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INDUSTRIAL ENERGY MANAGEMENT

THE STRUCTURE OF IEM FROM A NATIONAL PERSPECTIVE

BY

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FOR

SEMINAR ON INDUSTRIAL ENERGY MANAGEMENT

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1845

OUTLINE

- Historical Review of World Energy Demand
- Projected Growth of Energy Demand
- Energy Demand By Sector--Contribution of Industrial Sector
- Relative Energy Intensiveness of Various Industrial Elements
- Energy Contribution to Total Production Cost
- Relative Priority of Energy Efficiency Investments
- National Objectives May Suggest The Free Market Intervention
- What Is Industrial Energy Management

  The Private Sector Component

  The Public Sector Component
- Summary of National IEM Programs
- Evaluating National Programs
- Issues
- Back-Up Materials

  Estimates of World Energy Reserves

  Energy Unit Conversion Table

Exhibit 1

Annual World Energy Production of Individual Energy Sources

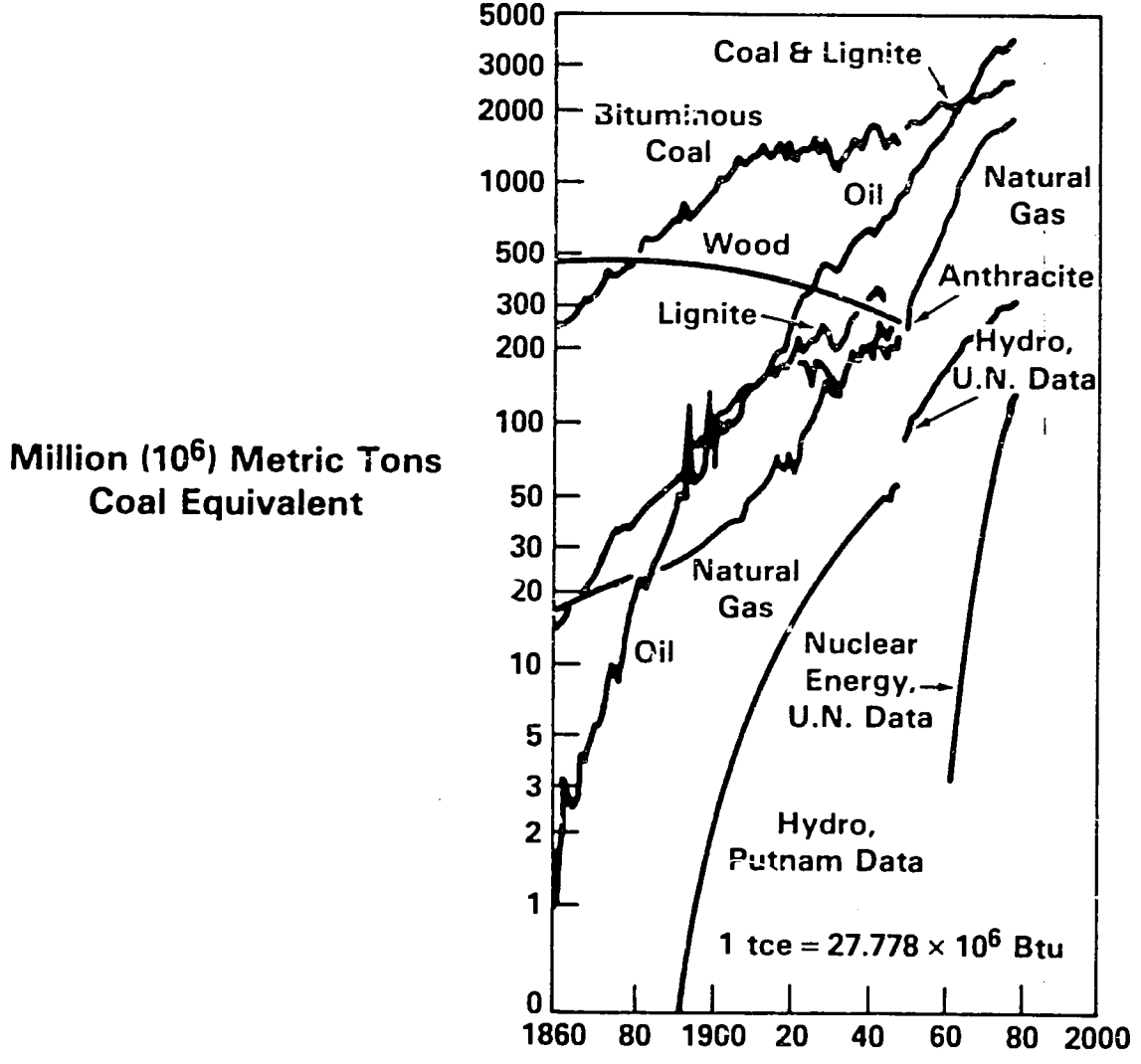

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Exhibit 2

World Population and Energy Consumption

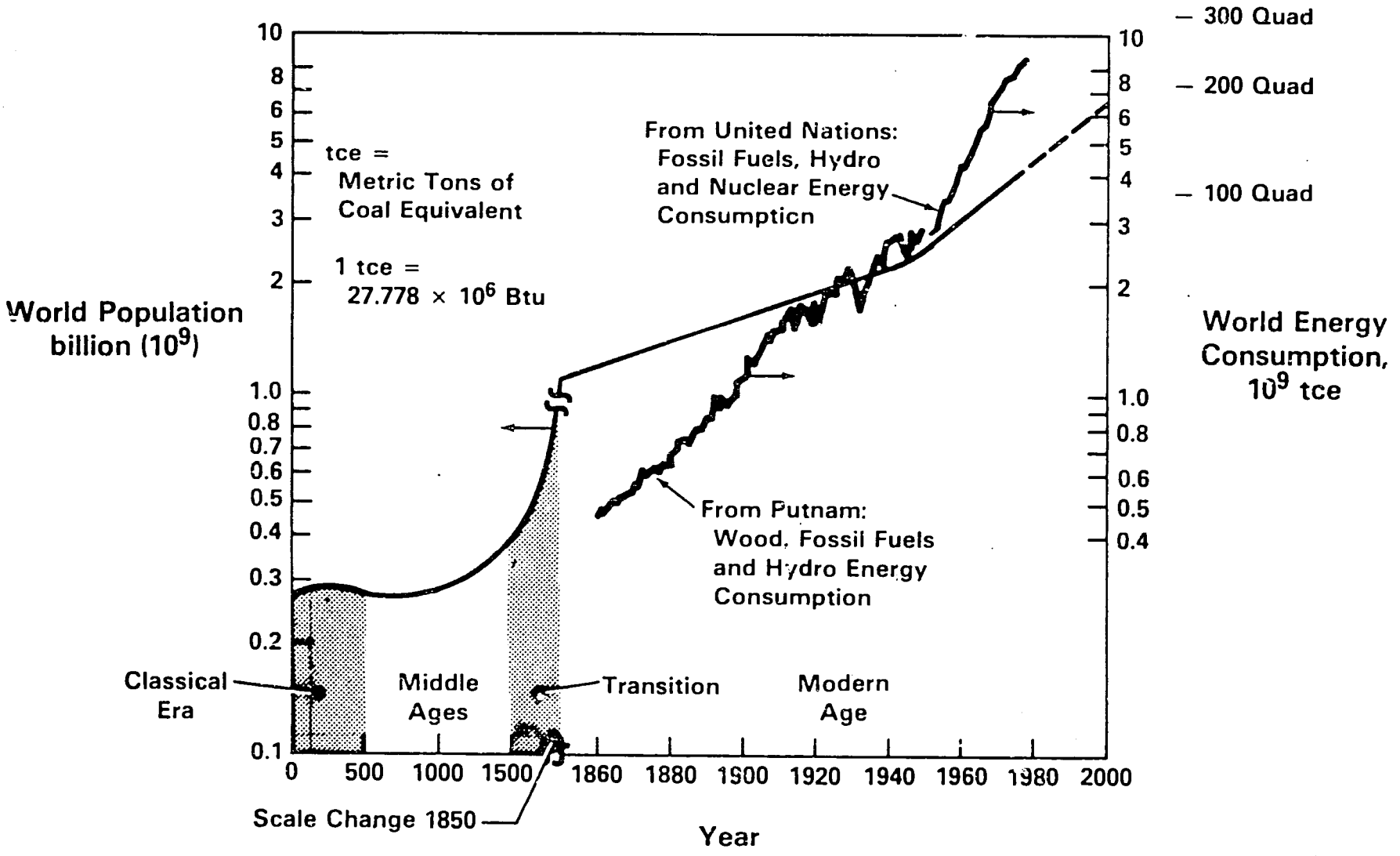


Exhibit 3

Annual Energy Consumption and Gross World Product Per Capita

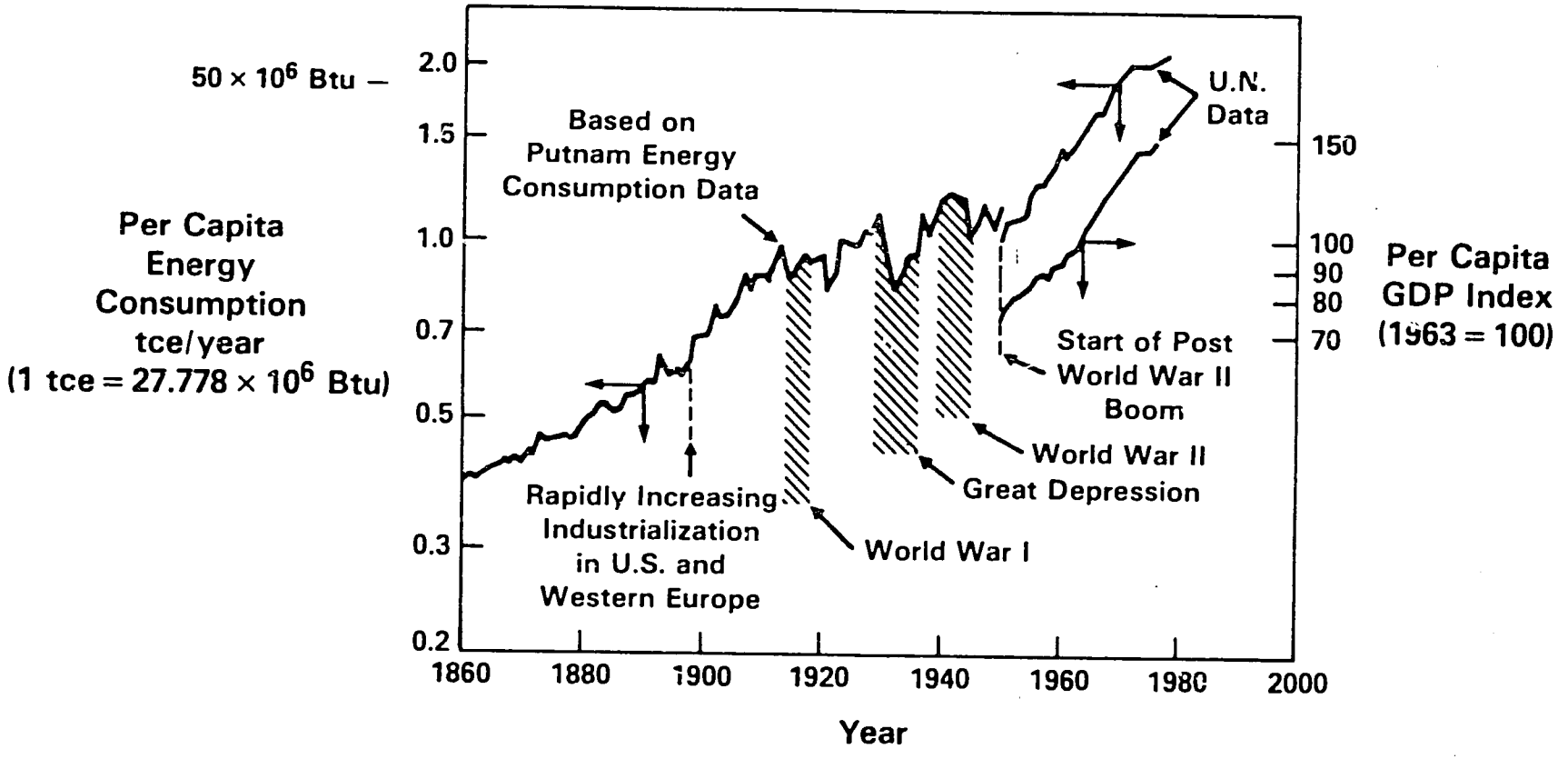
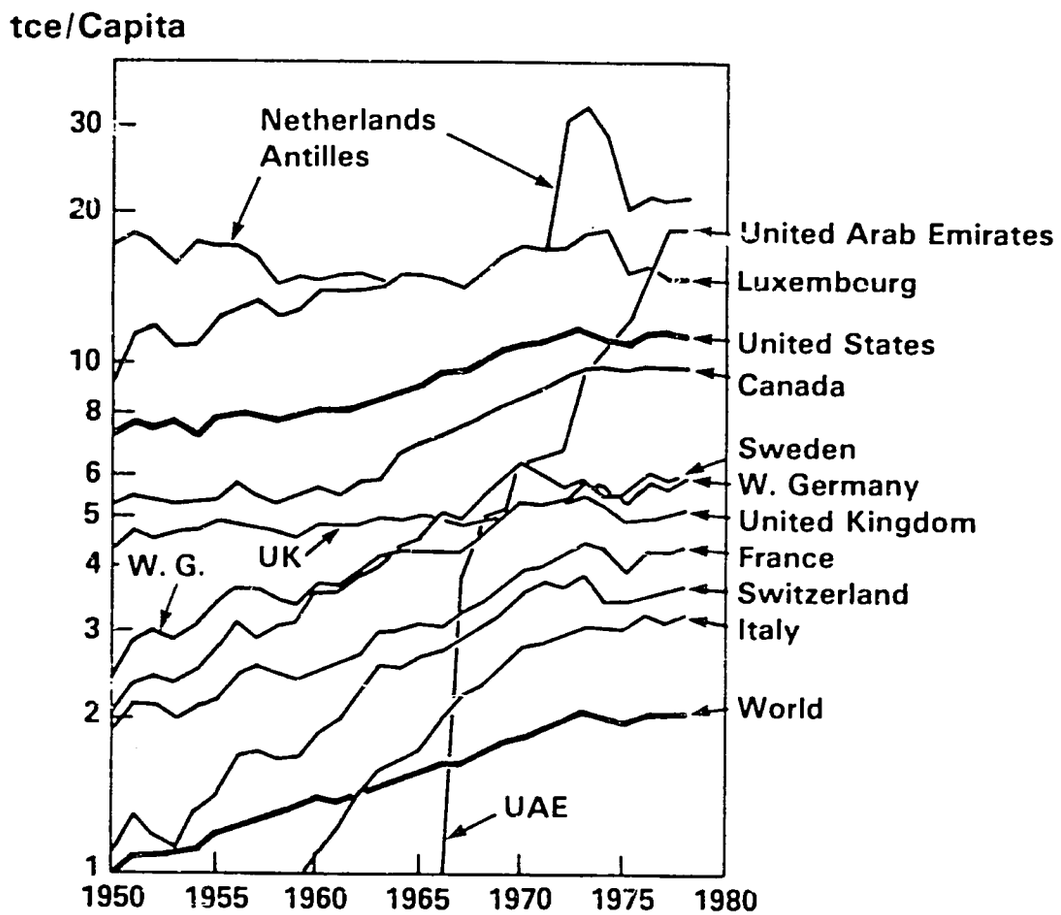


