MMBD in 1990. How much of this import requirement will be met by foreign refined product will depend, in large part, on the ability of domestic refineries to compete with foreign refiners as sources of refined product. The economics of trade implies that product imports will increase when the price of foreign product supplies is below domestic production costs. In addition, government policies in some countries, which are designed to protect their domestic refining industries through restrictive trade practices, will also play an important role. Both economic factors and government policies, therefore, will influence future petroleum product import trends in the United States. Among the most important are

- the expansion of refining capacity by Organization of Petroleum Exporting Countries (OPEC),
- policies affecting the volume and price of exports from these refineries, and

- product import policies of the major oil-consuming countries.

How Much New OPEC Capacity Is Coming on Line?

While world crude refining capacity declined by about 7 MMBD between 1980 and 1985, OPEC capacity is expected to expand considerably. Table 3.1 shows construction of 90 percent of OPEC capacity additions between 1985 and 1988 in the Persian Gulf, the majority of them in Saudi Arabia. Saudi Arabia can be expected to replace Venezuela as the leading OPEC product exporter by 1988.

The new Persian Gulf refineries are sophisticated, modern plants with considerable flexibility in varying the types of products they can produce. Most of the products available for export will be made up of high-valued light products. A detailed study by Purvin and Gertz, Inc.[1] on Middle East refineries projects the mix of products in 1990 to be 16 percent gasoline, 45 percent middle distillates, 29 percent residual fuel oil, and 10 percent other products (including gasoline blendstocks).

Table 3.1: Projected OPEC Refining Capacity (MBD)

	1985 capacity	Planned additions	1988 capacity
Saudi Arabia	950	825	1,775
Iran	545	250	795
Kuwait	550	80	630
Iraq	320	90	410
Bahrain	250	0	250
United Arab Emirates	130	45	175
Qatar	10	50	60
Persian Gulf	**2,755**	**1,340**	**4,095**
Venezuela	1,360	0	1,360
Indonesia	860	0	860
Algeria	435	115	550
Nigeria	260	150	410
Libya	350	0	350
Ecuador	85	0	85
Gabon	20	0	20
Other OPEC	**3,370**	**265**	**3,635**
Total OPEC	**6,125**	**1,605**	**7,730**

Source: H. Lee and B. Mossavar-Rahmani, "Emerging Trends in U.S. Refining and Petroleum Product Trade: Implications for Energy Security Policy," Discussion Paper Series, Kennedy School of Government, Harvard University (Dec. 1985), #H-85-02.

[1]Purvin and Gertz, Inc., Impact of Refined Product Imports on the U.S. Refining Industry, (n.d.).

This expansion of Middle East capacity, while capacity is closing elsewhere in the world, might appear unusual. However, despite the poor economics of refining at the present time, these OPEC countries may have undertaken this expansion for a number of reasons. First, planning for these projects began in the late 1970's, when additional refinery capacity was thought to be necessary to meet growing world demand for oil products. Even as late as 1981, the International Energy Agency was projecting free-world oil consumption to exceed 53 MMBD by 1985, well above estimated 1985 consumption of about 46 MMBD.

It also may have made economic sense for countries dependent on raw material exports to add value to those raw materials by refining them before export. The economics of Middle East refining were thought to be particularly attractive due to the region's comparatively low refining costs, easy access to land on which to build or expand facilities, and large amounts of capital to buy the most sophisticated technology.

With hindsight, however, the benefits of this kind of investment appear somewhat less certain. As summed up by oil refining analysts Fesharaki and Isaak,

"... above all there was an honest belief that upgrading refineries, using low-cost gas in a world of increasing energy prices, would prove profitable. If planners in these nations had been able to foresee today's market conditions, these projects would not have been so vigorously pursued. It is, however, too late to abandon these projects now."[2]

Policies Affecting the Price and Volume of Product Exports

As noted in chapter 2, a May 1985 ITC report concluded that governments of oil-producing countries may have sought to improve the competitiveness of their export refineries by discounting the price of crude oil made into products by these refineries. By reducing their crude input costs, these refineries would be able to offer more attractive prices for their product. The more attractive their prices are, the easier it would be to penetrate markets in the United States and other oil-consuming countries.

With the expansion of OPEC product exports expected to account for most of the growth in future world product trade, concern has mounted over whether the new OPEC refineries too may receive the benefits of price discounting. A February 1985 study by the Resource Systems

[2]F. Fesharaki and D.T. Isaak, "Impact of OPEC Export Refineries on the World Refining Industry," National Petroleum Refiners' Association, Proceedings of the 1985 Annual Meeting, AM-85-26, p. 18.

Institute at the East-West Center in Hawaii, prepared for DOE, examined the economics of a number of Persian Gulf export refineries coming on line to determine whether the Gulf countries would have an incentive to discount their crude to be competitive with refineries in the United States and other industrialized countries. Despite the high transportation costs from these refineries to consumer markets, the report concluded that

". . . it does not appear that Gulf governments will have to discount crudes to their refineries to be competitive; even at official prices they can compete with most OECD [Organization for Economic Cooperation and Development] capacity. This does not, of course, mean that they will not discount their crudes; it merely shows that it is not necessary to discount to achieve competitiveness."[3]

The study's results suggest, however, that crude oil discounting could be required if these governments' objectives include penetrating the U.S. market. Even though the Kuwaiti and some Saudi refining capacity may be on an equal competitive footing with U.S. refineries without discounting, the United States is the least profitable market for Persian Gulf countries. The study noted that "In a world based on free trade very little refined products would flow from the Gulf to the U.S."

A June 1985 study prepared for the Independent Refiners Coalition concluded that Middle East refineries would not be competitive with U.S. refineries, and found this to be a strong incentive for the Middle East countries to resort to price discounting. It reported that

"The combined burden of higher transportation cost and higher capital cost would result in Middle East refiners becoming non-competitive with U.S. Gulf refineries when selling finished products in the U.S. market, if they are paying the same price for crude."[4]

This study asserts that Middle East countries will therefore provide crude to their own refineries below the world price in order to penetrate the U.S. market.

Still, while incentives may exist for OPEC countries to discount crude prices to their refineries if they want to further penetrate markets in the United States and elsewhere, discounting also poses risks for these countries if they are concerned about undermining the world price of crude

[3]East-West Center, The Changing Structure of the World Refining Industry: Implications for the United States and Other Consuming Regions (Feb. 1985), p. 163.

[4]The Pace Company, The Effect of Increasing Petroleum Product Imports on the United States Refining Industry (June 1985), p. 53.

oil in an already depressed market. This disincentive is acknowledged by the Pace report, which noted that "Exporters of crude and products who expand the supply of refined products in a demand-limited market not only risk downward pressure on their product revenues but also on their crude revenues."

Thus, it is presently unclear to what extent crude oil price discounting might be used to increase utilization of, and exports from, Middle East refineries, although this issue should become clearer over time. As we show in our analysis of import projections in the next section, analysts' assumptions about these pricing policies are important in projecting how much product will be imported by the United States and other oil-consuming countries.

Petroleum Product Import Policies of Other Oil-Consuming Nations

Import policies of the U.S. and other oil-consuming nations, particularly Japan and Western European countries, would also substantially affect future trends in U.S. product imports. If Japan and Western Europe restricted product imports, the reduced demand for petroleum products in these markets would put downward pressure on world product prices. Lower world prices, in turn, would likely result in increased product imports to the United States.

Currently, quotas do not exist for product imports into the United States. Tariffs range from 5.25 cents per barrel for distillate and residual fuel oils to 52.5 cents per barrel on motor gasoline and jet fuel.

By contrast, in Japan the tariff is about $1.70 per barrel on distillate and $2.70 per barrel on jet fuel (based on early 1986 exchange rates). Only naphtha (used to make petrochemicals or as a fuel) and residual fuel oil are allowed unrestricted entry. Gasoline imports are not allowed, and other imports, such as distillates, are only permitted to alleviate specific shortages.

In order for the additional product from the Middle East to have any substantial penetration into Japan, existing import policies would have to change. Such a change was suggested by the July 20, 1985, Communique of the International Energy Agency Ministerial, in which Japan and other IEA members agreed to create conditions which would allow the distribution of products from the Middle East to be determined on the basis of supply and demand. The issue is also being studied by

Japan's Ministry of International Trade and Industry, which has suggested that some easing of import restrictions may occur in the spring of 1986.

Western European markets are far less restricted than those of Japan. Over the last few years, tariffs established by the European Economic Community (Community) have been applied to only a limited volume of product imports. About 80 to 85 percent of product imports are permitted to enter duty free, either because they are imported for further processing or because they come from countries with preferential trade agreements. The remaining 15 to 20 percent of imported products are assessed duties ranging from 3.5 percent to 6 percent of value.

Importantly, several countries expected to be major sources of future Middle East product exports, such as Saudi Arabia and Kuwait, receive preferential treatment under trade agreements with the Community. Their oil products may enter at no duty but are subject to quantity limits each year. On imports above the specified ceiling, duties may be imposed if the Community or a member country requests such action. In practice, however, duties have not been required of these countries since 1979, even when volume limits have been exceeded.

