

# THE CHANGING PETROLEUM INDUSTRY OF WESTERN EUROPE

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Since the industrial revolution, the countries of Europe have relied almost totally upon coal as the source of industrial energy. This dependence upon coal tended to retard the use of petroleum as an energy-producer. After World War II, however, petroleum increased in importance. This growth was associated with: 1) growing problems of the European coal industry; 2) inherent advantages of petroleum as an energy-producer; 3) increased demand for energy; and 4) need for increased productivity per man.

Before World War II extensive petroleum processing centers were neither required nor desirable for greatest efficiency. The bulk of the products consumed was processed petroleum commodities of high value, and little emphasis was placed on the utilization of by-products. Refineries were, in general, located near the source area of the crude oil. The crude was processed, and the products of high value were shipped to market in a finished state. In 1938 less than one-third of the processed petroleum products consumed in Western Europe were refined in the marketing areas (Fig. 1). (O.E.E.C., 1955: 13). The dominant source for refined products and crude oil at this time was the Western Hemisphere.

World War II and the resulting technological achievements acted as catalysts on the petroleum industry of Europe (Table 1). The increasing demand for petroleum products, however, presented serious problems. The major immediate problem facing the nations of Europe was to supply petroleum products without damaging the countries' weakened economies. In an effort to solve this problem, among others, 17 nations joined together to form the Organization for European Economic Cooperation. Working in conjunction with the United Nations and the Marshall Plan, the organization had as its immediate purpose the integration of the expansion programs of the member nations. (Hereafter the member nations of the O.E.E.C. indicated on Fig. 1 will be referred to as "Western Europe.")

It was apparent to the member nations of the O.E.E.C. that, if they were to utilize greater amounts of petroleum, the pre-war system of marketing would have to be altered. The aims of the nations were: 1) to lower costs of petroleum products, since their buying power, especially in dollars, was limited; and 2) to create a system of marketing that would make each country as immune as possible to future stra-

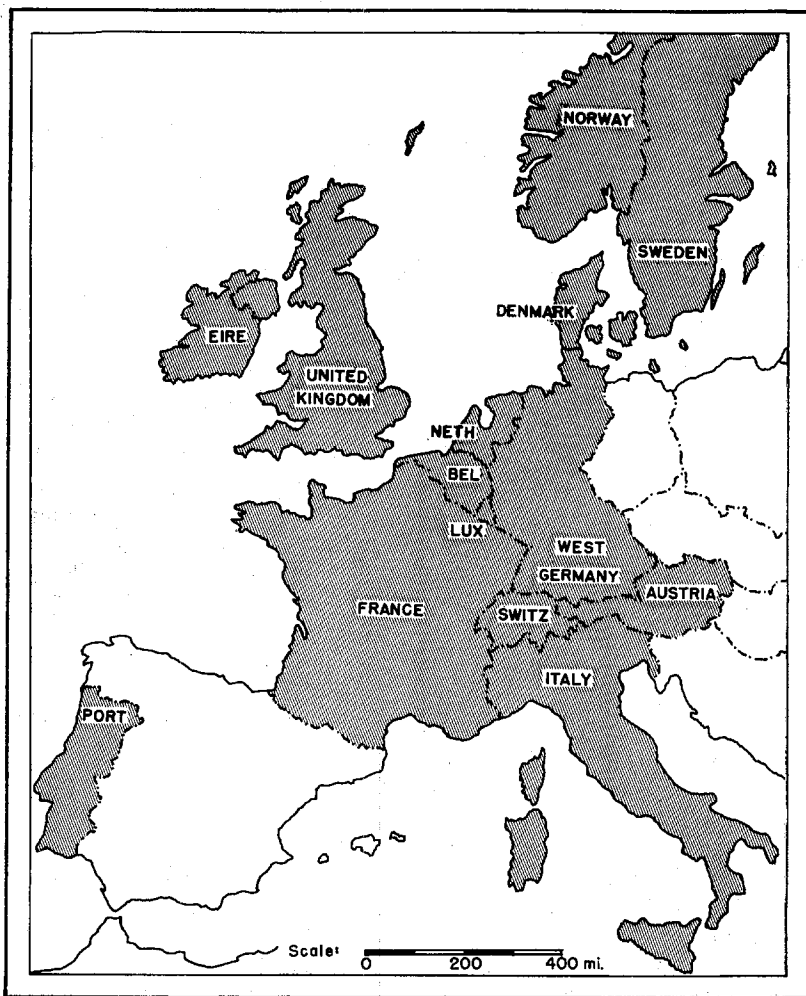


FIG. 1.—O. E. E. C. member nations of Western Europe.

tegic and political problems. The means for achieving these aims seemed to be the location of refinery facilities in the market rather than the source area.