Exhibit 4

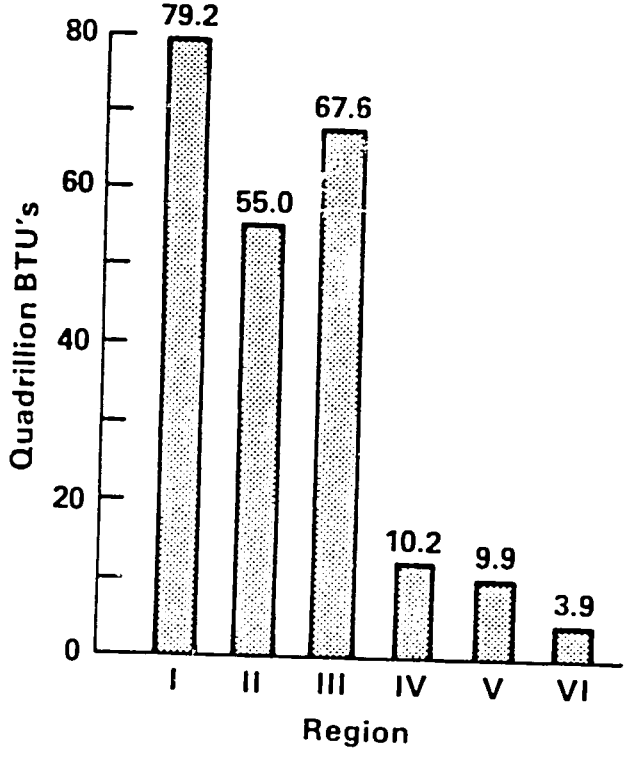
Per Capita Energy Consumption of Selected Countries (U.N. Data)



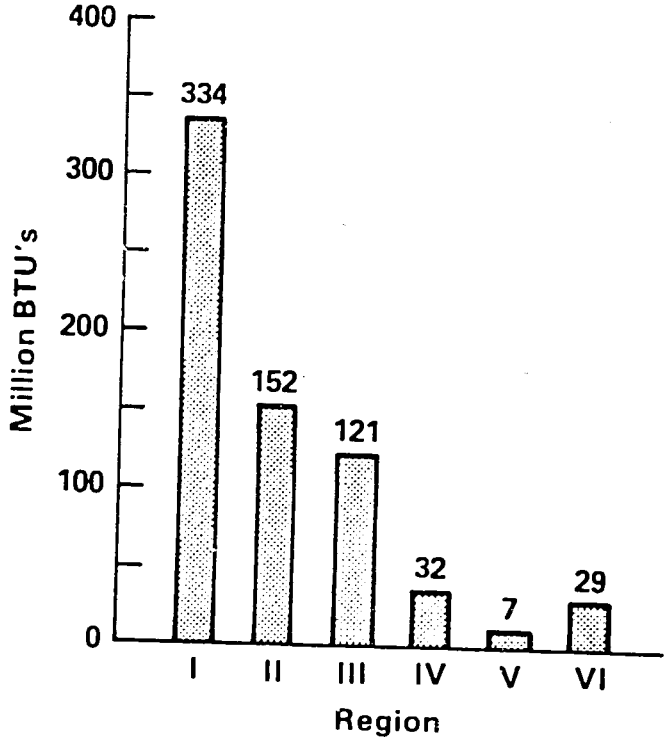
Source: U.N. Data

Exhibit 5

1975 World Energy Use by Region*



Total Primary Commercial Energy use



Per Capita Primary Commercial Energy Use

Regions:

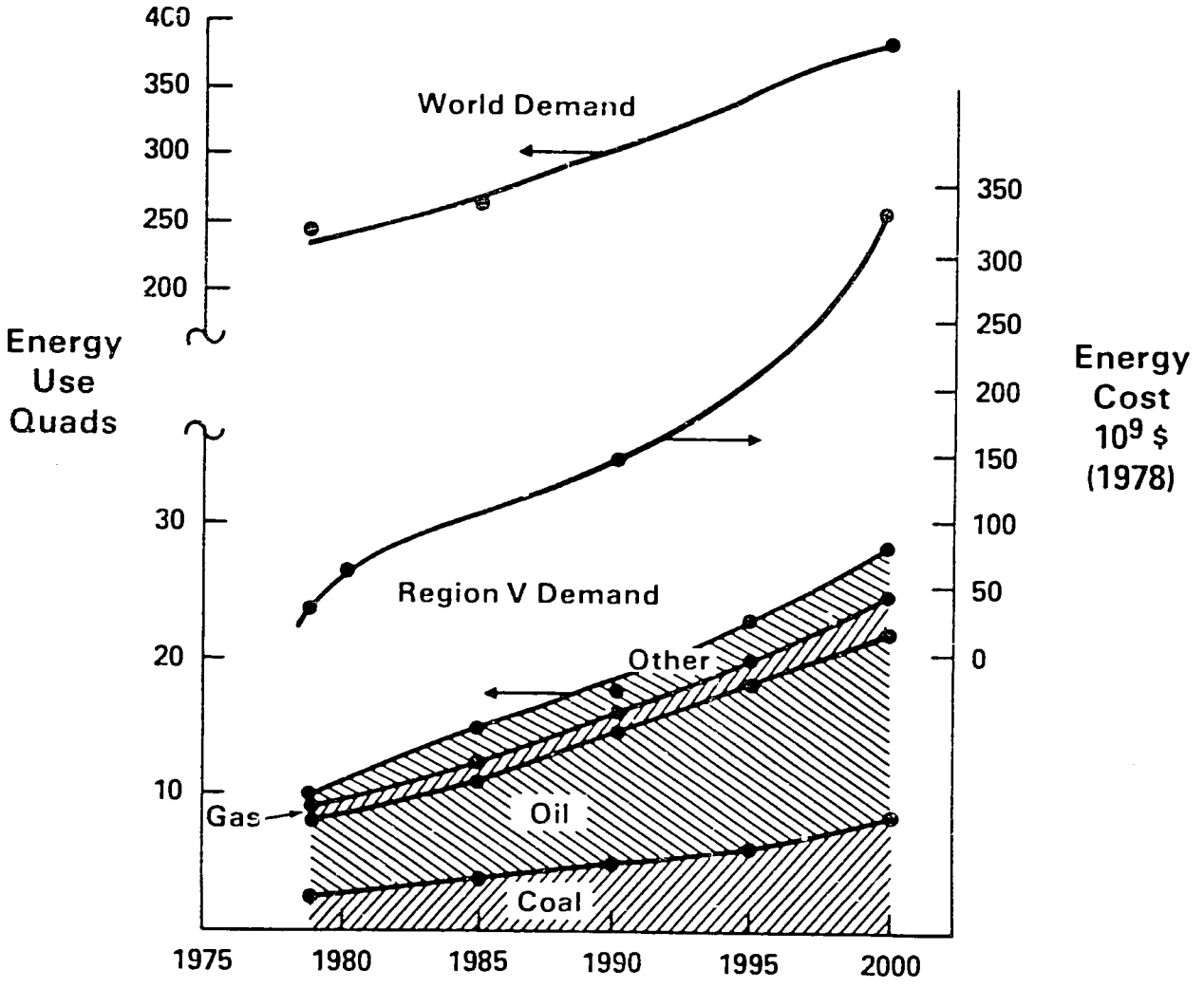
I — USA and Canada
II — USSR and Eastern Europe
III — Western Europe, Japan, Australia, New Zealand, Israel, and South Africa
IV — Latin America
V — South and Southeast Asia, Africa, Except Parts in Region III & VI
VI — Middle East and Northern Africa

Source: *Energy in a Finite World*, Wolf Hafele, Institute for Applied Systems Analysis, Ballinger, Cambridge, Mass, 1981, pp. 423-435.

*The Above Figures Do Not Include Approximately 18 Quads of Primary Non-Commercial Energy Use.

