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SPECIAL REPORT :

THE EUROPEAN OIL MARKET -
PAST, PRESENT AND FUTURE

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OIL IN THE POSTWAR PERIOD

The rise of oil consumption and processing in Western Europe has been one of the outstanding features of that area in the ten years since the end of World War II. It has brought with it profound changes in the world oil industry, the most important being the meteoric rise of the Middle East to the position of the world's major oil exporter which would not have been possible in such a short period without the oil-starved markets of Western Europe.

To some extent this increase in demand is due to the postwar industrial expansion in Western Europe, its rising standard of living and its natural population increase but total energy consumption (coal, waterpower, oil, natural gas) in the area has risen by only 28% between 1937 and 1955, from 570 million tons of coal equivalent to about 730 million tons and per capita consumption of energy has increased only 10.5%, from 2.28 tons of coal equivalent in 1937 to 2.52 tons in 1954.

Obviously then, the main reason for the rise in oil consumption was the shift from coal to oil in the European economy. Much has already been written about this shift. Its main causes are the inability of most European coal mines to sufficiently expand production, the greater efficiency of oil as a heating fuel and the price advantage of oil over coal, measured in calorific content. The growth of the European motor vehicle sector, stimulated partly by the large-scale introduction of consumer installment purchases, has also contributed to the rise in oil consumption, although to a lesser extent than the shift from oil to coal.

How rapid this change has been within the postwar period is clearly illustrated by the following table for the 16 countries of the Organization of the European Economic Cooperation (OEEC):

Table 1.
SHARE OF PRIMARY SOURCES
IN INLAND ENERGY CONSUMPTION

YEAR	COAL, LIGNITE	WATER- POWER	NATURAL GAS	CRUDE OIL	TOTAL
1937	87.0	6.0	--	7.0	100
1948	83.2	6.5	0.1	10.2	100
1949	83.0	5.9	0.1	11.0	100
1950	80.6	6.8	0.2	12.4	100
1951	80.0	7.0	0.2	12.8	100
1952	78.8	7.4	0.4	13.4	100
1953	77.1	7.4	0.5	15.0	100
1954	75.0	7.8	0.6	16.6	100
1955 (Est.)	74.3	7.8	0.7	17.2	100

Source: OEEC

The outstanding fact about Table I is the uninterrupted decline of the share of coal since 1937 and the equally uninterrupted increase in the share of oil. Percentage-wise, the increase is even sharper for natural gas but its share in the total is still less than 1%, equivalent to only 70,000 b/d of oil products. The bulk of it - about 86% - is produced and consumed in Italy.

The growth of Europe's oil industry over the past five years - the period following the end of the continent's reconstruction effort - is illustrated in the following table for the OEEC area:

Table 2.

EUROPE'S OIL TRADE, PRODUCTION AND CONSUMPTION

	<u>1951-55</u>				
	(thousands of barrels daily)				
	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955*</u>
Crude Oil Production**	67	77	98	116	154
Crude Imports	1,073	1,373	1,578	1,810	1,924
Refinery Output	1,077	1,320	1,544	1,773	1,932
Products Imports***	370	218	164	182	n.a.
Products Exports***	--	146	188	176	n.a.
Total Consumption	1,294	1,364	1,492	1,735	1,980
of which Bunker fuels	180	198	194	234	258

Source: OEEC

*Preliminary figures. **Excludes the share of Austrian crude oil going to the Soviet Union. ***Excludes trade between the OEEC countries.

Crude oil is now produced in significant quantities in the following countries:

Austria	74,000 b/d	(of which the USSR takes 26,000 b/d for the next six years under the state treaty of 1955)
Germany	62,000 "	
Netherlands	20,000 "	
France	18,000 "	
Italy	4,500 "	
	<u>180,500 b/d</u>	

The total proved reserves of these five countries amount to about 850 million barrels, equivalent to 14 years' production at the current rate. Domestic crude oil output is thus of only minor importance in meeting Europe's oil needs since it accounts for only about 7.5% of the area's refinery throughput. Hence the increasingly heavy reliance on crude oil imports of which 85% come from the Middle East. Europe's concern over the political stability in the Middle East can therefore be understood largely in terms of oil. Prime Minister Eden stated this fact very succinctly when he declared, "no Middle East oil - hunger and unemployment in Britain. It's as simple as that."

