Oil Pipelines, Politics and International Business

The Rotterdam Oil Port, Royal Dutch Shell and the German Hinterland, 1945-1975

Oliepijpleidingen, politiek en het internationale bedrijfsleven

De Rotterdamse oliehaven, Koninklijke Shell en het Duitse achterland, 1945-1975

Marten Boon

Colophon

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Chapter 1 Introduction

The transition from coal to oil between 1945 and 1975 was the main driver of both an unprecedented expansion of the Port of Rotterdam and the fundamental transformation of its German hinterland. The oil industry was the key element of Rotterdam's post-war rise to becoming the world's largest port, as oil became the dominant cargo flow through its docks.[1] However, the extent to which this affected the port's relations with the German hinterland – historically Rotterdam's primary hinterland – is little understood. Indeed, the historiography of the port and its relationships with the German hinterland has generally focused on the pre-1940 period, when Rotterdam and the Ruhr area were strongly connected through the Rhine shipping of bulk goods such as coal, iron ore, pitwood and grains.[2]

After 1945, the stream of scholarly work on port-hinterland relations dried up. The transition from coal to oil and the subsequent rise of the Port of Rotterdam and the industrial decline of the Ruhr area have been accepted as having reduced Rotterdam's reliance on its German hinterland. The oil and petrochemical cluster that emerged in the port after 1945 is generally understood to have made it less dependent on German transit flows.[3] However, this interpretation is contested. The German geographer Renate Laspeyres, for instance, highlighted that Rotterdam remained hugely important for iron ore imports into the Ruhr area, causing a locational shift to the Rhine of the region's steel industry.[4] Moreover, Europoort, the port's largest post-war expansion, was constructed in the late-1950s and early 1960s when a massive rise in oil refinery capacity in the West German Rhine-Ruhr area required a port that could handle large tankers and host a pipeline to supply the new refineries with crude oil.[5] Furthermore, the oil port itself was highly international. For instance, the capacity of its refineries was the largest in Western Europe, and the port exported over 50 per cent of its production.[6] Accordingly, there is little doubt that the

[1] For instance: F. de Goey, *Ruimte voor industrie. Rotterdam en de vestiging van industrie in de haven 1945-1975* (Rotterdam 1990) 21-25. Between 1946 and 1973, the share of crude oil and oil products in the total cargo flow through the Port of Rotterdam increased from 27 to 70 per cent.
[2] H.A.M. Klemann and F. Wielenga, 'Die Niederlande und Deutschland, oder verschwindet die nationale Ökonomie?', in: H.A.M. Klemann and F. Wielenga (eds.), *Deutschland und die Niederlande, Wirtschaftsbeziehungen im 19. und 20. Jahrhundert* (Münster 2009) 11-13; R. Laspeyres, *Rotterdam und das Ruhrgebiet* (Marburg 1969) 195.
[3] F. de Goey, and H. van Driel, 'Rotterdam und das Hinterland (1920-1995)', in: H.A.M. Klemann and F. Wielenga (eds.), *Deutschland und die Niederlande, Wirtschaftsbeziehungen im 19. und 20. Jahrhundert* (Münster 2009) passim.
[4] Laspeyres, *Rotterdam*, 126-127, 151.
[5] De Goey, *Ruimte voor industrie*, 81.
[6] See Appendix B: Data Table 0-6. The refinery capacity in Western Europe by region, 1950-75 (in million tons); Royal Dutch Shell's Rotterdam-Pernis refinery, for instance, exported on average 70 per

transition from coal to oil fundamentally changed the Port of Rotterdam and, in turn, profoundly affected its relationship with its German hinterland. The extent of this has not, however, yet been fully appreciated.[7]

The purpose of this study is to revisit the post-war history of the Rotterdam oil port from a transnational perspective, i.e. from the viewpoint of its relations to the German hinterland. In particular, the research questions how and why the transition from coal to oil affected the relationship between the port and the German hinterland between 1945 and 1975. Sections one and two of this chapter briefly outline the post-war histories of the port and the Rhine-Ruhr area, particularly in the context of the transition from coal to oil. Thereafter, following a discussion of the historiography in section three, section four will consider theoretical issues. Then, the research questions will be formulated in section five, before the chapter ends with a discussion of the methodology in section six.

1.1 The rise of oil and the decline of coal, 1945-1975

Between 1890 and 1940, the relationship between Rotterdam and the Ruhr area was cast in coal.[8] Coal was the basis for the economic and industrial development of the Ruhr region, and it was this area's growing need to transport raw materials, foodstuffs and finished products that fuelled Rotterdam's ascendance as a major port in Western Europe between 1870 and 1940. After 1890, the Rhine became the cheapest transport artery for bulk goods to and from the Ruhr area, making Rotterdam its most important seaport.[9] The River Rhine, and in particular the Lower Rhine, was therefore crucial to the rise of the Port of Rotterdam in the age of coal. As part of the Lower Rhine region, the Ruhr area is bordered to the north and south by the rivers Lippe and Ruhr, respectively (Figure 1-1). Rotterdam's inland counterpart was the Port of Duisburg, which, being located at the intersection of the Rhine and Ruhr, developed into Germany's largest inland port around 1900.[10] The Rhine basin also

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cent of its production between 1957 and 1963 (Shell Historical Archive, inventaris 976, doos 114, Statistical data on Shell Nederland Raffinaderij NV).

[7] M. Boon, H.A.M. Klemann and B. Wubs, 'Outport and Hinterland. Rotterdam Business and Ruhr Industry, 1870-2010', in: R. Gorski, A. Rosengren and B. Söderqvist (eds.), *Parallel Worlds of the Seafarer. The 10th North Sea History Conference* (Gothenburg 2012) 201-207.

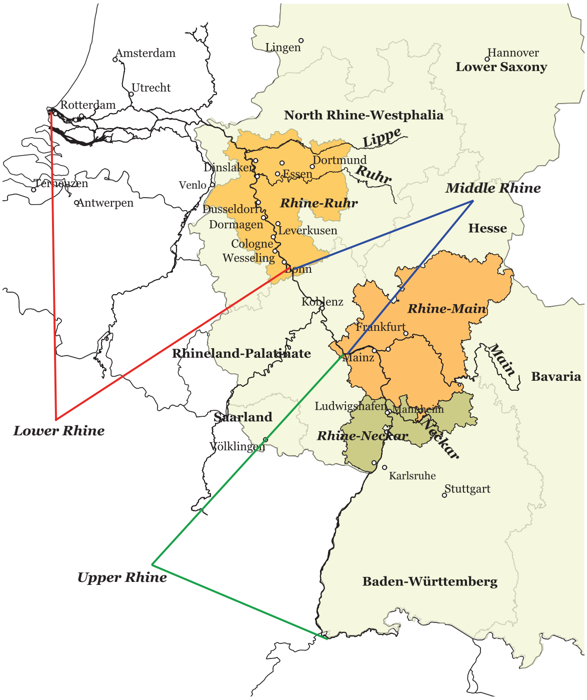
[8] H.A.M. Klemann and J. Schenk, 'Competition in the Rhine delta: waterways, railways and ports, 1870–1913', *The Economic History Review* 66 (2013) 826-847; E.-M. Roelevink and J. Schenk, 'Challenging times - The renewal of a transnational business relationship: The Rhenish Westphalian Coal Syndicate and the Coal Trade Association, 1918 to 1925', *Zeitschrift für Unternehmensgeschichte/Journal of Business History* 57 (2002) 154-180.

[9] Klemann and Schenk, 'Competition in the Rhine delta', 833-844.

[10] A. Kunz, *Statistik der Binnenschiffahrt in Deutschland 1835-1989* (1999 [2005]) GESIS Köln, Deutschland ZA8157 Datenfile Version 1.0.0, Güterumschlag in Binnenhäfen, own calculations. http://www.gesis.org/histat/de/project/details/3849408141F966CF9317FC792820CD95, accessed 11 July 2014.

harbours other metropolitan agglomerations, such as the Rhine-Ruhr area, the Rhine-Main area around Frankfurt and the Rhine-Neckar area around Mannheim and Ludwigshafen (Figure 1-1).[11]

Figure 1-1. The Rhine and its most important tributaries



Source: Map created by the author. Waterways GIS data: European Environment Agency, COoRdinate INformation on the Environment (Corine) 2006, GIS data on watercourses, http://www.eea.europa.eu/data-and-maps/data/clc-2006-vector-data-version-2, accessed 3 May 2012. Metropolitan regions (Rhine-Ruhr, Rhine-Main and Rhine-Neckar): Bundesamt für Bauwesen und Raumordnung (BBR) and Initiativkreis Europäische Metropolregionen in Deutschland (IKM), *Regionales Monitoring 2008. Daten und Karten zu den Europäischen Metropolregionen in Deutschland* (Bonn 2008) 7. http://www.deutsche-metropolregionen.org/fileadmin/ikm/IKM-Veroeffentlichungen/IKM-Monitoring2008_lite.pdf, accessed 11 July 2014. For a detailed composition of the metropolitan regions, see Appendix E: The composition of the German metropolitan regions.

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[11] See also Appendix E: The composition of the German metropolitan regions. These regions are a fairly new phenomenon. The term Rhine-Ruhr metropolitan region, for instance, emerged in the 1990s in governmental and urban planning circles in North Rhine-Westphalia. The region stretches from Bonn in the south to Mönchengladbach in the west and Hamm in the north. However, what has since become known as the *Metropolregion Rhine-Ruhr* has few historical roots. It consists of at least four economic areas with highly diverse historical experiences, with the Ruhr area being the most well known. The use of the term Rhine-Ruhr to denote a historical region therefore seems to be anachronistic, but is currently the most accurate label available to denote the area relevant to this study. The same is true for the other metropolitan regions that will figure prominently in this book. (Source: H.H. Blotevogel, 'The Rhine-Ruhr metropolitan region', *European Planning Studies* 6 (1998) 395-410, here: 395-396, 401)

The coal and steel trade to and from the Ruhr area dominated Rotterdam's hinterland traffic.[12] In general, until World War II, coal was Europe's most important energy source. In 1937, the average share of coal in the primary energy consumption of Western Europe was 86 per cent. The share was even higher in countries with abundant domestic coal supplies; Germany, for instance, used coal for 97 per cent of its energy consumption.[13] However, after 1945, there was a shift in the energy balance of Western Europe.

The dominance of oil in the expansion of the Port of Rotterdam was testament to the process that fundamentally changed the energy economy in Western Europe after the end of World War II. An energy transition is generally defined as a "gradual shift from a specific pattern of energy provision to a new state of an energy system."[14] Oil consumption in Western Europe increased more than tenfold between 1950 and 1970, rising from 57 million tons to 670 million tons per annum, which implies an average annual growth rate of 13 per cent.[15] Oil became a cheap alternative to coal for industrial underfiring, domestic heating, electricity generation, transportation and chemistry. At the same time, the development of the petrochemical industry, which was based on the valorisation of the by-products of oil refining, gave rise to an entire range of new industrial and consumer goods. Oil's share of the total energy consumption of Western Europe increased from 15 per cent in 1952 to 55 per cent in 1972. The share of coal declined from 80 to 24 per cent in the same period.[16] Concurrent with the transition to oil was the rise of natural gas consumption in Western Europe, especially after the discovery of large gas reserves in the Netherlands and the North Sea in the late 1950s and 1960s.[17]

In response to the increasing demand for oil, refinery capacity in Western Europe increased from 41 million tons per annum in 1950 to 703 million tons in 1970.[18] Prior to World War II, Germany depended heavily on coal. Indeed, from 1933, the Nazis had pursued a policy aimed at autarky, in which German coal played a key role, especially for the production of gasoline, aviation fuel, lubricants and synthetic rubber. This policy further increased Germany's pre-war dependence on coal.[19] During the late 1940s, Europe as a whole, but Germany in particular, suffered

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[12] Klemann and Schenk, 'Competition in the Rhine delta', 834.
[13] Odell, *Oil and world power*, 120-121.
[14] V. Smil, *Energy Transitions: History, Requirements, Prospects* (Santa Barbara 2010) vii.
[15] Odell, *Oil and world power*, 120-121. The countries included are: West Germany, Italy, France, Great Britain, the Netherlands, Belgium and Luxembourg.
[16] Odell, *Oil and world power*, 120-121.
[17] J. Schenk, *Groninger gasveld vijftig jaar. Kloppend hart van de Nederlandse gasvoorziening* (Amsterdam 2009) 78-79.
[18] W. Molle and E. Wever, 'Oil refineries and petrochemical industries in Europe', *GeoJournal* 9 (1984) 421-430, here: 422.
[19] R. Stokes, 'The Oil Industry in Nazi Germany, 1936-1945', *The Business History Review* 59 (1985)

a major shortage of energy.[20] This was the result of the slow recovery of coal production after the war and the import restricting effects of currency inconvertibility and the limited availability of foreign currency, both in Germany specifically and in Western Europe in general.

Due to Germany's post-war economic problems and its pre-war dependence on coal, the adoption of oil as a source of energy and raw material for the chemical industry was relatively slow compared to other Western European countries. In 1950, only 8 per cent of Germany's energy needs were supplied by oil.[21] Even in the chemical industry, only 15 per cent of the production of organic chemicals was based on oil, although by then American, British and Dutch oil and chemical companies were already heavily involved in petrochemicals.[22] However, the energy policies of the Allied occupation authorities aimed to break with Germany's historic dependence on coal, partly as a way to constrain the country's capacity to become autarkic again, and partly to save foreign currency. With the inception of the Bizonal Refinery Plan in 1947 and its subsequent integration into the Marshall Plan in 1949, the Allies sought to increase Germany's dependence on foreign oil.[23]

The transition from coal to oil had many causes, an important one of which was a difference in production costs and prices.[24] The post-war energy crisis, although initially caused by a shortage of coal, led to an effort to recapitalise and rationalise the coal industry. By 1958, the production of German coal was back at pre-war levels. However, policies to diversify energy sources – through importing US coal or fuel oil – dampened the demand for German coal and led to faltering coal sales and growing stocks. In fact, since that time, the coal sector in every major coal producing country in Europe suffered, with production gradually being scaled down and ultimately ending. Coal could certainly not compete with oil without subsidies or the imposition of taxes and tariffs on oil products. As a consequence, in coal producing countries, such measures were commonplace from the 1950s up to the 1970s.[25] Between 1950 and 1960, the production costs of coal rose significantly, because the West German economic miracle created full employment and no job was less attractive than coal mining. As the sector was very reliant on labour, rising employment costs during the

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256. In fact, Nazi Germany never managed to become fully autarkic.

[20] D. Painter, 'Oil and the Marshall Plan', *The Business History Review* 58 (1984) 3, 359-383, here: 361.

[21] P. Waller and H. Swain, 'Changing Patterns of Oil Transportation and Refining in West Germany', *Economic Geography* 43 (1967) 143-156, here: 143.

[22] R. Stokes, *Opting for Oil. The political economy of technological change in the West German chemical industry, 1945-1961* (Cambridge 1994) 3.

[23] R. Stokes, 'German Energy in the U.S. Post-War Economic Order, 1945-1951', *Journal of European Economic History* 17 (1988) 621-639.

[24] M. Chick, *Electricity and energy policy in Britain, France and the United States since 1945* (Cheltenham 2007) 7-8.

[25] Odell, *Oil and world power*, 122-124.

economic boom led to rising coal prices.[26] Simultaneously, the cost of producing, transporting and processing oil fell.[27] Consequently, from the late 1950s onwards, the West German government took several steps to improve the fate of the coal industry, culminating in the 1969 merger of all active coal mines in the Ruhr area into a single private company, *Ruhrkohle AG*.[28] This could not however save the Ruhr coal industry from decline and fundamental reorganisation, and of the 140 mine shafts active in 1955, only 35 were still open in 1972.[29]

The oil industry in Western Europe, and in West Germany in particular, experienced a period of unprecedented growth as both markets and the operations of foreign and domestic oil companies expanded. The oil industry established several large-scale refineries in the major industrial regions and urban agglomerations, most prominently in the Rhine-Ruhr area. This conurbation formed the basis for Germany's largest concentration of petrochemical activity.[30] The energy transition thus had far-reaching consequences for the Rhine-Ruhr region. This gave rise to changing transport demands, as refineries required continuous inflows of crude oil and product exchanges led to petrochemical cluster formation through the growing physical integration of plants.

The transition from coal to oil is easily mistaken as a path of natural development stemming from the increasing divergence between the production costs of coal and those of oil, particularly oil from the Middle East. In fact, the transition was beset with crises, introducing Western European countries to a number of risks with respect to their energy supply in the oil era. Indeed, several crises in the Middle East and the ever present fear of the Soviet Union upsetting the regional balance of power, demonstrated time and again that production, supply and the price levels of oil were extremely sensitive to political upheaval, leaving the national energy interests of Western European countries exposed.[31]

Notwithstanding the clear risks of relying on imported oil, alternatives were not seriously pursued – save for gas and nuclear energy – until after the first oil crisis of 1973.[32] The promise of nuclear energy did, however, hang over the energy markets throughout the period. Indeed, US President Eisenhower's Atoms for Peace speech in 1953 had fostered interest in the civil application of nuclear technology, while the

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[26] C. Nonn, *Die Ruhrbergbaukrise. Entindustrialisering und Politik, 1958-1969* (Göttingen 2001) 37-39.
[27] W. Molle and E. Wever, *Oil refineries and petrochemical industries in Western Europe: buoyant past, uncertain future* (Aldershot 1984) 26-27
[28] Karlsch and Stokes, *Faktor Öl,* 310-311; 376.
[29] W. Abelshauser et al, D*as Ruhrgebiet im Industriezeitalter. Geschichte und Entwicklung* (Düsseldorf 1990) 51.
[30] F. Broich, 'Die Petrochemie des Rhein-Ruhr-Gebietes', *Jahrbuch für Bergbau, Energie, Mineralöl und Chemie* 61 (1968) 13-55, here: 13-40.
[31] Chick, *Electricity and energy policy*, 13-14; M.A. Adelman, 'Security of Eastern Hemisphere Fuel Supply', working paper dept. of economics MIT, 6 December 1967, 1-2.
[32] Yergin, *The Prize*, 544.

1956 Suez Crisis demonstrated that reliance on imported oil was risky. EURATOM, the European organisation in which the member countries of the European Coal and Steel Community (ECSC) and the European Economic Community (EEC) collaborated on nuclear energy from 1957 onwards, attested to the intense interest in nuclear energy. Indeed, nuclear energy was seen as the panacea for Western Europe's foreign energy dependency.[33] Oil companies watched advances in nuclear energy closely. Royal Dutch/Shell, for instance, considered it as a means of diversifying, but concluded during the 1960s that serious applications of the technology were unlikely before the 1980s, and even then nuclear energy was not expected to compete with oil directly.[34] The company's attitude to nuclear energy changed when rising oil prices prompted energy conservation in the 1970s, leading to lower than expected growth rates for the entire energy industry, including liquid fuels.[35] In fact, energy prices were the key element holding up nuclear energy development. After the initial acceleration of development in the wake of the 1956 Suez Crisis, consistently declining prices for oil and a growing coal glut reduced the cost of energy, making the promise of nuclear energy and its enormous development costs less and less attractive during the 1960s.[36] Lower energy prices were key to European industrial competitiveness, and countries in Europe were not prepared to sacrifice that advantage for energy independence.

1.2 Scaling up: the Rotterdam oil port

The oil industry is a prime example of a sector characterised by technologically-induced economies of scale in production, refining and transportation.[37] Although John D. Rockefeller's Standard Oil Trust was the first to understand the benefits of exploiting economies of scale in the 19th century, it was not until after World War II that the European oil industry experienced a similar expansion, and even then it was largely based on Anglo-American technology, capital and managerial capabilities. Moreover, the oil industry is a prime example of how technology can deliver economies of scope.[38] The search for the valorisation of by-products from oil refining

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[33] G.P.J. Verbong and J.A.C. Lagaaij, 'De belofte van kernenergie', in: J.W. Schot et al (eds.), *Techniek in Nederland in de Twintigste Eeuw. II Delfstoffen, Energie en Chemie* (Zutphen 2000) 239-255, here: 239-240; E.B. Kapstein, *The Insecure Alliance. Energy Crises and Western Politics Since 1944* (New York 1990) 125-129.
[34] Jonker and Howarth, *Stuwmotor*, 375-376.
[35] Ibid., 379.
[36] Kapstein, *Insecure Alliance*, 128.
[37] A.D. Chandler, *Scale and Scope. The Dynamics of Industrial Capitalism* (Cambridge MA 1990, first paperback edition 1994) 92. Economies of scale are efficiency gains deriving from a larger scale of production or transportation.
[38] Ibid., 103-104. Economies of scope are efficiency gains in production deriving from product diversification. Chandler notes that the chemical industry was actually much more attuned to creating economies of scope than the oil industry. Oil companies were traditionally aimed at expanding scale and struggled to develop the research and development capabilities needed to foster economies of scope.

that started around World War I created the basis for the increase of extensive research and development capabilities in and among oil companies. This fostered the creation and growth of the petrochemical industry, in particular after World War II. The technological innovations and applications in the oil industry drove down unit costs dramatically. Consequently, as exploration techniques improved, supply expanded.[39] Advances in shipbuilding in turn created additional economies of scale in transportation, as did the construction of pipelines in Europe from the late 1950s onwards. As a result, crude oil prices remained low and stable, and were even declining in real terms between the mid-1950s and the late 1960s.[40]

The economies of scale and scope in the oil and petrochemical industry translated into a scale shift for the Port of Rotterdam. The transition led to new large-scale flows of oil into Western Europe, and also greatly expanded the Western European oil industry. Indeed, between 1945 and the early 1970s, oil consumption grew exponentially in most Western European countries. This caused a shift in the location of oil refining, first from producer countries to port locations in consumer countries, and from the late 1950s also to inland locations close to markets.[41]

To supply the expanding refineries in Western Europe, growing amounts of crude oil were shipped from producer countries – mainly in the Middle East – to consumer countries in Western Europe. As the economic value of crude oil contained much less added value than refined oil products, incentives for utilising potential economies of scale in transport were created. The upwards trend in tanker size that started in the 1950s was a reflection of this.[42] Indeed, oil tankers rapidly increased in size, from just 25,000 tons in the late 1940s to 500,000 tons in the early 1970s. Figure 1-2 shows the growth in the number of tankers by size class, clearly demonstrating that each size class grew rapidly after its introduction, testifying to the high growth ratio of global crude oil consumption.

It was only at the outset of World War II that R&D yielded a growing gamut of chemical products derived from oil.

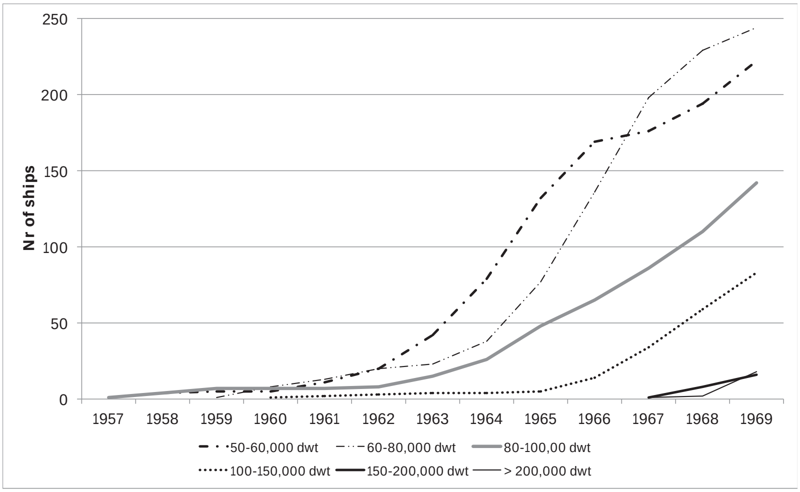
[39] R. Karlsch and R. Stokes, *Faktor Öl: die Mineralölwirtschaft in Deutschland, 1859-1974* (München 2003) 314-317; M.A. Adelman, *The World Petroleum Market* (Baltimore 1972) 196-224; W. Levy, *Lage und Entwicklungstendenzen des Weltölmarktes in ihrer Auswirkung auf die Energiepolitik Westeuropas, insbesondere der Bundesrepublik* (Köln 1961) 13-14.

[40] BP statistical review of World energy, 'Crude prices since 1861', June 2011, http://www.bp.com/statisticalreview, accessed 31 January 2013.

[41] Molle and Wever, 'Oil Refineries and Petrochemical Industries in Europe', 424-425; Waller and Swain, 'Changing Pattern of Oil Transportation', 146-148.

[42] M. Hubbard, *The Economics of Transporting Oil to and within Europe* (London 1967) 2-3

Figure 1-2. The composition of the world tanker fleet by size class, 1957-1969



Source: J. Brennecke, *Tanker. Vom Petroleumklipper zum Supertanker* (Herford 1975) 317 (table 24). Own calculations.

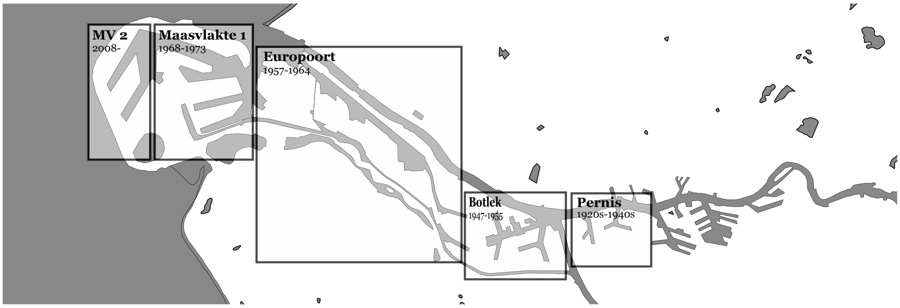
The closure of the Suez Canal in 1956, and between 1967 and 1975, also greatly affected the size of crude oil tankers.[43] The 1956 crisis was triggered by the nationalisation of the Suez Canal by Egyptian President Gamal Abdel Nasser in July 1956 in response to pressure from Western powers to end the country's flirtations with the Soviet Union. France, Britain and Israel responded by invading Egypt and seizing the canal. The nationalisation and ensuing standoff blocked the canal for commercial shipping. This was an issue because the Middle East had become Europe's main oil supplier after World War II. Indeed, in 1955, 89 per cent of Europe's crude oil requirements were supplied from Middle Eastern oil fields, which amounted to around 98 million tons. Almost two thirds, or 61 million tons, reached Europe via the Suez Canal.[44] Along with the Trans Arabian pipeline connecting Saudi Arabian oil fields with Lebanon's Mediterranean Port of Sidon, which transported around 38 per cent of Middle Eastern crude oil to Europe, the Suez Canal had become "the critical link in the post-war structure of the international oil industry."[45] Although some crude oil tankers had already exceeded the capacity of the canal before the eruption of the Suez Crisis, the standoff did cause both oil companies and governments to realise that the world's tanker fleet needed to scale up to create more

[43] E. Corlett, *The Ship. The Revolution in Merchant Shipping, 1950-1980* (London 1981) 24-30.
[44] H. Lubell, *Middle East oil crises and Western Europe's energy supplies* (Baltimore 1963) 11.
[45] D. Yergin, *The Prize. The Epic Quest for Oil, Money and Power* (New York 1992) 480.

flexibility in the transportation of crude oil across the globe.[46] The rationale was that only larger tankers could provide an efficient alternative to the Suez Canal, which was to go around the Cape of Good Hope. Accordingly, the Suez Crisis fed into the process of increasing scale in crude oil transportation.[47]

The rising scale of overseas oil transportation was part of what has been called the third transport revolution (after sailing in the 16th century and steam in the 19th century). This refers to a sharp fall in maritime transport costs since the 1950s and the effects of this on world trade.[48] The upwards trend in the size of tankers required ports to continuously adapt in order to provide adequate deep-sea access, as was the case for the Port of Rotterdam. The respective post-war port expansions, Europoort (1957) and Maasvlakte (1968), and the continued dredging of the sea access channel and the docks, were directly aimed at accommodating the increasing scale in maritime transport (Figure 1-3).

Figure 1-3. The areas of post-1945 expansion in the Port of Rotterdam, 1945-1975



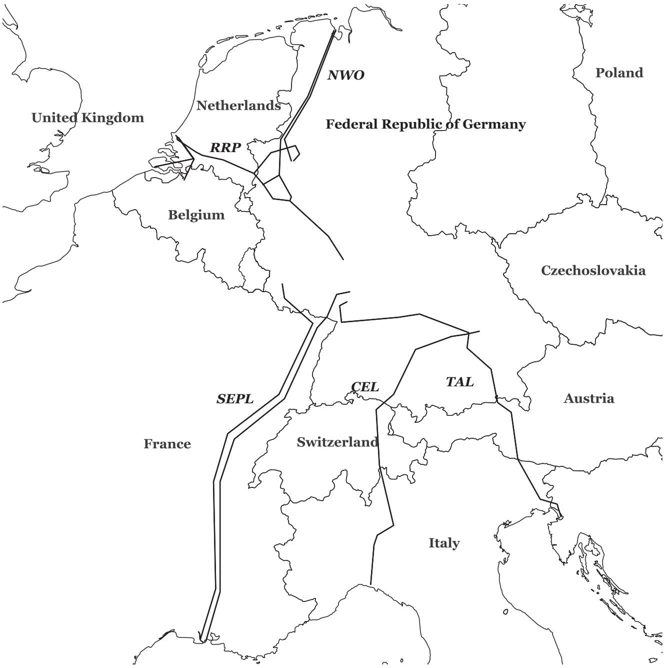
Note: The dates signify the period of construction.
Source: Created by the author.

The scale shift in transportation not only affected maritime transport; the increasing volume of crude oil shipped towards inland refineries also fostered the introduction of pipelines. During the 1950s and 1960s, crude oil pipelines were constructed from various landing ports in Western Europe to feed the refineries in, among other countries, West Germany, France and Switzerland. The five major international crude oil pipelines (Figure 1-4) consisted of the Nord-West Oelleitung from Wilhelmshaven to the Ruhr area (1958), the Rotterdam-Rhine pipeline from Rotterdam to the Ruhr area (1960), the Southern European pipeline from Marseille

[46] S. Howarth and J. Jonker, *Powering the Hydrocarbon Revolution. The History of Royal Dutch Shell, volume 2* (Oxford 2007) 282.
[47] Yergin, *The Prize*, 496-497; OEEC, *Europe's need for oil. Implications and lessons of the Suez crisis* (Paris, 1958) 44-45.
[48] N.-G. Lundrgren, 'Bulk trade and maritime transport costs. The evolution of global markets', *Resources Policy* 22 (1996) 5-32, here: 8.

to northeast France, southern Germany and Switzerland (1963), the Central European pipeline from Genoa to Switzerland and southern Germany (1965), and the Trans-Alpine pipeline from Trieste to southern Germany (1967). Moreover, since 1968, an oil product pipeline had connected Rotterdam to the German hinterland as part of the Rotterdam-Rhine pipeline.[49]

Figure 1-4. Map of the major Western European crude oil pipelines around 1980



Source: Adapted from W. Molle and E. Wever, *Oil refineries and petrochemical industries in Western Europe: buoyant past, uncertain future* (Aldershot 1984) 53.

The post-war oil boom fell on fertile ground in the Port of Rotterdam. After World War I and the economic depression of the 1930s, Rotterdam City Council attempted to make the port less sensitive to external shocks by pushing for its industrialisation. These efforts led to the creation of a powerful agent, the Municipal Port Authority, which was responsible for port management and development. The Port Authority proved to be instrumental in both developing a series of port expansions that successfully adapted it to the increasing scale of maritime transportation, particularly in the oil industry, and creating the conditions for industrial settlement and development, at least up to the early 1970s.[50] The port expansions particularly

[49] H.J.M. Koene et al (eds.), *'58'98: Veertig jaar veilig en verantwoord transport* (Den Haag 1998) 33.
[50] De Goey, *Ruimte voor industrie*, 10.

contributed to the growth of an oil and petrochemical cluster in the port, transforming it into Europe's largest oil port.

Larger tankers and the introduction of pipelines upended existing port-hinterland relations. Pipelines are, by far, the cheapest overland mode of transport for concentrated oil flows; only maritime oil tankers can be cheaper. As a consequence, the supply chain of Middle Eastern crude oil to Western Europe depended in part on the relative costs per ton-mile of pipelines and tankers.[51] As long as tankers remained small, pipelines represented the largest relative transport cost reduction in the supply chain, but this depended on the utilisation of economies of scale in tanker transportation. The relative costs of pipelines and tankers had a major impact on the organisation of the supply chain of Middle Eastern crude oil to Western European refineries. As long as pipelines were cheaper, short sea routes between the Middle East and Western Europe and long pipelines across the European continent were favoured. However, when tankers became cheaper, long sea routes no longer mattered and could even become an advantage in combination with comparatively short pipelines. This trade-off between the relative advantages of pipelines and tankers was a decisive factor in reshaping port-hinterland relations in the age of oil. Nevertheless, it is a factor that has thus far not received enough recognition in the historiography of the period.

Between the late 1940s and the first oil crisis of 1973, the Port of Rotterdam quadrupled in size (in terms of its gross surface area) as it expanded westwards into the sea to accommodate increasingly larger oil tankers. At the same time, the port attracted some of Europe's largest oil and petrochemical plants.[52] Consequently, the share of mineral oil in the total commodity flow through the docks rose from 25 per cent in 1950 to 70 per cent in 1972.[53] The number of refineries in the port also rose from two to five between 1950 and 1975, while primary refining capacity increased from 2.7 to 85.8 million tons per annum, which was the largest concentration in Western Europe (Figure 1-5). With the growing number of refineries, the scale of refinery operations expanded considerably from an average capacity of 1.4 million tons in 1950 to 17.2 million tons in 1975.[54]

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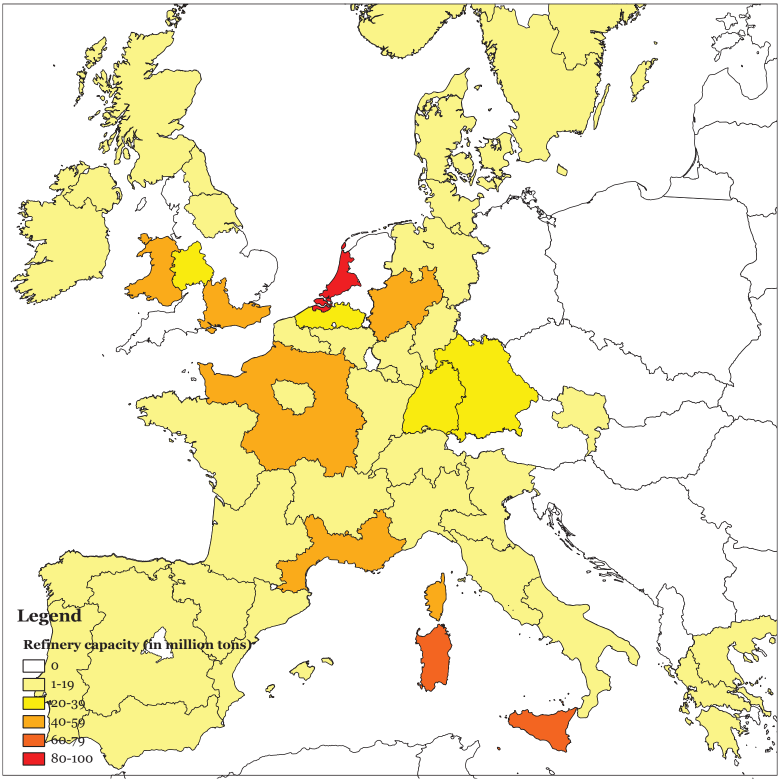
[51] G. Manners, 'The Pipeline Revolution', *Geography* 47 (1962) 154-163, here: 157-159.
[52] De Goey, *Ruimte voor industrie,* 77, 123, 180, 240.
[53] Database *Rotterdam-Antwerp: a century and a half of port competition 1880-2000*, http://www.persistent-identifier.nl/?identifier=urn:nbn:nl:ui:13-n6w-g4s, 10 September 2009. Own calculations.
[54] Molle and Wever, *Oil Refineries*, 164-169. Own calculations.

Figure 1-5. The refinery capacity in Western Europe by region, 1975



W. Molle and E. Wever, Oil refineries and petrochemical industries in Western Europe: buoyant past, uncertain future (Aldershot 1984) 164-168.

Royal Dutch was an important first mover in the Port of Rotterdam. Although the petroleum trade had started to establish itself in the port in the early 1860s, the gasoline refinery established by Royal Dutch in 1902 was the beginning of the modern oil industry in the port.[55] Royal Dutch (*N.V. Koninklijke Nederlandse Petroleum Maatschappij* in full) had taken a bold step with this refinery. The company started out as a freestanding company in the Dutch East Indies in 1890. Generous oil finds and the powerful leadership of its managing director Henri Deterding enabled it to expand into a multinational oil company by the turn of the century, culminating in a merger with Shell Transport & Trading in 1907 (for more information on the structure of the Shell group, see Appendix A: The organisational structure of the Royal Dutch Shell group).[56] Although petroleum was the most traded oil product at

[55] J.G. Loohuis, *Rotterdam als petroleumhaven in de negentiende eeuw* (Rotterdam 1952) 10; 'Van Rotterdam-Charlois naar Rotterdam-Pernis', *Onder de vlam*, 21 (1977) 939, 4-5.
[56] H. Gabriels, *Koninklijke Olie: de eerste honderd jaar 1890-1990* ('s Gravenhage 1990) 30-31. After the 1907 merger, the company continued as a bi-national company with headquarters in both London and The Hague. Royal Dutch controlled 60 per cent of the group's shares and Shell Transport and Trading

the time, Deterding conceived that an expanding market for gasoline was developing in Europe. Using Russian oil tankers that would have otherwise returned empty, Deterding transported crude gasoline to Europe and managed to break Jersey Standard's monopoly in the continent's largest markets of France and Germany.[57] Through its subsidiary Rhenania, Royal Dutch also operated gasoline refineries in Germany, which started with a plant in Reisholz near Düsseldorf in 1902.[58] From an early stage, the gasoline refineries in Rotterdam and Reisholz were part of a developing functionally related value chain that began with the distillation of Borneo crude oil in the Dutch East Indies. This crude gasoline, which was otherwise burnt as a useless by-product, was shipped to Rotterdam where it was further refined to produce various grades of commercial and industrial gasoline, some of which were then transported onwards to Reisholz for further treatment to produce gasoline and feedstock for the German explosives and dye industries.[59]

Royal Dutch's Rotterdam plant was gradually expanded over the first three decades of the 20th century. In 1936, the plant was moved to a bigger plot in the port and expanded into a full refinery with the most modern installations available at the time.[60] This Rotterdam refinery became the company's largest in Europe, with the purpose of providing a regional manufacturing base that could supply a wide range of intermediate and final oil products for the many different national markets in Europe. As a consequence, Rotterdam became home to Royal Dutch Shell's regional balancing refinery[61] which, up to the 1970s, was the largest in Europe and, for some time, the most efficient refinery of the Shell group.[62]

The careful ventures in petrochemicals that had already started before World War I were quickly expanded after World War II. As the Rotterdam refinery was

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40 per cent. The company name, Royal Dutch/Shell, reflected its bi-national identity until the company fully merged into a single company under the name Royal Dutch Shell plc in 2005. Throughout the book references to Royal Dutch/Shell will either use the full name or widely used reductions: Royal Dutch, the Shell group or simply the Group, all of which refer to the company as a whole or the company's headquarter level. Where applicable, subsidiaries of the Group will be specifically named and subsequently reffered to by that name.

[57] J. Jonker and J. Luiten van Zanden, *Van nieuwkomer tot marktleider, 1890-1939. Geschiedenis van Koninklijke Shell, deel 1* (Amsterdam 2007) 79.

[58] Ibid.

[59] E. Homburg, J. Small and P. Vincken, 'Van carbo- naar petrochemie, 1910-1940', in: J.W. Schot, H.W. Lintsen, A. Rip and A. de la Bruhèze (eds.), *Techniek in Nederland in de twintigste eeuw, deel 2. Delfstoffen, Energie en Chemie* (Zutphen, 2000) 335-336.

[60] Jonker and Luiten van Zanden, *Van nieuwkomer*, 447.

[61] A balancing refinery performs the function of balancing the position of an oil company in a number of markets. As such, it is designed to process multiple different types of crude oil and intermediate oil products for the purpose of absorbing surpluses from one market and filling shortages in another. In consumer markets, oil companies typically operate a number of smaller, relatively simple refineries dedicated to serving the local market, and a regional balancing refinery to absorb temporary imbalances in the various local markets.

[62] S. Howarth and J. Jonker, *Powering the Hydrocarbon Revolution, 1939-1973. History of Royal Dutch Shell, part 2* (Oxford 2007) 263; Molle and Wever, *Oil Refineries*, 164-169, own calculations.

flexible and could produce and process a large number of intermediates, it was a suitable location to add production facilities for chemical products like PVC (polyvinylchloride, a plastic) and detergents using petrochemical starting materials delivered by the refinery. The Dutch chemical industry, which had hitherto been small-scale and isolated, was strongly supported by the Dutch government in the first two decades after the war, making it the fastest growing industry.[63] Existing plants such as the Royal Dutch refinery in Rotterdam formed the core of chemical complexes that gradually developed into some of the largest in Europe. Scarce land in the Rotterdam port and a huge increase in the scale of production of basic petrochemicals in the late 1960s led to the development of new complexes in Terneuzen and Moerdijk. As both production and demand for basic industrial chemicals and products led to the expansion of large complexes in the Rhine delta (Rotterdam, Terneuzen, Moerdijk and Antwerp), these were connected to exchange feedstock, intermediates and industrial gases. The Rhine delta complex was in turn connected to other complexes in the Belgian Campine and the Walloon area, the Dutch province of Limburg, and the German Rhine-Ruhr, Rhine-Main and Rhine-Neckar areas.[64] Over the course of the 1960s and early 1970s, the Dutch chemical industry developed into Europe's largest producer of basic petrochemicals, which was a position that was strongly related to the refinery cluster in the Port of Rotterdam.[65]

Buoyed by the oil and petrochemical industry, the Port of Rotterdam became the largest in the world in 1962.[66] In the European context, it developed into the single largest oil port, handling 30 per cent of Western Europe's total oil flow in 1973, while its refineries exported around three quarters of their production.[67] Dominating the port's industrial establishments were American companies seeking to gain access to the Common Market, which was created with the Treaty of Rome in 1957.[68] In general, the Netherlands attracted a rapidly growing amount of direct American investment between the late 1940s and the 1970s, most of which was invested in the western part of the country.[69] During the 1960s, the majority of inwards foreign direct

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[63] E. Homburg, A. van Selm and P. Vincken, 'Industrialisatie en industriecomplexen: de chemische industrie tussen overhead, technologie en markt', in: J.W. Schot, H.W. Lintsen, A. Rip and A. de la Bruhèze (eds.), *Techniek in Nederland in de twintigste eeuw, deel 2. Delfstoffen, Energie en Chemie* (Zutphen, 2000) 379-381.
[64] D. Mittmann, *Die Chemische Industrie im nordwestlichen Mitteleuropa in ihrem Strukturwandel* (Wiesbaden 1974) 36.
[65] Ibid., 385-400.
[66] F. Posthuma, 'Het Havenbedrijf 1945-1965', in: G.E. van Walsum (ed.), *Rotterdam-Europoort, 1945-1970* (Rotterdam 1972) 66.
[67] E. Wever, 'Energie en industriële vestigingsplaats', *Geografisch Tijdschrift* 13 (1979) 352; D. Hellema, C. Wiebes and T. Witte, *Doelwit Rotterdam; Nederland en de oliecrisis, 1973-1974* (Den Haag 1998) 103-104.
[68] De Goey, *Ruimte voor industrie*, 27.
[69] F. De Goey and B. Wubs, 'US Multinationals in the Netherlands in the twentieth century', in: H. Bonin and F. De Goey (eds.), *American Firms in Europe. Strategy, Identity, Perception and Performance*

investment originated from the United States, and in 1970 the Netherlands was ranked sixth among the Western European recipients of this direct US investment.[70] A substantial share of these investments flowed to the Port of Rotterdam.

As the largest oil port in Western Europe, the Port of Rotterdam became the regional oil price benchmark. During the 1950s and early 1960s, multinational oil companies (jointly dubbed the Seven Sisters because of their firm grasp on the industry[71]) dominated the oil cluster in the Rotterdam port by way of long-term supply contracts with oil producing countries and fully integrated transportation, processing, distribution and marketing operations. However, their dominance waned during the 1960s as oil producing countries, organised in the Organisation of Petroleum Exporting Countries, expanded their share in the production of oil and looked for ways to increase the price of oil by wresting price setting from the hands of the Seven Sisters.[72] Moreover, increasing amounts of crude oil became available outside the control of OPEC. This led to national oil companies asserting themselves, independent refinery capacity being expanded, and consumption and production becoming increasingly hard to match because of structural changes in demand. As a result, oil flows outside the integrated channels of the oil majors started to grow and increasingly found their way to Rotterdam.[73] Independent tank storage operators and independent oil traders profited from this development and, from the mid-1960s onwards, Rotterdam became Western Europe's most important open oil market; it was certainly no longer just a transhipment or production location for the oil majors. The open market, in contrast to the long-term supply contracts between oil producing countries and the majors, had always existed on the margins of the oil industry. Moreover, until the 1960s, it was mainly based on US Gulf prices. By the mid-1960s, Europoort had developed into Europe's most important location of physical oil flows, and Rotterdam's spot and term prices for oil products began to determine price levels in West Germany, Switzerland, Sweden, Denmark, Belgium and the Netherlands. West Germany was by far the largest market, primarily because it was Western Europe's largest economy, but also because independent traders commanded a higher

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(1880-1980) (Geneve 2009) 149-184, here: 158, 162;

[70] K. Sluyterman, *Dutch Enterprise in the Twentieth Century. Business strategies in a small open economy* (London 2005) 180; M. Wilkins, 'US Business in Europe: An American Perspective', in: H. Bonin and F. De Goey (eds.), *American Firms in Europe. Strategy, Identity, Perception and Performance (1880-1980)* (Geneve 2009) 35-70, here: 53.

[71] The name Seven Sisters was coined by Enrico Mattei, the famed president of Italy's state owned oil company *Ente Nazionale Idrocarburi*, which Mattei himself had created from a number of ailing Italian companies in 1953. The name referred to Standard Oil of New Jersey (present-day Exxon), Socony-Vacuum, Standard of California (Chevron), Texaco, Gulf, British Petroleum and Royal Dutch Shell. Between them, these companies controlled Middle Eastern oil production and therefore the vast majority of the European oil market. Source: Yergin, *The Prize*, 501-503.

[72] F. Parra, *Oil Politics. A Modern History of Petroleum* (London 2004) 318-320.

[73] Adelmann, The World Petroleum Market, 199-204.

share of the market in Germany than was the case in most other Western European countries.[74] The Rotterdam oil market was therefore important for West Germany and vice versa. In terms of investment, volumes, and long-term developments, the oil majors were, and remained, the most important actors in both the Port of Rotterdam and the global oil market during this period.

For the Rotterdam oil port, the extended period of growth from the late 1940s up to the late 1960s was suddenly upended with the onslaught of the first oil crisis of 1973. The general economic environment had been worsening since the breakdown of the Bretton Woods system in 1971.[75] Adding to volatile currency markets, the Arabian oil boycotts of 1973 and 1974 that followed Western support for Israel in the Yom Kippur War sent oil prices spiralling upwards. These prices had actually been on the rise since the late 1960s, as OPEC countries attempted to increase their take from crude oil production by pressuring oil companies into accepting higher prices.[76] The rising prices demonstrated that power was shifting from oil consuming countries (the West) to OPEC countries, in particular the Arab oil-producing nations. The oil embargo of 1973-4 illustrated this shift, shocking the Western world into realising that the reliance on oil imports exposed its economies and societies to considerable risk. The embargo itself was directed at the US and the Netherlands. The former was singled out as an arms supplier to the Israelis, while the Dutch were officially targeted for their support for this, although it has been argued that the Netherlands was a target because the Port of Rotterdam was such a central hub in the Western European oil supply.[77]

The embargo itself was ineffective. The real sting was the increase in oil prices for Arabian crude oil that followed the initial embargo and production restraints.[78] Encouraged by the support of the Shah of Iran, the price for Arabian crude oil settled at an unprecedented 11.65 US dollars in December 1973, which was up from 1.80 US dollars in 1970.[79] These increased prices and OPEC's lower production volumes negatively affected world trade in general and energy intensive industries in particular. As the Port of Rotterdam relied heavily on both, the decrease in trade and production that followed the first oil crisis led to a reduction in the revenues of the Port

[74] W. Vermeer, 'De Rotterdamse oliemarkt: overal en nergens', *Shell Venster* 4 (1979) 9, 3-5; Joe Roeber, 'The Rotterdam Oil Market', *Petroleum Economist* (April 1979) 1-15, here: 2, 4; H. Weisser, 'Mineralölpreise, Spekulanten und der Rotterdamer Spotmarkt – Abhängigkeit und Mythen', Handelsblatt Conference 'Energiepreise', Düsseldorf, 8-9 May 2001, 6-8; Deutsche Shell AG, 'Fakten-Argumente', *Wirtschaftspolitik and Informationen* (September 1986) 8; 'Verdammtes Rotterdam', *Die Spiegel*, 10 March 1975, 94-97.
[75] Sluyterman, *Dutch Business*, 183.
[76] Yergin, *The Prize*, 577-583, 585.
[77] Yergin, *The Prize*, 613; D. Hellema, C. Wiebes and T. Witte, *Doelwit Rotterdam. Nederland en de oliecrisis, 1973-1974* (Den Haag 1998) 75.
[78] Hellema et al, *Doelwit*, 262.
[79] Yergin, *The Prize*, 625.

Authority.[80] "Rotterdam, city in doubt" was the conclusion of a report written under the auspices of the Rotterdam Chamber of Commerce in 1974. Indeed, the city council and the Municipal Port Authority had lost their influence on the future of the Port of Rotterdam.[81] Combined with growing local concerns over nature preservation and pollution, the first oil crisis brought an abrupt end to the unprecedented period of growth that lasted from the late 1940s to the early 1970s.[82]

1.3 Historiography: Rotterdam and the Rhine-Ruhr hinterland, 1945-75

The narrative of the post-war rise of the oil industry and the decline of the coal sector is generally well documented, as are the respective experiences of the Port of Rotterdam and the Ruhr area. However, historical publications on port-hinterland relations in the post-war era are few and far between. Moreover, there is little consensus in the existing literature as to the impact of energy transition on port-hinterland relations. Hugo van Driel and Ferry de Goey have argued that the industrialisation and expansion of the Rotterdam port after 1945 reduced its reliance on the German hinterland.[83] In his dissertation, De Goey also concludes that the Rotterdam Municipal Port Authority pursued a policy of industrialisation with the express goal of reducing the port's dependence on the German hinterland. De Goey argues that the Port Authority succeeded in this goal through a policy of rapid port expansion and the careful selection of industrial settlements.[84] According to De Goey, the Rotterdam port thus expanded enormously between 1945 and 1975, stimulated by wider processes such as European economic integration, the post-war economic boom, the associated expansion of industrial production and the inflow of American industries seeking to access the Common Market from the late 1950s onwards.[85]

Others have argued that the transport relations between Rotterdam and the Ruhr area fostered enduring economic interrelations between the port and the hinterland. Most prominently, Martijn Lak and Jeroen Euwe argue that the importance of Rhine shipping for both the Port of Rotterdam and the Ruhr area caused the political relationships between the Netherlands and Germany to seek ways to accommodate the Rhine-based interdependence between the areas after World War I and World War II. As a natural river, the Rhine is geographically fixed. However, after an institutional process of Prussian power politics that spanned the

[80] De Goey, *Ruimte voor industrie*, 235-236.
[81] Nederlands Economisch Instituut, *Rotterdam, stad in twijfel* (Rotterdam 1974); De Goey, *Ruimte voor industrie*, 236.
[82] K. Boender, *Milieuprotest in Rijnmond. Sociologische analyse van milieusolidariteit onder elites en publiek* (Rotterdam 1985) 114.
[83] De Goey and Van Driel, 'Rotterdam und das Hinterland', 144.
[84] De Goey, *Ruimte voor industrie*, 253-257.
[85] Ibid., 21-29.

better part of the 19th century, the Rhine became subject to international law in the form of the 1868 Treaty of Mannheim, which enshrined the freedom of trade and transport on the Rhine. It also became governed by a supranational organisation, the Central Commission for Navigation on the Rhine (CCNR).[86] The canalisation of the Rhine under the auspices of the CCNR opened up opportunities for scale increases in Rhine shipping in the last few decades of the 19th century, after which the Rhine became the principal trade artery for the Ruhr area and Rotterdam became its primary seaport.[87]

As a consequence, the Rhine provided a geographically and institutionally embedded link between the port and its hinterland, which seems to have been reinforced time and again. The work by Lak and Euwe reveals that after the two world wars, the Rhine did indeed function as an economic motivator to accommodate political differences in Dutch-German relations.[88] According to Lak, the expanding scale of the transport demand in the hinterland associated with the take-off of the West German economic miracle from the mid-1950s onwards seems to have guided a political accommodation and, thereby, the restoration of relations between the Port of Rotterdam and the Rhine-Ruhr hinterland.

While conceding that the transition from coal to oil affected relations between the Port of Rotterdam and the Ruhr area, Laspeyres accentuates the enduring importance of this relationship. Declining coal exports from the Ruhr region and an increase in iron ore transport from Rotterdam to West Germany caused the upstream traffic on the Rhine to double between 1936 and 1962, while downstream traffic fell over the same period by 8 per cent, mainly due to dwindling Ruhr coal exports to Rotterdam. Exports of coal to member states of the European Coal and Steel Community remained stable over the period, but exports outside Europe dwindled as US coal forced its Ruhr counterparts out of most overseas markets, which particularly affected Ruhr coal flows via Rotterdam.[89] In 1937, 14 million tons of coal were exported via the Port of Rotterdam to overseas markets, and to Sweden in particular. However, between 1945 and 1975, coal exports via Rotterdam averaged only 3 million

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[86] H.A.M. Klemann, 'The Central Commission for the Navigation on the Rhine, 1815-1914', *ECHR working paper no. 1* (2013) passim. http://www.eshcc.eur.nl/fileadmin/ASSETS/eshcc/chr/ECHR_working_papers/ECHR-2013-1_Klemann_CCNR.pdf

[87] Klemann and Schenk, 'Competition in the Rhine delta', 826-847.

[88] M. Lak, *"Because we need them…" German-Dutch relations after the occupation: economic inevitability and political acceptance* (Rotterdam 2011) 188-190; J. Euwe, *"It is therefore both in the German and in the Dutch interest…" Dutch-German relations after the Great War. Interwoven economies and political détente, 1918-1933* (Rotterdam 2012) 251-252. M. Lak, '"Eine Angelegenheit von fundamenteler Bedeutung"', in: H.A.M. Klemann and F. Wielenga (eds.), *Deutschland und die Niederlande, Wirtschaftsbeziehungen im 19. und 20. Jahrhundert* (Münster 2009) 45-86.

[89] Laspeyres, *Rotterdam*, 37.

tons per annum.[90]

Simultaneously, the iron ore shipped upstream grew unabatedly from 2.2 million tons in 1950 to 35 million tons in 1974.[91] The consequence of the imbalance between up- and downstream cargo flows was a decline in the utilisation of transport capacity in dry bulk Rhine shipping, as a rising share of the fleet travelled downstream empty after delivering cargo upstream.[92] The negative impact of empty return journeys on unit transport costs for iron ore were mitigated by both exploiting economies of scale in transhipment in Rotterdam and inland shipping on the Rhine. Europoort accommodated the largest ore carriers of the day, allowing larger volumes to be transported to Rotterdam from more distant origins, particularly West Africa. A consortium of German steel enterprises invested in the Rotterdam ore transhipment facility and founded the Dutch limited company Ore Transhipment (Ertsoverslagbedrijf Europoort NV), which expanded the transhipment capacity for iron ore enormously in the Port of Rotterdam from 1970 onwards. Push barge combinations allowed for scale increases in onwards transportation over the Rhine.[93] Together, the growth in scale in the entire iron ore supply chain gave Rotterdam a considerable competitive edge over other North Sea ports vying for iron ore flows to the Ruhr. It also led to the relocation of blast furnaces in the Ruhr to the Western Ruhr area in order to profit from ore deliveries over the Rhine.[94] Indeed, ore shipments to the Ruhr became increasingly centred on the Western Ruhr area, attracting 52 per cent of these shipments in 1950 versus 71 per cent in 1966. As a result, Rotterdam expanded its share of ore transport to the Ruhr from 59 per cent in 1950 to 83 per cent of the total volume of imported ore in 1966.[95] Laspeyres thus concludes that, although Rhine shipping flows between Rotterdam and the Ruhr became unbalanced, Rotterdam became increasingly important for the Ruhr iron and steel industry.

In short, the limited literature in existence on the relations between the Port of Rotterdam and the Rhine-Ruhr area between 1945 and 1975 is inconclusive beyond the obvious observation that the transition from coal to oil and the post-war economic boom affected the port-hinterland relationship. An important explanation of this inconclusiveness stems from a bias in the historiography towards national or nationally embedded local and regional history writing. The majority of the literature focuses on the Port of Rotterdam with little or no comparative or transnational

[90] Database *Rotterdam-Antwerp: a century and a half of port competition 1880-2000*, http://www.persistent-identifier.nl/?identifier=urn:nbn:nl:ui:13-n6w-g4s, 13 October 2009. Own calculations.
[91] Ibid.
[92] J.H. Müller, *Die Binnenschiffahrt im Gemeinsamen Markt* (Baden-Baden 1967) 102.
[93] Laspeyres, *Rotterdam*, 126-127.
[94] Ibid., 151.
[95] Ibid., 153. Own calculations.

perspective. Authors discuss the history of the city and its port (Van de Laar 2000), the role of the Municipal Port Authority (Brolsma 2007, De Goey 1990) and port industrialisation (De Goey 1990, Wever 1974 and Winkelsmans 1973).[96] Prominent in the research by Winkelmans, De Goey and Wever is a discussion of locally embedded advantages and the local climate for investment that was involved in establishing a petrochemical cluster at the port. Taken together, the work of these authors provides an image of an industrial port that profited from the post-war oil boom because of geographical advantages, the clustering tendencies of the oil and petrochemical industries, and able management of the Municipal Port Authority. However, only a limited number of publications, emanating from the project *Rotterdam-Antwerp: A century and a half of port competition,* employ a comparative perspective.[97]

There is extensive literature when it comes to the post-war development of the Rhine-Ruhr area, although the historical analysis of the impact on the region of the transition from coal to oil is divided between three separate bodies of work. Regional histories on the Ruhr area tend to focus on the decline of the coal and steel industry during the second half of the 20th century, but largely ignore the rise of the oil and petrochemical sector in the region.[98] This is covered by several publications on the German oil industry, although these largely lack the regional perspective.[99] There is a more detailed analysis of the transition of the West German economy in Ray Stokes's study of the transition of the West German chemical industry from coal-based to oil-based (petrochemical) production.[100] Stokes draws on both political economy and business history to provide context and case studies concerning this process. The German chemical industry, Stokes argues, could adapt to petrochemical production

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[96] P. van de Laar, *Stad van formaat. Geschiedenis van Rotterdam in de negentiende en twintigste eeuw* (Zwolle 2000); J. Brolsma, *Havens, kranen, dokken en veren: de Gemeentelijke Handelsinrichtingen en het Havenbedrijf der gemeente Rotterdam, 1882-2006* (Utrecht 2007); F. de Goey, *Ruimte voor industrie* (Rotterdam 1990); E. Wever, *Olieraffinaderij en petrochemische industrie: ontstaan, samenstelling, voorkomen van petrochemische complexen* (Groningen 1974); W. Winkelmans, *De moderne havenindustrie* (Rijswijk 1973).

[97] F. de Goey, *Comparative port history of Rotterdam and Antwerp (1880-2000): Competition, cargo and costs* (Amsterdam 2004); R. Loyen, *Haven in de branding: De economische ontwikkeling van de Antwerpse haven vanaf 1900* (Leuven 2008); R. Loyen, E. Buyst and G. Devos, *Struggling for leadership: Antwerp-Rotterdam port competition between 1870-2000* (Heidelberg 2003).

[98] For instance: W. Abelshauser et al, *Das Ruhrgebiet im Industriezeitalter: Geschichte und Entwicklung* (Düsseldorf 1990); W. Abelshauser, *Der Ruhrkohlenbergbau seit 1945: Wiederaufbau, Krise, Anpassung* (München 1984); C. Nonn, *Die Ruhrbergbaukrise. Entindustrialisierung und Politik, 1958-1969* (Göttingen 2001).

[99] For instance: R. Karlsch and R. Stokes, *Faktor Öl : die Mineralölwirtschaft in Deutschland, 1859-1974* (München 2003); M. Horn, *Die Energiepolitik der Bundesregierung von 1958 bis 1972 : zur Bedeutung der Penetration ausländischer Ölkonzerne in die Energiewirtschaft der BRD für die Abhängigkeit interner Strukturen und Entwicklungen* (Berlin 1977); H. Vollrath, *Die Mineralölwirtschaft in der Bundesrepublik. Ihr Aufbau und ihre Entwicklung seit 1945* (München 1959).

[100] Stokes, *Opting for Oil*. Another relevant work is W. Abelshauser, *German industry and global enterprise: BASF: the history of a company* (Cambridge 2004).

through a gradual and deliberate evaluation of its own interests and options, fostering a transition that was much more careful than could be expected from the distinct cost advantages of oil over coal from the early 1950s onwards. Two of the largest chemical companies, BASF and Bayer, entered into partnerships and joint ventures with oil multinationals as a means of making inroads into petrochemistry. As the transition of the chemical industry was so gradual, many of the old plants remained and were slowly transformed, with new facilities being built around the existing infrastructure. As a consequence, they created a downstream market for the by-products of the oil industry, thereby becoming pull locations for oil companies. The wider implication of the successful transition of the chemical industry was the impact of German research traditions, with capabilities generally being retained that greatly enhanced the growth potential of the West German economy and helped to foster its post-war economic boom.[101]

Stokes's analysis forms an important link between the existing historiography and the present study. One key issue not fully appreciated in either the Dutch or German literature is the implication of the transition of the Rhine-Ruhr industries on the demand for transportation in the area. Stokes points out that by successfully switching to petrochemical production, the vast chemical complexes in the Rhine basin required oil-based feedstock, which needed to be imported. Certainly, the growth of the oil and petrochemical industry in the Rhine-Ruhr area created an entire supply chain infrastructure to serve the growing demand for oil in the region. The rather obvious need to transport oil to the Rhine-Ruhr area, and the implications of this new demand for the Port of Rotterdam, is a glaring lacuna in the historiography. In fact, when the demand for crude oil in the Rhine-Ruhr area started growing in the late 1950s, the capacity of Rhine shipping was soon found to be inadequate when it came to meeting demand. The construction of a crude oil pipeline thus became essential, which triggered competition between various European ports for the supply of crude oil to the burgeoning oil and petrochemical industry in the Rhine basin, most notably in the Rhine-Ruhr area. Although this episode has received some attention in the literature, its impact and significance for the development of the Port of Rotterdam, the Rhine-Ruhr area and their interrelations have not been appreciated.[102] Yet the episode brings the fundamental issue at stake in this study to the fore: how

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[101] R. Stokes, 'Technology and the West German Wirtschaftswunder', *Technology and Culture* 32 (1991) 1-22.

[102] De Goey, for instance, mentions the demand for pipeline infrastructure and how it triggered the Port of Rotterdam to plan expansions on an increasingly larger scale (De Goey, *Ruimte voor industrie*, 81-89). Several German publications also deal with the development of the German oil pipeline system, but are limited to the German context. For instance: E. Riffel, *Mineralöl-Fernleitungen im Oberrheingebiet und in Bayern: Arbeit aus dem Geographischen Institut der Universität Mannheim* (Bonn 1970); H. Seidenfuss, *Energie und Verkehr* (Tübingen 1960) 146-147; H. R. Streicher, *Raffineriestandorte und Rohrleitungspolitik* (Hamburg 1963).

and why was the port-hinterland relationship affected by the rise of a new mode of transport, namely pipelines? Was the Port of Rotterdam the clear favourite to host a pipeline to the Rhine-Ruhr area from the outset? To what extent were other ports in the region in a position to compete with Rotterdam? In short, what were the factors that threatened the position of Rotterdam vis-à-vis its German hinterland, and which elements strengthened its position? Whereas Laspeyres analysed port-hinterland relations with regard to coal and iron ore, those between Rotterdam's oil port and the Rhine-Ruhr hinterland require further examination.

1.4 Theoretical considerations

Whether the transition from coal to oil has weakened or strengthened the ties between Rotterdam and the Rhine-Ruhr area hinges on the extent to which the growth of the Rotterdam oil port can be related to developments in the Rhine-Ruhr hinterland and vice versa. In general, port-hinterland relations changed in the post-war era as the truck, the plane and the pipeline substantially altered both global supply chains and local and regional logistics. The current study focuses in particular on pipelines and how their introduction in Western Europe in the 1950s altered port-hinterland relations in the Rhine region. In order to understand the development of the European oil pipeline infrastructure, a transnational perspective is required. The existing literature on the industrial development of the Port of Rotterdam has hitherto focused mainly on the question of local conditions for industrialisation and growth. This is unsurprising, because this literature is generally based on theories of location, which stress locally embedded push and pull factors. Given its great propensity for economies of scale and scope, the oil and petrochemical sector is a prime example of an agglomeration industry. As a consequence, the development of Rotterdam's oil port has been interpreted as a self-sustaining agglomeration process.[103] Nonetheless, the clustering of economic activity is generally an economic phenomenon. Indeed, ever since Alfred Marshall demonstrated in the 1890s that the clustering of economic activity yields external economies of scale, and thus provides economic benefits, theories of location have attempted to both grasp the uneven geographical distribution of economic activity and understand why agglomeration takes place in some areas and not in others. Most recently, new economic geography has brought several concepts of location theory together. The discipline proposes that internal and external economies of scale, transportation costs, and market potential create links that pull economic activities (firms), which in turn drive clustering or agglomeration.[104] Market potential refers to the size of the market that can be served

[103] Molle, and Wever, *Oil refineries*, 112-113.
[104] M. Fujita and P. Krugman, 'The new economic geography: past, present and future', *Papers in Regional Science* 83 (2004) 139-164, here: 141; P. Krugman, *Growth on the Periphery: Second Wind for*

by a plant's location. Transport costs matter because cheap transportation widens the potential market and allows for the more efficient supply of raw materials.

Earlier scholars of economic geography have noted that economies of scale in transportation (reducing unit transport costs) seem to reinforce processes of agglomeration, making ports and their hinterland connections important nodes and links in a system of interregional trade.[105] Ports with well-developed infrastructures are therefore supposed to benefit from increases in scale and the associated agglomeration process. This tendency was noted, for instance, by the American geographer Allen Pred in the 1960s, and has been replicated by theoretical models in the new economic geography framework.[106] For the oil industry, economies of scale in transportation were part and parcel of the oil boom after 1945. As a location, it seems evident that the Port of Rotterdam profited from scale increases and agglomeration in the oil industry. Location theory suggests that this would also entail the reinforcement of the relations with the hinterland. The conclusions of Lak and Euwe that Rhine-based interrelations between Rotterdam and the Rhine-Ruhr area were reinforced time and again seem to suggest that the city was in an excellent position to become the principal oil port of the Rhine-Ruhr hinterland, and possibly even other regions in West Germany.

The questions thus arise as to precisely what constitutes a hinterland and how an analysis of the effects of energy transition on the port-hinterland relationship can best be designed. Pred refers to the hinterland as being "discontinuous and overlapping" and stresses that a port is almost always competing for a hinterland with other ports. Borrowing from the American economist and location theorist Walter Isard, Pred argues that the boundary of the hinterland is struck at the point where commodity flows from the port drop to a minimum.[107] This definition of hinterland is reflected by the existing literature on this concept. There is broad recognition that the hinterland in general is the area from which "a port draws the majority of its business."[108] Different ideas have been proposed to define the hinterland, for instance the distinction between captive and contested, primary and secondary, or export-oriented and import-oriented hinterlands.[109] A captive hinterland is the area where a

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Industrial Regions? (Strathclyde 2003) 23-24.

105 A. Pred, *The external relations of cities during "industrial revolution"; with a case study of Götenborg, Sweden: 1868-1890* (Chicago 1962) 34.

106 Pred, *The external relations*, 34; M. Fujita and T. Mori, 'The role of ports in the making of major cities: Self-agglomeration and hub-effect', *Journal of Development Economics* 49 (1996) passim.

107 W. Isard, 'The General Theory of Location and Space-Economy', *The Quarterly Journal of Economics* 63 (1949) 476-506, here: 490-491.

108 Quote from: T. Notteboom and J.-P. Rodrigue, 'Re-Assessing Port-Hinterland Relationships in the Context of Global Commodity Chains', in: J. Wang et al. (eds), *Ports, Cities, and Global Supply Chains* (London 2007) 51-69, here: 52.

109 In order of writing: H.E. Haralambides, 'Competition, access capacity and the pricing of port infrastructure', *International Journal of Maritime Economics* 4 (2002) 323-347; W. Morgan,

port boasts lower hinterland transport costs than any other port. A contested hinterland, meanwhile, is where several ports compete to meet transport demand. In extremis, each product and mode of transportation has, to some degree, its own hinterland.[110] Although relevant, the static aspects of the port-hinterland literature, i.e. defining the boundaries of a port's hinterland, are not so interesting. More relevant are the dynamic aspects of the port-hinterland relationship: what drives change? How is change transmitted through the port-hinterland relationship? What are the consequences of change for the port's hinterland? Echoing Allen Pred's argument, Theo Notteboom postulates that hinterlands are dynamic and unstable due to political, economic and technological change.[111]

Notteboom implies that an analysis of the port-hinterland relationship through time should look beyond cargo flows and grasp the wider economic, political and technological processes affecting the economic geography of both port and hinterland. According to Pred, the port-hinterland relationship depends on four factors: the relative location of the port vis-à-vis the hinterland; the types of industry in the physically accessible hinterland; the quality of the port's transport access to the hinterland expressed in transport costs; the capacity of the hinterland transport connections; and the physical attributes of the port itself.[112] These factors have frequently been mentioned in the older hinterland literature, for instance the work by Weigend (1956), Morgan (1952) and Sargent (1938).[113] A port's development is therefore contingent on the interaction between its hinterland and its own physical and economic attributes. Moreover, the extent to which a port can benefit from a greater demand for transport in the hinterland depends on its capacity to adapt.

Pred's theoretical proposition accentuates three important areas that determine the continuity of port-hinterland relations. The first of these is the hinterland itself. The economic development of the hinterland determines whether there is demand for transportation at all. In this regard, the Port of Rotterdam had little or no direct influence, because the development of the Rhine-Ruhr area depended on wider economic and technological processes in the German political and administrative system.

The second area is the infrastructure connecting the port to the hinterland. The degree to which Rotterdam could benefit from a growing demand for transport in the hinterland depended on the extent to which the transport infrastructure actually

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'Observations on the study of hinterlands in Europe', *Tijdschrift sociale en economische geografie* 42 (1951) 366-371.

110 Notteboom and Rodrigue, 'Re-Assessing Port-Hinterland Relationships', 52.

111 Ibid.

112 Pred, *External relations*, 43.

113 G.G. Weigend, 'The Problem of Hinterland and Foreland as Illustrated by the Port of Hamburg', *Economic Geography* 32 (1956) 1-16, here: 1-3; A.J. Sargent, *Seaports and Hinterlands* (London 1938) passim; F.W. Morgan, *Ports and Harbours* (London 1952) passim.

connected the port to the hinterland and the quality of the infrastructure in terms of capacity and cost. In this regard, the port had a more direct influence on creating and improving hinterland access, but the fact that the primary hinterland was located in a foreign country created substantial risk. The recurring discussions on the interpretation of the Treaty of Mannheim after World War II, and the current ongoing failure to fully connect the German extension of the Dutch rail link to Germany (the Betuwe route), illustrate the point.[114]

The third area that Pred identifies is the port itself. Here, geographical, financial and institutional conditions determine the extent to which a port can adapt to a rising demand for transport in the hinterland. Naturally, the port has the most direct influence in this regard, albeit depending on the agility with which it negotiates local, regional and national constraints on port expansion. The strength or weakness of port-hinterland relations thus depends, according to Pred, on the interaction between these areas. In the case of the Port of Rotterdam, because the main hinterland is located in a different country, the greatest risk to the continuity of port-hinterland relations is posed by the port's limited influence on the development of infrastructure connections to the hinterland.

Echoing Allen Pred's argument, Notteboom and Rodrigue make a distinction between the macro-economic, physical and logistical factors affecting the port-hinterland relationship.[115] Each factor constitutes a layer of the hinterland. On the macro-economic level, economic, political and technological processes determine the economic conditions and development of the hinterland, thereby determining the demand for transportation there.[116] Changes to any attribute of the macro-economic layer can shift trade patterns or production locations, thereby greatly affecting the demand for transport in the hinterland.