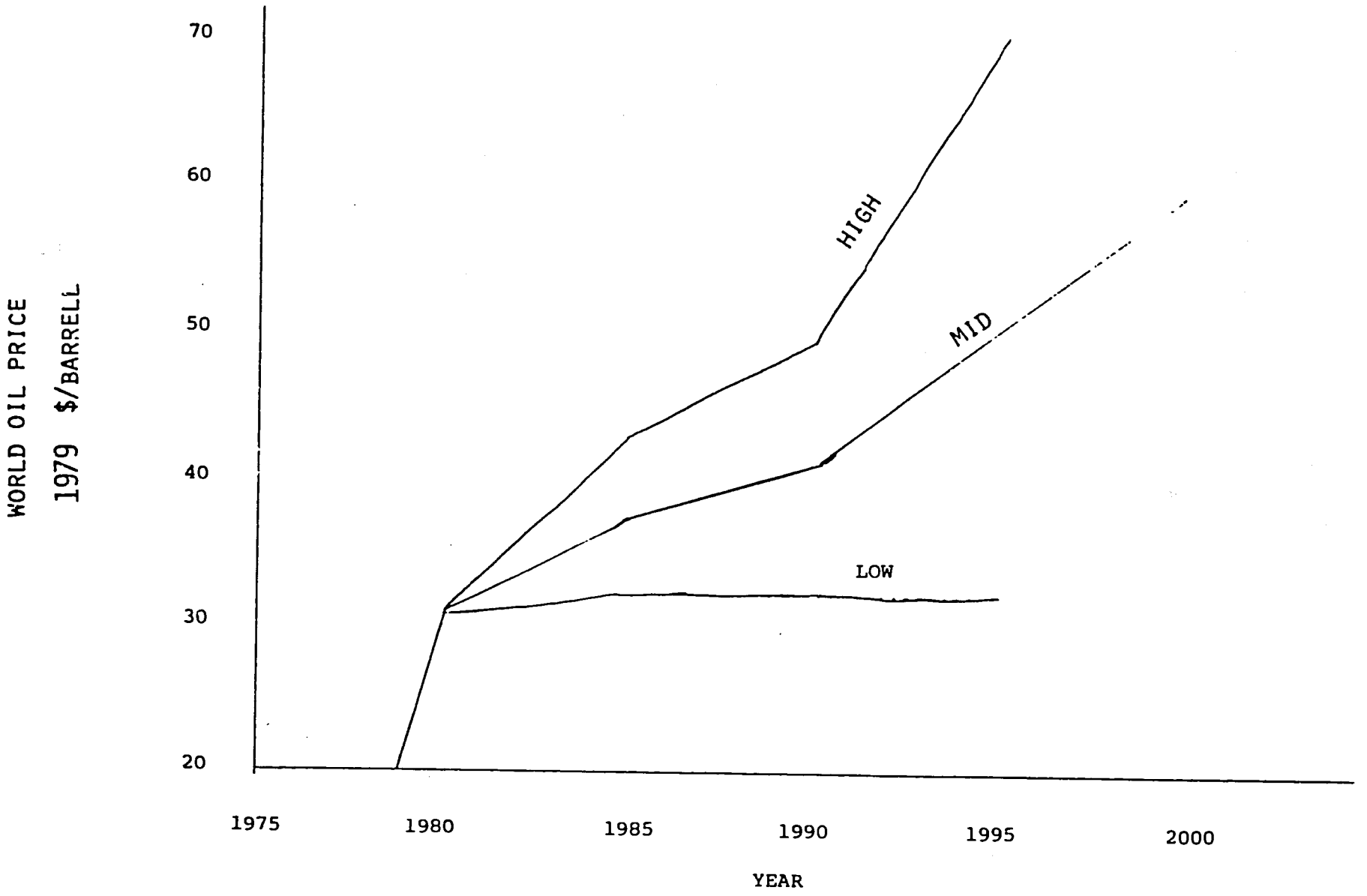
Exhibit 6

Projected Energy Use and Fuel Share for Region V Compared to World Demand



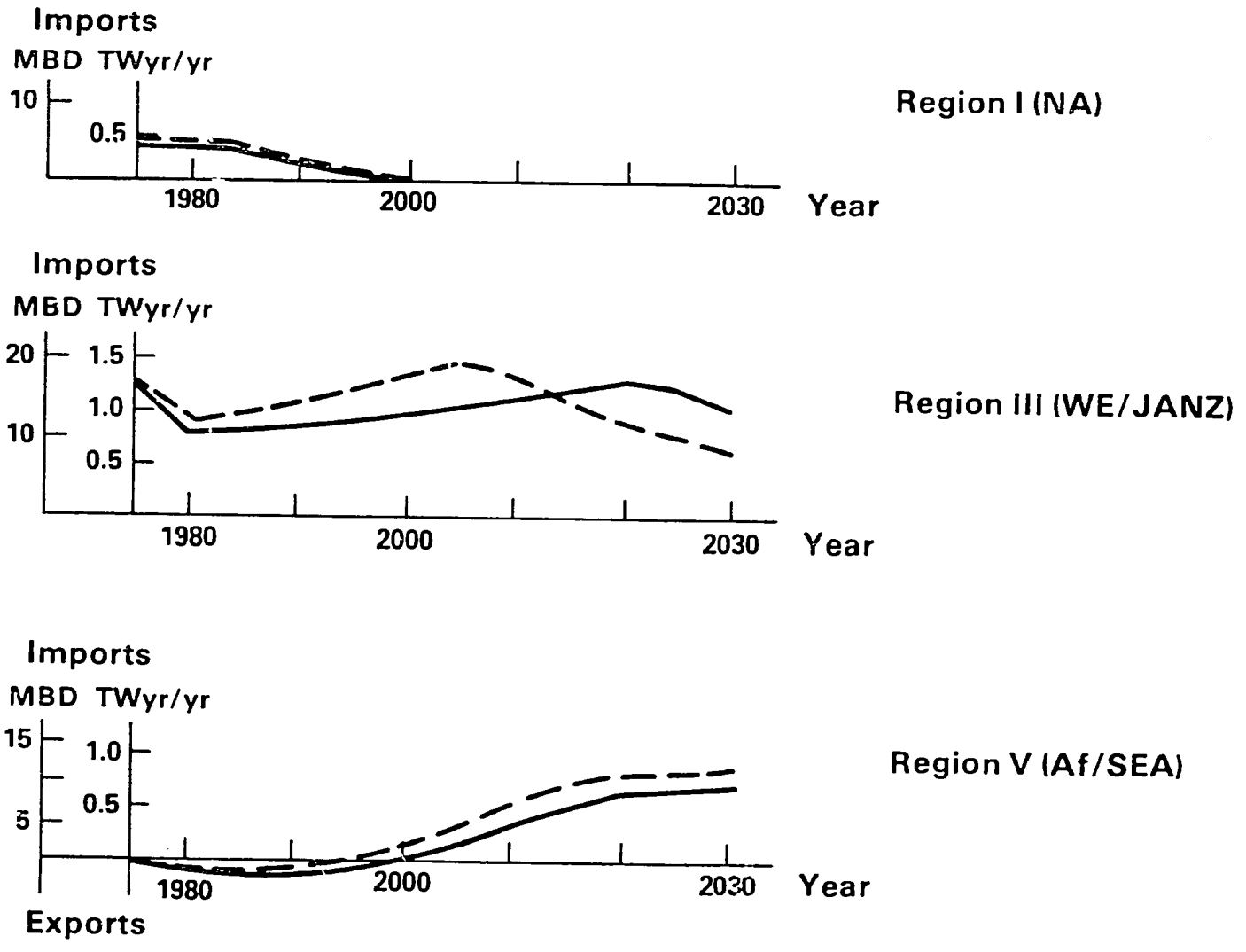
Note — Energy Use Projections Based on Middle Range Oil Cost Scenario U.S. EIA Estimates

WORLD OIL PRICE ASSUMPTIONS



SOURCE: 'EIA 1980 REPORT TO CONGRESS

Exhibit 8
Projected Interregional Oil Trade



Source — Energy in a Finite World

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Exhibit 9

Some OECD Data Related to Energy Consumption

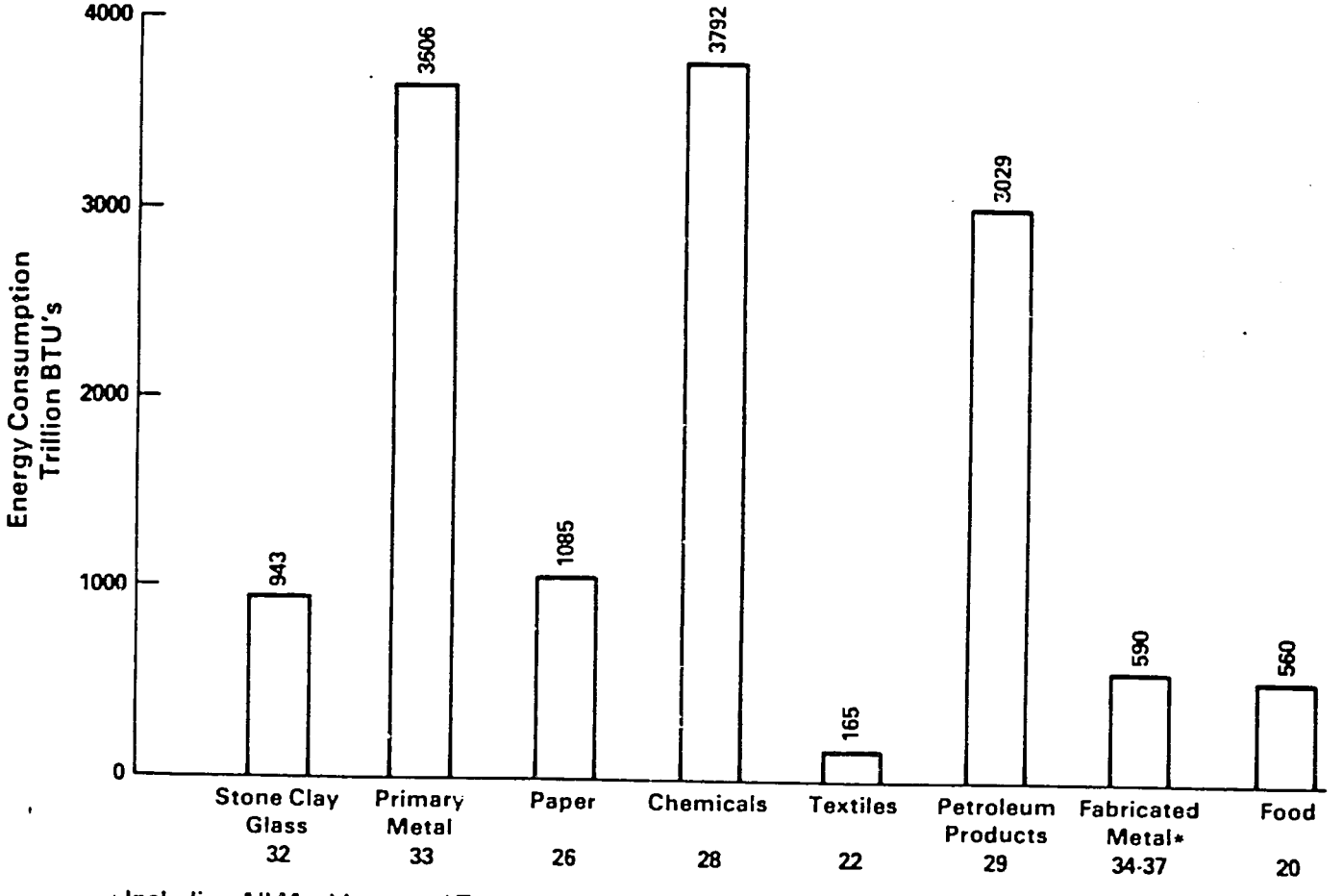
Country	Sectoral Energy Consumption, 1978			
	Industry	Residential/ Commercial*	Transport	Non-Energy
	Gross Consumption, %			
Switzerland	29	50	19	2
United States	38	34	25	3
Canada	41	36	19	4
United Kingdom	46	37	16	2
W. Germany	46	37	14	3
Sweden	47	39	13	1
Norway	53	30	14	3
Italy	53	29	16	1
Japan	59	24	14	3
Luxembourg	71	16	11	1