Five major economic factors favored greater emphasis on market area refineries. 1) Market area refineries eliminated the expense of foreign refining. 2) Market area re-

fineries actually increased the total assets of the countries through the value of the industry itself and the employment it created. 3) Market area refineries lessened shipping and storage problems which had previously accompanied the importation of refined products. 4) Market area refineries permitted a country to market finished or refined products,

TABLE 1.—Proportion of Energy Supplied by Petroleum.<sup>1</sup>

Year	Percentages	
	World	Europe
1938.....	20	8
1949.....	30	11
1955.....	37	18

<sup>1</sup> From O.E.E.C. (1955: 13).

creating an additional source of income. 5) Capital was made available through various reconstruction agencies.

Three major strategic and political factors fortunately complemented the economic factors. 1) The establishment of refineries at the market area permitted the purchase of crude petroleum from any available source and eliminated complete dependence upon one area for specific petroleum products and raw materials. 2) The current trends of nationalism and anti-colonialism create unstable conditions for development of source area refineries outside the political realm of the investor. 3) In national emergencies market area refineries can be more efficiently protected and defended.

#### PETROLEUM'S GROWING IMPORTANCE IN POST-WAR EUROPE

Western Europe has increased the total crude oil processed by refineries from 14,000,000 metric tons in 1938 to 103,000,000 metric tons in 1955 (O.E.E.C., 1955: 23, 78). These figures not only indicate expansion of refining capacities but also increased consumption (Table

2). The consumption of refined petroleum products increased at an average of 13.2% a year during reconstruction, with a total increase of approximately 270% in 1955 over 1947. During the same period Western Europe increased its petroleum refining capacity from less than one-third of the total amount of crude oil imported in 1948 to more than nine-tenths of the total amount of crude oil imported in 1955.

As refining in market areas grew in importance, significant changes occurred in source areas. In less than ten years the flow of crude petroleum and finished products into Europe shifted largely from the Western Hemisphere to the Middle East. Between 1938 and 1955 the Middle East increased its shipments to Europe more than ten-fold. In 1955 the Middle East accounted for 80% of the crude and finished products entering Western Europe (Table 3). In contrast, the West-

TABLE 2.—Output of Refined Products and Total Consumption of Petroleum Products (in million metric tons).<sup>1</sup>

Year	Output by refineries	Consumption, O.E.E.C. Europe	Refin. prod./consumption
1938...	12.5 <sup>2</sup>	39.0 <sup>2</sup>	32.3%
1947...	10.9	37.1	29.6
1948...	17.5	39.9	43.9
1949...	26.0	46.8	55.6
1950...	36.8	55.0	66.9
1951...	53.9	65.8	81.9
1952...	68.0	69.6	97.7
1953...	77.2	75.0	102.9
1954...	88.6	86.8	102.1
1955...	94.2	99.9	94.3

<sup>1</sup> From O.E.E.C. (1955: 78).

<sup>2</sup> Estimate.

TABLE 3.—Total Petroleum Imports into Western Europe (in million metric tons).<sup>1</sup>

From	1938	1950	1955
Middle East.....	8	40	90
Western Hemisphere.	26	16	21
Others.....	5	..	2
Total.....	39	56	113

<sup>1</sup> From O.E.E.C. (1955: 46).

ern Hemisphere in 1938 shipped 66% of the products consumed by the member nations.

The growth in refining capacities developed at the same time as the shift in source areas. Through economic cooperation the member nations of the O.E.E.C. concentrated on the construction and expansion of refineries within their political boundaries. With the increasing demand for refined products, the existing refineries in the source areas continued to function on efficient levels, but there was an increase in capacity and production of market area refineries.

The emphasis in the expansion program was on efficiency and economy of production. These objectives resulted in the actual abandonment of some refineries which were deemed relatively inefficient and the expansion or construction of larger and more efficient refineries. The output by refineries in Western Europe between 1950 and 1955 was more than doubled, but the actual number of refineries decreased slightly (Tables 2 and 4). The petroleum industry of France illustrates this trend. In 1941 the country had 19 operating refineries, but in 1955

the number had decreased to 13. Yet, production capacity increased three-fold. Italy was the only country which experienced an increase in the number of refineries between 1950 and 1955 (Table 4).

A more precise index to the growth of refineries is the actual capacity of the industry (Fig. 2). The United Kingdom (30%), France (23%), and Italy (18%) command 71% of the total refining capacity (Table 5). The greatest relative increase in capacity between 1950 and 1954 was experienced by Belgium. With the exception of Ireland and Norway, the member nations experienced substantial increases in capacity between 1950 and 1954; yet there was a decline in the total number of refineries. It is apparent that refinery capacities are being increased to permit lower production costs per unit.