In March 1985 the Community issued a report[5] assessing the impact of petroleum product imports on its refining industry. The report indicated that the Community expects to absorb a substantial share of products from the new OPEC export refineries. This is estimated to be about 40 percent of the total additional product on the world market. Net imports of finished products could rise to about 7 percent of forecast consumption in 1990. However, the Community's willingness to allow entry of additional products is based on the presumption that "the export surplus is allowed free access to the main markets of the world."

So while Japan presently enforces strict product import limitations (particularly on light products), both the United States and Western European markets are largely unrestricted to Middle East product imports. Whether Japanese markets open in the future—or U.S. and European markets close—has been the subject of much speculation. The importance of the issue, however, is underscored by industry analysts such as

[5]Commission of the European Communities, The Situation in the Oil-Refining Industry and the Impact of Petroleum Product Imports from Third Countries (March 1, 1985).

the authors of the East-West Center study, who assert that "trade barriers rather than economics may be the decisive factor in determining the pattern of product flows from the Gulf."[6]

Estimating U.S. Light Product Imports in 1990

Several studies have evaluated the potential impact of increasing product imports on the U.S. oil market. These include analyses by Purvin and Gertz, Inc., an energy and chemical industry consulting firm; the Petroleum Industry Research Foundation, Inc. (PIRINC), a research organization supported by various segments of the oil industry; and the Pace Company, a consultant to the Independent Refiners Coalition.[7] Each includes 1990 as a forecast year, by which time all currently planned OPEC export refineries are expected to be in full operation.

A review of these studies shows that the projected levels of U.S. light product imports vary considerably not only between studies but in different scenarios within the studies. This is due to the different forecasting techniques used as well as the diverse assumptions about export refineries' utilization rates, world oil demand, import policies in Europe and Japan, and underlying economic factors. A summary of the results and key assumptions of these studies is discussed in the next section, along with the effect of differing assumptions on estimates of future product imports.

Purvin and Gertz

The Purvin and Gertz analysis concludes that, even with a potentially large increase in the world product surplus, net imports of major light products (gasoline, kerosene, jet fuel, and distillate fuel oil) to the United States will decrease from 554 MBD in 1984 to 518 MBD in 1990. The study finds that increased imports from the Middle East and Africa will be offset by a fall in shipments from Caribbean and Latin American refineries. As the market adjusts, net imports' share of domestic consumption will decline from 5.2 percent in 1984 to 4.8 percent in 1990.

The key assumptions used in this study include:

[6]East-West Center, p. 163.

[7]Purvin and Gertz, Inc., Impact of Refined Product Imports on the U.S. Refining Industry, (n.d.); Petroleum Industry Research Foundation, Inc., Outlook for Light Product Imports Into the United States (June 1985); The Pace Company, The Effect of Increasing Petroleum Product Imports on the United States Refining Industry (June 1985).

- Middle East refineries will operate at 76 percent of capacity in 1990 (compared to 67 percent in 1984).
- U.S. light product demand will grow 0.4 percent annually between 1984 and 1990 (compared to a yearly decrease of 1.9 percent between 1978 and 1984).
- Japan will continue to ban gasoline imports. Western Europe will maintain its current policy of not applying import duties or quotas to developing countries, such as Saudi Arabia and Kuwait.

PIRINC

This study estimates that gross U.S. light product imports (gasoline, kerosene, jet fuel, and distillate fuel oil) from all sources will rise to 735-1,200 MBD. Gross imports would then represent 6.5 to 10.6 percent of domestic light product demand in 1990, compared to its 5.8 percent market share in 1984. U.S. imports of light products from OPEC countries alone could increase from 170 MBD in 1984 to 385 MBD in 1990 under more optimistic assumptions, or to 850 MBD under less optimistic assumptions. In addition, the United States will continue to import light products from Caribbean and other non-OPEC sources, although at volumes below current levels.

Key assumptions of this study are:

- OPEC export refineries worldwide will operate at 85 to 90 percent of capacity in 1990.
- U.S. demand for light products is forecast to remain about the same in 1990 as in 1984.
- In the "low foreign import absorption" case, Europe imposes currently suspended tariffs if import levels start to rise, Japan maintains import restrictions, and Asian nations meet product demand from local refineries.
- In the "high foreign import absorption" case, Europe takes about 27 percent of OPEC light product exports, Japan eases restrictions on gasoline imports, and OPEC refineries capture a significant share of the Asian market.

Pace

In a study prepared for the Independent Refiners Coalition, the Pace Company predicts that "maximum" utilization of Middle East refineries and restricted entry into European and Japanese markets will divert large volumes of refined products to the United States. It projects net imports of light products (gasoline, jet fuel, kerosene, and distillate fuel oil) at about 1,300 MBD, or about 12 percent of domestic demand in 1990.

Without Japanese and European trade barriers, and assuming refineries operate at a more "rational" utilization rate of 70 percent, net light product exports to the United States would be 640 to 740 MBD, or about 6 percent of consumption in 1990. Pace uses alternative sets of assumptions about (1) future economic growth trends and (2) trade and refinery utilization policies:

- Economic growth. Under a "cyclical" forecast, Pace assumes a recession in 1987 with a slow recovery through 1990. Demand for light products in the United States is expected to remain near 1983 levels. Under a "trend" forecast, steady economic growth is predicted through this period. U.S. demand for light products is forecast to grow at 0.6 percent per year.
- Trade and refinery utilization policies. A "high imports" scenario assumes Japanese and Western European trade restrictions, and "maximum utilization" of Middle East refineries. A "medium imports" scenario assumes that Japan will allow gasoline imports, Western European imports are not restricted, and Middle East refineries operate at a "rational" 70 percent utilization.

Analysis of Forecasts

Table 3.2, which summarizes the results of these studies, illustrates how different assumptions, primarily regarding trade barriers in industrialized countries and utilization rates of export refineries, can affect the projection of future U.S. import levels.

Table 3.2: Projections of Net Imports of Light Products to the United States, 1990

Study/scenario	Key assumptions: Mideast refinery utilization	Key assumptions: Trade barriers elsewhere	1990 U.S. net light product imports (MBD)
Purvin and Gertz	76%	[a]	518
PIRINC High foreign absorption case	85–90%[b]	low	735[c]
PIRINC Low foreign absorption case	85–90%[b]	high	1,200[c]
Pace Co. Medium imports/ trend case	70%	none	740
Pace Co. Medium imports/ cyclical case	70%	none	640
Pace Co. High imports/ trend case	maximum	high	1,287
Pace Co. High imports/ cyclical case	maximum	high	1,332

[a]The Purvin and Gertz study assumes that Japan will maintain its gasoline imports ban and the European Economic Community its preferential treatment of Middle East imports.

[b]PIRINC's estimates of refinery operating rates are for all OPEC countries, not just for refineries in the Middle East.

[c]PIRINC's estimates represent gross imports while the other studies deduct exports to derive net imports. However, exports of light products are currently only about 80 MBD and are not expected to rise significantly.

Variations in trade barrier assumptions produced wide variations in import projections. In the PIRINC study, 1990 gross light product imports are forecast to reach 735 MBD if the major oil-consuming markets outside the United States do not enforce trade restrictions, but this estimate rises to 1,200 MBD if they do. Pace projects net U.S. light product imports at 640 to 740 MBD assuming no trade barriers in other markets, but about twice this amount (1,287 to 1,332 MBD) with trade barriers.

While it is somewhat speculative to predict future trade policies, it appears overly pessimistic to assume uniformly high trade barriers in oil-consuming countries in view of present import policies in Western Europe and the possible liberalization of Japan's import policy. We noted earlier in this chapter that Western European countries presently do not enforce light product import restrictions against the major Middle East refiners, and that Japan's Ministry of International Trade and Industry is considering a relaxation of some of its present import restrictions. Therefore, the estimates of light product imports in the 1,200 to 1,300 MBD range are probably too high.

The results of these scenarios are also sensitive to their assumptions about Middle East refinery utilization rates. Pace's medium imports cases and Purvin and Gertz both use relatively low operating rates, 70 and 76 percent, respectively, and project the lowest levels of U.S. product imports—less than 750 MBD. The other four scenarios assume utilization rates of at least 85 percent, and three of these result in import forecasts of over 1,200 MBD.

An assumption of low operating rates, however, could understate Middle East product exports and, hence, U.S. imports. While export refineries' operating rates will be influenced largely by product prices, we noted earlier that oil-producing governments have the capability of discounting crude oil prices to their export refineries to increase their output and further penetrate markets in the United States and elsewhere. We also cited in chapter 2 an ITC report that concluded that such price discounting has taken place in some product-exporting countries. Should export refineries benefit from crude price discounting and operate above 85 percent of capacity, then the estimates in table 3.2 reflecting low utilization rates (518 to 740 MBD) could understate U.S. light product imports.

Thus, our examination of these studies suggests an estimate of U.S. light product imports of roughly 1,000,000 B/D in 1990, based on a moderate set of assumptions about trade policies and capacity utilization. This would represent an increase of about 315 MBD over light product imports during 1985.

Impact of Higher Product Imports on U.S. Refining Capacity in 1990

Because light products are the most profitable to refiners, losing market share to foreign gasoline and distillate suppliers damages a refiner's competitive position. If the world oil market continues to be glutted with excess capacity and low profits in refining and marketing, U.S. and worldwide capacity shutdowns can be expected to accompany the startup of OPEC's new export refineries. Each of the previously discussed studies examined the relationship between additional light product imports and the prospect for further U.S. refinery shutdowns. Their estimates of capacity losses are summarized in table 3.3.