The physical hinterland constitutes the supply of transportation, which comprises the capacity and efficiency of the transport networks that connect a port to its hinterland. Changes in the macro-economic hinterland require adaptations to be made to the physical infrastructure, as changing demand can lead to either capacity surpluses or shortages. The physical hinterland comprises both the port infrastructure (sea access, docks, quays, transhipment, storage and land) and the hinterland infrastructure.

Notteboom and Rodrigue identify a third layer, the logistical hinterland, in which actual transport flows occur. How these flows are organised depends on the

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[114] 'Fors meer treinen over Betuweroute na realisatie Duitse deel', *SpoortPro.nl Vakblad voor Railbedrijven*, 24 July 2013, http://www.spoorpro.nl/goederenvervoer/2013/07/24/financiering-derde-spoor-emmerich-oberhausen-is-rond/, 27 May 2014; K. Paardenkooper, *The Port of Rotterdam and the maritime container. The rise and fall of Rotterdam's hinterland (1966-2010)* (Rotterdam 2014) 97-101.
[115] Notteboom and Rodrigue, 'Re-Assessing Port-Hinterland Relationships', 51.
[116] Ibid., 53.

type of demand for transportation in the hinterland, the capacity and quality of the infrastructure, and the actors deciding on actual shipments. The three layers are therefore interrelated, just as Pred observed earlier.[117] Changes in the macro-economic layer trickle down to the physical layer, causing alterations to the transport infrastructure, which in turn affects actual cargo flows. Notteboom and Rodrigue stress that port-hinterland relations are comprised of a number of relationships between various actors in the supply chain, ranging from cargo owners, ship owners, shippers, terminal operators and distributors, as well as political actors and government agencies (such as port authorities).[118] These actors have various objectives and respond differently to problems given their respective goals and options. Recent work on the role of hinterland connections in port competition stresses that the power of ports to influence the organisation of supply chains depends on the degree of concentration of power among the other actors shaping the supply chain.[119] The more the power to shape international supply chains is concentrated, the more ports need to coordinate policy at a national and international level. This implies that a port and the port authority managing it must gain a position in international supply chains in order to further its growth potential. Becoming an important international player, or aligning itself to one, is now seen as one of the most important strategic problems for port authorities.[120]

A second vital issue concerns the extent to which port-hinterland relations suffer from the fact that a border separates the port from its main hinterland. Although Rhine shipping repeatedly recovered from major disruptions to cross-border transport, it did so with considerable difficulty because, each time, the interests of the Rhine-Ruhr industries (cheap transportation) were weighed against other German interests, such as limiting foreign currency expenses, or the interests of the German transport sector and German ports (fostered by, among others, special rail tariffs for German North Sea ports, the *Seehafenausnahmetarife*). This has been a recurring theme from the 19th century onwards.[121] However, as long as Germany was dependent

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[117] Ibid., 56-57.
[118] Notteboom and Rodrigue, 'Re-Assessing Port-Hinterland Relationships', 58.
[119] 'Port Competition and Hinterland Connections: Summary and Conclusions', *OECD/ITF Joint Transport Research Centre*, Discussion Paper No. 2008-19 October 2008, 5. http://www.internationaltransportforum.org/jtrc/discussionpapers/DP200819.pdf, 27 May 2014.
[120] S. Janssens, H. Meersman and E. Van de Voorde, 'Port throughput and international trade: have port authorities any degrees of freedom left?', in: R. Loyen et al (eds.), *Struggling for Leadership: Antwerp-Rotterdam Port Competition between 1870-2000* (Berlin 2003) 91-114.
[121] Paardenkooper, *The Port of Rotterdam*, 75, 244; K. Paardenkooper, 'Liberalization of the German and Dutch Railways and the containerization of the hinterland of Rotterdam (1966-2010)', 4th Annual Conference Competition and Regulation in Network Industries (25 November 2011) 7. http://www.crninet.com/2011/b8d.pdf, 26 May 2014; J. Jonker, 'Koopman op een dwaalspoor. De Seehafenausnahmetarife in de betrekkingen tussen Nederland en Duitsland aan het begin van de jaren twintig," *Jaarboek Buitenlandse Zaken 1988-1989* (1989) 181, 190; Euwe, *"It is therefore"*, 68; Lak, *"Because we need them"*, 159; R. Oldewage, *Die Nordseehäfen im EWG-Raum: Fakten und Probleme*

on the geographically fixed and institutionally guarded position of the Rhine, port-hinterland relations between Rotterdam and the Rhine-Ruhr area were more or less safeguarded. During a period of growth, Rotterdam thus stood to gain from its Rhine connection to the hinterland. However, the question arises as to what extent Rotterdam was able to benefit from an increasing demand for transport in the hinterland if a new transport infrastructure (pipelines) was required. The answer depends on the interaction of the areas or layers identified by Pred and Notteboom and Rodrigue: together they determine the strength of port-hinterland relations.

The Port of Rotterdam relies on transnational integration, but until the 1990s national transport and infrastructure policies were rarely coordinated among the member states of the European Economic Community.[122] Beyond the transnational governance of the Rhine, there was no effective coordination of cross-border infrastructure and transport policy-making; national policy was dominant in such issues. The role of governments could therefore be regarded as a dividing force inhibiting the creation of cross-border infrastructure and transport. The creation of the Common Market, however, provided opportunities for business and an incentive for firms to perform cross-border direct investment and operations. The role of firms could therefore be regarded as integrative, which is similar to the role ascribed by Strikwerda to the rise of multinational companies in pre-1914 Europe, when rising cross-border direct investment fostered a high degree of economic integration in a highly nationalistic political environment.[123] Even though the mind-set of European governments was completely opposed to the nationalist sentiments that prevailed on the eve of World War I, the long road to a serious attempt at European coordination of cross-border infrastructure and transport policy illustrates how resistant the national perspective on European development remained throughout at least the second half of the 20th century.

To conclude these theoretical considerations, Pred and Notteboom and Rodrigue highlight two key theoretical and methodological issues that have implications for this study. Firstly, the port-hinterland relationship consists of three distinct, but interrelated, areas or layers: the demand for transportation in the hinterland (the economic composition of the hinterland), the supply of transport (the development of infrastructure), and the organisation of actual transport flows. Secondly, it is important to take into account the relevant actors that together shape the port-hinterland relationship, i.e. governments on all levels and their agencies and firms. The study is therefore designed to bring out the conditional development of both port and hinterland by considering the interrelatedness of policy choices and

(Basel 1963) 76-77.

122 K. Paardenkooper, *The Port of Rotterdam and the maritime container: The rise and fall of Rotterdam's hinterland, 1966-2010* (Rotterdam 2014, dissertation) 43-47.

123 Strikwerda, 'The Troubled Origins', passim.

their outcomes across the border. To do this, the research makes use of the concept of hinterland as a unifying spatial category linking Rotterdam with different parts of the Rhine region. Rather than just a statistical expression, hinterland in this study consists of three layers, which aim to integrate the various actors, institutions and processes that together shape it. A technological regime shift such as the transition from coal to oil cannot be interpreted just by observing changes in transport statistics. In fact, transport flows are merely the expression of much wider economic and political processes that guide and filter the impact of technological change on societies and therefore on port-hinterland relations.

1.5 Research questions and methodology

In this study, the central research question concerns how and why the transition from coal to oil affected the relationship between the Port of Rotterdam and the German hinterland between 1945 and 1975. Reflecting the theoretical considerations, the answer to this question depends on the responses to three further questions. Firstly, how and why did the transition from coal to oil affect the Rhine-Ruhr area's demand for transport? Secondly, to what extent was Rotterdam's port successful in adapting port and hinterland infrastructure to the energy transition in the hinterland, what were the constraints on this adaptation and how were these overcome? Thirdly, how did the transition of the hinterland and the adaptation of the transport infrastructure affect the composition of the hinterland of the Rotterdam oil port? Each sub-question addresses an aspect of the port-hinterland relationship identified in the theoretical section: the economic development of the Rhine-Ruhr area, the development of port and hinterland infrastructure, and the organisation of the actual cargo flows between port and hinterland.

For several decades, historians have been debating the need for a transnational approach to escape the national historical perspective that still dominates much of Europe's historiography, and also seems to have dominated the historiography of the Lower Rhine region. The debate has led to various calls by historians for the adoption of transnational methodology.[124] In recent reflections on the subject, Patricia Clavin has defined transnational history as a perspective that "enables history to break free from the nationally determined timescales that dominate the historiographical

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[124] P.P. Ther, 'Beyond the Nation: The Relational Basis of a Comparative History of Germany and Europe', *Central European History* 36 (2003) 45-73, here: 48-52; E. van der Vleuten, 'Toward a Transnational History of Technology: Meanings, Promises, Pitfalls', *Technology and Culture* 49 (2008), 974-994, here: 974-977; T. Misa and J. Schot, 'Inventing Europe: Technology and the Hidden Integration of Europe', *History and Technology* 21 (2005) 1–20, here: 2; E. van der Vleuten and A. Kaijser, *Networking Europe. Transnational Infrastructures and the Shaping of Europe, 1850-2000* (Sagamore Beach 2006) 4-5; Klemann and Wielenga, 'Die Niederlande und Deutschland', 7.

landscape."[125] Expanding on this, Clavin states that transnational history "[…] is motivated by the desire to highlight the importance of connections and transfers across boundaries at the sub- or supra-state level, […] and the character and exploitation of boundaries."[126]

Clavin identifies several challenges for the transnational historian. Transnational history deals with existing, bounded chronologies and should strive to reshape these into timeframes reflecting transnational rather than national, regional or local histories. Moreover, transnational history challenges historians to look for connections and relations between global and regional organisations and actors, and to compare these in order to derive renewed meaning and significance from historical events. This also provides leeway when it comes to the concept of networks (e.g. business, political and scientific) in understanding transnational history.

The present study takes stock of the transnational turn in history and aims to apply its methodological implications. This is incorporated in the research design in two ways. Firstly, the study aims to connect the histories of the Port of Rotterdam and the Rhine-Ruhr area by looking at infrastructural connections and transport flows. Secondly, the research examines actors and how their interrelations help to explain how and why transnational connections were developed. The study focuses on two sets of actors, specifically governments and firms. These are the main agents shaping the transition from coal to oil. Firms transmit technological innovations by recognising and acting upon opportunities, while governments attempt to set parameters within which technological change evolves and markets operate. As a consequence, it is important to incorporate both actors in an analysis of the port-hinterland relationship.

The analysis requires two methods. The first consists of an historical case study approach based on archival material aimed at reconstructing the causal process of the impact of the transition on port-hinterland relations. The second method is comprised of a quantitative analysis of transport data with a view to achieving a well-defined and comparative measure of the port-hinterland relationship. Case study methodology (and the historical method in general) is designed to deal "with operational links needing to be traced over time, rather than mere frequencies or incidence."[127] It is therefore well-suited to unravelling the causal chains of an event or historical process and understanding the how and why of this through a detailed analysis of the sequences of the event.[128] This study aims to use case studies to be able:

[125] P. Clavin, 'Defining Transnationalism', *Contemporary European History* 44 (2005) 421-439, here: 429.
[126] P. Clavin, 'Time, Manner, Place. Writing Modern European History in Global, Transnational and International Contexts', *European History Quarterly* 40 (2010) 624-640, here: 625.
[127] R.K. Yin, *Case Study Research. Design and Method* (Thousand Oaks 2003) 6.
[128] J. Mahoney, 'Review Articles: After KKV. The New Methodology of Qualitative Research', *World*

to establish a chain of evidence that allows the economic development of the hinterland to be linked with the development of the infrastructure; and to, ultimately, assess the implications thereof for the organisation of cargo flows.

Company cases are an excellent source, because they allow for insights into location and investment decisions on where to produce, how to develop transport infrastructure and capacity, and how to organise transport flows. However, for a proper understanding of the actions of single companies, company cases need to be embedded in the historical context in which they operate and the relevant government actors that shaped their environment. The drawback of relying on government sources is that information and data remain contained within the national framework. On the other hand, multinational companies employ a transnational perspective, and their investments and cross-border activities are expressly designed to overcome (or exploit) the constraints of national borders on flows of goods, knowledge and capital. Writing and researching transitional, regional history can therefore benefit from combining a macro-economic historical perspective with a business historical viewpoint and method.

Methodological issues with case study approaches often focus on external validity or analytical generalisability.[129] The small number of observations in the case study approach is often seen as limiting the value of the case study methodology for theory testing or determining a causal effect.[130] Such a view is dominated by the postulates of quantitative methodology and is, according to recent additions to qualitative methodology, too restrictive a view of the merits of case studies when it comes to yielding valuable causal inferences.[131] Quantitative methodology stresses that the strength of causal inferences from qualitative sources can only be derived from so-called data-set observations, i.e. adding observations to a standardised set of variables (increasing the N). However, qualitative research can yield robust causal inferences by adding so-called causal-process observations. A causal-process observation is a piece of information that adds insight and additional detail to the causal process in a particular case, thereby strengthening the validity of the causal inference based on limited and incomplete data.[132] While not increasing generalisability in the sense of quantitative methodology, the detailed historical reconstruction of one or a limited number of cases can therefore yield valid proof of causal relations, with implications beyond the case itself.

Politics 62 (2010) 120-147, here: 123.

[129] Yin, *Case Study Research*, 34.

[130] Yin, *Case Study Research*, 37; G. King, R.O. Keohane and S. Verba, *Designing Social Inquiry: Scientific Inference in Qualitative Research* (Princeton 1994) 227-228.

[131] Mahoney, 'After KKV', 124.

[132] D. Collier, H.E. Brady and J. Seawright, 'Sources of Leverage in Causal Inference: Toward an Alternative View of Methodology', in: H.E. Brady and D. Collier (eds.), *Rethinking Social Inquiry: Diverse Tools, Shared Standards* (Oxford 2004) 229-266, here: 252-255.

Chapter 2 Post-war reconstruction and the rise of oil, 1945-1951

2.1 Introduction

The energy transition of the 1950s and 1960s brought about a technological regime shift that led Western European economies to switch from coal to oil as their main source of energy. This changed the economic composition of the Rhine-Ruhr area dramatically. The coal industry, which was the source of its industrialisation and the main employer in the region, experienced a prolonged decline. At the same time, the oil sector established large-scale refineries in the area and developed a petrochemical cluster jointly with Germany's chemical industry. The energy transition thus had far-reaching consequences for the Rhine-Ruhr region, giving rise to changing transport demands as refineries required continuous inflows of crude oil and product exchanges led to the formation of a petrochemical cluster through the increased physical integration of plants.

On a global scale, the construction and expansion of refineries in the Rhine-Ruhr area was part of a two-stage shift in the pattern of oil refining and distribution between the 1930s and 1960s. The rising share of oil in energy consumption in the 1950s entailed a shift from the pre-war pattern of refining crude oil at source to one of refining near markets. In the first stage, refineries were constructed in the major ports of consumer countries, while in the second, from the late 1950s onwards, refinery capacity tended to shift inland, as demand for mineral oil products increased in inland markets.[133] The Rhine-Ruhr refineries of the late 1950s were of this latter type. With the expansion of oil refineries in the region, opportunities arose to use by-products from refining for the chemical industry. Traditionally based on coal, the German chemical industry had fathered the world's preeminent chemical companies. However, from 1945 onwards, Germany's defeat, the Allied occupation and the rise of oil-based chemistry (petrochemicals) forced the German chemical industry to switch from coal to oil.[134] As a consequence, the Rhine-Ruhr area became the largest concentration of the oil and petrochemical industry in West Germany from the early 1960s onwards.[135]

The energy transition and the ensuing transformation of the Rhine-Ruhr area had several causes, the first of which was rooted in the post-war occupation of Germany. This chapter questions how the Allied occupation of Germany dealt with the energy crises of the late 1940s, and how and why this affected Rhine-Ruhr industries, in particular the regional oil, chemical and coal sectors. The way in which the Allied occupation authorities attempted to solve the problem of German

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[133] Molle and Wever, 'Oil Refineries and Petrochemical Industries in Europe', 424-425; Waller and Swain, 'Changing Pattern of Oil Transportation', 146-148.
[134] Stokes, *Opting for oil*, 4-9.
[135] Molle and Wever, *Oil Refineries*, 172-173.

reconstruction contains the reasons for the first steps towards the energy transition that evolved in the 1950s and early 1960s. The end of World War II and the subsequent occupation of Germany was a radical break with the previous period with regard to the organisation of the energy supply to the German economy.
The first section of this chapter discusses the European context of post-war reconstruction and the Allied (US) approach to the post-war energy situation in Western Europe. Structural changes in world oil supplies combined with the dollar influx provided by the Marshall Plan were at the root of the European energy transition. The second section deals with the impact of the Allied occupation on the Rhine-Ruhr area, particularly with regard to the Ruhr coal industry. The third section discusses the Allied oil refining program and its consequences for the oil industry in the Rhine-Ruhr region. Then, the fourth and final section will analyse the effects of the Allied occupation on the economic composition of the Rhine-Ruhr area, particularly with regard to its significance for the West German oil sector.

2.2 The question of energy in post-war Western Europe

In popular memory, Western Europe came out of the war ruined and destroyed. Reconstruction fuelled economic growth in the first two years after the war, but the European economic recovery came to a halt in 1947, leading to the inception of the Marshall Plan. However, recent work by Hein Klemann and Sergei Kudryashov has demonstrated that most countries in Western Europe were not destitute at the end of the war and had actually done pretty well economically during the years of the Nazi occupation.[136] This corresponds with Alan S. Milward's contention that 1947 was not the year of a general economic breakdown, in contrast to what was portrayed at the time. In fact, most Western European countries experienced the sustained growth of outputs throughout 1946-48 at levels at or above those of 1938.[137] However, the main issue for European reconstruction was Germany, whose industrial and agricultural outputs, energy and food supplies in 1947 were still well below 1938 levels. Germany had been Europe's major supplier of coal and capital goods and the largest export market for other European economies. Its economic destitution and the shortages of German coal were thus a major obstacle to economic revival in Western Europe.[138]

Nonetheless, from 1948 until the first oil crisis of 1973, Western Europe experienced an unprecedented period of economic growth. However, behind the image of improving welfare and unbounded faith in the benefits of technological progress and industrialisation unfolded a dramatic transformation in the energy

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[136] H.A.M. Klemann and Sergei Kudryashov, *Occupied Economies. An Economic History of Nazi-Occupied Europe, 1939-1945* (London 2012) 433.
[137] A.S. Milward, *The Reconstruction of Western Europe, 1945-51* (London 1992) 8-12.
[138] Milward, *Reconstruction*, 13.

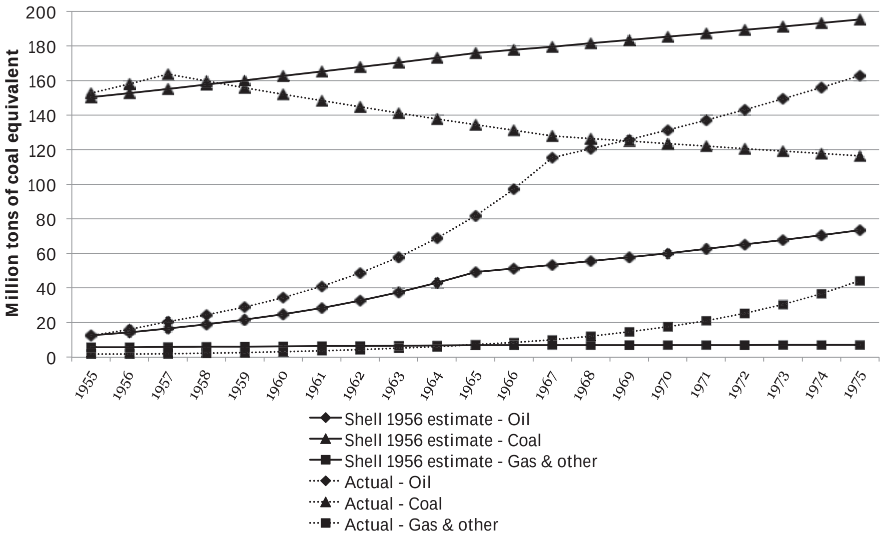
domain, which was one of the fundamental conditions for economic growth and industrialisation. In 1952, 80 per cent of Western Europe's primary energy consumption was based on coal. Twenty years later, coal supplied only 24 per cent of the region's primary energy needs; its dominant position had been taken over by oil (55 per cent) and natural gas (20 per cent).[139] This transition was dramatic for a number of reasons. Firstly, the replacement of coal caused major social and economic crises in the coal-producing regions of Western Europe, such as the Rhine-Ruhr area in West Germany. Furthermore, the transition unfolded in leaps and bounds, experiencing intense periods of crisis or fierce competition between energy sources. For many in the coal industry, the rapid replacement of coal in the late 1950s and early 1960s was unexpected. Indeed, the speed of the transition surprised many, and the magnitude of their surprise speaks from the projections of energy consumption that were produced by a multitude of organisations in the 1950s.

In 1957, a group of influential entrepreneurs active in the Port of Rotterdam published a study on the future energy consumption of the most important countries in the port's hinterland.[140] The group estimated energy consumption in 1965 in the Netherlands, Belgium, West Germany and Switzerland, and then projected the composition of the energy balance of each country. Its estimate of the total energy consumption in West Germany in 1965 was not far off the mark, albeit rather conservative; the study projected the consumption of 225 million tons of coal equivalent, while actual consumption that year was 240 million tons.[141] However, its estimate of the composition of energy consumption, namely the energy balance, was dramatically different to what actually happened. In particular, the study estimated that coal would remain West Germany's dominant source of energy, projecting that production would grow to 140 million tons of hard coal in 1965.[142] In reality, West German hard coal consumption declined between 1957 and 1965 to 128 million tons.[143] The study also completely overlooked the dramatic rise in the consumption of oil that occurred in this period, estimating that of West Germany to be 39 million tons in 1965 when it was actually around 100 million tons, constituting 40 per cent of total energy consumption in West Germany instead of the estimated 17 per cent. Although this is only one example, influential international organisations such as the European Coal and Steel Community and the Organisation for European Economic Cooperation produced similar estimates.[144] Even the oil companies were too

[139] Odell, *Oil and World Power*, 120-121.
[140] Kamer van Koophandel, *Een blik in de toekomst. Verwachtingen omtrent de omslag van kolen, erts en graan in de Rotterdamse haven tot 1965* (Rotterdam 1957) passim.
[141] KvK, *Een blik in de toekomst*, 7; Odell, *Oil and World Power*, 120-121.
[142] KvK, *Een blik in de toekomst*, 10.
[143] Odell, *Oil and World Power*, 120-121.
[144] J. Hollander, 'Enige opmerkingen over de organisatie der Westeuropese energievoorziening', *Internationale Spectator* 11 (1957) 1, 95-106.

conservative in their projections. In an internal report from Deutsche Shell that was published in 1956, the company estimated that the total West German energy demand would grow to 232 million tons of coal in 1965 and 276 million tons in 1975.[145] The estimate was close to the actual consumption in 1965, but missed the 1975 mark by 50 to 80 million tons.[146] The breakdown of the energy balance as estimated by Deutsche Shell is presented in Figure 2-1.

Figure 2-1. The estimated and real West German energy balance, 1955-1975



Note: Both series originally contained three benchmark years (1955, 1965 and 1975 for Deutsche Shell and 1957, 1967 and 1977 for Odell). The intervals have been interpolated using compound annual growth rates between the benchmark years. The graph serves as an illustration and does not claim accuracy for the interval years.
Source: Data from Deutsche Shell: SHA, MF 48/Installaties/Duitsland/Godorf/Algemeen, Internal report Deutsche Shell Hamburg, 'Planung neue Raffinerie im Rhineland', 7 June 1956. The data for the actual consumption was taken from: P. Odell, *Oil and World Power* (Harmondsworth 1986 eighth edition) 120-121.

Like the Rotterdam Chamber of Commerce report, Deutsche Shell underestimated the demand for oil and gas and overestimated that for coal, failing to foresee the transition from coal to oil that would transpire in the 1960s. Although Deutsche Shell estimated that oil consumption would be 49 million tons in 1965, which was higher than the Rotterdam Chamber of Commerce's 1957 estimate, it was still only half the actual amount consumed that year. For 1975, Deutsche Shell underestimated oil

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[145] SHA, MF 48/Installaties/Duitsland/Godorf/Algemeen, Internal report Deutsche Shell Hamburg, 'Planung neue Raffinerie im Rhineland', 7 June 1956.
[146] Odell, *Oil and World Power*, 120-121.

consumption by 100 million tons. Strikingly, the company estimated that if the energy demand grew at a slower pace, this would be at the expense of oil, not coal. These examples serve to illustrate how significant the first two post-war decades were in terms of the supply of energy in Western Europe in general, and in West Germany in particular.

An important cause of the energy transition in the 1950s was the attempt of the US to expand European oil refining capacity in order to replace oil product imports with crude oil imports, while at the same time expanding oil consumption to cover the energy deficit caused by problems with coal production. The Marshall Plan, which was the American program for providing coordinated economic aid to Western European countries, was an important instrument when it came to achieving that goal.[147] The Marshall Plan had far-reaching effects on the Western European energy balance. Oil was an important part of the plan because, during and shortly after World War II, the global oil industry experienced a fundamental structural shift. Furthermore, the European recovery was hampered by a severe shortage of coal, which necessitated the development of a new source of energy, namely oil.

The structural shift in the global production of oil was caused by the exploration and production of Middle Eastern oil reserves. In 1928, this work was cartelised in what became known as the Red Line Agreement, which was made between the American, British, Anglo-Dutch and French oil firms participating in the Iraq Petroleum Company (IPC). [148] The Agreement stipulated that they would jointly develop Middle Eastern oil reserves, excluding Kuwait and Iran, which were both under British influence. Finds would be reported to the other shareholders and shared according to the percentage of ownership in the IPC. After World War II, the agreement came under pressure from the American oil companies in the partnership which, supported by their government, sought to extend their foreign oil reserve holdings to counter fears about the depletion of domestic sources in the US.[149] Jersey Standard and Standard Oil of New York (Socony) attempted to upend the agreement in order to acquire a 40 per cent stake in the Arabian American Oil Company (ARAMCO), which held major concessions in Saudi Arabia. Although the French initially protested the legality of the American breach, fears over domestic instability

[147] Milward, *Reconstruction*, 56-61.
[148] The shareholding in IPC was divided as follows: Anglo-Persian Oil Company (today BP), 23.75 per cent; Compagnie Française des Pétroles (today Total), 23.75 per cent; Royal Dutch/Shell, 23.75 per cent; and the Near East Development Company, 23.75 per cent (consisting of Standard Oil of New Jersey, Standard Oil of New York - SOCONY, today Mobil, part of Exxon-Mobil, Gulf Oil, Pan-American Petroleum & Transportation Co., and Atlantic Refining Co.) The latter three sold their stakes to Jersey and SOCONY in 1931 and 1934. Source: Anand Torpani, 'The French Connection: A New Perspective on the End of the Red Line Agreement, 1945-1948', *Diplomatic History* 2 (2012), 261-299, here: 261.
[149] Torpani, 'French Connection', 262.

in France and deteriorating relations with the US and Great Britain left them with no option but to support the end of the Red Line Agreement in 1948.[150]

The end of the agreement was part of a great reshuffling of the oil industry with respect to the burgeoning reserves of the Middle East, and the changes that took place became known as the great oil deals of 1947: the Jersey Standard-Socony deal with ARAMCO; a 20-year supply contract between Jersey Standard-Socony and Anglo-Iranian (later British Petroleum, BP); and a 10-year supply deal between Gulf Oil and Royal Dutch Shell.[151] These deals reflected a shift in global oil production from the US Gulf coast to the Middle East. Up until World War II, the US had produced 90 per cent of the world's crude oil output, but it was clear that in the post-war world America would soon become a net importer of oil. Indeed, even during the war, it was clear to the US that the Middle East would be the future centre of global oil production,[152] and that it therefore needed a stake in the region. This was the background of the great oil deals of 1947. In the words of Yergin, this "dramatic reorientation in the oil industry [...] would have [a] profound impact on the direction of world politics."[153]

In 1948, rising domestic demand and a peak in production caused the US to become a net importer of oil. As a consequence, it could no longer supply Europe with oil, as it had done during and shortly after the war. Although US energy security was the rationale behind the great oil deals, the actual state of US oil reserves was not as bad as appeared during the war, leaving US companies with a surplus of Middle Eastern oil.[154] This meant that Europe was an important potential outlet for the Middle Eastern oil of these US firms, not least because the largest US oil company, Jersey Standard, saw its European markets threatened by a shortage of American oil. The problem was that the transportation, processing and marketing infrastructure for transporting, refining and distributing Middle Eastern oil to and within Europe was lacking. Indeed, it was no coincidence that the great oil deals were between companies long on crude oil, but short on European outlets, and vice versa. Jersey Standard and Royal Dutch Shell were major oil suppliers to European markets and were thus relatively well-suited to addressing the problems that arose.[155] The great oil deals not only served to provide the less well-equipped companies in the Eastern hemisphere with an outlet for their Middle Eastern oil, but were also, first and foremost, an effective means of controlling the world oil market. Carefully worded clauses in each deal provided safeguards against overproduction and competition, and according to

[150] Torpani, 'French Connection', 263-264; Yergin, *The Prize,* 413-416.
[151] Torpani, 'French Connection', 264.
[152] Yergin, *The Prize*, 393.
[153] Ibid.
[154] Ibid., 409.
[155] Ibid., 419.

Howarth and Jonker, the deals were probably more effective in dividing the market than the 1928 Achnacarry Agreement.[156]

By 1947, Europe was being threatened by a severe energy shortage, with Germany, the most important pre-war continental source of coal, only producing at 40 per cent of its pre-World War II level.[157] Shortages of coal disrupted industrial production and household heating, but Europe lacked the financial and natural resources to avert the crisis on its own. Resolving the energy crisis was one of the goals of the Marshall Plan, which, according to a contemporary American report, could not have succeeded without oil.[158] According to Yergin, the Marshall Plan, and specifically the centrality of oil therein, had major implications for Europe's energy balance.[159] Oil was indeed the single largest aspect of the plan's aid: 10 per cent of the dollars allocated under the plan were used to enable the dollar-starved Western European countries to import dollar-oil from the Middle East.[160] The Economic Cooperation Administration (ECA), which was managing the allocation of Marshall Plan dollars, directed oil from the Middle East to Europe to resolve the energy crisis of the late 1940s and to secure the American oil supply from its own domestic sources. This also helped US oil companies to retain their European markets.[161] The lower price levels of Middle Eastern oil, the increasing size of its production, and the structural rise in the cost of labour, which strongly affected the cost price of coal production, caused oil to become much cheaper than coal, ultimately setting in motion the transition from coal to oil as the primary source of energy in most European economies.[162]

The second part of the solution to Europe's energy shortage was the construction of new refining capacity in Western Europe. This would save dollar outlays for oil product imports and thus be beneficial with respect to the effectiveness of the Marshall Plan for a European recovery. However, refinery expansion required large amounts of steel and equipment, which could only be supplied by US companies and thus needed to be paid for in dollars. The ECA agreed to finance a coordinated European refinery expansion program. However, due to problems with the execution of the plan, it only provided 24 million US dollars to be earmarked for refinery expansion, which was a tiny amount compared to the 1.2 billion US dollars used to finance dollar oil imports.[163] However, according to Painter, Western European countries used free dollars – the Marshall Plan aid not earmarked for specific

[156] Howarth and Jonker, *Stuwmotor*, 172-173.
[157] Painter, 'Oil and the Marshall Plan', 361.
[158] Yergin, *The Prize*, 424.
[159] Ibid.
[160] Painter, 'Oil and the Marshall Plan', 362.
[161] Ibid., 362-363.
[162] Ibid., 364-370.
[163] Painter, 'Oil and the Marshall Plan', 372-375.

purchases – to nonetheless expand refining capacity, albeit in a less coordinated, more national way.

2.3 The impact of the Allied occupation on the Ruhr coal industry

While the German oil industry experienced a boost from US policy and aid, coal mining was struggling. Before the war, Germany was the primary supplier of hard coal to many European countries, especially France, the Netherlands and Sweden, and restarting production in the Ruhr area was essential for a Western European recovery. This was recognised at an early stage by the US military authority, which only took control of the Rhine-Ruhr coal mines after the creation of the Bizone in 1947. Restarting production was severely hampered by war damage to the mines and German infrastructure, restrictive occupation policies, a lack of labour and the malnourishment of the workforce that remained.[164] Moreover, the preoccupation of the Third Reich with military planning and autarky had diverted capital investment in the industry towards the building of production facilities for synthetic fuel, ammonia and rubber, starving the mines of much-needed investment. According to Abelshauser, apart from war damage, the mines in the Ruhr area were thus in dire need of maintenance and modernisation. Indeed, Ruhr coal mining never really recovered from the burden of the Nazi period and the war.[165]

From early 1946 onwards, the Allied military authorities aimed to increase the output of Ruhr coal. This was increasingly accomplished in 1947 and 1948. However, the solution to the overarching questions of ownership (the Americans sought to decartelise the industry and cut the intimate ties between coal mining and steel manufacturing) and the international governance of the region proved elusive. Resolving both issues was vital to the creation of a proper foundation for the future of Ruhr coal mining and thus for its modernisation. When it came to international governance of the Ruhr area, US policies of containment were at odds with European, and especially French, interests with regard to coal supplies from the Ruhr. On the one hand, from 1947 onwards, the US and Britain aimed for a German recovery, which required increased supplies of coal for German industry. On the other, the French goal was international control over the Ruhr area and, just as in 1923, France demanded guaranteed supplies of Ruhr coal. The US sought a solution through the integration of Western Europe. Integration gave sovereignty to a fully reconstructed and internationally recognised Germany, as well as providing France with the security it required against any future German aggression. The policy of combining German reconstruction with the integration of Western Europe gained traction during 1948,

[164] Stokes, 'German Energy', 631.
[165] W. Abelshauser, *Der Ruhrkohlenbergbau seit 1945* (München 1984) 16, 20.

and led to the acceptance of the International Authority for the Ruhr by the French. The Germans also grudgingly accepted this approach in 1949, but both Germany and France remained unhappy with this outcome. To West Germany, the International Authority was an infringement on its sovereignty, while to the French it did not provide enough guarantees. Mounting tensions between Germany and France over the Saar region paved the way for the Schumann Plan of 9 May 1950, which led to the inception of the European Coal and Steel Community in 1951/1952.[166]

The ECSC was much more in line with the economic interests of the Ruhr area than the International Authority. John Gillingham even went as far as interpreting the ECSC as reflecting the historical continuity of the cartelisation of the Western European coal and steel industries.[167] The reality was that Karl Arnold, prime minister of North Rhine Westphalia, which contained 80 per cent of West Germany's coal and steel production, had already promoted an international solution to the Ruhr question along the lines of the Schumann Plan between 1946 and 1948.[168] Germany's position as Western Europe's main coal and steel producer required an international and integrative approach to German reconstruction. However, until 1950, the French and even the Dutch hoped to become Europe's principal steel producer at the expense of Germany. It took France two years to realise that it needed the Ruhr at least as much as the Ruhr needed France, and so the Schumann Plan came into being.[169]

With regard to the question of ownership, Allied policy and German wishes differed greatly. Initially, ownership of the entire Rhine-Ruhr coal mining industry came under Allied control. The British, then under the Labour government of Clement Attlee, at first pursued full public ownership of the Ruhr coal mines by the German states. From late 1947 onwards, the Ruhr coal mining companies regained some measure of control over their mines with the inception of the German Coal Mining Executive (*Deutsche Kohlenbergbauleitung*), which consisted of an executive and supervisory board made up of the former owners of the mines. Although ultimate control resided with the Allied Coal Control Group, the German Coal Mining Executive managed day-to-day affairs. Nonetheless, law 75 of November 1948 ordained the new founding of the coal mines by severing ties with former owners, as well as cross-ownership deals with steel and electrical power groups, transferring ownership to German trustees. In a specification of the law, in 1949 the Allies proposed incorporating 10 independent mining companies that would each own

[166] Stokes, 'German Energy', 634-637.
[167] J. Gillingham, *Coal, Steel and the Rebirth of Europe, 1945-1955: The Germans and French from Ruhr Conflict to Economic Community* (Cambridge 1991) 366.
[168] D. Petzina, 'The Origin of the European Coal and Steel Community: Economic Forces and Political Interests', *Journal of Institutional and Theoretical Economics*, 137 (1981) 3, 450-468, here: 463.
[169] Petzina, 'The Origin', 464.

approximately 10 per cent of the mines in the area.[170] The Germans were sceptical about this proposal. Steel producers needed integrated coal mining and coke manufacturing to balance and control their raw material procurement costs, which amounted to 70 per cent of the production costs of pig iron.[171]

Although the Ruhr coal mining companies wanted a more independent role as a safeguard against their subordinated pre-war position vis-à-vis steel and chemicals, the German Coal Mining Executive favoured retaining the existing intimate ties with both industries and the related level of concentration. However, the Allied High Commission came to a different conclusion: as of May 1950, law nr. 27 (replacing law nr. 75) stipulated the creation of 23 new and independent coal mining companies from the existing eight groups.[172] In contrast, German Coal Mining Executive had proposed crafting just 10 mining companies out of the same groups. The Allied goal of solving the post-war shortage of coal by combining efforts to increase output with the aim of increased competition among Rhine-Ruhr coal producers thus prevailed over German wishes to retain the existing structure of the industry. According to Abelshauser, who quotes the IG Bergbau annual report of 1952, the long-term effect of focusing on short-term goals was detrimental to the future health of the Ruhr coal mining industry.[173]

However, decartelisation was not entirely successful, because it and the creation of the ECSC were somewhat at odds in the sense that the latter provided Ruhr industry with an escape route. Faced with constant opposition from the West German government, the Allied High Command gradually agreed to shift jurisdiction over the coal and steel industry to the High Authority of the ECSC after its establishment in 1953, allowing Ruhr industry to gradually scale back decartelisation measures. According to Gillingham, decartelisation was ultimately a failure;[174] although the ECSC provided continuity with respect to the coal and steel industry's longstanding attempts to achieve European market coordination, it did not provide the Ruhr coal industry with a solution to its long-term problem of limited rationalisation and modernisation. Given the wide variety of factors causing possible market distortions in the ECSC member states, the best it could do to foster a common market for coal was to introduce price controls.[175]

Price controls for Ruhr coal thus prevailed from 1945 to 1956, when ECSC listed prices were abolished. Enduring price controls hampered rationalisation and modernisation investment. The output growth realised in 1948 was at the expense of

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[170] Abelshauser, *Der Ruhrkohlenbergbau*, 50-52.
[171] Ibid., 52.
[172] Vereinigte Stahlwerke, Krupp, Flick, Hoesch, Klöckner, Mannesmann, Rheinische Stahlwerke and Gutehoffnungshütte
[173] Abelshauser, *Der Ruhrkohlenbergbau*, 54-57.
[174] Gillingham, *Coal, Steel and the Rebirth of Europe*, 313-318.
[175] Gilingham, *Coal*, *Steel and the Rebirth of Europe*, 319.

the British and US authorities (Coal Control Group), which furnished resources and subsidies to cover the gap between rising production costs and the listed price that remained unchanged. While the currency reform of 1948 created better financing conditions for other industries, the Ruhr coal mining industry did not benefit. Although prices more than doubled shortly after currency reform, only a fifth of coal mines operated at a profit. As a consequence, much needed investments were postponed. Even Marshall Plan funds could not cover the capital requirements of the industry. In particular, the issues of the construction of new mines, the mechanisation of existing production and new homes for workers remained unaddressed.[176]

The Ruhr coal mines were constantly producing at full capacity, meaning that there was little room for production increases. Forced exports of Ruhr coal, which were first agreed by the Allied High Command and later by the ECSC, exacerbated the problem. During both the raw material boom of the Korean War, which was the first hot war of the Cold War and lasted from 1950 to 1953, and the subsequent growth of the German steel sector in the wake of the increasing pace of Western European rearmament, the Ruhr coal industry was producing at its limits. In 1950/1951, coal shortages led to an energy crisis, necessitating power cuts for consumers, industry and the transportation sector.[177] Unwillingness on the part of the International Authority for the Ruhr to cut the export quota, resistance from domestic industries to supply cuts, and a growing domestic black market for coal required the German federal government to stimulate imports of foreign, mainly US, coal in order to address the 1951 energy crisis. Germany's opposition to missing out on the rearmament boom because of its tight coal supply led to a deterioration in its balance of payments. However, the reintroduction of distribution controls, the importation of US coal and a gradual increase in coal production relieved the situation from early 1952 onwards. Nevertheless, the energy crisis had once again highlighted that an investment program that would structurally improve its position was long overdue for the Ruhr coal industry. Subsequently, a way to free up capital for the coal mining sector was devised, which consisted of a voluntary aid program run by German industry on the one hand and federal fiscal measures under the investment aid law – *Investitionshilfegesetz* – on the other. Taken together, this resulted in over 2 billion DM of investment capital for critical energy industries. The law also approved price rises for Ruhr coal, although this was limited by the price setting competence of the High Authority of the ECSC.[178]

The belated investment program for the Ruhr coal mining industry addressed the supply side of the energy market. However, the West German government

[176] Abelshauser, *Der Ruhrkohlenbergbau*, 64-68.
[177] W. Abelshauser, 'Korea, die Ruhr und Erhards Marktwirtschaft: Energikrise 1950/51', *Rheinische Vierteljahrsblätter* 45 (1981), 287-316, here: 288-289.
[178] Abelshauser, *Der Ruhrkohlenbergbau*, 73-79.

doubted whether the Ruhr coal sector would be able to meet the rising energy demands of the rapidly growing economy in West Germany over the decades to come. Part of the problem was that the economic boom of the mid-1950s created full employment in West Germany, and the Ruhr coal industry thus struggled to find people who were willing to work in the mines.[179] Consequently, wages and labour costs increased, pushing up coal prices. In an attempt to ease the tight West German energy market, the government introduced more competition for coal by exempting fuel oil from value added tax (1953) and import duties (1956).[180] The aim was to create greater demand for alternative energy sources, fuel oil in this case, to force the Ruhr coal mining industry to rationalise and modernise.

2.4 The Allied refining program: restarting the hydrogenation plants

During the Allied occupation (1945-1949), the US approach to German economic and political development changed a number of times. Initially, the US military occupation directive resembled the plan proposed by Henry Morgenthau, the US Secretary of the Treasury. Morgenthau's aim was to de-industrialise Germany in order to deny it any future capability to make war. Accordingly, he listed all strategic and weapons industries, including synthetic chemical production and steel manufacturing, for decommissioning. However, the country was in such a poor state, and a prolonged occupation potentially so costly, that the US military government soon allowed industrial production to take place again, including in prohibited industries. Germany needed to be able to produce and export in order to finance a number of essential imports, such as foodstuffs. From the Potsdam Protocols of August 1945, via the inception of the combined British-US occupation zone (Bizone) in January 1947, the currency reform of 1948, and the start of the Marshall Plan in the same year, the US policy for Germany shifted from containment to reconstruction.[181] However, the dismantling of plants and the bans on the production of certain strategic materials (in particular chemicals and steel) remained in place until the Petersberg Agreement of November 1949, where the nascent Federal Republic exchanged the lifting of industrial bans for the inception of the International Authority for the Ruhr. The actual removal of all restraints on German industry occurred in 1951, but the reality was that most restrictions had already been lifted by 1949.[182] The intensifying Cold War shifted US priorities from containing German industrial power to rebuilding and mobilising it in order to shore up European

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[179] Nonn, *Die Ruhrbergbaukrise*, 37-39.
[180] Abelshauser, *Der Ruhrkohlenbergbau*, 80.
[181] R. Stokes, 'German Energy in the US Post-War Economic Order, 1945-1951', *Journal of European Economic History* 17 (1988), 621-639, here: 622-625.
[182] Karlsch and Stokes, *Faktor Öl*, 274.

defences against the Soviet Union.[183] The policy shift with regard to Germany had important and fundamental consequences for the country's future energy balance.

At the top of the Allied list of essential war industries was the synthetic fuel sector. The history of synthetic fuels reveals much about Germany's pre-war technological prowess and the post-war development of the oil and petrochemical industry in the Rhine-Ruhr area. The production of synthetic fuels from hard coal or brown coal was based on the invention of the high-pressure hydrogenation of coal by the Nobel Prize winning German chemist Friedrich Bergius in 1913. Although the importance of the hydrogenation process has been played down in the literature on account of its failure to produce a viable alternative to oil and its role in the Nazi war economy, at the time it appeared to be a revolutionary technology.[184] Known as the Bergius process for the high-pressure hydrogenation of coal, the technology enabled the production of motor fuels (gasoline and diesel) from coal. The process gained recognition during and after World War I. Bergius devised a commercial sized plant in 1914, but progress was slow and he sold his patent to BASF in 1925. At BASF, Carl Bosch further developed the process, which fostered interest from both domestic and foreign firms and governments.[185] The Bergius-process was an exponent of advanced German chemical engineering, belonging to the family of high-pressure chemical technologies that was the technological frontier of the time. The decision of Carl Bosch, president of both BASF and, since 1925, the chemical conglomerate *Interessengemeinschaft Farbenindustrie AG* (IG Farben for short), to go through with the development of high-pressure hydrogenation was the result of the enormous technological momentum that had been building up during World War I.

Ever since the 19th century, innovation in the German chemical industry was driven by a relentless search for synthetic substitutes for expensive imports. Limited in natural resources, Germany's chemical ventures sought to produce alternatives from the few resources available domestically, in particular coal. Riding the crest of an innovation wave, Bosch and his team at BASF had pushed the frontiers of high pressure, high temperature and catalytic chemistry by hugely expanding synthetic nitrogen production in Germany during World War I. That achievement carried the determination to pursue new breakthroughs in industrial chemistry over into peacetime.[186] The capital required for such ventures provided the rationale for the integration of the German chemical industry. Although groups of individual

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[183] C.S. Maier, 'The politics of productivity: foundations of American international economic policy after World War II', *International Organization* 31 (1977) 607-633, here: 618; Stokes, 'German Energy', 634-635.

[184] Homburg, Small and Vincken, 'Van carbo- naar petrochemie', 345.

[185] J. E. Lesch, *The German Chemical Industry in the Twentieth Century* (Dordrecht, 2000), 185.

[186] T. Parke Hughes, 'Technological momentum in history: Hydrogenation in Germany 1898-1933', *Past & Present* (1969) 4, 106-132, here: 110-112; R. Stokes, 'The oil industry in Nazi Germany, 1936-1945', *The Business History Review* 59 (1985) 266.

companies had been forming since 1903, the process culminated in 1925 with the formation of a single entity, IG Farben, in which BASF acted as the holding company.[187] The pooled resources of IG Farben allowed it to undertake the development of synthetic alternatives to motor fuels from coal.

For international oil companies, the hydrogenation process was both a threat and an opportunity. On the one hand, it could be used for the production of gasoline from heavy oil residues, lube oils, and fertiliser from refinery or coking gas. Hydrogenation thus promised to be a valuable addition to the chemical endeavours of the oil companies in their search for the valorisation of by-products. On the other hand, it could potentially harm their position on the world motor fuel market. Foreign oil and chemical companies, notably Royal Dutch Shell, Jersey Standard and Imperial Chemical Industries, became interested. In fact, Royal Dutch had participated in the Bergius venture in 1921, but lost interest because Bergius seemed to be unable to develop the technology commercially.[188]

The formation of IG Farben and its vast resources renewed the promise of a commercial application for the hydrogenation technology. Indeed, in 1931 Royal Dutch and Jersey Standard closed a number of patent-sharing deals in which they essentially divided the world market for synthetic fuels, complementing the oil cartel that Royal Dutch, Jersey Standard and British Petroleum had formed three years earlier in the Scottish town of Achnacarry.[189] However, the progress at IG Farben's Leuna plant, near the present-day city of Merseburg in Eastern Germany, was overtaken by the economy and expanding world oil reserves. In 1927, synthetic gasoline from Leuna had cost 40 pfennig per litre, which was twice as much as imported gasoline. By 1931, the price of a litre of Leuna gasoline had dropped to 23 pfennig, which was close to 1927 prices for imported gasoline. Simultaneously, expanding world oil reserves and plummeting demand following the economic depression had reduced world market prices for gasoline to roughly 5 pfennig per litre by 1931. Even an increase in the tariff on imported gasoline that same year could not shield IG Farben from the disastrous losses that it incurred on the hydrogenation project.[190]

The rise to power of Adolf Hitler proved to be a boon for IG Farben. Following the breakdown of world trade in the wake of the depression, the Nazi regime intervened heavily in the German economy in order to protect German agriculture and industry and ensure the replacement of hitherto imported goods. The

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[187] P. Hayes, *Industry and Ideology. IG Farben in the Nazi era* (Cambridge 2001 second edition) 12-16.
[188] Lesch, *The German Chemical Industry*, 189; Karlsch and Stokes, *Faktor Öl*, 135; Jonker and Van Zanden, *Van nieuwkomer tot marktleider*, 359; Homburg et al, 'Van carbo- naar petrochemie, 1910-1940', 348-349.
[189] Homburg et al, 'Van carbo- naar petrochemie, 1910-1940', 353; Karlsch and Stokes, *Faktor Öl*, 190.
[190] Karlsch and Stokes, *Faktor Öl*, 137.

purpose of all this was Hitler's ultimate, mainly military, goal: German autarky.[191] At first, Hitler was restrained in his pursuit of autarky in the interests of gaining the support of private industry. However, as the speed and volume of rearmament needed to increase, greater intervention was required, which led to the rise of Hermann Göring as plenipotentiary of the Four Year Plan in 1936.[192]

IG Farben's hydrogenation technology fitted in well with the policy goals of the Nazi regime. Presenting the technology as a means to attain strategically vital autarky in the production of motor fuels, the company successfully lobbied the regime into supporting its hydrogenation technology. The decision of the Nazis to back IG Farben was later explained by the company's management as a decision in favour of the more advanced and cost efficient synthesis technology. Ray Stokes adds that IG Farben's managers were much better connected in the Nazi regime than other industrial groups with an interest in the oil industry.[193] In particular, German heavy industry, including the Ruhr iron and steel sector, was weary of and resented Hitler's interference in private business.[194] After 1933, the Nazi state became increasingly forceful in diverting private industry investments into the autarky industry. In terms of investments, whether explicitly or implicitly coerced by the state, synthetic fuels represented the largest single autarky project in the Nazi period.[195] More or less under state coercion, private industry in Germany (mostly coal and steel companies, but also IG Farben and even Royal Dutch Shell and Jersey Standard) invested billions of Reichsmarks in the construction of 12 hydrogenation plants, which were spread among the hard coal and lignite areas in the German Reich. Four of these plants were located in the Rhine-Ruhr area.[196] The hydrogenation plants complemented Germany's existing oil refineries, which were primarily located in Hamburg, to form half of the country's total production capacity for motor fuels.[197]

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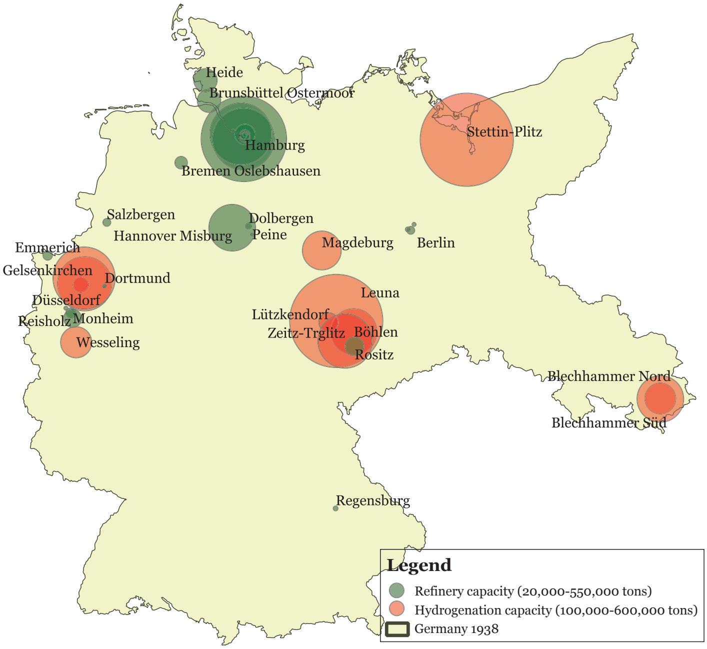
[191] D. Petzina, *Autarkiepolitik im Dritten Reich. Der nationalsozialistische Vierjahrespan* (Stuttgart 1968) 20.
[192] Ibid., 22-23.
[193] Stokes, 'The oil industry', 267-272.
[194] R. Overy, *War and Economy in the Third Reich* (Oxford 1994, 2002) 100-103.
[195] J. Scherner, *Die Logik der Industriepolitik im Dritten Reich* (Stuttgart, 2008) 106.
[196] Petzina, *Autarkiepolitik im Dritten Reich*, 22-23, 36-41; W. Birkenfeld, *Der synthetische Treibstoff, 1933-1945* (Berlin 1964) 37-41; A. Krammer, 'Fueling the Third Reich', *Technology and Culture* 19 (1978) 394-422; Fischer-Tropsch Archive, microfilm reel B1870, item 11, 'Petroleum Facilities of Germany', March 1945, http://www.fischer-tropsch.org/Tom%20Reels/Linked//B1870/B1870_toc.htm, accessed 11 December 2012.
[197] Data taken from SHA, Germany country book IV, Dr. P. Schwarz, 'Germany strives for self-sufficiency', *World Petroleum* (October 1936) and the Fischer-Tropsch Archive, microfilm reel B1870, item 11, 'Petroleum Facilities of Germany', March 1945, http://www.fischer-tropsch.org/Tom%20Reels/Linked//B1870/B1870_toc.htm, accessed 11 December 2012.

Figure 2-2. The refineries and hydrogenation plants in Germany, 1938.



Source: Data on refineries: SHA, Germany country book IV, Dr. P. Schwarz, 'Germany strives for self-sufficiency', *World Petroleum* (October 1936). Data on hydrogenation plants: Fischer-Tropsch Archive, microfilm reel B1870, item 11, 'Petroleum Facilities of Germany', March 1945, http://www.fischer-tropsch.org/Tom%20Reels/Linked//B1870/B1870_toc.htm, 11 December 2012. Map: MPIDR [Max Planck Institute for Demographic Research] and CGG [Chair for Geodesy and Geoinformatics, University of Rostock], *MPIDR Population History GIS Collection* (Rostock 2011). http://censusmosaic.org/web/data/historical-gis-files, 23 July 2014. The data are reported in Appendix B: Data Table 0-1 and Table 0-2.

Ownership of the three largest hydrogenation plants in the Rhine-Ruhr area was dominated by the region's big industry. The largest Ruhr coal mining company, Gelsenkirchener Bergwerks AG (GBAG), owned the second largest hydrogenation plant, Gelsenberg Benzin AG in Gelsenkirchen, with a share capital of 100 million Reichsmark. Through GBAG, Vereinigte Stahlwerke held a stake in Gelsenberg Benzin. The area's largest hydrogenation plant, Scholven AG in Gelsenkirchen, with a share capital of RM 250 million, was owned by the state-controlled mining giant Hibernia AG.[198] The area's smallest plant, Union Rheinische Braunkohlen Kraftstoff in Wesseling, was established jointly by the Rhenish brown coal industry around Cologne.[199] Although the Rhine-Ruhr coal and steel industries invested in hydrogenation more or less voluntarily out of a fear of government coercion, for

[198] Ibid., 145.

[199] H.J. Joest, *Kraftakte. Ein halbes Jahrhundert Union Krafstoff in Wesseling* (Düsseldorf 1987) 22-23.

Gelsenkirchener Bergwerks AG and Hibernia, the hydrogenation plants also presented an opportunity to valorise a proportion of their coal production that was otherwise hard to sell.[200] Indeed, the shareholders in Union Krafstoff in Wesseling hoped that the hydrogenation plant would spin-off a chemical cluster based on brown coal.

The plants in the Ruhr area did form the basis for a large-scale integrated chemical cluster, which was an ambition that the Ruhr coal and steel industry had long entertained. In 1938, IG Farben (74 per cent) and Hibernia AG (26 per cent) founded Chemische Werke Hüls for the production of synthetic rubber (*Buna*) from hydrocarbon feedstock from the hydrogenation plants at Gelsenkirchen. In return, Hüls provided both hydrogenation plants with hydrogen, which they needed in great quantities for the production of synthetic fuels.[201] By 1943, the product exchange network, through pipelines, had spread to smaller chemical plants in the Ruhr area, and comprised five different product flows between eight different plants.[202] The synthetic technologies of IG Farben had thus provided the Ruhr Montan industry with an opportunity to diversify into chemical production, which was entirely facilitated by the autarkic proclivities of the Nazi regime, the commercial viability of which would have been nil under normal circumstances.

The synthetic fuel and rubber industry provided most of the Reich's fuels, lubricants and rubber during the war. Its destruction was vital to the Allied military campaign against Germany. Although 72 per cent of the country's hydrogenation capacity was located in East Germany, and was therefore lost to the Soviets, one million tons of capacity came under British control. This capacity consisted of four plants: Union Kraftstoff in Wesseling, two plants in Gelsenkirchen and a much smaller plant in Bottrop-Welheim.[203] Initially, any production by these plants was banned, but the military government was permitted to restart such work if the situation required it.[204] The fate of the hydrogenation plants in the Rhine-Ruhr area is a fine example of the policy shift of the Allies with regard to Germany; first listed for dismantling, they were gradually reopened as German reconstruction became increasingly central to the Allied occupation policy. International oil companies were closely involved in this policy shift and were quick to profit from it. As the utilisation of these plants for coal hydrogenation continued to be banned, and was not economically viable in any event, oil refining was the only remaining option. The case of Union Kraftstoff in Wesseling shows how and why the Allied policy towards West

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200 Birkenfeld, *Der synthetische Treibstoff*, 108.
201 Broich, 'Die Petrochemie', 42.
202 Mittmann, *Die Chemische Industrie*, 41.
203 Fischer-Tropsch Archive, microfilm reel B1870, item 11, 'Petroleum Facilities of Germany', March 1945, http://www.fischer-tropsch.org/Tom%20Reels/Linked//B1870/B1870_toc.htm, accessed 11 December 2012.
204 Stokes, 'German Energy', 626.

Germany changed, and highlights the instrumental role of the hydrogenation plants in the Rhine-Ruhr area in this Allied policy shift.

2.5 The case of Union Kraftstoff

In the first few months after the German capitulation of May 1945, the country's food situation was precarious. As one of the least damaged hydrogenation plants, Union Kraftstoff realised that it was in a good position to utilise part of its plant for the production of chemical fertilisers and methanol using its high-pressure facilities. These products formed the heart of the technological breakthrough that BASF had forged in the 1910s and 1920s with the synthesis of ammonia and methanol.

Figure 2-3 The German occupation zones, 1947

Source: Map created by the author based on IEG-MAPS, Institut für Europäische Geschichte, Mainz / © A. Kunz, 2004. http://germanhistorydocs.ghi-dc.org/pdf/deu/p947Zonen_a4_mb.pdf, 4 July 2014.

While the French disposed of fertiliser through its command of IG Farben's BASF Ludwigshafen plant (Figure 2-3, left of the Rhine), the British and American zones were short. Electrical power generation was equally critical. As early as 1 June 1945, the Allied authority granted Union Kraftstoff permission to repair and restart power generation in its power plant. On 27 August 1945, the British occupation authority agreed in principle to Union Kraftstoff's plan to start the production of ammonia to produce fertiliser.[205] From November 1945, Union Kraftstoff employed a workforce of 1,200 to clear the plant of rubble and repair the critical installations such as the power generation and high-pressure facilities. However, in November 1946, the company heard that it was listed for dismantling. This was part of the US policy of the containment of German industry, but did not stop the British from granting Union Kraftstoff permission to start producing methanol in October 1946.[206] Around the same time, Union Kraftstoff director Carl Müller von Blumencron visited Hoechst in Frankfurt (in the US zone, Figure 2-3) and learned that the area was looking for a daily supply of ammonia of 120 tons, which no one could deliver.

As the control commission would possibly deny an application from Union Kraftstoff directly, von Blumencron's English contacts advised him to let Hoechst make the application via the US military government. According to von Blumencron, this was an approach that everyone in the English zone was taking if they wanted something done, especially in the agricultural sector.[207] Von Blumencron put in his request via the Central Office for Economic Affairs (*Zentralamt für Wirtschaft*), which was the first post-war predecessor to the Federal Ministry of Economic Affairs (*Bundesministerium für Wirtschaft*) that was established in 1946. This office forwarded his letter to the Bipartite Economic Control Group. The *Zentralamt* argued that there was a considerable shortage of nitrogen, which could not be supplemented by imports.[208] This situation was expected to worsen, as BASF no longer delivered nitrogen to Hoechst due to an order by the French occupying authorities, which aimed to put pressure on their British counterparts to fulfil coal deliveries to the French zone (which had apparently faltered). According to the *Zentralamt*, this situation would not be resolved any time soon, meaning that there was a considerable shortage of nitrogen in the British zone. The alternative was the possibility of granting Union Kraftstoff a permit to produce ammonia, which could start within three months. The *Zentralamt* tried its best to improve the position of Union Kraftstoff, because it argued that the company's production of ammonia would be beneficial for BASF. As Union Kraftstoff used abundant brown coal and BASF rare hard coal, producing ammonia at Wesseling would alleviate the strain on the latter. The *Zentralamt's* argument hit the right note, because on 20 May 1947 Union

205 Joest, *Kraftakte*, 39.
206 Ibid., 41.
207 BA Koblenz, Z 8/467, Werk Wesseling der Union Rheinische Braunkohlen Kraftstoff AG.-Wiederingangsetzung, 1946-1947, letter from Carl Müller von Blumencron (Union Kraftstoff) to Dr. Reifferscheidt (Zentralamt für Wirtschaft), 15 October 1946.
208 BA Koblenz, Z 8/467, Werk Wesseling der Union Rheinische Braunkohlen Kraftstoff AG.-Wiederingangsetzung, 1946-1947, letter from Reiffenscheidt to the Bipartite Economic Control Group (BICO), 'Subject: start of production of primary ammonia by Union Rheinische Braunkohlen Kraftstoff AG at Wesseling' 7 May 1947.

Kraftstoff received a permit for the production of ammonia,[209] which started on 15 September 1947. As both nitrogen and ammonia were critical to the economy of Occupied Germany, the British promised Union Kraftstoff that the dismantling policy would interfere as little as possible with the already commissioned production of methanol.[210]

Indeed, the economic necessities of governing Occupied Germany soon overtook the initial industrial dismantling plans of the Allied authorities; as early as September 1946, US Secretary of State J.F. Byrne hinted at an Allied policy change in this regard. Actual dismantling ended with the formation of the Bizone on 1 January 1947, although production bans remained in place for products associated with the German war economy, such as synthetic fuels and a range of chemicals. Dismantling returned to the agenda briefly in April 1949, but was finally abandoned in the Petersberg Agreement of 22 November 1949 after fierce protests from the new West German government.[211] Interestingly, Union Kraftstoff was not on the dismantling list of the Allied agreement of April 1949. Carl von Blumencron, managing director of Union Kraftstoff at the time, later hypothesised that the company had by then proved to be too important to the regional economy to be dismantled, although he also entertained the possibility that the Allies were just not interested in brown coal.[212] Production bans on synthetic fuels, which had been the mainstay of Union Kraftstoff's production during the war, remained in place. The production of ammonia and methanol utilised only 40 per cent of the plant. Indeed, the majority of the plant's facilities were idle. This included the 800-900,000 tons per annum crude oil distillation unit, which was added to the plant during the war for the purpose of refining Caucasian crude oil, although this never happened because Hitler's Russian campaign was derailed before Caucasian oil fields could be captured. The distillation unit was thus never operational and emerged unharmed from the war.[213]

After the successful start-up of ammonia and methanol production, Union Kraftstoff was looking for further opportunities to enhance its financial position. Its distillation unit and hydrogenation plant allowed the company to obtain high yields of gasoline from crude oil or heavy oil residues. It was therefore in a good position to help to reduce the enormous shortage of motor fuels, but had no source of crude oil of its own.[214] As a consequence, Union Kraftstoff had inquired after the opportunity to buy and process crude oil for its own use, but this remained a political impossibility at

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[209] BA Koblenz, Z 8/467, Werk Wesseling der Union Rheinische Braunkohlen Kraftstoff AG.- Wiederingangsetzung, 1946-1947, letter Carl Müller von Blumencron to Reiffenscheidt, 27 May 1947.
[210] Joest, *Kraftakte*, 40.
[211] Stokes, *Opting for Oil*, 47; R. Stokes, *Divide and Prosper: The Heirs of IG Farben Under Allied Authority 1945-1951* (Berkeley 1988) 172.
[212] Joest, *Kraftakte*, 41.
[213] Ibid., 53.
[214] Joest, *Kraftakte*, 54.

the time.[215] Parallel with the birth of the Bizonal Oil Refinery Plan in 1947, Union Kraftstoff began negotiations with Deutsche Shell and Esso AG, the German subsidiary of Jersey Standard.[216] In 1948, the Bizonal Plan was extended to include former hydrogenation plants.[217]

Whereas Union Kraftstoff only began to look for opportunities in oil refining in 1947, international oil companies had been interested in the former hydrogenation plants from 1945 onwards. As advisors to the military occupation authorities, officials from US and British oil companies were in an excellent position to gather information on the state of the German oil industry in general and the hydrogenation facilities in particular.[218] While Union Kraftstoff was talking to Deutsche Shell and Esso AG, Royal Dutch Shell was interested in another hydrogenation plant in Gelsenkirchen, namely Gelsenberg Benzin AG.[219] Although plans to cooperate with this company fell through, they highlighted the great interest shown by Royal Dutch Shell in gaining refinery capacity in the Rhine-Ruhr area without having to invest. According to Union Kraftstoff director von Blumencron, Union Kraftstoff chose to work with Deutsche Shell because it was better positioned to deliver the required crude oil to Wesseling. Indeed, while Esso AG did not have sufficient transport capacity to ship crude oil over the Rhine, Deutsche Shell could use the services of the Shell group's captive fleet on the Rhine, which was operated by the Rotterdam-based Van Ommeren.[220] The announcement of the Bizonal Plan in May 1948 paved the way for the Deutsche Shell-Union Kraftstoff processing deal, which was signed on 13 October 1948.[221] The contract consisted of the distillation of 300,000 tons of foreign crude oil and the hydrogenation of 150,000 tons of heavy oil residues from the distillation unit.[222]

The processing contract came none too soon for Union Kraftstoff, and reflected the plant's precarious circumstances. The Rhenish brown coal companies held Union Kraftstoff's 90 million DM of paid up capital. As guarantors, the group of shareholders was jointly liable for Union Kraftstoff's debt obligations, which by 1948 amounted to 211 million RM (before currency reform) of accumulated debts that were held by banks and private debenture holders. Union Kraftstoff's largest shareholder, *Rheinische AG für Braunkohlenbergbau und Brikettfabrikation*

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[215] HK RWE, C1/10778, UK 12.1945-12.1957, Bericht über die derzeitige wirtschaftliche Lage der Union Rheinische Braunkohlen Kraftstoff AG, Wesseling, 11 September 1948, 8.
[216] Ibid.
[217] Karlsch and Stokes, *Faktor Öl*, 255.
[218] See, for instance, Stokes, *Opting for Oil*, 56; Karlsch and Stokes, *Faktor Öl*, 417-418 (note 70 in Chapter 7).
[219] Karlsch and Stokes, *Faktor Öl*, 417 417-418 (note 70 in Chapter 7).
[220] Joest, *Kraftakte*, 53.
[221] Ibid., 55.
[222] HK RWE, C1/10778, UK 12.1945-12.1957, Bericht über die derzeitige wirtschaftliche Lage der Union Rheinische Braunkohlen Kraftstoff AG, Wesseling, 11 September 1948, 1.

(Rheinbraun), which represented the group of shareholders, had managed to keep creditors at bay. Union Kraftstoff desperately needed the Deutsche Shell contract if it wanted to keep its plant from turning into a rust heap, although it nonetheless required repairing and needed damaged installations to be replaced. In order to proceed with the Deutsche Shell contract, Union Kraftstoff needed an additional 6.5 million DM to make the plant operational again. The company was able to finance 2.5 million DM from its own means, but needed short-term credit to the tune of 4 million DM, for which the shareholders acted as guarantors.[223]

After the German currency reforms of June 1948, Union Kraftstoff's total debt amounted to 21 million DM, of which 10.4 million in interest payable and amortisation was overdue. The banks holding the debt were, nevertheless, willing to grant an extended grace period on the loans and to roll over the outstanding amortisation instalments. Union Kraftstoff expected to reach a similar agreement with the debenture holders. However, getting the shareholders to guarantee new loans was not as straightforward.[224] Although the Bizonal Plan was an opportunity for Union Kraftstoff, there were no guarantees that the Allies would leave the plant intact. Indeed, the hydrogenation facilities in particular were still officially listed for dismantling, which, if enforced, could potentially lead to the premature end of the Deutsche Shell contract.

The Deutsche Shell contract was the only thing that could save Union Kraftstoff from obsolescence. Deutsche Shell guaranteed to buy Union Kraftstoff's production at a price covering operating costs, amortisation and interest. In turn, Union Kraftstoff was expected to run profits on the processing contract of 2.48 million DM in 1949 and 9.18 million in 1950. Together with the profits from the production of power, methanol and ammonia, Union Kraftstoff expected to repay the reparation loan of 4 million DM by 1950.[225] Moreover, Deutsche Shell had agreed to take on the risk of Union Kraftstoff's reparation loan.[226] The contract contained a clause in which Deutsche Shell agreed to repay any outstanding instalments of the reparation loan in the first three years of the contract if the hydrogenation part could not be fulfilled because of either an Allied ban or uneconomical operations.[227] This clause killed two birds with one stone. On the one hand, and provided that Union Kraftstoff succeeded in servicing the processing contract without disruptions, it took

[223] HK RWE, C1/10778, UK 12.1945-12.1957, Bericht über die derzeitige wirtschaftliche Lage der Union Rheinische Braunkohlen Kraftstoff AG, Wesseling, 11 September 1948, 6.
[224] HK RWE, C1/10778, UK 12.1945-12.1957, Meeting of shareholders in Union Kraftstoff, 7 September 1948, 2.
[225] HK RWE, C1/10778, UK 12.1945-12.1957, Bericht über die derzeitige wirtschaftliche Lage der Union Rheinische Braunkohlen Kraftstoff AG, Wesseling, 11 September 1948, 8.
[226] HK RWE, C1/10778, UK 12.1945-12.1957, Meeting of shareholders in Union Kraftstoff, 7 September 1948, 2.
[227] Ibid.

from Union Kraftstoff's shareholders the risk of guaranteeing the new loan in the first three years of operations. On the other hand, the contract provided for the contingency of an enforced Allied ban on the hydrogenation facility, which was still a possibility in late 1948.

Guaranteeing the loan was no small risk for Deutsche Shell, which was in the midst of an extensive operation to repair war damage to its plants. However, financing the investment program was difficult. Royal Dutch Shell's marketing division expenditures had already absorbed the profits and depreciations of 1949, and needed external financing through the local affiliate Mineraloelwerke Albrecht & Co to furnish the 24 million DM required for reparations that same year.[228] For the rehabilitation program, Royal Dutch Shell's manufacturing department estimated a further need for DM 15 million in the years after 1949. While Deutsche Shell would be able to finance DM 5 million from its own means, there remained a need for a long-term loan to the tune of DM 35 million. However, at the time, there were virtually no opportunities for obtaining such a facility in Germany, because credit-granting institutions were either unwilling or incapable of doing so. Accordingly, Deutsche Shell was forced to use short-term credit to finance the rehabilitation of its refineries. This was not an attractive proposition, but the alternative would be to halt rehabilitation, which could be dangerous in the face of the Bizone's refinery rehabilitation and expansion program. Royal Dutch Shell was using all of its powers to secure local sources of long-term credit. Guaranteeing a risky loan to the tune of DM 4 million for Union Kraftstoff was therefore a considerable financial obligation in light of the problematic financial situation at the time.

Table 2-1 shows how important the refining contract was for Union Kraftstoff. Even in the first year of the contract (the second half of 1949), the production of motor fuels from crude oil distillation and hydrogenation would constitute 31 per cent of the company's total operating profits. Then, in 1950, the first full year of production, the refining contract would supply 58 per cent of the operating profits. Interestingly, crude oil distillation contributed limited profits – just 6-7 per cent of the total.

[228] SHA, Germany country book part III, Rhenania/Shell financial, Capital expenditure for Germany 1949.

Table 2-1. The projected operating profits of Union Kraftstoff, 1948-1950 (in million DM)

Profits	1948	1949 (projected	1950 (projected)
Methanol	3.34	2.67	3.00
In pct. of total profits	*67*	*34*	*19*
Ammonia	1.67	2.73	3.84
In pct. of total profits	*33*	*35*	*24*
Crude oil distillation		0.48	1.08
In pct. of total profits		*6*	*7*
Hydrogenation		2.00	8.10
In pct. of total profits		*25*	*51*
Total profits	**5.01**	**7.88**	**16.02**

Source: HK RWE, C1/10778, UK 12.1945-12.1957, Bericht über die derzeitige wirtschaftliche Lage der Union Rheinische Braunkohlen Kraftstoff AG, Wesseling, 11 September 1948, 7-8.