*Includes Agricultural Uses

Data Source: IEA/OECD

Exhibit 10

Annual Energy Consumption in Ten Energy Intensive Industries in U.S. During 1980

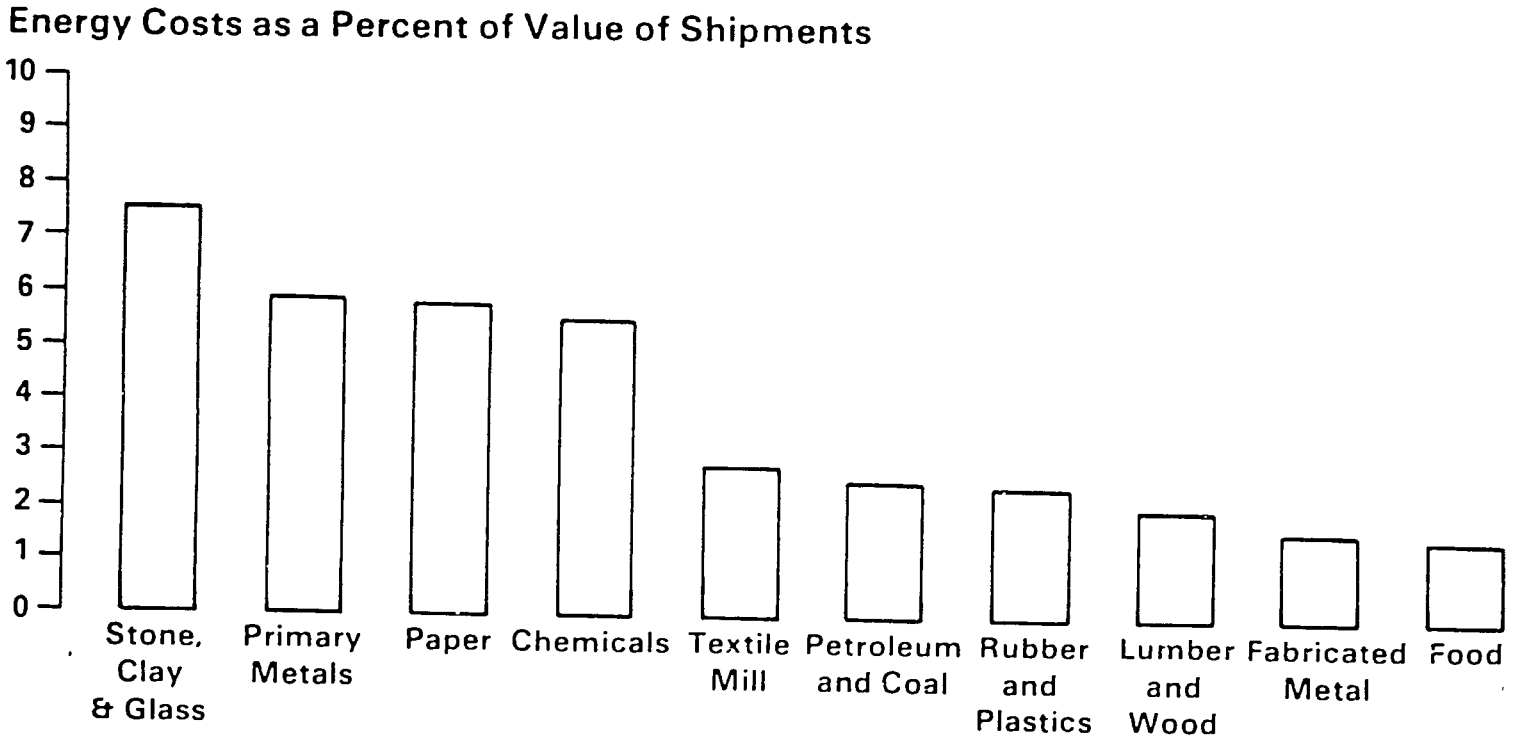


* Including All Machinery and Transportation Products

Source — U.S. DOE Industrial Energy Efficiency Improvement Program

Exhibit 11

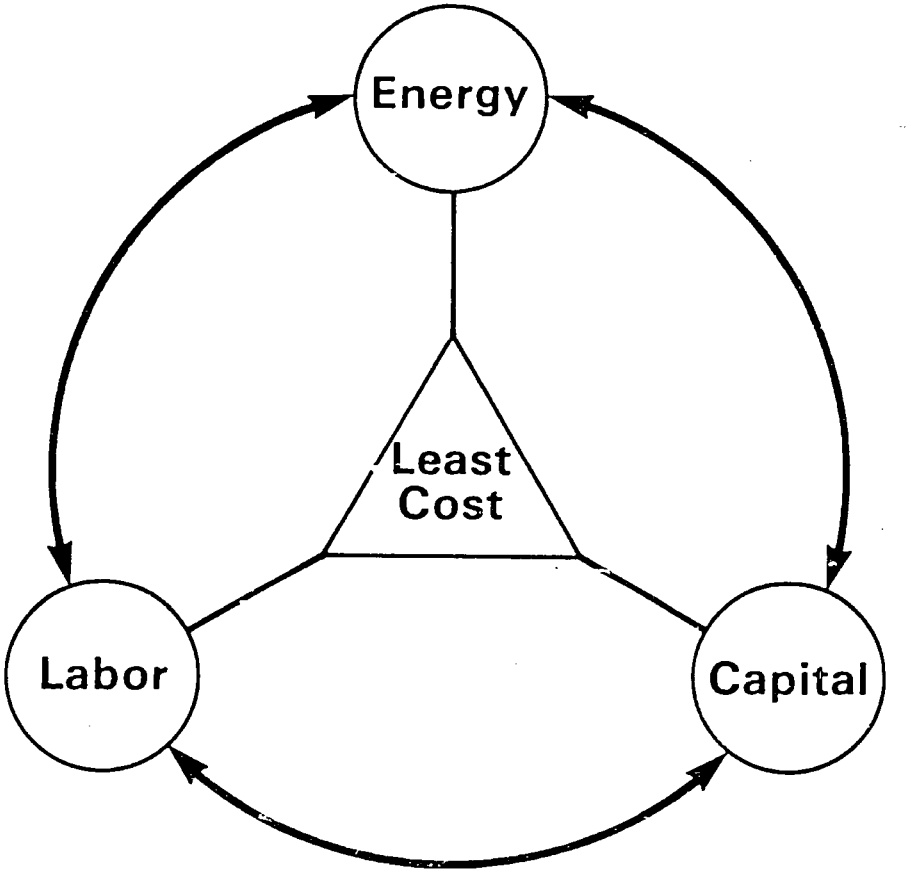
Energy Costs as a Percent of Shipments in the 10 Most Energy Intensive Industries



Source: U.S. Department of Commerce, *1980 Industrial Outlook.*

Exhibit 12

Minimum Production Cost — A Primary Industrial Objective



An Optimum Balance of Energy, Capital and Labor Will Achieve Least Cost

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Exhibit 13

Investments in Energy Efficiency Have Low Priority

Priority for Industrial Capital

- Nondiscretionary Investments
  - Replacement Equipment
  - Mandatory Measures — Safety, Environmental
  - Market Protection
- Discretionary Investments
  - New Product Development and Introduction
  - Process Productivity Improvements
  - Process Efficiency Improvements
  - New Process Development

Perceived Risk Can Further Suppress Investment

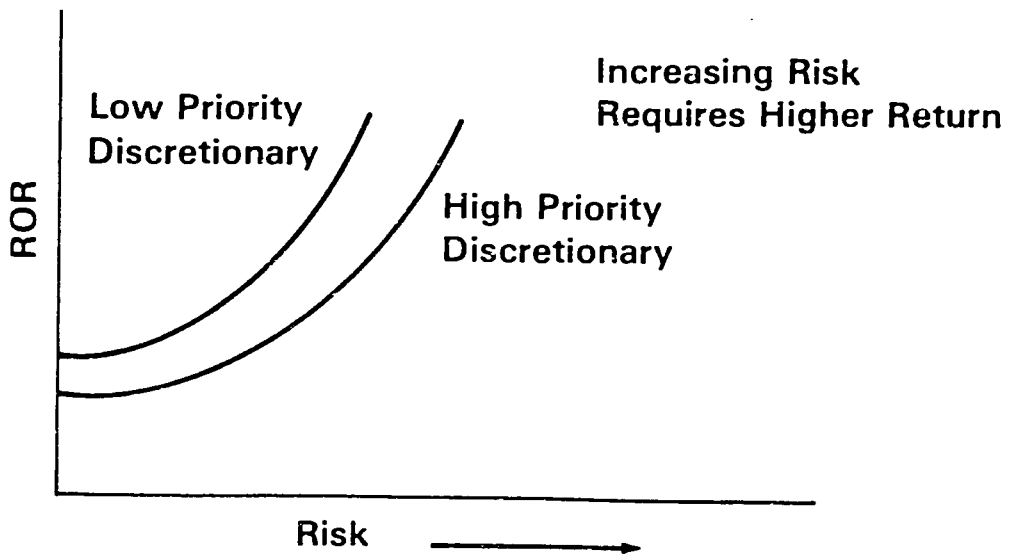

Exhibit 14

National Objective May Suggest Intervention in the Free Market

Energy May Impact —

- National Security
- Public Health
- Balance of Payments

Public Intervention

- Price Control
- Taxation
- Incentives
- Risk Assumption
- Regulation

Exhibit 15

Industrial Energy Management
The Private Sector Component

- *Conduct Audits*—Detailed Determination of Current Demand
- *Identify Improvements*—in Process and Procedures
- *Set Targets*—Plan To Implement Improvements
- *Develop Standards*—for New Equipment Acquisition
- *Develop Capital Budgets*—for Equipment Upgrading and Replacement
- *Forecast Demand*—Based on Targets and Growth
- *Stimulate Employee Awareness*—in Plant and at Home
- *Prepare Reports*—To Account for Progress
- *Exchange Information*—With Trade Association and Government Groups

Exhibit 16

Industrial Energy Management
The Public Sector Component

- *Monitor Demand*—in Each Industrial Sector
- *Assess Impact*—Projected Demand Versus Supply/Price Forecasts
- *Define Energy Policy*—Consistent With National Development Plans
- *Provide Information*—on Price Availability and Technology Options
- *Provide Assistance*—in Establishment of Individual IEM Programs
- *Establish Targets*—Based on Reasonable Industrial Expectations
- *Conduct Audits*—for Small Industrial Concerns
- *Finance Demonstration*—of Innovative Industrial Concepts
- *Provide Incentives or Disincentives*—To Encourage Investment in Industrial Energy Productivity
- *Finance Research and Development*—To Accelerate Availability of Needed Technology
- *Exchange Information*—Participate in Regional and International Energy Management Programs

Exhibit 17

Comparison of Government IEM Programs in IEA Member Countries

	Financial/Fiscal Incentives			Reporting/Auditing			Information, Advice/Assistance			Other Measures	
	Grant/ Subsidy	Loan	Tax Incentive	Target Setting	Reporting	Auditing	Information/ Publication	Meeting/ Seminar	Advice for Small & Medium Sized Firms	CHP	Waste/ Waste Heat
Australia	–	–	X	–	–	X	X	X	X	X	X
Austria	X	X	X	–	X	X	X	X	X	X	X
Belgium	–	–	–	–	–	–	X	–	X	–	–
Canada	X	–	X	X	X	X	X	X	X	X	X
Denmark	X	X	–	–	–	–	X	X	X	X	X
Germany	X	X	X	X	–	–	X	X	X	X	X
Greece	P	X	–	X	X	X	X	X	X	P	P
Ireland	X	P	–	P	P	–	X	X	X	X	X
Italy	P	P	–	–	X	–	X	X	X	XP	XP
Japan	X	X	X	X	X	X	X	X	X	–	X
Luxembourg	–	–	–	–	–	–	X	–	–	–	–
Netherlands	X	–	X	–	–	X	X	X	X	X	X
New Zealand	X	X	X	P	–	X	X	X	X	X	X
Norway	X	X	X	–	X	–	X	–	P	X	X
Portugal	X	–	–	–	–	X	X	–	X	P	–
Spain	X	X	X	X	X	X	X	X	X	X	P
Sweden	X	X	–	–	–	X	X	X	X	–	X
Switzerland	–	–	X	–	–	–	X	–	X	–	X
Turkey	–	–	–	–	–	–	X	–	P	P	P
United Kingdom	X	–	X	X	–	X	X	X	X	X	X
United States	X	X	X	X	X	X	X	X	X	X	X

X = Exists

P = In Preparation

– = Does Not Exist

Source: Country Submissions for IEA 1977, 1978, 1979 and 1980 Reviews of National Energy Policies

(1) They Are Described in More Detail in the Country Chapters of the Annual Publication Energy Policies and Programmes of IEA Member Countries. Some Specific Examples Are Given in Section III.

INDUSTRIAL CONSERVATION PROGRAM
UNITED STATES

ORGANIZATION

U.S. DEPARTMENT OF ENERGY (DOE)

BUDGET

FY 1980 -- $60 MILLION

FY 1981 -- $43 MILLION

PROGRAM ELEMENTS

--RD&D (COST SHARED)

--TAX INCENTIVES

--REPORTING PROGRAM

--EADC PROGRAM (AUDITS, TRAINING)

--OTHER AIDS

- PUBLICATIONS, FILMS
- WORKSHOPS

POLICY

--FREE MARKET PRICING

--ACCELERATED DEREGULATION

--RESEARCH LIMITED TO LONG TERM HIGH RISK

INDUSTRIAL CONSERVATION PROGRAM
SWEDEN

ORGANIZATION

NATIONAL ENERGY BOARD (NEB)

OIL SUBSTITUTION FUND (OSF)

LONG TERM AND GENERAL ENERGY RESEARCH CNETER (LTERC)

BUDGET

1980 - 1982 -- $36 MILLION

1983 - 1985 -- $50 MILLION

PROGRAM ELEMENTS

--RD&D

--INVESTMENT GRANTS AND LOANS

--COMMERCIALIZATION LOANS

--OTHER AIDS--INFORMATION COUNSELING TRAINING AND AUDIT SERVICES

POLICY

--STRONG GOVERNMENT ROLE IN PRICING

--SURCHARGES ON OIL AND ELECTRICITY

--DIRECT REGULATORY INTERVENTION

--EXTENSIVE RD&D SUPPORT

INDUSTRIAL CONSERVATION PROGRAMS
UNITED KINGDOM

ORGANIZATION

DEPARTMENT OF INDUSTRY (U.K. DOI)

DEPARTMENT OF ENERGY (U.K. DOE)

SCIENCE RESEARCH COUNCIL (SRC)

MINISTRY OF AGRICULTURE, FOOD AND FISHERIES (MAFF)