The changing flow patterns and refinery expansion of Western Eur-

TABLE 4.—Major Refineries Operating in Western Europe.<sup>1</sup>

Country	1941	1950	1955
Austria.....	5	9	7
Belgium.....	7	7	7
France.....	19	16	13
Germany.....	53	26 <sup>2</sup>	20 <sup>2</sup>
Italy.....	10	16	35
Netherlands.....	1	2	2
Portugal.....	1	1	1
Sweden.....	1	4	2
United Kingdom....	18	21	14
Others (Denmark, Norway, Switzer- land, Turkey)....	4	5	3
Total.....	119	105	104

<sup>1</sup>From O.E.E.C. (1955: 78) and Amer. Petrol. Inst. (1951: 454, 456).

<sup>2</sup> Western Germany.

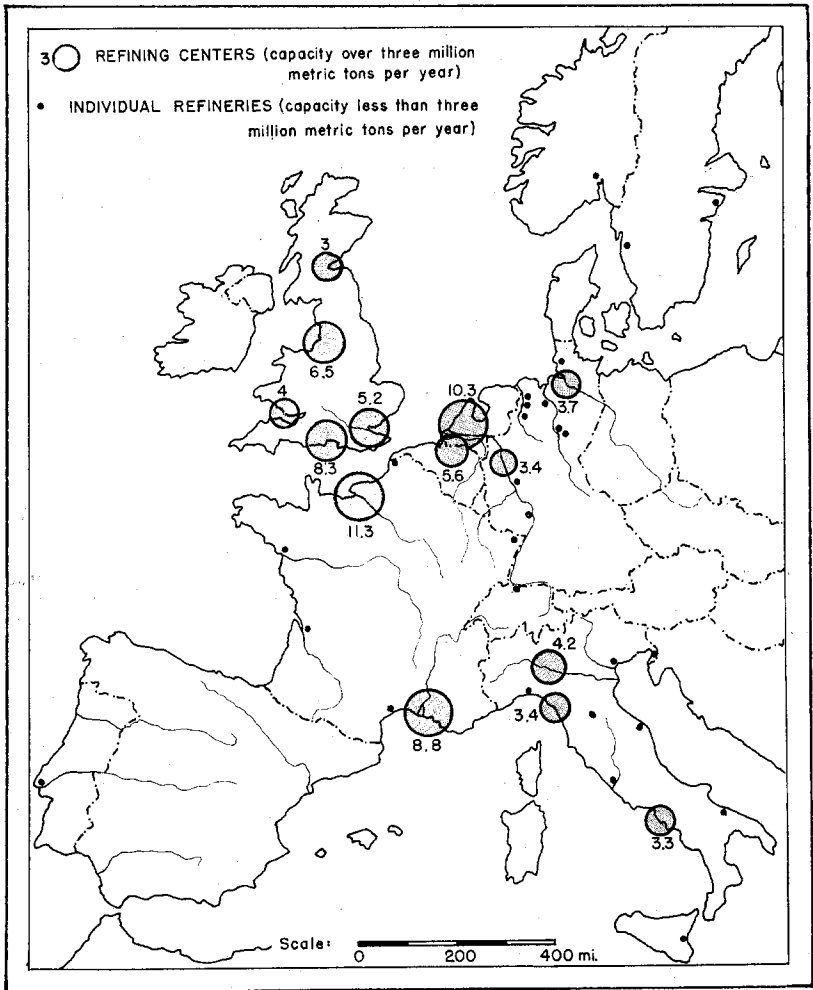


FIG. 2.—Major refineries of Western Europe (1955).

ope is illustrated in Figures 3 and 4. Although the increase in production may be the most striking contrast, a comparison of the crude imports and refined imports of 1948 with those of 1955 reveals an important aspect of the changing structure of Western Europe's petroleum marketing system.

#### LOCATION AND TRANSPORTATION

Two primary factors in the location of petroleum refineries in Western Europe are transportation facilities and market. Most of the refineries are near the sea, and the few inland refineries are oriented to rivers (Fig. 2). The extensive de-

TABLE 5.—Refinery Capacities of O.E.E.C. Member Nations (in thousand metric tons).<sup>1</sup>

Country	1941	1950	1954
Austria.....	401	1,305	..... <sup>3</sup>
Belgium.....	609	790	4,765
Denmark.....	250	31	45
France.....	7,578	15,285	22,825
Germany.....	3,038	3,557 <sup>2</sup>	9,955 <sup>2</sup>
Ireland.....	530	30	00
Italy.....	2,865	5,360	17,940
Netherlands..	750	3,850	9,925
Norway.....	60	50	50
Portugal.....	250	375	1,250
Sweden.....	175	1,290	1,740
Switzerland... ..... <sup>3</sup>		00	200
United King- dom.....	6,673	9,838	30,033
Total..	23,179	41,761	98,628

<sup>1</sup> From Amer. Petrol. Inst. (1951: 454, 456) and (1954: 494).