The real added value was in the hydrogenation of the heavy oil residues from the distillation that made it possible to convert almost worthless residues into high-grade motor fuels. For Deutsche Shell, the refining contract provided the company with twice as much refining capacity as it could have mustered with its financial means at the time. The reconstruction of the Harburg refinery near Hamburg and the rise in crude oil imports had drained the company's capital reserves and it had to apply for a Marshall Plan loan to finance the Harburg reconstruction. By 1949, the company was able to recommence work at the Harburg refinery at an annual capacity of 440,000 tons. The Union Kraftstoff refining contract provided Deutsche Shell with a further 300-400,000 tons of refining capacity.[229]

The other former hydrogenation plants in the Rhine-Ruhr region, Gelsenberg Benzin AG and Scholven AG, closed similar refining deals with Mobil Oil AG in 1950 and with Deutsche BP AG in 1952. As a consequence, these three plants were important additions to the motor fuel production capacity of the newly formed Federal Republic of Germany. After the liberalisation of the distribution of the motor fuel market in May 1951, the demand for motor fuels increased rapidly. Union Kraftstoff's hydrogenation installation was duly expanded to its maximum capacity of 260,000 tons. The potential for further growth was constrained by the hydrogenation capacity – the distillation unit was not yet operating at its maximum capacity of 800,000 tons per annum. Accordingly, in the early 1950s, Union Kraftstoff was confronted with the issue of how it could expand its secondary refining capacity, i.e. the reprocessing of heavy oil residues from the distillery. The company's technical director, Kurt Wissel, decided to opt for a thermal cracker, which became operational in 1953. This was Union Kraftstoff's first major investment program, requiring a total

[229] SHA, Annual report Deutsche Shell AG, 1948-1949, 3-4.

capital outlay of 37 million DM, which was financed by the German counterpart funds established by the Marshall Plan.[230] Wissel favoured a thermal cracker over a catalytic cracker, even though the latter was by then thought to be the more advanced technology. His reasoning was that the combination of a thermal cracker and a hydrogenation installation could produce better quality gasoline.[231] Further quality improvements were realised in 1955 by investing in a catalytic reforming installation, called a platformer because it used platinum as a catalyst.[232] A platformer is used to enhance the anti-knock quality or octane level of motor gasoline. The investments and technical improvements that were possible under the Deutsche Shell contract had propelled Union Kraftstoff into the top three largest refineries in Germany by the mid-1950s.[233]

2.6 The geographical consequences of the Allied occupation

The consequences of the Allied approach to solving the post-war energy crisis were considerable for the structure and geography of the German oil industry. For Germany in general, the two most important outcomes were the expansion of refinery capacity, which replaced the pre-war dependence on oil product imports with a reliance on crude oil imports, and the increase in domestic crude oil production.[234] For the Rhine-Ruhr area, the first consequence was most significant. Instead of being dismantled, the hydrogenation plants constructed by the major coal and steel companies in the region were adapted to process oil and, at a stroke, became the largest refineries in West Germany. German coal companies thus suddenly owned a considerable share of the country's refinery capacity, although the significance of this was limited because these plants mainly produced oil products for international oil companies that marketed the products through their own distribution networks. Nonetheless, the large amounts of capital sunk into these locations meant that they were saved from obsolescence, and the former hydrogenation plants made the Rhine-Ruhr area the most important oil refining region after Hamburg. Figure 2-4 shows the geographical distribution of refinery capacity in West Germany in 1950.

[230] HK RWE, C1/10778, UK 12.1945-12.1957, letter from the new chairman of Rheinbraun to von Blumencron (Union Kraftstoff), 15 May 1953.
[231] Joest, *Kraftakte*, 56.
[232] Ibid., 57.
[233] Molle and Wever, *Oil Refineries*, 164-169.
[234] Karlsch and Stokes, *Faktor Öl*, 275.

Figure 2-4. The geographical distribution of refineries in Germany, 1950 (in million tons)

Source: Data taken from W. Molle and E. Wever, *Oil refineries and petrochemical industries in Western Europe: buoyant past, uncertain future* (Aldershot, 1984), 164-168. Map produced with QGIS 2.0. See, for the data, Appendix B: Data Table 0-3. The refinery capacity in West Germany, 1950-75.

In the late 1930s, the Rhine-Ruhr area represented around 10 per cent of the Reich's refinery capacity.[235] By 1950, this had increased to 32 per cent, while the Hamburg area still dominated with 49 per cent, and Niedersachsen had an additional 15 per cent.[236] The West German refinery capacity approximately doubled to 5.2 million tons in 1950. The growth of refinery capacity in the Rhine-Ruhr area was entirely due to the former hydrogenation plants, and was the start of a shift in the concentration of German refinery capacity away from Hamburg to the Rhine-Ruhr region. Although the availability of former hydrogenation plants helps to explain that shift, the German

[235] SHA, Germany country book IV, Dr. P. Schwarz, 'Germany strives for self-sufficiency', *World Petroleum* (October 1936).
[236] Mineralölwirtschaftsverband e.V., 'Rohöldestillationsanlagen nach Bundesländern 1950–2009, Atmospärische Destillation', in: *Jahresbericht Mineralölzahlen 2009*, 27, accessed 11 January 2013, http://www.mwv.de/upload/Publikationen/dateien/2009_JB_KL763hj1mjg3LYm.pdf

division and the Iron Curtain were decisive. Hamburg suffered greatly from the east-west division of Europe; before World War II, 40 per cent of the city's cargo flows had relied on its Eastern European hinterland. With almost all of that traffic wiped out after 1945, the city struggled to recover from the war.[237] The Eastern Bloc countries developed their seaports during the 1950s and 1960s, establishing ports like Rostock in East Germany as the primary seaport of the Eastern Bloc. Hamburg only regained its former position after German unification in 1990.[238]

As coal was still by far the most important source of energy in the late 1940s and early 1950s, the German oil market was relatively small and lopsided. In the early 1950s, oil represented only 4 per cent of Germany's energy balance, as opposed to 95 per cent for coal.[239] Oil consumption therefore consisted of 80 per cent motor fuels. Household and industrial heating, as well as power production, were still dominated by coal, while fuel oil represented just 9 per cent of total oil consumption.[240] Although the technical design of the former hydrogenation plants fitted in well with this pattern of consumption, the 1950s would witness a dramatic shift in West Germany's energy balance, in which the Rhine-Ruhr area and its former hydrogenation plants played a central role.

2.7 Conclusion

This chapter questioned how the Allied occupation of Germany dealt with the energy crises of the late 1940s and how and why this affected Rhine-Ruhr industries, in particular the regional oil, chemical and coal sectors. The energy crisis of the late 1940s arose at the time of the great oil deals of 1947. As Anglo-American oil companies swam in cheap Middle Eastern oil and the American market was closed to Eastern hemisphere imports, Europe was the only large market to turn to. A not insignificant aspect of the Marshall Plan was the provision of dollars to finance oil imports into Western Europe. The Marshall Plan also provided for dollars to be invested in the expansion of European refinery capacity. In West Germany, this program was preceded by the Bizonal Refinery Plan, which was a British-American plan launched in 1947 to expand Germany's oil refining capacity. Under the American energy order, West Germany was no longer expected to be dependent on coal; with the plan, the Americans aimed to solve the energy crisis of 1947 and break Germany's dependence on domestic coal at a stroke. The rapid reconstruction of

237 Weigend, 'The Problem of Hinterland', 3-7.
238 D.R. Hall, 'Impacts of economic and political transition on the transport geography of Central and Eastern Europe', *Journal of Transport Geography* 1 (1993) 20-35, here: 26.
239 Peter R. Odell, *Oil and World Power* (Harmondsworth 1986) 120-121.
240 Mineralölwirtschaftsverband e.V., 'Inlandsabsatz 1950 – 2009', in: *Jahresbericht Mineralölzahlen 2009*, 51, accessed 11 January 2013, http://www.mwv.de/upload/Publikationen/dateien/2009_JB_KL763hj1mjg3LYm.pdf

Royal Dutch Shell's Hamburg refinery and the reactivation of the hydrogenation plants between 1947 and 1949 illustrated the effort expended in expanding West Germany's refinery capacity.

The Allied authorities played a key role in providing continuity to the oil and chemical cluster that had emerged in the Nazi period in the Rhine-Ruhr area. Decommissioning the synthetic fuel and rubber plants would not have yielded the opportunities for petrochemical projects that emerged in the early 1950s. The hydrogenation plants presented foreign oil companies with an opportunity to increase their refining capacity in the major market of the Rhine-Ruhr area. This allowed Deutsche Shell, for instance, to adapt to the growing market while simultaneously dedicating its scarce resources to the reconstruction of its Hamburg refinery. The goal of the Allied authorities – to replace oil product imports with domestically produced oil products – provided the opportunity for hydrogenation plants to be reopened. Due to their technological setup, these plants were particularly well-placed to produce motor fuels.

The reactivation of the former hydrogenation plants initiated a geographical shift in the distribution of refinery capacity in West Germany. This shift was only partially on account of the expansion of the oil industry. A second important factor was the problematic development of the coal industry under the Allied occupation and the early years of the Federal Republic. Faltering production rates, postponed modernisation and mechanisation, and controlled prices hampered the ability of the Ruhr coal mining sector to deal with the subsequent energy crises of the late 1940s and early 1950s. Although it is highly doubtful whether the coal industry could have competed successfully against oil in the face of the increasing disparity between the costs of producing coal and oil in the 1950s, the condition in which the Ruhr coal industry emerged from the war and the Allied occupation certainly did not help.

Chapter 3 The transition from coal to oil, 1951-1961

3.1 Introduction

The actual transition from coal to oil transpired in the late 1950s and early 1960s. It was largely rooted in the political decision to completely open the West German market up to foreign oil, which was an opportunity that was seized by oil companies and oil traders with a view to expanding their operations in West Germany. The liberalisation of the energy market aimed to lower the cost of energy for German industry. However, the German coal sector was on the receiving end of the liberal energy policy. Indeed, from the mid-1950s onwards, it faced crises and declined under pressure from cheaper energy imports, culminating in the 1958 coal crisis. Why was oil allowed to compete freely with coal in the mid-1950s in the face of an imminent coal crisis? How did the West German energy policy of the 1950s affect the position of coal with regard to oil? What measures did the West German government take to offset the coal crisis in the 1960s, and how did these measures affect oil consumption in West Germany?

Shortages in both energy and foreign currency in the late 1940s required Western European countries to invest in oil refining capacity to substitute oil product imports for crude oil imports, which reduced the pressure on the scarcely available foreign exchange reserves.[241] Although West Germany reconstructed and even expanded its refinery capacity considerably between 1950 and 1955, the share of oil in the energy balance still amounted to only 11 per cent in 1957, as opposed to the West European average of 26 per cent. However, within 15 years, oil consumption increased to a share of 52 per cent, just shy of the West European average of 55 per cent.[242] During the 1950s, West Germany mainly consumed motor fuels (gasoline, diesel) and very little fuel oil. In 1950, oil consumption was comprised of 80 per cent motor fuels and only 9 per cent fuel oil. In 1965, however, fuel oil consumption had increased to 64 per cent of total oil consumption, while the share of motor fuels declined to 31 per cent.[243] The displacement of coal as the dominant source of energy was therefore not caused by the rise of motorisation in the 1950s and 1960s; instead, the transition took place in manufacturing, heavy industry, households and the chemical sector, which used fuel oil and residual gases and not motor fuels.

Fuel oil is a generic term to indicate a class of oil products obtained from crude oil. Whereas gasoline, jet fuel and diesel are considered to be light distillates of crude oil distillation, fuel oils consist of the range of middle to heavy distillates. Fuel oils are

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[241] Odell, *Oil and World Power*, 116.
[242] Ibid., 121-122.
[243] Minalölwirtschaftsverband, Daten zum Mineralölverbrauch, http://mwv.de/index.php/daten/statistikeninfoportal, 14.05.2009. Own calculations.

used in burners with a wide range of applications, but generally for heating, traction and, to a limited extent, the production of electrical power. Its use depends on its specifications. Fuel oil is generally categorised in five groups, but the terms light and heavy are most commonly used. Table 3-1 summarises these two types of fuel oil and their main applications.

Table 3-1. Types of fuel oil and their main applications

Type of fuel oil	Main applications
Light fuel oil	Domestic heating, small industrial furnaces
Heavy fuel oil	Shipping, industry, electrical power production

Source: P. F. Schmidt, *Fuel Oil Manual* (New York, 1985), 19-24; S.J. Rand, *Significance of Tests for Petroleum Products* (West Conshohocken, 2010), 82.

The ascent of fuel oil formed the core of energy transition in West Germany. Years of controlled, low coal prices under the ECSC had put the coal industry under strain. After price controls were lifted in 1956 and prices were allowed to rise, the coal industry hoped to make up for the losses of the years before. However, by that time, the market situation had changed dramatically. After the energy crisis of 1950-51, the Federal Ministry of Economic Affairs took a liberal economic course and initiated competition in the energy market. The reasoning behind such a step was a fear that the Ruhr coal industry was unable to overcome its structural problems and would therefore be unable to supply enough energy to sustain West Germany's economic growth. The ministry encouraged imports of US coal to solve the 1950-51 energy crisis, and in 1953 exempted fuel oil from value added tax. The aim of these measures was to force the Ruhr coal industry to adapt to a competitive energy market by rationalising and modernising the sector. However, the industry's problems were multiple, with some of them rooted deep in its history. Furthermore, the coal industry lost ground to other energy sources, most notably oil, resulting in the 1958 coal crisis that led to decades of decline for the sector.

3.2 The competition between coal and oil, 1950-1955

Initially, the competition from imported coal, mainly from the US, had the greatest impact on the position of Ruhr coal. Indeed, although US coal imports at first declined after the energy crisis of 1950/1951 subsided, imports started to rise again from 1955 onwards, increasing from 6.6 million tons in 1955 to 15.9 million tons in 1957.[244] In fact, by 1957, US coal supplied 21 per cent of the total coal deliveries in West Germany.[245] At the same time, economic growth in the country slowed down.

[244] E. Neuffer, *Der Wettbewerb zwischen Steinkohle und Heizöl auf dem westdeutschen Energiemarkt* (Tübingen 1960) 80.
[245] P. Dolata-Kreutzkamp, *Die deutsche Kohlenkrise im nationalen und transatlantischen Kontext*

In particular, between 1956 and 1958, the annual growth of West German GDP fell from 11.1 per cent in 1955 to 2.8 per cent in 1958.[246]

Table 3-2. Ruhr coal production and energy consumption, 1946-1960 (in million tons)

	(A) Ruhr coal production	(B) Primary energy consumption	(C) Ruhr coal stocks	(D) Coal stocks as pct. of coal production	(E) Coal production as pct. of energy consumption
1950	103	136			76%
1951	111	150			74%
1952	114	158			72%
1953	116	156			74%
1954	119	167			71%
1955	121	184			66%
1956	125	195			64%
1957	123	196	0.9	1%	63%
1958	122	191	12.9	11%	64%
1959	115	194	16.4	14%	59%
1960	115	212	10.5	9%	55%

Source: Ruhr coal production data from: G. Hempel, *Die deutsche Montanindustrie. Ihre Entwicklung und Gestaltung von 1900 bis 1966* (1969 [2006]) Histat nr: ZA 8262, series: 01 Steinkohlenförderung in Deutschland nach Bezirken in 1000 t (1900-1965), http://www.gesis.org/histat/de/project/details/33F343CA1BA2548666303C110F16EC53, accessed 15 February 2013. Ruhr stocks data: Hellmut von Bibra, *Absatzwirtschaftliche Untersuchung des Wettbewerbs zwischen Kohle und schwerem Heizöl in der Industrie der Bundesrepublik* (Nürnberg 1963) 45 and C. Salaske, *Deindustrialisierung und Restrukturierung –Das Ruhrgebiet im Wandel (1957 – 2007)* (Cologne 2007 Diplomarbeit) 19. Primary energy consumption data: Arbeitgemeinschaft Energiebilanzen (2009), *Energieverbrauch in Deutschland 1950 bis 2006*, Histat nr: ZA 8370, series: 'A.01 Primärenergieverbrauch im Inland nach Energieträgern (1950-2006)', http://www.gesis.org/histat/de/project/details/FD0CF7FD7ED7F24890BBBD32D25BA3C7, accessed 15 February 2013.

In response, gross energy consumption, which had been rising along with GDP, stabilised in 1957 and actually fell in 1958 by 2.7 per cent (see the dip in the series in column B of Table 3-2).[247] In order to counter overproduction, the Ruhr mines subsequently scaled it back by 7 per cent, from 125 million tons in 1956 to 115 million in 1959.[248] To make matters worse, coal piled up in the Ruhr, with stocks exploding from just 0.8 million tons in 1957 to 13 million tons, or 14 per cent of total production, in 1958.[249] Overall, the Ruhr coal mines experienced a drop in sales of

(Wiesbaden 2006) 11-12.

[246] H. Holländer und A.E. Ott, *Wachstumszyklen: über die neue Form der Konjunkturschwankungen: theoretische und empirische Beiträge* (Berlin 1973) 219.

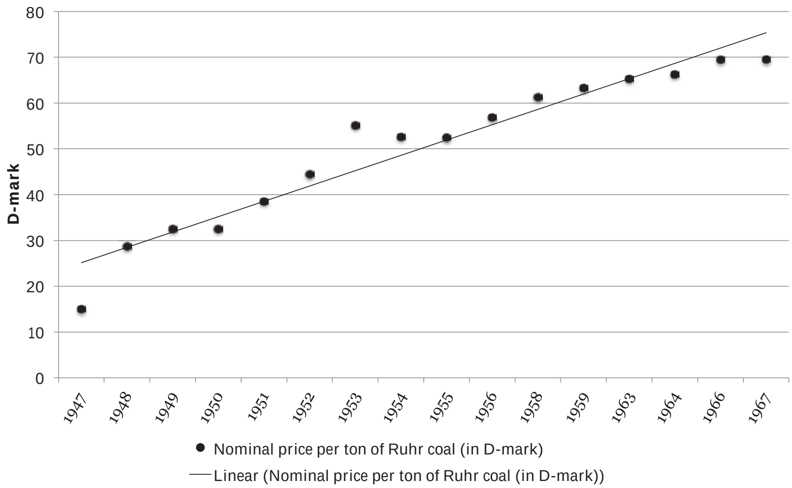
[247] A. Plitzko, *Bemerkungen zu den Wettbewerbsbedingungenzwischen Kohle und Erdöl* (Köln 1960) 11.

[248] Neuffer, *Der Wettbewerb*, 72.

[249] Ibid., 75.

almost 20 per cent of its 1956 production during 1957 and 1958. A fall in demand from the economic slowdown and the competition from cheaper US coal did not, however, lead to lower Ruhr coal prices. Indeed, Figure 3-1 shows that prices for Ruhr coal continued to rise throughout the 1950s and 1960s.

Figure 3-1 Domestic nominal Ruhr coal prices in D-mark, 1947-67.



Note: Plitzko reports prices semi-annually; these have been averaged per year. Abelshauser reports prices for some years between 1958 and 1967. Abelshauser specifies prices for Ruhr coking coal, while Plitzko only mentions Ruhr coal.
Source: A. Plitzko, *Bemerkungen zu den Wettbewerbsbedingungenzwischen Kohle und Erdöl* (Köln 1960) 47; W. Abelshauser, *Der Ruhrkohlenbergbau seit 1945: Wiederaufbau, Krise, Anpassung* (München 1984) 90.

However, more important for the future position of coal than competition from foreign imports was fuel oil. The rise of fuel oil initially went largely unnoticed, as imported coal was the Ruhr's main enemy at the time.[250] The coal sector served four main groups of users: industry (primarily steel) consumed around 50 per cent of the domestic supply of coal and coke, households 20 per cent, electricity generation 20 per cent, and transport 10 per cent.[251] However, all four groups increasingly used fuel oil during the 1950s, albeit to varying degrees, due to the extent to which the product acted as a complete substitute for coal.

The situation in the West German energy market in the early 1950s seemed to be fairly straightforward. Despite a small tax benefit for fuel oil, the federal oil tax law of 1953 mainly continued the policy of the Allied occupation, which was to encourage the substitution of oil product imports for crude oil imports. In practice, this meant

[250] F. Spiegelberg, *Energiemarkt im Wandel. Zehn Jahre Kohlekrise and der Ruhr* (Baden-Baden 1970) 30
[251] Neuffer, *Der Wettbewerb*, 88-97.

stimulating the domestic production of motor fuels and prohibiting motor fuel imports.[252] As motor fuels were not in competition with coal, the fuel oil question did not seem to be particularly pressing. Moreover, the tax and tariff system for oil that had existed since the 1930s levied such high duties on imported fuel oil that there was traditionally almost no market for fuel oil in Germany.[253] However, international attention paid to the competition between coal and fuel oil triggered interest at the West German Federal Ministry of Economic Affairs. In July 1953, the ministry's section for coal issues requested information from the oil section regarding the potential to increase supplies of fuel oil on the West German market.[254] The oil section referred the request to Friedrich Fetzer, an independent oil man with extensive experience of the German oil industry and a former supervisory board member of *Kontinentale Öl*.[255]

One of the principal worries of the ministry's coal section was whether the European refinery expansion program would lead to growing supplies of fuel oil on the German market. Fetzer responded that this should indeed be expected, since the program entailed the upgrading of European refineries into full refineries. Fuel oil was one of the principal products yielded by the processing of crude oil, and the program therefore increased the production of fuel oil in Europe.[256] However, Germany was an exception. Its refinery composition was extraordinarily skewed towards the production of motor fuels, owing in part to the large share of hydrogenation facilities in the Rhine-Ruhr area, which produced up to 90 per cent of motor fuels from crude oil and very little fuel oil. It was generally understood that in the German case, the ascent of fuel oil would not simply be a question of oil companies expanding production, but a political issue of how far the state was willing to let fuel oil compete with coal. Fetzer thus pointed out the primacy of political choice in the matter. Italian, Belgian, French

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[252] Karlsch and Stokes, *Faktor Öl*, 288.
[253] BAK, Z14/60, Bipartite Control Office, Commerce and Industry Group, 'Report on Germany's (Trizone) Oil Supplies', undated, but presumably published in 1950, section VI, 1-3.
[254] BAK, B146/1925, Wettbewerb Kohle/Heizoel, internal memo from section IIIA6 (coal) to section IVB3 (oil) regarding 'Wettbewerb Heizöl-Kohle, 2 July 1953.
[255] BAK, B146/1925, Wettbewerb Kohle/Heizoel, letter from section IVB3 (oil) to Friedrich Fetzer regarding 'Wettbewerb Heizöl-Kohle, 7 July 1953. *Kontinentale Öl* was a Nazi-inspired, privately owned venture, developed under the auspices of the Four Year Plan to amass ownership of foreign oil fields in occupied countries. In particular, the company aimed to own shares in Middle Eastern (Iraq) and Soviet oil fields in due course. Lacking an integrated oil company with access to foreign oil reserves, the Nazi state hoped that *Kontinentale Öl* would be able to gain a similar position in foreign oil production to that enjoyed by the state-owned oil companies of France and Italy (CFP and AGIP, respectively). The company was established in 1941, and the major German exploration and production companies, IG Farben, the major coal mining companies, and Deutsche Bank and Dresdner Bank all participated. Source: T. Kockel, 'Eine Quelle zur Vor- und Gründungsgeschichte der Kontinentale Öl AG aus dem Jahr 1940', *Jahrbuch für Wirtschaftsgeschichte/Economic History Yearbook* 44 (2003) 175-208, here: 175-197; Stokes, 'The Oil Industry in Nazi Germany', 255.
[256] BAK, B146/1925, Wettbewerb Kohle/Heizoel, letter from Fetzer to Boecker (section IVB3), 30 July 1953.

and Dutch refineries that were capable of churning out large volumes of fuel oil all disposed of excess capacity. Indeed, the overcapacity of Italian refineries was a particular worry for both the German government and the German oil industry.[257]

International reports on the competition between coal and fuel oil stressed the importance of the differences in pricing structure of the two materials.[258] Fuel oil prices were found to be much more volatile than coal prices, which was explained by the fact that the former was a by-product of motor fuel production, and was therefore marketed as a secondary product. Fuel oil prices thus exhibited high price volatility. Coal, on the other hand, was characterised by relatively inflexible prices and steadily rising costs. Price cuts or reduced production led to job losses, which was deemed to be highly undesirable; the oil industry, meanwhile, was much less labour intensive. The result of this difference in flexibility was that fuel oil pricing was much more responsive to changes in energy demand. In times of high demand, with high energy prices, coal had the advantage of its relatively stable prices and high levels of output. However, due to their responsiveness to demand, fuel oil prices increased sharply and were also often exacerbated by high freight rates. During economic upswings, coal thus had little to fear from fuel oil. However, it was at times of weak demand or overproduction, which was when fuel oil prices often fell below coal prices, that fuel oil posed a real threat to coal.[259]

Price was not the only factor determining the substitution rate. In general, refitting boilers to burn fuel oil instead of coal was a simple operation, although very large boilers, such as in electricity production, were not suitable for fuel oil at the time.[260] For most other industrial and private consumers, fuel oil was an attractive alternative to coal: it was easier to store, was less messy to use, allowed for a higher degree of control over temperature, and had a higher calorific value.[261] Although switching between coal and fuel oil required further investment, studies commissioned by the ECSC found that demand for fuel oil was highly elastic, with a small drop in its price relative to coal leading to large increases in its consumption.[262]

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257 BAK, B146/1925, Wettbewerb Kohle/Heizoel, memo on the meeting of the *Spiegelkomitee Mineralöl* on 16 June 1953, 17 June 1953.

258 BAK, B146/1925, Wettbewerb Kohle/Heizoel, ECSC, High Authority, minutes of the meeting on 4 June 1954 of the 'Besonderer Ausschuss für das Studium der Probleme betreffend den Schutz der Kohlenproduktion gegenüber dem Wettbewerb des Heizöls', 8-10; BAK, B146/1925, Economic Commission for Europe, Coal Committee, 'Das Verhältnis zwischen Kohle und Heizölen im westeuropäischen Brennstoffmarkt', 10 July 1954.

259 BAK, B146/1925, Economic Commission for Europe, Coal Committee, 'Das Verhältnis zwischen Kohle und Heizölen im westeuropäischen Brennstoffmarkt', 10 July 1954, 34-37.

260 B. Lehbert, 'Beitrag zum Problem der ökonometrischen Bestimmung einer Substitutionselastizität', *Weltwirtschaftliches Archiv* 83 (1959) 75-92, here: 77.

261 Ibid., 75-77.

262 B. Lehbert, 'Ökonometrische Bestimmung der Substitutionselastizität zwischen Steinkohle und Heizöl in der Industrie der Bundesrepublik Deutschland', *Weltwirtschaftliches Archiv* 85 (1960) 318-332, here: 330-332.

The pricing differences between coal and fuel oil were to a large extent inescapable. With the rise of motorisation, motor fuel demand could also only rise, increasing the output of European refineries. As an increase in motor fuel production would automatically lead to an increase in fuel oil production, the amount of fuel oil looking for markets in Europe also steadily rose. It was thus up to governments to devise rational market policies to secure the long-term stability of the fuel supply, while mitigating the potentially disastrous effect of fuel oil competition on the coal industry.[263] However, the coal and oil sectors had diametrically opposed approaches to this dilemma. The oil industry wanted a level playing field, while its coal counterpart demanded protection. The choice between protection and competition was a political one, and for the German market was made by the federal government, in particular the Federal Minister of Economic Affairs Ludwig Erhard. Erhard was a convinced liberal, but not a believer in unbounded capitalism.[264] His political ideas were shaped in the world economic crisis of the 1930s, during which the idea of a social market economy was developed as an alternative to Keynesianism, or outright state interventionism as practiced by the Nazi regime. The concept of the social market economy was based on classical liberalism, but acknowledged a role for the state to ensure that the market produced its potential for the common good. Its proponents became known as ordoliberals. In the words of Alexander Rüstow, one of the principal founders of ordoliberalism: "[state intervention] is not directed against the laws of the market but goes along with them, is not aimed at preserving the old but to bring about the new, not to slow down but to precipitate the natural course of things."[265] This quote contains the core of the ordoliberalist approach to the competition between coal and oil: instead of preserving the coal industry by state intervention, he chose to guide its adaptation.

According to Erhard, West Germany required the lowest possible energy costs, and the operation of the market was the appropriate instrument to safeguard this in the long run. Erhard argued, "[t]he competition between energy sources that we pursue will result in a more efficient energy supply in the long run."[266] Exempting fuel

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[263] BAK, B146/1925, Economic Commission for Europe, Coal Committee, 'Das Verhältnis zwischen Kohle und Heizölen im westeuropäischen Brennstoffmarkt', 10 July 1954, 38.
[264] H.G. Schröter, *Americanization of the European Economy. A compact survey of American economic influence in Europe since the 1880s* (Dordrecht 2005) 58.
[265] W. Abelshauser, *Deutsche Wirtschaftsgeschichte seit 1945* (Bonn 2004) 94-100. Quote obtained from page 95; the original quote reads: "ein Eingriffen in genau der entgegengesetzten Richtung, als in der bisher eingegriffen worden ist [by the Nazi regime], nämlich nicht entgegen den Marktsgesetzen, sondern in Richtung der Marktgesetze, nicht zur Aufrechterhaltung des alten, sondern zur Herbeiführung des neuen Zustandes, nicht zur Verzögerung, sondern zur Beschleunigung des natürlichen Ablaufs. […]".
[266] Quoted in: M. Horn, *Die Energiepolitik des Bundesregierung von 1958 bis 1972: Zur bedeutung der Penetration ausländischer Ölkonzerne in die Energiewirtschaft der BRD für die Abhängigkeit interner Strukturen und Entwicklungen* (Berlin 1977) 201. Original quote: "Die von uns geförderte Konkurrenz der Energieträger untereinander wird auf die Dauer zu einer besseren und wirtschaftlichen

oil from import duties in 1956 was in line with that policy. On the other hand, the federal government offered the coal industry structural subsidies if it would keep prices in check. However, the Ruhr coal price increase of 1957 strengthened the government's commitment to forcing the adaptation of the Ruhr coal industry through the market.[267]

Erhard's policy was controversial, even within the federal government. The centrality of energy in Erhard's policies put him in direct confrontation with the coal industry. Erhard saw the continued inability of the sector to modernise and rationalise as the central bottleneck to the stable growth of the West German economy. His energy policy sought to address that problem.[268] Combined with the economic situation after the Suez Crisis, the liberal avenue pursued by the federal government triggered an increase in the inflow of cheap fuel oil between 1956 and 1958. The sudden awareness of both politics and business of the coal crisis that was emerging elicited a strong reaction that countered the initial trend of the liberalisation of the energy market in Germany. However, the long-term effect of the competition between coal and fuel oil in the late 1950s could not be stemmed: coal descended into a prolonged crisis and declined, while oil enjoyed a decade of unprecedented growth.

3.3 The rise of fuel oil and the 1958 coal crisis

During the years of 1957-59, fuel oil consumption rose considerably, while Ruhr coal production and sales fell. Overall, fuel oil consumption in West Germany increased more than eight-fold between 1954 and 1959, from 1.2 to 10 million tons (Table 3-3). Due to a limited domestic production capacity for fuel oil (the refineries were primarily designed to produce motor fuels), the amount of it that was imported grew faster than its domestically produced counterpart between 1954 and 1958, comprising up to around 60 per cent of consumption in the 1956-58 period.

Energieversorgung führen."

[267] Abelshauser, *Deutsche Wirtschaftsgeschichte*, 202.

[268] Nonn, *Die Ruhrbergbaukrise*, 40-41.

Table 3-3. Fuel oil consumption and imports in West Germany, 1954-1959

	Consumption (in mln tons)	**Imported** (in mln tons)	**Imported** (in pct. of total)
1954	1.2	0.4	33
1955	2.0	1.2	60
1956	3.8	2.4	63
1957	4.9	3.1	63
1958	7.5	4.4	59
1959	10.0	3.5	35

Source: E. Neuffer, *Der Wettbewerb zwischen Steinkohle und Heizöl auf dem westdeutschen Energiemarkt* (Tübingen 1960), Tabellenanhang, tables 34 and 35.

In 1958, the two largest consumers of fuel oil were households, which consumed around 40 per cent, and raw material industries (minerals, oil refining, foundries, steel works, metal processing), which consumed around 50 per cent.[269] As a result of the urban conglomerations and the high share of the raw material industries, North Rhine Westphalia was the largest consumer of fuel oil in West Germany, even though its industries were not among the most comprehensive adopters of the product because of the availability of cheap coal.

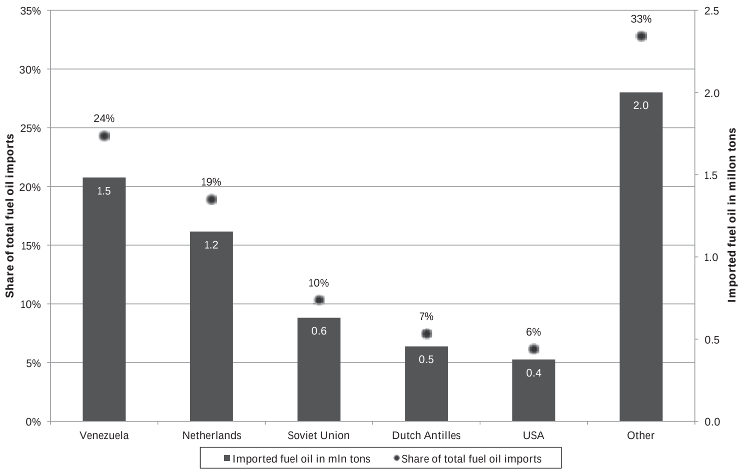
So, what explains the rise of fuel oil? Two matters played a significant part: the price development of fuel oil and that of Ruhr coal. The price of the former in the 1950s was primarily determined by two factors. The first of these was the West German fiscal measure to encourage the use of fuel oil in the wake of the 1950/1951 energy crisis. Out of a fear of a structural energy gap, the federal government exempted fuel oil from the federal oil tax (*Mineralölsteuer*) in 1953 and from import duties in 1956.[270] A contributing factor was the Suez Crisis, which set in motion a number of developments that had a downwards effect on fuel oil prices in West Germany. During the Suez Crisis, oil companies scrambled to replace Middle Eastern oil with oil from other sources, for instance Venezuela. Increased production, delivered on medium-term supply contracts, continued after the end of the Suez Crisis in mid-1957, leading to an oil glut on the world market and depressed prices. Furthermore, stocks amassed in response to the crisis were released again in mid-1957, adding to the glut of oil products on the market. This surplus of fuel oil on the world market coincided with a temporary drop in the otherwise rising demand for energy in West Germany. Caused by the economic slowdown of 1956-1958, the energy demand fell by more than 3 per cent in 1958. However, import contracts for fuel oil had been closed on the expectation of a rising energy demand and caused a surplus of supply on the German market.[271] Finally, tanker freights, which had tripled between

[269] Neuffer, *Der Wettbewerb*, 91-92; Plitzko, *Bermerkungen*, 27.
[270] Spiegelberg, *Energiemarkt im Wandel*, 41.
[271] P. Bennecke, 'Das Kohle-Öl Kartell', *Glückauf. Bergmännische Zeitschrift* 95 (1959) 8, 471-473, here:

1954 and 1956, again declined rapidly in 1957 and 1958. Spot tanker freights per ton from the Persian Gulf to German North Sea ports rose from 44 US dollars in 1954 to 152 US dollars in 1956, before falling again to 119 US dollars in 1957 and around 30 US dollars in 1958 and 1959.[272] A further factor having an impact was the increased refinery capacity in the Caribbean, the Netherlands and Italy in the 1950s. A considerable proportion of the production of these countries was exported: in the Caribbean case mainly to the US, but also to Europe, and in the case of the Netherlands and Italy within Europe.[273] Rising exports from the Soviet Union also became important for West Germany.

Figure 3-2 shows the top five origins of fuel oil imports in West Germany from January 1958 to May 1959. In this period, West Germany imported a total of 6.1 million tons of fuel oil from 23 different countries. Figure 3-2 highlights that two thirds of the imports originated from just five countries: Venezuela (24 per cent), the Netherlands (19 per cent), the Soviet Union (10 per cent), the Dutch Antilles (7 per cent) and the USA (6 per cent). These factors translated into continuously declining prices in 1957 and 1958 for both heavy (Figure 3-3) and light fuel oil (Figure 3-4).

Figure 3-2. Fuel oil imports in West Germany, January 1958 – May 1959



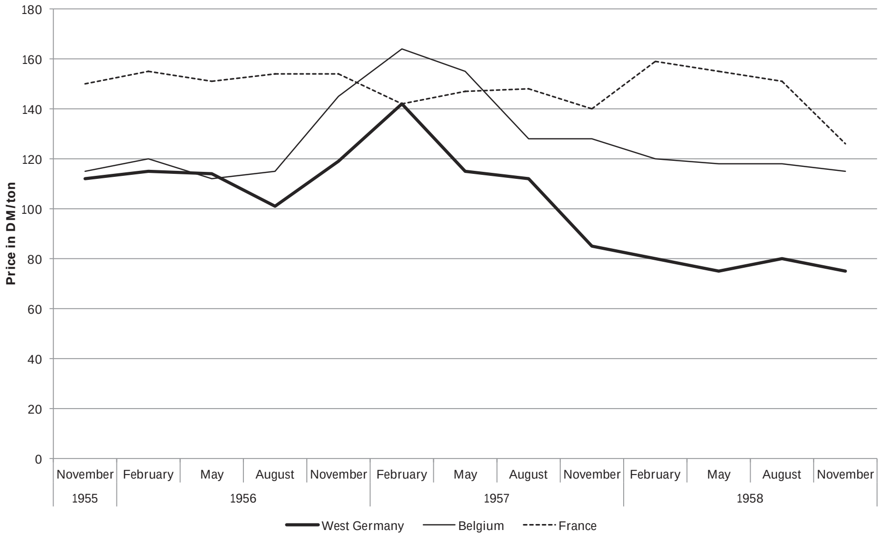
Source: B 102/14539 1 von 2, Konkurrenz zwischen Kohle und Heizöl, 1958-1961, Section IV B 3, Heizöl-einfuhren nach sorten und Herstellungsländer, Kalenderjahr 1958

471.

[272] Plitzko, *Bemerkungen*, 53, 56.

[273] P. Odell, *An Economic Geography of Oil* (New York 1963) 142-143, 162-164.

Figure 3-3. Heavy fuel oil prices, 1955-1958 (in DM per ton)

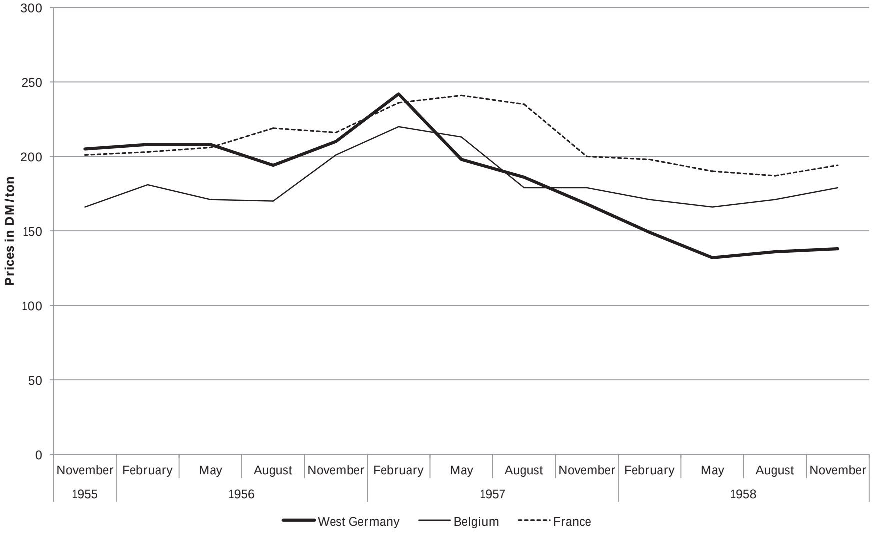


Source: E. Neuffer, *Der Wettbewerb zwischen Steinkohle und Heizöl auf dem westdeutschen Energiemarkt* (Tübingen 1960) 60. The prices for BRD are: consumer prices in Hamburg; for Belgium, ex tank car in Brussels; and for France, consumer prices in Le Havre.

The pattern is similar in both Figure 3-3 and Figure 3-4. Prices in 1955 were already lower than in neighbouring countries – except for light fuel oil. The prices for both light and heavy fuel oil responded strongly to the price increases during the Suez Crisis between November 1956 and May 1957. Coinciding with the winter season, stock piling in response to the crisis drove up world prices. However, when the crisis subsided, prices in West Germany fell much more between May 1957 and November 1958 than they did in neighbouring countries.

Plitzko explained this as the increasing competition between oil companies, independent oil traders and coal traders in West Germany. The independent oil and coal traders were comprised of two groups who were active on the heating fuel market. The first group was comprised of the large numbers of independent traders that supplied coal to smaller industries and households. These traders increasingly entered the market for fuel oil in order to retain customers who wanted to switch from coal to this product.

Figure 3-4. Light fuel oil prices, 1955-1958 (in DM per ton)



Source: E. Neuffer, *Der Wettbewerb zwischen Steinkohle und Heizöl auf dem westdeutschen Energiemarkt* (Tübingen 1960) 61. The prices for BRD are: consumer prices in Hamburg; for Belgium, ex tank car in Brussels; and for France, consumer prices in Le Havre.

The second group consisted of the marketing branches of the big coal firms in the Ruhr area. In an attempt to protect their customer relations, these companies became heavily involved in the fuel oil trade. Indeed, major coal companies held up to 40 per cent of the light fuel oil market and were also involved in the heavy fuel oil trade. These coal firms were the third largest distributor of fuel oil, just behind Esso AG (the German subsidiary of Jersey Standard) and Deutsche BP.[274] Statistics for 1957 reported total fuel oil imports of 3.1 million tons, of which 1.9 million tons were imported by oil companies, 0.6 million by coal companies and 0.6 million by independent companies, part of which was also sold on to coal companies.[275] All of the major coal firms were involved in trading fuel oil.[276]

The glut of fuel oil on the world market found its way, through Caribbean refiners and countries in the Eastern bloc among others, to these (independent) fuel

[274] 'Heizöl contra Kohle', in: Der Spiegel, 4.06.1958, p. 27; Plitzko, *Bemerkungen*, 63-64.
[275] BA Koblenz, B 102/14538, Konkurrenz zwischen Kohle und Heizöl, 1958-1961, internal memo from Abt. III 6 A to Abt. III (Dr. Obernolte), I B 1 (Caspari) and IV B 3 (Ministerialrat Kling), 'Betr: Heizölimporteure', 14 March 1958. The complete list reads: Klöckner & Co., Abt. Chemie, Duisburg, Rheinpreussen GmbH, Homberg, Raab Karcher GmbH, Frankfurt am Main, Hugo Stinnes GmbH, Mülheim-Ruhr, Gebr. Röchling, Mannheim; Hansa-Öl GmbH, München, Haniel's Handelsges. mbH, München, M. Stromeyer Lagerhausges., Mannheim, Kohlenwertstoff GmbH, Mannheim, Süddeutsche Kohlenhandelsges. mbH, München, Lindauer Brennstoffvertrieb GmbH, Lindau/Bodensee and Brenntag GmbH, Mulheim-Ruhr.
[276] Klöckner, Rheinpreussen (Haniel), Raab Karcher (Gelsenkirchener Bergwerks) and Stinnes

traders.[277] Oil companies responded by lowering prices for fuel oil, which triggered a price war that sent German prices for both heavy and light fuel oil spiralling down, much faster than in neighbouring countries. From the mid-1950s onwards, oil companies were in the process of planning to construct new refineries in the Rhine-Ruhr area that had a considerable fuel oil production capacity to meet the potential rise in demand. The first refinery to open, in late 1958, was that of Esso AG near Cologne, with Deutsche Shell following in 1960. However, the post-Suez price gap was threatening to overtake their plans, as other parties were entering the fuel oil market with competitive prices.[278]

The second element explaining the rise of fuel oil was the development of coal prices. Ever since the late 19th century, Ruhr coal pricing was conducted by coordination (first cartels, later the government) rather than through the market. This situation endured until ECSC-listed prices were abolished in April 1956. However, even then, prices were controlled by both a limited number of marketing organisations that were coordinating sales and government interference aimed at holding coal prices down to stimulate industrial growth.[279] Notwithstanding steady coal price increases since 1948, Ruhr coal mines suffered losses throughout the 1950s.[280] Coal prices went up and up because a shortage of labour led to rising costs of employment, regardless of the business cycle.[281]

The result of both of these price developments was that heavy and light fuel oil became cheaper than coal, not only in Hamburg, where the majority of imported oil products were traded, but also in Frankfurt and Munich, where fuel oil prices declined below coal prices in 1959 due to the difference in energy content per ton. Expressed in heat equivalence prices, fuel oil became cheaper than coal in virtually every area in West Germany.[282] Indeed, the country had become the dumping market for fuel oil, largely because domestic refineries produced little fuel oil and hitherto uncontested markets could now be successfully challenged.

The long-term effect of the increasing competition between coal and fuel oil in the late 1950s is set out in Figure 3-5. Between 1955 and 1970, Ruhr coal production declined from 120 million tons to around 90 million tons, while crude oil imports increased to around 100 million tons in the same period. Fuel oil consumption, meanwhile, rose from only 2 million tons in 1955 to 75 million tons in 1970. During the 1960s, oil overtook coal as the largest supplier of energy in West Germany.

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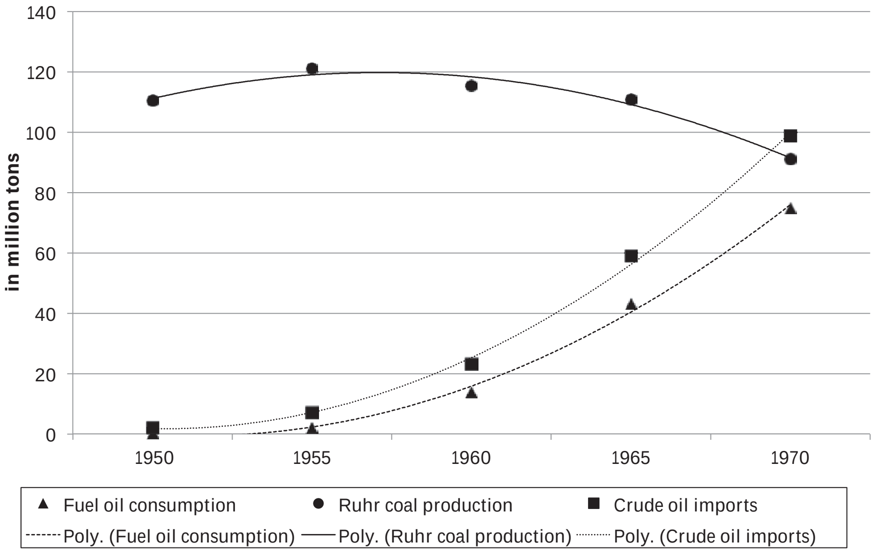
[277] Plitzko, *Bemerkungen*, 63-64.
[278] Neuffer, *Die Wettbewerb*, 275.
[279] Neuffer, *Der Wettbewerb*, 176-179.
[280] Neuffer, *Der Wettbewerb*, Tabellenanhang, Table 24 contains net loss calculations per ton of coal submitted by the Unternehmensverband Ruhrbergbau; Plitzko, *Bermerkungen*, 47.
[281] Nonn, *Die Ruhrbergbaukrise*, 37-39.
[282] Plitzko, *Bemerkungen*, 70.

Figure 3-5. Fuel oil consumption and Ruhr coal production, 1950-1970



Source: Fuel oil and crude oil data taken from Mineralölwirtschaftsverband e.V., 'Inlandsabsatz 1950-2008' and 'Rohöl-Versorgung 1950-2008', in: *Jahresbericht Mineralölzahlen 2009*, 27, accessed 11 January 2013, http://www.mwv.de/upload/Publikationen/dateien/2009_JB_KL763hj1mjg3LYm.pdf. Ruhr coal data taken from: Neuffer, *Die Wettbewerb*, 72 (for 1950); Horn, *Die Energiepolitik*, 73 (for 1955-1970). The trend lines are polynomials.

Notwithstanding the findings of a number of European studies on the competition between coal and oil, the Ruhr coal industry was unprepared for the energy transition that unfolded after 1956. Indeed, in the full conviction that industrial production would grow unabatedly and coal would remain scarce, it increased prices throughout the late 1950s. The sudden slackening of the demand for coal and the growth of coal stocks in 1957-1959 thus came as a shock.[283]

The coal crisis of 1958 was the tipping point for the sector, although the experience was not limited to the Ruhr area.[284] The competition with US coal brought to bear the inability of the Ruhr coal industry to be flexible in its response to market conditions. Its massive production apparatus and preoccupation with keeping miners at work caused the sector in the Ruhr to demand protective measures, which duly followed in the form of the imposition in September 1958 of an import tariff of 20 DM per ton on coal imports from non-ECSC countries.[285] However, the decline could not be halted, and between 1958 and 1969 production decreased by 30 per cent.

[283] Abelshauser, *Der Ruhrkohlenbergbau*, 89.
[284] R. Leboutte, 'A space of European de-industrialisation in the late twentieth century: Nord/Pas-de-Calais, Wallonia and the Ruhrgebiet', *European Review of History* 16 (2009) 755-770, here: 761.
[285] Karlsch and Stokes, *Faktor Öl*, 311.

Over the same period, both the numbers employed in the industry and the number of mine shafts fell by 59 per cent.[286] This decline was the result of a state-initiated rationalisation process that limited production to the most productive mines. The West German government attempted to guarantee demand for 140 million tons of coal annually for all of the country's coal mines by making the German coal sector the exclusive supplier to the steel and electricity producing industries. Both the West German and North Rhine Westphalian governments awarded massive subsidies to finance mechanisation, allow incomes to rise, provide schooling and an income for the unemployed, and subsidise coal prices.[287]

3.4 Stemming the tide: attempts to limit the rise of fuel oil

After restricting imports of US coal, the next challenge for the federal government was to deal with the coal crisis. In December 1958, Helmut Burckhardt, the chairman of the employers federation of the Ruhr coal mining industry called for a higher tax on fuel oil of 30 DM per ton.[288] This provoked protests from a number of German industries within which fuel oil was consumed in growing proportions. A higher fiscal burden on fuel oil would thus increase their energy costs.[289] The opposition to higher taxes on fuel oil came from various directions, including from the Cologne Chamber of Commerce, which claimed that a fuel oil tax would be detrimental to the firms that had invested in switching from coal to fuel oil. The chamber asked Erhard not to burden these companies with "dirigiste measures" [sic], as they had "trusted in the workings of the social market economy by switching to fuel oil".[290]

Erhard was susceptible to such pleas. After all, his aim was to increase German competitiveness and output by reducing the costs of energy. Taxation would clearly have been detrimental to that effort, because it directly increased the costs of energy inputs for German industry. Consequently, rather than taxing fuel oil, Erhard favoured the self-regulation of the industries involved. Along with the coal and oil

[286] H.G. Steinberg, (1985 [2005]) *Das Ruhrgebiet im 19. und 20. Jahrhundert: Bevölkerungsentwicklung, Erwerbstätige, Bergbau und Großeisenindustrie*. GESIS Köln, Deutschland ZA8073 Datenfile Version 1.0.0. http://www.gesis.org/histat/de/project/details/A3A29BDE106D2A29B8E2A494CB8AA602, accessed 15 February 2013.
[287] A. D. Neu, 'Subventionen ohne Ende? Steinkohlenbergbau und Energieverbrauch in Deutschland', Kieler Diskussionsbeiträge, No. 248 (1995), http://hdl.handle.net/10419/479906-11; Abelshauser, *Ruhrkohlenbergbau*, 105-117, 218-219.
[288] BA Koblenz, B 102/14538, Konkurrenz zwischen Kohle und Heizöl, 1958-1961, letter from Burckhardt to Erhard, 3 December 1958.
[289] BA Koblenz, B 102/14538, Konkurrenz zwischen Kohle und Heizöl, 1958-1961, telex from Verband der Chemische Industrie and others to Ministers of EA, Finance and the Bundeskanzler, 'Betr.: Belastung des Heizöls', 28 November 1958. Other signatories included: Vereinigung Deutscher Elektrizitätswerke, Bundesverband Glasindustrie and other industries such as ceramics, minerals, textiles and paper manufacturers.
[290] BA Koblenz, B 102/14538, Konkurrenz zwischen Kohle und Heizöl, 1958-1961, letter from Industrie- und Handelskammer zu Köln, 'Betr.:,Kohle/Heizöl, 3 December 1958, 3.

industry, Erhard thus condoned the founding of "the largest private cartel in Europe", the Coal-Oil Cartel (*Kohle-Öl-Kartell),* on 22 December 1958.[291] The establishment of the cartel came at a curious time, because West Germany had just adopted the anti-trust law of January 1958.[292] Anti-trust legislation had been one of the pillars of US policy towards Europe after 1945.[293] Germany was the first of the Western European nations to commit to anti-trust legislation, largely because it had extensive experience in dealing with anti-trust matters under American occupation.[294] After a prolonged and heated debate between German industry and conservative political factions on the one hand, and Adenauer, Erhard and ordoliberal academics such as Walter Eucken and Franz Böhm on the other, the West German government implemented anti-trust legislation. A staunch ordoliberal, Erhard had been in favour of adopting the new laws, but the imminent coal crisis forced him to temporarily exempt coal and oil companies to allow them to sort out the fuel oil market.

The participants in the new cartel were the largest producers and marketers of fuel oil: the largest coal companies in the Ruhr and Aachen areas on the one hand, and Germany's largest oil firms on the other.[295] The duration of the cartel was set at two years, and the members committed themselves to selling heavy fuel oil at world market prices to end the price war and allow the coal industry to rationalise and modernise under stable market conditions.[296] The oil companies promised not to expand their market share for the duration of the cartel,[297] because Erhard's plea to refrain from further price competition brought about the realisation that an escalation of the coal crisis would be detrimental to all of the parties involved.[298] Independent traders did not, however, take part, as participation was voluntary.

The major coal and oil companies had a clear incentive to stabilise the fuel oil market. By the mid-1950s, the major oil firms and the former hydrogenation plants in the Rhine-Ruhr area noted the rising demand for fuel oil and started planning to

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[291] I. E. Schwartz, 'Antitrust Legislation and Policy in Germany. A Comparative Study', *University of Pennsylvania Law Review* 105 (1957) 617-690, here: 656; SPD Pressemitteilung Nr. 108.1958 vom 15.12. 1958, 'Betrifft: Kohle-Öl-Kartell. Nach Pressemitteilungen soll geplant sein, ein Krisen-Kartell Kohle - Öl zu beantragen. Dazu erklärt der Wirtschaftsexperte der SPD, Dr. Heinrich Deist. http://library.fes.de/cgi-bin/digibert.pl?id=005088&dok=1/005088, accessed 13 February 2013.
[292] T.A. Freyer, Anti-Trust and Global Capitalism, 1930-2004 (New York 2006) 264.
[293] B. Wubs and L. Segreto, 'Resistance of the Defeated: German and Italian Big Business and the American Antitrust Policy, 1945–1957', *Enterprise and Society* 15 (2014) 3; Maier, 'The politics of productivity', 607-633.
[294] Freyer, *Anti-Trust*, 281.
[295] Bennecke, 'Das Kohle-Öl Kartell', 471. The coal companies comprised *Eschweiler Bergwerksverein* (Aachen), *Gelsenkirchener Bergwerks AG*, and *Bergwerkgesellschaft Hibernia AG*; the oil companies consisted of *BP Benzin und Petroleum AG*, *Deutsche Shell AG*, *Esso AG*, *Mobil Oil AG* and *Deutsche Erdöl AG*.
[296] Karlsch and Stokes, *Faktor Öl*, 312; Horn, *Die Energiepolitik*, 245.
[297] 46. Kabinettssitzung am 8. Dezember 1958 (Kabinettsprotokolle der Bundesregierung online), '[A.] Lage des Steinkohlenbergbaues'.
[298] Abelshauser, *Ruhrkohlenbergbau*, 104.

increase their refining capacity to meet it. Esso AG, Deutsche Shell and Deutsche BP planned to construct new refineries in the Rhine-Ruhr area to maximise fuel oil production, which started in 1959 and 1960. The design of these refineries differed from those in Hamburg. The latter typically contained cracking installations that transformed heavy oil fractions into light oil products (motor fuels). The new refineries in the Rhine-Ruhr, however, typically lacked cracking installations because they aimed to maximise the yield of fuel oil instead of transforming it into motor fuel. Indeed, the fuel oil yield of the Hamburg refineries was typically around 20 per cent, while that of the Rhine-Ruhr refineries was 50-60 per cent.[299]

The former hydrogenation plants also planned to add new capacity, which was particularly aimed at increasing their output of fuel oil.[300] Up to 1958, the former hydrogenation plants had primarily produced motor fuels under the protection of the so-called *Hydrierpräferenz*, which was a tax break specifically for these plants. This premium allowed these plants to produce high volumes of motor fuels, which proved to be valuable during the Suez Crisis, when these were in short supply. The premium thus equalised the higher production costs of hydrogenated motor fuels. However, the 1958 treaty that established the European Economic Community harmonised external tariffs and abolished the levying of import duties between EEC member states. The German system of protecting the domestic production of oil products, including the *Hydrierpräferenz*, was thus no longer tenable under the EEC treaty. This forced the hydrogenation plants to shift their production programs from motor fuels to fuel oil, which occurred in the late 1950s and early 1960s and greatly increased the volume of fuel oil on the West German market in the latter decade. The EEC treaty allowed West Germany to extend the *Hydrierpräferenz* for six years until 1964 to give the hydrogenation plants time to adapt.[301] Although these plants were already contemplating expansion prior to 1958, the actual treaty of that year suddenly increased the importance to them of the fuel oil market enormously.

Notwithstanding the careful planning of the oil companies, fuel oil consumption increased rapidly in 1956 and 1957, and the firms thus needed to adjust their projections continuously. Deutsche Shell's projections for its required extra production capacity in 1964 rose from 1.4 million tons in 1955 to 4.5 million tons in 1957. The amount of fuel oil in these projections increased from 60 per cent in 1955 to over 90 per cent in 1957.[302] The growing demand in 1956 and 1957 was primarily

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[299] W. Pruskil, *Geographie und staatsmonopolistischer Kapitalismus: zu den Auswirkungen auf die Standortverteilung der erdölverarbeitenden Industrie Westdeutschlands* (Gotha 1971) 45, 156-175.
[300] SHA, Archive of Manufacturing department (MF), inv. no. 48, file: Installations/Germany / Godorf: Budget Revision, Return no. 513, 15 March 1957, 2.
[301] Karlsch and Stokes, *Faktor Öl*, 308-309.
[302] SHA, inv. MF, nr. 48, Installaties/Algemeen-Godorf/Installaties/Duitsland/Godorf/Algemeen, memo Deutsche Shell regarding 'Planung neue Raffinerie im Rheinland', 7 June 1956; letter Van Drimmelen to Hofland, regarding 'Purchase of a site for a new refinery in the Rhineland', 28

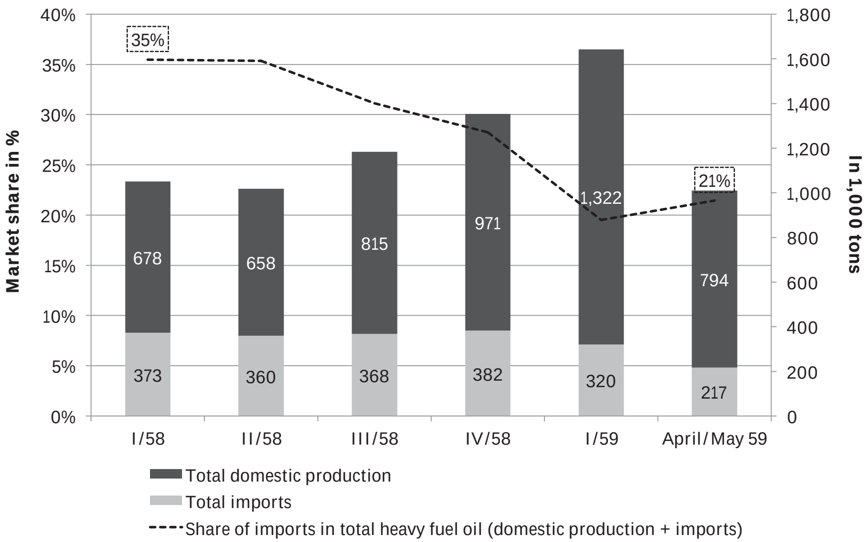
covered by imports (Table 3-3). The price reductions in the wake of the Suez Crisis caused a surge in demand, further increasing the volume of imported fuel oil in 1958. The major oil companies responded to this by unleashing a price war to protect their markets in West Germany. However, a race to the bottom in the fuel oil market promised no profitable future for their new refineries. Their business cases were particularly built on fuel oil to repay the vast amounts of capital laid out for these new refineries. Not competing with independent traders – who operated freely outside the cartel – for the fuel oil market was not an option either, as a loss of market share would later have to be regained when the new refineries started production. The oil companies thus had a strong incentive to bring order to the market and to attempt to retain or even expand their share of it. The expansions of the former hydrogenation plants were a similar incentive for the coal companies, whose capital positions were much more precarious than those of the oil firms. Moreover, the coal situation itself required action, with the coal companies needing to stop the decline of their industry and protect their fuel oil production at the former hydrogenation plants of Gelsenberg-Benzin and Scholven.

The cartel proved to be a spectacular failure; on 13 August 1959, after only nine months, Esso AG unilaterally dissolved it. *Der Spiegel* reported that Esso's market share in the fuel oil market before the cartel was 35 per cent, but by August 1959 it was below 25 per cent.[303] The position that Esso AG claimed to have lost was not, however, as dramatic as it sounded, if indeed it was true at all.

December 1955; Budget Revision, supplementary projects - manufacturing, 15 March 1957.

303 'Löcher im Kartell', in: *Der Spiegel*, 12 August 1959, 30-31.

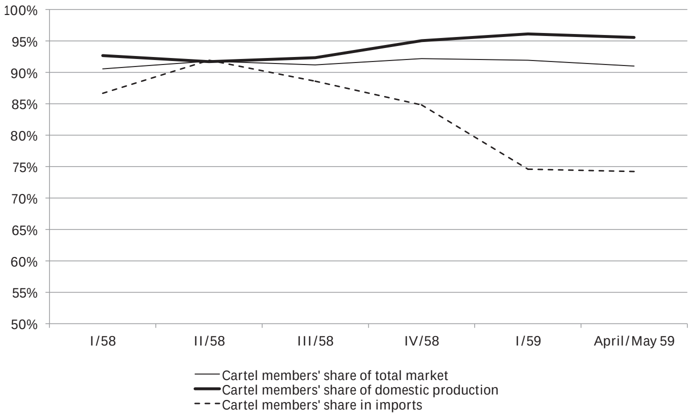
Figure 3-6. Heavy fuel oil production and imports in West Germany, 1958-59.



Note: The graph depicts the volume of heavy fuel oil sold in West Germany from the first quarter of 1958 to April/May 1959. The total marketed volume comprises both domestic production (dark columns) and imports (light columns). The dotted line is the share of imports of total marketed heavy fuel oil.
Source: B 102/14539 1 von 2, Konkurrenz zwischen Kohle und Heizöl, 1958-1961, memo (section IV B 3), 'Betr: Entwicklung der Marktanteile von Firmengruppen nach ihrer Kartellzugehörigkeit für schweres Heizöl', 1 August 1959. Own calculations.

Figure 3-6 shows that as the total volume of heavy fuel oil marketed in West Germany increased in 1958 and 1959, the share of imports dropped, from 35 per cent in the first quarter of 1958 to 21 per cent in April/May 1959. A calculation of the respective market shares of cartel members and non-members (Figure 3-7) reveals that the overall market share of the cartel members remained unchanged after the inception of the cartel in the fourth quarter of 1958 through to the second quarter of 1959. The cartel members even strengthened their position in domestically produced heavy fuel oil. The only significant change in market share was for imports, where outsiders gained almost 20 percentage points to the detriment of the cartel members.

Figure 3-7. The market shares of the cartel members, 1958-1959.



Source: B 102/14539 1 von 2, Konkurrenz zwischen Kohle und Heizöl, 1958-1961, Memo (section IV B 3), 'Betr: Entwicklung der Marktanteile von Firmengruppen nach ihrer Kartellzugehörigkeit für schweres Heizöl', 1 August 1959. Own calculations.

However, imports became less important as domestic production in West Germany picked up in early 1959, when the Esso AG refinery near Cologne, which was the first of the new fuel oil refineries in the Rhine-Ruhr area, became operational. The increased domestic production put Esso AG in a better position to compete with independent fuel oil traders and integrated competitors alike. The cartel had thus become an obstruction rather than a solution.

The cartel certainly failed to provide stability in the heavy fuel oil market; after it was dissolved, heavy fuel oil prices declined to as low as DM 48 per ton (almost half the cartel's official price), as the new refineries in the Rhine-Ruhr area attempted to regain (or expand) their market share.[304] The price gap between coal and fuel oil increased throughout 1958 and 1959.[305] In early 1960, heavy fuel oil prices were between DM 14 and DM 27 per ton less than coal prices throughout West Germany.[306] It was thus clear that the cartel had not achieved its goal and that an alternative had to be found. On the day the cartel was dissolved, Erhard responded by proposing a sales tax of DM 30 per ton on all types of fuel oil. The proposal met with fierce resistance from both the oil industry and non-coal producing German states. The latter bargained the proposed tax down to 25 DM per ton for heavy fuel oil and only 10 DM for light fuel oil. The tax was finally imposed seven months later, but changed little in terms of the rising demand for fuel oil, although the tax revenue was used to subsidise the reductions in work hours that became a daily practice in the

[304] Neuffer, *Der Wettbewerb*, 276.
[305] Horn, *Die Energiepolitik*, 72; Neu, *Subventionen*, 5-6.
[306] Neuffer, *Der Wettbewerb*, Tabellenanhang, tabelle 41.

Ruhr area.[307] Simultaneously, the establishment of the EEC opened West Germany up for imports of fuel oil from EEC member states like the Netherlands and Italy.[308] The creation of the EEC liberalised the West German oil market and limited the policy options for the country's government to intervene in the fuel oil market. West Germany was allowed to maintain its fiscal regime with regard to the oil industry until 1964. After that year, the stakes of France, the Netherlands, Belgium and Italy in the West German oil market were too great to allow West Germany to continue with its interventions in the German energy market.[309] As an alternative, the West German government agreed a system of self-limitation (*Selbstbeschränkung*) with the oil industry. In practice, this was a quota system.

The quotas were set in advance according to a set distribution formula. The effect of the voluntary quota system was a stabilisation of fuel oil prices. This was not only in the interests of the coal industry, but also those of the oil sector. Due to superfluous supply, fuel oil prices had been falling since the late 1950s. Although this had fostered an enormous demand for fuel oil, it had also depressed the oil industry's profit margins. Both of these interests seemed to be served by the quota system, although it also functioned as a barrier to entry for newcomers. The effectiveness of the system varied. For heavy fuel oil, the number of buyers was limited to heavy industry, which proved to be quite manageable. The much larger market for home heating proved to be much less controllable. Although the quota system allowed annual growth of the light fuel oil market of 4 per cent, the real growth rate was around 8 per cent throughout the 1960s, as independent traders and coal industry sales organisations active in the light fuel oil market often exceeded the quota limits.[310] Under pressure from industry, the quota system was revised in 1968, when the allowed annual growth rate for light fuel oil was increased to 8 per cent, and effectively ended in 1970.[311]

The effects of the competition between coal and oil were therefore most notable in the domestic heating market, which was still the largest market segment for West German coal in 1960 with 60 million tons or 43 per cent of total production. By 1975, the importance of the heating market for the German coal industry had shrunk to around 15 million tons (around 15 per cent of total production), and trailed such markets as the steel industry, electricity and even exports.[312] During the attempts of Erhard to regulate heavy fuel oil in the 1950s, light fuel oil (for domestic heating) became the real bane of the coal industry, which is clearly demonstrated in Figure 3-8.

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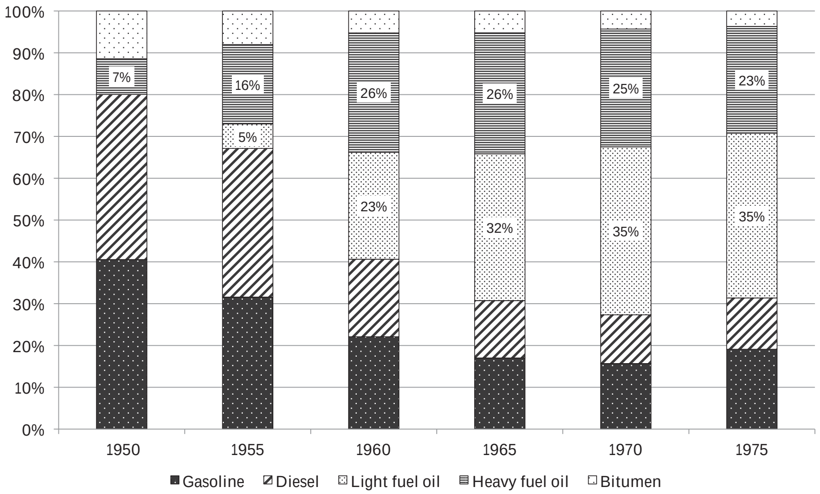
[307] Abelshauser, *Ruhrbergbau*, 105.
[308] Karlsch and Stokes, *Faktor Öl*, 308-309.
[309] Horn, *Die Energiepolitik*, 179-183.
[310] E. Kratzmüller, 'Die Mineralölwirtschaft in der Bundesrepublik Deutschland', *Jahrbuch für Bergbau, Energie, Mineralöl und Chemie* 64 (1971) 11-35, here: 16-17.
[311] A. Mulfinger, *Auf dem Weg zur gemeinsamen Mineralölpolitik* (Berlin 1972) 70-73.
[312] Neu, *Subventionen*, 7.

During the 1960s, the West German consumption pattern became increasingly skewed towards light fuel oil.

Figure 3-8. The composition of oil consumption, West Germany, 1950-1975 (per cent)



Source: Mineralölwirtschaftsverband, 'Daten zum Mineralölverbrauch1950-2008'; 'Inlandsabsatz 1950-2008'.

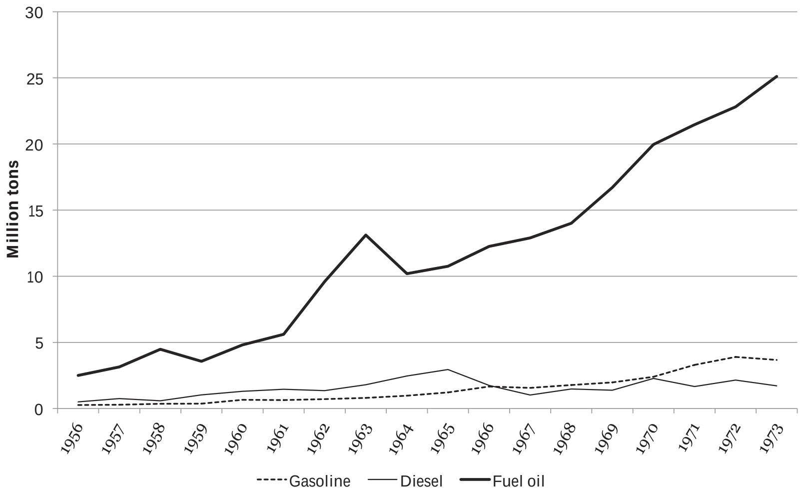
Figure 3-8 shows that heavy fuel oil was indeed the most important type of fuel oil in the 1950s, but both Erhard and the coal industry had misjudged its significance. The advantages of fuel oil over coal became particularly important in the home heating market. The other large consumers, mainly steel and utilities, remained much more dependent on coal, although this was primarily caused by governmental interventions such as the *Verstromungsgesetze*, which was a set of laws adopted in 1965 and later that obliged new power plants to use coal for the production of electricity.[313] Moreover, the steel industry relied on coke for smelting, for which oil provided no viable alternative. As a consequence, the demand for heavy fuel trailed the demand for light fuel oil from the mid-1960s onwards. The oil companies thus geared their production to the continuously growing demand for fuel oil. Indeed, refineries quadrupled their output between 1955 and 1965, of which fuel oil constituted 58 per cent, up from 21 per cent a decade earlier (Figure 3-8). Even in the face of the expansion of refinery capacity in the late 1950s and 1960s, fuel oil imports increased more than five-fold in the same period to 13 million tons.[314] Fuel oil was consistently the largest component of oil

[313] Mulfinger, *Auf dem Weg*, 61-62.
[314] Karlsch and Stokes, *Faktor Öl*, 312.

product imports (Figure 3-9), ranging between 72 and 84 per cent of imported liquid fuels between 1956 and 1973.[315]

Although fuel oil was consistently the most imported oil product between 1956 and 1973, the composition of fuel oil imports changed over the period. In 1958-59, light fuel oil constituted 59 per cent of fuel oil imports.[316] However, by 1970, this figure was 82 per cent.[317] This dominance was partially due to the production programs of the newer refineries in West Germany. As heavy fuel oil was more cumbersome to transport, most of the refineries constructed after 1955 predominantly produced heavy fuel oil to supply the local and regional market.[318]

Figure 3-9. Oil product imports, West Germany, 1956-1973.