BUDGET

APRIL 1980-81 -- $21 MILLION

APRIL 1981-82 -- $27.3 MILLION

PROGRAM ELEMENTS

RD&D GRANTS COST SHARED CONTRACTS

ENERGY AUDITS

REGIONAL GRANTS FOR PLANT IMPROVEMENTS

TAX INCENTIVES

OTHER AIDS -- NEWSPAPER, TELEPHONE COUNSELING

POLICY

ENERGY PRICING IS CORNERSTONE

BROAD RD&D SUPPORT

MINIMUM REGULATORY INTERVENTION

ASSESSMENT OF POLICY OPTIONS

THE PUNITIVE POLICIES

- MINIMUM PERFORMANCE STANDARDS FOR SELECTED EQUIPMENT
- MANDATORY ENERGY PRODUCTIVITY TARGETS
- ENERGY TAXES
- MANDATORY FUEL SWITCHING FOR SELECTED EQUIPMENT

INCENTIVE POLICIES

- COST-SHARING IN THE DEVELOPMENT OF CONSERVATION TECHNOLOGY
- FINANCIAL INCENTIVES FOR INSTALLING SPECIFIC TECHNOLOGIES
- RELAXATION OF EXISTING POLICY INHIBITING CONSERVATION

COMPLEMENTARY POLICIES

- VOLUNTARY ENERGY PRODUCTIVITY TARGETS AND ENERGY REPORTING
- TECHNOLOGY TRANSFER, TECHNICAL ASSISTANCE, AND PROMOTIONAL EFFORTS

CL 79-02812M/23-32

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CRITERIA FOR EVALUATING POLICY OPTIONS

1. ENERGY SAVINGS IMPACT
2. FUEL SWITCHING IMPACT
3. RISK LEVEL OF TECHNOLOGY INTRODUCED
4. COMPATIBILITY WITH OTHER FEDERAL OBJECTIVE (EMPLOYMENT, INFLATION, ENVIRONMENT, COMPETITION)
5. ADMINISTRATIVE COST EFFECTIVENESS
6. AVOIDANCE OF DISPLACEMENT OF INDUSTRY INITIATIVES
7. EXPEDIENCY OF IMPLEMENTATION

CL 79-02812M/19-32

Policy Options	Energy Savings	Fuel Switching	Risk Spectrum	Compatibility with other Fed. Objectives	Cost Effect.	Displacement Avoidance	Expedience	Overall Desirability
PUNITIVE								
Performance Standards	+	0	Low Risk		-	-	+	-
Mandatory Targets	+	0	Low Risk	-	-	-	0	-
Energy Taxes	0	+	Low Risk	-	+	0	0	0
Mandatory Fuel Switch	0	+	Low Risk	-	+	0	+	+
INCENTIVE								
Cost Shared RD&D	+	+	High Risk	+	+	+	+	+
Financial Incentives	+	+	Low Risk	+	-	-	+	0
Policy Relaxation	+	+	Broad	0	+	+	+	+
COMPLEMENTARY								
Vol. Energy Product. Targets + Reporting	+	+	Low Risk	+	+	0	0	+
Technology Transfer	+	+	Low Risk	+	+	0	0	+

Industrial Sector Ranking by Value of Innovation Index

Industrial Sector	Innovation Index
Aircraft and Missiles	3.004
Electrical Machinery and Communications	1.418
Autos and Other Transportation Equipment	0.718
Machinery	0.224
Professional and Scientific Instruments	0.091
Chemicals and Allied Products	-0.057
Rubber Products	-0.345
Petroleum Products	-0.443
Nonferrous Metals	-0.538
Fabricated Metals And Ordinance	-0.590
Stone, Clay, and Glass	-0.669
Textile Mill Products and Apparel	-0.689
Paper and Allied Products	-0.694
Food and Kindred Products	-0.703
Steel	-0.725

Reasons for Risk Avoidance

- Linear Industries with Large Capital Equipment
- Fragmented Industries with No Central Engineering
- Slight Competitive Market Advantage by Process Change (Easy To Duplicate)
- Energy Price Increases Can Be Passed Through To Consumer

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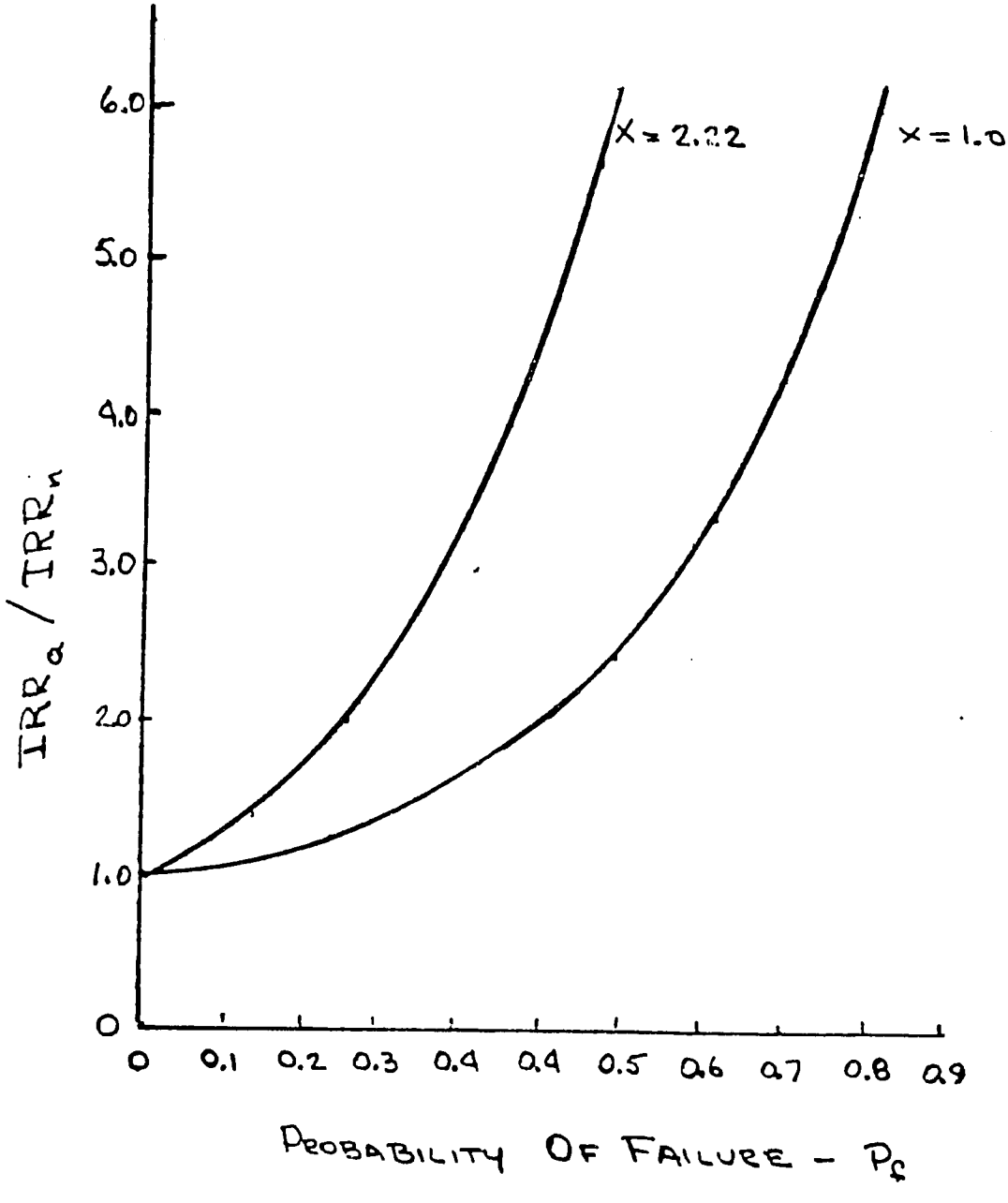
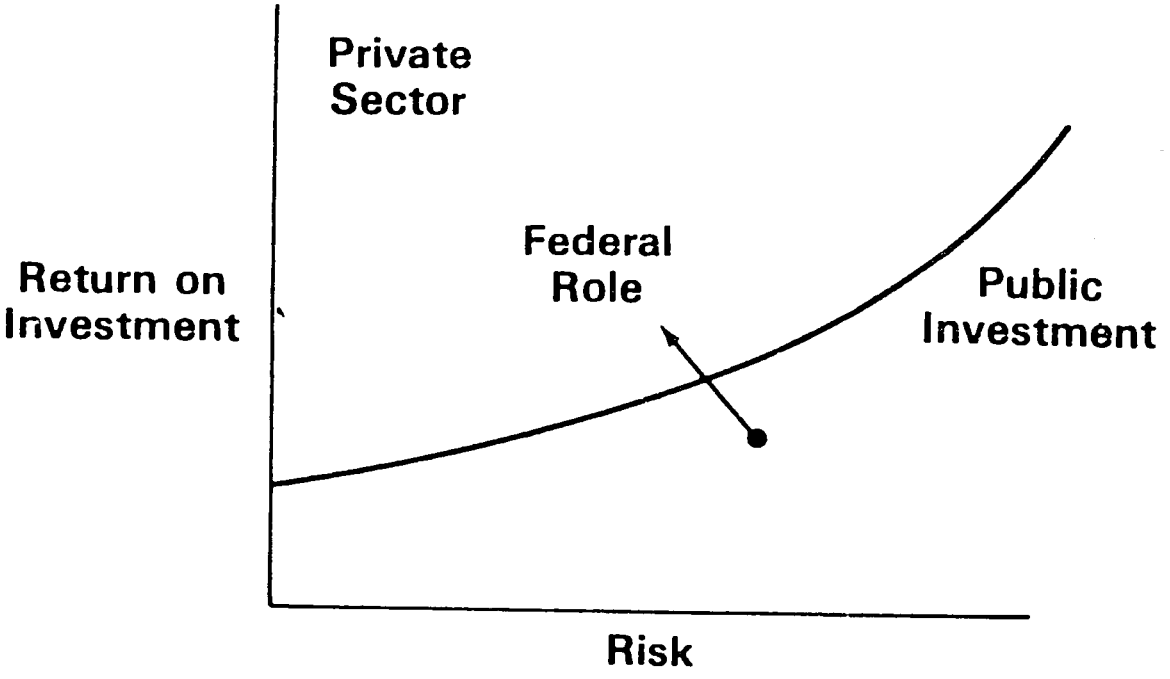
12.

Impact Of Perceived Risk On Required Rate Of Return

$$IRR_a / IRR_n = 1 / (1 - P_f)^x$$



Risk vs Return on Investment



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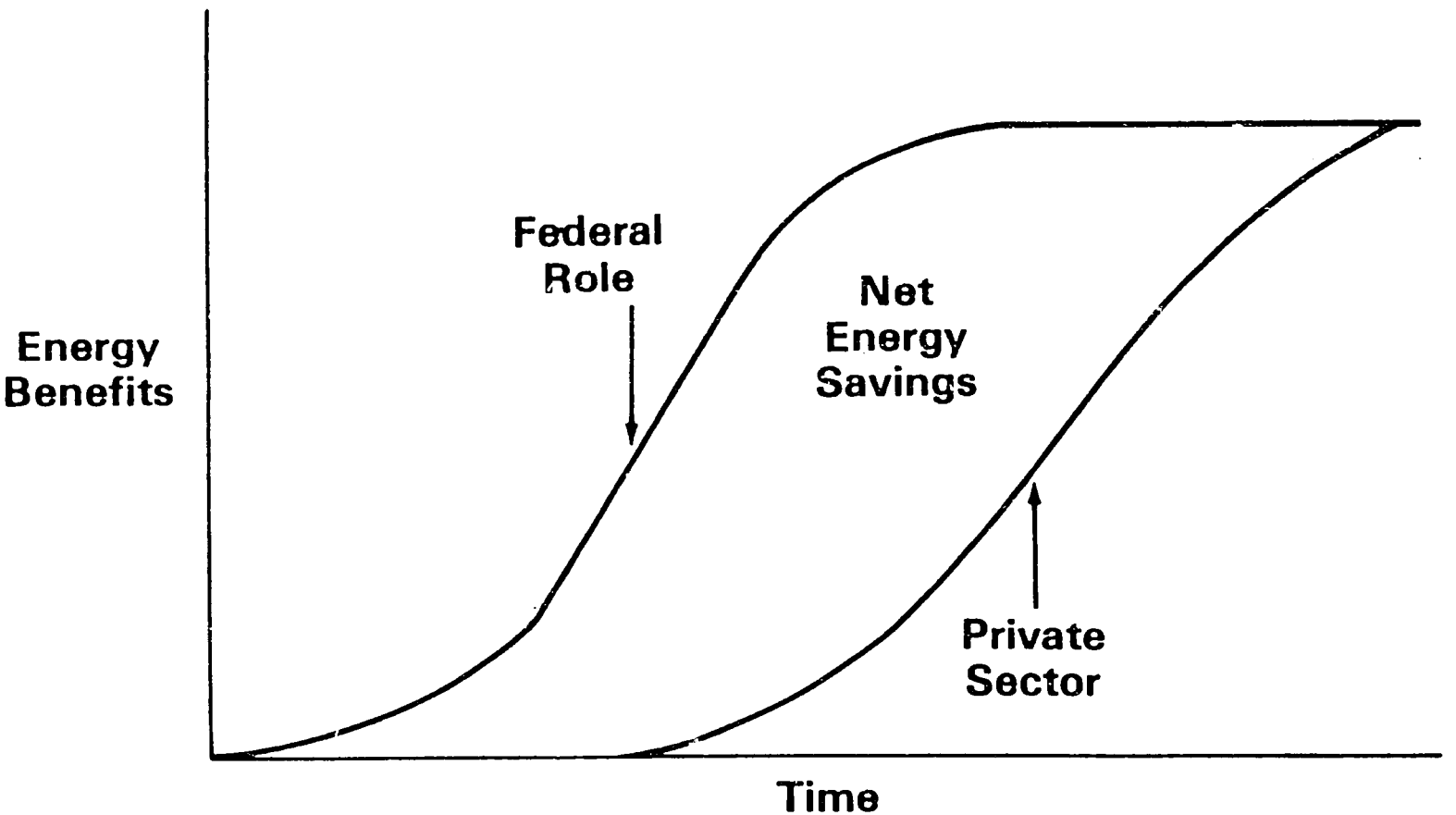
IMPACT OF GOVERNMENT PROGRAM