Products imports into Europe were also higher last year than in 1954, according to preliminary indications. Residual fuel oil and gas/diesel oil exports from the Middle East to west of Suez rose by 138% and 70% respectively to reach a total of over 70,000 b/d for 1955. The bulk of these exports went to Western Europe. Caribbean gas/diesel and fuel oil shipments to Europe amounted together to 168,000 b/d, a 40% increase over 1954. All these shipments were destined largely for consumption in sectors which previously had relied on domestic coal for their fuel needs.

The Soviet Bloc contributed a total of about 54,000 b/d to Western Europe's oil imports (exclusive of synthetic oil shipments from East to West Germany) apportioned as follows:

Finland	18,660 b/d
Sweden	14,770
Italy	7,060
Iceland	5,280
Greece	3,900
France	3,300
Others	<u>1,030</u>
	54,000 b/d

Products exports declined sharply last year, mostly because of the virtual cessation of shipments to areas east of Suez, following the reopening of the Abadan refinery and the coming-on-stream of new refineries in Aden, Australia and India. At their highpoint in 1953 these shipments had amounted to about 115,000 b/d. In 1954 they had declined to 90,000 b/d and in 1955 they averaged only 15,500 b/d. In the first four months of the current year they shrunk further to a residual trickle of 2,500 b/d. However, this loss of the East of Suez market was more than made up by higher domestic demands in each country resulting in intra-European oil shipments of about 340,000 b/d last year.

Taking products imports and exports together, the OEEC area seems to have been a net importer to the extent of about 140,000 b/d last year, on the basis of still incomplete figures. It was a net exporter of motor gasoline, although on a very reduced scale compared to 1954, and a heavy net importer of fuel oils.

The internal consumption pattern within the OEEC area shows the following figures over the four years, 1951-54:

Table 3.

INLAND CONSUMPTION
of Oil Products, 1951 - 1954
(in millions of metric tons)

	1951	1952	1953	1954
Gasoline	15,670	16,596	18,072	19,673
Kerosene	3,088	3,224	3,287	3,446
Gas/Diesel Oil	12,271	13,352	14,725	17,082
Fuel Oil	17,932	18,309	20,956	25,173
Lubes	2,196	2,088	2,221	2,375
Bitumen	2,363	2,424	2,864	3,191
Other Products	1,868	2,261	3,238	4,206
	55,388	58,254	65,363	75,146

Complete internal consumption figures for 1955 are not yet available but 10 OEEC member countries, including all the major ones, have now issued such figures and a comparison of them over the last three years reveals some interesting shifts.

Table 4.

PERCENTAGE CHANGE IN INLAND CONSUMPTION
OVER THE PREVIOUS YEAR
(for ten European countries)

	1954	1955
Gasoline	9.2%	10.4%
Kerosene*	-1.6	8.0
Gas/Diesel Oil	14.8	16.2
Fuel Oil	21.0	20.1
Lubricants	6.5	8.3
Bitumen	10.4	11.4
Other products	38.1	0.4
Total, all prods.	14.5	14.4