Source: Statistisches Bundesamt, Jahrbuch für Statistik, Versorgung und Verbrauch, 1956-1973.

This was particularly the case for the Rhine-Ruhr refineries that had been built in the late 1950s. The refineries that were constructed in Bavaria in the 1960s typically produced more light than heavy fuel oil.[319] Accordingly, the Rhine-Ruhr area, with its large and dense population, was a major export market for foreign refineries with an excess production of gas oil and light fuel oil. This led to a situation where, although light fuel oil was the single most important oil product consumed in West Germany (36 per cent of all oil products consumed) in 1970, only 63 per cent of it was supplied from domestic production; 38 per cent was imported, which was much more than the

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[315] Statistisches Bundesamt, Jahrbuch für Statistik, Versorgung und Verbrauch, 1956-1973.
[316] B 102/14539 1 von 2, Konkurrenz zwischen Kohle und Heizöl, 1958-1961, Section IV B 3, Heizöl-einfuhren nach sorten un Herstellungsländer, Kalenderjahr 1958. Own calculations.
[317] T. Knecht, *Leistungsgewinn und Wettbewerb* (Göttingen 1980) 35.
[318] Pruskil, *Geographie*, 160-166.
[319] Ibid., 172-175

average import quota of 24 per cent for West German oil consumption overall (Table 3-4). In the case of heavy fuel oil, West Germany was self-sufficient and even produced more than domestic demand.[320]

Overall, Table 3-4 shows that between 1950 and 1965, oil consumption grew at an annual rate of around 20 per cent, while consumption, refinery capacity and oil product imports kept rising until 1975, albeit at a slower pace owing to the economic slowdown of the late 1960s and the 1973 oil crisis.

Table 3-4. The oil industry in West Germany, 1950-1975

	1950	1955	1960	1965	1970	1975
Consumption (in mln tons)	4.1	9.7	28.7	74.3	124.4	129.6
Annual growth rate (in percent)		*19*	*24*	*21*	*11*	*1*
Refining capacity (in mln tons)	3.2	13.2	29.1	74.5	115.4	148.8
Annual growth rate (in percent)		*33*	*17*	*21*	*9*	*5*
Crude oil imports (in mln tons)	2.2	7.1	23.2	59.1	98.7	90
Annual growth rate (in percent)		*26*	*27*	*21*	*11*	*-2*
Oil product imports (in mln tons)	0.9	1.9	7.2	16.1	31	37.3
Annual growth rate (in percent)		*16*	*31*	*17*	*14*	*4*

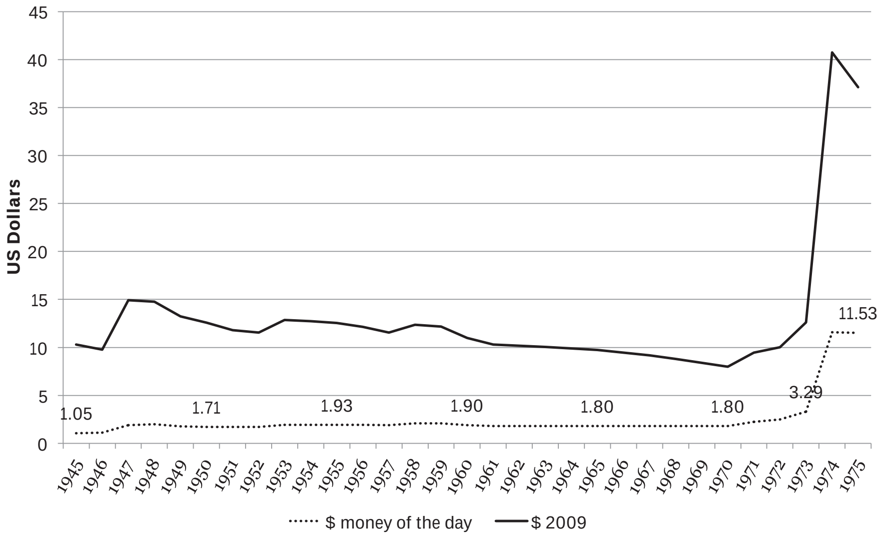
Source: Mineralölwirtschaftsverband, Daten zum Mineralölversorgung, Mineralölverbrauch, Mineralölausfuhr, http://mwv.de/index.php/daten/statistikeninfoportal, accessed on 14 May 2009. Data on refining capacity: W. Molle and E. Wever, *Oil refineries and petrochemical industries in Western Europe: buoyant past, uncertain future* (Aldershot 1984) 164-168.

Underlying the West German energy transition was the fact that global oil surpluses and changes in the global demand structure caused nominal oil prices to remain low and stable throughout the 1950s and 1960s (Figure 3-10), giving oil a decisive advantage over coal.[321]. In real terms, the posted prices for Middle Eastern oil even declined between 1948 and 1970, only to start rising in 1971 after the demise of the Bretton Woods system. However, the period of steady oil prices abruptly ended with the 1973 oil crisis, after which nominal oil prices rose to over 11 US dollars per barrel.

[320] Ibid.

[321] Karlsch and Stokes, *Faktor Öl*, 314-317; Levy, *Lage und Entwicklungstendenzen*, 13-14.

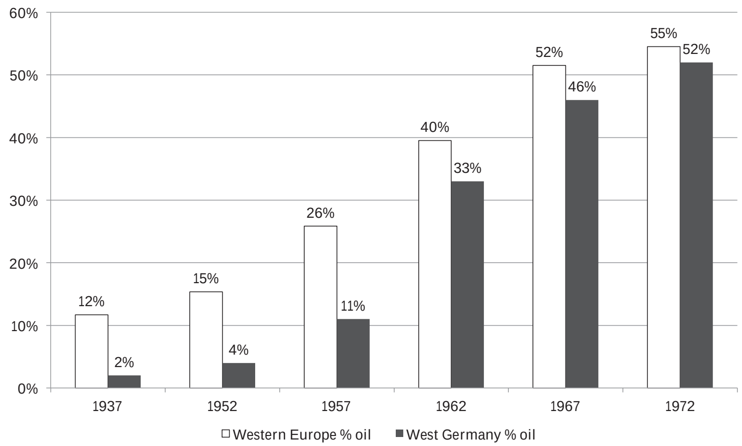
Figure 3-10. Posted prices for Arabian light crude oil, 1945-1975 (in US dollars)



Note: The prices – both nominal and constant – are the posted prices for a barrel of Arabian light crude oil free on board at Ras Tanura (Saudi Arabia) in US dollars. Real prices use 2009 as the base year. A barrel contains approximately 138 kilograms of crude oil; a metric ton contains approximately seven barrels.
Source: BP statistical review of world energy, 'Crude prices since 1861', June 2011, http://www.bp.com/statisticalreview, accessed on 31 January 2013. Real prices are calculated using the GDP deflator provided by S.H. Williamson, "What Was the U.S. GDP Then?" MeasuringWorth, 2014. http://www.measuringworth.org/usgdp/ 7 July 2014.

As the *Kohle-Öl Kartell* clearly illustrated, the combination of the developing international oil industry, the structural problems of the coal industry and the federal government's conception of the market economy provided the setting for a rapid energy transition (Figure 3-11) and a huge expansion of the oil industry in the late 1950s and early 1960s. Up to 1957, the share of oil in the West German energy balance was 15 per cent below that of the Western European average. Within 15 years, the difference declined to only 3 per cent, the largest aspect of which was realised in just five years, between 1957 and 1962.

Figure 3-11. The share of oil in the energy balance of West Germany, 1952-1972



Source: Odell, *Oil and World Power*, 120-121. Own calculations. Western Europe includes the United Kingdom, France, Italy, the Netherlands, Belgium, Luxemburg and West Germany (BRD).

3.5 Conclusion

Why was oil allowed to compete freely with coal in the mid-1950s in the face of an imminent coal crisis? How did the West German energy policy of the 1950s affect the position of coal with regard to oil? What measures did the West German government take to offset the coal crisis in the 1960s and how did these measures affect oil consumption in West Germany? The economic policy of the Adenauer cabinets of the 1950s faired a liberal course with regard to the question of the West German energy supply. The federal government collided with the Ruhr coal industry more than once. Ludwig Erhard was convinced that market discipline could force the coal industry to rationalise its production. However, he did not opt for all out confrontation, because direct competition with imported coal was abandoned again in the late 1950s by the imposition of a tariff on imported coal from non-ECSC countries. Erhard did not regard the Ruhr coal industry as being capable of supplying marginal demand, as the West German energy demand grew faster than Ruhr coal production. The federal government calculated that fuel oil could fill the gap, hoping that coal and oil would complement each other in terms of meeting the West German energy demand. Many contemporary observers held similar views. The reduction of taxes on fuel in 1953 and 1956 aimed to encourage competition between coal and oil for marginal demand. The bottom line was that West German industry received its energy at the lowest possible price.

However, allowing oil to compete freely with coal had unexpected effects.

Particularly eventful was the period directly after the 1956 Suez Crisis, when both oil prices and spot tanker freights fell dramatically. The West German market was wide open to fuel oil imports and became a dumping ground for foreign suppliers. West German fuel oil markets also dipped far below prices in neighbouring countries. The falling prices were not only caused by low taxation; they were also the result of fierce competition between oil companies, coal companies and, to some extent, the relatively important independent West German oil traders. The oil companies aimed to retain their market share in the suddenly growing markets for light and heavy fuel oil in view of their planned refineries in the Rhine-Ruhr area. Meanwhile, the coal companies tried to retain existing clients by supplying both coal and fuel oil. By late 1958, fuel oil was cheaper than West German coal throughout the country and the situation became urgent for the mining companies. Exacerbated by an economic down-cycle, coal stocks rose and the association of Ruhr coal employers demanded protection from fuel oil, eliciting strong opposition from a number of industries that had switched to fuel oil. Rather than interfering directly, the federal government opted to allow the major oil and coal companies to form a cartel, the *Kohle-Öl Kartell*, in order to stabilise the market and buy time for the coal industry to adapt. Although the cartel was in the interests of the coal and oil companies, it failed to bring stability to the fuel oil market and was disbanded in mid-1959 as both the oil and coal companies had expanded their domestic production of fuel oil. Although the federal government subsequently tried to stymie the growth of fuel oil consumption by reintroducing taxes on both light and heavy fuel oil, opposition from German industries and the creation of the EEC gradually reduced the room for state intervention in the West German oil market. The alternative to the direct or indirect taxation of fuel oil was the quota system of self-limitation, but this failed entirely, particularly for light fuel oil.

The result of the liberalisation of fuel oil imports in the 1950s had far-reaching effects. The chronic problems of the Ruhr coal industry did not help matters, but the sudden price drop in 1957 caused a coal crisis of unexpected magnitude. Subsequent measures to stop the transition from coal to fuel oil in both industry and households were to no avail. Continuing well into the 1960s, the growth of light fuel oil consumption in particular caused a substantial decline in the production of Ruhr coal, and many mines closed and thousands of members of staff were laid-off in the process. The dominance of heavy fuel oil in the production programs of the Rhine-Ruhr refineries subsequently opened West Germany up to large imports of light fuel oil and gas oil, which continued unabated throughout the 1960s and early 1970s.

The West German *Wirtschaftswunder* had a clear loser – coal – and a clear winner – oil, although the outcome of the federal government policies of the mid-1950s might have had much wider consequences than foreseen at the time. Notwithstanding the haphazard way in which Bonn dealt with the Ruhr coal industry, the oil companies, particularly the major foreign firms, recognised the opportunity and set out to benefit from it.

Chapter 4 An oil and petrochemical cluster in the Rhine-Ruhr area

4.1 Introduction

The transition from coal to oil fundamentally changed the West German economy, paving the way for the unprecedented growth of petrochemicals, which was one of the foundations of the West German post-war economic miracle.[322] Where and why did oil companies decide to invest to adapt their West German operations to the growing consumption of oil? To what extent did existing industrial clusters determine the location choice of oil companies? And, lastly, how did the transition from coal to oil affect the demand for transportation in the Rhine-Ruhr area?

Partly rooted in the Allied occupation of Germany after World War II, the transition also became part and parcel of the post-war economic miracle of West Germany. Although the Allied oil program and Erhard's liberal approach to the energy problem had national implications, they were especially consequential for the Rhine-Ruhr area. Here, a mix of pre-war inheritances and post-war discontinuities laid the basis for the emergence of an oil and petrochemical cluster, while simultaneously causing the coal crisis of 1958 and, in the long run, the decline of the region itself.[323] The establishment of synthetic fuel and rubber plants in the late 1930s, and their reactivation by the Allied occupation in 1949, provided the Rhine-Ruhr area with its first large-scale oil industry. Unlike the well-developed and integrated oil cluster of Hamburg, these facilities were German-owned, fairly isolated, and limited in their operations. However, the proximity of existing chemical complexes provided an opportunity for the German chemical industry to experiment on a commercial scale with petrochemical production methods and feedstock based on by-products from these plants. The increasing demand for fuel oil in North Rhine Westphalia in the second half of the 1950s also created a market for the further expansion of the area's oil industry, as the major oil companies established their own refineries between 1958 and 1961 and subsequently expanded them in the 1960s.

4.2 The Rhine-Ruhr refineries

West German refinery capacity expanded greatly in the 1950s. Indeed, between 1950 and 1960, it increased eight-fold from 5.1 million tons to 40.5 million tons. The expansion in North Rhine Westphalia was part of a westwards reorientation of the West German oil industry, and comprised a geographical shift from Hamburg to the Rhine-Ruhr area. Hamburg lost its main hinterland due to the separation of East

[322] Stokes, *Opting*, 1, 248.
[323] W. Köllmann, 'Industrieregion Ruhrgebiet (Aufstieg, Strukturwandel und neuer Aufbruch)', *Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte* 78 (1991) 305-325, here: 316-320.

Germany, which was detrimental to its position as the German centre of the oil industry.[324] In 1950, North Rhine Westphalia already contained 33 per cent of West German refinery capacity, owing mainly to the three former hydrogenation plants in Gelsenkirchen and Wesseling. By 1960, however, North Rhine Westphalia had disposed of 57 per cent of its total refining capacity.[325] This shift was partly caused by the extension of the processing contracts between multinational oil companies and the former hydrogenation plants, which duly doubled their capacity between 1955 and 1960. However, the specific design of the former hydrogenation plants (as well as the upgraded refineries in the Hamburg area) aimed to maximise the production of motor fuels.

The rapid increase of imports of fuel oil from 1955 onwards showed that the oil companies needed additional capacity for fuel oil production. By the mid-1950s, it was already clear to the multinational oil firms that the changing demand structure in West Germany required new refineries. As North Rhine Westphalia was developing into a major consumer of fuel oil in the mid-1950s, these refineries were planned in the Rhine-Ruhr area. Responding to the rise of fuel oil, the major international oil companies and their German partners in the Rhine-Ruhr area planned to expand their capacity by 26 million tons between 1958 and 1963. The two cases of Union Kraftstoff and Deutsche Shell, which will be discussed in the next section, demonstrate how rapid and consequential the liberalisation of the heating fuel market was.

4.3 Deutsche Shell and Union Kraftstoff, 1951-1958

Having survived the Allied occupation unscathed, Union Kraftstoff upgraded its refinery by adding a thermal cracker and a platformer in 1953 to make its production more flexible and of a higher quality. The thermal cracker and platformer are two chemical processes that aim to both convert heavy oil products into lighter ones and improve the quality of the latter. The thermal cracker allowed for a higher yield of light products (gasoline mainly) from heavier ones, while the platformer improved the ignition quality of the gasoline.[326] These investments were protected by the fuel strategy of the federal government, which maintained the Allied policy of boosting West Germany's domestic oil industry. The federal tax and tariff law of 1953 supported domestic crude oil production and refining. Meanwhile, the former

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[324] T. Wild, 'From Division to Unification: Regional Dimensions of Economic Change in Germany', *Geography* 77 (1992) 3, 244-260, here: 245.

[325] Mineralölwirtschaftsverband e.V., 'Rohöldestillationsanlagen nach Bundesländern 1950–2009, Atmospärische Destillation', in: *Jahresbericht Mineralölzahlen 2009*, 27, accessed 11 January 2013, http://www.mwv.de/upload/Publikationen/dateien/2009_JB_KL763hj1mjg3LYm.pdf

[326] Shell Petroleum International Ltd., *The Petroleum Handbook* (London, 1966 fifth edition) 94-95, 100-101

hydrogenation plants received further support through special tax breaks for oil products produced with hydrogenation technology, the so-called *Hydrierpräferenz*.[327]

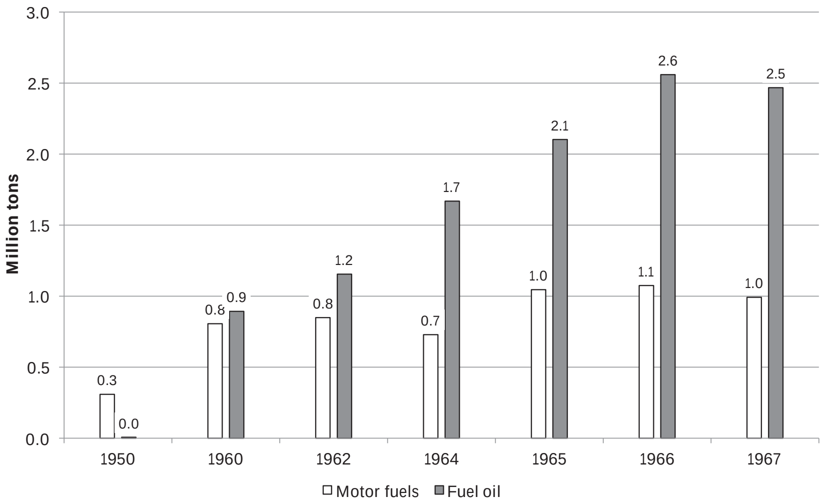
As heating and power generation were exclusively achieved with coal, oil refineries were geared to maximising the production of motor fuels, as was Union Kraftstoff. However, the revision of the tax and tariff law in 1955 aimed to stimulate competition in those markets by abolishing import duties on light and heavy fuel oil. In terms of refining economics, the challenge for any refiner was to choose the optimal mix of oil products from a barrel of crude oil, which depended on the type of crude oil to be processed, the combination of processes available in the refinery and the market situation. With its mix of hydrogenation, thermal cracker and platformer installations, Union Kraftstoff was well equipped to respond to fluctuations in the demand for oil products. However, its refining contract with Deutsche Shell was rather restrictive, prescribing the amounts that Union Kraftstoff was to produce for fixed cost-based compensation.

The increasing German demand for fuel oil was such a fundamental change that Deutsche Shell presumably became susceptible to Union Kraftstoff's objections to the 1948 processing contract. Accordingly, to optimise the use of the refinery, the two companies agreed to give Union Kraftstoff more flexibility in choosing its refining program in a new contract signed on 1 October 1955;[328] henceforth, Union Kraftstoff's profits would be determined from the difference between the value of the crude oil and the value of the final products. Instead of producing according to a fixed program, Union Kraftstoff was now challenged to maximise its margins on its production given the prevailing market conditions. The company could thus establish its own production program, which was reviewed every six months by Deutsche Shell. This was an important step towards a more independent way of doing business for Union Kraftstoff.

In the 1950s and early 1960s, Union Kraftstoff's production of fuel oil increased rapidly, illustrating the changing structure of West German demand (Figure 4-1).

[327] Karlsch and Stokes, *Faktor Öl*, 286-289.
[328] Joest, *Kraftakte*, 57.

Figure 4-1. Fuel oil production at Union Kraftstoff, 1950-1962



Source: HK RWE, C3/12380, Einsatz und Ausbeute der Union Kraftstoff, 1950-1967. Own calculations.

In 1950, Union Kraftstoff produced only 4,000 tons of fuel oil, which was one per cent of its total output of fuels. In 1960, its fuel oil output was higher than its production of motor fuels (893,000 tons versus 806,000 tons), comprising 53 per cent of its total production of fuel. Two years later, in 1962, the company's fuel oil production increased to 1.2 million tons or 58 per cent of its total fuel production. By 1967, this figure was 71 per cent, although it was light fuel oil that accounted for the growth after 1962. Fuel oil production was the main driver of the growth in Union Kraftstoff's production capacity in the 1950s and early 1960s. The company's data illustrate the nature and extent of the West German energy transition well. Moreover, the fuel oil produced at Union Kraftstoff became an important source for the sales apparatus of the Brown Coal Group, the *Vereinigungsgesellschaft der Rheinische Braunkohlewerke* (Verges), which used it to counter the declining sales of brown coal briquettes.[329]

During the 1950s, Union Kraftstoff was significant for the region's development for four reasons. Firstly, it and other former hydrogenation plants were important for the fuel supply in the region, which traditionally sourced its fuel from either Hamburg and Bremen or Rotterdam. This reflected the continued Allied policy of the Federal Republic, which was aimed at stimulating the domestic refining of imported crude oil rather than importing finished products. Secondly, Union Kraftstoff was important to Deutsche Shell as a way to maintain its market share.

[329] Ibid., 59.

Thirdly, the increasing amounts of fuel oil produced by Union Kraftstoff during the 1950s were vital to the sales organisation of the Rhenish Brown Coal Group because it allowed the group to retain a market share in the face of clients switching to oil. This also highlights the competing interests of the coal industry with regard to the former hydrogenation plants they owned. On the one hand, the rising demand for oil threatened their markets. On the other, the former hydrogenation plants allowed coal companies to retain their clientele by also offering them oil. Lastly, Union Kraftstoff and the other former hydrogenation plants were important for the emergence of a petrochemical industry in the region. Indeed, the by-products of oil refining at the former hydrogenation plants provided the opportunity for their onwards processing into petrochemicals.

4.4 The Rhineland refinery of Deutsche Shell

As the Rhine-Ruhr area contained a large concentration of urban agglomerations and industries, it was the biggest growth market for fuel oil in West Germany in the 1950s. It was already the largest consumer of fuel oil in the mid-1950s, and increased its share of West German fuel oil consumption from 33 per cent in 1956 to 37 per cent in 1959 and 38 per cent in 1961.[330] By 1955, it was apparent to Deutsche Shell that its available refining capacity in the area (Union Kraftstoff) was completely inadequate with respect to supplying the burgeoning demand for fuel oil. Moreover, competitors were planning similar expansions in the Rhine-Ruhr area (Table 4-1). Along with Deutsche Shell, Esso AG and Deutsche BP were also planning to build new refineries with more than 3 million tons of annual capacity each, while the existing former hydrogenation plants in Gelsenkirchen were also doubling their capacity between 1960 and 1963.

At the time, Union Kraftstoff was producing around 800,000 tons of oil products for Deutsche Shell, which it would continue to do until the 1952 contract ended in 1963. However, a product requirement projection produced by Deutsche Shell director Hubert van Drimmelen in December 1955 showed that, for 1964, and disregarding the production of Wesseling, the company expected a shortfall to the tune of 1.56 million tons of oil products. The shortfall was especially large for heavy fuel oil (620,000 tons), but was also significant for gas oil (357,000 tons, containing both diesel and light fuel oil) and gasoline (502,000 tons). A further estimate for 1970 predicted a total shortfall of 2.2 million tons.[331]

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[330] Plitzko, *Bemerkungen*, 72; H. R. Streicher, *Raffineriestandorte und Rohrleitungspolitik* (Hamburg 1963) 22.

[331] SHA, inv. 48, MF, Installaties/Algemeen-Godorf/Installaties/Duitsland/Godorf/Algemeen, letter, Van Drimmelen to Hofland, regarding 'Purchase of a site for a new refinery in the Rhineland', 28 December 1955.

Table 4-1. Planned refinery expansions in the Rhine-Ruhr area, 1959-1968

Company	Expansion	Year	Added capacity (Mt/y)
Shell (Godorf)	1st stage	1960	4.0
	2nd stage	1963	3.0
Esso (Cologne)	1st stage	1959	3.0
	2nd stage	1961	3.0
Petrofina (Duisburg)	1st stage	1959	1.0
	2nd stage	1961	2.0
BP (Dinslaken)	1st stage	1960	3.0
	2nd stage	1963	3.0
Scholven AG (Gelsenkirchen) (present cap 1 Mt/y)	extension	1959	1.0
Gelsenberg Benzin AG (Gelsenkirchen)	1st stage extension	1961	2.0
(present cap 3 Mt/y)	2nd stage extension	1963	1.0
	3rd stage extension	1968	2.0
Total announced added capacity			**29.0**

Source: SHA, Archive of manufacturing department (MF), inv. no. 48, file: Installations/Germany/Godorf: Budget Revision, Return no. 513, 15 March 1957, 2.

Van Drimmelen tried to estimate the best location for the new refinery, with the aim being to supply the lower and middle Rhine basin with oil products. Based on transport cost calculations, Van Drimmelen weighed the possibility of a Strasbourg area refinery against one in the Cologne region.[332] For freight costs within Germany, Van Drimmelen used the cheapest routes possible from each location, with these costs on the Rhine under normal circumstances being an important share of the cost structure. The calculations revealed very little difference between the two locations in terms of the costs per ton of product deliveries to Karlsruhe: from Strasbourg the figure was 15.84 DM, while it was 15.80 DM from Cologne. However, Van Drimmelen also pointed out that experience had shown that water levels on the upper Rhine tended to be problematic, which would make distribution to Karlsruhe from Strasbourg more difficult than from the Cologne area. Moreover, Strasbourg could only be reached by a limited number of vessels, depending on their draught, so there was a real danger that continuous supplies from there could not be ensured. Van Drimmelen also assumed that rail cars would be needed much more often in the case of Strasbourg than in the Cologne area. Accordingly, as rail costs were expected to rise more than Rhine tanker freight rates in the long run, the costs for Strasbourg could actually be considerably higher than for Cologne. Van Drimmelen therefore

[332] SHA, inv. 48, MF, Installaties/Algemeen-Godorf/Installaties/Duitsland/Godorf/Algemeen, letter from Van Drimmelen to JP Visser and Van Goch, regarding: 'Purchase of site for new Refinery in the Rhineland', 25 January 1956.

concluded that, disregarding the differences in the costs of supplying crude oil and the capital expenditure required to construct pipelines, a refinery in the Cologne area would be the best option.

The second question was where to locate the refinery in the Cologne region. Van Drimmelen regarded a location close to Rheinische Olefinwerke in Wesseling as advantageous. Olefinwerke was a joint venture between the Shell group and BASF, and was established in 1953 to produce polyethylene (a basic plastic) from gaseous by-products from Union Kraftstoff. However, the processing deal with Union Kraftstoff was due to end in 1963, and as the feedstock providing partner for Olefinwerke, Deutsche Shell was contractually bound to provide it with an alternative feedstock supply.[333] In August 1956, a promising plot of land close to Olefinwerke was found in Cologne-Godorf in the municipality of Wesseling. The capital expenditure proposal in which the capital was requested for the purchase of the land stated that:

> "one of the essential requirements of a refinery in the Rhineland is the supply of the gas feedstock for ROW [Rheinische Olefinwerke]."[334]

Apart from supplying Olefinwerke, the new refinery was primarily aimed at supplying the additional production needed to retain a 20 per cent share in Deutsche Shell's main product markets, which were expanding rapidly, especially for heavy and light fuel oil. In retrospect, it is interesting to see how quickly projections became outdated. Whereas the anticipated shortfall in production for 1964 was estimated at 1.56 million tons in December 1955, a June 1956 estimate projected a deficit of 3.8 million tons in 1964, an increase of 160 per cent from six months earlier.[335] The final budget proposal for the new refinery, which was submitted to the Committee of Managing Directors of the group in March 1957, predicted a shortfall for 1964 of 4.5 million tons, which was three times higher than the original 1955 estimate. The deficit was especially acute in the fuel oil and gas oil markets. Figure 4-2 shows the progression of the consecutive projections between December 1955 and March 1957. The columns give the total shortfall in 1,000 tons, while the lines give the progression of the projected deficit in the main three product groups: gasoline, gas oil (including light fuel oil) and heavy fuel oil.

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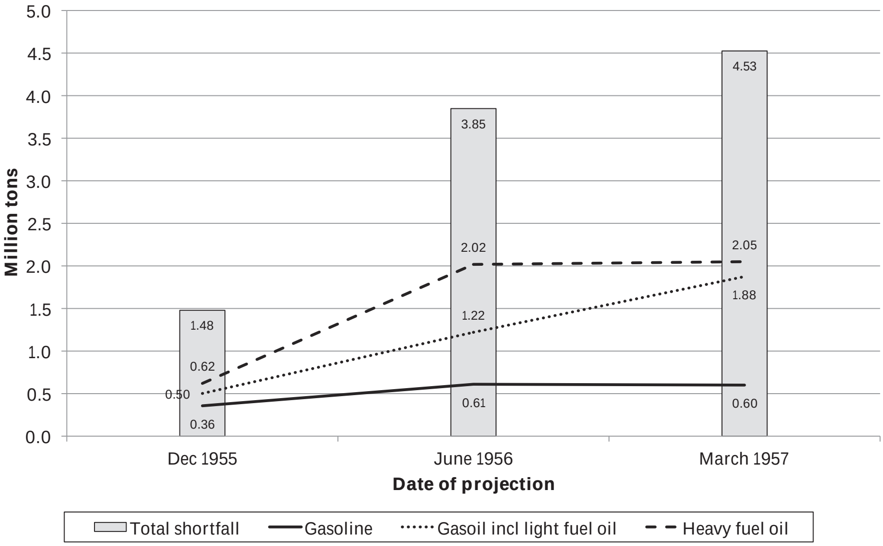
[333] SHA, inv. 82, nr. 129, Verhouding BPM en ROW, Agreement Deutsche Shell-Badische, article 12, October 1953.
[334] SHA, inv. MF, nr. 48, Installaties/Algemeen-Godorf/Installaties/Duitsland/Godorf/Algemeen, Germany: Rhineland refinery site, 14 August 1956 (original quote).
[335] SHA, inv. 48, MF, Installaties/Algemeen-Godorf/Installaties/Duitsland/Godorf/Algemeen, memorandum of discussion between DS and BPM regarding 'New Rheinland Refinery', 12 June 1956.

Figure 4-2. The progression of the projected shortfall in 1964 for Deutsche Shell



Source: SHA, inv. MF, nr. 48, Installaties/Algemeen-Godorf/Installaties/Duitsland/Godorf/Algemeen, Memo Deutsche Shell regarding 'Planung neue Raffinerie im Rheinland', 7 June 1956; letter, Van Drimmelen to Hofland, regarding 'Purchase of a site for a new refinery in the Rhineland', 28 December 1955; Budget Revision, supplementary projects - manufacturing, 15 March 1957. Own calculations.

In December 1955, the projection seemed to be quite conservative and the difference in the shortfall for the three products small. Six months later, reflecting the rising demand for heavy fuel oil in West Germany, the projected deficit more than doubled and the heavy fuel oil position became the most problematic of the three main products. In March 1957, the projected shortfalls had increased, although by then it had become clear that gas oil and light fuel oil in particular were relatively more important, in line with the rising demand for the former between 1955 and 1960. The progression of these projections shows not only how fast oil product demand in West Germany grew in the mid-1950s, but also illustrates the rapidly changing composition of this demand.

As the technical designs were altered to match the adjusted marketing projections, Deutsche Shell requested the capital budget for the construction of the refinery. In August 1956, a suitable tract of land was found in Godorf, near Cologne, and a capital expenditure proposal was filed with the group's oil directorate in the same month to reserve the required amount of funding for Deutsche Shell's 1957 budget.[336] Then, the Suez Crisis unfolded, and, as an economy measure, the new Rhineland refinery (as it was called internally) with Royal Dutch Shell was removed from the manufacturing budget for 1957.[337] There were a number of issues arising from the crisis. For example, the new refinery was projected to process Kuwaiti crude oil, the supply of which became uncertain when the crisis struck. Moreover, emergency measures to increase production in Venezuela, arrange additional transport capacity to get oil from alternative sources to Europe, and the subsequent rising freight rates required extra cash outlays for Royal Dutch Shell, which were created by scrapping parts of the capital budget. However, the estimated shortfall projection of March 1957 highlighted that any further delay with respect to the Rhineland refinery would put the market position of Deutsche Shell at risk. The earlier mentioned shortfalls in existing refinery output by 1960 and beyond made it imperative that the refinery started production in 1960. Moreover, the competition showed no sign of slowing down either.[338] The final design of the new refinery aimed to meet the estimated future heavy fuel oil demand, while also balancing the gasoline supply and leaving a shortfall in Deutsche Shell's gas oil requirements.[339] The shortfall of gas oil production would remain an issue throughout the 1960s for the entire West German market, which necessitated rising imports in the second half of the decade. Rotterdam was to play an important role with respect to those imports.

As a consequence of the transition from coal to fuel oil, the centre of gravity of the West German oil industry shifted from Hamburg to the Rhine-Ruhr area. Hamburg suffered from the division of Germany and the Iron Curtain, but remained important for the production and export of high-grade oil products, nonetheless. Figure 4-3 shows how the geographical distribution of refinery capacity in West Germany evolved between 1950 and 1975. It clearly demonstrates that during this period, four distinct clusters of refineries appeared, with North Rhine Westphalia becoming the largest. Other clusters emerged along the Upper Rhine in Baden-Württemberg and the Rhineland Palatinate and in Southern Bavaria. The clusters match closely the distribution of West Germany's major industrial regions, i.e. the Rhine-Ruhr, Mannheim-Karlsruhe-Stuttgart and Munich areas.

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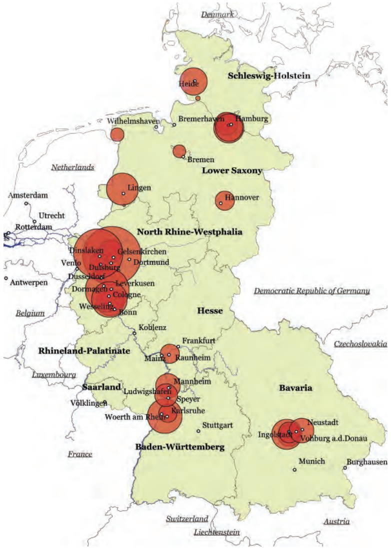
[336] SHA, MF/48/Cologne-Godorf: supplementary capital expenditure proposal, Germany 56/106, reservation of an additional DM 6 million for the purchase of Cologne-Godorf site in 1957 Deutsche Shell budget, 14 August 1956.
[337] SHA, MF/48/Godorf: budget revision, Return no. 513, 15 March 1957, 1.
[338] Ibid., 1-2.
[339] SHA, inv. 48, MF, Installaties/Algemeen-Godorf/Installaties/Duitsland/Godorf/Algemeen, budget revision, supplementary projects - manufacturing, 15 March 1957.

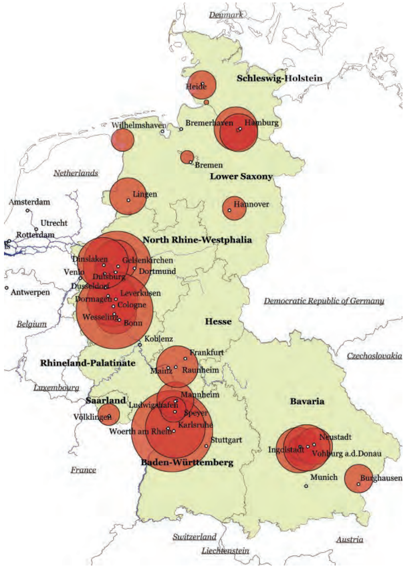
Figure 4-3. The geographical distribution of refineries in West Germany, 1950-1975 (in million tons per year)

1950 1955 1960

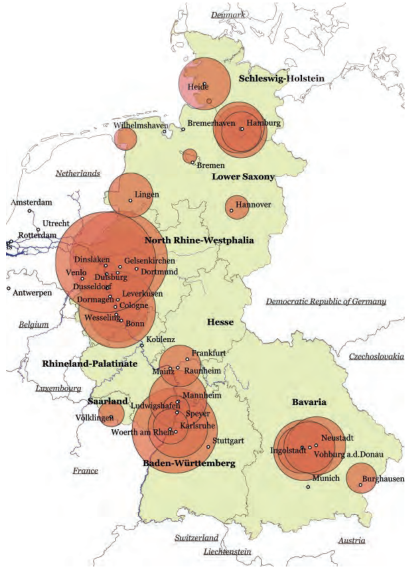
1965



1970



1975



Source: W. Molle and E. Wever, *Oil refineries and petrochemical industries in Western Europe: buoyant past, uncertain future* (Aldershot 1984) 164-169. The data are reported in Appendix B: Data Table 0-3. The refinery capacity in West Germany, 1950-75.

4.5 The post-war transition of the chemical industry

As the cases of Deutsche Shell and Union Kraftstoff have already highlighted, it was not just the liberalisation of the heating fuel market in the mid-1950s that caused the growth of an oil and petrochemical cluster in the Rhine-Ruhr area. Indeed, the opportunities from increased oil processing in the region, starting with the reactivation of the hydrogenation plants in the late 1940s, provided hydrocarbon byproducts that could be valorised as feedstock for the chemical industry. The development of the Rhine-Ruhr refinery cluster was therefore different from Hamburg's, and focused on fuel oil on the one hand and petrochemical feedstock on the other. In fact, the links to the German chemical industry in the Rhine region largely explained the location patterns of new refineries. The pre-war sites of chemical, synthetic fuels and rubber plants therefore go a long way to explaining the economic geography of the oil and petrochemical industry in the Rhine-Ruhr area after 1945.

Whereas IG Farben had enjoyed a hugely privileged position under the Nazi regime, it became clear after World War II that Farben had largely missed the petrochemical revolution that Anglo-American oil companies had embarked on during the 1930s and the war.[340] After the war, Farben was therefore confronted with the competition from the petrochemical advances of the international oil industry, and also had to deal with the problems from the break-up and the rising costs of coal feedstock. However, instead of being wiped out, the Farben successor companies successfully re-established themselves on the world market. Moreover, with the balance being tipped in favour of the relatively new petrochemical industry, a renewed collaboration between the German chemical and the international oil companies ensued. As a result, the former gradually switched from coal to petroleum, although Stokes points out that the switch was not as self-evident as is often suggested in the literature.[341] Stokes mentions several reasons for the relative strength of the German chemical industry, with its technological prowess, research tradition and advanced coal-based techniques being the most important. Moreover, it must be stressed that coal-based chemistry did not disappear entirely, even though the transition to petrochemicals seemed to be an obvious development. The Ruhr industry's proprietary Fischer-Tropsch technology, for instance, remained in use well into the 1960s for the production of niche products for which petrochemical alternatives had yet to be found.[342]

The transition of the German chemical industry has been dealt with extensively in the literature. Ray Stokes's *Opting for Oil* is the most important publication on the actual transition of the four main Farben successors: Bayer, BASF,

[340] Stokes, *Opting*, 3.
[341] Ibid., 7, 96-101.
[342] Stokes, *Opting*, 5.

Hoechst and Hüls. Other authors have published business histories of the pre- and post-war evolutions of individual firms, as well as on the development of the industry.[343] The present study is not aiming to add anything to that body of literature in terms of a better understanding of the post-war development of these companies. Instead, the purpose here is to identify the significance of their transition for the economic composition of the hinterland. The most important observation of that body of literature is that rather than becoming obsolete, the West German chemical industry regained its competitiveness by successfully transforming its raw material base. This implies that its plants remained important industrial locations and, therefore, loci for growth. An important aspect of this path-dependent development was the enduring relationship with international oil companies that was established in the 1920s and reactivated in the 1950s.[344] In fact, IG Farben's Carl Krauch was reputed to have stated in the 1930s that it was his dream to combine the company's chemical know-how with the oil-based feedstock of the Anglo-American oil firms.[345]

Immediately after the war, German chemical companies had a clear picture of the advantages of petrochemical production and how to catch up with the level of their Anglo-American competitors. For instance, when Bayer was carefully looking for avenues into petrochemicals, it talked to a number of German, as well as American and British, chemical and oil companies with a view to gaining access to petrochemical feedstock. The American contacts dated back to the pre-war cooperation between IG Farben and Jersey Standard, although the latter was apprehensive about entering into a joint project with Bayer due to a fear of raking up its past dealings with IG Farben and its entanglement with the strict US anti-trust legislation.[346] The intimate relationship between Royal Dutch Shell and BASF that developed from the early 1950s onwards is another striking example. The post-war transition from carbo- to petrochemical production dated back to the 1910s and 1920s, when IG Farben developed technology to produce motor fuels from coal and Royal Dutch Shell ventured into the synthetic nitrogen business. In particular, the so-called Bergius hydrogenation of coal to produce motor fuels was a landmark in the

[343] W. Abelshauser, *German industry and global enterprise: BASF: the history of a company* (Cambridge 2004); P. Kleedehn, *Die Rückkehr auf den Weltmarkt. Die Internationalisierung der Bayer AG Leverkusen nach dem Zweitem Weltkrieg bis zum Jahre 1961* (Stuttgart 2007). Industry studies include R. Stokes' *Divide and Prosper* (Berkeley 1988) and *Opting for Oil* (Cambridge 1994 (2006)); and J. E. Lesch (ed.), *The German Chemical Industry in the Twentieth Century* (Dordrecht 2000). On the history of IG Farben: H. Tammen, *Die I. G. Farbenindustrie Aktiengesellschaft (1925-1933): ein Chemiekonzern in der Weimarer Republik* (Berlin 1978); P. Hayes, *Industry and ideology: IG Farben in the Nazi era* (Cambridge 1987); G. Plumpe, *Die IG Farbenindustrie AG* (Berlin 1990); and S. H. Lindner, *Inside IG Farben: Hoechst during the Third Reich* (Cambridge 2008).
[344] W. Abelshauser, *Die BASF, ein Unternehmensgeschichte* (München 2002) 442-443.
[345] R. Stokes, 'Technology and the West German Wirtschaftswunder', *Technology and Culture* 32 (1991) 1-22, here: 10.
[346] Stokes, *Opting for Oil*, 156-157, 164.

technological crossover between coal and oil.[347]

Whereas in the pre-war period the international oil companies were highly indebted to chemical knowledge and research from Germany, the post-war period of transition was characterised by a high degree of mutual dependence and benefits. As Stokes has pointed out, the German chemical industry boasted a strong research tradition and state of the art chemical technology and know-how. International oil companies, on the other hand, disposed of the feedstock that the Germans lacked. However, the oil companies had also built up experience in the design, engineering and construction of large-scale petrochemical plants. While chemical engineering was typically advanced in relatively small-scale, customised installations for extreme pressures and temperatures, the oil industry's engineering specialised in large-scale, continuous process plants. Chemical installations were often constructed, tested and tweaked, while oil refineries and petrochemical plants had to be delivered turn-key, with outages and the need for tweaking reduced to a minimum. Along with the differences in design, engineering and construction experience, the two industries also differed in their research tradition. The chemical sector was focused on devising elegant synthesis processes to obtain the highest yield of chemically pure compounds. The oil industry, however, was much messier than its chemical counterpart, and its chemical research was focussed on finding the cheapest and most practicable solution. Up to the 1920s, oil companies rarely understood even the chemical composition of crude oil or the oil products they produced. Although the efforts of firms like the Shell group and Jersey Standard propelled them into petrochemicals, the industry's chemists were still not as advanced as their German counterparts in the chemical sector.[348] It is thus important to understand that both parties had something to gain from the renewed cooperation in the 1950s.

4.6 An oil and petrochemical cluster in the Rhine-Ruhr area

The origins of the petrochemical cluster in the Rhine-Ruhr can be traced back to the late 19th century, when the Ruhr coal and steel industry started investing in developing the production of byproducts from the growing number of coking plants in the Ruhr area. Although the Ruhr coal and steel industry was relatively apprehensive about diversification into organic chemistry, the distillation of coal tar gave rise to the first group of chemical enterprises in the Rhine-Ruhr region up to World War I.[349]

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347 E. Homburg, J. Small and P. Vincken, 'Van carbo- naar petrochemie, 1914-1940', in: J.W. Schot et al (eds.), *Techniek in Nederland in de twintigste eeuw, vol. 2: Delfstoffen, energie en chemie* (Zutphen 2000) 344-345; E. Homburg, 'Operating on several fronts: The transnational activities of Royal Dutch/Shell, 1914–1918', in: R. Macleod and J. A. Johnson (eds.), *Frontline and Factory. Comparative Perspectives on the Chemical Industry at War, 1914-1924* (Dordrecht 2006) 123-144, here: 125-126.

348 A. L. Waddams, *Chemicals from Petroleum. An Introductory Survey* (London 1973) 7-14.

349 M. Rasch, 'Industrielle thermisch-chemische Kohleveredelung bis zum Ende des Zweiten

Increasing numbers of coal tar distillation plants were established in the late 19th century. The first major chemical plants in the region were dedicated to the production of dyes and pharmaceuticals from the basic chemicals obtained from coal tar. These plants were mainly set up by chemical companies – Bayer, Hoechst, and BASF – or engineers, and not by coal or steel industrialists. In the 1920s, the synthesis of nitrogen by Fritz Haber and Carl Bosch gave a second wind to the Rhine-Ruhr chemical industry, because it valorised the gas that was yielded by coking, namely coking gas, which was available in abundance. Indeed, between the late 1920s and late 1930s, the region's largest steel companies established five major synthetic nitrogen plants in the Ruhr area.[350]

The diversification ambitions of the coal industry were given further opportunities with IG Farben's development of other synthetic alternatives to natural or imported products, such as motor fuels, lubricants and rubber. Although the investments of the coal and steel industry under the framework of the Nazi Four Year Plan were not entirely voluntary, the sector did invest heavily in a number of plants dedicated to synthetic fuels, lubricants and rubber. These investments were derived from the proprietary technology of Ruhrchemie on the one hand (Fischer-Tropsch) and IG Farben on the other (the Bergius hydrogenation of coal). In total, the coal industry invested in three major hydrogenation plants in Gelsenkirchen (2) and Wesseling near Cologne (1), as well as a number of Fischer-Tropsch plants.[351] Additionally, IG Farben and the state mining company Hibernia AG established a synthetic rubber plant in Marl on the northern edge of the Ruhr area in 1938, subsequently developing a physical exchange network with the hydrogenation plants in Gelsenkirchen.[352] The investments made by the Ruhr coal and the Rhenish brown coal industries were part of their aim to diversify the valorisation of coal, hoping to develop a vibrant and profitable chemical cluster as a spin-off from their original activities. Such a chemical cluster did indeed develop, but it was not to be based on coal, but on oil.

The actual transition to petrochemicals began in the early 1950s with the 1953 foundation of Rheinische Olefinwerke as a joint venture by Deutsche Shell and BASF, which was the first West German petrochemical plant to be founded. Union Kraftstoff was also closely involved; soon after it commenced production on the processing deal with Deutsche Shell in 1949, it played a key role in the birth of this very first petrochemical plant in West Germany and was therefore at the heart of the

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Weltkriegs in Deutschland und inbesondere im Ruhrgebiet, Ein Überblick', in: G. Bayerl (ed.), *Braunkohlenveredelung im Niederlausitzerrevier: 50 Jahr Scwarze Pumpe* (Münster 2009) 35-72, here: 71.

[350] Broich, 'Die Petrochemie', 15.

[351] Ibid., 16; B. H. Davis and M. L. Occelli (eds.), *Fischer-Tropsch synthesis, catalysts and catalysis* (Amsterdam 2007) 13-15.

[352] Broich, 'Die Petrochemie', 17-18.

German chemical industry's transition from coal to oil. With the decision to build a thermal cracker at Union Kraftstoff in 1951, an opportunity to construct a petrochemical plant emerged. The cracking of heavy oil residues yields a gaseous byproduct containing highly reactive hydrocarbon compounds called olefins. Crack gas (apart from natural gas) is the most obvious source of olefins, with ethylene and propylene being the most important elements (see Appendix C for more information). These form the basis for a wide range of synthetic materials such as plastics, synthetic rubber and synthetic fibres. Union Kraftstoff hoped the cracker would give the company the opportunity to enter the petrochemical industry, as this enjoyed higher margins than oil refining.

Union Kraftstoff did not own the crack gases that became available from its thermal cracker from 1953 onwards. Instead, it was paid to process the crude oil supplied to it by Deutsche Shell, which also had sole responsibility for marketing. It was therefore Deutsche Shell and its staff and directors in London and The Hague who began to look for a third party interested in buying the crack gases for further petrochemical processing. Deutsche Shell was eager to find a German partner, and so turned to BASF. According to Ray Stokes, the company had already approached BASF in 1948 to see whether it would be interested in joining forces in a wax-cracking venture. BASF was certainly interested, but was ultimately looking for a much more comprehensive joint venture into petrochemicals.[353] Although BASF was still predominantly active in coal-based chemistry, it was already familiar with processing petrochemical feedstock like ethylene into plastics. Indeed, it had already devised a small-scale production facility at Ludwigshafen at the end of the war for this purpose. Immediately after the war, BASF perfected its process and the question was not whether to proceed with the technology, but how to obtain feedstock security to expand its production to a commercial size.[354]

However, opportunities for closer cooperation between oil companies and German chemical firms were limited at the time. First of all, there was limited availability of the gaseous feedstock required for the production of ethylene and propylene, which is probably why Deutsche Shell only proposed a wax-cracking venture in 1948. Wax was also easily transported to BASF's plant in Ludwigshafen, which was approximately 200 kilometres south of Wesseling. Secondly, the volume of byproducts from Union Kraftstoff was initially relatively small; in 1950, it processed 350,000 tons of crude oil, which yielded only 4,000 tons of heavy fuel oil and 22,000 tons of refinery gas as byproducts for potential petrochemical use.[355] Deutsche Shell became more interested in BASF's idea of a comprehensive joint venture with the

[353] Stokes, *Opting for Oil*, 138.
[354] Ibid., 137.
[355] HK RWE, C3/12380, Unternehmensbeschreibung mit den wichtigsten Bilanz- und Produktionszahlen, von 1967, 'Einsatz and Ausbeute 1950-196', 15.

construction of the thermal cracker in Wesseling, which yielded a substantial amount of crack gases with high olefin content. This provided an opportunity for BASF to start producing polyethylene, a basic plastic, from petrochemical feedstock.

However, once the opportunity was there, other problems arose. On 23 and 24 January 1952, representatives from the Shell group, BASF and Union Kraftstoff met in Ludwigshafen, with the two principal points of discussion being the location of the plant and the position of Hoechst in the venture.[356] With respect to the first issue, Deutsche Shell and BASF had three opportunities: transporting the entire crack gas stream to Ludwigshafen, cracking the gas stream into individual products and only transporting the transportable goods to Ludwigshafen, or treating the entire gas stream locally and building the processing plant next to it. In general, ethylene causes a clustering of backwards and forwards steps in the production chain. On the one hand, ethylene production tends to be located close to the ethylene buyer, because it is not easily transported. On the other, the production of ethylene tends to be located close to the supply source of the gas stream (the refinery), because the byproducts of ethylene production are fed back to the refinery.[357] BASF chose to locate the polyethylene venture in Wesseling, next to Union Kraftstoff, with the view being that it would take too long to expand the separation capacity in Ludwigshafen to a level whereby it could process the entire crack gas stream from Union Kraftstoff. Moreover, separating the crack gas in Wesseling and sending only the transportable fraction (propylene) to Ludwigshafen was uneconomical.[358]

BASF and Deutsche Shell finalised their negotiations in September 1952. All of the necessary contracts were signed over the course of 1953 and Rheinische Olefinwerke was duly founded. Construction of the plant in Wesseling started in 1954 and, by 1955, the first production of Lupolen commenced. During the 1952 negotiations, BASF estimated that the German market could not absorb more than 6,000 tons of polyethylene per year and that export opportunities were limited. Nevertheless, during the construction of the plant, its maximum capacity was raised to 10,000 tons. Subsequent expansions of its capacity in 1957, 1959 and 1963 raised the maximum to 190,000 tons per annum, making Olefinwerke the biggest producer of polyethylene in Europe and among the largest in the world.[359] The consecutive expansions of Olefinwerke led Deutsche Shell to establish its Cologne-Godorf refinery near Wesseling to meet the growing demand for feedstock. In 1968, Olefinwerke was further expanded to produce 660,000 tons of ethylene per year.[360] The feedstock for such a capacity required 3.5 million tons of naphtha, which in turn

[356] Stokes, *Opting for Oil*, 140.
[357] Molle and Wever, 'Oil Refineries', 427-428.
[358] Stokes, *Opting for Oil*, 141.
[359] Ibid., 145, 150-151.
[360] 'Uitbreiding bij de Rheinische Olefinwerke', *Olie* 22 (1969) 7, 208.

demanded a crude oil distillation capacity of 20 million tons.[361] Royal Dutch Shell was obliged to meet the burgeoning demand for feedstock by BASF's plants in Wesseling and Ludwigshafen based on a long-term supply contract signed in 1953. Deutsche Shell's Cologne-Godorf refinery was expanded in 1965 – from 4 to 8 million tons – and additional investment was aimed at increasing the production of naphtha to enable the expansion of Olefinwerke.[362] As a result of the developing close relationship between the Cologne-Godorf refinery and Olefinwerke, the Cologne area became Deutsche Shell's largest investment location in West Germany. Indeed, between 1951 and 1964, Royal Dutch Shell nominally invested 270 million US dollars (1.5 billion in US dollars of 2009) in West Germany,[363] more than half of which (53 per cent) was sunk into the Cologne-Godorf refinery and Olefinwerke.[364]

In 1957, Bayer and BP followed suit and established Erdölchemie Dormagen adjacent to the former's Dormagen plant, which would be supplied with naphtha from the BP refinery that became operational in 1960.[365] Hoechst faired a different course.[366] In the 1950s, it tried to develop in-house petrochemical production technology, but largely failed and so, in the 1960s, sought out external technology and petrochemical feedstock. Hoechst cooperated for a while with the American oil company Caltex (present day Chevron and Texaco) to supply its main plant in Frankfurt with petrochemical feedstock. Then, for its principal plant in the Cologne area, namely Knapsack AG, it developed a close feedstock relationship with Union Kraftstoff.

Chemische Werke Hüls, the fourth largest IG Farben successor, was an earlier adopter of petrochemicals. Taking advantage of its existing exchange network with Scholven AG and Gelsenberg Benzin AG, which were the former hydrogenation plants in Gelsenkirchen, Hüls succeeded in the 1950s in rapidly expanding its petrochemical product gamut. Technologically, however, it remained dependent on BASF, Bayer and Hoechst.[367] In 1955, Hüls joined with these three companies to

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361 'Plastic gigant aan de Rijn', *Olie* 22 (1969) 11, 338-339, here: 339.
362 'Die ROW als Beispiel fruchtbarer Zusammenarbeit zwischen Mineralöl- und chemischer Industrie', *Erdöl und Kohle, Erdgas, Petrochemie* 22 (1969) 11, 721-723; H. Jacobsen, 'Die erweiterte Shell-Raffinerie Godorf', *Erdöl und Kohle, Erdgas, Petrochemie* 21 (1969) 5, 269-275, here: 269-270.
363 SHA 190/190C/387.1-2 Capital expenditure Shell Oil and Chemicals, 1951-1964. The data is denominated in GBP and converted to USD using annual average GBP-USD exchange rates based on Lawrence H. Officer, 'Dollar-Pound Exchange Rate From 1791', MeasuringWorth, 2014 http://www.measuringworth.com/exchangepound/, 15 July 2014. For the calculation of real prices (2009 US dollars): GDP Deflator Samuel H. Williamson, "What Was the U.S. GDP Then?" MeasuringWorth, 2014, http://www.measuringworth.org/usgdp/, 15 July 2014.
364 The data for chemical investments (comprising ROW investments) only runs to 1960. Were ROW investments in the early 1960s included, the share of Deutsche Shell's investments in the Cologne area would have been substantially higher.
365 Stokes, *Opting for Oil*, 170-171.
366 Ibid., 193.
367 Stokes, *Opting for Oil*, 199; Broich, 'Die Petrochemie', 33-34.

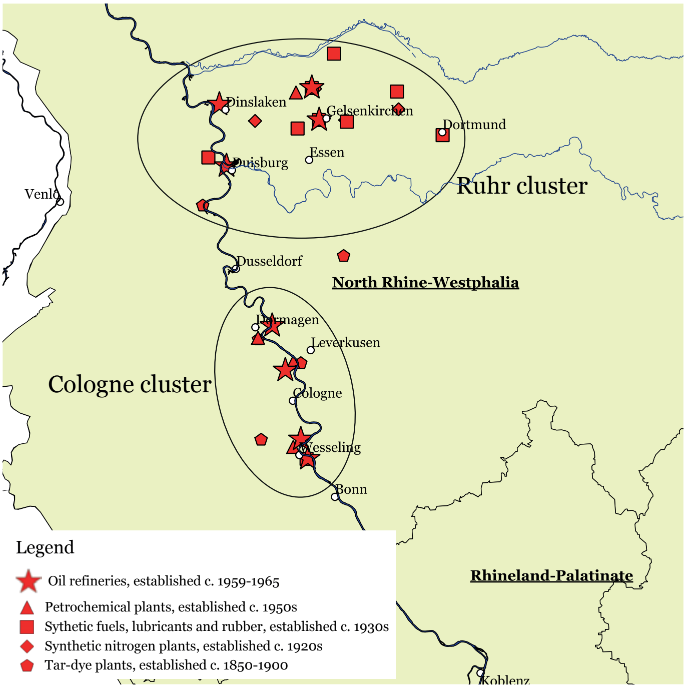
establish the synthetic rubber plant Buna Werke Hüls. Meanwhile, Hüls and Scholven jointly developed a commercial scale production unit for polyethylene, a plastic, and in the mid-1960s, the two companies jointly established a steam cracker to increase the production of ethylene for their joint polyethylene business.[368]

After the German chemical industry's hesitant start in petrochemical activities in the early-1950s, petrochemical production experienced rapid growth in the late 1950s and 1960s. The expansion of the former hydrogenation plants and the construction of the Rhine-Ruhr refineries in the late 1950s served to fuel that growth. The BP refinery at Dinslaken supplied naphtha to Dormagen, which also obtained additional feedstock from the nearby Esso refinery north of Cologne. The latter in turn also supplied gas and later ethylene to Hüls, Bayer and Hoechst's Ruhrchemie plant in Oberhausen. The BP refinery also supplied gas to Hüls. The Deutsche Shell refinery south of Cologne provided feedstock and ethylene to its joint venture with BASF, namely Rheinische Olefinwerke, which also received gas from Union Kraftstoff. Union Kraftstoff, meanwhile, provided ethylene and other basic petrochemicals to nearby Knapsack AG, a subsidiary of Hoechst. These are just a tiny indication of the range of input-output relationships that developed in the 1960s between chemical and petrochemical plants and refineries in the Rhine-Ruhr area.[369] Over the course of the 1960s and early 1970s, the Rhine-Ruhr developed two clusters of oil and petrochemical plants: one in the Ruhr area centred on Hüls, and the other in the area to the north and south of Cologne grouped around Bayer in Leverkusen and Knapsack AG and Olefinwerke south of Cologne (Figure 4-4).

[368], 'Die Petrochemie', 22-23, 34.

[369] Broich, 'Die Petrochemie', 42-48; Mittmann, *Die Chemische Industrie*, 72-105.

Figure 4-4. The oil and petrochemical clusters of the Rhine-Ruhr area, 1960s



Note: The map is not meant to be exhaustive and merely aims to convey the fact that refineries and petrochemical plants were located close to existing chemical plants. The Rhine-Ruhr area consisted of two interrelated clusters, a northern Ruhr cluster and a southern Cologne cluster.
Source: Mittmann, *Der Chemische Industrie*, 21-129; Broich, 'Die Petrochemie', 13-40, Rasch, 'Kohleveredlung', 36-72, B.H. Davis and M.L. Occelli (eds.), *Fischer-Tropsch synthesis, catalysts and catalysis* (Amsterdam 2007) 13-15.

The cluster of petrochemical activity that thus emerged (Figure 4-4) was derived from the outcome of two oppositional institutional frameworks. The first petrochemical activities in the Rhine-Ruhr area were based on the byproducts from the reactivated former hydrogenation plants, particularly with regard to Chemische Werke Hüls and the first petrochemical green-field investment, Rheinische Olefinwerke. With its focus on autarky, the Nazi period fostered the rather haphazard development of a synthetic industry in the Rhine-Ruhr area. In direct opposition to this, the US occupation authorities attempted to radically break with these autarkic tendencies and the high level of cartelisation of the German chemical industry, aiming to dismantle the synthetic industry in the Rhine-Ruhr area. The reactivation of the former hydrogenation plants within the framework of the Allied refining program was the result of the inability of the Allies to fully erase the autarkic industries from the German economy, which had proved to be influential when it came to the transition of the German chemical sector. The subsequent rise of the Rhine-Ruhr petrochemical cluster is thus the result of a number of continuities in the German chemical industry, which provided it with the foundation to successfully pursue the transition from coal to oil.[370]

Cluster formation is a common characteristic of the petrochemical industry,[371] as the transportation of basic petrochemicals is often difficult, which is why chemical activities cluster around the producers. As a result of the many input-output relationships among the different stages of the production process, the economies of scale were high. The expansion of an existing plant or complex was therefore favoured over the development of entirely new production locations. The high degree of vertical integration in the industry also encouraged clustering, because petrochemical complexes are often owned and operated by a limited number of firms active in most or all of the stages of the production process. Finally, agglomeration economies also stimulate clustering, as existing production locations pull additional producers to them, because of the availability of skilled labour, suppliers and buyers. As a result of this tendency to cluster, the Rhine-Ruhr area developed into the foremost petrochemical region in West Germany and one of the main petrochemical clusters in Europe.

Table 4-2. Ethylene production capacity in the Rhine-Ruhr, 1960-75 (in million tons)

	1960	1965	1970	1975
Ethylene production capacity Rhine-Ruhr	0.23	0.70	1.34	3.05
As a percentage of West German capacity	*92*	*67*	*63*	*75*
As a percentage of Western European capacity	*32*	*26*	*17*	*23*

Source: Molle and Wever, *Oil Refineries*, 172-173.

The production capacity of ethylene is a good indicator for determining the relative importance of a petrochemical cluster, because it was the most important basic petrochemical.[372] Although the Rhine-Ruhr cluster's share of total West German and Western European production declined during the 1960s, as other regions developed a petrochemical and oil industry, the petrochemical cluster in the Rhine-Ruhr grew rapidly, especially in the early 1970s (Table 4-2). Moreover, in 1967, North Rhine Westphalia consumed 67 per cent of the country's petrochemical feedstock and produced 70 per cent of the country's basic petrochemicals. With respect to the most important basic petrochemicals, namely ethylene and propylene, North Rhine Westphalia produced 68 and 73 per cent, respectively, in 1967.[373] Throughout the 1960s and early 1970s, the region contained at least 60 per cent of West Germany's

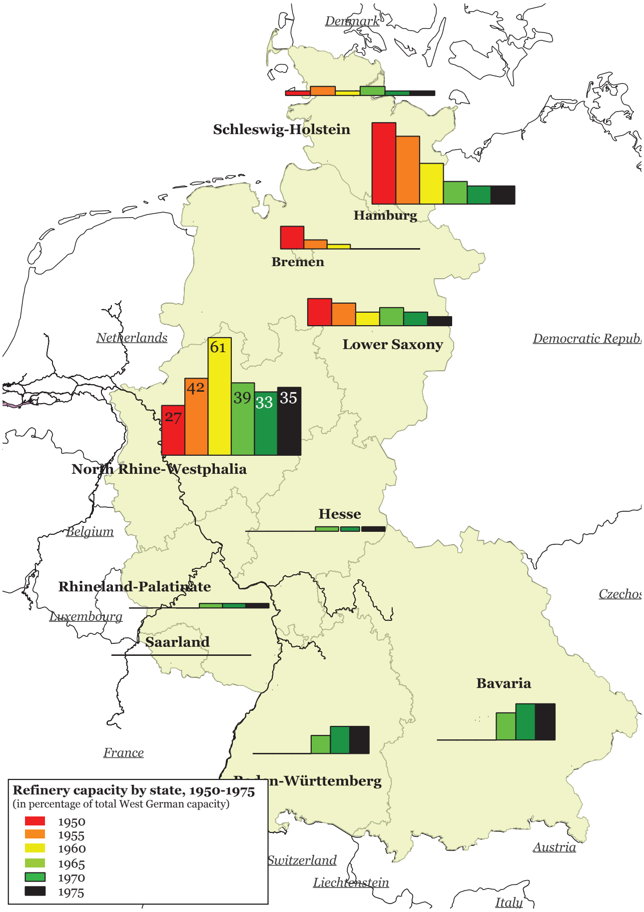
[370] Stokes, *Opting for Oil*, 106-107.
[371] Molle and Wever, *Oil Refineries*, 112-113.
[372] Molle and Wever, *Oil Refineries*, 19, 70, 84-85; Waddams, *Industrial Organic Chemicals*, 10-11.
[373] Broich, 'Die Petrochemie', 49-50.

production capacity of ethylene (Table 4-2). It was not, however, only in West Germany that the Rhine-Ruhr area became a dominant petrochemical cluster; it also held a major share of Western Europe's petrochemical industry. For instance, the area was responsible for between 20 and 30 per cent of the Western European production capacity of ethylene (Table 4-2).

The initial emergence and expansion of the petrochemical cluster was related to the strong growth in refinery capacity in the late 1950s, as the Rhine-Ruhr area developed into the largest concentration of refinery capacity in West Germany (61 per cent of total West German refining capacity in 1960, Figure 4-5). Notwithstanding the unimpeded growth of the refinery capacity in the region, the Rhine-Ruhr area's share stabilised at around 35 per cent of West Germany's capacity, with Baden-Württemburg and Bavaria adding substantial capacity during the 1960s and early 1970s.[374]

[374] Molle and Wever, *Oil Refineries*, 164-169. Own calculations.

Figure 4-5. West German refinery capacity by state, 1950-75 (in percentage of total West German capacity)



Source: Molle and Wever, *Oil Refineries*, 164-169. Map: author.

The growth of both the oil and petrochemical industries in the Rhine-Ruhr area was facilitated by economies of scale. Indeed, between 1950 and 1975, the average size of refineries in the region grew more than ten-fold at an annual rate of 11 per cent, from 0.4 million tons in 1950 to over 5 million tons in 1975.[375] Ethylene production units expanded at an even faster rate (16 per cent annually), from 56,000 tons on average in 1960 to an average of 500,000 tons in 1975.[376] These cursory data allude to agglomeration in the petrochemical industry. Rather than developing new complexes, existing ones were expanded to profit from potential internal and external economies

[375] Own calculations derived from Molle and Wever, *Oil Refineries*, 164-169.
[376] Own calculations derived from Molle and Wever, *Oil Refineries*, 172-173.

of scale. This made the conditions for the initial emergence of the cluster hugely significant. It also had long-term, path-dependent consequences for the development of the region. As a result, the reactivation of the former hydrogenation plants was decisive for the development of the petrochemical cluster in the Rhine-Ruhr area. Indeed, these plants effectively transformed the region from being dominated by resource-dependent industries to one that attracted traded industries. Resource-dependent industries have the majority of their production and labour located near their dominant resource, although they often operate in foreign markets. Traded industries, meanwhile, are located in a region based on "broader competitive considerations."[377] With petroleum feedstock becoming ever more attractive in the face of constantly rising coal prices in the 1950s, the coal-based chemical industry in the Rhine basin faced an imminent threat. The reactivation of the former hydrogenation plants as oil refineries meant that petrochemical feedstock was available to the chemical industry and allowed them to transform their production basis on an increasingly large scale from coal to oil. The competitive petrochemical clusters that emerged were further sustained by the expanding oil refinery capacity, which increased the supply of feedstock in the region.

4.7 Effect of the transition on transport demand in the hinterland

Ports and hinterland transport connections came under pressure with the construction of inland refineries in the late 1950s. Until then, distribution from coastal refineries to inland markets was performed mainly by barge, rail tank car and, in the 1960s, increasingly by road tank cars. Barge transport had been dominant for the haulage of products and crude oil in the Rhine basin. However, with the plans for inland refineries from the mid-1950s onwards, these transport modes no longer sufficed. Those already in existence could only deliver crude oil in batches. As a consequence, although push barges and round-the-clock sailing schedules could partly solve the problem, it was much more economical for refinery operations to have a continuous supply. In 1955 and 1956, several groups of oil companies emerged with plans for pipeline connections to the new refineries in the Rhine-Ruhr area. One consortium studied Wilhelmshaven and Rotterdam as potential landing ports,[378] while another considered a trans-European system of pipelines connecting the French port of Marseille with refineries in France, Switzerland, West Germany, the Netherlands and Belgium.[379]

For the Port of Rotterdam, such plans could have significant consequences. In

[377] M. Porter, 'The Economic Performance of Regions', *Regional Studies* 37 (2003) 549-578, here: 559.
[378] 'Pipeline nach Wilhelmshaven oder Rotterdam', *Die Welt*, 31 August 1955.
[379] 'Wer schlägt das Öl um?', *General-Anzeiger*, 8 June 1956; 'Transeuropa-Pipeline', *Die Zeit*, 12 April 1956.

1954, a year before the general public was introduced to the pipeline plans for the new Rhine-Ruhr refineries, West Germany imported 5.9 million tons of crude oil. Almost 95 per cent of these imports landed at three ports: Hamburg, Bremen and Rotterdam. With 1.5 million tons, or 25 per cent of West German imports, Rotterdam was the second most important landing port for crude oil in West Germany.[380] The imported crude was then shipped from Rotterdam by barge over the Rhine to the refineries in the Rhine-Ruhr area. However, with the expansion of the refinery capacity in the region, the Rhine tank fleet was faced with competition from large diameter, cross-border crude oil pipelines, which did not yet exist at the time in Western Europe.

The expansion of the oil industry in the Rhine-Ruhr area thus gave rise to a huge increase in transport demand. In principle, this was an opportunity for Rotterdam's port, because the increasing demand for crude oil transhipment and transportation occurred in its traditional hinterland. However, the economics of pipeline transportation did not automatically dictate that the new pipeline would start in Rotterdam. Indeed, the oil companies contemplated a variety of solutions, one of which had Rotterdam as one of the candidates. Rotterdam thus stood to lose part of the transport flow to its traditional hinterland and with it a share in the future growth of West Germany's oil consumption. The Municipal Port Authority was well aware of the opportunities and threats that awaited the port in its efforts to secure a pipeline connection to the hinterland.[381]

Around the same time, the Dutch Rhine fleet was still suffering from German limitations with respect to cabotage (the right to operate in Germany under a foreign flag) on the German Rhine. These limitations were suddenly lifted in 1956, presumably because the industrial production of the Rhine-Ruhr area experienced a second post-war period of growth, raising the level of output in 1955 to above the pre-war high point of 1938 for the first time since the war. The increasing demand for barge transportation as a result of the growth of industrial output in the Ruhr required the services of the Dutch Rhine fleet.[382] The Dutch inland tank fleet was already allowed to operate in Germany in 1951, presumably because refinery output in the Rhine-Ruhr area quintupled between 1948 and 1953. This could be interpreted as the result of a regional dependence on the Rhine and its shipping industry, i.e. the Ruhr industry needed the Dutch Rhine fleet to meet its transportation requirements. As the Rhine cannot be easily diverted, this created a compelling geographical reason to resolve the cabotage dispute in favour of the Dutch Rhine fleet. In the case of a pipeline to the Ruhr, such a compelling geographical argument did not exist. The economics of pipeline transportation allowed for a number of possible starting points

[380] Vollrath, *Die Mineralölwirtschaft in die Bundesrepublik*, 93; 99.
[381] GAR, AHB, 589.01, inv. nr. 70, letter from Koomans (director Port Authority) to Mayor and Aldermen of Rotterdam City Council, 30 September 1955, 2.
[382] Lak, *'Because we need them…'*, 188-190, 229.

for the Ruhr pipeline. However, as much as the Rotterdam Port Authority wanted such a pipeline connection to the hinterland, it depended on the oil companies for a decision.

4.8 Conclusions

The sudden rise in oil consumption provoked an expansion effort from the oil industry, which subsequently questioned when, where and how to achieve the required new refineries. The development of an oil and petrochemical sector constituted a dual process of energy transition: the rise of fuel oil partially displacing coal and the transition of the chemical industry to petrochemical feedstock. The two processes were interrelated. At least three factors were of major importance for the development and geographical dispersion of the oil and petrochemical cluster in the Rhine-Ruhr area. The first was the presence of an industrial and urban agglomeration in the region, which constituted the largest potential market in West Germany for the main driver of the energy transition, namely fuel oil. Secondly, longstanding relations between foreign oil companies and the German chemical industry, which were developed and maintained to share and exploit technological know-how, provided opportunities for joint petrochemical ventures. Thirdly, the inheritance of hydrogenation plants from the Nazi period, and their successful transformation into oil refineries under the auspices of multinational oil companies, functioned as geographical 'anchors' for the expansion of the oil and petrochemical industry in the region.