<sup>2</sup> Western Germany.

<sup>3</sup> Figures not available.

velopment of the petroleum industry in Belgium and the Netherlands, for example, has been complemented by their favorable locations. The refineries in both countries import crude by means of ocean-going tankers, process the raw material, and market refined products in their own countries and at available markets on the Rhine. The distance between the source area and the processing center also affects the location of refineries. This factor has encouraged France to develop two major refining centers, one on the Atlantic coast near the major consuming areas and one on the Mediterranean oriented towards the source area.

The bulk of petroleum products imported by Western Europe is shipped by ocean-going vessels. Although the costs of water transportation are relatively low, current

problems concerning the Suez Canal and the limitations of tankers have renewed interest in the movement of petroleum by pipelines from the source area to the markets. But political fragmentation of Europe and the Middle East, combined with international political philosophies, discourages such a program at the present. Nevertheless, with the increased efficiency of movement by pipelines, some advances may be made in or between political units of the O.E.E.C. Since it is now possible to transport more than one commodity by pipeline, countries like France and Germany may utilize this method for greater efficiency of movement between refinery and consuming areas.

#### SUMMARY AND PROSPECT

The function and structure of the petroleum industry of Western Europe reveal two significant changes which have occurred since World War II. 1) The dominant source area for petroleum has changed from the Western Hemisphere to the Middle East, and the bulk of the products shipped has become crude petroleum rather than refined commodities. 2) Since World War II, consumption of petroleum has increased substantially, even though there has been an actual decrease in the number of operating refineries.

The growth of the petroleum industry in Western Europe is applicable to Prescott's concept of growth related to demand and to White and Foscue's concept of manufacturing stages (Prescott, 1922: 471-479; White and Foscue, 1955:

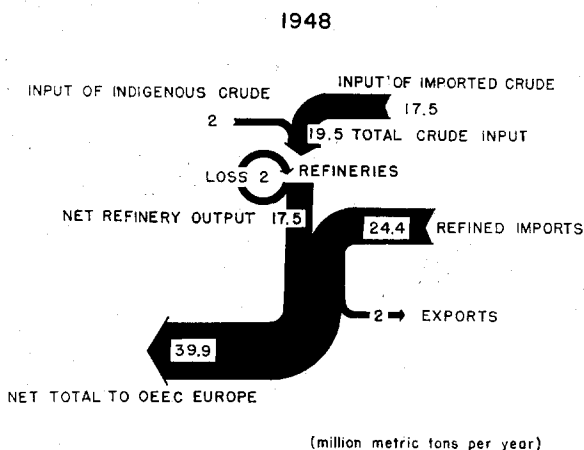


FIG. 3.—Movement of petroleum in Western Europe (1948).

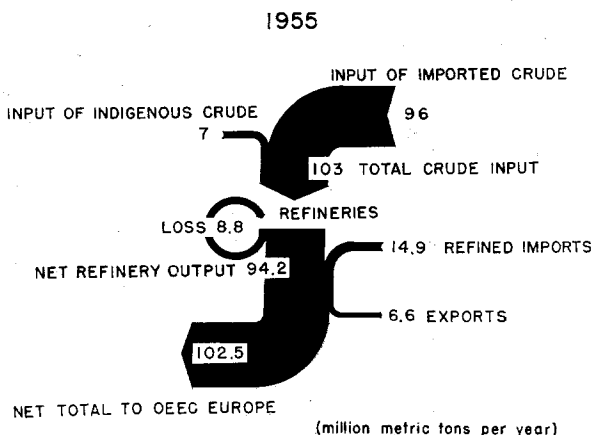


FIG. 4.—Movement of petroleum in Western Europe (1955).

18-20). The industry has progressed through the experimental stage and is now in the second stage of rapid growth. The next stage will be continued growth, but at a diminishing rate. Finally a stage of stability will be attained. This growth process, however, is dependent upon a

continuing demand for petroleum products and the ability to market them at the lowest possible cost. The Middle East, with its abundant supply of labor and its natural resources, may develop refining industries and enter world competition for petroleum markets. Such an

occurrence would result in a second phase of reorganization in Western Europe because the market growth principle would be interrupted. If market area refineries are to continue to supply the bulk of the refined products to Western Europe, the present marketing system and its advantages must be maintained.

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