*Incl. jet plane fuel

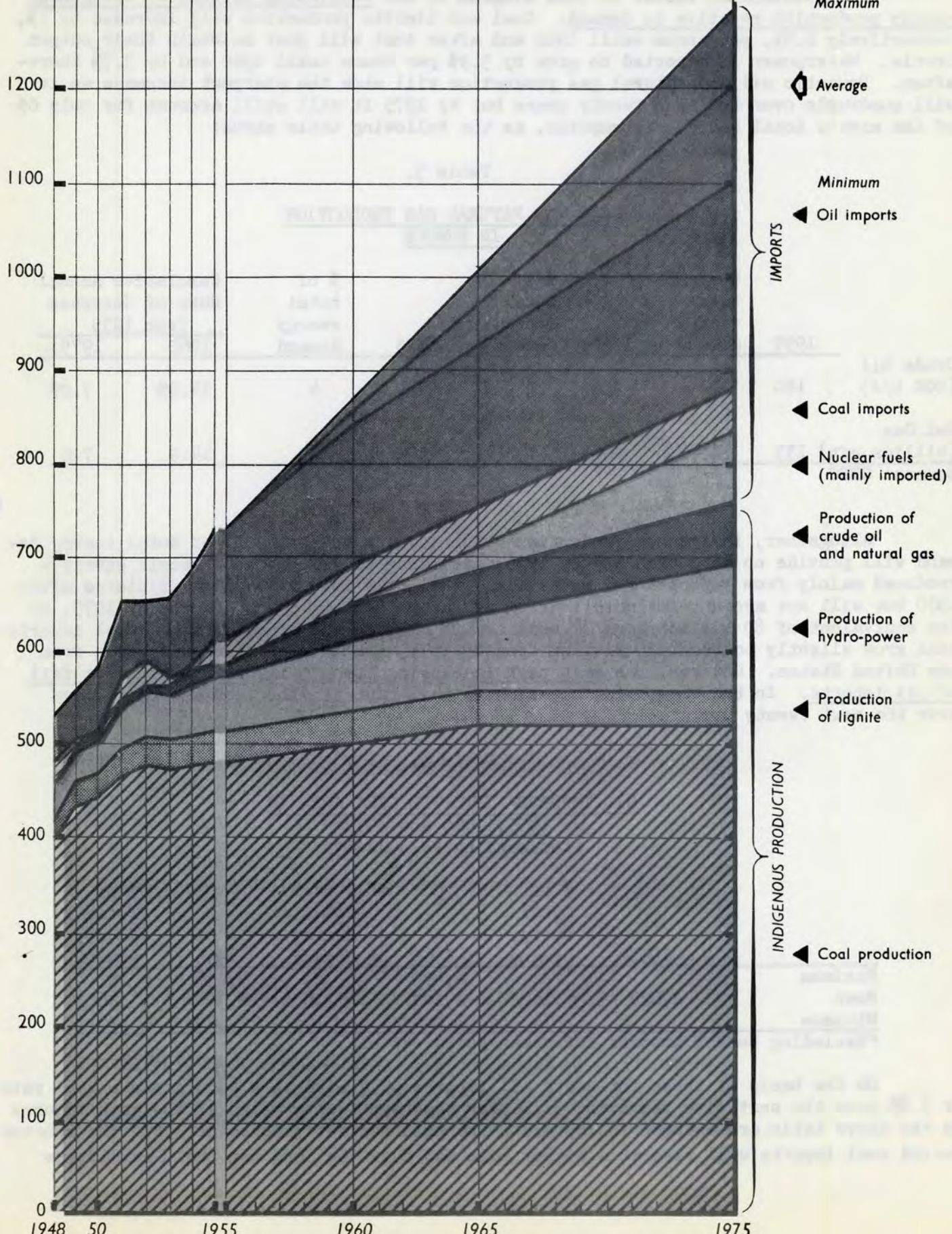
With the exception of heavy fuel oil, all major products showed a sharper rise last year than in 1954. Of special significance is the rise in kerosine consumption from 1954 to 1955, compared to a decline from 1953 to 1954. About half of Western Europe's kerosine is consumed in Great Britain where its use as fuel for jet planes is the main reason for the revival of this product which until recently was often called a "dying" commodity. In addition to jet fuel use, there is also the factor of the cheapness of kerosine as a heating fuel compared to most other fuels, on a heat content basis. This has attracted some new users from the domestic boiler heating segment.