Table 3.3: Estimates of U.S. Refining Capacity Losses, 1985 to 1990

Study	Scenario	Capacity Loss (B/D)
Purvin and Gertz		1,050,000
PIRINC	Low foreign absorption	1,000,000
Pace Co.	Medium imports/trend	444,000
	Medium imports/cyclical	690,000
	High imports/trend	1,016,000
	High imports/cyclical	1,408,000

In the most comprehensive examination of the issue, Purvin and Gertz performed a detailed "shutdown" analysis of the U.S. refining industry on an individual refinery basis. It concluded that about 1,000,000 B/D of U.S. refining capacity is "highly vulnerable to closure." Although the report found that the level of product imports will be a major contributing factor to continuing refining closures, it also cited a lack of access to low-cost crude, difficulty in producing unleaded gasoline, and other factors that will contribute to the demise of domestic refineries in the future. According to Purvin and Gertz, the combined effect of product imports on an already weakened refinery industry and the desire of many refiners to retrench to more efficient operations accounts for the disproportionately large impact on capacity of light product imports.

The PIRINC analysis made similar observations. With demand growth and capacity utilization rates expected to remain low in the near future, and with environmental standards becoming more stringent, the position of some refiners will be put in jeopardy. If light product imports rise to 1,200 MBD in 1990, as forecast in its low foreign absorption case, an estimated 1,000,000 B/D of U.S. capacity will be put at risk. But PIRINC points out that the prospects for further refinery shutdowns will be exacerbated even if actual import levels are far lower. The report concludes that,

"The presence of the estimated incremental volumes of light products on the world market would likely exert downward pressure on product prices. Accordingly, even if not all the physical barrels immediately enter the U.S, their potential negative impact on refinery margins would still be felt."

The Pace study calculated the effect of imports on the refining industry for each of its alternative scenarios using a linear programming model. It estimated U.S. capacity losses of 444,000 to 690,000 B/D under uniformly optimistic assumptions about Middle East refinery output and product import barriers, and 1,016,000 to 1,408,000 B/D under pessimistic assumptions about these factors. While these losses are forecast

to result directly from additional light product imports, the timing of refinery shutdowns is expected to be hastened by the industry's poor financial condition. The report noted that, ". . . recent low and often negative profit margins have increased the debt structure of many refiners. This has weakened their ability to operate with excess capacity."

Thus, an additional U.S. refining capacity loss of roughly 1,000,000 B/D by 1990 appears to be a reasonable estimate, based on the results of these studies. Only two of Pace's projections deviate substantially from this figure (444,000 and 1,408,000 B/D). As noted above, however, its lowest estimate is based on uniformly optimistic assumptions, while its highest estimate uses the most pessimistic assumptions. The other estimates— particularly Purvin and Gertz's detailed refinery analysis— more closely approximate 1,000,000 B/D of additional capacity loss when more moderate assumptions are used.

Importantly, recent sharp decreases in crude oil and product prices could affect this outcome if they result in substantially increased consumer demand for petroleum products. Such a demand response could lead to increased utilization of domestic refineries—and hence fewer refinery closures—even if product imports increase. Similarly, lower crude oil prices have improved refiners' margins recently, with some oil imports being priced in such a way as to guarantee refiners adequate profit margins for their products. Continuation and expansion of this practice (referred to as "netback pricing") could also prevent or delay some refinery closures.

Do Growing Product Imports Pose a Serious Threat to U.S. Energy Security?

The potential impact of petroleum product imports on the ability of the United States to respond to an oil supply cutoff has become a central question in the debate over whether government intervention in this issue is justified. The question expands the product imports controversy beyond the interests of a domestic industry to one of national security and public welfare. Thus, the attention given to this aspect of the issue has raised questions about whether the nation's dependence on imported products could contribute to sharply rising oil prices and associated economic losses that would result from a disruption in the flow of world oil supplies.

The problem, as argued by proponents of import restrictions, is that reliance on product imports may leave the United States unable to refine all of its available crude supplies in an oil disruption, thereby magnifying the shortage's damaging effects. The reason cited is that this dependency will further reduce U.S. refiners' capacity utilization rates, which will accelerate the decline in U.S. refining capacity as more and more refineries close. During an oil supply disruption involving a loss of product imports (such as an interruption in Middle East exports), it is argued, the United States would respond by drawing down and refining crude oil from the SPR. However, reduced U.S. refining capacity, caused by increased dependency upon foreign refined products, may leave the United States unable to refine all SPR oil plus crude supplies from domestic production and other sources.

It is important to point out that during a severe world shortage of petroleum and petroleum products, the United States could find itself unable to meet its product demand regardless of the size of its domestic refining industry. The added problem of a refining capacity shortage, compounding a loss of crude oil and product imports, would be that petroleum product supplies might not be limited simply by a loss of such imports. Rather, they could be further limited by a shortage of capacity to refine available SPR and other crude into needed products.

U.S. Refiners' Ability to Refine Available Crude Supplies in a Disruption Today

To examine whether such a U.S. refining capacity shortage could exacerbate a loss of oil and product imports, we compared likely domestic crude oil refining requirements in an oil supply disruption today (based on published data available through March 1986) to likely available crude refining capacity. We then discuss in the following section whether crude refining capacity would be sufficient to meet emergency refining needs during the next 5 years.

How Much Crude Oil Would the Nation Have to Refine During Such a Shortage?

The primary sources of crude oil that U.S. refineries would process during an oil supply disruption are domestic crude oil production (including emergency oil production that would be available during an oil shortage) and oil drawn down from the SPR. It may also be prudent to have capacity available to refine imported crude oil that U.S. refiners may be able to acquire from nondisrupted foreign sources.

Domestic Crude Oil Production

Crude oil production in the United States during 1985 averaged 8.9 MMBD. In addition, production at some oil fields could be increased above their maximum efficient rates temporarily to help alleviate a shortage. According to a 1981 NPC study,[1] total deliverable emergency oil production was projected to be about 140,000 B/D in 1985, although a 1984 NPC study[2] addressing the issue questioned whether such emergency production could be made available in time to help offset the effects of a shortage.

In addition, about 1.6 MMBD of natural gas liquids and other materials are produced that require processing. However, only about 160,000 B/D of these materials are refined in refiners' crude oil distillation units; most of these materials are processed in natural gas processing plants and in refinery units not involved in crude oil processing. Adding emergency crude oil and other liquids to domestic production, we estimate that inputs into crude refining units from these sources would be about 9.2 MMBD in a present-day oil supply disruption.

Oil Drawn Down From the SPR

DOE currently estimates that 3.3 MMBD could be drawn from the SPR. However, this may overstate the amount of SPR oil that could actually be made available to U.S. refineries for several reasons. First, as we have noted in past reports, potential physical problems associated with withdrawing the oil, including the reliability of SPR equipment and availability of spare parts, could affect the amount of oil that could be pumped from the caverns on a daily basis.

Second, even if the oil could be withdrawn at the estimated rate, limitations exist with the commercial distribution system that, in the near

[1]National Petroleum Council, Emergency Preparedness for Interruptions of Petroleum Imports Into the United States (Apr. 1981), p. 139.

[2]National Petroleum Council, The Strategic Petroleum Reserve: A Report on the Capability to Distribute SPR Oil (Dec. 1984), p. 64.

term, limit the amount of oil available to refineries. Particularly important has been the 1984 sale of two of the three commercial pipelines that DOE planned to use for transporting SPR oil. Until improvements proposed by DOE are made, the agency estimates that distribution of SPR oil will be limited to a maximum rate of 2.3 MMBD.

Third, questions remain concerning DOE's ability to sell the oil in an efficient and timely manner. As we have reported in the past,[3] DOE has made progress in eliminating potential problems that could slow the sale of SPR oil, particularly by improving its contract terms for potential buyers. Moreover, DOE officials stated to us in technical comments on a draft of this report that, with minor exceptions, a January 1986 test sale of SPR oil demonstrated the capability to get federally stockpiled oil to the marketplace. A key unresolved issue, however, currently under study by DOE, is whether the legislative requirement to use U.S.-flag tankers to transport SPR oil shipped between U.S. ports could impede the distribution process due to insufficient U.S.-flag vessels.

Thus, the amount of SPR oil available to U.S. refiners during a present-day oil supply disruption would be limited to the SPR's maximum 2.3 MMBD distribution capacity, unless it were further limited by problems arising during the sale of the oil. Adding this amount to the domestic production figure cited above (9.2 MMBD), total refining requirements for domestic supplies could be expected to reach 11.5 MMBD during an oil shortage.

Available Crude Oil Imports

U.S. crude oil imports during 1985 averaged about 3.2 MMBD. While a major disruption in the world oil market would sharply reduce U.S. crude and product imports, it is likely that U.S. refiners would still have access to some foreign crude oil. Most U.S. crude imports come from outside the Middle East, and our leading suppliers in 1985 were Mexico, Canada, Venezuela, the United Kingdom, and other relatively stable sources. Furthermore, it is likely that U.S. companies would join other buyers in the international crude oil market in scrambling for spot market supplies from other countries during an emergency.