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Issues

For Industrial Participants

Is an IEM Program Worthwhile and How Significant an Effort Should Be Applied.

How Does One Plan and Establish Such a Program?

What Tools Are Required?

For Government Participants

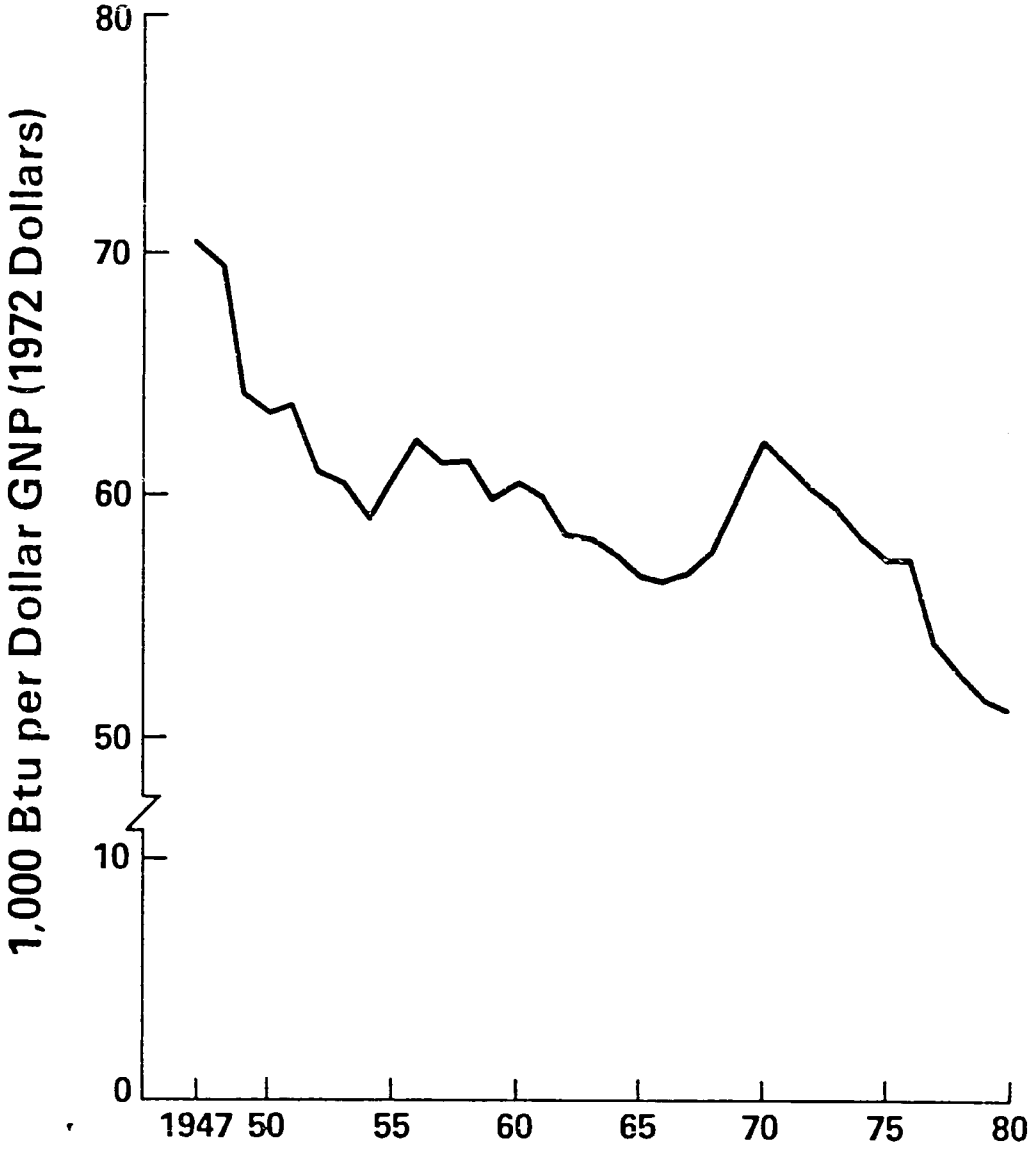
Content of Program

Placement Within the Bureaucracy

Implementation Plan

Organizational Structure and Cost

Exhibit 8
U.S. Energy Consumption
Ration to Gross National Product



Source: *International Energy Indicators*, DOE Office of International Affairs, May, 1981, p. 28.

Working Hours Required To Purchase a Selected Basket of Goods & Services, as of June, 1979

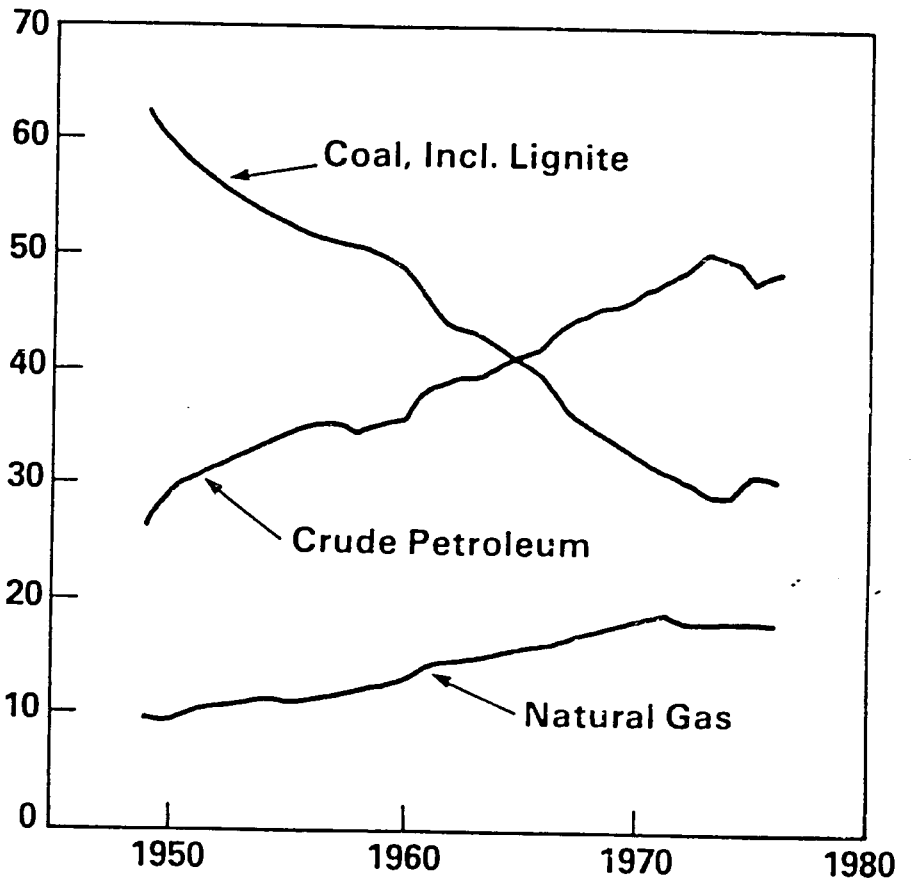
Data Source: Union Bank of Switzerland;
Study Dated Dec. 1979

City	Hours Needed
*Four U.S.A. Cities	75.3-85.5
Montreal, Toronto	86.87.8
Zurich, Geneva	84.3, 92.3
Dusseldorf	98.3
Stockholm, Oslo	97.3, 116.5
Tokyo	136.5
Paris	138.8
Milan	139.5
London	150.3
Madrid	155.8
Mexico City	189.3
Sao Paulo, Rio de Jan.	194.3, 224.8
Teheran	204.3
Buenos Aires	283.3

*Chicago, San Francisco, Los Angeles, New York. Based on Exchange Rates of June 1979.

BACK-UP MATERIAL

Share of Fossil Fuels in World Primary Energy Production, %



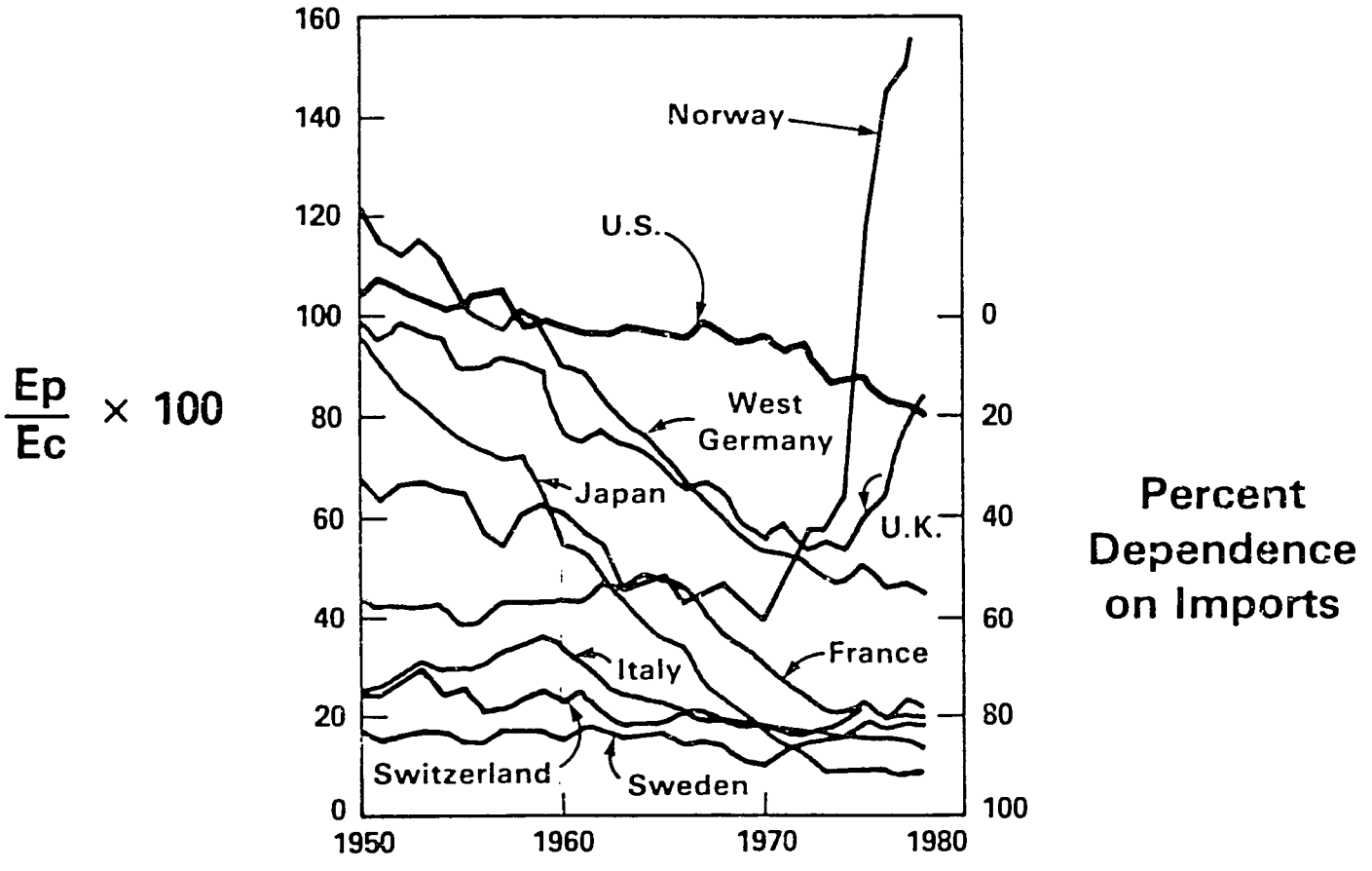
Source: U.N. Data

Change in Mix of Commercial Fuel Used by Selected Countries

	Oil, %			Gas, %			Coal, %		
	1950	1965	1978	1950	1965	1978	1950	1965	1978
France	17.2	46.3	62.8	0.3	4.4	12.0	79.9	45.3	19.8
W. Germany	3.1	39.6	49.2	0.0	1.8	17.1	95.9	57.7	31.7
Japan	4.3	56.6	74.3	0.2	1.5	5.2	85.3	37.0	17.4
Sweden	35.9	75.2	78.0	0.0	0.0	0.0	49.5	8.9	4.4
Switzerland	27.6	72.0	76.0	0.0	0.0	4.4	49.4	10.6	1.3
U.K.	9.1	31.5	40.3	0.0	0.4	20.7	90.8	67.2	37.2
U.S.	38.9	41.7	47.1	19.9	33.0	29.8	40.1	23.9	20.8

Source: U.N. Data; Remainder Is Hydro and Nuclear.