The percentage figures also point to one of the most persistent troubles of West European refineries, namely the imbalance in the consumption growth of gasoline and heavy fuel oil. In the past two years heavy fuel oil inland consumption grew by over 20% each year and diesel oil consumption by at least 15% while gasoline demand rose by hardly 10% per year. If foreign bunker liftings are added the imbalance is even greater. As was mentioned above, Western Europe is trying to balance its supply and demand of light and heavy oil products by exporting gasoline and importing fuel oil but the continued restriction on gasoline consumption in form of discriminatory taxes, the official encouragement to use diesel fuel instead of gasoline as road fuel and the need to substitute more and more residual fuel oil for coal make it unlikely that these two types of oil products will strike a balance in the foreseeable future under current price and refinery yield conditions. It seems likely therefore that the price of the heavy products will be raised as their share of each barrel of crude oil goes up.

EUROPE'S FUTURE ENERGY NEEDS

What about oil in Western Europe's economy of the future? The best answer yet to this very speculative question has been supplied in a report just issued by the Energy Commission of the OEEC. The report strongly emphasizes the increasing dependence of Europe on imported fuel of all kinds until at least 1975. This trend is certainly not new. In fact, it is the main feature of Western Europe's postwar energy pattern, as compared to the pre-war period. Europe started to be a net importer of energy in the thirties but by 1937 its net energy imports accounted for only 4.5% of its total energy needs of 560 million tons of coal equivalent. In 1955, imports accounted for over 20% of a total energy consumption of 730 million tons. In 1948 Europe became a net importer of coal and since then has had to bring in annually about 15.7 million more tons of coal from abroad (mainly the U.S.) than it shipped to the outside world. During the same seven years oil imports rose from 39 million metric tons per year to 84 million.

Energy requirements will grow from last year's 730 million tons of coal equivalent to 820-860 million in 1960 and to 1,100-1,300 million tons by 1975, according to the Commission's report. In other words, they will expand by one half to three quarters over the 1955 figure within the next twenty years, or at an annual rate of 2.1 - 2.9%. The following diagram suggests the growth of this demand and how it will be met.



The outstanding factor in this diagram is the continuing decline of indigenous energy production relative to demand. Coal and lignite production will increase by 1%, respectively 2.5%, per annum until 1960 and after that will just maintain their output levels. Waterpower is expected to grow by 5.9% per annum until 1960 and by 3.7% thereafter. Domestic oil and natural gas production will show the sharpest increase as it will quadruple over the next twenty years but by 1975 it will still account for only 6% of the area's total energy consumption, as the following table shows:

Table 5.

OIL AND NATURAL GAS PRODUCTION
IN EUROPE

	1955	% of total energy demand	1960	% of total energy demand	1975	% of total energy demand	Cumulative Annual Rate of Increase from 1955	
						1960	1975	
Crude Oil (000 b/d)	180	2	350	3	700	4	14.9%	7.2%
Nat. Gas (billion cft)	133	1	266	1	532	2	14.9	7.2

Source: OEEC

Altogether, indigenous production which now accounts for 80% of total energy demand will provide no more than 63% by 1975, according to the report. Atomic energy - produced mainly from imported raw materials - will come into commercial existence after 1960 but will not account for more than 8% of Europe's total energy demand by 1975, or the equivalent of 80 million tons of coal or 1.1 million b/d of crude oil. Coal imports will grow slightly to reach 50 million tons by 1975, the bulk of which will come from the United States. However, the main task in closing the growing energy gap will fall to oil imports. In the Commission's estimates oil imports will increase as follows over the next twenty years:

Table 6.

OIL IMPORTS* INTO THE OEEC AREA IN
1955, 1960 and 1975
(thousand barrels daily)

	1955	% of Total Energy Demand	1960	% of Total Energy Demand	1975	% of Total Energy Demand
Maximum			2,420	20	5,676	32
Mean	1,627	16	2,142	18	4,300	26
Minimum			1,864	16	2,924	20

*Excluding bunker imports for ocean-going vessels.