Nevertheless, it would be difficult to predict the additional refining requirements these crude imports may impose on U.S. refiners without

[3]Evaluation of the Department of Energy's Plan To Sell Oil From the Strategic Petroleum Reserve, (GAO/RCED-85-80, June 5, 1985), p. 21.

knowing the size, duration, and other circumstances of a potential disruption. In addition, several other factors complicate this issue:

- Countries considered "secure" crude import sources may not continue to export to the United States as much as they had before the disruption. Some oil previously exported may be needed for domestic purposes, and oil supplies that are exported may be diverted to other customers willing to pay more for them.
- During a severe oil disruption, the United States would likely find itself obligated to share its available crude supplies with its allies under the International Energy Program's (IEP) Emergency Sharing System. We calculated in a past report[4] that during a Persian Gulf oil supply shortfall resulting in a net world oil shortfall of 5 MMBD, the IEP oil-sharing formula could obligate the United States to share almost 1 MMBD with its allies. This requirement could be satisfied at least in part by diverting crude oil bound for the United States to other countries entitled to additional supplies under the sharing system.

Thus, the amount of crude imports U.S. capacity could expect to refine depends on several issues, including the amount of U.S. crude imports lost as a direct result of a world supply cutoff, whether nondisrupted import sources divert exports from the United States to other oil-consuming markets as a disrupted oil market readjusts, and how much oil the United States could expect to share with its more import-dependent allies under the IEP. Taking these factors into account, an API discussion paper concludes that ". . . secure crude imports in a shortfall situation are hard to predict, and might range anywhere from none to 2 million B/D."[5]

In addition, refining capacity located overseas could reduce domestic refining requirements somewhat by processing U.S.-bound crude oil imports during a supply disruption. As table 4.1 shows, worldwide capacity is still far in excess of market needs. Furthermore, while basic crude oil distillation capacity is decreasing, the type of sophisticated capacity needed to enhance yields of the light products of greatest demand in the U.S. market ("downstream" capacity) has increased from 29 percent of total crude throughput in 1980 to 38 percent in 1985,

[4]Ibid., p. 34.

[5]Roger D. Wollstadt, "Factors Affecting Petroleum Product Imports," American Petroleum Institute (July 1985), p. 21.

according to one study.[6] Thus, the API discussion paper cited above observes that "Spare capacity currently exists in Western Hemisphere countries and Western Europe, and the U.S. might gain access to this capacity through exchange agreements or contract processing." The paper concludes that

"... it may not be necessary for the U.S. to meet 100 percent of its refining needs out of its own resources, even during a supply interruption. However, the extent and availability of excess capacity outside the continental U.S. would depend on a variety of future events, and the specific circumstances at the time."[7]

Table 4.1: Surplus World Crude Refining Capacity

	1960	1973	1980	1984
Refining capacity (MBD)	24,470	60,214	81,918	74,900
Product consumption (MBD)	21,812	56,591	61,585	54,500
Surplus refining capacity over consumption	12%	6%	33%	37%

Source: East-West Center, The Changing Structure of the World Refining Industry: Implications for the United States and Other Major Consuming Regions (Feb. 1985), p. 2. Data estimates for 1984 were preliminary.

Thus, a potentially substantial amount of crude oil imports could be expected to supplement domestic U.S. crude supplies during an emergency, although the volume would be difficult to predict. As we show in the next section, however, even if we use the upper-bound estimate of 2 MMBD in the API range cited previously, capacity would still likely be more than adequate to refine domestic crude supplies plus imports.

How Much Refining Capacity Does the United States Presently Have?

EIA reported operable U.S. crude oil distillation capacity to be 15.7 MMBD as of December 1985. At first glance, this amount would appear sufficient to accommodate emergency refining requirements for domestic production and SPR distribution, and still leave over 4 MMBD of capacity to refine any crude oil imports. However, the 15.7 MMBD figure must be adjusted to account for the following factors to get an accurate estimate of the amount of crude oil U.S. refineries could actually process.

Capacity in the Virgin Islands and Puerto Rico

Because EIA counts only continental U.S. refineries in its domestic capacity figures, refineries in the Virgin Islands and Puerto Rico are excluded in its 15.7 MMBD estimate of U.S. refining capacity. If, however,

[6]Arthur Andersen Co. & Cambridge Energy Research Associates, World Oil Trends: A Statistical Profile, (1985) p. 76.

[7]Wollstadt, p. 23

we are interested in domestic capacity as a measure of secure refining capability that the nation can rely on during a disruption, operable capacity in these U.S. territories should be included. Operable crude refining capacity for these territories is estimated to be about .7 MMBD. Adding this figure to the 15.7 MMBD EIA identifies as U.S. crude capacity would bring this total to about 16.4 MMBD.

Some "Idle" Capacity May Not Be Operable

Of EIA's estimated 15.7 MMBD domestic crude capacity, 1.1 MMBD is considered "idle" capacity. Idle capacity is defined by EIA as capacity that is either (1) not in operation, and not under active repairs, but capable of being placed in operation within 30 days or (2) not in operation, but under active repairs that can be completed within 90 days. EIA's estimate is based upon idle refineries' monthly certifications that their capacity can be reactivated within the time frames cited previously. An API refinery survey, using EIA's definition for idle capacity, closely approximated the EIA figure, estimating idle capacity to be about 1.2 MMBD at the end of 1985.

Nevertheless, proponents of product import restrictions have asserted that the United States cannot count on much of this capacity because most of it could not be restarted quickly enough to meet emergency refining needs. Although operators of idle refineries must certify to EIA each month that their facilities are still operable, these proponents have pointed to environmental restrictions, tax laws, and stockholder confidence as incentives for companies to report such capacity as idle rather than shut down.

While industry analysts generally acknowledge that restarting some idle capacity may not be possible during an oil supply cutoff, the EIA and API estimates suggest that it is reasonable to assume that much of it would become available. For the purpose of our calculation, therefore, it is reasonable to assume that about half of the DOE estimate of idle capacity, or about 500,000 B/D, could become available to meet emergency oil refining needs. If the remaining 600,000 B/D were not available, U.S. crude refining capacity would be reduced from 16.4 to 15.8 MMBD.

How Do Refineries' Utilization Rates Affect Estimates of Available Capacity?

Because capacity must periodically go out of service for scheduled maintenance and repairs, 15.8 MMBD of operable refining capacity could not actually process 15.8 MMBD of crude oil. Even if U.S. refineries operated at maximum levels to alleviate a shortage of oil products, they would probably operate at less than 100 percent of full capacity. The lower the

industry's maximum utilization rate, the less crude oil it would be capable of processing.

An examination of historical U.S. refinery utilization rates provides an indication of how much crude oil the industry would be capable of processing during an oil shortage. During the late 1960's and early 1970's, U.S. refineries operated consistently at rates well over 90 percent, and over 94 percent each year from 1966 to 1969. Based on these data, published statements from industry organizations, and our interviews with industry analysts, 92 percent represents a reasonable estimate for the industry's maximum capacity utilization rate. Multiplying 15.8 MMBD of gross capacity by 92 percent yields about 14.5 MMBD as the maximum amount of crude oil that U.S. refineries could process during an oil supply shortage.

U.S. Refining Capacity Is Presently Sufficient to Refine Domestic Crude Plus Crude Imports During an Oil Emergency

As table 4.2 shows, present U.S. crude oil refining capability would likely exceed domestic crude supplies during an oil emergency and still leave about 3 MMBD capacity to refine available crude imports. Since available crude imports would probably be substantially lower than this level during a worldwide shortage (as we noted earlier in this chapter), we can conclude that domestic refining capacity would likely be sufficient to refine all the oil the United States could reasonably expect to obtain.

This does not necessarily mean that the United States will be able to meet petroleum product demand during a shortage in which oil-consuming nations are competing for scarce supplies. The nation's ability to meet domestic demand will depend on the severity of the shortage, how much demand is reduced during the emergency, and how successful the United States is in obtaining crude and product imports. It does mean, however, that the oil crisis would probably not be exacerbated—at least at the present time—by an inability to refine available supplies of crude oil.

Table 4.2: Comparison Between Available U.S. Crude Supplies in an Oil Disruption and Crude Refining Capability, 1986[a] And 1990 (MMBD)

	1986	1990
Available domestic crude supplies		
Domestic production (incl. emergency oil production and other materials refined in crude oil distillation units)	9.2	8.3
Maximum SPR drawdown	2.3	3.3
Total available domestic crude oil	**11.5**	**11.6**
Maximum crude oil refining capability		
U.S. crude oil refining capacity	15.7	14.7[b]
Add Virgin Islands and Puerto Rican capacity	+ .7	+ .7
Subtract half of idle capacity	− .6	− .6
Multiply by maximum utilization rate	x .92	x .92
Equals total crude oil refining capability	**14.5**	**13.6**
Maximum crude imports that could be refined by U.S. capacity in an oil disruption (maximum crude oil refining capability minus available domestic crude supplies).	3.0	2.0

[a]Based on data available as of March 1986.

[b]1986 crude oil refining capacity minus 1 MMBD. The 1 MMBD capacity loss was derived in chapter 3.