These forces were clearly visible in the case of Deutsche Shell and its relations and investments in the Rhine-Ruhr area. The changing composition of oil consumption in the mid-1950s required Deutsche Shell to adapt its refinery set-up to produce heavy fuel oil instead of gasoline. Its contract refiner in the Cologne area, Union Kraftstoff, was geared towards producing high grade gasoline, but Deutsche Shell's own refinery needed to address the growing shortfall of fuel oil in the Rhine-Ruhr area. The subsequent choice of location revealed just how important the reactivation of the former hydrogenation plants, such as that of Union Kraftstoff, was for the localisation of the newly-emerging oil and petrochemical cluster in the region. West Germany's first petrochemical plant, Rheinische Olefinwerke, was constructed next to Union Kraftstoff to allow the Deutsche Shell-BASF joint venture to use the refinery gas produced there. Deutsche Shell's Cologne-Godorf refinery was located next to the Olefinwerke plant in order to take over the feedstock supply after the processing contract with Union Kraftstoff ended in 1964. Olefinwerke was subsequently expanded during the 1960s, mainly enabled by the expansion of Deutsche Shell's Cologne-Godorf refinery in 1965. The two plants became strongly integrated through input-output relationships. Due to the high capital intensity, the characteristics of the products, and the input-output relations between the various steps in the petrochemical production process, the petrochemical industry has a strong tendency to cluster. This was why a relatively small event such as the construction and location of Union Kraftstoff could have such major and enduring consequences. Similar processes of cluster formation also took place around the plants of Bayer and Hüls, which were already in existence before World War II.

The transition from coal to oil gave rise to an increased demand for crude oil transportation and transhipment services, which in turn necessitated the construction of a new infrastructure of crude oil pipelines. Unlike Rhine-based transportation, the economics of pipeline transport did not provide a compelling reason to choose Rotterdam as the most favourable starting point for a pipeline to the Ruhr. The energy transition thus provided an excellent test case to question whether the transport relations of the Port of Rotterdam, with its traditional Rhine-Ruhr hinterland, could extend beyond the Rhine.

Chapter 5 Rotterdam's contested hinterland, 1955-1956

5.1 Introduction

The increasing amounts of crude oil that needed to be shipped to the expanding refineries at new inland locations in West Germany required both maritime and overland transportation capacities to increase, i.e. larger tankers and the introduction of pipelines.[383] The maritime ports of Western Europe thus needed to adapt to the growing scale and shifting pattern of production and consumption in the oil sector. As both industrial locations and providers of transport and transhipment services, ports stood to gain from the unprecedented growth of the oil industry, albeit at the cost of substantial capital investment in port expansion and adaptation. Those ports that could muster the financial capacity – and disposed of favourable geographical conditions – could benefit hugely. The Port of Rotterdam was no exception.

For the oil industry, the key issue was to find the optimal complementary configuration of tanker and pipeline transport between the Middle East and continental refineries in Western Europe. On the one hand, very big tankers provide cheap transport and are highly flexible, but the larger they are the more limited the number of ports able to receive them. The case of the Port of Rotterdam has historically shown that its regional monopoly on deep-sea access led to relatively high port dues for the biggest ships, including super tankers and very and ultra large crude carriers.[384] On the other hand, pipelines provide the cheapest possible form of overland transport, but they are inflexible and the relatively large capital outlay required is sunk once the pipeline is constructed.[385] The future position of the Port of Rotterdam for Western Europe in the oil supply chain depended on the issue of how to optimally configure tanker and pipeline transportation given the macro-economic, technological and geopolitical context of the 1950s.

In the summer of 1955, the Rotterdam Port Authority was notified of the pipeline plans being developed by a consortium of German subsidiaries of multinational oil companies. In particular, Rotterdam and Wilhelmshaven were being studied as potential starting points for a crude oil pipeline to the Rhine-Ruhr area. A year later, rumours emerged in Rotterdam about a second plan for a trans-European crude oil pipeline system, which aimed to supply the entire northwestern European crude oil requirements from Marseille, including those in the Rhine-Ruhr area and the Port of Rotterdam. Such a system made commercial sense at the time. Most of Western Europe's oil came from the Middle East, either through the Suez Canal or

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[383] E.G. Parke, 'Pipelines and tankers: Two complementary forms of oil transportation', *Tijdschrift voor vervoerswetenschap* 3 (1967) 297-310, here: 298-299.
[384] F. de Goey (ed.), *Comparative Port History of Rotterdam and Antwerp (1880-2000)* (Amsterdam 2004) 9-10.
[385] Parke, 'Pipelines and tankers', 305-306.

by pipelines terminating at Mediterranean ports in Lebanon and Syria. The development of a major European port in the Mediterranean as the feeding point of Western Europe's crude oil requirements was thus a sensible plan.

The Rhine-Ruhr area was the Port of Rotterdam's primary hinterland and the basis for its initial growth from the 1890s onwards.[386] However, in the mid-1950s, at least two ports, Wilhelmshaven and Marseille, appeared to be contesting the position of Rotterdam as the principal oil port of the Rhine-Ruhr area. This posed an immediate threat to Rotterdam. In the short term, losing a share of the crude oil inflow destined for the Rhine-Ruhr area would mean losing a significant amount of revenue from docking ships for the Rotterdam Port Authority. Although the costs of port expansions were also earned back by renting out land, an important share of revenue came from docking and quay fees. Not obtaining a pipeline to the Rhine-Ruhr area would thus reduce the earning power of future port adaptations, which could threaten its attractiveness for industrial settlement. Ever since the 1930s, the Port Authority, which was created in 1932 as the municipal agency for port development, had developed a policy to industrialise the port to make it less dependent on the transhipment of a limited number of transit goods, cereals, pit wood, coal and iron ore. The world wars and the economic crisis of the 1930s had fostered a belief in Rotterdam that the industrialisation of the port was the panacea for its sensitivity to external shocks.[387] The upgrading of the Royal Dutch Shell refinery at Rotterdam-Pernis in 1947 and the establishment of the Caltex refinery just before World War II were the first successes for the Port Authority on the path to industrialisation.[388] These early successes also made clear that oil was the new growth industry.

The ability of the Port of Rotterdam to obtain a pipeline connection to its hinterland depended on the considerations of the West German government on the one hand and the oil companies on the other. The locational considerations of the latter were dependent on a number of factors. Pipelines have a high degree of asset specificity, meaning that they are geographically fixed and dedicated to serving a limited number of users in a limited space. As the capital invested in pipelines is sunk, their routing, operation and transport tariffs need to be concluded and fixed before they are actually built, especially when private capital is involved. Privately-funded pipelines therefore tend to be part of vertically integrated oil companies so that the potentially high transaction, coordination and contracting costs can be managed.[389]

Another source of uncertainty is government legislation and regulation. Jeffrey

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[386] Klemann and Wielenga, 'Die Niederlande und Deutschland, oder verschwindet die nationale Ökonomie?', 11-14; Laspeyres, *Rotterdam und das Ruhrgebiet*, 195.
[387] Van Walsum, *Rotterdam-Europoort*, 12-13.
[388] De Goey, *Ruimte voor industrie*, 76.
[389] J. D. Makholm, *The Political Economy of Pipelines* (Chicago 2012) 4-6.

Makholm's recent study of the history of the political economy of pipelines shows that although oil and gas pipelines are technically similar the world over, their operations, governance and regulation differ from country to country.[390] In contrast to the US, where pipeline legislation and regulation was already in place (an inheritance from the Standard Oil Trust era), in Western Europe in the 1950s, there was no legislation, let alone laws relating to cross-border pipelines. The oil companies considering pipelines in Western Europe in the 1950s were therefore making plans in a regulatory void.

This chapter questions to what extent the Port of Rotterdam was successful in adapting the port and hinterland infrastructure to the new demand for transportation in the latter. What were the constraints on adaptation and how were these overcome? The focus of this chapter is on the 1955 German consortium of oil companies that proposed a pipeline from Wilhelmshaven to the Rhine-Ruhr area.

5.2 A pipeline to the Rhine-Ruhr area

In the 1950s, the cost of transportation made up around 30 per cent of the oil industry's total operating costs for getting oil supplies to European markets (excluding taxes). As a consequence, it was the single largest cost component in the value chain.[391] As long as individual products were shipped to individual markets from large refineries located at source, transport operations remained fairly small-scale in the sense that opportunities for scale economies were limited. Typically, 10-12,000 ton tankers laden with, for instance, gasoline would call at several ports in Europe, depending on the particular demand structure of each country. When, however, the consumption pattern changed significantly in the post-war years, and crude oil was increasingly shipped to consumer refineries in Europe, major opportunities for scale economies in transportation arose. Instead of calling at several ports to supply a single type of product, larger-sized tankers would call at one port to supply the local refinery with crude. In short, the incentives for scale economies induced the oil companies to limit the number of entry ports for the European market.[392]

Further distribution to inland markets was performed mainly by barge, rail tank car and, in the 1950s and 1960s, increasingly by road tank cars. For the transportation of products and crude in the Rhine basin, barge transport was dominant. However, with the planning for inland refineries from the mid-1950s onwards, these transportation modes came under pressure, as they could only deliver crude in batches. Although push barges and round-the-clock sailing schedules partly helped to resolve the problem, it was much more efficient for refinery operations to

[390] Ibid., 1-3.
[391] Hubbard, *The Economics of Transporting Oil*, xii
[392] Ibid., 2-3

have a continuous supply. Indeed, this general shift in the pattern of oil transportation could be observed in Deutsche Shell's planning for its new Rhineland refinery in 1957, when the company concluded that feeding the Cologne-Godorf refinery would no longer be possible by barge.[393]

On 31 August 1955, *Die Welt* published a small article entitled 'Pipeline to Wilhelmshaven or Rotterdam.'[394] The piece mentioned the existence of a group of oil companies that was planning a pipeline connection to a new refinery in the Ruhr area. Most of this new pipeline firm would be comprised of several of the major oil companies with overseas capital. The starting point would be either Wilhelmshaven or Rotterdam. According to the article, Wilhelmshaven's city council had already promised a 5km^2 tract of land for the project, while the state government of Niedersachsen had also pledged its support. Moreover, Wilhelmshaven pointed out that its port had better tidal conditions than Rotterdam.[395]

The article in *Die Welt* referred to a consortium of multinational and German oil companies. With Esso in the lead, the group was gathering information on the opportunities for a crude oil pipeline to the new and expanded refineries in the Rhine-Ruhr area. Around the time of the article's publication in *Die Welt*, Esso AG had published a report on its initial findings. This stated that the consortium was considering Wilhelmshaven and Rotterdam as potential starting points for the pipeline, which Esso projected to have an initial throughput capacity of 8 million tons per year. Table 5-1 presents the partners in the project and their share in the throughput. The consortium consisted of German firms, with three German subsidiaries of multinational oil companies (Esso, Deutsche BP and Deutsche Shell) comprising the majority of the pipeline's projected capacity. Also involved were the German-owned Scholven and Union Krafstoff, which were participating in conjunction with Deutsche Shell and Deutsche BP. The consortium was complemented by three other German-owned companies, the former hydrogenation plant Gelsenberg Benzin, the much smaller Ruhrchemie (owned by coal and steel companies in the Ruhr area) and Ruhröl (part of the Stinnes group).

393 SHA, MF/48/Godorf: Budget Revision, Return no. 513, 15 March 1957, 3.
394 'Pipeline nach Wilhelmshaven oder Rotterdam', *Die Welt*, 31 August 1955.
395 'Pipeline nach Wilhelmshaven oder Rotterdam', *Die Welt*, 31 August 1955.

Table 5-1. The German pipeline consortium, 1955

Partners	Throughput (million tons)
Esso AG	3.00
Deutsche BP / Scholven	1.50
Shell / Union Kraftstoff	1.50
Gelsenberg Benzin	1.50
Ruhrchemie	0.35
Ruhröl	0.15
Total initial pipeline capacity	**8.00**

Source: GAR, AHB, 589.01, inv. nr. 70, letter from Koomans (director Port Authority) to Mayor and Aldermen of Rotterdam City Council, 30 September 1955, 2.

The German partners Wesseling, Scholven and Gelsenberg had made long-term processing deals with Deutsche Shell, Deutsche BP and Mobil, respectively, in the course of the late 1940s and early 1950s. [396] As these multinational partners planned to increase their refining capacities, so did the German partners, hence their participation in the Esso-plan.

Although the Esso AG pipeline was the first crude oil pipeline in Western Europe, other large-scale pipeline projects were being developed simultaneously. From 1952 onwards, NATO had been constructing a network of oil product pipelines in France, Belgium, the Netherlands and West Germany to supply military bases and airports with fuel. Accordingly, by the late 1950s, large sections of the so-called Central European Pipeline System were already in place.[397] In Eastern Europe, meanwhile, the Soviets planned a huge system of oil pipelines (the Friendship or Druzhba Pipeline System), which aimed to supply the Comecon states with Soviet crude oil. The process of importing crude oil and refining it near the market that evolved in Western Europe in the 1950s and 1960s was mirrored in the Eastern Bloc.[398] The construction of the Friendship pipeline brought surplus Soviet crude oil to the doorstep of the Western Bloc, simultaneously enticing and horrifying Western powers. The abundance of Soviet crude oil seemed to some Western European countries to be an attractive alternative source of oil that was both cheap and sold indiscriminately.[399] The Soviet Union started exporting crude oil on a large scale from 1955 onwards, sending shockwaves through world oil markets and causing Western oil companies to lower posted prices to counter the competition. This in turn led the Middle Eastern oil-producing countries to form OPEC in 1960 to put them in a

[396] Karlsch and Stokes, *Faktor Öl*, 292.
[397] J. Hoffenaar, D. Krüger and D.T. Zabecki, *Blueprints for battle: planning for war in central Europe, 1948-1968* (Lexington 2012) 92.
[398] J. S. Prybyla, 'Eastern Europe and Soviet Oil', *The Journal of Industrial Economics* 13 (1965) 154-167, here: 155-156.
[399] Prybyla, 'Eastern Europe', 156.

stronger position to face the unilateral price cuts of the Western oil companies.[400] Strategically, the Friendship pipeline signalled a strengthening of Soviet military potential in Eastern Europe, provoking NATO in the early 1960s to impose a ban on the export of large diameter steel pipes to the Soviet Union in an attempt to obstruct the influx of its crude oil into Eastern Europe.[401] Oil pipelines, therefore, commanded not only commercial, but also considerable strategic and military attention and interest in the 1950s and 1960s.

5.3 Rotterdam competing with Wilhelmshaven

For the Port of Rotterdam, the pipeline plan could have significant consequences. With 1.5 million tons, or 25 per cent of West German imports, Rotterdam was the second most important landing port for crude oil for West Germany.[402] The imported crude was shipped from Rotterdam by barge over the Rhine to two refineries in the Rhine-Ruhr area.[403] Pipelines, however, could change that pattern entirely. Capital costs and amortisation make up 65 per cent of the total operating costs of pipelines.[404] The longer the pipeline, the higher the capital outlay required for its construction. Moreover, due to the high share of fixed costs in a pipeline's cost structure, ton-mile costs do not reduce with distance, unlinke most other transport modalities.[405] The capacity of a pipeline has a much greater impact on ton-mile costs than its length. Increasing the capital expenditure that is due to distance can be offset by increasing the diameter of the pipe, because capacity rises exponentially while capital costs increase linearly, causing the ton-mile costs to fall as the capacity rises.[406] However, because their fixed costs are relatively high, pipelines require a stable and continuous payload in order to be competitive and efficient. A key factor is thus the question of whether there is sufficient demand to warrant a continuous payload on or near the full capacity of the pipeline.[407]

As capacity and payload are the largest determinants of ton-mile costs, it is generally more efficient to serve a region or market with one large-diameter pipeline than with several pipelines with a smaller capacity.[408] In theory, the capacity of a

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[400] Yergin, *The Prize*, 515.
[401] I. B. Kravis and R. E. Lipsey, *Price Competitiveness in World Trade* (New York 1972) 205-206.
[402] Vollrath, *Die Mineralölwirtschaft*, 93; 99.
[403] These refineries were Gelsenberg Benzin AG in Gelsenkirchen (Ruhr area) and Union Rheinische Braunkohlen Kraftstoff AG in Wesseling near Cologne. Together with Scholven AG in Gelsenkirchen, these were the first true inland refineries in Germany. They were originally constructed as synthetic fuel producers in the late 1930s within the framework of the four year and Karin Hall plans that sought to end Nazi Germany's dependence on foreign oil.
[404] Manners, 'The Pipeline Revolution', 158.
[405] Ibid., 157-159.
[406] Ibid., 159-160; Makholm, *The Political Economy of Pipelines*, 29.
[407] Manners, 'The Pipeline Revolution', 159.
[408] Makholm, *The Political Economy of Pipelines*, 29.

pipeline is unlimited as long as pumps can be added to increase the speed of the flow through it. However, adding pumps adds to the operating costs, at some point increasing these faster than the amount of oil pumped through the pipe, causing ton-mile costs to rise again.[409] The effect of adding horsepower to the pumping capacity is greater in larger diameter pipelines than in smaller ones. The main economic problem with pipeline planning is finding the optimal configuration of diameter and pumping power at the expected throughput in order to ensure the lowest possible ton-mile cost.[410] An additional problem is the need to plan for adequate spare capacity in the pipeline to allow for future growth while maintaining low enough ton-mile costs in the first few years of its operations. This means that if a pipeline from Marseille could operate a sufficiently higher capacity pipe to the Rhine-Ruhr area than Rotterdam, it could in theory be cheaper to supply crude oil from Marseille, even though the distance from there to Cologne is four times longer than that from Rotterdam to Cologne. However, pipeline costs were not the only determining factor in terms of planning, because the political economy of this modality is just as important when it comes to understanding how and why pipeline developments evolved historically.[411]

A pipeline for the transportation of crude oil with a capacity of 2 million tons per year and a length of 250 kilometres – the distance between Rotterdam and Cologne – would be more expensive than shipping the crude by river barge.[412] However, the new inland refineries were projected to have a combined first stage capacity of 8 million tons per year,[413] and with annual capacities of 4 million tons or more, pipelines were much cheaper than barges. As distance was less of an issue than capacity when considering pipeline trajectories, suddenly the choice of landing ports for crude oil was also questioned. Pipelines for crude oil would not only push out barge transport, as barges were quite cumbersome and costly, but would also decisively establish long-term connections between ports and their hinterlands.[414]

In 1955, the director of the Rotterdam Port Authority, N. Koomans, signalled the threat of pipelines to Rotterdam's position as a crude oil gateway to the Rhine basin. In a letter to Rotterdam City Council, Koomans outlined what a choice for Wilhelmshaven would mean for the Port of Rotterdam. Taking the projected initial capacity of the pipeline at 8 million tons per annum, this would involve between 400 and 450 ship movements through the port annually, amounting to roughly 2 million Dutch guilders in port dues. Losing the pipeline connection to Wilhelmshaven would

[409] J.R. Meyer, M.J. Peck, J. Stenason and C. Zwick, *The economics of competition in the transportation industries* (Cambridge MA 1976 fifth edition) 130-131.
[410] Meyer et al, *The economics of competition in the transportation industries*, 126.
[411] Makholm, *The Political Economy of Pipelines*, 30.
[412] Hubbard, *The Economics of Transporting Oil*, 80-81.
[413] GAR, AHB, 589.01, inv. nr. 70, letter from Koomans (director of the Port Authority) to the Mayor and Aldermen of Rotterdam City Council, 30 September 1955, 2.
[414] Manners, 'The Pipeline Revolution', 156.

thus seriously damage the position of Rotterdam's port as an oil transhipment location, let alone costing it a good deal of revenue.[415]

The strategy behind the post-war expansion of the Port of Rotterdam can be described as tonnage maximisation.[416] This was related to the policy of industrialisation and the role of the Port Authority, which is usually defined as a type of landlord.[417] A landlord-type port authority invests in expansion and the maintenance of the port, and raises revenue by levying port dues (for docking and cargo handling) and renting out land. A landlord port authority does not own and exploit installations, although the Rotterdam Port Authority did to some extent. As a result, its turnover consisted of 65 per cent of port dues and income from rents. This would increase to almost 90 per cent in 1980.[418] The growing importance of port dues and rents for the Port Authority's turnover derived from the enormous expansion of the Port of Rotterdam between 1945 and 1975 in terms of rentable commercial land, the number and size of the ships arriving, and the volume of cargo handled.

Contemplating the oil industry's opportunities with respect to the growth potential of the Port of Rotterdam, Koomans was well aware that the oil sector could become a key player. Indeed, oil companies operated refineries that required large plots of land close to water; they also transported huge volumes of oil and did so using large ships. They were, in short, the port's ideal client. In terms of revenue, the estimate of 2 million guilders in port dues that Koomans referred to in his letter to the city council represented 10-11 per cent of the total revenue from port dues in the port's turnover for 1955-57, which was a substantial amount.[419]

However, the German pipeline consortium had a list of requirements. Esso AG planned to have its new refinery operational by early 1959. The pipeline thus needed to be up and running by then, which required a suitable feeding terminal in a suitably adapted port. Speed was therefore of the essence for both Rotterdam and Wilhelmshaven. In a preliminary report on its findings regarding the suitability of the two ports, Esso AG concluded that Rotterdam was attractive for fiscal reasons, but its nautical situation was lagging behind Wilhelmshaven.[420] Esso AG expected

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415 GAR, AHB, 589.01, inv. nr. 70, letter from Koomans (director Port Authority) to the Mayor and Aldermen of Rotterdam City Council, 30 September 1955, 2.

416 F. de Goey, 'Port of Rotterdam: Land-use policy during the twentieth century', in: R. Loyen et al (eds.), *Struggling for leadership: Antwerp-Rotterdam port competition between 1870-2000* (Berlin 2003) 221-234, here: 230-231.

417 Ibid., 224.

418 Municipal Port Authority Rotterdam, *Annual report 1955*; De Goey, 'Port of Rotterdam', 223. Today, crude oil and oil product tankers are an important source of income for the port. In particular, crude oil tankers pay the highest port dues and quay fees (which depend on the length of the ship). Source: Port of Rotterdam Authority, 'Algemene voorwaarden zeehavengeld, binnenhavengeld en bijdrage afvalstoffen zeeschepen Havenbedrijf Rotterdam N.V., 14-20. http://www.portofrotterdam.com/nl/Scheepvaart/havengelden/Documents/AV-NL.pdf, 28 May 2014.

419 Municipal Port Authority Rotterdam, *Annual reports 1955-57*. Own calculations.

420 BAK, B146/1697 BMZ: memo from Esso AG, 'Steuerliche Behandlung einer Pipeline-

Wilhelmshaven to be better positioned to successfully adapt its port to Esso's requirements in time. In response, Koomans urged Rotterdam City Council to contact the ministries of finance, economic affairs and transportation to probe them about solutions to Esso's concerns. As for providing space in the port for a pipeline terminal and docks, the Port Authority initially thought of the Third Petroleum Dock (*Derde Petroleumhaven*) in the Botlek area. This area was the result of the first post-war expansion of Rotterdam's port. Construction had finished in 1955 and the first tracts of land had been let out. However, it was by no means full, and seemed to be the logical site for a pipeline terminal. Soon, however, it became apparent that Esso envisaged the use of larger tankers than the Botlek docks could handle. So, between summer 1955 and March 1956, the Port Authority drew up alternative plans, which involved dredging the New Waterway to accommodate bigger tankers, enlarging the Third Petroleum Dock, and building a completely new port to the west of the Botlek area, closer to the sea. In March 1956, the Port Authority asked City Council to obtain national government approval for these plans.[421]

The adaptation of the port to resolve the problems highlighted in the Esso report was not moving quickly enough to accommodate the immediate requirements for a pipeline. After drafting the first plans in early 1956, which sought to address the concerns of Esso AG, the Port Authority became entangled in a complex planning process in which the regional and national governments were scrutinising the Rotterdam plans and even drafting their own alternatives. The planning board of the province of Zuid-Holland and the water department of the Ministry of Transport were particularly actively involved. Whereas the Port Authority had its eye firmly on the short-term goal of facilitating the pipeline connection, the regional and national government agencies aimed to address planning and water management issues within a broader framework. The active involvement of other municipalities, the province and the national government complicated matters considerably for the Port Authority. It was, however, dependent on the agreement of the authorities to obtain overall approval for its expansion plans. The involvement of diverse levels of government led to the expansion plan becoming disconnected from the pipeline plan.[422] Nonetheless, Esso AG frequently used the efforts of the Rotterdam Port Authority to pressurise the German government into financially supporting the adaptation of the Port of Wilhelmshaven. Esso AG thus played the Dutch off against the Germans and vice versa. That it was in a position to do so was because the German government was keen on securing a German solution to the pipeline question.

Gesellschaft', 21 February 1956, 7.
[421] De Goey, *Ruimte voor industrie*, 81-82.
[422] Posthuma, 'Het Havenbedrijf 1945-1965', 44-48; De Goey, *Ruimte voor industrie*, 84-88.

5.4 Wilhelmshaven: "the best deep water port in Europe"?[423]

The German governmental response to the Esso plan started in Wilhelmshaven. Esso AG had provided Wilhelmshaven City Council with a detailed calculation of the pipeline and its economic benefits.[424] The annual throughput of the pipeline would start at 10 million tons in 1959, increasing to 20 million tons in 1970. The tankers docking there would pay docking and quay fees and would also require towing and pilotage services, repairs and supplies. The port itself would have to be adapted to allow a 300 metre wide port entrance at a depth of 12 metres in 1959, to be dredged to 13 metres at a later stage. The pipeline plan resonated with the city council and the government of the state of Lower Saxony, and the numbers provided by Esso were used by representatives from both Wilhelmshaven and the state government to request federal support to secure the pipeline.

Wilhelmshaven City Council produced a report for the Federal Ministry of Economic Affairs to petition for federal support for the adaptation of the Wilhelmshaven port to the required depth of 12 metres.[425] The report stressed that federal support for the changes would guarantee the pipeline for Wilhelmshaven. If the federal government hesitated, the project would surely be lost to Rotterdam.[426] The city council stressed that both Rotterdam and Wilhelmshaven offered equal opportunities and that the decision hinged on nautical factors. Guaranteeing a depth of 12-13 metres was essential for Wilhelmshaven to obtain the pipeline. The pipeline plan was one of the few potential growth options for the economically depressed city of Wilhelmshaven, with its high unemployment rate and otherwise limited opportunities for development. Provided that the federal government invested in it, Wilhelmshaven could even become "the best deep water port in Europe."[427] The total cost of dredging was estimated at 29 million DM for a depth of 12 metres, with an additional 8 million DM to reach 13 metres, which were sums that were entirely justifiable given the economic merits of the project for Wilhelmshaven.[428]

The city council pointed to the strategic risk of allowing Rotterdam to acquire an even greater concentration of oil transhipments than it already boasted. "The entire oil supply of Central Europe could potentially be disrupted and in case of a nuclear

[423] B146/1697 BMZ: memo from Grunewald (Wilhelmshaven), 'Errichtung einer Ölumschlaganlage in Wilhelmshaven in Verbindung mit einer Pipeline von Wilhelmshaven zum Ruhrgebiet', 23 March 1956.
[424] B146/1697 BMZ: letter Esso AG to Arthur Grunewald, Alderman of Wilhelmshaven, 14 March 1956.
[425] B146/1697 BMZ: memo from Grunewald (Wilhelmshaven) to BMWi, 17 March 1956.
[426] Ibid., 2.
[427] B146/1697 BMZ: memo from Grunewald (Wilhelmshaven), 'Errichtung einer Ölumschlaganlage in Wilhelmshaven in Verbindung mit einer Pipeline von Wilhelmshaven zum Ruhrgebiet', 23 March 1956.
[428] At the time, Wilhelmshaven and, more generally, northwest Germany were officially declared a *Notstandsgebiet*, namely an economically deprived and depressed area, eligible for federal economic aid.

attack entirely wiped out."[429] It was thus not in German interests to have the largest part of its oil supply flowing through a foreign pipeline. Moreover, it was to be expected that a second pipeline could be constructed for the supply of the eastern parts of Germany, for which Wilhelmshaven was well positioned. Furthermore, the investment would also be beneficial for Wilhelmshaven as a NATO port.

Around the same time, the minister-president of Lower Saxony, Heinrich Hellwege, backed the plea of Wilhelmshaven City Council for federal support.[430] According to Hellwege, the Federal Ministry of Transportation (headed by his fellow *Deutsche Partei* member Hans-Christoph Seebohm) had already conceded that Esso's request was feasible, but would not provide the means for dredging the port from its own budget. It was therefore important that the federal government produced the funds. Speed was of the essence because Hellwege expected the oil companies to make a decision within two to three weeks.

A third effort to mobilise federal support for Wilhelmshaven was undertaken by the Lower Saxony Minister of Economic Affairs, Hermann Ahrens, a close political ally of Hellwege. Ahrens also stressed that Rotterdam and Wilhelmshaven were equal candidates for the pipeline. As a decision in favour of the latter would involve a longer sea journey (350 kilometres longer) and a longer pipeline to Cologne (Rotterdam was 60 kilometres closer), the city needed financial aid from the federal government to gain an advantage over Rotterdam.[431] Ahrens pointed out that it would be detrimental to the future position of all German North Sea ports if the federal government allowed Esso AG to go to the Dutch city. Indeed, the tempestuous growth of the Port of Rotterdam in the post-war years translated into a rising force of attraction for international oil companies. The Wilhelmshaven project was therefore in the local, regional and national interest.

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[429] Ibid., 3.

[430] Hellwege was the founder and leader of the *Deutsche Partei*, a right-wing party that was later subsumed into the CDU. He was a staunch supporter of the position of Lower Saxony in the German federation, taking after his father, who was a political activist supporting the freedom of Lower Saxony from the Prussian annexation of 1866. In 1945, Hellwege founded the regional *Niedersächsische Landespartei*, which became the *Deutsche Partei* in late 1946. The party became a member of the first two Adenauer governments (1949-1953 and 1953-1957) and Hellwege became a minister in the cabinet, along with his fellow party member Hans-Christoph Seebohm (Minister of Transport). Adenauer saw Hellwege's party as a buffer against right-wing extremists. In the two consecutive Adenauer governments of the 1950s, Hellwege was also Adenauer's most trusted ally against the Social Democrats. In 1955, Adenauer dispatched Hellwege to Lower Saxony to take over the post of minister-president from the left wing Heinrich Wilhelm Kopf. Hellwege was therefore a confidant of the chancellor and potentially influential. 'Deutsche Partei, der Abfall', *Der Spiegel*, 13 July 1960. http://www.spiegel.de/spiegel/print/d-43066277.html, accessed 21 May 2013. B146/1697 BMZ: Telegram van Minster-president Niedersachsen aan Vice Bundeskanzler, Errichtung von anlagen zum umschlag von rohoel in Wilhelmshaven, 22. März 1956.

[431] B146/1697 BMZ: memo from Ahrens on the preparation for the meeting with vice-chancellor Blücher on 5 April 1956, 'Probleme einer Rohölleitung von Wilhelmshaven nach Köln', 29 March 1956.

In March 1956, representatives from Wilhelmshaven and Lower Saxony met with representatives from the federal ministries of economic affairs, transportation, defence, finance and labour.[432] Those from the Ministry of Transportation pointed out that Wilhelmshaven was the only German port that could offer the appropriate depth for the pipeline project. The dredging of the Elbe (Hamburg) or the Weser (Bremen) would require capital outlays of at least 100 million DM or more, which was considerably higher than the 30 million DM required to dredge the Jade, which was the entrance to the Port of Wilhelmshaven. The Ministry of Defence expressed an interest in disposing of a German deep-sea port, although at the time the navy operated no ships with a draught of more than six metres. However, in preparation for the reconstitution of the German army, air force and navy in 1955, the ministry had already selected Wilhelmshaven in 1952 as one of the principal bases for the new German navy (*Bundesmarine*).[433] Modernising the Wilhelmshaven port was thus also of military interest.

The national interest and the regional economic benefits were unanimously agreed upon by the federal ministries involved, which were in principle prepared to support Wilhelmshaven financially.[434] Finding a consensus on how to share the dredging costs, however, was much harder. The costs were considerable and higher than calculated by Wilhelmshaven City Council: up to 11 metres, dredging would entail a cost of 30 million DM, while at 12 metres this figure would rise to 42 million DM. On the one hand, the federal ministries concluded that they would all have to make a contribution, although part of the financial burden should also fall on Lower Saxony and Wilhelmshaven itself. Lower Saxony responded that its finances were too weak to take on such a burden. Moreover, it pointed out that the federal government had a constitutional obligation to finance the maintenance of waterways and ports. Accordingly, Wilhelmshaven, Lower Saxony and the federal ministries agreed to start by offering to limit dredging to 11 metres for the first phase of the pipeline's operations in order to keep costs down.[435]

In April 1956, the representatives of the federal ministries of economic affairs,

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[432] B146/1697 BMZ: minutes of a meeting between Grunewald, Ahrens and representatives of the ministries of economic affairs, transportation, defence, finance and labour, 'Betr.: Einrichtung von Anlagen für den Umschlag von Rohöl in Wilhelmshaven', 29 March 1956.
[433] H. Ahner, *Wilhelmshavener Chronik* (Wilhelmshaven 1969) 334.
[434] B146/1697 BMZ: minutes of a meeting between Grunewald, Ahrens and representatives of the ministries of economic affairs, transportation, defence, finance and labour, 'Betr: Einrichtung von Anlagen für den Umschlag von Rohöl in Wilhelmshaven', 29 March 1956.
[435] B146/1697 BMZ: minutes of the meeting between vice-chancellor Blücher, Ahrens and representatives of the ministries of finance, defence, economic affairs and transportation, 'Betr: Einrichtung einer Ölumschlagsanlage in Wilhelmshaven', 6 April 1956, 4. [The financing was problematic. None of the ministries had room in their budget. Ahrens proposed giving the Ministry of Transportation a power of attorney to make a 1/3 down payment on a dredging contract. The remaining payments could then be made in annual instalments of 6 million DM. Lower Saxony could then start contributing from 1960 onwards.]

transportation and finance, as well as those from the Lower Saxony Ministry of Economic Affairs, met in Hamburg with the general managers of the four largest oil companies, Esso AG, Deutsche Shell, Deutsche BP and Mobil Oil AG.[436] During the meeting, Geyer of Esso rejected outright the suggestion of limiting the first stage dredging to 11 metres, asserting that 36,000 ton tankers required 11.8 metres, while 45,000 ton vessels required 12.8 metres. Half of the tanker fleets of the oil companies already employed 36,000 ton tankers, and several 45,000 ton versions were on order. Moreover, with the continuous arrival of tankers all year round, the efficiency of operations hinged on the ability to dock and unload tankers 24 hours a day. The oil companies were already incorporating a longer sea route if they chose Wilhelmshaven. As a consequence, compromising the draught of the port would be an extra burden.

The meeting concluded that the federal government should find the financial means to dredge to 12 metres, but there was no concrete timescale for increasing the depth to 13 metres. The oil companies made it clear that no financial participation by them for the dredging should be expected; the government must provide the necessary means. The Ministry of Finance suggested a financial arrangement in which the Ministry of Defence would provide 12 million DM, while the annual costs to maintain the depth would be borne by the Ministry of Transportation. That left an 18 million DM financial hole for the actual dredging works needed to reach a depth of at least 12 metres.[437]

For the oil companies, the choice between Rotterdam and Wilhelmshaven seemed to be edging in favour of the latter. Although the question of federal financial support was still open, there seemed to be a tentative agreement that the federal government would grant financial support in exchange for Esso AG choosing Wilhelmshaven. In an internal memo, the federal Ministry of Finance expressed the view that the oil companies were obliged to choose a German port, because the pipeline marked the opening of the German market for these firms, i.e. it allowed oil to compete with coal.[438] From the side of the oil companies, Esso AG had privately confided in Max Adenauer, Mayor of Cologne and the son of Chancellor Konrad Adenauer, that the company strongly supported Wilhelmshaven, but needed a swift decision from the federal government to close the deal.[439]

For several months, the oil companies had communicated that their final decision would be made in April 1956. However, at the meeting that took place then, it became clear that the committees responsible for studying the opportunities of

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[436] B146/1697 BMZ: 'Betr: Errichtung einer Ölumschlagsanlage in Wilhelmshaven und Bau einer Ölleitung von Wilhelmshaven nach Köln, 16. April 1956

[437] B146/1697 BMZ: minutes by Ahrens on the meeting with the oil companies, 'Betr: Errichtung von Anlagen zum Umschlag von Rohöl in Wilhelmshaven', 18 April 1956.

[438] B146/1697 BMZ: memo from the Ministry of Finance to BMZ regarding the meeting of 13 April 1956, 'Betr: Einrichting von Anlagen für den Umschlag von Rohöl in Wilhelmshaven, 28 April 1956.

[439] B136/2413: Max Adenauer (Oberstadtdirektor Köln) to Bundeskanzler, 23. April 1956

Rotterdam and Wilhelmshaven could not yet reach a decision.[440] Rotterdam still had some considerable advantages over any German port. The Dutch capital market, for instance, was much more liquid and the interest rate was half the prevailing rate in Germany. Fiscally, Rotterdam was also attractive, because the Dutch did not levy sales tax and taxes on assets and capital, while the tax on profits was considerably lower than in Germany. Moreover, the Dutch allowed for an additional 20 per cent depreciation on assets in the first five years of operations. Moreover, the Rotterdam Port Authority had worked strenuously to develop plans for a new deep-sea port on the western tip of the Rhine delta (Hook of Holland).

Wilhelmshaven's only real advantage over Rotterdam had been its deep-sea access. However, the developments in the Netherlands had improved Rotterdam's chances, notwithstanding the efforts of the German government to support Wilhelmshaven. The meeting between the oil companies on 19 April concluded that it had not brought a decision any closer; instead, the meeting had only made things more difficult.[441] The oil companies had a list of favours to obtain from the federal and state governments. Most importantly, they demanded that the Wilhelmshaven port be dredged to a depth of 12 metres, fully paid for by the German federal government, including for its maintenance and pilotage services, shore radar installations, and the free docking and unloading of tankers. Other demands included measures to offset the disadvantages of the German capital markets and fiscal regulations vis-à-vis the Dutch.

In May, the relevant federal and state ministries met again with the oil companies to discuss their demands. The meeting was tense. The oil companies produced maps of the proposed new docks at the Hook of Holland in Rotterdam, demonstrating how forthcoming the Dutch were. The government representatives, on the other hand, had the impression that the oil companies were overstating the positive aspects of the Rotterdam candidacy; the firms were praising the efforts of the Rotterdam Port Authority to develop an entirely new dock, but were silent about the problems with the plan, for instance, salinisation and the related issue of using locks.[442] Furthermore, the claim that the Dutch had already offered the oil companies a right of eminent domain seemed doubtful to the German government representatives.[443]

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440 B146/1697 BMZ: letter from Esso AG to BMF, BMW, BMV, BMZ, BMVert, LSMF, LSMW and the NRWMW regarding the meeting of the pipeline consortium on 19 April 1956, 'Betr: Rohöl-pipeline Projekt Nordsee-Rhein-Ruhr', 30 April 1956.
441 Ibid., 2.
442 B146/1697 BMZ: memo from BMZ, 'Betr.: Besprechung der Landesvertretung Niedersachsen mit den Mineralölfirmen in Anwesenheit der beteiligten Ressorts (BMF, BMV, BMWi, BMZ) und verschiedener Vertreter der Länderressorts von Niedersachsen und der obersten Finanzbehörden des Landes Niedersachsen, Nordrhein-Westfalen und Hamburg', 19 May 1956.
443 B146/1697 BMZ: telex from the German Embassy in The Hague to BMZ and BMW, 'Betr:

Pressurising the German government was of course part and parcel of the process. In Germany, the oil companies stressed the advantages of Rotterdam (fiscal and financial), whereas in the Netherlands they pressed those of Wilhelmshaven (a ready-to-use deep-sea port, save for some minor adaptations). However, within the consortium, tensions were mounting. Although federal support for changes to the Wilhelmshaven port was coming together, Royal Dutch Shell still strongly supported Rotterdam and did not want to give up its preference, which was a position firmly defended by Deutsche Shell in the German consortium.[444] By June 1956, the pipeline issue seemed to have reached a deadlock. The consortium was divided internally and the federal government was also struggling to make a decision on its support for Wilhelmshaven. Meanwhile, the proposal for a fourth petroleum dock (Vierde Petroleumhaven) by the Rotterdam Port Authority was gaining momentum, regardless of the many problems the plan was still facing and the fact that it involved the construction of a completely new port complex.

The Rotterdam promise of a guaranteed depth of 13 metres for the new dock was alarming for the Lower Saxony and federal ministries.[445] The question of financial support seemed to hinge on the objections of the Minister of Transport, Hans-Christoph Seebohm (Deutsche Partei), who feared that a positive decision on Wilhelmshaven would have major financial repercussions for his ministry, because Bremen and Hamburg would then also want port expansions. Hellwege, the minister-president of Lower Saxony, pressed his fellow Deutsche Partei member to realise the political, economic and strategic importance of the issue at stake.[446] Hellwege pointed out that the project was in the national interest and that it solely served to facilitate a German port for the largest tankers, which would otherwise be sent to Rotterdam or even a French port, diverting 80 per cent of German crude oil imports to a foreign port. As Wilhelmshaven would thus only serve to welcome the largest vessels, it would not pose a threat to the other German seaports.

By mid-June 1956, the funding for federal support of the Wilhelmshaven project had been secured.[447] The remaining obstacle was Seebohm's objection with regard to the effects of the pipeline project on other German ports and modes of transportation.[448] Seebohm had reservations about what he saw as a lack of

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Pipelineprojekt', 19 May 1956.
[444] B136/2413 BKA: letter from BKA to Hellwege, 'Betr: Errichtung von Anlagen zum Umschlag von Rohöl in Wilhelmshaven und Bau einer Ölleitung von Wilhelmshaven nach Köln', 22 May 1956.
[445] B146/1697 BMZ: internal memo BMZ, 'Betr: Pipeline-Wilhelmshaven', 4 June 1956.
[446] B146/1697 BMZ: Hellwege to Seebohm (BMV), 4 June 1956.
[447] B146/1697 BMZ: minutes BMZ, 'Betr: Ergebnis der Besprechung am 13. June 1956 im BMZ über die Finanzierung der durch die Vertiefung der Jade-einfahrt entstehenden Kosten', 14 June 1956; B146/1697 BMZ: memo BMZ on the meeting with representatives of BMW, BMV, BMF, BMVert, BMZ and BKA, 'Betr: Einrichtung von Anlagen für den Umschlag von Rohöl in Wilhelmshaven', 13 June 1956.
[448] B136/2413 BKA: minutes of the meeting on 15 June 1956, 'Chefbesprechung Pipeline', 15 June

consideration of the consequences of a pipeline for the competitive position of other forms of transport, most notably inland shipping and rail. He feared that the Wilhelmshaven pipeline was only the start of a growing network of pipelines in West Germany. Indeed, the lower transport costs of pipelines would undoubtedly hurt the oil transport hitherto performed by rail and inland navigation.[449] Seebohm was therefore adamant that pipelines should be subjected to the transport tax that the railways were paying, and he therefore disagreed with the ease with which Schäffer waived the levying of this tax on pipelines. Seebohm was thus not inclined to give in easily to the wishes of the ministries of economic affairs and finance, who expressed full support for the oil industry and the pipeline plan.

Ludger Westrick (CDU), the Federal Secretary of Economic Affairs, objected to an additional tax on oil pipelines. Westrick stressed that it was of utmost importance to increase the level of oil supply to the German economy in view of the tight situation on the energy and labour markets, particularly to create competition for coal. It made no sense to Westrick to lift the tariff on imported fuel oil (in 1956) while also increasing the tax burden on transporting it. Moreover, with the rising consumption of oil, it was to be expected that pipelines would perform an increasing share of oil transportation to and within West Germany in the near future. For Seebohm, this was all the more reason to consider how the German government should handle pipeline transportation in the future. The basic question was thus whether the government should develop regulations for pipelines. Seebohm opined that pipelines should be defined as a mode of transport, and that their competitive position vis-à-vis other forms of transport should be regulated according to the existing regulatory framework that applied to inland waterways, railways and road haulage. The ministries of finance and economic affairs were not, however, willing to discuss the issue and so Seebohm ultimately gave in.[450]

In late June 1956, the representatives of the federal ministries met with the oil companies again.[451] All remaining issues had been dealt with. The oil firms thus announced that they would make a decision in July 1956, for which they required an official statement from the federal government regarding their demands and containing a pledge of its support. The Ministry of Economic Affairs prepared a draft letter after the meeting and again Seebohm raised objections.[452] According to

1956.

[449] B136/2413 BKA: telex from Seebohm (BMV) to Chancellor Adenauer, 8 June 1956.

[450] B136/2413 BKA: minutes BMW of the meeting with the Lower Saxon ministries of finance and economic affairs, 'Betr: Vermerk über die Besprechung im BWM am 20.6.56 zum Projekt Wilhelmshaven unter Vorsitz von Ministerialdirektor Dr. Krautwig', 21 June 1956.

[451] B146/1697 BMZ: minutes BMW, 'Betr: Vermerk Besprechung vom 27. June 1956 betreffend die Projekt Wilhelmshaven', 27 June 1956.

[452] B146/1697 BMZ: draft letter BMW to Esso AG, 'Betr: Rohöl-Umschlaganlage Wilhelmshaven (Rohrleitung)', 2 July 1956; B136/2413 BKA: Memo BMW in preparation of the cabinet meeting of 4

Seebohm, two issues remained open: the question of a transport tax and the option of subjecting the pipeline to a federal concession. Seebohm wanted a fundamental discussion about the two issues, fearing that the draft letter created a precedent that would render it impossible to apply a transport tax or subject pipelines to a concession in future projects, which he deemed to be indefensible.[453] Neither the Ministry of Economic Affairs nor the Office of the Chancellor were amused, and feared that omission of this commitment in the letter to Esso AG would nullify the efforts of the federal government to secure the pipeline project for Wilhelmshaven.[454]

Reflecting the balance of power in the cabinet, Seebohm's objections were swept aside and the draft letter was agreed, which was subsequently sent to Esso AG.[455] The oil companies could not, however, come to an agreement and the decision was postponed once again.[456] The reason for this delay was that Deutsche Shell withdrew from the consortium, which altered the share distribution among the remaining participants.[457] Royal Dutch Shell, the parent company, deemed the Wilhelmshaven pipeline to be a senseless solution and, jointly with British Petroleum, was already studying alternatives. In a concerted effort, BP and Royal Dutch attempted to destabilise the consortium. Deutsche BP announced that a new study had found that construction costs for a pipeline from Rotterdam to Cologne were 30 million DM lower than for Wilhelmshaven to Cologne. Combined with lower interest rates and a lower freight rate to Rotterdam that saved up to 0.70 DM per ton, the Wilhelmshaven candidacy was suddenly shaky.[458] In response to the retreat of Deutsche Shell and the BP report, the consortium thus needed more time to decide, which led to yet another delay of the final decision.[459] Apparently, Deutsche BP was reconsidering its participation in the consortium. Esso AG, meanwhile, was determined to see the project through, with or without BP.[460] Although BP had harboured serious doubts about the economic benefits of the Wilhelmshaven pipeline from the start, it recognized:

> "that the obvious appeal [of] an all German line to nationalistic

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July, 2 July 1956.
453 B136/2413 BKA: telex Seebohm to the entire federal cabinet regarding the draft letter to Esso AG, 4 July 1956.
454 B136/2413 BKA: memo BMW in preparation for the cabinet meeting of 4 July, 2 July 1956; B136/2413 BKA: memo BKA, Betr: Rohölumschlaganlage Wilhelmshaven (Pipeline), 2 July 1956.
455 B136/2413 BKA: internal memo BMZ and telex to Esso AG, 'Betr: Rohöl-Umschlaganlage Wilhelmshaven (Rohrleitung)', 5 July 1956.
456 B136/2413 BKA: internal memo BMZ, 5 July 1956.
457 B136/2413 BKA: 'Entscheidung über Ölleitung am 18. Juli', *Handelsblatt*, 9 July 1956.
458 B136/2413 BKA: 'Bedenken gegen Wilhelmshaven', *Die Welt*, 16 July 1956.
459 B136/2413 BKA: 'Wilhelmshaven oder Rotterdam', *Handelsblatt*, 18 July 1956.
460 B136/2413 BKA: internal memo BMZ, 'Betr: Rohöl-Umschlaganlage Wilhelmshaven', 20 July 1956.

ambitions is making it increasingly difficult to achieve any dispassionate all-party examination of relative merits. It is, therefore, necessary to make a decision between the material advantages of building a line from Rotterdam and the less tangible but equally important consequences of proceeding in the face of German opinion."[461]

After several months, the consortium, along with BP, finally agreed to choose Wilhelmshaven and incorporated the Nord-West Oelleitung GmbH on 15 November 1956.[462] The pipeline started operations in late 1958, and its throughput increased steadily during the 1960s, rising from 14.2 million tons per year in 1962 to 24.5 million tons per year in 1973. Between 1971 and 1973, a second, 40-inch pipeline was constructed between Wilhelmshaven and Cologne. The rising throughput required increasing depths of the Jade, which was dredged several times during the 1960s. Particularly after the closure of the Suez Canal in 1966, increasing the depth was of great importance to the oil companies participating in the Nord-West pipeline. Dredging started in September 1967, with the aim being to increase the depth of the Jade to 19 metres, allowing 200,000 ton tankers to dock at the terminal. By early 1968, a depth of 15 metres was realised, accommodating 100,000 ton tankers. By 1971, Wilhelmshaven welcomed 200,000 ton tankers and the federal government promised to dredge the Jade further to allow for 250,000 ton vessels.[463] In 1973, 22 per cent of Germany's crude oil imports flowed through the Nord-West pipeline.[464]

5.5 Conclusions

BP's observation that economic reasoning was trumped by political and popular pressure in the decision-making process for the pipeline to the Rhine-Ruhr area characterises the episode nicely. Esso AG played German sentiments about an all-German pipeline cunningly. Understanding the federal nature of the political decision-making process in the Federal Republic, Esso fostered local and regional support by presenting a convincing case for local development. It then pressurised the federal government with the rival candidacy of the Port of Rotterdam, and frequently

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[461] BPA, 97335, Ruhr pipeline scheme, internal BP memo, 'Ruhr pipeline, the comparative merits of the Rotterdam and Wilhelmshaven routes', 29 June 1956, 3.
[462] F. Förster, *Geschichte der Deutschen BP, 1904-1979* (Hamburg 1979) 274.
[463] Förster, *Geschichte der Deutschen BP*, 286, 294, 322.
[464] Mineralölwirtschaftsverband e.V., 'Rohöl-Versorgung 1950 – 2008', Mineralölzahlen als Excel-Datei mit Daten zu Kapazitäten, zur Mineralölein- und -ausfuhr, zum Mineralölverbrauch, zu Preisen und zum Weltölmarkt (2011), http://www.mwv.de/index.php/daten/statistikeninfoportal, accessed 17 June 2013. Own calculations.

pointed out the exaggerated positive aspects of Rotterdam and the Dutch business environment.

The strategy worked quite well, although actual decision-making in the federal cabinet moved slowly, mainly because government funding was scarce, but more importantly because tensions arose between the ministries of transportation, finance and economic affairs. The latter two ministries maintained a liberal approach to the West German economy, and their aim was to bring down energy costs and welcome foreign investment. The Ministry of Transportation, meanwhile, approached the matter from the perspective of the German transport sector and wanted to integrate pipelines in the legal and regulatory framework under which other modes of transport operated. Although the discussion would continue into the early 1960s, the objections of Seebohm in the case of the Wilhelmshaven pipeline were swept aside in the economic cabinet in favour of the position taken by the ministries of economic affairs and finance.

The ultimate decision of the consortium was also delayed, partly because of slow decision-making in Bonn, and partly because of differences within the group. Deutsche Shell and Deutsche BP, egged on by their respective parent companies, disagreed with the case put forward by Esso AG. Deutsche Shell withdrew as Royal Dutch Shell decided that national pipeline solutions were uneconomical and not in the interests of the company. Whether Royal Dutch was guided by Dutch national sentiment was not explicitly voiced, but it was clear from its communications with the Municipal Port Authority in Rotterdam that it favoured Rotterdam over Wilhelmshaven, not least because of its longstanding presence in the port. Although Deutsche BP ultimately remained in the consortium, BP shared Royal Dutch's reservations with regard to the Wilhelmshaven pipeline and attempted to dissuade the consortium from choosing it, but to no avail. A possible explanation for the determined manner in which Esso AG pursued the all-German solution was the predominantly German composition of the consortium. Esso AG enjoyed a high degree of autonomy in the Jersey Standard group, and was therefore presumably less constrained by group level policy than Deutsche Shell or Deutsche BP. Moreover, although Deutsche BP and Esso AG held the majority of the pipeline shares, the consortium also consisted of German oil companies.

Although the Port of Rotterdam went out of its way to devise port adaptations that complied with Esso AG's wishes, Wilhelmshaven was chosen. To some companies, this proved that economic rationality had been trumped by political sentiment. Indeed, the assertion of national interests over private economic planning was, for the Rotterdam port, a major obstacle. The Municipal Port Authority, however, used its limited means to counter the danger from nationalistic policies in its most important hinterland, relying in no small way on the decision-making of Royal Dutch Shell. Although sympathetic to the Rotterdam port, Royal Dutch was pursuing its own goal, which was to study pipeline planning in Western Europe from a transnational rather than a regional or national perspective.

Chapter 6 The trans-European pipeline, 1956-1958

6.1 Introduction

Notwithstanding slow decision-making and discontent in the Esso AG pipeline consortium, Wilhelmshaven was preferred to Rotterdam. Dissatisfied with the planning and decision-making process, Royal Dutch Shell withdrew from the consortium to pursue a grander scheme: the merger of all national pipeline ventures like the Wilhelmshaven project into a single trans-European system of crude oil pipelines. However, if the issue of the pipeline to the Rhine-Ruhr area gave rise to nationalistic responses, how would states react to a trans-European pipeline? The notion of pipeline planning in this period accentuates the tensions between national interests and transnational opportunities. To a multinational company like Royal Dutch Shell, it seemed obvious that national solutions to transport problems were unable to yield the potential economies of scale of tankers and pipelines. If each country wanted to arrange its own crude oil supply infrastructure, the transport flows of crude between the Middle East and Western European markets would remain fragmented. If, however, flows could be bundled, larger tankers and pipelines could be deployed, leading to substantial savings on ton-mile costs as economies of scale could be achieved. However, this implied that a combination of a small number of landing ports and a few large-diameter cross-border pipelines would be supplying all of Western Europe's crude oil imports. As a consequence, Royal Dutch envisaged more rational and therefore also more transnational planning of the crude oil supply chain. Meanwhile, to national governments, pipelines offered a means to secure national oil supply and develop local ports and industries.

This chapter focuses on the case of the trans-European pipeline plan and questions to what extent the Port of Rotterdam was successful in adapting to it, what the obstacles were and how these were overcome. The decision-making process for Western Europe's crude oil pipeline infrastructure therefore brought out the tensions between local, national and transnational interests, as well as the conflicts that arose from negotiating these diverging interests among firms and governments. The pipeline infrastructure that would emerge from the negotiations at the end of the 1950s would turn out to be a compromise between national and transnational perspectives on the respective interests of states and firms. In that sense, the trans-European pipeline system envisaged by Royal Dutch Shell never materialised and, as such, was an utter failure. Nonetheless, studying this particular episode illuminates and explains how and why the Western European crude oil pipeline system developed as it did. Moreover, the story of the trans-European pipeline is also essential to understanding why Rotterdam, after initially losing out to Wilhelmshaven, succeeded in getting its prized pipeline connection to the Rhine-Ruhr hinterland.

6.2 From national to transnational: the trans-European pipeline plan

By the summer of 1956, it had become clear to the Rotterdam Port Authority that Royal Dutch Shell was its only hope for obtaining a pipeline to the Rhine-Ruhr area. Its capacity would, however, be smaller than the pipeline from Wilhelmshaven, which would carry the majority of the crude supply for the German consortium. Although the decision-making process of the German consortium was delayed to November 1956, the agreement of the federal government to finance the changes to the Jade at Wilhelmshaven in early July 1956 had effectively sealed the deal. Local, regional and national government commitments and the German perspective of the consortium had created momentum for the Wilhelmshaven plan.

From an early stage, the Rotterdam Port Authority understood that it needed its good contacts within Royal Dutch Shell in order to secure a pipeline connection to the Rhine-Ruhr area. Whereas Jersey Standard's New York headquarters had no involvement in Esso AG's pipeline venture, Royal Dutch Shell's head offices in London and The Hague, particularly the Bataafsche Petroleum Maatschappij (The Hague), were intimately involved and supported the Rotterdam candidacy. However, one of the Bataafsche directors, H. Bloemgarten, signalled that the Esso-led consortium needed to play on German sentiment if the international oil companies were to successfully operate on the German market.[465] Royal Dutch Shell therefore chose not to intervene, because it wanted to maintain a good relationship with Jersey Standard and thought it was too early to put pressure on Esso AG to choose Rotterdam. The Port Authority was aware of these limitations in Rotterdam's bargaining position right from the start.[466]

However, the interests of Esso AG did not coincide with those of Royal Dutch Shell. The Esso AG consortium was made up entirely of German-owned companies and German subsidiaries of multinational oil firms. The principal aim was to organise pipeline transportation for refineries in the Rhine-Ruhr area, and so the issue was therefore conceived as a German problem. Although the consortium delayed its final decision time and again, Rotterdam never seemed to be a serious option for Esso and the German members of the group. Playing Rotterdam off against Wilhelmshaven seemed to be a strategy to extract concessions from the German local and federal governments. The fact that Deutsche Shell left the consortium altogether suggested that Rotterdam was only intended to create leverage when it came to obtaining subsidies from the German government. It was also clear that Esso overstated the merits of Rotterdam in its negotiations with the Germans (and vice versa), for instance by exaggerating the promises made to the consortium by the

[465] GAR, AHB, 589.01, inv. nr. 70, internal memo PA on discussions with H. Bloemgarten of the Royal Dutch/Shell group on 15 October 1955.
[466] GAR, AHB, 589.01, inv. nr. 70, memo from Koomans to the city council meeting on 18 November 1955.

Dutch government.[467] This spawned a public image of German government inaction, which was a story that resonated strongly with the country's regional and national press.[468] In short, Esso AG chose to maximise the outcome of a German solution. Although BP remained doubtful about the economics of the Wilhelmshaven option, it was the fastest solution to getting crude oil to Esso's refinery by 1959. Notwithstanding its many advantages, Rotterdam's elaborate expansion plan would simply have taken too long to materialise for Esso to bank on it.

For the Royal Dutch Shell Group, Rotterdam was home to its largest refinery on the European continent. The Rotterdam refinery was the group's regional balancing refinery, which was essential to providing it with flexible refining capacity. Whereas the projected refineries in the Rhine-Ruhr area would operate on one type of crude oil, a balancing refinery could handle a multitude of crudes and was therefore able to balance the market positions of the Shell group in the Western European region. Rotterdam was thus an important crude oil port for Shell, and when the company became increasingly exasperated with the one-sided approach of Esso AG during the summer and autumn of 1956, it moved to serve its own interests.[469] According to BP, Deutsche Shell could leave the consortium because its contract refiner in the Rhine-Ruhr area, Union Kraftstoff, was still part of the German group. Deutsche Shell had a refining contract with Union Kraftstoff until 1963, which would cover its crude oil requirements in the Rhine-Ruhr area through the Wilhelmshaven line until then. In the meantime, Royal Dutch Shell could study alternative pipeline solutions and, if necessary, construct a separate pipe from Rotterdam to the Rhine-Ruhr region in due course.[470]

Royal Dutch's exasperation with the German consortium resonated with BP. Even in March 1956, which was before the long summer of drawn out negotiations in Germany, BP had contacted Royal Dutch Shell in London and Jersey Standard in New York to coordinate European crude oil pipeline development. BP's concern was slowing down the German consortium to enable the alternatives to be considered.[471] BP and Royal Dutch were anxious not to jump into pipeline projects before they had

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[467] B146/1697 BMZ: memo from BMZ, 'Betr.: Besprechung der Landesvertretung Niedersachsen mit den Mineralölfirmen in Anwesenheit der beteiligten Ressorts (BMF, BMV, BMWi, BMZ) und verschiedener Vertreter der Länderressorts von Niedersachsen und der obersten Finanzbehörden des Landes Niedersachsen, Nordrhein-Westfalen und Hamburg', 19 May 1956; B146/1697 BMZ: telex from German Embassy in The Hague to BMZ and BMW, 'Betr.: Pipelineprojekt', 19 May 1956.
[468] B136/2413 BKA: Ministry of Economic Affairs of Lower Saxony to BKA, 'Betr: Zeitungsberichte über die Pipeline Wilhelmshaven/Ruhrgebiet', 6 June 1956.
[469] Howarth and Jonker, *Powering the Hydrocarbon Revolution*, 295-297.
[470] BPA 97335, Ruhr pipeline scheme, letter to A.E.C. Drake (BP director of supply), 26 September 1956.
[470] BPA 97335, Ruhr pipeline scheme, internal memo BP, 'Ruhr pipeline', 16 July 1956.
[471] BPA 97335, Ruhr pipeline scheme, letter from BP planning group to A.E.C. Drake (director of supply), 'Proposed pipeline to the Ruhr', 15 March 1956.

a more established picture of the long-term development of the European oil demand and the corresponding requirements of inland refineries in Western Europe. After Deutsche Shell had retreated from the German consortium, it was left to BP to delay the decision-making in order to study the alternatives. Although Esso AG claimed to have no time for alternatives other than Rotterdam, BP, Royal Dutch and Jersey Standard jointly ordered the American engineering company Bechtel Corporation to perform an additional study into the Wilhelmshaven pipeline. BP used this study to delay the German consortium, thus buying time to study different pipeline options.[472]

The principal alternative to the German pipeline was Royal Dutch Shell's plan for a trans-European pipeline system from Marseille to Rotterdam via Strasbourg and the Rhine-Ruhr area. Its aim was to set up a small, dedicated research team to study the possibilities of such a plan, and it hoped to attract the attention of other oil companies as future participants. The company particularly hoped to persuade BP to detach itself from the Esso AG consortium and join the transnational pipeline system that Royal Dutch envisaged. According to an internal BP memo on the Ruhr pipeline, Arnold Hofland, director of the Shell Petroleum Company, was quoted as being:

> "emphatic that it was essential to take these pipeline questions out of the hands of local companies and have them dealt with on a Head Office basis although he recognized the difficulties which this might present to Esso with their highly de-centralized organization."[473]

With increasing volumes of Middle Eastern oil being available to Europe, for instance through the Suez Canal, the Iraq Petroleum Company and Trans-Arabian pipelines, connecting the Mediterranean ports to the crude oil demand in the heartland of Western Europe started to make commercial sense. The Shell group was not the only company to consider such an undertaking. Another such plan was a study-consortium formed around the French Pechelbronn SA/Antar group, which ran a small refinery in the Merkwiller-Pechelbronn area in northern France that processed crude oil from an old and depleted oil field in the Alsace. The plan was to reinvigorate its operations by constructing a modern refinery that could supply northeast France and southwest Germany. To circumvent the high transportation costs of supplying crude oil to the new refinery over the Rhine, Pechelbronn brought up the idea of a pipeline from Marseille in April 1956, the so-called SOPIMER plan.[474] Apart from Pechelbronn/Antar, the group consisted of the French state-owned oil company CFP, Jersey Standard, Standard of New York (Socony), Caltex (a European combine

[472] BPA 97335, Ruhr pipeline scheme, internal memo BP, 'Local pipeline companies', 10 August 1956.
[473] BPA 97335, Ruhr pipeline scheme, internal memo BP, 'Ruhr pipeline', 16 July 1956.
[474] BPA 97335, Ruhr pipeline scheme, internal memo BP, 'Some particulars on the Pechelbronn initiative for a pipeline from Marseille to the Rhine', 25 July 1956.

between present-day Chevron and Texaco), Royal Dutch Shell, BP, Petrofina and German oil companies.[475] The SOPIMER plan projected supplying 18 million tons of crude oil annually from 1961 onwards to refineries in the Upper Rhine and Rhine-Ruhr areas.[476] The French pipeline company TRAPIL, which operated an oil product pipeline between Le Havre and Paris, undertook a study of the technical and economic feasibility of the plan.

The SOPIMER initiative was well received in the Western European press. At its launch in April 1956, the German daily *Die Zeit* reported enthusiastically that the pipeline plan would entail a freight economy of up to DM 3 to 4 per ton of crude oil delivered to refineries in the Upper and Middle Rhine areas. The article had a decidedly positive outlook on the plan, as it would prove to be a good investment given the large observed growth rates of oil consumption in Western Europe. Moreover, such a trans-European connection would have positive effects on the economies of Germany, France, Switzerland and Luxemburg, as it would obviously serve the common good of these European economies and offer politicians a new example of European cooperation, i.e. it would be "a new binding element for the common interests."[477]

Although SOPIMER's objective served Deutsche Shell's market interests in the Upper Rhine region (Strasbourg), Royal Dutch's own vision extended the Marseille pipeline to the Rhine-Ruhr area and even Rotterdam. Its initial examination of the idea attracted attention from the other majors, and by late July 1956, the Shell group, BP, Jersey Standard, Caltex and Socony started discussing the trans-European pipeline project. On 23 July 1956, Royal Dutch Shell, through its Dutch operating company Bataafsche Petroleum Maatschappij, incorporated the Company for the Study and Planning of Pipeline Projects in Western Europe NV (SAPPEUR) and invited the firms in the trans-European group to join it. The objective of SAPPEUR was to develop, jointly with SOPIMER, a crude oil pipeline from Marseille to Rotterdam. The pipeline was estimated to save capital costs for tankers, inland distribution facilities and tankage.[478] Notwithstanding the potential advantages of a trans-European pipeline, the project was politically sensitive. Indeed, the Royal Dutch proposal anticipated that "both before and after completion such a pipeline would be subject to protracted negotiations at Governmental level."[479]

At the first meeting between the prospective SAPPEUR partners on 31 July

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[475] BPA 97335, Ruhr pipeline scheme, internal memo BP, 'Local pipeline companies', 10 August 1956.
[476] BPA 97335, Ruhr pipeline scheme, internal memo BP, 'Some particulars on the Pechelbronn initiative for a pipeline from Marseille to the Rhine', 25 July 1956.
[477] 'Transeuropa-Pipeline', *Die Zeit*, 12 April 1956.
[478] BPA 97335, Ruhr pipeline scheme, minutes of a meeting held in The Hague on 31 July 1956, 'Trans-European Pipeline Project', 2.
[479] BPA 97335, Ruhr pipeline scheme, internal memo BP, 'The Shell European pipeline plan', 30 July 1956.

1956, Royal Dutch Shell was especially wary of French government intervention. The company pointed to French state participation in TRAPIL (the oil product pipeline between Le Havre and Paris) and the fact that the French government had declared Middle Eastern oil to be in the French national interest. The trans-European pipeline would initially exclusively pump Middle Eastern crude oil. In short, Royal Dutch feared that the French state would interfere with private pipeline plans.[480] The fact that TRAPIL was conducting SOPIMER's feasibility study could be interpreted as a sign of the interest of the French state in such ventures.[481] In that sense, SOPIMER could be regarded as yet another nationally-oriented pipeline plan. SAPPEUR, however, was aiming for a transnational approach, which was highlighted by its choice of the Bechtel Corporation to conduct the economic and technical feasibility study for the trans-European pipeline.[482]

There were also other institutional concerns. To coordinate pipeline planning, the companies needed to share information about market expectations and company objectives. The American firms objected to this, presumably on the basis of US anti-trust legislation. The group thus agreed to devise a legal company structure that would allow the Americans to participate in the planning and, in time, construction and operation of the pipeline. Within this framework, the group considered the option of setting up the pipeline as a common carrier pipeline, i.e. a pipeline open to third parties without price discrimination, which was a model that was already being applied in the US.[483]

The SAPPEUR initiative was open to any company that was interested. The group held its first official meeting on 21 September 1956 in The Hague, which was attended by all of the companies involved in SOPIMER and representatives of the Bechtel Corporation.[484] The meeting discussed conditions for participation in the study-company and the parameters of Bechtel's feasibility research. Bechtel initially proposed limiting the study to devising scenarios for Western European oil demand, Middle Eastern production and the development of maritime transportation, with a view to discerning whether a trans-European pipeline would make economic sense.

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480 BPA 97335, Ruhr pipeline scheme, minutes of a meeting held in The Hague on 31 July 1956, 'Trans-European Pipeline Project', 2.

481 BPA 97335, Ruhr pipeline scheme, internal memo BP, 'Some particulars on the Pechelbronn initiative for a pipeline from Marseille to the Rhine', 25 July 1956, 2.

482 BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Record of a meeting held on Friday, the 21st of September 1956, at the Hotel Wittebrug in The Hague', 28 September 1956, 1.

483 BPA 97335, Ruhr pipeline scheme, minutes of a meeting held in The Hague on 31 July 1956, 'Trans-European Pipeline Project', 4.

484 BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Record of a meeting held on Friday, the 21st of September 1956, at the Hotel Wittebrug in The Hague', 28 September 1956, 4. The companies present included: Shell, BP, Jersey Standard, Caltex, Socony, Deutsche Erdöl AG, Gelsenberg Benzin, Scholven Chemie, Union Kraftstoff, Ruhrchemie, CFP, Pechelbronn SA, Petrofina and Bechtel Corporation. Later, Wintershall also joined SAPPEUR.

Bechtel's assignment also included studying a pipeline branch to Dunkirk, with opportunities being considered for the transhipment of Middle Eastern crude oil from North Sea ports to southern England, as well as alternatives to Marseille as the starting point of the trans-European pipeline.[485] In short, Bechtel was asked to review the future of the Western European crude oil supply. According to Bechtel, the future size of crude oil tankers would be particularly important in determining whether all crude oil supplies to Western Europe would flow in a south to north direction in the future, rather than the north to south route taken by the Wilhelmshaven-Ruhr pipeline.[486]

In December 1956, Bechtel presented its final report to SAPPEUR. By that time, however, the German pipeline consortium had agreed to opt for Wilhelmshaven. Moreover, SAPPEUR came to understand that plans for a French pipeline had preceded SOPIMER's initiative. The SAPPEUR meeting of 7 December 1956 therefore concluded that the Bechtel report required further consideration, particularly with regard to the question of how a set of national pipelines would compare to the trans-European pipeline that SAPPEUR was pursuing.[487] In addition, SAPPEUR needed additional advice on the legal and financial implications of a trans-European pipeline.

On 31 January 1957, SAPPEUR's shareholder meeting in The Hague convened with experts from all of the participating oil companies and Bechtel. The purpose of the meeting was to discuss Bechtel's updated feasibility study concerning the trade-offs between an integrated trans-European pipeline system and the combination of tankers and national pipelines.[488] The update was required to allow for the establishment of Nord-West Oelleitung as a separate venture in December 1956. The Nord-West pipeline's supplies of crude oil to the Rhine-Ruhr area would obviously affect the operation of a trans-European pipeline. Bechtel's baseline capital cost estimate showed that a trans-European pipeline required less capital, less steel, less power (for pumping) and less manpower than a set of separate, national pipelines (Table 6-1).

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485 BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Minutes of a meeting of the Board of Directors held on Friday, the 21st of September 1956, at the Hotel Wittebrug in The Hague', 28 September 1956, 1.
486 BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Aide memoire to a meeting held on Thursday, the 20th of September 1956, at the Hotel Wittebrug in The Hague', 28 September 1956, 2.
487 BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Aide memoire to a meeting held on Friday, the 7th of December 1956, at the Company's head office in The Hague', undated, 2.
488 BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Aide memoire to a General Meeting of Shareholders' Experts held in The Hague on the 31st January 1957', undated, 2.

Table 6-1. Capital cost comparison of the trans-European pipeline and individual pipelines, 1957

(In 1957 prices)	Trans-European Pipeline	Individual pipelines: Served by T2's*	Individual pipelines: Served by super tankers**	Reduction when served by super tankers
Capital cost (mln dollars)	325	385	350	-9,1%
Steel (short tons)	353,000	424,000	417,000	-1,7%
Horsepower (HP)	120,000	300,000	260,000	-13,3%
Direct operating manpower	220	2,400	950	-60,4%

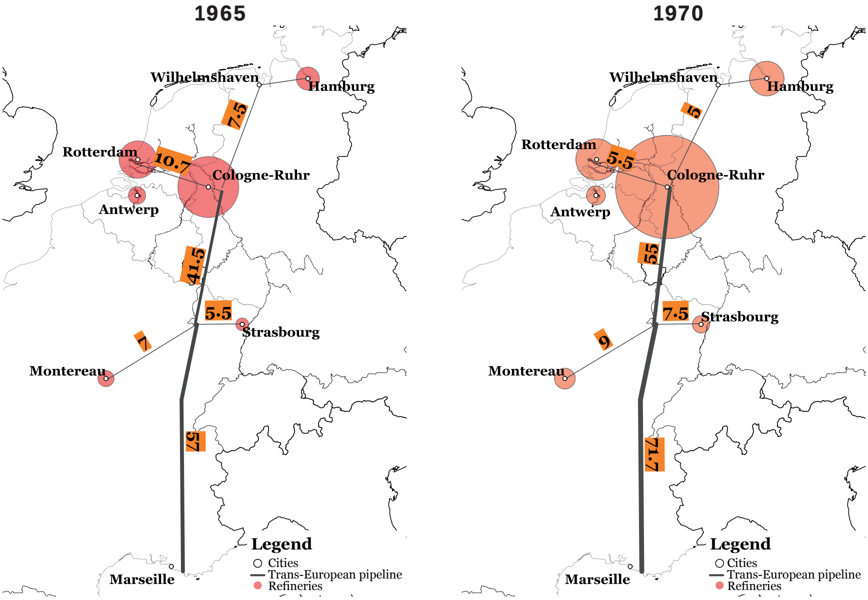
*T2 tanker	16,000
**Max size in Rotterdam	45,000
Max size in Wilhelmshaven	60,000

Source: BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Aide memoire to a General Meeting of Shareholders' Experts held in The Hague on the 31st January 1957', undated, 'Attachment 1 ('Comparison with tankers plus individual pipelines serving 1964 requirements of Germany and Central France').