Trends of the Ratio of Energy Produced (Ep) to Energy Consumed (Ec) for Selected Industrialized Countries



Source: U.N. Data

Life of World Fossil Fuel Resources at Various Demand Growth Rates

(Based on 1978 Year-End Estimates)

Annual Growth Rate, %	Date When Remaining Reserve/Production Ratio Drops to 10 Years		
	A	B	C
4	2010	2054	2071
3	2016	2072	2095
2	2024	2103	2137

A: Proved Reserves (0.891 to 0.955 Trillion tce)
B: Total Remaining Recoverable Resources (5.8 to 6.5 Trillion tce)
C: Effective Doubling of B Resources by Use of Non-Fossil Sources

tce = Metric Tons of Coal Equivalent

Source: Henry R. Linden, Gas Research Institute

Total Nonrenewable World Energy Resources – 12/31/78

	Proved & Currently Recoverable, 10^9 tce	Estim. Total Remaining Recoverable, 10^9 tce
Natural Gas	86 - 95	293 - 341
Natural Gas Liquids	9.5 - 10.5	32 - 37
Crude Oil	118 - 128	345 - 427
Syncrude	55	484
Coal	622 - 667	4650 - 5190
Uranium Oxide @ < $30/lb		
In Burners	34.7	76*
In Breeders	2600	5730*

One Metric Ton of Coal Equivalent (tce) = 27.778×10^6 Btu = 7×10^6 kcal

*Includes U.S. Possible and Speculative

Source: Henry R. Linden, Gas Research Institute

CONVERSION TABLE FOR COMMON ENERGY UNITS

	J	Btu	Quad	kcal	mtce	10^6 mtce	boe
1 J =	1	947.9×10^{6}	947.9×10^{21}	239×10^{6}	34.14×10^{12}	34.14×10^{18}	163.4×10^{12}
1 Btu =	1055	1	1×10^{15}	0.2522	36.02×10^{9}	36.02×10^{15}	172.4×10^{9}
1 QUAD =	1055×10^{15}	1×10^{15}	1	252×10^{12}	36.02×10^{6}	36.02	172.4×10^{6}
1 kcal =	4184	3.966	3966×10^{18}	1	142.9×10^{9}	142.9×10^{15}	683.8×10^{9}
1 mtce =	29.29×10^{9}	27.76×10^{6}	27.76×10^{9}	7×10^{6}	1	1×10^{6}	4.786
10^6 mtce =	29.29×10^{15}	27.76×10^{12}	27.76×10^{3}	7×10^{12}	1×10^{6}	1	4.786×10^{6}
1 boe =	6119×10^{6}	5.8×10^{6}	5.8×10^{9}	1462×10^{3}	0.2089	208.9×10^{9}	1
10^6 boe =	6119×10^{12}	5.8×10^{12}	5.8×10^{3}	1462×10^{9}	208.9×10^{3}	0.2089	1×10^{6}
1 mtoe =	44.76×10^{9}	42.43×10^{6}	42.43×10^{9}	10.7×10^{6}	1.528	1528×10^{9}	7.315
10^6 mtoe =	44.76×10^{15}	42.43×10^{12}	42.43×10^{3}	10.7×10^{12}	1528×10^{3}	1.528	7315×10^{3}
1 m^3 gas =	37.26×10^{6}	35.31×10^{3}	35.31×10^{12}	8905	1272×10^{6}	1272×10^{12}	6089×10^{6}
1 ft^3 gas =	1055×10^{3}	1000	1×10^{12}	252.2	36×10^{6}	36×10^{12}	172.4×10^{6}
1 kWyr =	31.54×10^{9}	29.89×10^{6}	29.89×10^{9}	7537×10^{3}	1.076	1076×10^{9}	5.154
1 GWyr =	31.54×10^{15}	29.89×10^{12}	29.89×10^{3}	7537×10^{9}	1076×10^{3}	1.076	5154×10^{3}
1 TWyr =	31.54×10^{18}	29.89×10^{15}	29.89	7537×10^{12}	1076×10^{6}	1076	5154×10^{6}

	10^6 boe	mtce	10^6 mtoe	m^3 gas	ft^3 gas	kWyr	GWyr	TWyr
1 J =	163.4×10^{18}	22.34×10^{12}	22.34×10^{18}	26.84×10^{9}	948×10^{9}	31.71×10^{12}	31.71×10^{18}	31.71×10^{21}
1 Btu =	172.4×10^{15}	23.57×10^{9}	23.57×10^{15}	28.32×10^{6}	0.001	33.45×10^{9}	33.45×10^{15}	33.45×10^{18}
1 QUAD =	172.4	23.57×10^{6}	23.57	28.32×10^{9}	1×10^{12}	33.45×10^{6}	33.45	33.45×10^{3}
1 kcal =	683.8×10^{15}	93.47×10^{9}	93.47×10^{15}	112.3×10^{6}	3966×19^{6}	132.7×10^{9}	132.7×19^{15}	132.7×10^{18}
1 mtce =	4.786×10^{6}	0.6543	654.3×10^{9}	786.1	27.76×10^{3}	0.9287	928.7×10^{9}	928.7×10^{12}
10^6 mtce =	4.786	654.3×10^{3}	0.6543	786.1×10^{6}	27.76×10^{9}	928.7×10^{3}	0.9287	928.7×10^{6}
1 boe =	1×10^{6}	0.1367	136.7×10^{9}	164.2	5800	0.194	194×10^{9}	194×10^{12}
10^6 boe =	1	136.7×10^{3}	0.1367	164.2×10^{6}	5.8×10^{9}	194×10^{3}	0.194	194×10^{6}
1 mtoe =	7315×10^{9}	1	1×10^{6}	1201	42.43×10^{3}	1.419	1419×10^{9}	1419×10^{12}
10^6 mtoe =	7.315	1×10^{6}	1	1201×10^{6}	42.43×10^{9}	1419×10^{3}	1.419	1419×10^{6}
1 m^3 gas =	6089×10^{12}	832.3×10^{6}	832.3×10^{12}	1	35.31	1181×10^{6}	1181×10^{12}	1181×10^{15}
1 ft^3 gas =	172.4×10^{12}	23.57×10^{6}	23.57×10^{12}	28.32×10^{3}	1	33.45×10^{6}	33.45×10^{12}	33.45×10^{15}
1 kWyr =	5154×10^{9}	0.7045	704.5×10^{9}	846.4	29.89×10^{3}	1	1×10^{6}	1×10^{9}
1 GWyr =	5.154	704.5×10^{3}	0.7045	846.4×10^{6}	29.89×10^{9}	1×10^{6}	1	1×10^{3}
1 TWyr =	5154	7045.5×10^{6}	704.5	846.4×10^{9}	29.89×10^{12}	1×10^{9}	1000	1

Office of Industrial Programs
Industrial Reporting

FT7902154 17-17

Goals

Work Through Industry and Trade Association and Individual Companies

Improve Efficiency of Energy Use by Industry

Facilitate Substitution of Abundant Fuels for Scarce

Act as Vehicle for Appropriate Data and Information Exchange

FT7902154 13-17

Early Activities

- Energy Management Program Developed
- Appeal to 43,000 American Businesses to Save Energy
- Work With Six Energy Intensive Industries

Aluminum	Petroleum Refining
Cement	Paper
Chemicals	Steel

- Voluntary 1980 Energy Efficiency Values Set and Accomplishment Reporting Initiated

FT7902154/3-17

Energy Policy and Conservation Act (EPCA)

- Promote Energy Efficiency in U.S. Business Sector
- Establish Reporting Systems for 10 Major Energy Consuming Manufacturing Industries
- Set Energy Efficiency Targets for 10 Major Energy Consuming Industries

FT7902154/4-17

EPCA Milestones

1. Identification of Ten Largest Energy-Consuming Industries
2. Identification of Corporations Consuming Over One Trillion BTUs Annually
3. Propose Energy Efficiency Targets for Ten Largest Energy-Consuming Industries
4. Set Criteria for Establishment of Sponsored Reporting Programs
5. Identify Fifty Largest Energy-Consuming Companies
6. Establish Energy Efficiency Improvement Targets for Ten Largest Energy-Consuming Industries
7. Annual Report to Congress and the President

The Ten Most Energy Intensive Industries
Energy Efficiency Improvement: 1972-1980

Sic	Industry	1980 Consumption (Quadrillion BTUs)	% Improvement Over 1972	1972-1980 Efficiency Improvement Target
20	Food & Kindred Products	.472	18.9	12
22	Textile Mill Products	.149	18.7	22
26	Paper & Allied Products	1.063	19.3	20
28	Chemicals	3.646	22.2	14
29	Petroleum Products	3.020	19.1	20
32	Stone, Clay, & Glass Products	0.900	17.0	16
33	Primary Metals	3.351	9.1	9
34	Fabricated Metal Products	.060	25.4	24
35	Machinery, Except Electric	.125	26.5	15
37	Transportation Equipment	.368	29.4	16
	Total	13.154		

*Average Efficiency Improvement 17.7
*Average Efficiency Improvement Target 14.9
*Weighted by Relative Consumption

NECPA Changes

Expand Reporting Population

Industries:

- Cover Entire Manufacturing Sector by Adding Ten Industry Groups

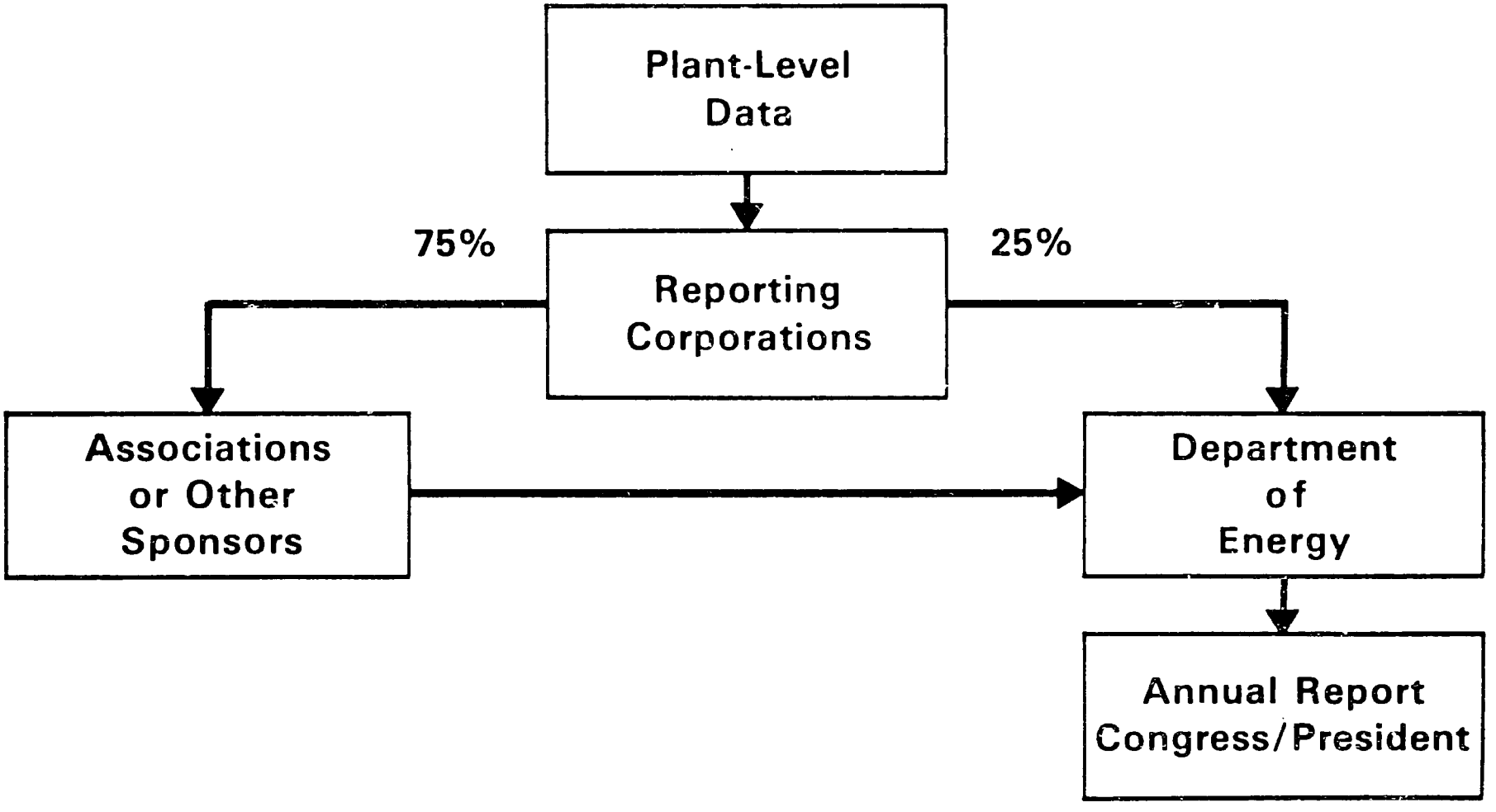
Companies:

- Reports From All Manufacturing Sector Companies Consuming Over One Trillion BTUs/Year

Add Recovered Materials Reporting

- Applies to Metal, Paper, Rubber, and Textile Industries
- Set Reporting Requirements
- Establish Targets for Increased Use of Energy-Saving Recovered Materials

EPCA/NECPA Reporting System



Manufacturing Industries Reporting Under the Energy Efficiency Improvement Program

SIC	EPCA Reporters	NECPA Additions	Recovered Materials
20	Food and Kindred Products	Tobacco Products	
21			
22	Textile Mill Products		Textile Mill Products
23		Apparel and Other Textile Products	
24		Lumber and Wood Products	
25		Furniture and Fixtures	
26	Paper and Allied Products		Paper and Allied Products
27		Printing and Publishing	
28	Chemical and Allied Products		
29	Petroleum and Coal Products		
30		Rubber and Miscellaneous Plastics Products	Rubber and Miscellaneous Plastics Products
31		Leather and Leather Products	
32	Stone, Clay and Glass Products		
33	Primary Metal Products		Primary Metal Products
34	Fabricated Metal Products		
35	Machinery, Except Electrical		
36		Electrical, Electronic Equipment	
37	Transportation Equipment		
38		Instruments and Related Products	
39		Miscellaneous Manufacturing Industries	

FT81-30896/5-7

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Reporting Program Coverage

Reporting Period	Association Reports	Direct Reports	Reported Consumption (Quads)
1974	4	460	7.03
1975	20	460	11.28
1976	50	460	13.50
1977	50	460	14.20
1978	55	460	14.32
1979	46	259	15.46
1980	47	263	14.10

Energy Efficiency Improvement and Recovered Material Utilization Report
U.S. Department of Energy

OMB Approval
No. 38-R0291
Expires July 1981

CORPORATE REPORTING FORM

DOE FORM CS 189-C

REPORTING YEAR

THIS REPORT IS MANDATORY UNDER PUBLIC LAWS 95-619, 94-163 AND 93-275.
FAILURE TO REPORT MAY RESULT IN CRIMINAL FINES, CIVIL PENALTIES, OR OTHER SANCTIONS AS PROVIDED BY LAW.
SEE GENERAL INSTRUCTION F ON CONFIDENTIALITY OF INFORMATION.

SECTION A: GENERAL INFORMATION

Part 1: Identification and Other Information

A. What is the name and address of your corporation?

If any of the above information has changed since your last report, enter previous information below:

B. Enter corporate Employer Identification Number (EIN) as used for reporting to the Internal Revenue Service. ☐☐☐☐☐☐☐☐☐

C. Who are the contact persons:

1. For Energy Data: Name
   Title
   Telephone No.
2. For Recovered Materials Data (if different from 1):
   Name
   Title
   Telephone

D. Enter "X" if this is a revised report. ☐

Part 2: Certification

I certify that data on energy efficiency improvement in this report is prepared with data aggregated from the plant reports of each of the plants of this corporation, as required in Title 10 of the Code of Federal Regulations (C.F.R.)§445.21.

I certify the information herein and appended hereto is true, accurate and complete to the best of my knowledge.

Name: Title:

Signature: Date:

Title 18 USC 1001 makes it a criminal offense for any person knowingly and willfully to make to any Agency or Department of the United States any false, fictitious or fraudulent statements as to any matter within its jurisdiction.

Energy Efficiency Improvement and Recovered Material Utilization Report
U.S. Department of Energy

CORPORATE REPORTING FORM

DOE FORM CS 189-C

CORPORATE EIN SIC REPORTING YEAR PAGE OF

SECTION B: ENERGY CONSUMPTION AND EFFICIENCY IMPROVEMENT

Part 3

A. Energy Consumption Data

For Each Energy Type Below, Enter The Consumption Data Requested	(A) Current Reporting Period Consumption (Billion Btus)	(B) Reference Year (____) Consumption (Billion Btus)
1. Electricity		
2. Natural gas		
3. Propane		
4. LPG		
5. Bituminous coal		
6. Anthracite coal		
7. Coke		
8. Gasoline		
9. Distillate fuel oil		
10. Residual fuel oil		
11. Petroleum coke		
12. Purchased steam		
13. Other (specify _____)		
14. Other (specify _____)		
15. Other (specify _____)		
16. TOTAL ENERGY CONSUMPTION		

Part 4

A. Energy Efficiency Improvement

1. Energy consumption during current reporting period (enter from Worksheet Col. C) ..... Billions of Btu
2. Calculated consumption based on reference year energy efficiency (enter from Worksheet Col. B) ..... Billions of Btu
3. Energy efficiency improvement relative to the reference year

$$\frac{(\text{line } 2) - (\text{line } 1)}{(\text{line } 2)} \times 100 = \quad \_\_\_\_\_\ \%$$

B. Narrative Commentary

Provide the information requested below on separate sheet(s), as indicated on the instructions to this form.

1. What significant energy conservation measures have been adopted in this reporting period and have contributed to the improvement shown on line 3 above?
2. Signify by checking the appropriate box the effect each of the following factors had on your energy use when compared to your reference year use:

	(1) Increase	(2) Decrease	(3) Unknown
a. Capacity Utilization	☐	☐	☐
b. Fuel Switching	☐	☐	☐
c. Governmental Regulations	☐	☐	☐
d. Product Mix	☐	☐	☐
e. Product Quality	☐	☐	☐
f. Raw Material & Feedstock Changes	☐	☐	☐
g Weather	☐	☐	☐
h. Other—Specify _____	☐	☐	☐

3 Provide any other comments desired.

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Energy Efficiency Improvement and Recovered Material Utilization Report
U.S. Department of Energy

CORPORATION REPORTING FORM

CORPORATE EIN SIC REPORTING YEAR ____ _____

WORKSHEET FOR PART 4A: CORPORATE ENERGY EFFICIENCY DATA

Col. A	Col. B	Col. C
Plants	Calculated Consumption Based on Reference Year (. . . .) Efficiency (Plant Report Part 4, Line 2)	Current Consumption (Plant Report Part 4, Line 1)
TOTALS		
	Enter on Line 2	Enter on Line 1 Check with Part 3, Line 16

Energy Efficiency Improvement and Recovered Material Utilization Report
U.S. Department of Energy

CORPORATION REPORTING FORM

DOE FORM CS 189-C

CORPORATE EIN _____ SIC _____ REPORTING YEAR _____ PAGE ____ OF ____

SECTION C: RECOVERED MATERIALS UTILIZATION*

Part 5

A. Current Use of Recovered Materials

1. Enter the manufacturing operation performed for the SIC and year indicated above. _____

2. What was the unit of production in this operation? _____

3. What was the amount of production in this operation? _____

4. How much virgin material was used in this operation? _____

	(A)	(B)	(C)
5. What recovered materials were used in this operation?			
6. How much of each recovered material was prompt industrial scrap?			
7. How much of each recovered material was obsolete scrap?			

*For use by Corporations identified in SIC Codes 22, 26, 30, and 33.

The Ten Most Energy-Intensive Industries
Reported Energy Consumption: 1972 and 1980

Sic	Industry	Consumption 1972 (Quads)	Consumption 1980 (Quads)	Consumption % Change 1972-1980	Production % Change 1972-1980
20	Food & Kindred Products	.462	.472	+ 2.3	+ 27.7
22	Textile Mill Products	.177	.149	- 16.0	+ 3.1
26	Paper & Allied Products	1.147	1.063	- 7.3	+ 17.2
28	Chemicals	3.738	3.646	- 2.5	+ 43.9
29	Petroleum Products	3.182	3.020	- 5.1	+ 10.6
32	Stone, Clay, & Glass Products	1.078	.900	- 16.6	+ 21.3
33	Primary Metals	3.965	3.351	- 15.5	- 9.3
34	Fabricated Metal Products	.076	.060	- 20.7	+ 20.3
35	Machinery, Except Electric	.144	.125	- 12.7	+ 40.2
37	Transportation Equipment	.490	.368	- 25.0	+ 7.9

Reported Energy Consumption and Energy Sources in the Manufacturing Sector 1972 and 1980

	1972	1980	% Change 1972-1980
Reported Consumption (Quads)	14.666	13.323	- 9.2
Energy Sources — Percent Share of Total:			
Natural Gas	37.9	33.6	- 4.3
Electricity	16.0	20.7	+ 4.7
Coal	18.8	17.2	- 1.6
Distillate Fuel Oil	1.4	1.0	- 0.4
Residual Fuel Oil	8.9	7.3	- 1.6
Coke	1.1	1.3	+ 0.2
Petroleum Coke	3.5	3.9	+ 0.4
Purchased Steam	1.4	1.3	- 0.1
Other	11.0	13.7	+ 2.7

The Ten Most Energy-Intensive Industries
Energy Sources

Sic	Industry	Percent of Total Consumption — 1980				
		Electricity	Natural Gas	Coal	Fuel Oil	Other
20	Food & Kindred Products	13.7	56.2	15.6	12.3	2.2
22	Textile Mill Products	33.4	36.9	16.8	11.4	1.5
26	Paper & Allied Products	12.0	34.8	19.7	31.3	2.2
28	Chemicals	28.4	42.4	8.6	5.2	15.4[1]
29	Petroleum Products	8.5	24.7	0.1	8.8	57.9[2]
32	Stone, Clay, & Glass Products	9.4	45.2	37.0	4.7	3.7
33	Primary Metals	26.9	24.0	37.2	4.1	7.8
34	Fabricated Metal Products	26.6	62.7	0.3	7.1	3.3
35	Machinery, Except Electric	33.4	42.0	12.0	9.3	3.3
37	Transportation Equipment	28.2	37.0	14.7	9.5	10.6
	Total	20.4	33.6	17.2	8.4	20.4

[1] Consists Mainly of Process By-Products
[2] Refinery Gas and Petroleum Coke

Other Industries With Reported Consumption

Sic	Industry	Reported Consumption (Trillion BTUs)	Efficiency Improvement (%)	
			Base Year 1972	Base Year 1978
21	Tobacco Products	15.3	16.2	4.0
24	Lumber & Wood Products	49.6	—	16.1
27	Printing & Publishing	9.1	—	1.78
30	Rubber and Plastic Products	122.6	11.4	4.6
36	Electric & Electronic Equipment	114.1	44.3	5.4
38	Instruments & Related Products	30.6	31.4	5.1
39	Miscellaneous Manufactures	1.4	N/A	N/A

No Reported Consumption: Sic 23 — Apparel & Other Textile Products
Sic 25 — Furniture & Fixtures
Sic 31 — Leather & Leather Products