U.S. Refiners' Ability to Refine Available Crude Supplies in an Oil Disruption in 1990

While U.S. capacity would likely be sufficient to refine available crude supplies during a present-day oil supply disruption, the ability to do so in the future will depend largely on changes in (1) the total of domestic crude production plus the SPR's maximum drawdown capacity and (2) the amount of available U.S. refining capacity. As discussed in the next section, the cushion that appears to exist today between U.S. capacity and available crude supplies will likely narrow over the next 5 years.

Available Domestic Crude Supplies During an Oil Shortage Would Likely Be Higher in 1990 Than Today

The bulk of available U.S. crude supplies in an oil shortage in 1990 is still expected to come from domestic production, which is forecast to decline somewhat from its current 8.9 MMBD level. EIA projected U.S. crude production to drop to 8.05 MMBD by 1990, due primarily to low world oil prices and hence reduced profitability from exploration and production.[8] Adding 140,000 B/D of emergency oil production and 160,000 B/D of other materials refined in crude distillation units (as we did in our 1986 estimate of available domestic supplies) would provide about 8.3 MMBD of total refinery inputs from these sources in a 1990 oil shortage as opposed to 9.2 MMBD if such a shortage occurred today.

[8]According to EIA's Annual Energy Outlook (1985), production could drop even further if oil prices remain low. This would further reduce domestic oil supplies in need of refining.

The decrease in U.S. crude oil production, however, would be offset by a probable increase in the SPR's drawdown rate—at least for several months until the SPR's drawdown rate had to be reduced. As noted previously, constraints in the SPR's distribution system have limited the current SPR withdrawal rate to about 2.3 MMBD. If planned improvements are made, however, the SPR's maximum drawdown and distribution rate could reach 3.3 MMBD by 1990.[9] Depending on the SPR's size at that time, this drawdown rate could be sustained for 3 to 4 months. Adding to the 8.3 MMBD production figure cited, we calculate that domestic crude refining requirements in a 1990 oil shortage could be about 11.6 MMBD. This compares to a current emergency domestic oil supply of about 11.5 MMBD.

Would Capacity in 1990 Be Sufficient to Refine Domestic Oil Supplies as Well as Available Imports?

Based on our analysis of forecasts of U.S. petroleum product imports and refining capacity, we concluded in chapter 3 that 1 MMBD represented a reasonable estimate of the amount of capacity the United States could expect to lose by 1990. Subtracting this capacity loss from the estimated 15.7 MMBD of current domestic crude refining capacity yields an estimated 14.7 MMBD refining capacity in 1990. As table 4.2 shows, this would be sufficient to refine all domestic supplies, and would leave about 2 MMBD of capacity available to refine crude imports.

Whether 2 MMBD capacity would be sufficient to refine imports in a 1990 disruption is hard to state conclusively. We noted earlier that an API discussion paper estimated that the U.S. could expect anywhere from zero to 2 MMBD of crude imports in a present-day emergency, depending on the nature of the disruption and other factors. However, this estimate reflects considerable uncertainty, and estimating 5 years into the future could only increase, rather than decrease, this uncertainty.

Trends in worldwide refining capacity would also affect the prospects for refining U.S.-bound crude imports overseas during a disruption. Some of the excess crude distillation capacity in the Caribbean, Europe, and elsewhere is expected to shut down in coming years as new Middle East export refineries enter the market. This would tend to reduce the availability of secure foreign refining capacity to process U.S.-bound crude imports. However, even as crude capacity falls, downstream capacity, which can yield a high proportion of the light products in greatest demand in the United States, is projected to continue increasing.

[9]The 3.3 MMBD figure includes improvements not yet authorized. DOE's presently approved plans would increase distribution capabilities to 3.1 MMBD.

This trend would provide greater flexibility in refining crude imports before reaching the United States.

Thus, while U.S. capacity in 1990 would probably be sufficient to refine domestic production and maximum SPR drawdown, it is difficult to state conclusively that it could accommodate all crude imports as well. However, (1) the amount of available domestic crude oil during a disruption may be greater in 1990 than today and (2) the amount of domestic capacity available to refine this oil will probably be less. These trends indicate that the relatively large cushion that would exist in a present-day emergency between refining capacity and available crude oil will probably narrow over the next 5 years.

Based on these findings, it would be hard to justify product import restrictions based on a U.S. energy security need to maintain adequate refining capacity, although trends in both U.S. capacity losses and potential U.S. emergency refining requirements should be monitored during the next few years. This does not suggest that government action could not be justified on other grounds if it were demonstrated, for example, that the U.S. refining industry was suffering from unfair trade practices of other nations.

Regardless of the justification, however, the costs and the effectiveness of such actions—the subjects of chapter 5—should be carefully weighed before they are considered.

The Effects of Petroleum Product Import Tariffs and Quotas

Tariffs on petroleum product imports have been proposed as a way to ensure the availability of domestic refining capacity for use during an oil supply disruption.[1] Raising the price of foreign products to the domestic market reduces competition, and domestic refiners can command higher prices for their products. This would improve profit margins for domestic refiners, and in turn could help refineries facing closure to stay in business. Thus, if a disruption occurred there would, in principle, be more domestic capacity available to refine the SPR and other crude supplies than would be the case without a tariff.

The import restrictions imposed by a quota system would also stimulate domestic product production and refining capacity by reducing the quantity of petroleum products imported. Unlike a tariff, an import quota causes price to increase in response to a mandated import reduction, rather than the other way around.

We were asked to examine tariffs and quotas as means of controlling petroleum product imports and to identify factors the Congress should weigh in considering such actions. We have included quantitative estimates of the costs of tariffs to consumers and benefits to industry and the government because they have been the subject of congressional interest and legislation.

Generally, we found that a tariff or quota would shift billions of dollars annually from consumers to crude producers and/or refiners, and, in the case of a tariff, to the government. These measures would likely preserve some refining capacity that might otherwise shut down. However, the extent to which this additional capacity benefits the consumer and the economy would depend on whether the additional capacity was actually needed to refine available crude supplies in an oil supply disruption.

Cost and Revenue Effects of a Tariff

The annual consumer costs of the tariff options discussed in the next section range from $12 billion to $56 billion. In addition to these direct consumer costs, tariffs could create secondary effects throughout the economy, in the forms of production losses, price increases, and unemployment increases.

[1]For example, the Senate Budget Committee proposed in July 1985 a $5 per-barrel fee on product and crude imports, Senator Boren proposed a $5 per-barrel fee on crude and $10 per-barrel fee on gasoline (S. 1507, 98th Congress), and Senator Hart proposed a $10 per-barrel fee on all crude and product imports (S. 1412, 98th Congress).

Direct Effects on Consumers, Industry, and the Government

We estimated the direct cost and revenue effects on consumers, oil producers, refiners, and the government of four different petroleum import tariffs. (See ch. 1, "Objective, Scope, and Methodology" for a description of how these estimates were made.) We selected four tariff options and applied them to petroleum product imports only, or to both petroleum product and crude oil imports, over the years 1986 through 1990.[2] The four tariff options analyzed were: $10 per barrel on products and $5 per barrel on crude; $5 per barrel on both products and crude; $5 per barrel on products only; and $2 per barrel on products only. The tariffs that include crude oil as well as products were examined because they were the subject of legislative proposals in 1985.

Corporate income and windfall profits tax rates were applied to the industry revenues created by these tariffs to generate after-tax industry revenue for refiners and producers. Effects on consumer expenditures were approximated as total consumption (as reduced by the tariff) multiplied by the tariff rate in effect. The government's tariff revenue estimates are the amounts that would be collected from applying the various tariff rates to the corresponding levels of crude or product imports. Taxes that would be collected from increased petroleum industry profits are not counted in government revenues since they would be offset by tax losses elsewhere. These tax losses occur because a tariff-induced oil price increase will simply shift consumer expenditures to the oil industry and away from other industries. While the oil industry will pay more taxes as a result of this shift, other industries will pay less. This offset is incomplete to the extent that marginal tax rates applied to the petroleum industry exceed rates applied to other industries. The primary difference is due to windfall profits taxes paid by crude producers. However, under current tax rates and projected crude prices, these taxes would become relatively insignificant in the near future.

Table 5.1 shows how consumers and other groups could be affected by the four different tariff options. The estimates shown represent average annual costs during these years. Actual tariff effects could vary from the estimates shown here if the responsiveness of domestic refiners to a price increase for their product is markedly different from what we assumed. For instance, if charging a higher price preserves more refining capacity than we assumed, then any given tariff will lead to more domestic production and fewer imports than we project. Total

[2]Projections of world oil prices and U.S. oil supply, demand, and imports were obtained from EIA, Annual Energy Outlook 1985 (Feb. 1986), pp. 68 and 93.

costs of the tariff to consumers will not change. However, industry revenues will increase somewhat and government tariff revenues will decline.

Table 5.1: Average Annual Cost and Revenue Effects of Various Tariff Options, in Billions of Dollars

Tariff option	Consumer[a] expenditures	After tax industry revenue: Refiners	After tax industry revenue: Oil producers	Government[b,c] tariff revenue
1. $10/bbl product, $5/bbl crude	56.2	15.1	7.0	10.8
2. $5/bbl product, $5/bbl crude	28.9	1.3	7.0	10.6
3. $5/bbl product	28.9	14.4	0	1.7
4. $2/bbl product	11.7	5.7	0	1.1

[a]Excluded from these estimates are "welfare losses" borne by consumers due simply to the fact that the tariff-induced price rise causes them to consume a smaller amount of petroleum products. These efficiency losses range from $1.5 billion annually in the $10/$5 case to $.06 billion in the $2 product-only case.