The estimate also showed that larger tankers would reduce the capital costs of national pipelines considerably. Indeed, serving individual pipelines with super tankers would allow for capital costs that were almost 10 per cent lower, reducing the cost difference between an integrated system and separate pipelines to just 25 million US dollars (instead of 60 million US dollars if T2 tankers were used).

The initial Bechtel study of December 1956 envisaged a trans-European pipeline system that would ultimately extend from Marseille via Strasbourg and Cologne to the Ruhr area, where it would branch into a northern section to Wilhelmshaven and Hamburg and a western section to Rotterdam and Antwerp by 1970 (Figure 6-1).

Figure 6-1. Bechtel's 1956 trans-European pipeline flow rate projection, 1965-1970.



Source: BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Aide memoire to a General Meeting of Shareholders' Experts held in The Hague on the 31st January 1957', undated, 'Attachment 2a ('Trans-European pipeline flow rates and refining demands'). Maps created by author.

The estimated flow rate of the pipeline (starting in Marseille) was expected to increase from 20 million tons in 1960 to 57 million tons in 1965.[489] By 1957, however, it was clear that the Nord-West pipeline would emerge as a separate, German venture. The updated Bechtel report estimated that the impact of the Nord-West pipeline would slash the flow rate of the trans-European pipeline by almost 50 per cent to 29 million tons in 1970.[490] In the original scheme, the trans-European pipeline was projected to transport crude oil from Marseille to Hamburg via Wilhelmshaven by 1965. The original scheme did not, therefore, incorporate a sustained and increasing flow of crude oil from Wilhelmshaven to the Rhine-Ruhr area, which was what transpired after the establishment of the Nord-West pipeline as a separate venture in December 1956. The up-to-date Bechtel study therefore projected a more limited version of the trans-European pipeline system (Figure 6-2).

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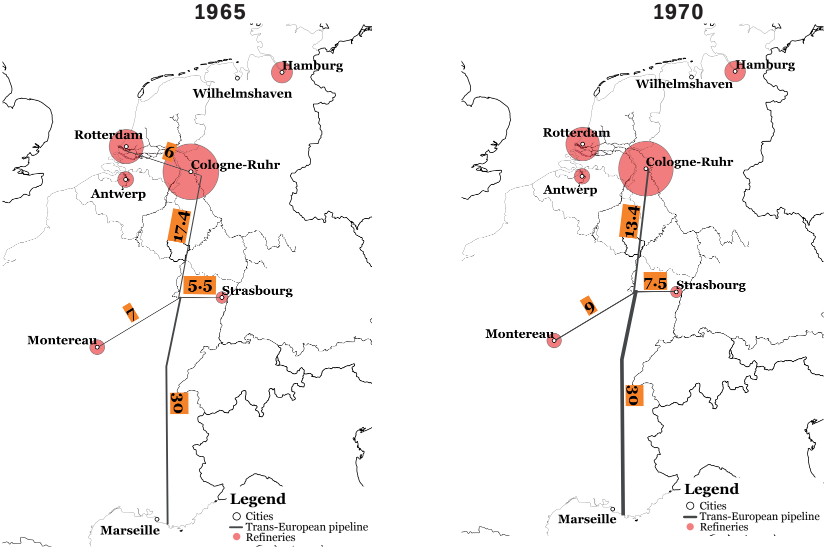
489 BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Aide memoire to a General Meeting of Shareholders' Experts held in The Hague on the 31st January 1957', undated, 'Attachment 2a ('Trans-European pipeline flow rates and refining demands').

490 BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Aide memoire to a General Meeting of Shareholders' Experts held in The Hague on the 31st January 1957', undated, 'Attachment 2a' ('Trans-European pipeline flow rates and refining demands. Alternate system without Wilhelmshaven Line').

Figure 6-2. Bechtel's 1957 trans-European pipeline flow rate projection, 1965-1970.



Source: BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Aide memoire to a General Meeting of Shareholders' Experts held in The Hague on the 31st January 1957', undated, 'Attachment 2a' ('Trans-European pipeline flow rates and refining demands. Alternate system without Wilhelmshaven Line'). Maps created by the author.

Even in the alternative set-up, the trans-European pipeline system was unprecedented, "as it linked two oceans and supplied oil both to inland destinations and to the far coast."[491] The question of whether or not the trans-European system as proposed was feasible depended largely on the development of the size of crude oil tankers and the extent to which seaports such as Rotterdam and Wilhelmshaven invested in expanding their facilities to accommodate the largest vessels. The pipeline system therefore required a tariff system that allowed for price discrimination between inland and seaboard locations. As the pipeline would compete with tanker transportation in seaports (Rotterdam, Antwerp), Bechtel proposed setting lower tariffs for coastal destinations. This proposal illustrated that apart from national pipeline initiatives, the trans-European system's main competitor was maritime tanker transportation.[492] Any feasibility study of the project therefore needed to consider the shrinking spread of the transportation costs from the Middle East to Marseille and Rotterdam caused by larger tankers. Tankers of 80,000 tons reduced the spread by 31 per cent compared to 45,000 ton tankers (also see Appendix B: Data Table 0-4).[493] Even larger tankers

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[491] BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Aide memoire to a General Meeting of Shareholders' Experts held in The Hague on the 31st January 1957', undated, 5.
[492] Ibid., 5-6.
[493] BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Aide memoire to a General Meeting of Shareholders' Experts held in The Hague on the 31st January 1957', undated, Attachment 3,

would further reduce the spread in transportation costs of delivered Middle Eastern crude oil between Marseille and Rotterdam, and therefore also to Wilhelmshaven. The centrality of the port adaptations in Wilhelmshaven in the negotiations of the German pipeline consortium was thus self-evident in light of this trade off between pipelines and tankers.

6.3 The trans-European pipeline and the Port of Rotterdam

Triggered by the incorporation of SAPPEUR NV in July 1956, the Rotterdam port saw the trans-European pipeline as yet another problem. By then, ideas for extensive port expansions had developed further in response to the initial Esso plan. Although Esso seemed destined to choose Wilhelmshaven, the Port Authority was convinced that the economic foundations for the further expansion of Rotterdam's port were in place, with or without the Esso pipeline.[494] From the first pipeline-related plans in 1955 to the early sketches of a much larger expansion to the west of the Botlek area, the Europoort-plan emerged. Although this plan was not presented to the public until 1957, by July 1956, the Port Authority had firmly set a goal of achieving a large-scale expansion similar to the later Europoort plan.

The initial ideas about a comprehensive trans-European pipeline system fed from Marseille shook the foundations of this plan. On 25 July 1956, the Port Authority drafted a memorandum to A. Hofland, a board member of SAPPEUR and director of the Shell Petroleum Company, which was one of the Shell group's international operating firms overseeing its sales. The Port Authority asked Hofland to clarify when the trans-European pipeline was projected to become operational to enable it to calculate whether investment in new port expansions (Europoort plan) would be worthwhile; port expansion to accommodate a pipeline terminal for a Rotterdam-Ruhr pipeline would not be sensible if crude oil would eventually flow from Marseille to Rotterdam within the foreseeable future. The Port Authority had to earn back the investments partly through fees paid by docking tankers.

On the other hand, the Port Authority recognised the importance of port expansion for accommodating new facilities for oil companies wanting to locate in the Port of Rotterdam. It therefore pledged to continue to commit to new port expansions. However, to be able to adapt these plans to the future needs of the industry, the Port Authority needed more detailed information on the changes that a trans-European pipeline system would entail for the port. The most pressing questions were: for how long would a Rotterdam-Ruhr pipeline pump crude to the Ruhr before starting to pump oil in the opposite direction? Would exports from

Meeting of Shareholders' Experts held in The Hague on the 31st January 1957', undated, Attachment 3, 'Tanker transportation cost. Persian Gulf via Cape of Good Hope and return via Suez Canal'.

[494] De Goey, *Ruimte voor industrie*, 83.

Rotterdam then increase? What would the consequences be for the pipeline terminal installations once the pumps were reversed? And, finally, would it be possible to start a Rotterdam-Ruhr pipeline from the first and second petroleum docks near Pernis, which was the current home of Royal Dutch Shell's refinery?[495]

The last issue clearly revealed the anxiety felt by the Port Authority. Even if a trans-European pipeline would reduce the revenue derived from the major port expansion envisaged by the Port Authority in the medium term, not having a pipeline connection was worse. Finding the compromise of getting the pipeline connection without having to expand would resolve some of the uncertainties faced by the Port Authority. On the other hand, the memorandum showed that it was also committed to the longer-term development of the Port of Rotterdam. Expansion to accommodate larger tankers was the trend, so Rotterdam should forge ahead with its expansion plans. The economic value of doing so was, however, in the balance, as the questions to Hofland showed.

In November 1956, Royal Dutch Shell director F.A.C. Guépin delivered a speech in Rotterdam about the need to study crude oil transportation in Europe in a transnational context. In his speech, he stressed that he envisaged an important role for the Port of Rotterdam in such a system. However, the Rotterdam role "[would] depend strongly on the availability of port facilities to accommodate the tankers of the future."[496] This was part of the answer to the questions raised by the Rotterdam Port Authority in its memo to A. Hofland in July 1956.

For Royal Dutch Shell, incorporating Rotterdam in the trans-European pipeline system was the highest priority, because it would enable it to feed its largest refinery cheaply via Marseille. Conversely, because Wilhelmshaven had no refineries, it was of no interest for Royal Dutch Shell to have the Nord-West pipeline as part of the trans-European pipeline system. Constructing a pipeline from Rotterdam to Cologne was an essential part of the trans-European pipeline plan, because Rotterdam was of vital importance for its European operations. Moreover, because Deutsche Shell's new refinery in Cologne-Godorf (near Cologne) was planning to start production in 1960, it was imperative to have a crude oil pipeline to the area that was operational by then.[497]

By April 1957, Royal Dutch Shell announced to the Rotterdam Port Authority that SAPPEUR had progressed with its study to the point that the Rotterdam-Rhine pipeline could be constructed without the risk of it not fitting into

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495 GAR, AHB, 589.01, inv. nr. 70, memo from F. Posthuma, director of engineering at the Rotterdam MPA, to A. Hofland regarding the interests of the Rotterdam port in the trans-European pipeline project, 25 July 1956.

496 NL-HaNA, EZ / Centraal Archief, 2.06.087, inv.nr. 408, Dutch newspaper (title unknown), Stijgende olie-vraag vergt studie pijpleidingnet, 16 November 1956.

497 BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Aide memoire to a Board Meeting held on Thursday, 14th March 1957 at the Company's office, The Hague', 22nd March 1957, 2.

the envisaged trans-European system.[498] For the Rotterdam port, the decision of Royal Dutch Shell to construct the Rotterdam-Rhine pipeline was significant. After losing the initial pipeline to Wilhelmshaven, the expansion plans developed by the Port Authority (Europoort plan) had become a long-term project. The Rotterdam-Rhine pipeline terminal was therefore constructed on the Second Petroleum Dock next to Royal Dutch Shell's Pernis refinery, which was a location that was regarded by Esso AG as unsuitable because of the limited depth of the Pernis docks. This suggests that the efforts of the Port Authority to accommodate the pipeline to the hinterland were less important for the short-term chances of obtaining a pipeline connection to the Ruhr than were the strategic and internal considerations of the Shell group. However, the Port Authority's commitment to the Europoort plan ushered in a third phase in the planning of the trans-European pipeline system. In its revised report of January 1957, Bechtel had concluded that, if the pipeline was to compete with maritime tankers, its future hinged on the ability to set competitive transport tariffs for inland, but particularly coastal, destinations (Rotterdam and Antwerp). If Rotterdam intended to invest in port expansion, thus allowing it to accommodate larger tankers, it would make competitive pricing of the trans-European pipeline harder to achieve. Larger tankers and better port facilities thus seemed to weaken the strength of the pipeline's business case.

A prominent feature of the episode was the intimate relationship between the Rotterdam Port Authority and Royal Dutch Shell. Port Authority officials have often pointed to the importance of Jan Willem Ernste, director of the Shell refinery at Rotterdam-Pernis, for inspiring the Port Authority planners to think big.[499] Equally, Ernste was once quoted as saying that business deals in Rotterdam were only a phone call away. Rather than starting with time-consuming formal procedures, the Rotterdam Port Authority understood the importance of accommodating business needs first and arranging the formalities later, keeping the pace of development high.[500] The pipeline episode thus underscores the close relationship between the port and Royal Dutch, but adds the hitherto neglected transnational dimension to the relationship.

6.4 The unravelling of the trans-European pipeline plan

Although the question of tariffs was important and thorny, the study group also considered legal, fiscal and financial issues. The company's second board meeting in

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[498] NL-HaNA, EZ / Centraal Archief, 2.06.087, inv.nr. 408, internal memo of the Directorate-General for Industrialisation and Energy Supply of the Ministry of Economic Affairs, 1 May 1957, p.1.
[499] W.F. Lichtenauer, 'Ernste, Jan Willem (1899-1971)', in *Biografisch Woordenboek van Nederland*. http://resources.huygens.knaw.nl/bwn1880-2000/lemmata/bwn2/ernste, 14 April 2014.
[500] De Goey, *Ruimte voor industrie*, 11.

The Hague on 14 March 1957 agreed that the revised Bechtel report was suggesting that the trans-European pipeline in a slimmed down form (without Wilhelmshaven) still made economic and technical sense.[501] However, the plan needed further legal, fiscal and financial work before any concrete proposals about trajectory, the company structure and financing could be made. This additional research would delay the construction of the pipeline to such an extent that Royal Dutch Shell announced a plan to build one between Rotterdam and Cologne as a separate venture to feed the Cologne-Godorf refinery. It also pledged to do so in line with Bechtel's recommendations for the trans-European pipeline.

In terms of the overall feasibility of the pipeline, the delays caused by further studying legal, fiscal and financial aspects did not seem to be problematic. Demand forecasts showed that refineries in Eastern France and Southern Germany were not yet required. SAPPEUR therefore banked on supplies to the coastal refineries of Rotterdam and Antwerp to ensure a reasonable throughput for the pipeline in the early stages of its operation.[502] In the short-term, the Rotterdam-Rhine pipeline seemed to fit in well as part of the plan.

The board agreed to proceed with the study of the legal, fiscal and financial aspects of the pipeline plan. The legal issues seemed to be the most pressing. The goal was to achieve a legal status for the pipeline company that could "ensure the permanent stability not only of the legal but also of the economic and fiscal conditions regulating its activities in the various territories concerned."[503] As this was an international venture, the board looked for a team of lawyers with experience in international law, which was to be headed by C.R.C. Wijckerheld Bisdom, a well-known Dutch lawyer. His leading role in the legal team advising the *Consortium for Iran* in 1954 made him an expert in oil-related international law.[504] Although it was acknowledged that the contours of a unified Europe were emerging, SAPPEUR stressed the need for legal conditions that ensured the satisfactory operation of the pipeline. The legal team was instructed: to define what those legal conditions should be, whether they could be achieved within existing legal frameworks or whether they

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501 BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Aide memoire to a Board Meeting held on Thursday, 14th March 1957 at the Company's office, The Hague', 22nd March 1957, 2.
502 Ibid.
503 BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Aide memoire to a Board Meeting held on Thursday, 14th March 1957 at the Company's office, The Hague', 22nd March 1957, Attached 'Note on some legal aspects of the proposed Trans-European Pipeline', 1.
504 BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Aide memoire to a Board Meeting held on Thursday, 14th March 1957 at the Company's office, The Hague', 22nd March 1957, 3. Wijckerheld Bisdom was also known for acting as one of the defence lawyers to Anton Mussert, the leader of the Dutch fascist party NSB, in 1945-46. (Source: J. Meyers, *Mussert, een politiek leven* (Amsterdam, 1984) 262). The *Consortium for Iran* consisted of the *Seven Sisters* and some smaller American oil companies that succeeded in 1954 in obtaining an operating and refining licence to operate in Iran after it nationalised the oil industry in 1951.

would require ad hoc agreements with separate governments, and to devise an institutional form with the appropriate international legal status.[505]

The legal issue was central to the work of the study group because no pipeline legislation existed in the countries concerned. With the discussion of the pipeline plans in the European transport markets, governments began to contemplate whether and how pipelines could be integrated within existing legislation and regulate with respect to traditional modes of transport. Three main concerns dominated the discussion: competition with other modes of transport, tariff discrimination and taxation.[506] In West Germany, the debate on pipeline regulation focussed on two opposing views embodied by the federal Ministry of Transportation on the one hand and the federal Ministry of Economic Affairs on the other. The former argued for state interference in order to integrate pipelines into the existing transport markets. The latter, meanwhile, argued that pipelines were an integral part of the privately-owned energy infrastructure. Interfering in that infrastructure could increase the cost of energy, which was to be avoided for the sake of the German economy.

With regard to state interference, there were two possible approaches. When an oil pipeline between Le Havre and Paris was constructed in the late 1940s, the French state took a stake in it as a way to influence its tariff-setting with a view to mitigating the possible negative effects of the pipeline on inland shipping on the Seine. The second approach originated from the United States, where pipelines were compelled to allow third party shippers to use them and were subjected to tariff regulation to preclude tariff discrimination against third party shippers by the pipeline's owner. These options were also discussed at length as part of the negotiations on transport and energy coordination in the European Economic Community.[507] For the oil companies involved in pipeline planning, looming legislation and regulation could potentially interfere with the financing, operation and financial performance of their pipeline ventures.

As pipelines have a high degree of asset specificity and require large initial capital outlays, the companies involved needed guarantees that their investments were safe and that they enjoyed optimal freedom to operate so as to ensure a satisfactory return on investment, including the setting of tariffs.[508] Therefore, the legal conditions required for a satisfactory operation consisted of the freedom of transport and transit and a legal status permitting the company to arrange rights of way, taxes and currency

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[505] BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Aide memoire to a Board Meeting held on Thursday, 14th March 1957 at the Company's office, The Hague', 22nd March 1957, Attached 'Note on some legal aspects of the proposed Trans-European Pipeline', 1.
[506] H. Seidenfuss, *Energie und Verkehr* (Tübingen 1960) 184-218.
[507] See, for instance, reports on the discussions in the European Commission in: BAK, B102/59230, Rechtsfragen zum Bau und Betrieb von Rohrleitungen, 1960-1965; BAK, B102/59212, Regelung im Ausland.
[508] Makholm, *The Political Economy of Pipelines*, 4-6.

regulations. The central issue of how to achieve such conditions was the question of whether to opt for a number of national operating companies or to aim for one international company with an international legal status. The former required no particular international legal agreements, as each national operating firm operated under national law, although this could lead to potential problems in the case of disagreements between these national companies. The alternative, namely a single company responsible for the construction and operation of the entire pipeline system, seemed to be the best solution. However, to enable such a business to operate satisfactorily, an international legal status was required to manage the international legal issues that the national legislation of the company's country of domicile would not be able to resolve. The necessary conditions for satisfactory operations would thus need to be laid down in an international agreement between the national governments of the countries involved.

By June 1957, the legal and financial advisers revealed their initial findings.[509] Their report proposed establishing a single trans-European pipeline company in one of the countries served by it, most probably the Netherlands. A general convention signed between the company and the countries concerned would ensure stable conditions under which the company could operate internationally. An international agreement between a single pipeline company and the countries it operated in would offset the danger of individual countries asserting their national interest over the transnational interests of the pipeline company and its parents, the multinational oil firms.[510] This plan had a precedent, but also reflected contemporary concerns. Not only could an arrangement in international law solve the cumbersome process of obtaining individual concessions for each country involved in the trans-European project, it could also be a useful precedent for the foreign oil companies in the Middle East.

Following the damage and upheaval caused by the Suez Crisis in late 1956 and early 1957, the oil industry attempted to secure its investments in the region through an international agreement or treaties of protection.[511] These treaties were drafted by the oil sector in order to create an international agreement between the Middle Eastern nations and the home countries of the major international oil firms, i.e. the United States, France, United Kingdom and the Netherlands. The treaties contained guarantees with respect to the free flow of oil, the restitution of damage, the prohibition of nationalisation and the option of bringing disputes to the International

[509] BPA 43379, Sappeur NV minutes of meetings, 'Recommendations on the legal aspects of the Trans-European pipeline project, submitted by Mr. C.R.C. Wijckerheld Bisdom', 5 June 1957.
[510] Ibid., 1.
[511] NL-HaNA, Ministerie van Buitenlandse Zaken: Code-archief 1955-1964, nummer toegang 2.05.118, inventarisnummer 12024, memo of the legal advisor to the Ministry of Foreign Affairs to the Minister of Foreign Affairs, 19 June 1957.

Court of Justice in the case of violations. The treaties were entirely aimed at securing private property rights and severely curtailing the position of the Middle Eastern countries. The French government drafted a counter proposal with more detail on the statutory position of the Middle Eastern countries and the beneficial effects of the agreement for all signatories.[512] These treaties were part of a much wider effort by capital exporting countries to devise a system of international agreements for the protection of investments after a number of prominent cases in which post-colonial nations had sequestrated foreign investors.[513] Trade and investment liberalisation had been conceived in the 1947 Havana Charter but, when it was not ratified by the US, only trade, and not investments, became regulated by the General Agreement on Trade and Tariffs.[514] The late 1950s and early 1960s thus marked a high point in the drafting of various solutions to the question of the international regulation and protection of investments.[515]

The interesting aspect of this episode is the juxtaposition of private and public interests in the oil industry, and the implications thereof for investments by the oil industry. West Germany had generally adopted a free market approach, which posed few problems for Royal Dutch Shell's realisation of the Rotterdam-Rhine pipeline. In the case of France, however, Royal Dutch feared that it would run into problems. France's opposition in the case of the protection treaties only increased these fears. For the same reason, the company and Wyckerheld Bisdom, SAPPEUR's legal advisor, were negotiating with the Dutch government with a view to pursuing an international agreement with West Germany for the Rotterdam-Ruhr pipeline, even though this made little practical sense because all legal, fiscal and financial issues had been successfully concluded with the Dutch and German governments separately. However, Royal Dutch thought that a Dutch-German international agreement could set a precedent for the trans-European pipeline case and pave the way for other European states (most notably France) to enter into such an international accord.[516]

The most important message from the legal team was that the companies involved in SAPPEUR needed to make haste. The next step for the consortium was to set up the international pipeline company proposed by the legal team. Speed was essential for two reasons. Firstly, the Wilhelmshaven and Rotterdam pipelines

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[512] NL-HaNA, Buitenlandse Zaken/Code-Archief 55-64, 2.05.118, inv.nr. 12024, memo of the legal advisor to the Ministry of Foreign Affairs to the Minister of Foreign Affairs, 20 May 1957.
[513] K. J. Vandevelde, 'A Brief History of International Investment Agreements', *U.C. Davis Journal of International Law & Policy* 12 (2005-2006) 157-194, here: 162, 166.
[514] P. Demaret, 'Metamorphoses of the GATT: From the Havana Charter to the World Trade Organization', *Columbia Journal of Transnational Law* 34 (1996) 123-171, here: 126-127.
[515] A.A. Fatouros, 'An International Code to Protect Private Investment-Proposals and Perspectives', *The University of Toronto Law Journal* 14 (1961) 77-102.
[516] NL-HaNA, Buitenlandse Zaken/Code-Archief 55-64, 2.05.118, 12024, memo of the legal advisor to the Dutch Ministry of Foreign Affairs to the Dutch Minister of Foreign Affairs, 19 June 1957.

signalled that crude oil requirements were increasing faster than SAPPEUR's decision-making. Indeed, the entire project could be jeopardized if the consortium failed to integrate the Rotterdam-Rhine pipeline into a trans-European pipeline system, or if further delays necessitated the construction of other separate pipelines, destroying the business case for an integrated system. Secondly, the legal team thought that it was only after the establishment of a pipeline company that the conclusion to an international agreement with national governments could be pursued.[517]

Following the report by the legal advisors, the board concluded that the process of negotiating an international agreement and actually constructing the pipeline would take up to four years. Accordingly, to meet the crude oil requirements of inland refineries in France and Switzerland by 1961-62, the board needed to make a decision in 1957. It therefore decided to install a steering committee to draft a memorandum of principles for the pipeline company, compose a tariff structure and choose the country of incorporation for the firm.[518] Notwithstanding the board's desire to accelerate the decision-making process, the feasibility of the trans-European pipeline was questionable, because the schedule for the crude oil requirements of the respective inland refineries in France, Switzerland, Germany and the Rhine delta diverged considerably.[519] The French refineries in the Strasbourg area would need a pipeline connection to Marseille in 1962. Given the timeframe of three years to construct a pipe, the decision to adopt the trans-European system would have to be taken in early 1959 at the latest. However, Royal Dutch Shell needed a pipeline to be ready by 1960 in order to feed its Rhineland refinery near Cologne.

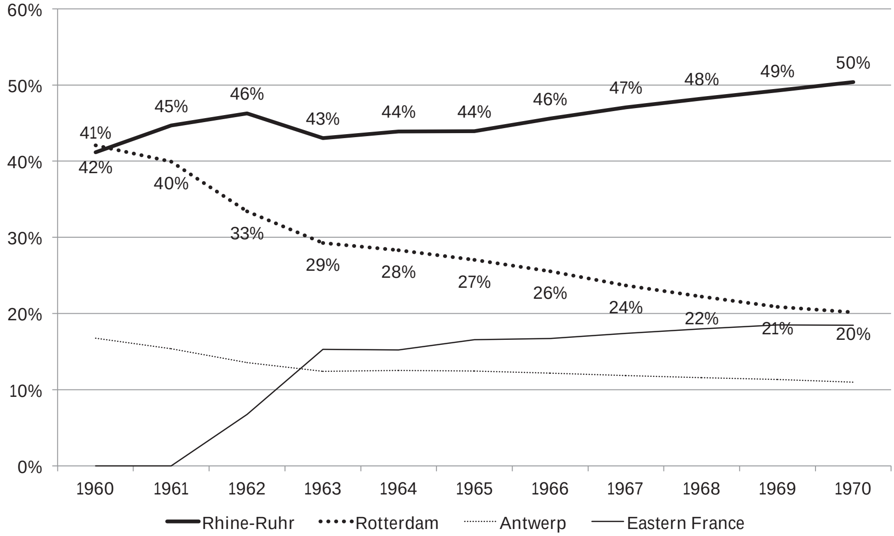
Royal Dutch Shell's commitment to constructing the Rotterdam-Rhine pipeline undermined the feasibility of the trans-European version. Although Royal Dutch was the initiator and lead company in SAPPEUR, its decision to construct the Rotterdam pipeline was the first nail in the latter's coffin. Royal Dutch Shell's proposal was to construct the Rotterdam-Rhine pipeline to pump crude oil to the Rhine-Ruhr area until the trans-European pipeline was operational. Then, the pumps would turn and the Rotterdam and Antwerp refineries would be supplied from Marseille. For the trans-European pipeline to succeed, SAPPEUR estimated that the system needed the supplies to Rotterdam and Antwerp in order to earn back the capital investment in it.

At the projected start of the trans-European pipeline in 1960, the estimated demand for Middle Eastern crude oil in the Rhine-Ruhr region was roughly the same

517 BPA 43379, Sappeur NV minutes of meetings, 'Report to the Board', 7 June 1957, 4-5.
518 BPA 43379, Sappeur NV minutes of meetings, 'Sappeur NV aide-memoire to a Board Meeting held on Tuesday 9th July 1957, at the Company's Office, The Hague', 12 July 1957, 1-3.
519 BPA 43379, Sappeur NV minutes of meetings, 'Sappeur NV aide-memoire to a Meeting held on 26th September 1957, at the Company's office, The Hague', 11 October 1957, 3-4.

as the demand in the Rotterdam area (Figure 6-3).

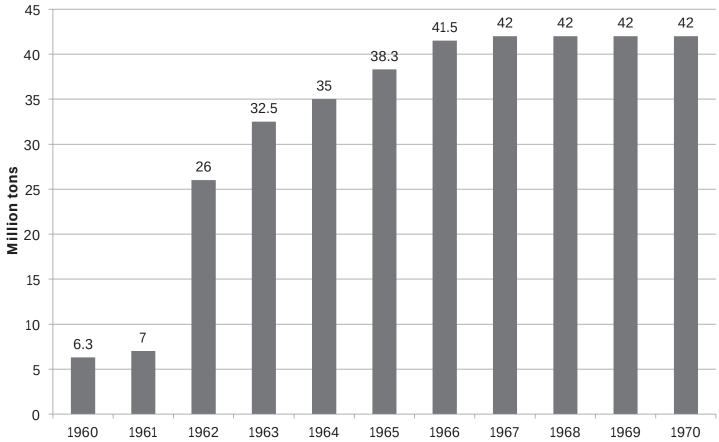
Figure 6-3. The 1957 estimate of demand for Middle Eastern crude oil in the Rotterdam-Antwerp area, the Rhine-Ruhr area and Eastern France, 1960-1970 (in per cent of total)



Source: BPA 130129, Southern Pipeline Project, Internal memo BP, 'The Trans-European pipeline project', Attachment 1, 7 June 1957.

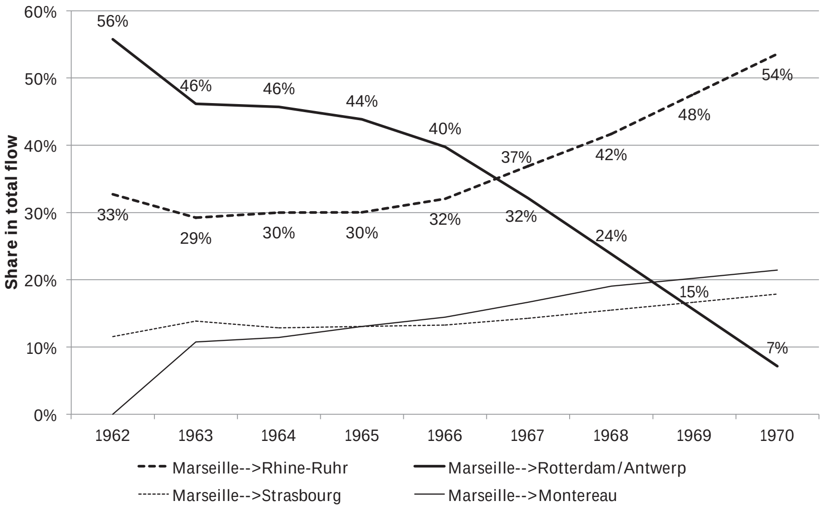
Although demand in the Rhine-Ruhr area was expected to rise much more than that in Rotterdam and Antwerp over the course of the 1960s, the trans-European pipeline would only profit from that growth after 1964 as a consequence of the Wilhelmshaven pipeline. As this pipeline operated separately from its trans-European counterpart, less than half of the crude oil supply to the Rhine-Ruhr region would initially fall to the Marseille pipeline. According to the 1957 SAPPEUR projections, the trans-European pipeline would reach its maximum capacity of 42 million tons in 1967 (Figure 6-4).

Figure 6-4. Estimated throughput of the trans-European pipeline, 1960-1970



Source: BPA 130129, Southern Pipeline Project, internal memo BP, 'The Trans-European pipeline project', Attachment 1, 7 June 1957.

Figure 6-5. The 1957 estimate of the trans-European pipeline throughput, 1962-1970 (in per cent of total throughput)



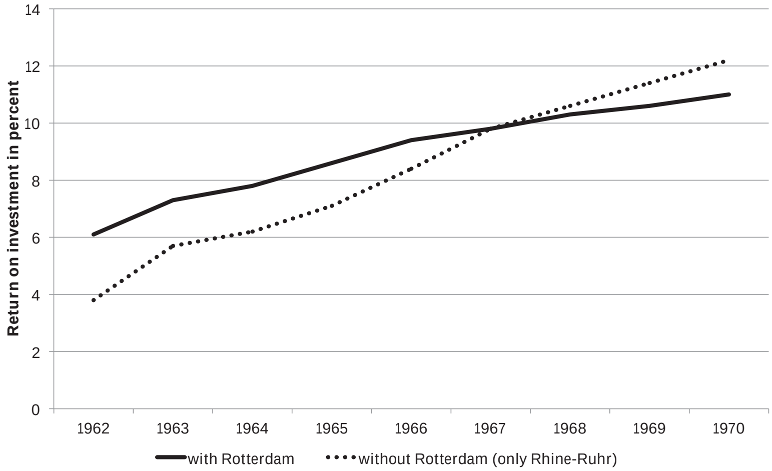
Source: BPA 130129, Southern Pipeline Project, internal memo BP, 'The Trans-European pipeline project', Attachment 1, 7 June 1957.

As the initial demand for crude oil flows via Marseille in the Rhine-Ruhr area was low, the pipeline's operations depended on flows to Rotterdam and Antwerp in the first five years of the trans-European system's operations (Figure 6-5). It was only after the Nord-West pipeline reached its peak capacity in 1965 that rising demand in the Rhine-Ruhr area would become available to the trans-European pipeline. After 1965, supplies to the Rotterdam-Antwerp area would drop to less than 10 per cent in 1970 (Figure 6-5).

Like some of the other participants in SAPPEUR, BP was unsure of the soundness of this plan. As a large diameter pipeline was required to pump crude all the way from Marseille to Rotterdam. John Davies, the BP representative in SAPPEUR, argued that the Rotterdam pipeline was needed to ensure a sufficient return on the investment in the trans-European system.[520] In particular, the Rotterdam-Antwerp demand was required to provide the initial payload for the pipeline, which would be taken over by the Rhine-Ruhr demand after 1965. However, BP's operational research department disagreed because, once constructed, the Rotterdam-Rhine pipeline would either be obsolete by 1970, as supplies from Marseille would no longer reach Rotterdam in profitable quantities, or would start to compete with supplies from Marseille in the Rhine-Ruhr area. BP therefore favoured a slimmed-down trans-European pipeline that would only connect Marseille to the Rhine-Ruhr area. As this would require less pipe, as well as a pipe with a smaller diameter, the capital outlay of the project would be reduced. Calculations by BP's operational research department revealed that the return on investment for the slimmed down trans-European pipeline was equal to that of the original plan. Meanwhile, a pipeline including a Rotterdam branch would enjoy a higher return in the first five years of its operations, whereas one without a Rotterdam branch would have a higher return after the first five years (Figure 6-6). In short, the latter option was less costly and would produce an equal return on average and a higher return in the long run.

[520] BPA 130129, Southern Pipeline Project, letter from Derek Mitchell (BP operational research) to John Davies (BP representative in SAPPEUR), 24 October 1957.

Figure 6-6. BP estimates of the return on investment of the trans-European pipeline with and without the branch to Rotterdam, 1962-1970



Source: BPA 130129, Southern Pipeline Project, letter from D.F. Mitchell (BP operational research) to J.E.H. Davies (BP representative in SAPPEUR), 24 October 1957.

If, however, the Rotterdam-Rhine pipeline was constructed, the trans-European pipe could either be built as the integrated system initially proposed by SAPPEUR, or would be deferred to 1967 or 1968 as increasing Rhine-Ruhr demand became available for a major southern pipeline from Marseille to the Rhine-Ruhr.[521] In the short term, the deferred variant would result in two separate pipelines: one serving the Rhine-Ruhr area from Rotterdam and the other northeastern France and the Upper Rhine area from Marseille. BP thus attempted to talk Royal Dutch Shell out of the Rotterdam-Rhine pipeline project,[522] while Jersey Standard concluded that with the Rotterdam-Rhine pipeline in place:

> "construction of the Trans-European pipeline system from the Mediterranean to the Köln-Ruhr [sic] area [was] premature and unneeded for several years."[523]

The key question for SAPPEUR's board was therefore whether to opt for a separate pipeline to serve the French refineries, which could be integrated with other

[521] BPA 130129, Southern Pipeline Project, letter from Derek Mitchell (BP operational research) to John Davies (BP representative in SAPPEUR), 24 October 1957.
[522] BPA 130129, Southern Pipeline Project, file note on SAPPEUR by D.F. Mitchell, 25 October 1957.
[523] BPA 130129, Southern Pipeline Project, internal memo BP, 'Memorandum re: Sappeur', 13 December 1957, 1.

individual pipelines at a later stage, or choose the trans-European system right away. In the first scenario, the integration of the separate pipelines could be complicated due to differences in the financial set-ups and national legal statuses of the separate companies. Moreover, it was also questionable whether a smaller, separate French pipeline could be usefully integrated into a European system at all. On other hand, in the second case, the economic foundations and demand projections needed to be relatively secure, and all of the participating companies would have to agree on the feasibility of, and commit capital to, the project. Ultimately, however, there was no consensus among the participating companies to commit to the integrated trans-European pipeline option.

The case of the Rotterdam-Rhine pipeline illustrates that three of the most important companies had diverging interests. On the one hand, BP and Jersey Standard were involved in the Nord-West pipeline and had no direct need for an additional crude oil supply in the Rhine-Ruhr area. On the other, Royal Dutch Shell did not participate in the Nord-West pipeline and required a crude oil pipe to its Rhineland refinery. Although Royal Dutch was committed to SAPPEUR, the decision-making was moving too slowly for its immediate requirements in the Rhine-Ruhr area, even though making other plans would undermine the feasibility of the trans-European pipeline project. Competing needs were not the only issue of debate. For instance, the proposed tariff structure of the trans-European pipeline was a cause for disagreement. In order to serve the Rotterdam and Antwerp refineries, the pipeline had to be able to compete with maritime tankers in those ports. SAPPEUR therefore suggested a tariff structure in which the Rotterdam and Antwerp refineries paid lower tariffs than their counterparts in the Rhine-Ruhr area, despite being closer to Marseille.[524]

Adding insult to injury, several important factors for long-term planning seemed to be on shaky ground in late 1957. The pace of the growth in demand for oil seemed to be slackening, the situation in the Middle East remained unstable, and European capital markets were tight. Finally, the falling spot tanker freights after the end of the Suez Crisis made tanker transport cheaper than pipeline transport in the short term. The discord among participants and the economic uncertainties made it almost impossible for SAPPEUR's board to make a confident decision to move forward with the trans-European pipeline project.[525] These uncertainties were reflected in the tentative attitudes of the participants in the consortium. Some were unwilling to proceed with the trans-European plan in its original form, and were only willing to incorporate the possibility of integrating separate pipelines at a later stage.

[524] BPA 130129, Southern Pipeline Project, file note on SAPPEUR by D.F. Mitchell, 25 October 1957.

[525] BPA 43379, Sappeur NV minutes of meetings, 'Sappeur NV aide-memoire to a Meeting held on 26th September 1957, at the Company's office, The Hague', 11 October 1957, 4.

Others, however, were not yet ready to abandon the idea of an integrated pipeline system.[526]

Those at the board meeting in July 1957 expected to make a decision in December that year, but given the many uncertainties the meeting and final decision were postponed until April 1958. By then, it had become clear that there was no common understanding among the participants, and so the board decided not to pursue the project any further. Even before this decision, the French oil companies CFP and Pechelbronn had decided to pursue the construction of their own pipeline from Marseille to Strasbourg.[527] The establishment of new refineries in the Upper Rhine region added momentum to this initiative, as it would both make a separate Southern European pipeline feasible and render an integrated system from Marseille to the North Sea obsolete.

Moreover, the expected coordination of European transport legislation and regulation under the European Economic Community promised to tackle most of the legislative obstacles to the transnational pipeline operations identified by SAPPEUR. Indeed, between 1955 and 1963, the EEC member states discussed the need for and requirements of pipeline legislation.[528] Although no common legal framework emerged, the pipeline regulations in the different member states removed the uncertainty experienced by SAPPEUR about the treatment of private industry investments in a transnational pipeline system. Legislative action to regulate the construction and operation of pipelines in France had been provoked by the CFP/Pechelbronn plans to pursue a separate Southern European pipeline. Rather than claiming a stake in the project, the French state pledged to cooperate with the oil companies to identify the most suitable legal framework for the construction and operation of the pipeline. For this purpose, CFP/Pechelbronn incorporated a pipeline company to conduct the negotiations with the French government.[529] This company was open to all oil firms that deemed it worthwhile to participate in the eventual Southern European pipeline. With this move, the trans-European pipeline project was effectively dead and SAPPEUR remained what it was, a study group. However,

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[526] BPA 43379, Sappeur NV minutes of meetings, 'Sappeur NV aide-memoire to a Meeting held on 22nd November 1957, at the Company's Office, The Hague', 26 November 1957, 1-3.
[527] BPA 130129, Southern Pipeline Project, BP internal memo by J.E.H. Davies, 'SAPPEUR NV', 19 December 1957.
[528] See, for instance, reports on the discussions in the European Commission in: BAK, B102/59230, Rechtsfragen zum Bau und Betrieb von Rohrleitungen, 1960-1965; BAK, B102/59212, Regelung im Ausland. The discussions focused on the need for and extent of separate pipeline legislation and the harmonisation thereof among the member states through the European Commission. Opinions diverged considerably among the member states. (BAK, B102/59212, Regelung im Ausland, Europäische Wirtschaftsgemeinschaft, Der Rat, 'Übersicht über die Stellungnahme der einzelnen Delegationen zur Arbeitsunterlage der Kommission über die Probleme im zusammenhang mit dem Ausbau der Rohrleiungen zur Beförderung flüssiger Brennstoffe', 2 Februari 1962)
[529] BPA 43379, Sappeur NV minutes of meetings, 'Sappeur NV aide-memoire to a Meeting held on 22nd November 1957, at the Company's Office, The Hague', 26 November 1957, 3-4.

as it had succeeded in bringing together the high level representatives of virtually all of the important oil companies active in Europe, it remained in place as a service company to assist European crude oil pipeline projects like the Southern European pipeline consortium with planning and negotiations.[530] Moreover, all of the companies that joined the consortium went on to participate in the Southern European pipeline company that was established on 30 July 1958.[531] The major oil companies even remained under the impression that the trans-European pipeline system would one day materialise. In the words of an internal BP memorandum:

> "Because a large capacity pipeline system from the Mediterranean does have future economic benefits, it is important that all pipeline companies formed in Western Europe to transport crude into the European interior be organized according to certain principles which will permit the integration, if desired, of any one pipeline into a larger system in order to achieve the most economical transportation costs at some later date."[532]

6.5 Why the trans-European pipeline never materialised

The oil companies' hopes of one day integrating the various crude oil pipelines into one trans-European system never materialised. There were several reasons for this, with a rise in crude oil production outside the Middle East being just one of them. However, probably the most important factor was the growth in the size of crude oil tankers after World War II. Larger tankers had a substantial effect on the European crude oil supply chain. In the course of the 1960s, crude oil pipelines to Southern Germany were constructed from the ports of Marseille, Genoa and Trieste, but none of these lines extended past Karlsruhe (Figure 6-7). The crude oil pipelines into West Germany therefore consisted of a northern and a southern system. Analogous to the term watershed in hydrology, the divide between the northern and southern pipeline systems has been called the "oil-shed."[533] Part of the explanation for this oil-shed is that the southern pipelines had to cross the Alps, thus increasing costs.[534] Moreover, the growing size of tankers in the 1960s caused tanker freight rates to drop relative to those for pipelines.

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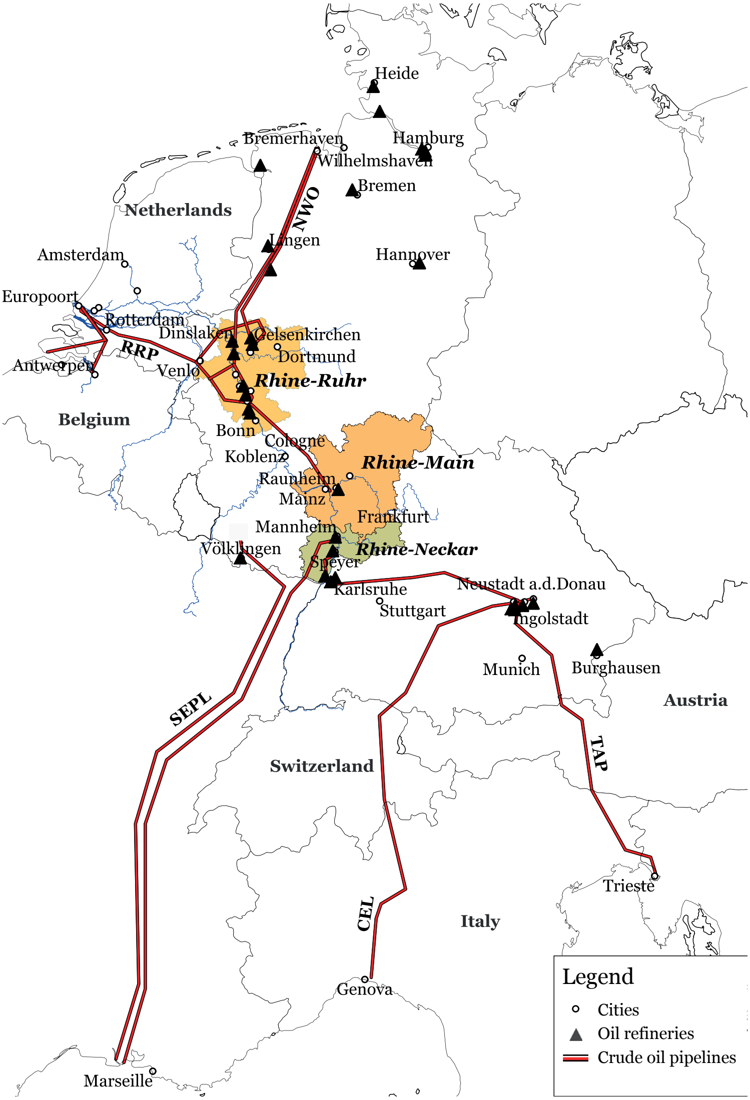
530 BPA 130129, Southern Pipeline Project, internal memo BP, 'Memorandum re: Sappeur', 13 December 1957.
531 Seidenfus, *Energie und Verkehr*, 150.
532 BPA 130129, Southern Pipeline Project, internal memo BP, 'Memorandum re: Sappeur', 13 December 1957, 2.
533 Molle and Wever, *Oil Refineries*, 49.
534 Ibid.

Figure 6-7. Crude oil pipelines to West Germany, c. 1970



Source: W. Molle and E. Wever, *Oil refineries and petrochemical industries in Western Europe: buoyant past, uncertain future* (Aldershot 1984) 53, 164-168.

When Royal Dutch Shell started studying the trans-European crude oil pipeline, such a solution was potentially the cheapest way to transport crude oil from the Mediterranean to the Rhine-Ruhr area, as opposed to by ship via Rotterdam, rendering Rotterdam's transit function for German crude oil obsolete. However, by the time the Southern European pipeline was actually being constructed, larger tankers had pushed down the cost of maritime shipping to the extent that the Rotterdam-Rhine pipeline would remain in operation to supply crude oil to the

Rhine-Ruhr area. Furthermore, tanker freights were brought down so much relative to pipeline freights that Rotterdam's pipeline connection to the hinterland was even extended as far as Frankfurt am Main. In theory, if tankers did not get bigger than 100,000 tons, Frankfurt could be supplied more cheaply from Marseille than from Rotterdam. However, using tankers of 100,000 tons or more, Frankfurt would be supplied more cheaply via Rotterdam.[535] With the first 100,000 ton tankers rolling off the blocks in 1959, the possibility of turning the pumps in the Rotterdam-Rhine pipeline to bring crude oil to the Rotterdam refineries via Marseille and the Ruhr faded quickly.[536] In 1963, Caltex Deutschland, the German subsidiary of the California Texas Oil Company (a joint venture between present day Chevron and Texaco), constructed a refinery in Raunheim near Frankfurt.[537] The Rotterdam-Rhine pipeline was extended in the same year to feed the Caltex refinery.[538]

In an attempt to discover whether or not Frankfurt would remain a captive hinterland for the Rotterdam port, the Port Authority ordered the engineer L. Cohen to study the long-term effects of oil pipelines on the hinterland connections of the port and the transhipment of crude oil and oil products. Cohen's report concluded that Rotterdam would probably not need to fear the Southern European pipelines originating in Marseille, Genoa and Trieste reaching further than Karlsruhe by the 1970s. The falling cost of tanker transportation, due to the growing scale of tankers and the limitations on the capacity of the Southern European pipelines, favoured Rotterdam in its competition with the Mediterranean ports for access to the Rhine basin hinterland.[539] As the minutes of SAPPEUR revealed, the choice not to pursue an integrated pipeline system was not made because tankers became cheaper relative to pipelines. Indeed, the cost divergence was only obvious some years after the rejection of the trans-European pipeline plan. Instead, the plan was abandoned because the timing for the different parts of the pipeline diverged to the extent that constructing the system all at once became unfeasible. In addition, the economic and legislative environment proved to be too uncertain in 1957. As a consequence, the trans-European pipeline continued in a slimmed down version as the Southern European pipeline with the primary aim of serving the Upper Rhine area. The capacity of the pipeline was therefore too small in the longer term, and the tariffs were too high to compete with the Northern European pipelines for the supply of the Middle and Lower Rhine areas.

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[535] Hubbard, *The Economics of Transporting Oil*, 29.
[536] Brennecke, *Tanker*, 144.
[537] 'Die Raffinerien im Oberrheingebiet und in Bayern', *Forschungen zur deutschen Landeskunde* 195 (1970), 150.
[538] RRP NV, *'58-'98: 40 jaar veilig en verantwoord transport* (Rotterdam 1998) 14.
[539] GAR, AHB, 589.01, inv. 4261, Ir L. Cohen, Study into the consequences of the transportation by pipelines of crude oil and oil products in Europe for Rotterdam port traffic and the Rotterdam port as a location for refineries and petrochemical companies; undated, but probably produced in 1965, 38.

6.6 Conclusion

Notwithstanding the frantic attempts of the Port Authority to leverage its relations with the Dutch government and the Shell group, Rotterdam was fairly powerless in influencing the decision-making process of the German pipeline consortium. Ultimately, the port depended on the Shell group for its future. However, before Royal Dutch Shell decided to construct the Rotterdam-Rhine pipeline, it first wanted to consider the options available to it. The company had enough time to do so, because it was covered for its crude oil supply by the participation of its refining contractor Union Kraftstoff in the Wilhelmshaven pipeline.

Royal Dutch took a transnational view on pipeline planning, studying the pipeline question from a European perspective. In response to the Esso AG consortium, BP and Royal Dutch shared the belief that pipeline planning should be wrested from the hands of national subsidiaries. With SAPPEUR, Royal Dutch succeeded in building a large group of national and multinational oil firms around the trans-European pipeline project. Although Rotterdam was the company's home-port on the European continent, this did not automatically translate into a pipeline connection between Rotterdam and the Rhine-Ruhr area. Indeed, it was only when Royal Dutch felt confident that a Rotterdam pipeline could fit within the trans-European system that it actually decided to construct the Rotterdam-Rhine pipeline.

However, the decision to build the Rotterdam pipeline was based on uncertainty. The SAPPEUR project faltered because it simply proved to be too difficult to simultaneously consider and synchronise the production planning of individual companies, the complexities of regulatory uncertainty, and the speed and direction of economic growth and the oil demand in Western Europe. Whereas the refineries of the Upper Rhine required a pipeline by 1963, Deutsche Shell's Rhineland refinery needed one by 1960, which would have required SAPPEUR to proceed with the construction of the trans-European pipeline in 1957, as it would take three years to build. However, in 1957, SAPPEUR was not yet ready to make a decision in favour of the trans-European system, and it was soon clear to Royal Dutch that the Marseille pipeline would come too late for its requirements in the Rhine-Ruhr area. As separate legs of the trans-European pipeline materialised, the opportunities and benefits of an integrated system disappeared. The legal and regulatory problems that SAPPEUR anticipated turned out to be of minor importance, as the Rotterdam-Rhine and Southern European pipelines operated across borders without any problems, largely because individual countries and the EEC refrained from implementing pipeline legislation other than technical and safety regulations. The need for a single European pipeline company with an international legal status based in international law thus no longer existed. Moreover, the economic foundations of the trans-European pipeline disappeared with declining freight rates in maritime tank shipping. Larger tankers also brought down the cost of transporting crude oil relative to pipeline transportation, closing the gap between what it cost to transport crude oil to Marseille and Rotterdam.

The contest for pipelines thus resulted in a collection of national and transnational pipelines, allowing the Port of Rotterdam to capture a large share of the crude oil supplies to its traditional hinterland. Yet what were the long-term effects of the contest for pipelines for Rotterdam's port? When the construction of the Rotterdam-Rhine pipeline commenced in 1958, its starting point was Royal Dutch Shell's existing Pernis facility, rather than a new site in the Europoort expansion. Although the initial ideas for the Europoort expansion were developed in direct response to the Esso AG pipeline plan, its further development was out of sync with that of the Rotterdam-Rhine pipeline. Royal Dutch announced its decision to choose Rotterdam in April 1957, while the Port Authority presented the Europoort plan in November that year.[540]

Even though the Port Authority seemed relatively powerless to influence the decision-making of the major oil companies, it was clear that Royal Dutch Shell and the port maintained a close relationship. Bataafsche directors briefed the Port Authority at critical junctures in the process, and urged Rotterdam to continue its expansion plans when the pipeline connection to the Rhine-Ruhr area seemed to be lost to Wilhelmshaven in late 1956. The ongoing dialogue between the Port Authority and Royal Dutch Shell with regard to the long-term development of the oil demand and the requirements of the infrastructure enabled the port to respond accordingly, which proved to be useful in the long run. The Europoort extension, which opened its first dock in 1960 (the Fourth Petroleum Dock), adapted the port to the trend of larger oil tankers. Although Royal Dutch Shell's Rotterdam-Rhine pipeline initially started in Pernis, the company simultaneously urged the port to make haste with the Europoort project. Larger tankers of 100,000 tons were being built and, to optimally benefit from their lower freight rates, Royal Dutch needed a terminal to receive them fully laden. This was impossible at Pernis. Ten years after the construction of the initial Rotterdam-Rhine pipeline, a second, larger crude oil pipeline to the Ruhr region, originating in the new Europoort area, was constructed. This one had a larger capacity, in tune with the growth of oil consumption in West Germany.[541] The fact that the larger pipeline meant lower transportation costs was further enhanced by the capabilities of the new Europoort area to accommodate the continuously growing tankers.

The Europoort expansion proved to be successful in securing a long-term

540 De Goey, *Ruimte voor industrie*, 89.
541 RRP NV, Annual Report 1968, 5.

competitive advantage for Rotterdam as a deep-water port catering for the biggest tankers on the planet. L. Cohen's report proved that Rotterdam had secured a strong and long-term presence in its traditional Rhine basin hinterland, notwithstanding the competition from other European ports specialising in the transportation of mineral oil. The key to this success was to recognise the future trend and capitalise on the geographic advantages of the location of the Rotterdam port. As Royal Dutch director Guépin had called for in his speech in November 1956, the Port Authority proved to be successful in its efforts to secure a relevant role for the Port of Rotterdam in the future.

Chapter 7 Expanding beyond the Rhine-Ruhr hinterland

7.1 Introduction

The appearance of crude oil pipelines on the European continent allowed several ports to contest Rotterdam's traditional position as the main outport of the German Rhine-Ruhr area. The vested interests of the Shell group had been decisive in securing Rotterdam's crude oil pipeline connection to the Rhine-Ruhr hinterland. Although the pipeline planning and decision-making process had made it clear that the Rotterdam Port Authority had very few ways of influencing the decision of the major oil companies in the short term, it also revealed that Royal Dutch Shell and the Port of Rotterdam maintained a close relationship. However, in the long run, the Port Authority successfully catered to the industry's need for deep-water access with the construction of the Europoort expansion. The negotiations with the German pipeline consortium had shown that deep-water access was one of the key factors in deciding where to locate the pipeline terminal. The Port Authority expressly attuned the Europoort plan to accommodate the largest ships of the day.[542] This chapter questions the consequences of these 1955-60 changes to the port and hinterland infrastructure for the 1960s and early 1970s.

At the time, the growing size of ships became the most important driver of port expansion projects.[543] During and after completion of the Europoort project, the depth of the channel to its docks increased from 14 to 19 metres in the 1960s, allowing access to ships ranging in size from 100,000 up to 225,000 tons. Just a handful of ports in the Atlantic and North Sea area had similar facilities (Le Havre, London, and Wilhelmshaven); some came close (Liverpool, Dunkirk), while others fell behind (Hamburg, Bremen, Antwerp).[544] The relationship between oil and ship size was a driving force for port expansion, because it heightened the competition for oil flows between ports. In the 1960s, ports like Antwerp and Hamburg lost their former position as oil landing facilities simply because their geographical circumstances did not allow deep-water access. Indeed, as Le Havre, Rotterdam and Wilhelmshaven in particular continued to invest in dredging and port expansion, they captured oil shipments from other ports. Over the course of the 1960s, oil flows to Europe therefore tended to concentrate in a small number of ports connected by large-scale pipelines to the hinterland. The competition between ports to attract oil flows was thus an important aspect of the Rhine-Ruhr pipeline case in the late 1950s, and continued unabated in the 1960s, as will become clear from this chapter.

[542] De Goey, *Ruimte voor industrie*, 88-89.
[543] R. Oldewage, *Die Nordseehäfen im EWG-Raum. Fakten und Probleme* (Tübingen 1963) 87.
[544] P. Kirschnick, *Der Wandel in der ökonomischen Bedeutung der großen europäischen Seehäfen im 20. Jahrhundert* (Kiel 1969) 72-77.

The two large-scale expansion projects of the Port of Rotterdam in the 1960s and early 1970s, namely Europoort and Maasvlakte, were a direct consequence of the competition between ports. Constructed between 1958 and 1964, Europoort enjoyed a high profile in the international business community. By 1966, 82 per cent of the facility was rented out.[545] As the prized establishment of a blast furnace and steel plant never materialised, Europoort became primarily filled with oil and petrochemical plants, welcoming the refineries of Gulf (now Kuwait Petroleum) in 1962 and BP in 1966, adding to the existing refineries in Pernis and Botlek of Royal Dutch Shell, Caltex (now Chevron and Texaco) and Jersey Standard. During the 1960s, Rotterdam developed into Western Europe's largest concentration of refinery capacity.[546] Indeed, between 1955 and 1966, tank storage capacity in the port more than tripled from 4 to over 13 million tons, and almost doubled again to 23 million tons in 1972.[547]

The existing literature has carefully studied the consequences of Europoort for the industrial establishments and cargo throughput in the port, but has neglected to consider its impact (and that of Maasvlakte) on Rotterdam's position in the wider West European oil supply system. This chapter aims to fill that lacuna by looking more closely at the effects of the Europoort and Maasvlakte expansions on the development of Rotterdam's transport connections with its hinterland.

Although the Rotterdam-Rhine pipeline ensured the continuation of Rotterdam's traditional ties with the Rhine-Ruhr area, the port expansions in the 1960s enabled the city's oil port to expand its reach beyond the Rhine-Ruhr hinterland. The chapter is divided into four sections. The first deals with the question of why Rotterdam captured most of the increasing demand for crude oil supplies in the Rhine-Ruhr area in the mid-1960s. The second section looks at how this expansion was related to the creation of Germany's first and only transnational oil product pipeline, which connected Rotterdam with Frankfurt am Main and Mannheim-Ludwigshafen. The third section considers the effect of the oil product pipeline on Rhine tank shipping, which was traditionally the dominant mode of transport for distributing oil products in the Rhine region. Finally, the fourth section deals with the conception of the Rotterdam-Antwerp pipeline, an episode that caused considerable political and popular hostility between Rotterdam and Antwerp, but was ultimately settled by the prevailing business interests of the major oil companies.

545 De Goey, *Ruimte voor industrie*, 123.
546 Molle and Wever, *Oil refineries*, 60-61. Also see, Appendix B: Data Table 0-6 for a list of refinery capacity by region between 1950 and 1975.
547 Figures kindly provided by Hugo van Driel. Sources: Kamer van Koophandel Rotterdam, Annual Reports for 1946-1970 and *Dirkzwager's Guide to the New Waterway*.

7.2 The expansion of the Rotterdam-Rhine pipeline, 1965-1968

The continued growth of oil consumption in the Rhine-Ruhr hinterland required the Rotterdam-Rhine pipeline to extend its pumping capacity in 1965 and 1966 in order to utilise its maximum annual capacity of 18 million tons of crude oil throughput by 1969.[548] The Wilhelmshaven pipeline was to reach its maximum capacity in 1968, at 22 million tons. By 1969, the two pipelines would thus supply 40 million tons of crude oil to the Rhine-Ruhr area and Frankfurt. In response to rising demand in the Rhine-Ruhr region, oil companies in the area were planning to expand their refinery capacity to 45 million tons by 1970 and 48 million tons in 1975. Additional pipeline capacity was therefore required, and both the Rotterdam-Rhine and Nord-West pipelines started to study opportunities for expansion.[549] However, it soon became clear that there was no need for two expanded pipelines. The Nord-West pipeline aimed to construct a 40-inch pipe with an ultimate capacity of 34 million tons per year, while its Rotterdam-Rhine counterpart aimed for a 36-inch pipeline with an ultimate annual capacity of 32 million tons. The two expansions would thus provide 66 million tons of total capacity, royally overshooting the actual requirements in 1975 by 18 million tons.[550]

Regardless of potential overcapacity, those behind the Rotterdam-Rhine pipeline asked the Dutch government to grant a new concession to expand in 1966.[551] According to the concession application, the Rotterdam-Rhine pipeline was eligible for expansion mostly because the sea route for imported crude was shorter in the case of Rotterdam. Moreover, Rotterdam boasted a facility, Europoort, which had been specially constructed to receive the latest generation of super tankers of up to 200,000 tons. Wilhelmshaven, on the other hand, could only handle tankers up to 120,000 tons by dredging continuously. According to the shareholders in the Rotterdam-Rhine pipeline, the advantages of Rotterdam over Wilhelmshaven were also acknowledged by a number of refiners (not named) in the Rhine-Ruhr area, which were contemplating moving their imports from Wilhelmshaven to Rotterdam. According to the concession application, even though the Wilhelmshaven pipeline would remain operating at full capacity in the future, it was imperative for the competitiveness of Rotterdam that the Rotterdam-Rhine pipeline remained in a position to cater for growing demand in the hinterland.

The Rotterdam-Rhine pipeline had one major disadvantage: the Wilhelmshaven concession allowed it to transport both crude oil and oil products,

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548 RRP NV, Annual Report 1966, 5.

549 BPA 33660, German NWO-pipeline, BP internal memo, 'NWO-RRP', 15 August 1966, 1.

550 Ibid.

551 Nationaal Archief, Den Haag, Ministerie van VROM: Centrale Sector, (1938) 1940-1981 (1987), nummer toegang 2.17.03, inventarisnummer 2991, letter RRP NV to Minister of Economic Affairs regarding new concessions for RRP, 18 October 1965.

while its Rotterdam-Rhine rival could only the transport of crude oil. Future growth was not so much expected to come from refinery expansion and, thus, crude oil throughput, but from growing imports of oil products in the hinterland, especially gas oil and chemical feedstock (naphtha). Accordingly, to be able to fully utilise its potential, the Rotterdam-Rhine pipeline needed to be in a position where it could cater for both the extra demand for crude oil and the increasing importation of oil products. To that end, the Dutch government granted two new concessions. The first was an adaptation of the old concession, with the addition of allowing the pipeline to transport oil products. The second was a concession to construct a 36-inch pipeline along the trajectory of the first pipe, with an extension to the new deep-water terminals of Europoort.[552] The concessions were granted in February 1967, because "the construction of the second pipeline, which enhances the transport capacity greatly, is of great importance for the transit position of the Rotterdam port and the utilisation of Europoort as a port for super tankers."[553]

The relative ease with which the Rotterdam-Rhine pipeline obtained its new concession obscures the turmoil that the rival expansion plans of Rotterdam and Wilhelmshaven caused in the oil industry. Vested interests ensured that participants in either pipeline argued in favour of expansion. The Federal Republic of Germany pledged financing to dredge the Wilhelmshaven port to enable it to handle tankers up to 170,000 tons. However, Rotterdam's Europoort expansion promised to accommodate the largest tankers of the day (200,000 tons) and seemed to several companies to be the designated port for expanding pipeline capacity to the Rhine-Ruhr area. A BP study had shown that because Europoort could accommodate 200,000 ton tankers, it was the optimal crude oil hub for supplies to northwestern Europe, both as a break bulk location and for the expansion of pipeline capacity to the Rhine-Ruhr area. This caused "a lot of jockeying for position" among the oil companies involved.[554] BP, which was a shareholder in the Nord-West pipeline, considered selling its stake and acquiring a share in the Rotterdam-Rhine pipe. Meanwhile, other Nord-West pipeline shareholders urged the construction of a second Nord-West pipeline from Rotterdam. Esso was considering yet another alternative by studying the possibility of expanding refinery capacity in Karlsruhe rather than in the Rhine-Ruhr area, thereby reducing the demand for a pipeline expansion from either Rotterdam or Wilhelmshaven.[555]

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552 NL-HaNA, VROM/Centrale Sector, 2.17.03, inv.nr. 2991, letter RRP NV to the Minister of Economic Affairs regarding new concessions for RRP, 18 October 1965.
553 NL-HaNA, VROM/Centrale Sector, 2.17.03, inv.nr. 2991, letter Rijksplanologische Commissie (National Planning Commission) to Minister van Volkshuisvesting en Ruimtelijke Ordening (Housing and Spatial Planning), 17 January 1967, 4.
554 BPA 33660, German NWO-pipeline, BP internal memo, 'NWO-RRP', 15 August 1966, 2.
555 BPA 33660, German NWO-pipeline, letter from Dr Buddenberg (director of Deutsche BP) to BP London, 'NWO/RRP', 2 August 1966.

Although the jockeying for position led to no actual changes in the shareholdings of either pipeline, Rotterdam seemed to have won the contest to expand hinterland transport capacity to the Rhine-Ruhr. The construction of the 36-inch pipeline between a new Royal Dutch Shell terminal in Europoort and the Rhine-Ruhr area started in 1967, and the project was completed in 1968. Following the BP study of 1966, several oil companies active in the Port of Rotterdam urged the Port Authority to further dredge the port's access channel to the sea in order to welcome tankers up to 225,000 dwt.[556] The subsequent dredging of the so-called oil channel in 1968 and 1969 was beneficial not only to the expanded Rotterdam-Rhine pipeline, but also to the various refineries situated in the port area. Between 1969 and 1975, the BP refinery, which had opened in Europoort in 1966, expanded from 5 to 15 million tons, Royal Dutch Shell went from 18 to 25 million tons and Esso from 8 to 16 million tons, creating some of the largest refineries on the Western European continent.

With Rotterdam expanding its port and pipeline capacity, expansion of the Nord-West pipeline no longer seemed to be required. The capacity of the existing facility could, however, be enhanced somewhat by putting in additional pumping capacity.[557] Nonetheless, the growing refinery capacity in the Rhine-Ruhr area and demand estimates seemed to suggest that an additional 40-inch pipeline made economic sense. After securing German federal government funding for the expansion of the Wilhelmshaven facilities, the shareholders in the Nord-West pipeline announced the new pipe in March 1971.[558] By 1973, the new pipeline, Germany's largest, was in operation. However, less than 10 years later, it had closed down again; the projected annual volumes of 85 million tons of crude oil never materialised, and the 1970s' oil crises thus halted the growth of oil consumption. By 1982, just 15 million tons of crude oil flowed through the Nord-West pipelines, which was less than it pumped in the 1960s.[559] Although Rotterdam faced the same oil crises, the impact on pipeline operations was less disastrous. Indeed, instead of operating two parallel crude oil pipelines, the Rotterdam-Rhine pipeline converted the old 24-inch pipe into an oil product pipeline in 1968.

7.3 The Rhine-Main pipeline, 1965-1971

Closely related to the expansion of the Rotterdam-Rhine pipeline was the development of Germany's first and only cross-border oil product pipeline system, the *Rhein-Main-Rohrleitung* or Rhine-Main pipeline. Rising demand for oil in Southern

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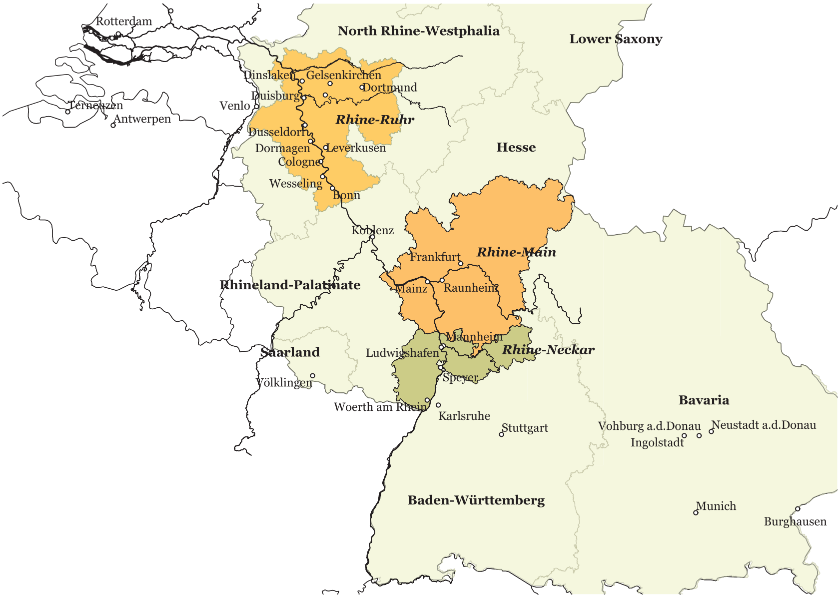
[556] De Goey, *Ruimte voor industrie*, 182.
[557] Förster, *Geschichte der Deutschen BP*, 322.
[558] 'Gündlich verschätzt', *Der Spiegel*, 23 August 1982, 56.
[559] Ibid.

Germany created opportunities to construct inland refineries in concentrated consumer areas along the Middle and Upper Rhine and in Bavaria.[560] During the planning and construction of these refineries in the 1950s, consideration was given to building an oil product pipeline from the Rhine-Ruhr area into Southern Germany to supply Baden-Württemberg and Bavaria. However, these plans never came to fruition; the oil companies decided to build refineries in Bavaria itself because the market was sufficiently large. By the mid-1960s, the pattern of refinery locations in Germany had formed a watershed between the northern and southern pipeline systems,[561] with the latter serving refineries in Bavaria and along the Rhine up to Karlsruhe and Mannheim, and the former supplying refineries on the Lower and Middle Rhine up to Frankfurt.

Figure 7-1. German metropolitan regions in the Rhine basin



Source: Map created by the author based on regional definitions provided in: Bundesamt für Bauwesen und Raumordnung (BBR) and Initiativkreis Europäische Metropolregionen in Deutschland (IKM), *Regionales Monitoring 2008. Daten und Karten zu den Europäischen Metropolregionen in Deutschland* (Bonn 2008) 7. http://www.deutsche-metropolregionen.org/fileadmin/ikm/IKM-Veroeffentlichungen/IKM-Monitoring2008_lite.pdf, accessed 11 July 2014.

When demand for fuel and chemical feedstock in the Rhine-Main and Rhine-Neckar areas (Figure 7-1) increased in the 1960s, Deutsche Shell began to ponder whether to

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[560] Karlsch and Stokes, *Faktor Öl*, 320-321; M. Gassner, 'Lokale Umwelt oder transnationale Chance? ENIs Reaktion auf die Proteste gegen die CEL-Pipeline in den 1960er Jahren', *Zeitschrift für Unternehmensgeschichte* 57 (2012) 1, 31-46, here: 35-37; T. Schlemmer, *Industriemoderne in der Provinz. Die Region Ingolstadt zwischen Neubeginn, Boom und Krise, 1945 bis 1975* (München 2009) 203-210.
[561] Molle and Wever, *Oil refineries*, 49.

construct a new refinery near Frankfurt or to supply the area via a pipeline from Cologne.[562] Initially, the company aimed to supply growing demand in the Rhine-Neckar and Rhine-Main regions from its refinery near Strasbourg. However, BASF's growing demand for petrochemical feedstock, with which Deutsche Shell was cooperating closely, required an increasing stream of naphtha to be supplied to Ludwigshafen. Although Strasbourg was closer to Ludwigshafen than Cologne-Godorf, its naphtha stream was inadequate. Accordingly, as the naphtha yield of a refinery is closely related to its size, the additional demand in Ludwigshafen was to be supplied from Cologne-Godorf, which was twice the size of the Strasbourg refinery in 1965.[563]

In 1964, Deutsche Shell incorporated the Rhine-Main Pipeline Company (*Rhein-Main-Rohrleitungstransportgesellschaft*) for the construction and exploitation of an oil product pipeline between the Rhine-Ruhr, Rhine-Main and Rhine-Neckar areas (Figure 7-2). In 1965, Deutsche BP joined Deutsche Shell, because the distribution of its refinery locations was similar, with facilities in Hamburg, the Rhine-Ruhr area, Bavaria and Strasbourg, but none in the Rhine-Main and Rhine-Neckar regions. By 1967, four more companies joined the Rhine-Main pipeline group.[564] With the exception of Deutsche BP, the participating firms also owned the Rotterdam-Rhine pipeline. The expansions of the two pipelines were thus closely coordinated.