On the basis of these forecasts oil imports will rise at a cumulative annual rate of 5.8% over the next five years and 5.1% over the next twenty years if the mean figures in the above table are assumed to represent the most realistic forecast. For the shorter period coal imports will rise at a higher rate but over the long run their cumulative

increase will be only 2.8%. These figures are a vivid illustration of the task assigned to oil imports in filling the European energy gap which the OEEC Commission expects to grow at a cumulative annual rate of 4.4-6.8 per cent, depending on the assumed growth rate of the area's economy.

Will the oil producing centers of the free world be able to provide Europe with such ever-increasing quantities of imports? The report answers this question with the statement that "the oil companies with whom we had discussions assured us that in view of their present knowledge of oil reserves ample crude oil would be available to meet the maximum demands of our forecasts. They pointed out that oil is an international industry and that Europe's consumption at present only represents 15% of the whole, though this might rise to 20% by 1975". However, the oil companies qualified their affirmative answers with the warning that to meet such vastly increased requirements would involve very heavy capital expenditures and since the oil industry is largely self-financing the job could only be done if no restrictions such as price maxima would prevent the companies from maintaining an adequate level of earnings and if nothing was done "to prevent the integration of the supply of oil products to Western Europe as part of the international oil industry."

The report estimates that total new investments in Western Europe's crude oil and natural gas production over the next twenty years would have to amount to \$10 billion to reach the targets given in table 5. In the first postwar decade \$3 billion were invested into this sector of the oil industry. Refinery capacity which was raised from 300,000 b/d in 1945 to 2,220,000 b/d at the end of 1954 at a cost of \$3.2 billion (including ancillary plants, transportation, etc.) will have to be raised by another 1,600,000 b/d to a total of 3,800,000 b/d by 1975. This would enable Europe to process all its domestic crude plus 75% of its total oil imports by 1975. The cost of this expansion would be \$2.4 billion, including replacement of obsolete plants. Transportation and distribution facilities will have to be enlarged by about 3,100,000 b/d to meet the increased consumption. This will cost \$4.6 billion, bringing total investments in Western Europe's petroleum and natural gas sector to \$17 billion over the next twenty years. Since the bulk of these investments have been and, under normal circumstances, will continue to be made by the oil companies themselves, including a number of non-European concerns, these expenditures will not be a burden on the European capital market.

Finally, the report discusses the effect of the increasing energy import on the European balance of payments. Since virtually all the coal imports and a good part of the oil imports will have to be paid in dollars this fact is of great importance in view of Europe's structural dollar deficit. This deficit is presently more than covered by U.S. unilateral defense and related expenditures in Europe but if these were to drop sharply the OEEC countries might find it difficult to close their energy gap as rapidly and fully as the Energy Commission foresees. The OEEC report itself makes no mention of a possible dollar shortage and its effect on the level of energy imports but it does state that "the cost of imported energy is likely to rise quickly" and that it will represent an increasing proportion of all imports into Western Europe. In 1955, total energy imports, at \$3.5 billion, represented about 16% of all imports.

Also, the report's estimate of the cost of future energy imports are based on the admittedly unrealistic assumption that energy prices will not rise above their present levels. Actually, the Commission is convinced that both oil and coal prices will rise. On the other hand, the composite price of oil products imports is expected to drop due to the shift from high-priced to low-priced imports. On the basis of present prices, this would mean a reduction from the current average products imports price of \$31.00

per ton, f.o.b. Gulf, to \$29.00 per ton in 1960 and \$27.00 in 1975. This is bound to influence the total cost of oil imports since the share of products imports (mainly fuel oils) is expected to grow relative to crude oil imports:

	1955	1960	1975
Share of products imports	7	13	25
Share of crude oil imports	93	87	75
	100	100	100

Bearing in mind the above assumptions plus the following additional ones: (1) a mean increase in oil imports, as per table 6; (2) a cessation of European oil exports by 1960; and (3) that 25% of oil shipping costs will be incurred outside of Europe, the cost of oil imports will be as follows over the next twenty years, on the basis of OEEC figures:

Table 7.