[b]The sum of oil industry revenues and government receipts does not equal consumer expenditures on any tariff option because we exclude the increased oil industry tax payments and payments to productive inputs (e.g., labor, material supplies) that result from tariff-induced increases in oil prices and refinery production. While part of consumer expenditures would go to these payments, we nonetheless exclude them because they tend to be offset by reduced taxes and losses to productive inputs in other industries. This happens because increased consumer spending on oil tends to reduce consumer demand for other goods and services, leading to declines in production and employment in these sectors. The extent of the offset has not been determined here.

[c]Since consumers must spend less on other goods and services in order to pay the tariff on imported petroleum products, these government tariff revenues would be partially offset by tax losses in other sectors of the economy.

Generally, the increase in consumer expenditures reflects each option's effect on product prices. The first tariff option has the largest impact on product prices and therefore raises consumer expenditures the most (about $56 billion annually). The effect of product prices on consumer costs is also illustrated by comparing the second and third options. Although one option includes a crude oil tariff and the other does not, the same $5-per-barrel product tariff in each case leads to the same product price increase—and therefore the same impact on consumer expenditures. The additional crude costs imposed by the second option's crude oil tariff are absorbed by refiners and therefore do not contribute to higher consumer costs. Indeed, these additional crude costs substantially reduce refiners' revenues from $14.4 billion under option three to $1.3 billion under option two.

These estimates assume, as do the estimates others have made, that a product tariff would be fully passed along in the form of higher prices to all consumers and that the prices of all domestically refined products

would rise to the new import price levels. All domestic prices would rise because the higher price for imports created by a tariff allows domestic refiners to get higher prices for their products without being displaced by imports. By the same token, import competition would prevent domestic refiners from raising their prices above the import price. The same "full pass-through" assumption applies to crude oil as well as product.

Assuming full pass-through produces an upper-bound estimate of a tariff's cost and revenue effects. To the extent that full pass-through did not occur, all of the estimates in table 5.1 would be reduced proportionately.[3]

The cost and revenue estimates presented in table 5.1 are generally consistent with those obtained by others. For example, comparable estimates of the annual government tariff revenues generated by a $5-per-barrel tariff on all petroleum imports (crude and product) are $8 billion, $11 billion, and $9 billion, compared to our estimate of $10.6 billion.[4] The study that produced the last estimate also places the annual cost of the tariff to consumers at $27 billion, close to our estimate of $28.9 billion. Differences among estimates can be attributed to differences in time periods covered, import level assumptions, petroleum price projections, and other factors.[5]

[3]The full pass-through effect could be mitigated by a decline in world product prices caused by the tariff. This might occur because a tariff reduces U.S. imports and hence U.S. demand on world product markets. Depending upon the responses of foreign suppliers (particulary OPEC), this could result in a decline in world prices, which would be translated back to U.S. consumers. Additionally, the decline in U.S. product consumption implies a comparable reduction in the demand for crude. Again, depending upon the responses of crude producers, this could lead to a fall in the world price of crude that could be translated into a decline in world product prices. In the end, the price facing U.S. consumers might rise by less than the amount of the tariff. If this happened, then all of the estimates in table 5.1 would be reduced to reflect the net pass-through to U.S. consumers.

[4]Obtained from: Washington Analysis Corporation, Energy Tax Reform/Oil Import Fee (Sept. 9, 1985); Congressional Budget Office, Oil Import Tariffs: Alternative Scenarios and Their Effects (Apr. 1982); and an informal working paper comprised of work done by Congressional Budget Office (CBO) and Congressional Research Service (CRS) staff.

[5]One of these factors is the supply elasticity for domestically produced petroleum products. The greater this elasticity, the larger will be the increase in domestic production induced by a tariff, and correspondingly the lower imports will be. Lower imports will also result in lower tariff revenues for the government. In deriving our supply elasticity assumption, we spoke with oil industry experts and used what we believe is a reasonable value given their views. We also did a sensitivity analysis to see how our results responded to different supply elasticities in order to ensure the reasonableness of these results.

Macroeconomic Effects of a Tariff

All of the cost and revenue estimates discussed previously include only the direct effects of a tariff. They ignore the secondary effects that follow from the higher petroleum product prices and the reduced U.S. economic activity occasioned by a tariff. Several analyses[6] predict that tariffs might decrease gross national product (GNP), increase inflation, and add to unemployment. These changes appear to be temporary, dissipating within a few years as the economy adjusts to the tariff. Nonetheless, the reduction in GNP is a one-time real loss in output that is never recaptured. Studies' estimates of the short-term macroeconomic effects from a $5-per-barrel tariff on all crude and product imports range from

- 0.5 to 1.0 annual percent loss in GNP,
- 0.4 to 1.0 annual percent increase in inflation, and
- 0.1 to .3 percent increase in unemployment.

In estimating macroeconomic effects, these studies used large models that simulate how the economy responds to changed economic conditions, such as would occur with a tariff on petroleum imports. The nature of the response, however, depends on a variety of assumptions. For example, the GNP and inflation effects indicated by macroeconomic models would depend on whether the Federal Reserve maintains a predetermined growth rate for the money supply or finances a tariff's effects by increasing money growth. The results would also be affected by whether the increased government revenues created by a tariff would be used to finance greater expenditures or to reduce tax collections. In view of these uncertainties, estimates of a tariff's macroeconomic effects should be interpreted with caution.

The general and relative severity of all macroeconomic effects would be exacerbated if the prices of competing energy sources, particularly natural gas, increased in response to a tariff imposed on petroleum product imports. Generally, we would expect decontrolled gas prices to increase in markets and areas of the country where natural gas competes directly with petroleum products for residential and industrial uses.

Other secondary effects of a tariff would also be distributed unevenly across consumers and regions of the country. Generally, those who

[6]The sources for these estimates are: CBO, Oil Import Tariffs, pp. 7-11; CBO-CRS staff working paper, p. 3; Washington Analysis Corporation, p. 2; Lawrence Kumins, Petroleum Import Fees and Taxes: Refinery Protection and Revenue Sources (CRS, August 14, 1985), pp. 20-24. The first source assumes two-thirds pass-through of the tariff, while the others assume full pass-through.

depend heavily on petroleum products would experience proportionately larger losses from a tariff. Low-income consumers would be at a relative disadvantage because a larger portion of their income goes to energy-related expenditures than is the case with consumers in general. Similarly, residents of the Northeast would probably be affected more than others because of their greater dependence on petroleum products for home heating.

The adverse effects of a tariff would also likely affect some industries more than others. Those who use relatively large amounts of petroleum products in their own production could be relatively disadvantaged. For example, the petrochemical industry could be particularly affected by the higher prices induced by a tariff because its primary raw materials are petroleum products. Adverse effects could result from a decline in demand for petrochemical products in general, the displacement of domestic sales by imports, and decreased competitiveness of U.S. petrochemical companies on world markets.

Benefits of a Tariff

The figures in table 5.1 show that the oil industry would clearly benefit from a tariff, but the type of tariff would determine the distribution of revenues between refiners or crude oil producers. Consumers would only benefit from a tariff or quota to the extent that (1) it induced refiners to preserve a substantial amount of capacity and (2) the additional capacity was actually needed to refine available crude supplies during an oil disruption.

Oil Producer and Refiner Benefits

Oil producers would benefit only from a tariff on crude oil because it would increase the price that they could get for their crude. A product-only tariff would provide no benefit for oil producers, as demonstrated by tariff options 3 and 4 in Table 5.1.

Conversely, refiners would benefit only from a tariff on product, or a tariff that raised the price of product more than it raised the price of crude. The reason is that higher product prices improve refiners' revenues, but equal or greater increases in their crude oil costs would offset these revenue gains.

Table 5.1 shows that refiner revenues would increase by about the same amount ($14-$15 billion annually) under either a $5/bbl product tariff or a $10/bbl product tariff accompanied by a $5/bbl crude tariff, because in both cases product prices would exceed crude costs by $5/

bbl. (The cost to the consumer, however, is twice as much in the latter case because of the greater product price rise it induces.) The effect on refiners' net revenues is much less under an across-the-board $5/bbl crude and product tariff because the higher price they would be able to charge for product would be offset by increased crude costs.

The improved refiner margins caused by a product tariff (or a crude tariff accompanied by a higher product tariff) might be used to preserve capacity at less profitable refineries that may otherwise shut down. To the extent that this occurred, jobs related to the refining industry would be saved that might otherwise be lost. However, it is not certain how much capacity refiners would maintain even with the economic incentive created by a tariff. Rather, some may close capacity anyway and operate their remaining units at higher, more efficient rates.

Consumer Benefits

Consumers could benefit from a tariff to the extent that it preserved refining capacity that was eventually needed to refine crude oil during an oil supply disruption.

We noted in previous chapters that if an oil shortage was compounded by an inability to refine available crude supplies, the price and macroeconomic effects of the disruption would be exacerbated. Ideally, by making product imports more expensive and, thereby, increasing the prices that domestic refiners receive for their products, a tariff could induce them to increase product production and hence keep more capacity on hand. If this additional capacity were then used during a disruption, the rise in petroleum product prices would be lessened by an increase in domestic product supply, thus benefiting U.S. consumers.