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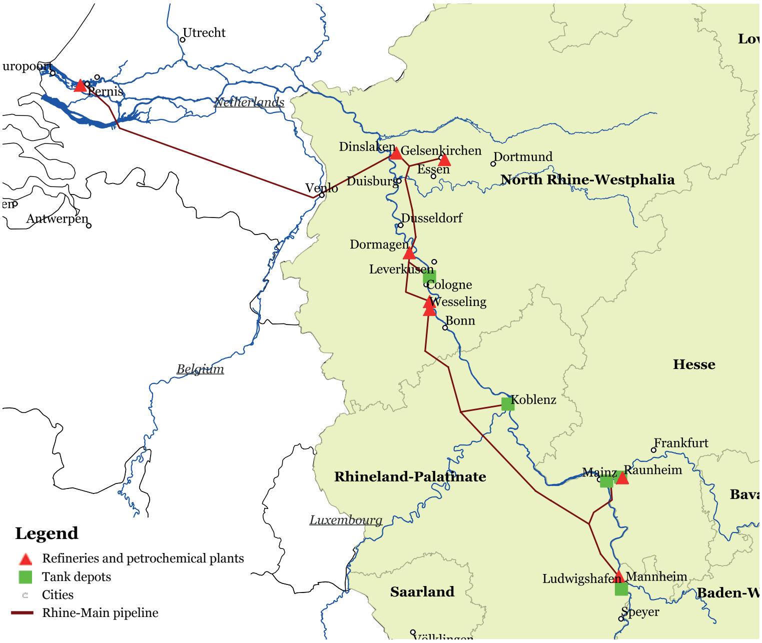
562 Riffel, *Mineralöl-Fernleitungen*, 114; H.-J. Burchard, 'Neuere Entwicklungen im Rohrleitungstransport', *Erdöl und Kohle – Erdgas – Petrochemie* 18 (1965) 11, 1008. Literature about the creation of the Rhine-Main pipeline is scarce, and is mostly produced by German geographers and authors active in the oil industry; none of it is historical. The following is compiled from a number of such publications, trade journals and some archival material found in the BP Archive.
563 Riffel, *Mineralöl-Fernleitungen*, 114; Molle and Wever, *Oil Refineries*, 165-169.
564 Riffel, *Mineralöl-Fernleitungen*, 115. The company's shares were divided between Deutsche Shell AG (55 per cent), Deutsche BP AG (29), Chevron Erdöl Deutschland GmbH (5), Texaco Oel GmbH (5), Gelsenkirchener Bergwerks AG (4) and Mobil Oil AG (2).

Figure 7-2. Map of the Rhine-Main pipeline trajectory



Source: Map created by the author based on the trajectory described by: D. Nagel, *Die ökonomische Bedeutung von Mineralöl-Pipelines* (Hamburg 1968) 41; E. Riffel, *Mineralöl-Fernleitungen im Oberrheingebiet und in Bayern: Arbeit aus dem Geographischen Institut der Universität Mannheim* (Bonn 1970) 115-117.

The locations of the tank depots and major clients of the pipeline's owners dictated its trajectory. At a total cost of 260 million DM, the pipeline was constructed in two parts.[565] In 1967, the first, southern part was built between the Cologne area, Frankfurt and Ludwigshafen, connecting Deutsche Shell's Cologne-Godorf refinery to its tank depots along the Rhine (Figure 7-3).[566] Near Frankfurt, the pipeline was connected to the Caltex refinery in Raunheim, which was the principal supplier of feedstock to Hoechst, which was Germany's third largest chemical company and located in Frankfurt. In Ludwigshafen, the pipeline connected to BASF's vast petrochemical plant, to where it delivered naphtha based on a long-term supply contract between Deutsche Shell and BASF for the delivery of 500,000 tons of the product annually.[567] Moreover, part of this delivery contract included the obligation to supply the naphtha via pipeline, which was one of the initial reasons for building it.

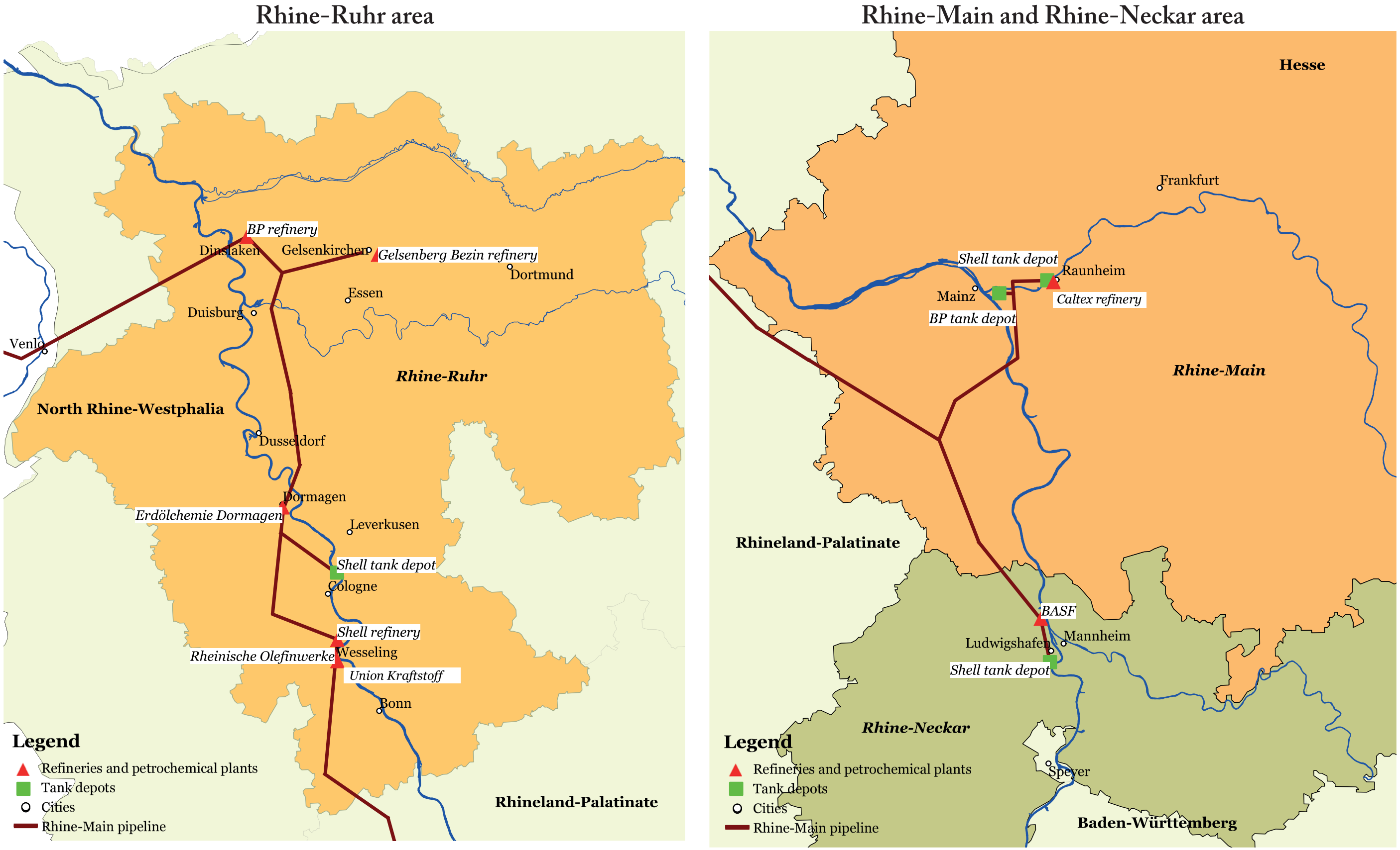
In 1968, the northern part of the pipeline was constructed and connected BP's refinery in Dinslaken (on the Rhine just north of the Ruhr area) with Deutsche Shell's

[565] D. Nagel, *Die ökonomische Bedeutung von Mineralöl-Pipelines* (Hamburg 1968) 41.
[566] 'Die Produktenleitung Godorf – Ludwigshafen – Flörsheim', *Erdöl und Kohle* 19 (1966) 1, 64-65.
[567] Riffel, *Mineralöl-Fernleitungen*, 115; Nagel, *Mineralöl-Pipelines*, 39.

Cologne-Godorf plant and the UK Wesseling refinery in Wesseling (Figure 7-3). Branches of the pipeline also connected the Gelsenberg Benzin refinery in Gelsenkirchen, Erdölchemie (a 50/50 joint venture between BP and Bayer) in Dormagen and Rheinische Olefinwerke (a 50/50 joint venture between Royal Dutch Shell and BASF) in Wesseling.[568] In late 1968, the Rhine-Main pipeline was connected to the Rotterdam-Rhine pipeline at Venlo, for which a pipe between Venlo and Dinslaken was constructed. A transport contract between the Rotterdam-Rhine and Rhine-Main pipelines governed the cross-border transportation of oil products through them. The connection to the Rotterdam-Rhine pipeline enabled Deutsche Shell, BP and Chevron to pump oil products from their refineries and tank depots in the Port of Rotterdam into the Rhine-Main pipeline, creating an integrated pipeline system for oil products between Rotterdam and Ludwigshafen. The Rhine-Main pipeline system, meanwhile, was dedicated to performing transport for the participating firms. Independent tank storage companies in Rotterdam, such as Paktank, did have a physical connection to the pipeline, but the actual use of it by outsiders was restricted and almost never occurred.[569]

[568] Riffel, *Mineralöl-Fernleitungen*, 116.
[569] Interview with Jan Brouwer, former director of Paktank International, 16 April 2013.

Figure 7-3. Refineries, petrochemical plants and tank depots connected to the Rhine-Main pipeline



Source: Map created by the author based on the trajectory described by: D. Nagel, *Die ökonomische Bedeutung von Mineralöl-Pipelines* (Hamburg 1968) 41; E. Riffel, *Mineralöl-Fernleitungen im Oberrheingebiet und in Bayern: Arbeit aus dem Geographischen Institut der Universität Mannheim* (Bonn 1970) 115-117.

The creation of the Rhine-Main pipeline served four purposes. Firstly, it solved the distribution problems of the participating oil companies. Secondly, it secured the continuous supply of petrochemical feedstock to BASF and Bayer. Thirdly, the expansion of Rheinische Olefinwerke in Wesseling in 1968 required a naphtha supply that corresponded to a crude oil distillation capacity of 20 million tons per year. As the principal supplier of naphtha, namely Deutsche Shell's Cologne-Godorf refinery, only disposed of 8 million tons, the Rhine-Main pipeline was vital for the operations of Rheinische Olefinwerke.[570] Fourthly, and most fundamentally, its connection to the Rotterdam-Rhine pipeline helped to resolve the mismatch between supply and demand on the German oil markets.

In the late 1950s, German oil consumption increasingly consisted of heavy fuel oil. Refineries constructed between 1958 and 1965 aimed for a high yield of heavy fractions to serve growing demand. However, during the 1960s, demand for lighter oil products increased relative to heavier ones. This demand could be met either domestically or via imports, for instance from Rotterdam. Domestic production would also entail a higher yield of heavy fuel oil, for which there was no demand in Germany. Importing the additional volumes of lighter oil products was therefore the better option, and the Rhine-Main pipeline's connection to Rotterdam provided an efficient and secure solution.[571] Indeed, Mobil Oil, Chevron, Texaco, BP and Deutsche Shell all supplied the German market with oil product imports via Rotterdam.

The Rhine-Main pipeline primarily became a competitor to inland tank shipping. All of the refineries and tank depots served by the pipeline were constructed next to inland waterways. The initial capacity of the pipeline in Germany was 4.5 million tons annually, but its maximum capacity was more than twice that amount. The pipe mainly transported gasoline, kerosene (jet fuel), naphtha and light fuel oil, which were products that were also commonly transported by inland tank ships. Consequently, the owners of these ships objected strongly to the pipeline. However, the cost benefits of the pipeline vis-à-vis inland tank shipping were substantial.[572] The Rhine was one of the principal waterways for the movement of oil products, because the freight rates of inland tank shipping were low due to the large volumes transported on this river. Yet, for the same reason, it became feasible to transport these volumes by pipeline.[573] The calculation of the Rhine-Main pipeline's tariff structure also revealed its competitive nature. Usually in pipeline operations, the pay-

[570] 'Die ROW als Beispiel fruchtbarer Zusammenarbeit zwischen Mineralöl- und chemischer Industrie', *Erdöl und Kohle, Erdgas, Petrochemie* 22 (1969) 11, 721-723
[571] Riffel, *Mineralöl-Fernleitungen*, 116.
[572] Ibid., 117.
[573] G. Heimerl, 'Neue Raffineriestandorte und Produkten-Pipelines. Eine verkehrswirtschaftliche Studie für den südwestdeutschen Raum', *Erdöl und Kohle* 19 (1966) 1, 536.

out time of the capital investment forms the basic assumption for setting the pipeline's transportation tariff, based on capital and operating costs, which are then divided between the shareholders' relative share in the transport performed by the pipe. In the case of the Rhine-Main pipeline, the competitiveness vis-à-vis barge transport formed the basis for tariff setting, regardless of the point in time when the pipeline would start turning a profit.[574] Tariffs were based on the actual barge freight rates on corresponding trajectories minus a fixed rebate, so as to ensure that the pipeline tariff followed the movement of barge rates at a competitive level. There was some disagreement between the major shareholders (Deutsche Shell and Deutsche BP), who were more concerned about their return on investment, and the smaller shareholders, who were mainly interested in low freight rates. However, to ensure that the pipeline was used enough, the shareholders ultimately agreed to low rates for transporting freight.[575]

Whereas the traditional method of distributing a refinery's production involved a combination of barge, train and road tank car, a pipeline replaced barge and rail for a large central tank depot from which road tank cars covered the last few miles to the client. Although a pipeline delivered unrivalled transport cost reductions, the drawback was the need to construct one or two large tank depots or a system of branch pipelines with a number of smaller tank depots, adding substantially to the capital investment. A pipeline only made sense for the continuous transport of large volumes to a small number of central tank depots that were close to a major concentration of consumers (state, business or private).[576] This was the function hitherto performed by inland tank shipping. After its inception, the Rhine-Main pipeline took care of 30 per cent of the transport of oil products from Deutsche Shell's Cologne-Godorf refinery.[577] Then, between 1967 and 1973, the throughput of the Rhine-Main pipeline increased from 2.5 to 12.8 million tons, while in the same period, the intra-German transport of Royal Dutch Shell's captive fleet of inland tankers remained stable between 2.5 and 3 million tons.[578] As a consequence, not only did the Rhine-Main pipeline take over a substantial part of intra-German inland shipping transportation, but the pipeline system also allowed for oil product imports to be pumped rather than barged.

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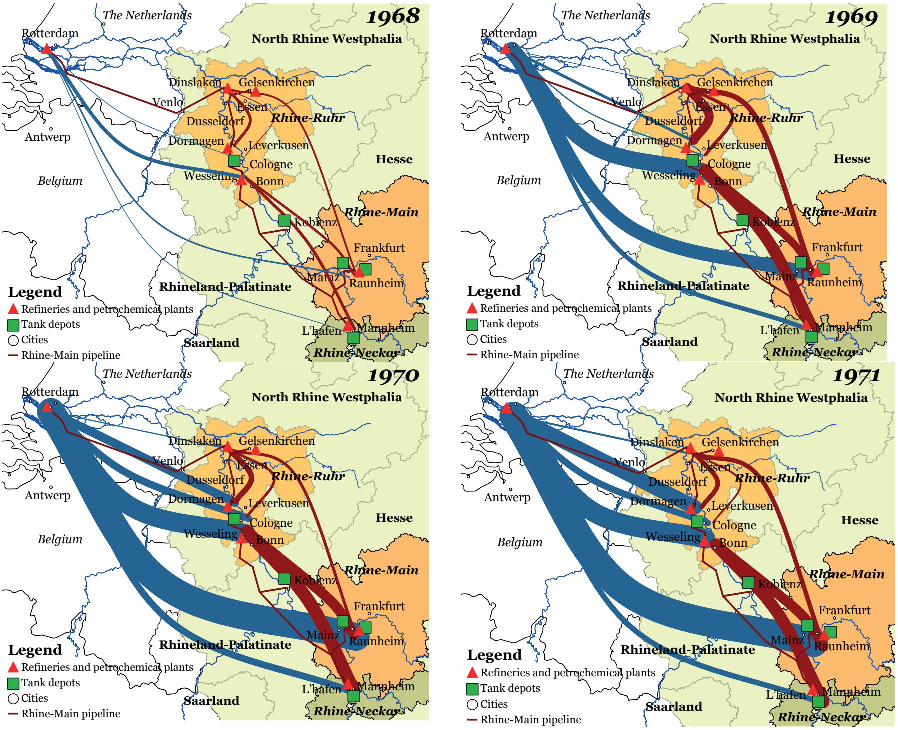
574 BPA 40963, Germany – RMR, record notes of RMR tariff committee meetings on 6 March 1968, 11 April 1966, 20 May 1966 and 19 June 1966.
575 Ibid.
576 Heimerl, 'Neue Raffineriestandorte und Produkten-Pipelines', 535-536.
577 'Weitere Einzelheiten über den Ausbau der Shell-Raffinerie Godorf', *Erdöl und Kohle* 20 (1967) 5, 379.
578 Mineralölwirtschaftsverband e.V., 'Statistikanhang, Mineralölpipelines über 40 km Länge', *Mineralölversorgung mit Pipelines* (Hamburg, 2006). http://www.mwv.de/upload/Publikationen/dateien/030_Pipelines_Z03yDZ9hZhcN2Q7.pdf, accessed 1 August 2013; VOA, 1260/86-89, Vervoersstatistieken INTERNATIONALE, 1950-1976.

Figure 7-4 represents the volumes of oil products transported by the Rhine-Main pipeline in its first four years of operation. Three main production areas dictated the pattern of transportation flows through the pipe: Rotterdam (home to the refineries of Royal Dutch Shell, BP and Caltex), Dinslaken (BP refinery) and Cologne-Godorf (Deutsche Shell refinery). Three main consumption regions were supplied from these production areas: Rhine-Ruhr, Rhine-Main and Rhine-Neckar. The flows depicted in Figure 7-4 represent the flows between these major areas of production and consumption.

Figure 7-4. The volumes of the oil products transported by the Rhine-Main pipeline 1968-1971



Source: BP Archive, 21090 & 21093, RMR Progress Reports, 1968-1971. Map created by the author. The data are reported in Appendix B: Data Table 0-5.

In 1968, the Rhine-Main pipeline pumped a total of 1.4 million tons of oil products, 66 per cent of which was intra-German transport. The trajectories of Rotterdam-Cologne, Dinslaken-Dormagen and Cologne-Ludwigshafen constituted the largest flows, which were comparable in size (between 0.2 and 0.3 million tons). In 1969, the first full year of operations, imports from Rotterdam already amounted to 52 per cent (3.3 million tons) of the pipeline's total transported volumes, and this pattern intensified in 1970 and 1971 when this figure rose to up to 67 and 70 per cent (Table

7-1). Imports from Rotterdam-Pernis were evenly distributed between the Rhine-Ruhr and the Rhine-Main-Neckar regions (Table 7-1), with the vast majority of imports to the latter were destined for the Frankfurt area (Figure 7-4).

Within Germany, the majority of the transported volumes went to the Rhine-Main and Rhine-Neckar areas (Table 7-1 Intra-German transport), rising from 66 per cent in 1968 to 80 per cent in 1970. Whereas all the participants in the Rhine-Main pipeline carried imports from Rotterdam, intra-German transport differed markedly. BP, for instance, used the pipeline mainly to distribute products within the Rhine-Ruhr region and its tank depot in the Rhine-Main area; it rarely transported goods to the Rhine-Neckar region.

Table 7-1. Oil product transport, Rhine-Main pipeline, 1968-1971

(million tons)	1968	1969	1970	1971
Imports from Rotterdam-Pernis	**0.48**	**3.27**	**5.89**	**6.30**
Pct. of total transported volume	*34*	*52*	*67*	*70*
To Rhine-Ruhr	0.32	1.75	3.02	3.53
Percentage of German imports	*67*	*53*	*51*	*56*
To Rhine-Main-Neckar	0.16	1.53	2.87	2.77
Percentage of German imports	*33*	*47*	*49*	*44*
Intra-German transport	**0.92**	**3.06**	**2.86**	**2.70**
Pct. of total transported volume	*66*	*48*	*33*	*30*
In Rhine-Ruhr	0.31	1.02	0.69	0.53
Percentage of intra-German	*34*	*33*	*24*	*20*
To Rhine-Main-Neckar	0.61	2.04	2.17	2.17
Percentage of intra-German	*66*	*67*	*76*	*80*
Total	**1.40**	**6.34**	**8.75**	**9.01**

Source: BP Archive, 21090 & 21093, RMR progress reports, 1968-1971. Own calculations. The full data are reported in Appendix B: Data Table 0-5.

Deutsche Shell, on the other hand, rarely used the pipeline to distribute products within the Rhine-Ruhr area; all of its transport was destined for the Rhine-Main and Rhine-Neckar areas, with 20 per cent of this consisting of deliveries to BASF under a long-term supply contract for naphtha.[579]

It is striking to note that soon after the pipeline became operational, its initial function changed quite dramatically. The pipeline had been intended to perform intra-German transport from the Rhine-Ruhr region to the Rhine-Main-Neckar area, but its connection to the old Rotterdam-Rhine pipeline rapidly made its importing function more important. By 1971, the Rhine-Main pipeline imported a total of 6.3 million tons of oil products in West Germany. As such, it was responsible for 45 per cent of the oil product flows between Rotterdam and West Germany, which

[579] BP Archive, 21090 & 21093, RMR progress reports, 1968-1971. Own calculations.

constituted almost 19 per cent of Germany's total oil product imports in 1971.[580] The Rhine-Main pipeline system thus rapidly developed into an important hinterland connection between the Port of Rotterdam and West Germany.

7.4 Rhine tank shipping and the transition of the hinterland

The Rhine-Main pipeline became feasible because the volumes of oil product movements in the Rhine region presented potential economies of scale in transportation. The pipeline aimed to divert flows from inland tank shipping, as the setting of pipeline tariffs showed, and it had a considerable impact on the competitive position of Rhine tank shipping. It is therefore necessary to take a closer look at the development of this mode of transport and its role in shaping port-hinterland relations between 1945 and 1975.

One of the largest Rhine tank ship owners was the Rotterdam-based Phs. Van Ommeren NV. Van Ommeren operated its own fleet, but also managed an inland tank fleet for Royal Dutch Shell, which was a joint venture between the two companies.[581] The transport data of Van Ommeren give a clear picture of how and why Rhine tank shipping changed between 1947 and 1975. The data reveal two distinct periods, which reflect the changes in the demand for oil in the Rhine-Ruhr hinterland. Between 1945 and 1959, German imports of crude oil and oil products rose rapidly, causing the strong growth of Rhine tank shipping, in particular between Rotterdam and West Germany after 1956. However, between 1960 and 1968, imports levelled off and the transport demand shifted from cross-border shipments to intra-German shipments as West Germany's domestic refinery capacity was expanded and the Rotterdam-Rhine and Nord West pipelines diverted all crude oil shipments from inland tank shipping to pipelines.

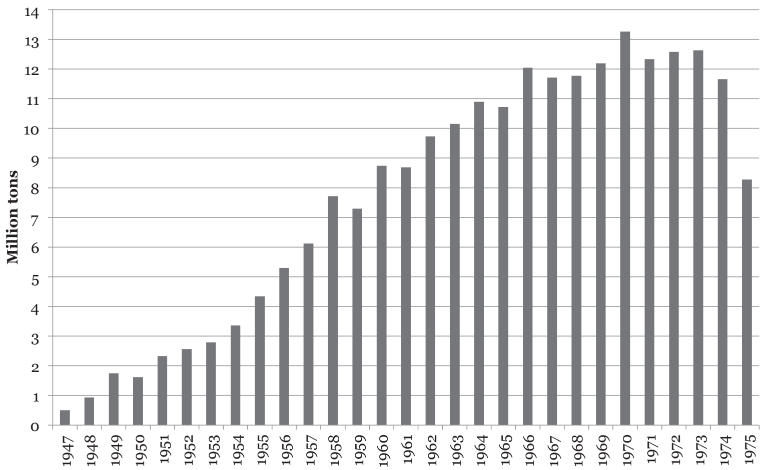
Notwithstanding the many obstacles to trade in the first 15 years after the war, especially with Germany, the total volume of oil products shipped over the Rhine increased by 25 per cent annually between 1947 and 1959.[582] Van Ommeren profited from this growth, and transport also increased by 25 per cent annually, from only 0.5 million tons in 1947 to 5.3 million tons in 1956. The pattern of the transport flows in this period changed substantially, mainly due to the removal of limitations on trade and transport arising from subsequent Allied and Federal Republic policies.

The most inhibiting policy barred foreign flags from partaking in intra-German transport, and had been implemented during the Allied occupation of

[580] Based on data compiled for: M. Boon, 'Energy Transition and Port-Hinterland relations. The Rotterdam oil port and its relations to the West German hinterland, 1950-1975', *Economic History Yearbook* (2012) 2, 217, note 10.
[581] C. Boele and P. van de Laar, *Geschiedenis Koninklijke Van Ommeren NV* (Rotterdam 2001) 96-99.
[582] VOA, 1260/87, Quarterly transport statistics, 1947-1975. Own calculations.

Germany between 1945 and 1949. The Allied Joint Export and Import Agency (JEIA), which oversaw German foreign trade, had issued a directive (nr. 30, in 1949) stipulating that foreign flags should only partake in intra-German transport when the German inland fleet was fully employed. This was mainly a means to limit foreign exchange outlays.[583] Part of the problem was that almost 75 per cent of the Elbe inland tank fleet was looking for employment in West Germany, because of the blockade of Berlin.[584] Van Ommeren's transport therefore concentrated on shipments from Rotterdam to West Germany and Switzerland until 1951 (Figure 7-5 and Figure 7-6).[585]

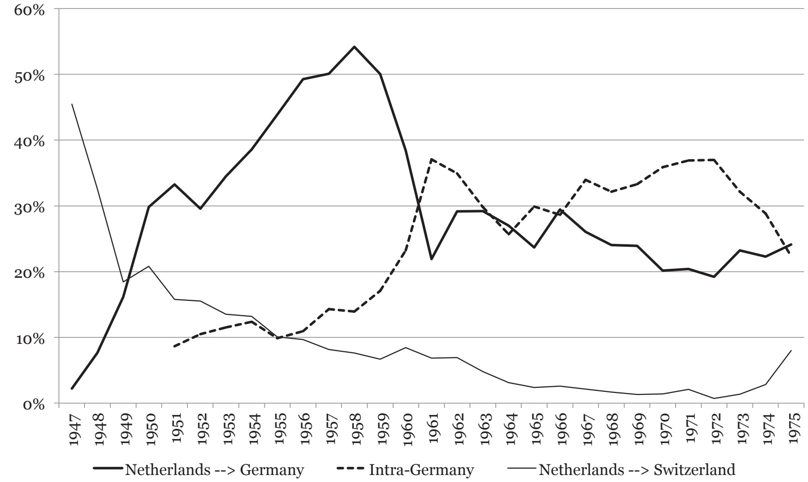
Figure 7-5. The total volumes of oil products transported by Van Ommeren, 1947-75 (in million tons)



Source: Van Ommeren Archive (VOA), archive number 1260, box number 87, quarterly transport statistics, 1947-1975. Own calculations.

[583] VOA, 1260/260, Hervatting *innerdeutsche* transporten, 1948-1953, internal memo on intra-German transport, 12 May 1949, 1.
[584] VOA, 1260/260, G. Meyer, 'Wo steht die Elbeshiffahrt', *Zeitschrift für Binnenschiffahrt* (1950) 5, 114.
[585] Van Ommeren also shipped to Belgium and France, as well as within Belgium and the Netherlands. Figure 7-6 only depicts the most important destinations, for the sake of clarity.

Figure 7-6. Destinations of the Van Ommeren transported volumes, 1947-75



Source: Van Ommeren Archive (VOA), archive number 1260 box number 87, quarterly transport statistics, 1947-1975. Own calculations.

Although JEIA directive 31 liberalised cross-border shipping between the Netherlands and Germany in September 1949, intra-German transport (or cabotage) remained closed to foreign flags,[586] with the restrictions applying to all forms of inland shipping. Before the war, intra-German transport had been an important part of Van Ommeren's operations, but consecutive rounds of Dutch-German trade negotiations could not achieve a solution to the issue. As one of the largest ship owners in the Rhine tank shipping business, Van Ommeren was thus closely involved in these Dutch-German negotiations.

The main German concern was the dumping of foreign inland barge capacity on the German market. This represented a shift in the country's argument against intra-German participation by foreign flags, which had hitherto been based on a shortage of foreign currency in Germany.[587] As long as the Dutch Rhine fleets could not agree on market discipline by setting minimum rates, the Germans continued to be anxious about allowing the Dutch fleet access to intra-German transport.[588] Van Ommeren, however, argued that this was not the position in the inland tanker market, because it was much more concentrated and coordinated than dry bulk and general

[586] VOA, 1260/240, letter from the Dutch Ministry of Transport to the Rotterdam Chamber of Commerce, 'Betr. JEIA-instructie No. 31', 8 September 1949.
[587] Lak, *'Because we need them…'*, 178.
[588] VOA, 1260/240, letter from the Dutch Ministry of Transport to the Rotterdam Chamber of Commerce, 'Betr. JEIA-instructie No. 31', 8 September 1949.

cargo shipping.[589]

Notwithstanding Van Ommeren's arguments regarding the organisation of the Dutch inland tank shipping business, Dutch-German negotiations suffered from the overcapacity in German tank shipping and a Dutch claim to 80 tank ships that were built in the Netherlands for German companies during the war. However, as the Dutch-German negotiations with regard to Rhine shipping generally moved into deadlock, the inland tank ship owners made progress and reached an agreement on 14 December 1950.[590] The agreement stipulated that the Dutch and German inland tank fleets could freely participate in domestic transport. In return, the Dutch gave up their claim to the 80 German inland tankers mentioned above.[591] The accord on Rhine tank shipping reflected the highly concentrated nature of the inland tank shipping business. The ability of Dutch tank ship owners to coordinate their activities allowed them to close an agreement with their German counterparts. However, for the other categories of Rhine shipping (dry bulk and general cargo), a Dutch-German accord was not concluded until 1956.[592]

Although the dropping of the claim to the 80 tank ships by the Dutch sealed the deal, the agreement probably also arose from necessity. The European refinery expansion program as part of the Marshall Plan provided for the scheduled expansion of West German refinery capacity from 0.86 to 5.3 million tons per annum between 1948 and 1953.[593] At least 1.5 million tons of this would take place in the Rhine-Ruhr region, considerably increasing the demand for intra-German tanker transport on the Rhine. As a result, between 1949 and 1953, the volume of the intra-German transport of oil products grew annually by 29 per cent from 1 to 2.6 million tons. Over the same period, the total capacity of the German inland tanker fleet increased by just 9 per cent annually, from 154,000 to 218,000 tons.[594] Although it is hard to say much about the loading rate of the German inland tanker fleet based on these data, it is quite plausible to conclude that the discrepancy between the growth of the German fleet and the transported volumes allowed for the participation of foreign fleets in intra-German transport. Moreover, in the early 1950s, the German inland tank fleet still consisted predominantly of barges; motor tankers made up just 38 per cent of the

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[589] VOA, 1260/240, letter from Van Ommeren to the Rotterdam Chamber of Commerce, 7 September 1949.
[590] VOA, 1260/240, minutes regarding Rhine shipping as part of the Dutch-German trade negotiations, 19 May 1950.
[591] VOA, 1260/260, letter from C. Matthijssen (Van Ommeren) to the Directorate-general of Shipping of the Dutch Ministry of Transport, 29 Maart 1951.
[592] Lak, *'Because we need them…'*, 186.
[593] VOA, 1260/240, memo from Van Ommeren Hamburg, 'Durchsatz der Oelraffinerien', 10 December 1949. The estimate was incomplete, because it did not include two refineries in Gelsenkirchen with a combined capacity of 1 million tons.
[594] Statistisches Bundesamt, *Die Binnenschiffahrt im Jahre 1949, 1950, 1952 and 1953* (Köln, 1950, 1951, 1953, 1954). Own calculations.

fleet.[595] As towed tank barges had a much lower transfer capacity than motor tankers, the Dutch inland tanker fleet, with its higher share of motor tankers, could deliver higher a turnaround.[596] As a consequence of import liberalisation in 1949 and the freeing up of intra-German transport in 1951, West Germany again became the most important market for Van Ommeren. Indeed, by 1959, 50 per cent of the total volumes transported by the firm were destined for West Germany and 17 per cent consisted of intra-German transport (Figure 7-6).

The explosive growth in the demand for oil in Western Europe in the late 1950s and the 1960s resulted in new refineries in the Rhine-Ruhr area in the period 1955-1960, followed by refineries in Strasbourg, Karlsruhe, Western Switzerland and Bavaria in the 1960s.[597] Imports via the Rhine dropped from a high point of 10 million tons in 1958 to 6.5 million tons in 1961, only to reach the 1958 level again in 1970.[598] Van Ommeren's transport pattern changed radically as a result. Inland refineries altered transport patterns to the benefit of road tank haulage and to the detriment of combined traffic, i.e. the combination of barge and rail traffic to supply clients. Around 1955, Germany disposed of an intricate structure of tank depots, which were typically supplied from coastal refineries (Hamburg) by barge or rail or a combination of the two. Clients were then supplied from these depots. By 1968, they were more often supplied directly from inland refineries by road tank cars. The intricate pattern of the placement of tank depots was replaced by a smaller number of large tank depots located in areas that could not be served directly by road tank cars. In 1964, these transported more than three times the volume moved by inland tank barges, and five times the amounts transported by rail tank cars.[599]

This structural change in the transportation pattern occurred particularly after the construction of refineries in Southwestern and Southern Germany in the early and mid-1960s. The average transport performance per unit (expressed in tons per kilometre) increased for road tank cars, while it decreased for tank barges and rail tank cars.[600] A shortening of the average distance per shipment was the primary cause, and this applied to all transport modes. For road tank cars, however, the growing volumes caused the total transport performance to rise along with the profitability of the road tank haulage sector. On the other hand, the declining transport performance of inland

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595 A. Kunz, *Statistik der Binnenschiffahrt in Deutschland 1835-1989* (1999 [2005]) GESIS Köln, Deutschland ZA8157 Datenfile Version 1.0.0, accessed 30 July 2013. Own calculations.
596 Boele and Van de Laar, *Geschiedenis Koninklijke Van Ommeren*, 62; Centrale Bond van Werknemers in het Transportbedrijf, *De positive van de Nederlandse Rijnvaart in internationaal verband* (Rotterdam 1951) 5.
597 Waller and Swain, 'Changing patterns of oil transportation', 2, 143-156.
598 VOA, 1260/87, quarterly transport statistics, 1947-1975. Own calculations.
599 O. Schneider, 'Die Auswirkungen des Strukturwandels in der Mineralölindustrie auf die Verkehrsträger und Verkehrsmittel in der Bundesrepublik', *Erdöl und Kohle* 19 (1966) 1, 58-60.
600 Seidenfuss, *Energie und Verkehr*, 168-175.

tank barges and rail tank cars led to a fall in their respective profitability and increased the competitive pressure from road tank cars on inland navigation and rail transport.[601]

Van Ommeren's transport performance changed from a predominantly cross-border pattern – shipments from Rotterdam to West Germany comprised 54 per cent of the company's total transport in 1958 – to intra-German transport. Then, between 1959 and 1961, the share of intra-German transport rose from 17 to 37 per cent (Figure 7-6), and from then on remained more important than cross-border shipments to West Germany. This shift shortened the average voyage performed by inland tanker fleets, which in turn led to a falling average ton-kilometre performance. As a result, Van Ommeren's profit margins declined. This was particularly problematic for Royal Dutch Shell's captive fleet on the Rhine, which was operated and co-owned by Van Ommeren.[602]

A further complicating factor that reduced the opportunities for the profitable exploitation of the captive fleet was the construction of the Rhine-Main pipeline system between 1965 and 1968. This threatened the captive fleet in two ways. Firstly, because a pipeline operates most efficiently at (near) full capacity, the shipments sent through it in this period consisted of regular and frequent volumes to fixed destinations. Secondly, the pipeline replaced barges on the long-haul trips between the Cologne area and Frankfurt and Ludwigshafen, as well as between Rotterdam and German destinations. The Rhine-Main pipeline therefore caused the transport of the captive fleet to become shorter and less regular, which increased the costs per voyage and reduced its profit margins.[603] Moreover, as a result of the pipeline, Deutsche Shell's demand for inland tank shipping transport became volatile. Regular batches that were hitherto reserved for the captive fleet were shifted to the pipeline, leading to spikes in demand. This required a level of flexibility that was not present in the fleet. As a result, Deutsche Shell, which was its most important client, found its rates to be too high. Accordingly, by the early 1970s, the fleet was no longer useful to the Shell group,[604] and was liquidated in 1976.[605] The fate of the captive fleet reflected the transformation of the way in which Royal Dutch Shell organised its transportation of oil in the Rhine basin, replacing an inland tanker fleet with a pipeline for long haul and cross-border shipments, leaving local distribution at the discretion of local subsidiaries.

The fate of non-captive fleets was not as dramatic, but in the longer term was no less problematic. Between 1961 and 1973, the volume of oil product flows over the

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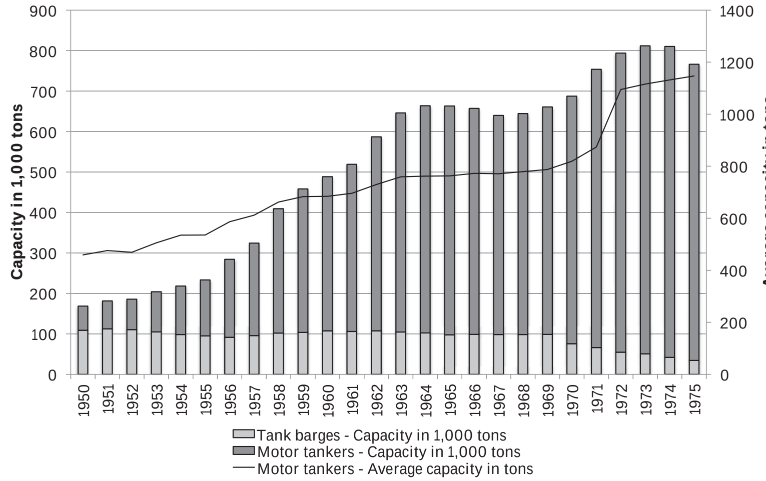
601 Schneider, 'Die Auswirkungen des Strukturwandels', 59.
602 VOA, 1260/85, minutes of the Supervisory Board of INTERNATIONALE, 1967-1969.
603 VOA, 1260/85, minutes of the Supervisory Board of INTERNATIONALE, 1967-1969.
604 VOA 1260/239, internal memo from the director of inland tank shipping Van Ommeren to RvB Van Ommeren, 22 August 1972, 1-3.
605 VOA 1260/239, internal memo on the Van Ommeren-Shell negotiations in 1973, 10 May 1973, 2-3.

Rhine between Rotterdam and Germany increased almost three-fold in response to the growth of oil product imports coming into the country. Although Van Ommeren and most other inland tank ship owners profited from the rise in German imports, inland tanker fleets in general experienced declining profit margins due to, for instance, shorter voyages and rising labour costs, which the ship owners sought to offset by modernising and rationalising their fleets.[606]

Figure 7-7. The German inland tanker fleet, 1950-1975



Source: A. Kunz, *Statistik der Binnenschiffahrt in Deutschland 1835-1989* (1999 [2005]). GESIS Köln, Deutschland ZA8157 Datenfile Version 1.0.0, accessed 30 July 2013. Own calculations.

Figure 7-7 shows the capacity of the German inland tanker fleet between 1950 and 1975. The modernisation and expansion of the fleet occurred in two stages. During the first period, between 1955 and 1963, the German tanker fleet expanded its capacity from around 200,000 tons to 650,000 tons. The fleet was also modernised with the addition of motor tankers of increasing sizes; the average capacity of the motor tankers rose between 1952 and 1963 from 500 tons to little under 800 tons. By 1963, when the refineries along the Rhine (Ruhr area, Cologne, Frankfurt, Mannheim, Speyer, Woerth, Karlsruhe and Strasbourg) were mostly operational, fleet expansion halted. Moreover, internal German voyages generally shortened, and imports from Rotterdam, Amsterdam and Antwerp plateaued. However, the growth of oil product imports in the late 1960s drove a second period of expansion and modernisation that lasted until 1975. The total capacity of the fleet increased from 650,000 tons in 1968 to a little over 800,000 tons in 1974. With the number of motor tankers declining from 702 in 1968 to 638 in 1975, their average size nevertheless

[606] Boele and Van de Laar, *Geschiedenis Koninklijke Van Ommeren*, 81.

increased sharply from 800 tons to a little less than 1,200 tons.[607] This period of expansion was generally experienced in all Western European countries.[608]

However, it is not right to say that the inland tank shipping sector enjoyed a sustained period of growth. Notwithstanding the expansion and modernisation of the early 1970s, it experienced decline and overcapacity in the wake of the first oil crisis. The major investments made by ship owners in expanding and modernising their fleets in response to the increase in transport demand in the late 1960s, led to overcapacity and declining freight rates.[609] Indeed, on average, spot freight rates between Rotterdam and four major Rhine ports (Duisburg, Cologne, Karlsruhe and Basel) declined by 34 per cent between 1972 and 1975, which rendered the operations of many Dutch ship owners unprofitable. Although long-term contracts between ship owners and cargo owners probably experienced more stable freight rates, overcapacity was calculated at 20 to 25 per cent in 1975 for the Dutch inland tank fleet.[610]

7.5 The Rotterdam-Antwerp pipeline, 1967-1969

Europoort was not only instrumental in attracting additional oil flows destined for the German hinterland. By the mid-1960s, the continuously growing scale of oil transportation became a problem for the Port of Antwerp and the refineries located there. The Scheldt, which was the waterway connecting the Antwerp port to the sea, allowed access to tankers up to 70,000 tons. However, in the mid-1960s, tankers of 200,000 tons were rolling off the blocks. The economies achieved from shipping crude oil in such vessels were substantial, but would, given the limited depth of the Scheldt, accrue exclusively to Rotterdam refineries and thus the Rotterdam petrochemical cluster. It was therefore unsurprising that, in 1967, two major Antwerp refineries took the initiative of building a pipeline between Rotterdam-Europoort and Antwerp. Their combined annual intake of crude oil was substantial at 19 million tons. Moreover, with such quantities, it was cheaper to divert the crude oil to Rotterdam and receive it through a 100-kilometre pipeline rather than continuing to ship it to Antwerp, even though the construction of a pipeline was a substantial investment. On 25 July 1967, Esso Netherlands, representing Petrofina, BP, Chevron and Esso Belgium, applied to the Dutch Ministry of Economic Affairs for a concession to construct a 34-inch pipeline.[611] The pipeline's maximum capacity was projected to be

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[607] A. Kunz, *Statistik der Binnenschiffahrt in Deutschland 1835-1989* (1999 [2005]). GESIS Köln, Deutschland ZA8157 Datenfile Version 1.0.0, Table A 2.1., accessed 30 July 2013.

[608] Economisch Bureau voor het Weg- en Watervervoer, *Een structuurschets van de Nederlandse binnentankvaart* (Rijswijk 1976) 13.

[609] I. Heidbrink, *Deutsche Binnentankschiffahrt, 1887-1994* (Hamburg 2000) 100-101.

[610] Economisch Bureau voor het Weg- en Watervervoer, *Een structuurschets*, 14-17.

[611] NL-HaNA, EZ/Directie Wetgeving en andere Juridische Aangelegenheden, toegangsnummr 2.06.125, inventarisnummer 17, letter from Esso Nederland NV to Minister van Economische Zaken

28 million tons, which could later be upgraded to 33 million tons, as other planned refineries would connect to it in the future. The consortium requested a concession not only for the transportation of crude oil, but also for oil products and petrochemical feedstock.

For the Port of Rotterdam, the pipeline would raise substantial extra revenues from docking tankers and additional land leases, as the interested companies needed to expand their terminals at Europoort to receive the oil. However, the plan was controversial. Although the pipeline would be beneficial to the long-term development of the petrochemical cluster of Antwerp's port, Belgian shipping interests were not keen to see the pipeline materialising, instead favouring the expansion of the Port of Zeebrugge for economic and strategic reasons.[612] Coverage in the Belgian press reflected a strong anti-Rotterdam sentiment. Although the fear in Belgium of becoming increasingly dependent on the Dutch was unanimous, Antwerp steered a different course from other Flemish ports.

Antwerp City Council favoured the option of diverting the crude oil in 300,000 ton tankers via Brest, where it would be transhipped into 80,000 ton tankers for onwards transportation to Antwerp. In doing so, not only would the Antwerp port retain income from docking and towage services, but it was also reportedly cheaper than transporting the crude oil via Rotterdam by pipeline.[613] Moreover, Antwerp had no appetite for plans that would only strengthen the competition it faced within Belgium, instead preferring to divert oil flows to French ports before helping domestic rivals.[614]

The calls to find an alternative to the Rotterdam-Antwerp pipeline found fertile ground with the Belgian government, which formed a 'pipeline committee' in October 1967 to study the available options. The committee consisted of the ministers of economic affairs, public works and transportation, who were complemented by representatives of the initiators of the Rotterdam-Antwerp pipeline. The committee studied alternatives ranging from pipeline connections from other Belgian ports to transhipment options via French ports such as Le Havre, Brest and Dunkirk. Le Havre in particular received considerable attention, because at the time it was developing plans to make the port accessible to oil tankers of 200,000 tons and above.[615] It was thus developing into Rotterdam's main competitor as Western Europe's largest oil port, especially as a hub for the transhipment of crude oil flows to

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(Foreign Affairs), 25 July 1967.
[612] 'Olie', *Limburgsch Dagblad*, 12 July 1967, 2.
[613] 'Havens', *Limburgsch Dagblad*, 5 August 1967, 2.
[614] NL-HaNA, Min BuZa/Code-Archief 1965-1974, 2.05.113, inv.nr. 5178, memo of the Directorate Europe of the Ministry of Foreign Affairs to the Minister of Foreign Affairs, 'Belgische havenplannen bij Zeebrugge, 11 July 1969.
[615] 'Pijpleiding', *Limburgsch Dagblad*, 27 October 1967, 2.

Western Europe.[616] In 1970, a daring plan for a crude oil pipeline between Le Havre, the Lorraine area and the Rhine-Ruhr region was contemplated with a staggering capacity of 50 million tons annually.[617]

Although the plan for a Le Havre pipeline to the Rhine-Ruhr area never materialised, it demonstrated that Rotterdam was experiencing competition with respect to its Rhine-Ruhr hinterland, at least in theory. Between 1970 and 1976, Le Havre expanded its port to receive oil tankers of 500,000 tons, and had the goal of becoming Rotterdam's primary competitor for supplying oil to West Germany. The pipeline plan resurfaced several times during the early 1970s.[618] A possible background to this could also have been the development of plans for French-German cooperation in the oil and petrochemical industry in which Compagnie Francaise de Petrole (CFP) and coal mining firms with interests in the oil and petrochemical sector in the Ruhr area participated.[619]

Although the initiators of the Rotterdam-Antwerp pipeline plan had the aim of finishing the construction of the pipe by 1969, by mid-1968 a decision had still not been made by either the Dutch or Belgian governments about granting a concession to build the pipeline. While French ports were initially favoured over Rotterdam, in the course of 1968 alternatives were narrowed down to Belgian options, such as expanding the Port of Zeebrugge and connecting it by pipeline to Antwerp.[620] However, by mid-1968, the Belgian government was considering granting approval for the Rotterdam-Antwerp pipeline. In July 1968, Antwerp City Council acknowledged that, contrary to its earlier standpoint, a pipeline from Rotterdam would be the most economic solution. However, to make up for the loss of port revenues, the council demanded a tax on the oil to be transported by the pipeline.[621] Agreeing to the plan, but taxing its operations, showed that the city was clearly struggling to combine its different interests. On the one hand, it wanted to protect Belgian interests in general and the position of Antwerp's port in particular from competition from the Port of Rotterdam. On the other, it wanted to create the best possible environment for the industries located in the port. However, taxing oil imports via the Rotterdam-Antwerp pipeline would be detrimental to the competitive advantage of the Antwerp petrochemical cluster that the pipeline was seeking to create.[622] For Rotterdam, the pipeline would bring in considerable additional revenue, up to 4.5 million guilders in port dues annually. Moreover, the pipeline could provide

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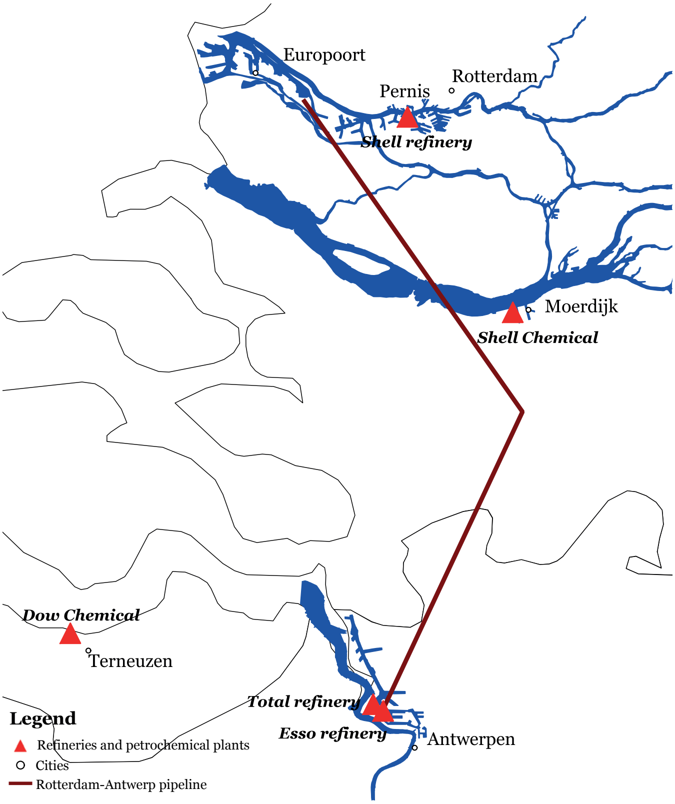
616 De Goey, *Ruimte voor industrie*, 230.
617 'Rohölpipeline Le Havre – Rhein/Ruhrgebiet?', *Erdöl und Kohle* 23 (1970) 11, 772.
618 'Grootse olieplannen – maar daarnaast betekent haven niet veel', *Het Vrije Volk*, 19 February 1974; 'Havenbedrijf Rotterdam heeft oliegeul nodig', *De Waarheid*, 23 August 1974.
619 'Chemie', *Limburgsch Dagblad*, 2 April 1969.
620 'Havens', *Limburgsch Dagblad*, 9 July 1968, 2.
621 'Pijpleiding naar Rotterdam. Antwerpen accoord', *De Waarheid*, 26 July 1968, 3.
622 'Olie', *Limburgsch Dagblad*, 30 July 1968, 2.

the basis for the development of a refinery in the Dutch province of Zeeland, as well as stimulating petrochemical cluster formation at Terneuzen and Moerdijk (Figure 7-8).[623]

Figure 7-8. The Rotterdam-Antwerp pipeline



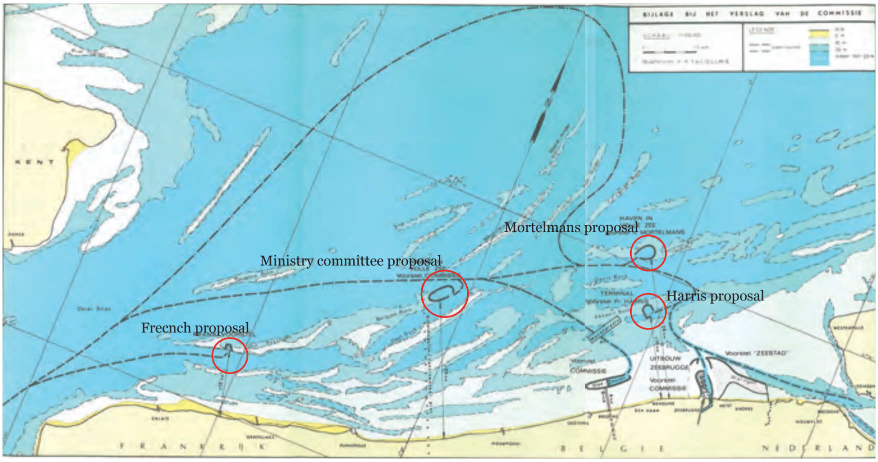
Source: Map created by the author. The pipeline route is an approximation and serves merely to illustrate the argument.

Presumably, the hesitant agreement of Antwerp City Council revived doubts about the pipeline in Brussels. There were also other interests at stake. The question of the crude oil supply boiled down to the development of Belgian ports, growth opportunities for Belgian chemical and related industries and regional economic development in general.[624] In August 1968, the Belgian Federal Ministerial Committee for Economic and Social Coordination announced a new study to compare the costs of obtaining the oil from Rotterdam or via transhipment in Le

[623] Ibid.
[624] J. Mortelmans, 'Het havengebied Antwerpen-Gent-Zeebrugge: groeipool van de delta', *Stero: publicatie voor stedebouw en ruimtelijke ordening* (1969) 3, 34-45, here: 34, 37-38.

Havre.[625] The latter option would retain revenues for Antwerp's port, but the prime minister of Belgium, Gaston Eyskens, openly mused about the advantages of the pipeline for developing Antwerp's industry.[626] Simultaneously, Antwerp City Council published a report by the *Rivierloodsendienst* (river pilotage service), which claimed that transhipping crude oil at a floating dock in the North Sea off the coast of Zeebrugge would be between 15 and 75 centimes per ton cheaper than the pipeline.[627] A deep-sea port in the channel off the coast of Zeebrugge was thus a serious option at the time (Figure 7-9).[628]

Figure 7-9. The proposed deep sea ports off the Belgian coast, 1969.



Source: Ministerie van Openbare Werken, *Verslag van de commissie belast met de studie van een nieuwe haven in volle zee of aan de Belgische kust* (Brussels 1969) 21-22.

Several proposals were made over the course of 1968 and 1969, of which those by engineer J. Mortelmans and US engineering consultant Frederic R. Harris were the most notable. Mortelmans intended the deep-sea port to be part of a wider development plan of the Belgian seaports, which could contribute to strengthening Belgian industries as well as the country's role as a North Sea gateway (*Noordzeepoort*). Mortelmans argued that, with his delta plan, Belgian ports could reclaim the role of port innovator in the Hamburg-Le Havre range.[629] Flemish members of parliament, senators and burgomasters voiced their support for alternatives to the pipeline, in

[625] 'Brussel stelt beslissing over olie pijpleiding naar Antwerpen voorlopig uit', *Limburgsch Dagblad*, 2 August 1968, 5.
[626] 'Olie', *Limburgsch Dagblad*, 3 August 1968, 2.
[627] Ibid.
[628] Mortelmans, 'Het havengebied Antwerpen-Gent-Zeebrugge', 38-41; Ministerie van Openbare Werken, *Verslag van de commissie belast met de studie van een nieuwe haven in volle zee of aan de Belgische kust* (Brussels 1969).
[629] Mortelmans, 'Het havengebied Antwerpen-Gent-Zeebrugge', 34, 44.

particular the expansion of the Port of Zeebrugge, claiming that the construction costs would be too high.[630] The Belgian union for transport labourers also protested against the pipeline plan, because it would divert income from handling the shipments of crude oil away from Antwerp. The union promoted a plan to dig a new canal from Bath to Antwerp to make the port accessible for tankers up to 100,000 tons.[631]

The promoters of a Belgian solution to the pipeline question attracted interest from 'economic circles in the Ruhr area' to study the possibility of constructing a deep-sea port off the coast at Zeebrugge. The foreign parties interested in this plan – later identified as French and German firms represented by banks – were also received by the Belgian ministers of economic affairs and public works.[632] The 'syndicate for a deep sea port' was backed by 'major German interests' and aimed to supply Antwerp, Ghent, Wallonia and the Ruhr area with oil from the new port. According to the syndicate's plan, the port would cost half a billion guilders, could handle 500,000 ton tankers and could be constructed in less than three years. The syndicate had the ear of the Belgian government,[633] and the foreign backing for the Zeebrugge plan seemed to be a serious attempt to shift oil transhipment away from Rotterdam, which could not, at the time, accommodate 500,000 ton tankers. Indeed, if Zeebrugge built docks for super tankers and a pipeline to the Rhine-Ruhr area, it could seriously threaten Rotterdam's competitive position in the Northwest European crude oil supply chain. According to the communist daily *De Waarheid*, the syndicate plan could, on the one hand, be interpreted as a reflection of the wishes of German industrialists, backed by Bonn, to gain a foothold on the North Sea coast. On the other hand, the far-fetched plan could just be a means to pressure the Dutch into granting concessions to the benefit of the Belgian transport sector.

However, the Belgian government postponed making a decision, but made it clear that it was not going to support the Zeebrugge plan financially. It was willing to issue construction permits, but only if the industry itself would furnish the capital. According to the promoters of the Rotterdam-Antwerp plan, there were three groups willing to invest in Zeebrugge. Meanwhile, Antwerp had become more careful. In response to the syndicate plan, the city council stated that it still supported Rotterdam. For Antwerp, everything came down to the cost per ton of transported crude oil. However, if realisation of the Zeebrugge plan would prove to be faster than the Rotterdam pipeline, then Antwerp would choose the former.[634] Moreover, Antwerp

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[630] 'De concurrentie', *Limburgsch Dagblad*, 17 September 1968, 2.
[631] 'Belgische vakbond kritiseert aanleg pijpleiding', *De Waarheid*, 20 September 1968, 3; 'Olie', *Limburgsch Dagblad*, 21 September 1968, 2.
[632] NL-HaNA, Min BuZa/Code-Archief 1965-1974, 2.05.113, inv.nr. 5178, memo of the Directorate Europe of the Ministry of Foreign Affairs to the Minister of Foreign Affairs, 'Belgische havenplannen bij Zeebrugge, 11 July 1969; 'Olie', *Limburgsch Dagblad*, 24 September 1968, 2.
[633] 'Plan voor haveneiland buiten Belgische kust', *De Waarheid*, 26 September 1968, 1.
[634] 'Plan voor haveneiland buiten Belgische kust', *De Waarheid*, 26 September 1968, 6.

warned that the city council would only agree to the pipeline if the Dutch concession expressly forbade branch pipelines from being constructed on the Dutch section of the pipe. This was because such branches could benefit firms competing against Antwerp's petrochemical cluster located on the Dutch side of the border, such as Dow Chemical and its major plant complex in Terneuzen, just 50 kilometres west of Antwerp, or Shell Chemical's complex in Moerdijk.[635]

Although the initiators of the Rotterdam-Antwerp plan initially seemed to be amenable to the syndicate's proposal, by early October they went into a full frontal attack. Petrofina publicly announced in a press conference that the Rotterdam-Antwerp consortium was refusing to compromise and demanded that the Rotterdam-Antwerp pipeline should be constructed, irrespective of any of Zeebrugge's alternatives. Petrofina even threatened to cancel its plans for a new petrochemical plant in the Walloon city of Feluy if the Belgian government refused permission for the pipeline. The press conference ended in a violent argument when syndicate members started to interrupt the meeting.[636] According to Petrofina, without the pipeline, the transport costs for a ton of crude oil in Antwerp were 3.30 guilders higher than in Rotterdam; with the pipeline, Antwerp's refineries would pay only 63 cents more.[637] Esso Belgium also announced its commitment to Rotterdam, because of its existing transhipment facilities in that port.[638]

Finally, in October 1968, the Belgian government announced its conditional agreement to the construction of the Rotterdam-Antwerp pipeline. The pipeline companies were expected to agree to continue crude oil shipments to Antwerp to the tune of 9.5 million tons per year for five years. Moreover, the pipeline could only be used to supply the two refineries in Belgium.[639] The news of the Belgian conditions caused a ripple in the Netherlands, especially in Zeeland. Dutch senator M.C. Verburg, who was originally from Zeeland and was committed to its industrial development, questioned foreign affairs minister Joseph Luns about the news, referring to the potential positive effect of the pipeline for the chemical sector in the Zeeland region. If the Belgian conditions were indeed as the press reported them to be, they would be detrimental to the industrial development of Zeeland. The provincial government of Zeeland petitioned the Ministry of Housing and Planning, pointing out that excellent industrial locations such as Flushing and Terneuzen could benefit from the new pipeline if branch lines were allowed. Both Verburg and the

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[635] 'Olieconcerns willen spoed met pijpleiding', *De Waarheid*, 9 October 1968, 2; B. Wubs, 'U.S. multinationals in the Netherlands: The cases of IBM, Dow Chemical and Sara Lee', in: H. Krabbendam, C.A. van Minnen and G. Scott-Smith, *Four centuries of Dutch-American relations 1609 - 2009* (Albany NY 2009) 785-797, here: 791
[636] 'Conflict om kunsthaven Zeebrugge', *De Waarheid*, 3 October 1968, 1.
[637] 'Olie', *Limburgsch Dagblad*, 3 October 1968, 2.
[638] 'Olie', *Limburgsch Dagblad*, 21 February 1969, 2.
[639] 'Pijpleiding Rotterdam-Antwerpen. Belgische regering accoord', *De Waarheid*, 10 October 1968, 3.

provincial government thus asked the Dutch government to negotiate with the Belgians.[640]

In Belgium, the conditional concession for the pipeline was met with disappointment. Members of all parties in the provincial parliament of West Flanders protested against the concession, and a German representative in Liege stated that German interests continued to look into a pipeline from Zeebrugge via Liege with branches to Hannover and Nürnberg.[641] Among the West German industrial interest in the Zeebrugge plan was Salzgitter, a large German state-owned industrial conglomerate located in Salzgitter near Hannover in the state of Lower Saxony, which committed itself to the syndicate in December 1968. The controversy over the Rotterdam-Antwerp pipeline had turned into a battle over the future of oil transhipment in Northwest Europe;[642] apparently, the conditional approval of the Belgian government for the pipeline was not the end of the Zeebrugge plan. Strikingly, the controversy over the Rotterdam-Antwerp pipeline was more than just an issue of port competition, as industrial interests in the hinterland were involved as well, although it remained unclear what their misgivings about Rotterdam were. One plausible explanation could be that German companies outside the network of the large multinational oil firms (Royal Dutch Shell, BP, Jersey Standard) and their German chemical partners (BASF, Bayer) were looking for an opportunity to establish their own transhipment facilities in, and pipelines from, North Sea ports.

After the consternation in Zeeland about the restrictive conditions under which the Belgian government wanted to issue a concession for the pipeline, the Dutch government negotiated with the Belgians to resolve the issue. It took until June 1969 for the two governments to reach an agreement in principle, and until December 1969 for the exact wording of the concessions to be hammered out. According to an internal memo of the Ministry of Economic Affairs, the Dutch had ensured that the Belgian concession would no longer contain any restrictions on its operations by using the influence of Royal Dutch Shell. Although Royal Dutch was not a partner in the pipeline project, it was planning a refinery in Antwerp that would become operational in 1975. As a consequence, for its crude supply, the refinery would require access to the pipeline. If the Belgians restricted the pipeline concession to just BP, Petrofina and Esso Belgium, it could seriously harm the operations of the future Royal Dutch refinery, which was not in the interests of Antwerp's port.[643] The Belgian government

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640 NL-HaNA, VROM/Centrale Sector, 2.17.03, inv.nr. 2995, letter Provinciaal Bestuur van Zeeland (Provincial Government Zeeland) to Minister van Volkshuisvesting en Ruimtelijke Ordening (Housing and Planning), 28 October 1968; Aanhangsel tot het Verslag van de Handelingen van de Eerste Kamer, Vragen van de heer Verburg n.a.v. persberichten m.b.t. de aanleg van een pijpleiding voor de aanvoer van ruwe olie van Rotterdam naar Antwerpen (ingezonden 11 October 1968), 19.
641 'Olie', *Limburgsch Dagblad*, 12 October 1968, 2.
642 'Duits concern steunt plan voor kunsteiland Zeebrugge', *De Waarheid*, 6 December 1968, 6.
643 NL-HaNA, EZ/Directie Wetgeving en andere Juridische Aangelegenheden, 2.06.125, inv.nr. 17,

was sensitive to this reasoning, not least because the Rotterdam-Antwerp pipeline was promising to be the cheapest way to supply the newly projected refineries in the chemical complex around Feluy, which the impoverished Walloon region dearly needed. By October 1969, the Belgian government was already pressurising the Rotterdam-Antwerp pipeline consortium to allow the new Chevron refinery in Feluy to participate in the project.[644] Finally, the Dutch and Belgian concessions for constructing the pipeline were granted on 19 December 1969.[645]

The controversy over the Rotterdam-Antwerp pipeline caused a shift in competitive relations between Rotterdam and its closest competitor, Antwerp. After a year of strife over the pipeline, Antwerp City Council acknowledged that it might be counterproductive to continue the fierce competition between the city and Rotterdam. The council stated that the industry had already led the way and that both local and national governments should aim for cooperation in the Rhine-Scheldt delta.[646] The Rotterdam-Antwerp pipeline was only one of many examples of how the oil and petrochemical industry was arranging its transportation and production facilities to optimally profit from the fiscal and transport conditions in the delta. Although the pipeline would send Antwerp down the list of the world's largest ports, Rotterdam was unquestionably *the* port for super tankers. Indeed, according to Antwerp City Council, "the Antwerp port [was] attuned to that situation with the construction of the pipeline."[647]

The cases of the expanded Rotterdam-Rhine pipeline, the Rotterdam-Antwerp pipeline and the connection to the Rhine-Main pipeline show that the Port of Rotterdam developed into a hub for crude oil and oil product distribution. This role also became visible in the increasing sea-sea transhipment of crude oil and oil products that occurred in the late 1960s and early 1970s. BP had concluded in 1966 that using Rotterdam as a transhipment hub would be the cheapest way of supplying smaller North Sea, Scandinavian and Baltic ports. In 1969, for instance, Jersey Standard announced that it was no longer going to supply its refineries in Hamburg and Kalundborg (Denmark) directly, but via transhipment from 200,000 ton tankers at Rotterdam. The company planned to tranship around 4 million tons annually.[648] BP's 1966 study and Jersey Standard's announcement were connected to the final port expansion that Rotterdam constructed in the 20th century, the Maasvlakte.

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internal memo from the Afdeling Algemene Olie- en Kolenvraagstukken to Ministry of Economic Affairs, 17 December 1969.
644 'Olie', *Limburgsch Dagblad*, 8 October 1969, 13.
645 NL-HaNA, VROM/Centrale Sector, 2.17.03, inv.nr. 2995, Koninklijk besluit ter verlening van een concessie aan Rotterdam-Antwerpen Pijpleiding (Nederland) NV i.o., 19 December 1969.
646 'Zonder samenwerking Gouden Delta klatergoud', *Limburgsch Dagblad*, 6 December 1968, 2.
647 Ibid.
648 'Olie', *Limburgsch Dagblad*, 26 June 1969, 13; 'Vanaf volgend jaar Rotterdam ook grootste doorvoerhaven voor olie', *De Waarheid*, 20 November 1969, 2.

Europoort, which was the expansion that was planned in the wake of the 1955-56 pipeline episode, materialised between 1958 and 1963. The new port area soon filled with industry and the Port Authority started to develop plans for further expansion in the early 1960s. It was clear that maritime ships would continue to become larger and that Rotterdam needed to expand further westwards to maintain accessibility for the world's largest ships. Maasvlakte I was constructed between 1965 and 1971.[649] After various attempts to establish a steel plant there faltered, the area mainly attracted transhipment activities, most notably for containers, ores, coal and oil. Elaborating on BP's 1966 study to use Rotterdam as a crude oil transhipment hub, Royal Dutch Shell, Jersey Standard, BP and two other companies participated in the construction of the Maasvlakte Olie Terminal, which was the world's largest crude oil terminal and started operations in 1974. The consecutive expansions of Europoort and Maasvlakte thus turned Rotterdam into one of Europe's largest distribution hubs for crude oil and oil products.

7.6 Conclusion

This chapter questioned the 1955-60 consequences of the adaptation of the port and hinterland infrastructure for the 1960s and early 1970s. The expansion of the Rotterdam-Rhine pipeline, and the construction of the Rotterdam-Antwerp pipeline, showed how and why the increasing scale of transport concentrated oil flows in a small number of ports, creating intense competition between them. The consecutive expansions of the Port of Rotterdam in the 1960s and early 1970s allowed the port to keep pace with the growth of crude oil tankers, attracting transit flows and allowing a cost effective supply to the refineries in the port. The scale increases of the port's operations – larger docks, longer jetties and deeper access channels – not only attracted more oil flows to the port, but also allowed it to strengthen its connections to the Rhine-Ruhr hinterland and to capture new hinterlands.

The expansion of the Rotterdam-Rhine pipeline provided the opportunity to link Rotterdam to the Rhine-Main pipeline. The latter was designed by Deutsche Shell in 1965 to facilitate cost effective transport from Cologne to Frankfurt and Ludwigshafen. The link to Rotterdam, however, proved to be more important, as it provided the opportunity to complement imbalances on the German oil market. The connection provided three of Rotterdam's large export-oriented refineries (Royal Dutch Shell, BP and Caltex) with an outlet to the German market. The tariff setting of the Rhine-Main pipeline aimed to undercut inland shipping freight rates and gave its owners a competitive advantage in terms of moving their products. Third party access was significantly restricted. Common carrier or not, the pipeline did provide

[649] De Goey, *Ruimte voor industrie*, 122, 132.

Rotterdam with a captive hinterland for oil products stretching beyond the Rhine-Ruhr area all the way to Frankfurt and Ludwigshafen. The extended hinterland reach that the Rotterdam port thereby enjoyed was a path-dependent effect of the manner in which the crude oil pipeline system in Western Europe had materialised in the late 1950s. Instead of an integrated trans-European system, West Germany was divided into a northern and a southern supply arrangement. Given the cost advantages of large tankers being able to dock in Rotterdam, the port extended its captive hinterland for crude oil supplies into the Rhine-Main area. When the Rotterdam-Rhine pipeline was expanded by constructing a new one, the old pipe provided an opportunity to capture the Rhine-Main hinterland for the supply of oil products.

The expansion of the port also allowed Rotterdam to function increasingly as a transit oil port, not just for the Rhine-Ruhr area, but also for other North Sea and Baltic Sea destinations. The Rotterdam-Antwerp pipeline was a case in point, although the plan met with fierce political opposition in Belgium. The Rotterdam-Antwerp case had some interesting parallels with the Rotterdam-Wilhelmshaven contest, particularly with regard to how the benefits of a pipeline were conceptualised. Apart from a certain competitive animosity between Antwerp and Rotterdam, the issue facing the Belgium government was whether to choose between sacrificing Antwerp's position for the benefit of Belgian industry or try to protect Antwerp and the Belgian port and shipping interests. The German government faced a similar dilemma with respect to Wilhelmshaven, although the German Ministry of Economic Affairs shortly after the 1955-56 epidose noted that the nationality of crude oil pipelines was of little interest, as long as they provided the cheapest possible energy to German industry. From the perspective of the national economies of surrounding countries, Rotterdam's expansion seemed to be worrisome. However, from the perspective of the oil companies, it was embraced as it reduced the cost of supplying oil to refineries and markets in Northwest Europe. Key to the falling cost of transportation and transhipment was the interplay between larger tankers and a deeper port, as became clear from the pipeline studies in the 1960s. Once tankers of 100,000 tons and larger became active, Rotterdam's oil port had a secure hold over a hinterland access network for oil that stretched right up to Frankfurt and Ludwigshafen.

Meanwhile, Rhine tank shipping was strongly affected by the construction of refineries and pipelines in the hinterland. In general, the function of the Dutch Rhine tank fleet, at least in the case of Van Ommeren, changed from predominantly serving demand for cross-border flows between Rotterdam and West Germany to participating in intra-German transport. At first, during the 1950s, Van Ommeren profited from rising West German oil imports. Although West German restrictions on cabotage hindered Dutch inland tank ship owners until 1951, the sharp rise in West German refinery output required the services of the Dutch Rhine tank fleet, and the issue of cabotage was settled that year. However, with the construction of refineries along the German Rhine, which replaced oil product imports, the pattern of oil distribution in West Germany was fundamentally altered. Moreover, the construction of crude oil pipelines diverted all crude oil shipments from inland tank shipping to pipelines. As a result, intra-German transport became the most important market for Van Ommeren. As the number of inland refineries in West Germany increased, serving al of Germany's major markets, there were fewer long distance hauls, as the distance between refineries and tank depots in final markets fell. The resulting decrease in the ton-kilometre performance of inland tank fleets thus increased costs and reduced profitability.