NET OIL IMPORTS INTO W. EUROPE,
1955, 1960 and 1975

	thousand of barrels daily			million dollars (at 1955 prices)		
	1955	1960	1975	1955	1960	1975
Products	101	252	1,010	220	500	1,900
Crude Oil	1,526	1,890	3,290	1,830	2,250	4,000
Total (c.i.f.)	1,627	2,142	4,300	2,050	2,750	5,900
Freight & In- surance paid in Western Europe				600	760	1,580
Total Net Foreign Disbursements				1,450	1,990	4,320

According to this table, Western Europe will spend at least \$ 6 billion just on oil imports by 1975 of which over \$4.3 billion must be paid abroad. It is not possible to predict how much of this amount will have to be paid in dollars. The oil industry of the Middle East from where the bulk of the imports will come is owned 58% by American and 42% by European companies. However, this does not provide a correct key to the future share of dollar and soft-currency oil imports since most U.S. oil companies have private arrangements with European countries under which part of their oil sales are paid in local currencies. Whether this share will be increased depends in part on the ability of European manufacturers to provide U.S. oil companies operating overseas with more of the oil-producing, processing and transporting equipment of the same quality and type than made in the U.S.

OIL AND ATOMIC ENERGY

Though the OEEC report is concerned more with the traditional sources of energy than with nuclear power which will not yet be very significant by 1975 it does give an indirect indication of the estimated economic cost of nuclear energy raw material and processing and also permits a comparison with the same cost factors in the oil industry:

	Oil	Nuclear Energy
Landed cost of imported raw material, per ton of oil equivalent	\$ 23.80	\$ 1.86
Total investment in processing equipment, 1955-75	\$ 2.4 billion	\$ 11.5 billion
Increase in processing capacity, 1955-75, in tons of oil equivalent	80 million	54 million
Investment in processing equipment, 1955-75, per ton of oil equivalent	\$ 30.00	\$213.00

The outstanding factor in this comparison is the very low price of nuclear raw material - uranium ore - relative to crude oil and the very high unit cost of nuclear power plants relative to oil refineries. Of course, the comparability between an oil-processing plant and a power plant of any type is limited since the output of the former is used as raw material in the latter, although both are secondary energy producers and in some consumption sectors fuel oil and electricity are directly competitive*. However, the real meaning of the above figures is that the development of commercial atomic energy - aside from its technical problems - is largely a matter of securing the necessary capital. Europe's atomic energy industry will need considerably more money over the next twenty years than will be invested in the processing, transporting and distribution sectors of the European oil industry. Yet, unlike in the oil industry, the possibility of self-financing does not exist and it is doubtful whether the European private capital market can furnish such gigantic sums. Thus, in all probability the bulk of the investments will have to come from national and international government sources which means that commercial atomic energy in Europe will from its outset be a government-controlled and government-owned industry.

Will this extension of public control have any consequences for the still private sector of the European energy industry of which oil is the most important? For the immediate future the answer is no but there are certainly signs that in the longer run all segments of Europe's energy industry will come under ever closer national and supra-national scrutiny. The OEEC report merely confines itself to recommending increased co-operation between member countries in the field of energy, including the pooling of research and development programs, the international coordination of energy policies, the supply of capital for energy production, etc. However, the European Coal and Steel Community which already has established a common market for coal where prices, production, freight costs, etc. are under supra-national control is now embarking upon its much-

* A better idea might be gained by comparing investment cost per unit of output (kW) of a thermal power plant which is \$160.00 or a hydro-electric plant which is \$375.00 with that of a nuclear power plant which is \$350.00.

publicized Euratom project which will extend this common market to atomic energy. In the view of some of the Community's top officials and other analysts of the European economic scene it would make little sense in the long run to have a common market which controls some energy resources while leaving other equally important ones free. It is therefore felt that once Euratom has been established, increased attention will be paid to bringing gas, oil and electricity also under some form of supra-national control.