These direct consumer benefits would be accompanied by macroeconomic benefits. With extra refining capacity on hand to produce more petroleum products and keep prices down, U.S. GNP would not fall as much as it otherwise would, and the increases in inflation and unemployment that accompany disruptions would be dampened.[7]

Several uncertainties, however, make it difficult to predict the magnitude of these benefits. First, as mentioned earlier, while a tariff would

[7]For a discussion of the macroeconomic impacts of oil shortages see: Oil Supply Disruptions: Their Price and Economic Effects(GAO/RCED-83-135, May 20, 1983); DOE, Costs and Benefits of a Protective Tariff on Refined Petroleum Products After Crude Oil Decontrol (Apr. 1981), p. 16; and CBO, Managing Oil Disruptions: Issues and Policy Options (Sept. 1981), pp. XVIII, 10, and 47-48.

likely make some marginal refineries profitable enough to stay in operation, some companies may still decide to shut down their less profitable facilities in order to operate their remaining units at higher rates. Therefore, it would be difficult to predict how much U.S. refining capacity would be preserved by a tariff.

Second, these benefits could be realized only if the capacity preserved by the tariff were actually needed to refine available crude supplies during an oil supply disruption. The need for this capacity, however, would be mitigated if (1) an oil disruption did not occur, (2) domestic capacity were sufficient to refine available supplies without the additional capacity preserved by the tariff, or (3) alternative and less expensive ways to refine available crude could be substituted for domestic capacity. In chapter 4 we noted that overseas capacity may be available to refine crude oil bound for the United States.

Thus, consumer benefits from a tariff on petroleum products are uncertain. They could be significant if capacity preserved by the tariff helped to alleviate a shortage of petroleum products during an oil disruption. However, consumer benefits would be substantially lower—perhaps as low as zero—if the tariff either did not preserve very much capacity or the additional capacity was not needed to refine available supplies.

Effects of a Quota

Quotas on refined products would have many of the same effects on consumers and industry as would tariffs. Rather than discouraging imports by raising their price, as a tariff would, a quota would reduce imports by setting specific limits on the amount that could be imported. Reducing product imports in this manner would raise domestic product prices, thereby increasing consumer expenditures and refiners' revenues. However, certain differences in the effects of tariffs and quotas are worth considering, in terms of (1) how revenues are divided between industry and government and (2) their administrative feasibility.

The tariff cost and revenue effects displayed in table 5.1 are similar to the effects that comparable quotas (ones that would reduce product imports by an equivalent amount) would create, but with one primary difference: whereas a tariff would produce billions of dollars for the government from import fees, these government revenues would be lost under a quota. The government's loss of import fee revenue under a quota would be the industry's gain in that refiners, marketers, and others able to import products under the quota would not have to pay the import fee. Depending on how the quota is implemented, part of the

gain could also go to foreign suppliers, to the extent that they could charge higher prices to U.S. customers under the quota.

Differences in the administrative ease of imposing tariffs and quotas may warrant consideration in deciding between them. Quotas may be more difficult and expensive to administer than are tariffs, both for government and industry. Tariffs are essentially accounting measures, while quotas involve the issuance and trading of rights to import products, and monitoring the allocation of these rights could be costly.

An important difference between tariffs and quotas is that when the world price of a product falls, quotas provide better protection to domestic industry than do tariffs—but are also more costly to consumers. This is so because once a quota is filled, the domestic price of the product is insulated from changes in the world market. If the world price falls, there is no change in the domestic price to consumers, just a larger transfer to domestic producers and importers. The additional refining capacity that would be preserved by a quota would thus be protected, albeit at a higher cost to consumers. On the other hand, with a tariff, the domestic price would fall along with the world price, benefiting consumers but eliminating some of the tariff's capability to preserve domestic refining capacity.[8]

Other Considerations

In addition to the costs and benefits discussed above, other factors should be considered in evaluating the desirability of tariffs or quotas. For example, a 1981 DOE study suggested that other possible actions could offer more direct energy emergency protection at a lower cost than a tariff. One option suggested is the construction of a petroleum product reserve, similar to the SPR, as a standby source of supplies that would not require refining during a disruption.[9] Alternatively, the report suggested that the government could provide financial incentives to refiners to encourage them to maintain higher levels of refining capacity.

[8]For a detailed discussion of these issues see: D. Bohi and M. Russell, Limiting Oil Imports: An Economic History and Analysis (Johns Hopkins University Press for Resources for the Future, 1978).

[9]DOE, Costs and Benefits of a Protective Tariff on Refined Petroleum Products After Crude Oil Decontrol, p. 20. The possibility of a petroleum product reserve was also suggested in: H. Lee and B. Mossavar-Rahmani, "Emerging Trends in U.S. Refining and Petroleum Product Trade: Implications for Energy Security Policy," Discussion Paper Series, Kennedy School of Government, Harvard University (Dec. 1985), pp. 37-38.

Possible side effects should also be considered in weighing the desirability of tariffs or quotas. One such side effect is the potential for retaliatory trade measures by other nations in response to U.S. tariffs or quotas. For example, product-exporting nations could establish restrictions on purchases of U.S. products, or reduce cooperation with the United States in other areas. In addition, other product-importing nations, principally members of the European Economic Community and Japan, may respond to U.S. trade restrictions with restrictions of their own. As we noted in chapter 3, Japanese government officials have indicated a possible relaxation of its ban on imports of gasoline and other products, and the Community presently does not enforce trade restrictions against Saudi Arabia, Kuwait, and other major product-exporting nations. Retaliatory measures by these countries to restore or augment trade barriers could undermine the effectiveness of the U.S. trade restrictions.

Summary and Conclusions

In this report we have examined the effect of petroleum product imports on the U.S. oil refining industry and U.S. energy emergency response capabilities. We have examined (1) whether product imports have contributed significantly to U.S. refiners' current problems, (2) what the outlook may be for product imports and refinery closures in the future, (3) whether growing product imports pose a serious threat to U.S. energy security, and (4) what the impact would be of proposed policy options to deal with the situation.

Product Imports' Contribution to Refiners' Current Problems

Our analysis of product import data shows that, while total product imports are well within the range of historical levels, imports of the major light petroleum products, gasoline and distillate fuel oil, have increased by about 127 percent between 1980 and 1985. Several reasons have been suggested by oil industry experts and industry representatives for this rapid increase, including (1) the end of U.S. crude oil price controls in 1981, which took away U.S. refiners' advantage of cheap crude oil costs and thereby increased the competitiveness of foreign refiners in the U.S. market, (2) the ability of some foreign suppliers to reduce their product prices to improve competitiveness, (3) the indirect effect of the U.S. dollar's strength by reducing product demand in other countries, (4) confusion over the proper tariff classification of certain petroleum products by the U.S. Customs Service, and (5) the possibility that federal regulations to reduce the lead content of gasoline may have increased gasoline imports.

Nevertheless, these imports do not adequately explain the bulk of recent U.S. refinery closures. Other explanations are (1) the combination of unexpectedly low petroleum product demand and overexpansion of refining capacity and (2) the elimination in 1981 of a crude oil price and allocation program that supported operations of many small refiners. While imports of light products may have contributed to refineries' problems, their volume appears to be too small to account for the bulk of refinery closures. Moreover, the majority of closures occurred before light product imports began to show significant penetration into the U.S. market.

Outlook for Product Imports and Future Refinery Closures

Concern over future refinery shutdowns has focused on light product imports from new export refining capacity coming on line, principally in the Middle East. We noted that the volume of light product imports the United States can expect to receive will be influenced largely by the amount of export capacity coming on line, policies affecting the volume

and price of exports from these refineries, and whether other major oil-consuming countries (particularly Western European countries and Japan) accept a share of the additional products supplied by these refineries. Based on examination of several studies that projected light product imports over the next several years, we believe that a reasonable estimate for U.S. light product imports in 1990 is 1,000,000 barrels per day, although this figure reflects a wide range of uncertainty.

Our analysis of these studies also suggests that an additional 1,000,000 barrels per day of U.S. refinery capacity (about 6 percent of operable capacity as of January 1986) may shut down during the next 5 years, and that light product imports are expected to contribute to these closures. Fewer closures would be expected, however, if reduced oil prices lead to substantially higher consumer demand for petroleum products.

Impact on U.S. Energy Security

Particular concern has focused on whether the prospect of such refinery closures may impair the United States' ability to respond to an oil supply cutoff. The problem, as argued by many independent oil refiners and other proponents of import restrictions, is that further U.S. refinery losses may leave the nation unable to refine domestic oil supplies (including oil from the SPR) and available crude oil imports in an oil shortage and that this would magnify the shortage's damaging effects.

To examine whether decreases in U.S. refining capacity could exacerbate an oil supply shortage, we compared our likely domestic crude oil refining requirements in an oil emergency to our likely available crude refining capacity. We then examined whether crude refining capacity would be sufficient to meet emergency refining needs today (based on data available through March 1986) and in 1990. We found that

- present U.S. crude oil refining capacity would likely be sufficient to process domestic oil and imports if an oil supply disruption occurred today, and
- U.S. capacity will likely be sufficient to refine domestic supplies in 1990, although it is difficult to state conclusively that it could refine all imports as well.

Based on these findings, it would be difficult at the present time to justify product import restrictions based on a U.S. energy security need to maintain adequate refining capacity, although trends in both U.S. capacity losses and potential U.S. emergency refining requirements should be monitored during the next few years. This does not suggest

that government action could not be justified on other grounds if it were demonstrated, for example, that (1) the U.S. refining industry was suffering from unfair trade practices of other nations or (2) tariffs were desired to raise revenue in order to reduce the federal deficit.

Effects of Tariffs and Quotas

Regardless of the justification, the costs and the effectiveness of policies designed to restrict product imports should be taken into account before they are considered. We were asked to examine tariffs and quotas as means of controlling petroleum product imports and to identify other measures that the Congress may wish to consider.

Our estimates of the costs and revenues generated by four different tariff options show that billions of dollars would be transferred annually from petroleum product consumers to refiners, crude producers, and the government. Estimates of total consumer cost range from almost $12 billion per year (under a $2/bbl tariff on product imports only) to $56 billion per year (under a $10/bbl tariff on product imports coupled with a $5/bbl tariff on crude imports). These estimates include only the tariffs' direct effects, and do not account for GNP losses and other dislocations that tariffs create. The effects of a quota would be similar to those of a tariff, except that the government would receive no revenues under a quota.

Consumers would benefit from a tariff or quota to the extent that it preserved refining capacity that was needed to process available crude oil from the SPR and other sources during an oil disruption. The additional products supplied to the market during the shortfall would help to reduce the price and macroeconomic effects that accompany such disruptions. However, whether this benefit would be realized depends on (1) whether the tariff induced refiners to preserve a substantial amount of capacity that would otherwise shut down and (2) whether the additional capacity preserved by a tariff or quota was actually needed to refine available crude supplies.

Finally, we note that evaluating the desirability of a tariff or quota requires weighing other potential effects, such as the possibility of retaliatory trade measures by product-exporting countries or other product-consuming countries. In addition, the costs and benefits of other options with potentially lower costs, such as a petroleum product reserve, should be fully evaluated.

Agency Comments

DOE's comments on a draft of this report are included as appendix II. DOE did not agree or disagree with our conclusions, noting instead that the report "accurately assesses the causes for the decline in profitability of the domestic refining industry over the past five years." DOE also had the following comments about specific assumptions and definitions contained in the report.

DOE disagreed with "the apparent assumption" in chapter 3 that Middle Eastern countries may discount crude oil prices to their refineries in order to be competitive in world markets. DOE indicated that these countries' export refineries will be competitive because of their sophistication and because of the availability of low-cost natural gas for refinery fuel.

The DOE comment apparently refers to a statement in our report that ". . . it is presently unclear to what extent crude oil price discounting may be used to increase utilization of, and exports from, Middle East refineries . . ." This statement is based on the findings of several studies, including the May 1985 ITC report on natural resource pricing mentioned in both chapters 2 and 3, that access to low-cost crude oil and natural gas provides a competitive advantage for refineries in these countries. While this alone does not necessarily prove that the governments of these countries will discount crude prices to their refineries, it demonstrates that such price discounting would be possible (as these studies suggest), and could be used to expand these refineries' petroleum product market share.

DOE also suggested that we clarify our description of a potential disruption in chapter 4, and noted that (1) the most likely disruption to occur would be a shortage of crude oil supplies and (2) such a shortage would result in a surplus of available refining capacity. DOE did not, however, disagree with our approach nor our calculations in determining whether U.S. refineries would be able to process available crude supplies in a disruption.

We agree that if crude oil supplies alone were disrupted, the current surplus in worldwide refining capacity would increase. However, in addition to a disruption in crude oil trade, our description acknowledges the possibility of a potentially more dangerous situation that also entails a disruption in world product trade (such as would occur with a loss of refining capacity from the disrupted region). In such a disruption, sufficient refinery capacity would be needed to refine (1) remaining crude

supplies and (2) additional crude supplies from public and private stockpiles and spare crude production capacity to make up for the shortage.

DOE said that our analysis of tariffs and quotas in chapter 5 did not fully account for reduced consumption of domestically produced and imported products caused by higher prices induced by these measures. We agree that a tariff-induced price increase for petroleum products would cause a reduction in U.S. consumption of imported products, and had already included this reduction in our estimates of the various tariffs' revenue effects on consumers, industry, and the government. We believe, however, that the decline in U.S. consumption will be reflected in reduced imports, and not domestic sources of petroleum products, since imports are the marginal source of supply to the U.S. market.

DOE also noted that the cost calculations in chapter 5 did not fully account for the reduced world crude oil demand that would accompany the reduction in U.S. product consumption caused by a product tariff. Accounting for reduced crude demand would lower estimates of consumer expenditures as well as revenues for industry and the government. We had acknowledged in chapter 5 that world market adjustments may result in less-than-full "passthrough" of a U.S. product (or crude) tariff. In response to this comment, however, we added language that explicitly addresses the world crude market adjustments noted by DOE.

Request Letter From the Chairman, Subcommittee on Fossil and Synthetic Fuels, House Committee on Energy and Commerce

Congress of the United States
House of Representatives
Committee on Energy and Commerce
Room 2125, Rayburn House Office Building
Washington, D.C. 20515

February 15, 1985

The Honorable Charles A. Bowsher
Comptroller General
U.S. General Accounting Office
441 G Street, N.W.
Washington, DC 20548

Dear Mr. Bowsher:

It has come to the attention of this Subcommittee that the U.S. oil refining industry has been experiencing financial difficulties which have led to the closing of many refineries. A possible contributor to these difficulties may be the rapid increase in imports of petroleum products to the United States in the last few years. Some observers believe that if this trend continues, it may cause a threat to the viability of the domestic oil refining industry. If this is the case, this situation may have energy policy consequences, and may possibly pose national security questions regarding our ability to react in the event of disruptions in the oil market.

The Subcommittee requests that the General Accounting Office conduct a study of this issue. We would like the GAO to ascertain the facts of the situation and outline the factors that Congress should consider in determining whether legislative action would be appropriate. Among the questions that we would like your report to address are:

--How rapidly are petroleum product imports increasing? Where are these imports coming from? What trends can be expected in the next few years?

--Why are imports increasing, what forces are working to generate the larger imports, and how did this situation develop?

--If this trend continues, is it likely that the U.S. would be unable to refine oil sold from the Strategic Petroleum Reserve in the event of a disruption? Are there other related questions that should be considered?

--Could either tariffs, taxes, or quotas effectively control product imports? What factors should be weighed by the Congress when considering such actions? Are there other solutions that the Congress could consider?

--What might be the effects of these actions on energy producers, refiners, and consumers?

We would like your report to address these questions to the extent that you are able, and to include any others that your preliminary work indicates is pertinent to the issue.

Sincerely,

Philip R. Sharp, Chairman
Subcommittee on Fossil and
Synthetic Fuels

PRS/tr

Advanced Comments From the Department of Energy

Department of Energy
Washington, DC 20585

MAR 11 1986

Mr. J. Dexter Peach
Director, Resources, Community, and
Economic Development Division
U.S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Peach:

The Department of Energy (DOE) appreciates the opportunity to review and comment on the General Accounting Office (GAO) draft report entitled "Petroleum Products: Effects of Imports on the U.S. Oil Refining Industry and U.S. Energy Security".

In our view, the report accurately assesses the causes for the decline in profitability of the domestic refining industry over the past five years. Depicting a plausible scenario about the future of domestic refining capacity and refined product imports, it concludes that protectionism cannot be justified on the basis of energy security. We would like to offer the following major comments about specific assumptions and definitions contained in the report,

Chapter 3 examines the outlook for product imports and refinery closures. We disagree with the apparent assumption in this chapter that Middle Eastern countries may discount crude oil prices to their refineries in order to be competitive in world markets. Our analysis indicates that the new export refineries will be competitive because of their sophistication and because of the availability of low-cost natural gas for refinery fuel. Indeed, a netback analysis yields an implicit value for crude oil transferred to Saudi Arabian refineries which is about the same price as the crude oil available for export from Saudi Arabia.

Chapter 4 examines the energy security threat posed by incremental U.S. product imports from the Middle Eastern refineries. This chapter would be improved by clarifying the implications of the disruption scenario. The most likely disruption to occur would be a shortage of crude oil supplies. A shortage would occur if a disruption in crude oil production were not fully offset by stock draw in consuming countries. In this case, a shortage of crude oil feedstocks would result in a surplus of available refining capacity.

Chapter 5 examines the effects of crude oil and refined product import tariffs or quotas on the domestic petroleum industry. We believe that this chapter does not fully address the effects of a product import tariff or quota on both petroleum product and crude oil markets. Specifically, the report does not fully consider the following points. First, since consumers respond to higher product prices by reducing demand, demand for products from both domestic and imported sources will tend to decrease under a tariff or quota. Second, reduced demand for products would also reduce demand for crude oil. Both domestic and foreign crude producers may receive lower crude prices as a result of reduced demand. The report's calculations of cost and revenue effects of tariffs do not capture this cost.

DOE hopes that these comments will be helpful to GAO in their preparation of the final report.

Sincerely,

Martha O. Hesse
Assistant Secretary
Management and Administration

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