The construction of the Rhine-Main pipeline further exacerbated the situation, although rising West German imports in the late 1960s off-set the declining margins to some extent. The effect of the pipeline was particularly detrimental to the performance of Royal Dutch Shell's captive fleet on the Rhine, which became obsolete and was subsequently liquidated in 1976. After a period of stagnating growth with respect to the inland tanker fleets, the sector invested heavily again, buoyed by rising imports in the late 1960s. However, the up-cycle was short-lived, as the demand for oil plummeted after the 1973-4 oil crisis, leading to overcapacity and crashing freight rates. The golden years of Dutch inland tank shipping had been the 1950s when, after 1949 and 1951, the West German market opened up again and growing oil imports relied on Dutch Rhine tank shipping. However, after the emergence of inland refineries and pipelines, the sector changed fundamentally and only experienced a short-lived period of 1950s-type growth in the late 1960s and early 1970s.

Chapter 8 Industrialisation and the rise of Rotterdam's oil port

8.1 Introduction

The transition of the hinterland and the subsequent adaptation of both its infrastructure and the Port of Rotterdam strongly affected the composition of the hinterland of the oil port. A hinterland is constituted of the actual cargo flows through a port. Cargo flows are the result of firms organising their transport based on their demand for it and the costs associated with its supply, i.e. the quality and capacity of the infrastructure. The transition from coal to oil established an oil and petrochemical cluster in both the Port of Rotterdam and its Rhine-Ruhr hinterland, creating new demand for transportation. Port expansion and investment in pipelines were undertaken to ensure that the transport network could meet the new demand. These investments in turn changed the organisation of transport flows to and from the port and its hinterland and thus presumably also altered the relationship between the two. The question, however, remains as to what extent these changes actually affected the hinterland relations of Rotterdam's port between 1945 and 1975.

This chapter examines how and why these scale shifts affected the cargo flows through the Rotterdam port. It also addresses the issue of what transport modalities were used, how this changed and why. The first section reviews the current debate on the post-war oil boom and its impact on the relationship between the Rotterdam oil port and the German hinterland. The second section discusses how the cargo flows in the port developed between 1946 and 1975. Then, the third section looks at the position of the port in Northwest Europe, while the fourth deals with how scale shifts affected the origins and destinations of cargo flows through the port.

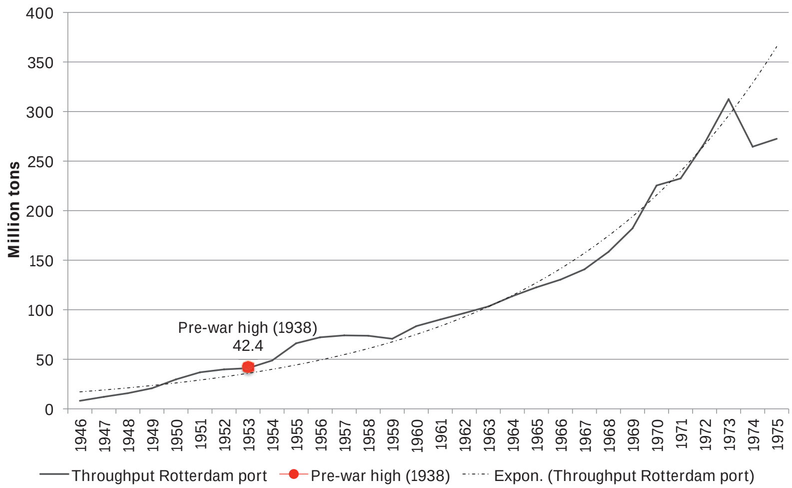
8.2 Port industrialisation and the hinterland: an ongoing debate

Before 1940, the Port of Rotterdam primarily performed a transit function for the Ruhr area, which made it extremely sensitive to external shocks. After two world wars and a series of major economic crises, Rotterdam City Council sought to change the dominance of transit traffic in the port's economy and adopted a policy of port industrialisation. By attracting (heavy) industry, the council hoped to stabilise the port economy and make it less dependent on transit traffic to and from its German hinterland.[650] Port industrialisation gained momentum in the late 1940s with the first major port expansion project, the Botlek Plan of 1947. As the industrialisation effort coincided with the emerging transition from coal to mineral oil, it was particularly successful in the oil and petrochemical sector. The expanding scale of the Port of Rotterdam becomes clear in Figure 8-1. After a hesitant start during the late 1940s, pre-war peak levels were only achieved in 1953, eight years after the end of the war.

[650] Van Walsum, *Rotterdam Europoort*, 12; De Goey, *Ruimte voor industrie*, 46.

The slow start was entirely due to the problematic economic reconstruction of West Germany under the Allied occupation, which obstructed cross-border trade and transport. Indeed, growth only really took off in the early 1950s.[651]

Figure 8-1. The total cargo flow through the Port of Rotterdam, 1946-1975



Source: *Database on cargo flows in the port of Rotterdam, 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, accessed 7 March 2014.

An economic slowdown between 1957 and 1959 depressed growth somewhat, but from 1960 onwards cargo throughput in the port grew exponentially, only to come to an abrupt halt after the first oil crisis of 1973. By 1962, Rotterdam had become the largest port in the world.[652] The explanations for this unprecedented expansion include port industrialisation, the transition from coal to oil and the creation of the European Common Market from 1957 onwards.[653] The extent to which the growth of the Port of Rotterdam influenced its relationship with its hinterland, in particular the Rhine-Ruhr region, is varied. While economic ties between the Rotterdam port and the German hinterland were evident in the age of coal, the relationship became much less clear in the age of oil. It seems obvious that port industrialisation, energy transition and the subsequent crisis in Ruhr coal mining would alter the economic relations between the port and the Rhine-Ruhr hinterland. However, the literature thus far has largely neglected the question of how important the German hinterland was for the development of Rotterdam's oil port. Renate Laspeyres touched upon the issue, but focused in particular on the steel industry and did not look beyond the Ruhr area.

[651] Lak, *'Because we need them…'*, 224-227.
[652] De Goey, *Ruimte voor industrie*, 255.
[653] Ibid., 27.

Other authors have also analysed the impact of industrialisation, the role of the Port Authority or the effects of port competition on the development of the Port of Rotterdam.[654]

The consensus seems to be that the combined effects of scale shifts in transport and industry, leading to port industrialisation, energy transition and the growing scale and volume of maritime shipping, have made Rotterdam's port less dependent on its Rhine-Ruhr hinterland than in the age of coal. Ferry de Goey and Hugo van Driel who, in 2009, attempted to estimate the impact of port industrialisation on port-hinterland relations, delivered the most notable contribution on this point.[655] To this end, they used a comprehensive database of all of the international cargo flows in the Port of Rotterdam.[656] De Goey and Van Driel defined the port-hinterland relationship as the share of transit goods in the total cargo flows through the port. As the oil and petrochemical cluster in the port consumed a large share of the growing volumes of incoming crude oil, the overall share of transit goods in the total commodity flows fell. Figure 8-2 illustrates their argument. Between the mid-1920s and the late 1930s, around 70 per cent of all seaborne cargo entering the Rotterdam port was destined for the (German) hinterland. After 1945, and particularly from 1949 onwards, as the port-hinterland relationship recovered from war and occupation, the ratio of seaborne incoming to landside outgoing cargo settled at around 50 per cent. The dotted line represents the same ratio excluding oil, which shows that by omitting the oil and petrochemical cluster the port would be more dependent on transit traffic. From this, De Goey and Van Driel concluded that the growth of the oil and petrochemical cluster in the port had reduced its dependence on transit flows to the (German) hinterland, which they named the oil effect.[657]

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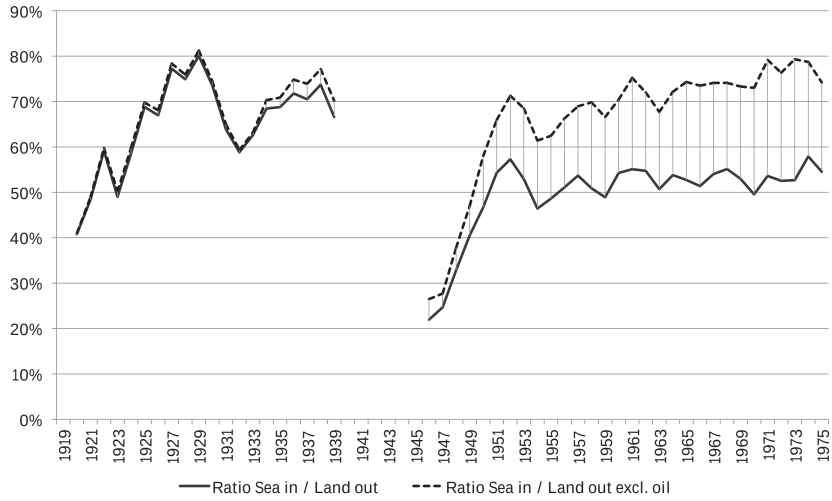
[654] Laspeyres, *Rotterdam und das Ruhrgebiet*, passim; De Goey, *Ruimte voor industrie*, passim; De Goey (ed.), *Comparative Port History of Rotterdam and Antwerp (1880-2000). Competition. Cargo and Costs*, passim; Winkelmans, *De moderne havenindustrialisatie*, passim.
[655] De Goey and Van Driel, 'Rotterdam und das Hinterland', 127-152.
[656] Database *Rotterdam-Antwerp: a century and a half of port competition 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, 13 October 2009.
[657] De Goey and Van Driel, 'Rotterdam und das Hinterland (1920-1995)', 144.

Figure 8-2. The ratio of sea incoming to land outgoing cargo flows in the Port of Rotterdam, 1920-1975



Note: Figure 8-2 differs considerably from the original calculations published by De Goey and Van Driel in 2009, which were derived from missing pipeline data in the original database (see source). De Goey and Van Driel originally reported a decline of the ratio including oil (solid line) to 40 per cent between 1960 and 1970. However, when the pipeline data are added, there is in fact no decline, but a remarkably stable ratio between 50 and 60 per cent between 1950 and 1975.
Source: Database on cargo flows in the Port of Rotterdam, 1880-2000, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, 13 October 2009. Own calculations.

However, this is a rather broad conception of the port-hinterland relationship: it does not look beyond aggregate flows and does not distinguish between the port as a transportation hub and a production location. In particular, the significance of the Rhine-Ruhr hinterland for the oil and petrochemical cluster in the port is rarely studied.

8.3 Changing cargo: the rise of oil and the decline of coal

The huge expansion of the cargo flows in the port was an expression of a number of processes, which can be derived from the cargo flows depicted in Table 8-1. Port industrialisation in particular caused the inflow of seaborne cargo to rise. Growing equally remarkably were seaborne and landside outflows. The latter grew the most, but this is explained mainly by the low levels of trade and transport with the German hinterland in the first five years after the war. Lagging dramatically behind were landside cargo inflows, highlighting the changing economy in the Rhine-Ruhr hinterland.

Table 8-1. Cargo flows through the Port of Rotterdam, 1946-1975

	Million tons				Indices			
	Sea in	Sea out	Land in	Land out	Sea in	Sea out	Land in	Land out
1946-50	55.7	30.7	23.2	20.2	100	100	100	100
1951-55	158.6	73.9	35.3	81.5	285	241	152	403
1956-60	275.2	98.9	35.3	142.8	494	322	152	706
1961-65	400.2	126.1	41.3	213.4	719	411	178	1055
1966-70	629.5	207.6	72.3	329.9	1130	676	312	1631
1971-75	989.7	360.5	81.2	536.6	1777	1175	350	2652

Source: *Database on cargo flows in the port of Rotterdam, 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, accessed 7 March 2014. The full data for the cargo flows are reported in Appendix B: Data Table 0-7. The Port of Rotterdam cargo flows, 1950-1975 (in tons).

The transition from coal to oil had a particularly major impact on the composition of the cargo flows. Table 8-2 presents the make-up of seaborne incoming cargo flows between 1946 and 1975. The largest and fastest growing commodity by far was oil, which increased from 18.3 million tons in 1946-50 to over 652 million tons in 1971-75. Iron ore was the second most important cargo, growing from 5.8 million tons in 1946-50 to over 145 million tons in 1971-75. The foreign coal imports, particularly those of West Germany, were the third largest cargo until 1960, but import restrictions after the 1958 coal crisis and the diversion of the remaining imports to North German sea ports by the West German government reduced the importance of hinterland coal imports for Rotterdam.[658] Chemicals also experienced a sharp growth, particularly after 1965 when the expansion of the petrochemical industry in the port took off. A fourth group of products that remained important throughout the period consisted of agricultural goods and foodstuffs. Table 8-3 presents the landside incoming cargo flows. Although still dominated by coal exports from the Ruhr area, the volumes were a far cry from pre-war levels; Rotterdam received 50 million tons of coal between 1934 and 1938, compared to the post-war high point of 19 million tons in 1951-55.[659]

[658] Horn, *Die Energiepolitik der Bundesregierung*, 244-245.
[659] *Database on cargo flows in the port of Rotterdam, 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, accessed 7 March 2014.

Table 8-2. Seaside incoming cargo flows into the Port of Rotterdam, 1946-1975

	Million tons						Indices					
	1946-50	1951-55	1956-60	1961-65	1966-70	1971-75	1946-50	1951-55	1956-60	1961-65	1966-70	1971-75
Agricultural produce	11.0	21.2	34.0	35.8	36.7	43.5	100	192	308	324	333	394
Foodstuff and fodder	5.5	10.7	17.2	25.8	38.4	53.3	100	196	314	471	703	975
Coal†	7.7	23.4	35.4	20.5	10.7	10.6	100	303	457	265	138	137
Oil††	18.3	61.8	118.4	214.8	367.8	652.5	100	338	647	1174	2010	3566
Ores†††	5.8	28.9	43.2	60.5	104.5	145.8	100	497	743	1040	1797	2506
Iron, steel & metals	1.8	2.3	4.3	5.6	6.6	9.5	100	130	243	317	371	537
Crude minerals*	1.0	2.6	9.8	14.3	25.7	21.0	100	248	941	1373	2469	2016
Fertilizers	2.0	3.2	5.5	8.8	13.9	16.0	100	158	267	431	682	781
Chemicals	1.1	2.7	4.1	8.2	18.4	26.3	100	243	378	754	1680	2405
Other goods**	1.4	1.8	3.5	5.9	6.7	11.2	100	131	248	422	482	806

Source: *Database on cargo flows in the port of Rotterdam, 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, accessed 7 March 2014. †Includes lignite. †† Crude oil and oil products. †††Includes metal waste. *Includes building materials. **Includes vehicles, machinery and other manufactured goods.

Table 8-3. Landside incoming cargo flows into the Port of Rotterdam, 1946-1975

	Million tons						Indices					
	1946-50	1951-55	1956-60	1961-65	1966-70	1971-75	1946-50	1951-55	1956-60	1961-65	1966-70	1971-75
Agricultural produce	1.0	1.1	0.9	1.2	2.3	4.0	100	110	88	115	222	390
Foodstuff and fodder	0.2	0.6	1.1	2.4	3.1	3.9	100	280	518	1093	1421	1773
Coal†	15.1	19.2	11.0	8.6	17.7	18.0	100	127	73	57	118	119
Oil††	0.2	1.3	3.2	4.6	5.3	5.8	100	763	1910	2790	3179	3479
Ores†††	0.8	0.6	0.4	0.2	0.3	0.4	100	75	57	21	34	50
Iron, steel & metals	3.4	3.8	5.8	7.6	10.5	12.8	100	113	170	224	308	376
Crude minerals*	0.7	1.5	1.5	3.8	14.9	10.2	100	221	222	580	2254	1549
Fertilizers	0.5	3.4	5.4	5.1	4.2	2.0	100	695	1102	1047	859	406
Chemicals	0.7	2.1	2.6	4.7	9.6	11.9	100	284	344	632	1287	1604
Other goods**	0.7	1.8	1.6	3.1	4.6	12.3	100	254	235	450	658	1774

Source: *Database on cargo flows in the port of Rotterdam, 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, accessed 7 March 2014. †Includes lignite. †† Crude oil and oil products. †††Includes metal waste. *Includes building materials. **Includes vehicles, machinery and other manufactured goods.

Table 8-4. Landside outgoing cargo flows from the Port of Rotterdam, 1946-1975

	Million tons						Indices					
	1946-50	1951-55	1956-60	1961-65	1966-70	1971-75	1946-50	1951-55	1956-60	1961-65	1966-70	1971-75
Agricultural produce	3.6	9.7	14.3	16.3	17.1	17.2	100	267	392	448	470	471
Foodstuff and fodder	1.9	4.3	7.4	12.3	18.0	27.9	100	222	385	640	935	1449
Coal†	2.6	12.7	22.0	11.3	8.0	9.2	100	497	859	440	313	358
Oil††	4.4	18.0	35.4	79.3	137.5	275.3	100	414	813	1821	3157	6322
Ores†††	5.5	28.7	43.1	60.2	101.8	143.6	100	518	779	1086	1836	2591
Iron, steel & metals	0.4	1.1	2.7	4.5	5.3	8.4	100	294	757	1252	1469	2315
Crude minerals*	0.3	2.0	8.8	12.2	14.4	15.7	100	585	2568	3545	4190	4565
Fertilizers	0.8	2.4	4.6	7.4	10.1	8.5	100	317	601	973	1327	1118
Chemicals	0.6	2.0	2.8	6.2	14.0	21.7	100	367	505	1109	2527	3909
Other goods**	0.2	0.6	1.6	3.7	3.7	9.2	100	298	848	1976	1971	4880

Source: *Database on cargo flows in the port of Rotterdam, 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, accessed 7 March 2014. †Includes lignite. ††Crude oil and oil products. †††Includes metal waste. *Includes building materials. **Includes vehicles, machinery and other manufactured goods.

Table 8-5. Seaside outgoing cargo flows from the Port of Rotterdam, 1946-1975

	Million tons						Indices					
	1946-50	1951-55	1956-60	1961-65	1966-70	1971-75	1946-50	1951-55	1956-60	1961-65	1966-70	1971-75
Agricultural produce	2.6	3.0	3.9	5.1	8.0	12.7	100	114	146	195	304	481
Foodstuff and fodder	1.8	5.4	6.4	8.3	11.3	17.7	100	303	357	466	629	991
Coal†	14.2	23.0	15.6	8.6	17.5	20.3	100	162	110	61	123	143
Oil††	4.6	25.3	49.9	75.1	124.8	242.3	100	556	1094	1648	2738	5313
Ores†††	0.8	0.6	0.4	0.6	3.0	3.3	100	76	42	76	362	396
Iron, steel & metals	3.0	3.4	5.1	6.5	9.2	12.8	100	116	173	219	312	435
Crude minerals*	0.8	1.9	1.8	2.2	2.9	3.6	100	230	209	258	343	429
Fertilizers	1.0	5.3	8.2	7.7	7.2	9.4	100	550	853	806	744	978
Chemicals	0.8	2.6	4.0	7.2	16.9	24.9	100	338	524	947	2224	3269
Other goods**	1.1	3.3	3.8	4.6	6.7	13.5	100	295	337	410	599	1201

Source: *Database on cargo flows in the port of Rotterdam, 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, accessed 7 March 2014. †Includes lignite. ††Crude oil and oil products. †††Includes metal waste. *Includes building materials. **Includes vehicles, machinery and other manufactured goods.

Other important cargo flows originating from the hinterland were iron, steel and metal products, crude minerals and other manufactured goods (vehicles, machinery). Although the inflow of all types of commodity grew over the period, it was the growth of oil and ores that best captured the post-war boom of the Port of Rotterdam. Indeed, the consecutive expansions of the port in search of deeper water and the development of oil and petrochemical activities created Europe's largest bulk port.

This was further accentuated by the landside outgoing cargo flows seen in Table 8-4. Two types of cargo dominated: oil and iron ore. Strikingly, the landside outgoing cargo flows did not reach pre-war levels until well into the 1950s (1955), underscoring the debilitating effect of the war and the subsequent occupation on trade and transport with West Germany. This was particularly apparent in the flows of iron ore, which, in 1960, were still at pre-war levels. Notwithstanding Germany's slow recovery, iron ore remained the most important commodity in hinterland destined cargo flows until 1960. From 1960 onwards, oil became the fastest growing and most important cargo, increasing by 14 per cent annually between 1950 and 1975. A second commodity with striking growth between 1960 and 1975 was chemical products, which grew from 0.6 million tons in 1946-50 to 21.7 million tons in 1971-75. This growth of chemical products emanated from the development of the petrochemical sector in the Rotterdam port. Table 8-4 thus paints a dual picture: on the one hand, the retention of the iron ore transit trade in the Ruhr area and, on the other, the emergence of an oil and petrochemical sector, as reflected by the strong growth of oil and chemical products. The deep-sea docks of Europoort and Maasvlakte still host two giant transhipment terminals for iron ore (among others), *Ertsoverslagbedrijf Europoort BV* (Europoort, established in 1970) and *Europees Massagoed-Overslagbedrijf BV* (Maasvlakte, established in 1974). The dominance of wet and dry bulk activities in the three major post-war port expansion projects (Botlek, Europoort, Maasvlakte) is not easily expressed in an exact metric, but Europoort in particular (constructed between 1958 and 1963) became almost entirely filled with the oil and petrochemical industry. Moreover, with the start of the container era after 1966, plots of land in Europoort and Maasvlakte were also reserved for container terminals. Even today, roughly 50 per cent of the rentable sites in the port are occupied by wet bulk activities.[660]

The seaborne outgoing cargo flows again point to the dominance of oil and petrochemicals, reflecting the transformation of the port between 1946 and 1975 (Table 8-5). Whereas the outbound transit of Ruhr coal (solid mineral fuels) was a primary function of the Rotterdam port in the inter-war years, the post-war period

[660] Port of Rotterdam Authority, 'Port Infrastructure 2013', http://www.portofrotterdam.com/en/Port/port-statistics/Documents/Port%20infrastructure%20and%20equipment.pdf, accessed 14 July 2014; Idem, *Facts and figures Rotterdam energy port and petrochemical cluster* (Rotterdam 2010) 7.

was dominated by the seaborne outflows of oil. While coal was still the largest seaborne outgoing cargo flow between 1946 and 1950, oil took over in an unprecedented fashion thereafter. Indeed, oil and chemicals were the fastest growing commodities after 1950, while coal declined and stagnated, although it remained the third largest cargo flow of the seaborne outflows throughout the period. The transition from coal to oil not only reflects the changing function of the Rotterdam port from transit to industry, but also the changing relationship between port and hinterland. Whereas seaborne outflows were entirely dominated by the transit of Ruhr coal before 1940, the importance of transit flows from the hinterland declined in the post-war period in favour of export and transit flows generated by the port's own oil and petrochemical cluster. Between 1946-50 and 1971-75, the ratio of landside incoming flows to seaborne outgoing flows dropped from 76 per cent to 23 per cent.[661] Accordingly, by the early 1970s, the volume of cargo flows from the hinterland was less than a quarter of the seaborne outgoing flows.

The preceding cursory overview of the development of cargo flows through the Port of Rotterdam between 1946 and 1975 revealed continuities and discontinuities in the function of the port and its relations with the hinterland. Firstly, it was found that the port remained an important transit hub for the iron ore and foodstuff imports of the hinterland. Secondly, the transition from coal to oil clearly added oil and (petro) chemicals to the array of hinterland-bound cargo flows. Thirdly, the 1958 coal crisis had a major impact on the position of coal flows through the port; although still sizable throughout the post-war period, the volume of coal transhipments stagnated. On the one hand, West Germany limited the importation of foreign coal after 1958, while diverting remaining imports to the North German sea ports, further limiting coal imports through the Rotterdam port. On the other hand, the export of Ruhr coal stagnated and declined after 1958, limiting coal exports through the port.[662] Fourthly, the growth of seaborne outgoing cargo flows underscored the implications of the third point: the outbound transit function that the port traditionally performed for its hinterland in the pre-war period declined in favour of an exporting role for the port's own industrial cluster in the post-war period. These major shifts in the composition and direction of the port's cargo flows between 1945 and 1975 point to a substantial transformation in the relations between the port and the hinterland in general, and the German hinterland in particular.

8.4 Rotterdam as a regional transhipment hub for oil

The dramatic shift in the composition of the cargo flows in the Port of Rotterdam

[661] *Database on cargo flows in the port of Rotterdam, 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, accessed 7 March 2014. Own calculations.
[662] Laspeyres, *Rotterdam und das Ruhrgebiet*, 37-38.

was caused by the expansion of the oil and petrochemical industry in both port and hinterland, which in turn changed the demand for transport in the latter. This changing demand led to the adaptation of the transport infrastructure and therefore had a considerable impact on the organisation of cargo flows and the distribution of cargo between the various modes of transport. The modal split of incoming and outgoing cargo flows in the Rotterdam port shows the extent to which the relative importance of the respective modes of transport changed over the period.

Table 8-6. The modal split of incoming cargo flows in the Port of Rotterdam, 1950-75

	Volumes (mln tons)					**Share**				
	1950-55	**1956-60**	**1961-65**	**1966-70**	**1971-75**	**1950-55**	**1956-60**	**1961-65**	**1966-70**	**1971-75**
Total sea	176.1	275.4	392.6	629.6	1,000.5	80%	89%	89%	89%	92%
Total inland navigation	42.8	32.4	41.2	65.6	69.7	19%	10%	9%	9%	6%
Total rail	2.5	2.2	2.7	5.9	5.3	1%	1%	1%	1%	0%
Total road	0.0	0.0	4.1	8.7	11.8	0%	0%	1%	1%	1%

Source: CBS, Statistiek van de Zeevaart (1950-51; 1961-65); CBS, Maandstatistiek van de zeevaart en van het havenverkeer (1952-60); CBS, Statistiek van het internationaal goederenvervoer in de havens van Amsterdam en Rotterdam (1966-75); CBS, Statistiek van de internationale binnenvaart (1950-1975); CBS, Historische reeksen, Historie verkeer en vervoer van 1899, Goederenvervoer met pijpleidingen, http://statline.cbs.nl/StatWeb/selection/?DM=SLNL&PA=37406&VW=T, accessed 12 October 2011. For the complete table, see Appendix B: Data Table 0-7. The Port of Rotterdam cargo flows, 1950-1975 (in tons).

Table 8-7. The modal split of outgoing cargo flows in the Port of Rotterdam, 1950-75

	Volumes (mln tons)					**Share**				
	1950-55	**1956-60**	**1961-65**	**1966-70**	**1971-75**	**1950-55**	**1956-60**	**1961-65**	**1966-70**	**1971-75**
Total sea	86.3	98.9	126.0	190.4	321.0	48%	40%	34%	34%	37%
Total inland navigation	89.9	144.1	193.3	260.3	309.9	50%	58%	52%	47%	36%
Total rail	2.4	3.1	5.6	6.2	6.5	1%	1%	2%	1%	1%
Total road	0.0	0.0	6.0	11.9	19.1	0%	0%	2%	2%	2%
Total pipeline	0.0	2.6	40.7	89.3	201.1	0%	1%	11%	16%	23%

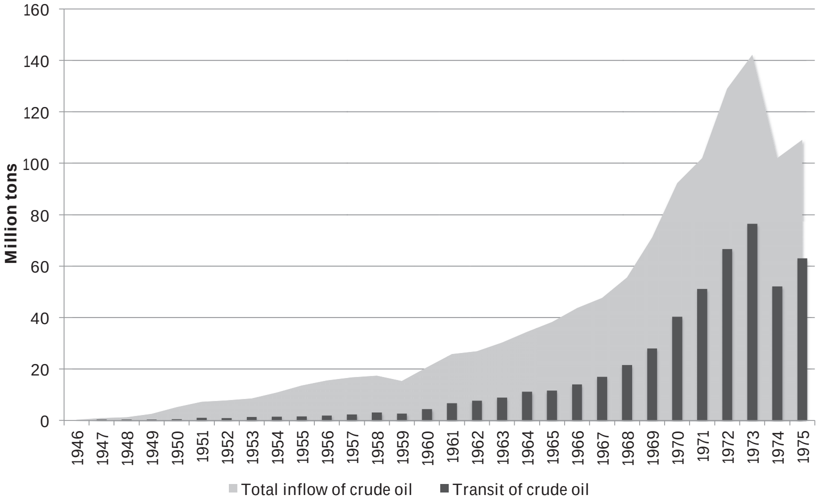
Source: CBS, Statistiek van de Zeevaart (1950-51; 1961-65); CBS, Maandstatistiek van de zeevaart en van het havenverkeer (1952-60); CBS, Statistiek van het internationaal goederenvervoer in de havens van Amsterdam en Rotterdam (1966-75); CBS, Statistiek van de internationale binnenvaart (1950-1975); CBS, Historische reeksen, Historie verkeer en vervoer van 1899, Goederenvervoer met pijpleidingen, http://statline.cbs.nl/StatWeb/selection/?DM=SLNL&PA=37406&VW=T, accessed 12 October 2011. For the complete table, see Appendix B: Data, Table 0-8. The West German oil supply from the Rotterdam oil port, 1950-75 (in tons).

With regard to incoming cargo flows, oil became increasingly dominant, while inflows of coal declined. As a consequence, maritime shipping became even more important than it already was at the start of the period. In 1950-55, 80 per cent of all incoming cargo was shipped by sea, with 19 per cent coming in by inland shipping (Table 8-6). By 1971-75, the share of maritime shipping had increased to 92 per cent, while that of inland shipping had declined to only 6 per cent. Rail and road haulage made up the remaining 2 per cent.

Outgoing cargo flows (Table 8-7) were predominantly shipped by inland shipping in 1950-55 (50 per cent), followed by maritime shipping (48 per cent). Inland shipping remained the most important modality until 1970. During the late 1950s and the 1960s, pipelines became increasingly important (11 per cent in 1961-65 and 16 per cent in 1966-70), primarily at the expense of the share of maritime shipping, which dropped to 30 per cent. However, from 1968 onwards, the Rotterdam port progressively became a regional break bulk hub for oil, while seaborne and landside transit flows of oil increased the shares of maritime shipping and pipelines to 37 and 23 per cent respectively in 1971-75. Meanwhile, the share of inland shipping declined sharply to 36 per cent in the same period.

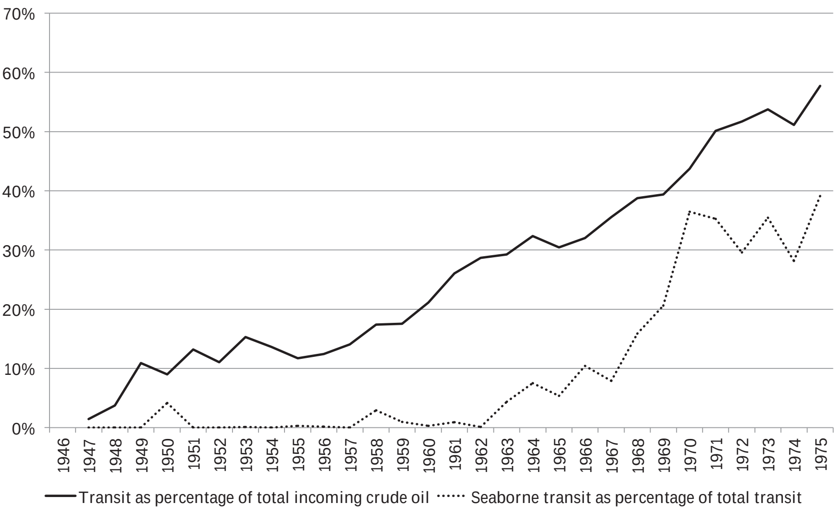
In terms of incoming cargo flows, the increasing size of maritime vessels stimulated the expansion of the Rotterdam port. The docks of Europoort and Maasvlakte not only allowed seaborne incoming cargo flows to grow, but also hosted a number of large storage hubs, in particular for oil, from which onwards transportation to other European ports was arranged. Figure 8-3 shows how both incoming flows and transit flows of crude oil through Rotterdam grew, particularly after 1960. Until 1959, the volumes of incoming crude oil increased gradually, with between 10 and 20 per cent of these being in transit to the hinterland (Figure 8-4). After the construction of Europoort and the opening of new refineries in the early 1960s, the volume of incoming crude oil flows increased, and with that so did the share of crude oil transit flows, which grew from 18 per cent in 1959 to 58 per cent in 1975. Initially, the majority of the transit flows were performed by the Rotterdam-Rhine pipeline. After 1966, crude oil was also increasingly transhipped by maritime shipping, with its share increasing from 10 per cent in 1966 to 39 per cent in 1975.

Figure 8-3.The total incoming and transit flows of crude oil in the Port of Rotterdam, 1946-75



Source: *Database on cargo flows in the port of Rotterdam, 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, accessed 7 March 2014.

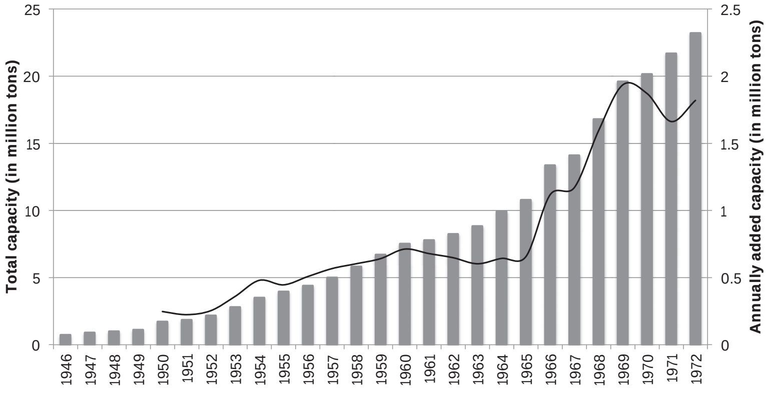
Figure 8-4. The share of crude oil transit flows in the Port of Rotterdam, 1946-75



Source: *Database on cargo flows in the port of Rotterdam, 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, accessed 7 March 2014.

The share of incoming crude oil that was transhipped to foreign destinations other than the German hinterland rose with the expansion of the (independent) tank storage capacity in the port. Pipelines typically had their own dedicated storage facilities, owned by the pipeline company, which only served the purpose of feeding the pipeline. However, with the expanding acreage created by Europoort and Maasvlakte, the space for large (independent) tank storage depots also increased. Figure 8-5 shows the development of independent tank storage capacity between 1946 and 1972. Between 1946 and 1965, this capacity grew on average by around 0.5 million tons annually. After 1965, the average added capacity rose to between 1.5 and 2 million tons annually in the period 1968-72. Although the precise size of the dedicated refinery tank depots is unknown, the total storage capacity for oil in the Rotterdam port grew a great deal, particularly in the late 1960s. Indeed, utilising the access to deep water, the tank depots of Europoort and the gigantic crude oil terminal of Maasvlakte (opened in 1972) particularly stimulated the transhipment of crude oil at Rotterdam.

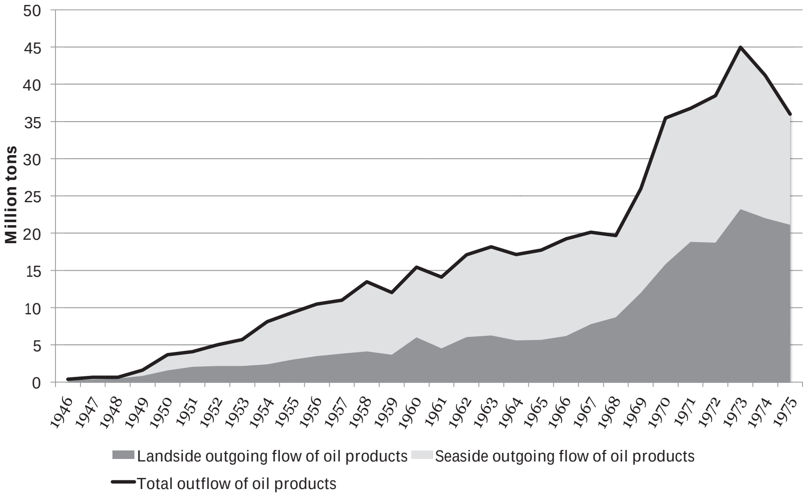
Figure 8-5. Independent tank storage for mineral oil in the Port of Rotterdam, 1946-72



Source: Kamer van Koophandel Rotterdam, *Jaarverslagen 1946-1970* and *Dirkzwager's Guide to the New Waterway 1973-1985*. Data compiled by Hugo van Driel.

The spectacular growth of the oil port in the second half of the 1960s also becomes clear in Figure 8-6; between 1946 and 1968, oil product outflows from the port grew from almost nothing to 20 million tons.

Figure 8-6. The outflow of oil products from the Port of Rotterdam, 1946-75 (in million tons)



Source: *Database on cargo flows in the port of Rotterdam, 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, accessed 7 March 2014.

Between 1968 and 1973, the volume of oil product outflows more than doubled to 45 million tons, with outflows to foreign destinations representing, on average, 52 per cent of the total volume of oil products moving through the port throughout this period.[663] Indeed, less than half of the oil products produced or imported were destined for the Dutch market. Figure 8-3 through to Figure 8-6 all testify to the accelerating growth of the export and transit function of the Rotterdam oil port.

8.5 The cargo flows through the Port of Rotterdam

The changing composition of the cargo flows and the rising importance of maritime shipping and pipeline transportation reflect how the transition from coal to oil affected the transport relations of Rotterdam's port between 1945 and 1975. Seaborne incoming flows increasingly originated from the Middle East and Africa, while Western Europe and North America became relatively less important (Table 8-8). By the early 1970s, oil became so dominant that in 1971-75, 63 per cent of all seaborne incoming cargo in the Rotterdam port came from the Middle East and Africa.

[663] *Database on cargo flows in the port of Rotterdam, 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, 7 March 2014. Own calculations.

Table 8-8. Seaborne incoming cargo flows by world region, 1950-75

	Volumes (mln tons)					**Share**				
	1950-55	**1956-60**	**1961-65**	**1966-70**	**1971-75**	**1950-55**	**1956-60**	**1961-65**	**1966-70**	**1971-75**
Western Europe	40.6	52.1	68.2	89.6	95.4	23%	19%	17%	14%	10%
North Africa	4.8	5.6	28.3	92.2	56.7	3%	2%	7%	15%	6%
West Africa	0.9	3.4	9.9	37.6	98.2	1%	1%	3%	6%	10%
North America	39.9	69.8	66.5	82	101	23%	25%	17%	13%	10%
South America	15.5	27.8	38.7	33.2	54.9	9%	10%	10%	5%	5%
Middle East	40.3	67.4	106.9	196.7	457.8	23%	24%	27%	31%	46%
Other	34	49.4	74.2	98.3	136.3	20%	17%	18%	15%	14%

Source: Source: CBS, Statistiek van de Zeevaart (1950-51; 1961-65); CBS, Maandstatistiek van de zeevaart en van het havenverkeer (1952-60); CBS, Statistiek van het internationaal goederenvervoer in de havens van Amsterdam en Rotterdam (1966-75). For the complete table, see Appendix B: Data, Table 0-7. The Port of Rotterdam cargo flows, 1950-1975 (in tons).

Table 8-9. The top 10 origins of seaborne incoming cargo flows, 1950-75 (mln tons)

	Volumes (mln tons)					**Share**				
	1950-55	**1956-60**	**1961-65**	**1966-70**	**1971-75**	**1950-55**	**1956-60**	**1961-65**	**1966-70**	**1971-75**
Saudi Arabia	2.3	6.9	11.9	49.6	157.2	1%	3%	3%	8%	16%
Iran	1.2	7.0	15.7	28.2	151.9	1%	3%	4%	4%	15%
Kuwait	21.1	31.2	32.4	67.6	97.3	12%	11%	8%	11%	10%
USA	35.5	60.9	57.5	68.6	82.7	20%	22%	15%	11%	8%
Nigeria	0.4	1.5	3.0	16.0	70.0	0%	1%	1%	3%	7%
Brazil	1.0	1.9	6.1	10.7	38.6	1%	1%	2%	2%	4%
Libya	0.0	0.0	19.2	78.2	34.5	0%	0%	5%	12%	3%
Liberia	0.6	1.9	7.0	21.7	28.2	0%	1%	2%	3%	3%
UK	8.3	11.8	16.8	20.4	25.2	5%	4%	4%	3%	3%
USSR	1.4	4.4	6.6	12.5	24.4	1%	2%	2%	2%	2%

Source: Source: CBS, Statistiek van de Zeevaart (1950-51; 1961-65); CBS, Maandstatistiek van de zeevaart en van het havenverkeer (1952-60); CBS, Statistiek van het internationaal goederenvervoer in de havens van Amsterdam en Rotterdam (1966-75). For the complete table, see Appendix B: Data, Table 0-7. The Port of Rotterdam cargo flows, 1950-1975 (in tons).

Table 8-9 presents the 10 most important countries of origin for seaborne incoming cargo flows in Rotterdam. In 1950-55, the USA was the port's most important source, with 20 per cent, followed by Kuwait by virtue of Royal Dutch Shell's long-term supply contract with Gulf Oil from 1947 onwards.[664] Other important countries not included in Table 8-9 comprise the Nordic countries, Syria and the Netherlands Antilles. Although the USA remained an important trading partner throughout the period, in particular because of its importance in the world supply of manufactured and capital goods, its share dropped to 8 per cent in 1971-75. The early 1960s saw the rise of the oil exporting countries in the Middle East, such as Saudi Arabia, Iran and Kuwait. These were followed in the late 1960s and early 1970s by the second wave of oil exporting countries, such as Libya, Qatar and Nigeria.

Seaborne outflows, on the other hand, were focused mainly on Western Europe (Table 8-10). Indeed, already concentrated in 1950-55 (65 per cent), these products increasingly left Rotterdam for other Western European destinations. Again, oil was the principal reason for this shift, as Rotterdam became Western Europe's largest oil port and the region's principal oil market. The gigantic *Maasvlakte Olie Terminal* (in operation since 1972) and the crude oil transit pipelines to the Rhine-Ruhr area and Antwerp, as well as the sizable share of exports from Rotterdam's oil refineries, created transit and (re) export flows of crude oil and oil products that were mainly shipped to Western European markets and refineries.[665] The main destinations of the seaborne outflows in 1971-75 were the United Kingdom and West Germany, which together represented 44 per cent of these outflows (Table 8-11). The position of the two countries had changed substantially, as in 1950-55 West Germany represented just 4 per cent of total seaborne outflows, which was much less than the UK (20 per cent) and Italy (17 per cent). In the case of West Germany, the growth of seaborne outflows mainly occurred after 1968, and was primarily caused by super tankers with crude oil destined for West Germany that were breaking bulk in Rotterdam.

[664] SHA, 190C/16, Agreements – Royal Dutch/Shell - Gulf agreement. The agreement stipulated the volumes and areas where Royal Dutch Shell could refine Gulf crude oil. Rotterdam Pernis was one of the principal refineries where Gulf crude could be refined.
[665] Royal Dutch Shell's Pernis refinery, for instance, exported on average 70 per cent of its production between 1957 and 1963. (Source: SHA, 976/114, Statistical data on Shell Nederland Raffinaderij NV).

Table 8-10. Seaborne outgoing cargo flows by world region, 1950-75

	Volumes (mln tons)					**Share**				
	1950-55	**1956-60**	**1961-65**	**1966-70**	**1971-75**	**1950-55**	**1956-60**	**1961-65**	**1966-70**	**1971-75**
Western Europe	56.2	63.4	79.2	131.4	234.8	65%	64%	63%	69%	73%
Eastern Europe	1.2	2.5	2	3.5	12.3	1%	3%	2%	2%	4%
North Africa	2.2	1.8	1.6	2.3	3.7	3%	2%	1%	1%	1%
North America	5.3	3.8	4.3	10.6	20.5	6%	4%	3%	6%	6%
East Asia	1.1	2.5	2.4	5	5.2	1%	3%	2%	3%	2%
Other	20.4	24.8	36.6	37.6	44.5	24%	25%	28%	18%	14%

Source: CBS, Statistiek van de Zeevaart (1950-51; 1961-65); CBS, Maandstatistiek van de zeevaart en van het havenverkeer (1952-60); CBS, Statistiek van het internationaal goederenvervoer in de havens van Amsterdam en Rotterdam (1966-75). For the complete table, see Appendix B: Data, Table 0-7. The Port of Rotterdam cargo flows, 1950-1975 (in tons).

Table 8-11. The top six destinations of seaborne outgoing cargo flows, 1950-75 (mln tons)

	Volumes (mln tons)					**Share**				
	1950-55	**1956-60**	**1961-65**	**1966-70**	**1971-75**	**1950-55**	**1956-60**	**1961-65**	**1966-70**	**1971-75**
UK	17.0	20.8	24.5	54.3	86.7	20%	21%	19%	29%	27%
West Germany	3.3	4.8	8.5	19.9	53.6	4%	5%	7%	10%	17%
Denmark	4.1	6.1	8.3	7.3	20.7	5%	6%	7%	4%	6%
USA	5.0	3.5	3.9	9.8	18.9	6%	3%	3%	5%	6%
Italy	12.2	6.6	5.8	14.6	17.8	14%	7%	5%	8%	6%
Sweden	6.6	10.8	14.4	12.3	17.3	8%	11%	11%	6%	5%

Source: CBS, Statistiek van de Zeevaart (1950-51; 1961-65); CBS, Maandstatistiek van de zeevaart en van het havenverkeer (1952-60); CBS, Statistiek van het internationaal goederenvervoer in de havens van Amsterdam en Rotterdam (1966-75). For the complete table, see Appendix B: Data, Table 0-7. The Port of Rotterdam cargo flows, 1950-1975 (in tons).

On the landside, around 95 per cent of incoming cargo flows originated in just four countries throughout the period (Table 8-12). West Germany remained the most important origin, with a stable share of around 70 per cent. Belgium became more important, although the volume of cargo from there remained small in comparison to West Germany. Cargo flows from France halved proportionately.

Landside outgoing cargo flows were concentrated among the same four countries (Table 8-13). Throughout the period, West Germany remained Rotterdam's most important destination for landside outflows, slightly increasing its share from 77 per cent in 1950-55 to 87 per cent in 1961-65, only to decline again to 71 per cent in 1971-75. Cargo flows to Belgium more than doubled over the period, although this was entirely due to the construction of the Rotterdam-Antwerp pipeline in 1972, causing landside outflows to jump from 7 million tons in 1968 to almost 30 million tons in 1973.

Table 8-12. Landside incoming cargo flows, 1950-75

	Volumes (mln tons)					**Share**				
	1950-55	**1956-60**	**1961-65**	**1966-70**	**1971-75**	**1950-55**	**1956-60**	**1961-65**	**1966-70**	**1971-75**
West Germany	31.2	25.0	32.9	59.5	63.1	69%	72%	69%	74%	73%
Belgium & Lux	5.5	5.6	10.1	13.0	13.3	12%	16%	21%	16%	15%
France	6.7	2.6	2.4	3.7	5.2	15%	8%	5%	5%	6%

Source: CBS, Statistiek van de Zeevaart (1950-51; 1961-65); CBS, Maandstatistiek van de zeevaart en van het havenverkeer (1952-60); CBS, Statistiek van het internationaal goederenvervoer in de havens van Amsterdam en Rotterdam (1966-75); CBS, Statistiek van de internationale binnenvaart (1950-1975). For the complete table, see Appendix B: Data, Table 0-7. The Port of Rotterdam cargo flows, 1950-1975 (in tons).

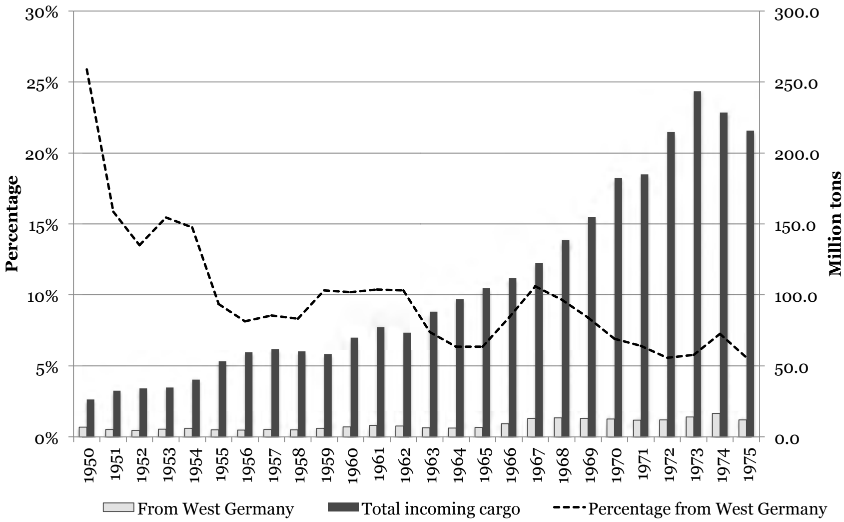
Table 8-13. Landside outgoing cargo flows, 1950-75

	Volumes (mln tons)					**Share**				
	1950-55	**1956-60**	**1961-65**	**1966-70**	**1971-75**	**1950-55**	**1956-60**	**1961-65**	**1966-70**	**1971-75**
West Germany	71.4	124.7	212.5	309.3	379.3	77%	83%	87%	84%	71%
Belgium & Lux	8.6	12.6	15.4	27.6	118.7	9%	8%	6%	8%	22%
France	2.0	2.4	6.0	15.5	19.4	2%	2%	2%	4%	4%
Switzerland	9.4	9.2	10.2	11.5	13.5	10%	6%	4%	3%	3%

Source: CBS, Statistiek van de Zeevaart (1950-51; 1961-65); CBS, Maandstatistiek van de zeevaart en van het havenverkeer (1952-60); CBS, Statistiek van het internationaal goederenvervoer in de havens van Amsterdam en Rotterdam (1966-75); CBS, Statistiek van de internationale binnenvaart (1950-1975); CBS, Historische reeksen, Historie verkeer en vervoer van 1899, Goederenvervoer met pijpleidingen, http://statline.cbs.nl/StatWeb/selection/?DM=SLNL&PA=37406&VW=T, accessed 12 October 2011. For the complete table, see Appendix B: Data, Table 0-7. The Port of Rotterdam cargo flows, 1950-1975 (in tons).

Overall, the position of West Germany in the cargo flows through the Rotterdam port developed along two divergent paths. On the one hand, the flows originating in West Germany grew much slower than total incoming cargo, averaging 5 per cent as against 10 per cent annually between 1951 and 1973.[666] The share of cargo originating in West Germany therefore dropped considerably from 16 per cent in 1951 to only 6 per cent in 1973 (Figure 8-7). Over the period, West Germany ceased to be a source of high volume bulk shipments, as seaborne incoming cargo became increasingly dominant.

Figure 8-7. The share of West Germany in total incoming cargo flows, 1950-75



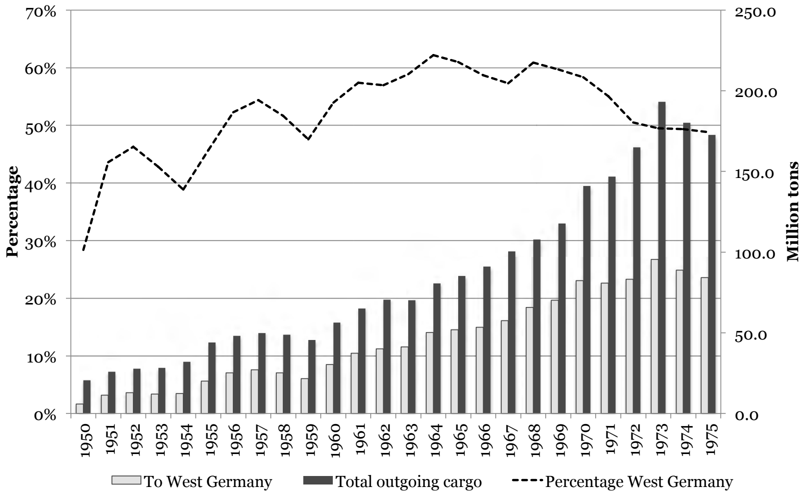
Source: CBS, Statistiek van de Zeevaart (1950-51; 1961-65); CBS, Maandstatistiek van de zeevaart en van het havenverkeer (1952-60); CBS, Statistiek van het internationaal goederenvervoer in de havens van Amsterdam en Rotterdam (1966-75); CBS, Statistiek van de internationale binnenvaart (1950-1975); CBS, Historische reeksen, Historie verkeer en vervoer van 1899, Goederenvervoer met pijpleidingen, http://statline.cbs.nl/StatWeb/selection/?DM=SLNL&PA=37406&VW=T, accessed 12 October 2011. For the complete table, see Appendix B: Data, Table 0-7. The Port of Rotterdam cargo flows, 1950-1975 (in tons).

On the other hand, West Germany remained hugely important as a destination for outgoing cargo flows from Rotterdam. Indeed, until the country re-entered the international community and engaged with international markets again from 1949 onwards, the Dutch economy struggled to recover from the war. The trade agreement of 1950 signalled the normalisation of Dutch-German economic relations, with the subsequent expansion of the West German economy in the 1950s stimulating Dutch economic growth as well as that of Rotterdam. Buoyed by what has become known as

[666] Calculated from the data in Figure 8-7 and Figure 8-8.

the economic miracle (*Wirtschaftswunder*), West Germany became more, rather than less, important for the Rotterdam port as a destination for outgoing cargo flows (Figure 8-8). Indeed, growing as fast as total outgoing cargo flows (10 per cent annually), cargoes destined for West Germany increased from 29 per cent of total outgoing cargo in 1950 to 62 per cent in 1964, only to fall again to 49 per cent in 1975.

Figure 8-8. The share of West Germany in total outgoing cargo flows, 1950-75



Source: CBS, Statistiek van de Zeevaart (1950-51; 1961-65); CBS, Maandstatistiek van de zeevaart en van het havenverkeer (1952-60); CBS, Statistiek van het internationaal goederenvervoer in de havens van Amsterdam en Rotterdam (1966-75); CBS, Statistiek van de internationale binnenvaart (1950-1975); CBS, Historische reeksen, Historie verkeer en vervoer van 1899, Goederenvervoer met pijpleidingen, http://statline.cbs.nl/StatWeb/selection/?DM=SLNL&PA=37406&VW=T, accessed 12 October 2011. For the complete table, see Appendix B: Data, Table 0-7. The Port of Rotterdam cargo flows, 1950-1975 (in tons).

8.6 Conclusion

The transition from coal to oil caused a fundamental change to both the Port of Rotterdam and its hinterland. In the latter, the mounting crisis in the coal industry, as well as its incorporation into the European Coal and Steel Community, caused a relative decline in the share of Ruhr coal as part of Rotterdam's cargo flows. Moreover, the enormous expansion of the oil and petrochemical industry in both port and hinterland caused oil to become, in both relative and absolute terms, the most important cargo flow in the Rotterdam port. The changing composition of Rotterdam's cargo throughput also significantly altered the port's transport relations. The West German hinterland became of only marginal importance for incoming cargo flows, showing that the port became less and less important as a hub for

German exports. For outgoing cargo flows, however, West Germany remained by far the most important destination, as its demand for oil and iron ore continued to rise throughout the 1960s and early 1970s. This showed that Rotterdam remained an important bulk port throughout the period, particularly for West German imports.

Growth in scale was the key term in the development of the Rotterdam oil port between 1945 and 1975. The mounting scale of oil transportation and processing set in motion a series of port expansions in the 1960s and early 1970s, starting with the further development of Europoort and followed by the Maasvlakte expansion in 1968. Although the direct reason for the Europoort expansion was the need to construct a pipeline infrastructure to supply crude oil to the refineries in the Rhine-Ruhr hinterland, this is not the only explanation for the growth of the Rotterdam oil port. Indeed, expansion became increasingly necessary to fend off competitors, as other European ports - Le Havre, for instance - adapted to the larger scale of maritime shipping and threatened Rotterdam's position as Europe's primary oil port in the late 1960s.[667] As a consequence, maritime oil tankers and pipelines carried an increasing share of Rotterdam's cargo flows, while the relative share of inland shipping declined. As the self-proclaimed raw materials gateway to Europe, Rotterdam concentrated heavily on seaborne bulk imports and large-scale landborne outflows.

The port expansions of the 1960s and early 1970s secured deep sea access for larger tankers, provided space for storage and processing facilities and, as such, developed the Rotterdam port into a transhipment hub for crude oil and home to Europe's largest concentration of refinery capacity. Between 1950 and 1975, the number of refineries in the Rotterdam port rose from two to seven, while primary refining capacity increased from 2.7 million tons per annum in 1950 to 98.9 million tons in 1975. With the rising number of refineries, the scale of refinery operations expanded considerably, from an average capacity of 1.4 million tons per year in 1950 to 14.1 million tons in 1975.[668] The expansions of both total capacity and the average size of plants were also stimulated by European integration. In the case of Jersey Standard, for instance, the creation of the Common Market meant that concentrating refining at Rotterdam produced potential economies of scale by serving the Common Market from one large plant rather than from several smaller plants spread out across Western Europe.[669]

The effect of the port expansions was a concentration of production, storage and transhipment facilities that far exceeded domestic consumption in the Netherlands. The Rotterdam oil port thus increasingly acted as a hub in the European

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[667] De Goey, *Ruimte voor industrie*, 218.
[668] Molle and Wever, *Oil Refineries*, 164-169. Own calculations.
[669] B.H. Wall, *Growth in a Changing Environment. A History of Standard Oil (New Jersey), Exxon Corporation, 1950-1975* (New York 1988) 270-273.

distribution network of crude oil. It did this by not just performing a transit function for West Germany, but increasingly for other destinations as well. Moreover, particularly after the depth of the port entrance was increased between 1967 and 1969, new storage and transhipment facilities emerged: one in 1968 to service a new 36 inch Rotterdam-Rhine pipeline, and another in 1971 to pump crude oil to Antwerp.[670] The Rotterdam-Antwerp pipeline was constructed to feed the refineries of TOTAL – formerly CFP – and Jersey Standard in the Port of Antwerp, which could no longer accommodate the largest tankers. The Europoort expansion thus caused the scale of port operations to grow in terms of the draughts of entering ships and the available facilities for storing and handling incoming and outgoing flows of oil. This continued with the third expansion, namely Maasvlakte.[671] These facilities brought about opportunities to become a regional transhipment hub with multiple international destinations. For instance, between 1967 and 1973, seaborne outgoing flows of crude oil grew from 1.3 million tons to 27 million tons.[672] At the same time, the Rotterdam-Antwerp pipeline increased its throughput from 6.8 million tons in 1971 to 18.5 million tons in 1975, an annual growth rate of 28 per cent.[673] By 1973, the Rotterdam port dominated Western Europe's oil flows, as it still does today.[674]

In conclusion, this chapter revealed two key findings. Firstly, although the growth of the oil port reduced the transit share (the oil effect) of the port's throughput, the German hinterland remained important for cargo outflows. Secondly, notwithstanding the efforts of the municipality and the Port Authority to industrialise and diversify the port's operations, the oil and petrochemical industries became the dominant port sectors. Although the port was quite successful in adapting its infrastructure and facilities to meet the needs of the oil industry, the diversification of the port's economy largely failed. A less lopsided industrialisation outcome could possibly have led to port historians coining the phrase the *industrialisation effect* rather than the *oil effect*, with the latter term essentially acknowledging the one-sided development of the port after 1945.

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[670] De Goey, *Ruimte voor industrie*, 182.
[671] De Goey, *Ruimte voor industrie*, 230.
[672] Database *Rotterdam-Antwerp: a century and a half of port competition 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, 13 October 2009.
[673] Stichting Havenbelangen, *Rotterdam-Europoort: statistisch overzicht*, Rotterdam, 1972, 5.
[674] Of all the oil moving through ports in the Hamburg-Le Havre range in 2011, Rotterdam was responsible for no less than 50 per cent; its nearest rival, Le Havre, shifted just 12 per cent. (Source: Rotterdam Port Authority, 'Port Statistics 2011', 3).

Chapter 9 The composition of the hinterland, 1945-1975

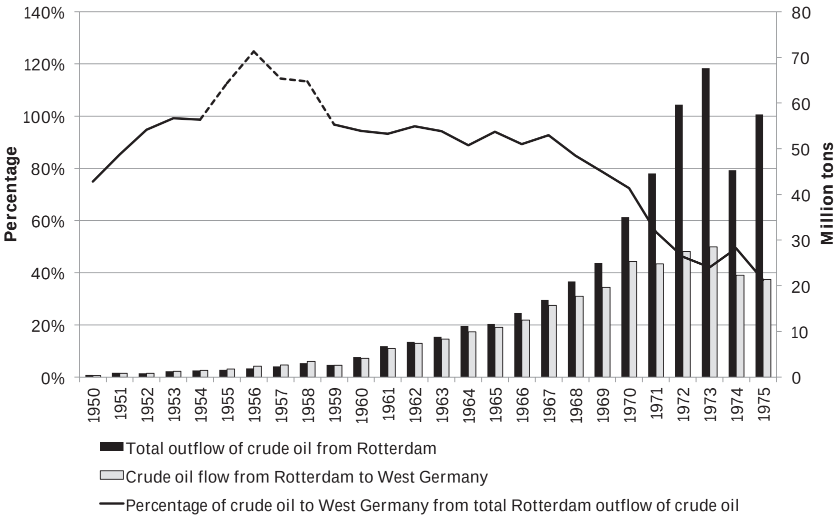
9.1 Introduction: beyond the Rhine-Ruhr hinterland?

One of the least explored aspects of Rotterdam's transport relations with the German hinterland is the question of how vital West Germany actually was for the city's oil port. West Germany remained the most important destination for outgoing cargo flows from the port. This chapter aims to establish whether the country was also the most important destination for the Port of Rotterdam. Additionally, the chapter also questions how the transition from coal to oil affected the composition of the German hinterland. The first section aims to ascertain the relative importance of West Germany for Rotterdam's oil port. It also questions how important Rotterdam was for West Germany, in particular the country's growing demand for oil from the early 1950s to the early 1970s. Did Rotterdam fuel the West German economic miracle? The second section looks specifically at the relative importance of the Rhine-Ruhr area, and compares the composition of the German hinterland for the Rotterdam port in general with the country's hinterland for the oil port in particular.

9.2 Fuelling the Wirtschaftswunder?

Although the decline of coal in the Ruhr area greatly reduced the importance of West Germany for incoming cargo flows in the Port of Rotterdam, it did remain the single most important destination for cargo outflows. What is, however, unclear is the extent to which this also holds true for the Rotterdam oil port. With regard to crude oil, Rotterdam performed a clear function as a landing port for West German crude oil imports. Indeed, until 1967, West Germany received 93 per cent of all of the crude oil transhipped in Rotterdam for destinations outside the Netherlands (Figure 9-1). The expansion of tank storage capacity in Europoort after 1966 strengthened the seaborne transit of crude oil via Rotterdam, while the share of West German transit fell sharply to 56 per cent in 1971. After the construction of the Rotterdam-Antwerp pipeline, the West German share fell further to 39 per cent in 1975.

Figure 9-1. Crude oil flows to West Germany from Rotterdam, 1950-75[675]



Source: CBS, Historie verkeer en vervoer van 1899, Goederenvervoer met pijpleidingen, http://statline.cbs.nl/StatWeb/selection/?DM=SLNL&PA=37406&VW=T, 12.10.2011; CBS, Statistiek van de zeevaart, 1946-1975; Mineralölwirtschaftsverband, Daten zum Mineralölversorgung, Mineralölverbrauch, Mineralölausfuhr, http://mwv.de/index.php/daten/statistikeninfoportal, 14.5.2009; RRP NV, Annual Reports, Rotterdam, 1960-1975. Statistisches Bundesamt, Die Binnenschiffahrt im Jahre, 1950-1957; Statistisches Bundesamt, Der Verkehr in der Bundesrepublik Deutschland, Reihe 1, Binnenschiffahrt, 1958-1961; Statistisches Bundesamt, Fachserie H Verkehr, Reihe 1 Binnenschiffahrt, 1962-1975; Statistisches Bundesamt, Die Seeschiffahrt im Jahre, 1948-1956; Statistisches Bundesamt, Verkehr. Reihe 2, Seeschiffahrt, 1957-1975; *Database on cargo flows in the Port of Rotterdam, 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, 13 October 2009. The full data are reported in Appendix B: Data Table 0-8. The West German oil supply from the Rotterdam oil port, 1950-75.

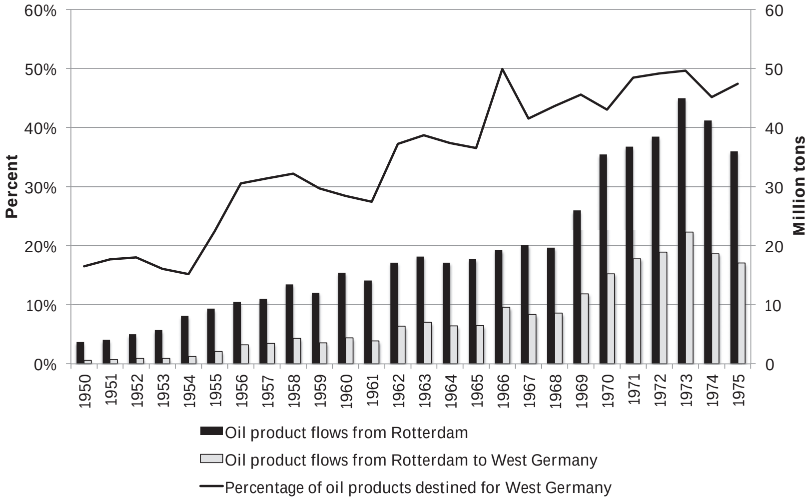
As a transit port for crude oil, Rotterdam thus developed beyond being an outport for the German hinterland. Notwithstanding the declining share of crude oil transit flows to West Germany in the 1960s, the initial development of the Rotterdam port as a transit hub for crude was dedicated to supplying the Rhine-Ruhr refineries from 1960 onwards. The Europoort expansion emerged as a way to adapt the port to demand from the Rhine-Ruhr hinterland for larger scale transhipment and transportation facilities. However, the sheer size of Europoort, and its ability to welcome the largest tankers of the day, created opportunities to establish the Rotterdam oil port as a

[675] The percentage in Figure 9-1 is derived from combining Dutch and German transport statistics. A number of problems arise from doing this, which is apparent from the percentages reported for the years 1955 to 1958. These figures are caused by a discrepancy between Dutch and German transport statistics. The German statistics reported a higher volume of crude oil shipments from Rotterdam to West Germany than the Dutch statistics for those years. The reasons for the discrepancy are discussed in Appendix B: Data Table 0-8. The West German oil supply from the Rotterdam oil port, 1950-75 (in tons).

transhipment hub for crude oil and also led to the expansion of the Rotterdam-Rhine and Rotterdam-Antwerp pipelines. Indeed, through Europoort and Maasvlakte, Rotterdam became important for a wider region than just its Rhine-Ruhr hinterland.

In the case of oil product flows, the picture was entirely different. Figure 9-2 presents the volumes of oil products shipped from Rotterdam to West Germany, as well as the country's share of total oil product outflows from the Rotterdam port.

Figure 9-2. Oil product flows to West Germany from Rotterdam, 1950-75



Note: For the full data, see Appendix B: Data Table 0-8. The West German oil supply from the Rotterdam oil port, 1950-75.
Source: CBS, Historie verkeer en vervoer van 1899, Goederenvervoer met pijpleidingen, http://statline.cbs.nl/StatWeb/selection/?DM=SLNL&PA=37406&VW=T, 12.10.2011; CBS, Statistiek van de zeevaart, 1946-1975; Mineralölwirtschaftsverband, Daten zum Mineralölversorgung, Mineralölverbrauch, Mineralölausfuhr, http://mwv.de/index.php/daten/statistikeninfoportal, 14.5.2009; RRP NV, Annual Reports, Rotterdam, 1960-1975. Statistisches Bundesamt, Die Binnenschiffahrt im Jahre, 1950-1957; Statistisches Bundesamt, Der Verkehr in der Bundesrepublik Deutschland, Reihe 1, Binnenschiffahrt, 1958-1961; Statistisches Bundesamt, Fachserie H Verkehr, Reihe 1 Binnenschiffahrt, 1962-1975; Statistisches Bundesamt, Die Seeschiffahrt im Jahre, 1948-1956; Statistisches Bundesamt, Verkehr. Reihe 2, Seeschiffahrt, 1957-1975; BP Archive, 21090 & 21093, RMR Progress Reports, 1968-1971; *Database on cargo flows in the Port of Rotterdam, 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, 13 October 2009.

The pattern of oil product flows from Rotterdam to West Germany corresponded with the development of the capacity of West German refiners, their geographical distribution and the output of these refineries in terms of types of oil product. In 1950, only 17 per cent of the oil products shipped from Rotterdam were destined for West Germany, but this share increased sharply in the early 1950s, rising to 31 per cent in 1957 in response to the growing consumption of fuel oil in the country. The refinery expansions of the late 1950s in the Rhine-Ruhr area aimed to replace rising fuel oil imports with domestic production. As a consequence, West German oil product imports stabilised between 1958 and 1961, and the German-destined share of the oil product flows from the Rotterdam port declined slightly to 27 per cent. There was then a sudden increase between 1961 and 1963, with growth to 34 per cent annually, as West German imports of oil products doubled. In the mid-1960s, West German oil imports stagnated in the face of a recession, further refinery expansions and due to government induced limits on fuel oil consumption in the country.[676] When the West German economy recovered, refiners struggled to keep up with demand and increasingly needed to import oil products, the share of which rose from 20 per cent of total oil imports in 1968 to 29 per cent in 1975.[677] In response, the share of German-destined oil products from Rotterdam increased again from 1967 onwards. In 1973, 50 per cent of all outgoing oil products from Rotterdam were destined for West Germany. This growth was partly caused by the 1968 connection of the Rotterdam-Rhine pipeline to the Royal Dutch Shell-BP oil product pipeline system, namely the Rhine-Main pipeline.

Figure 9-2 shows that the West German hinterland became more important for the Rotterdam port. Whether West German demand for oil products drove the expansion of the Rotterdam refining cluster is a difficult question to answer. Between 1950 and 1955, refinery capacity in the port increased from 3 million to 12 million tons per annum.[678] Given the rather low share of oil products destined for West Germany in those years, it is untenable to argue that West German demand drove refinery expansion in Rotterdam in the early 1950s. Indeed, until the second half of the 1950s, the West German economy still very much relied on coal, and therefore had little market potential for refineries establishing themselves in the Rotterdam port in the early part of the decade. However, the growing share of oil products to West Germany observed between 1952 and 1957 does suggest that the refineries in the port responded immediately when energy transition took off in the mid-1950s.

Before and shortly after World War II, West Germany's oil consumption consisted primarily of motor fuels. The immediate post-war energy crisis was addressed by subsequently creating an oil import program and a refinery capacity expansion program in the late 1940s.[679] The aim was to save on foreign currency by encouraging oil companies to refine crude oil in Germany instead of importing oil products. Furthermore, to stimulate the production of German crude oil in the process, a tax and tariff system was designed to further the aim of reducing imports of oil products. Up to 1959, these tariffs and taxes priced imported gasoline and diesel 12 per cent higher than domestically refined alternatives. However, the initial tax and

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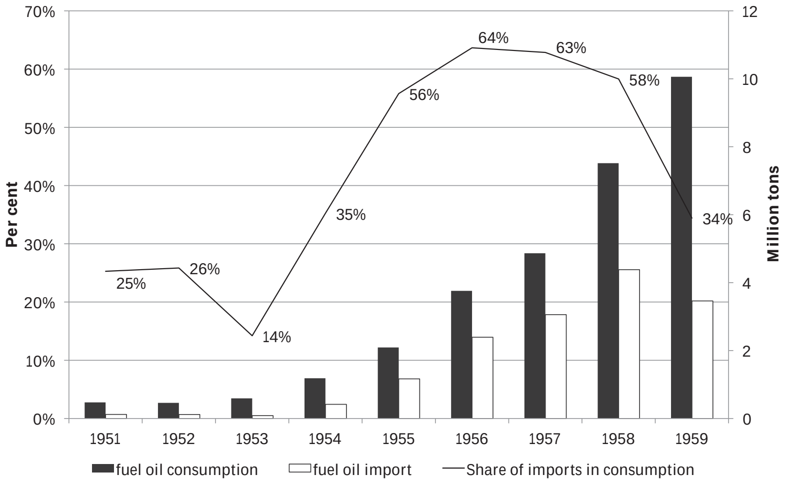
[676] Horn, *Die Energiepolitik*, 252-254.
[677] Mineralölwirtschaftsverband, Daten zum Mineralölversorgung, http://mwv.de/index.php/daten/statistikeninfoportal, accessed on 14 May 2009 (own calculations).
[678] Molle and Wever, *Oil Refineries*, 164-169. Own calculations.
[679] Karlsch and Stokes, *Faktor Öl*, 248.

tariff law for the oil industry of 1953 was changed in 1955, because the protection of German refiners threatened to kill the independent traders and wholesalers and provided opportunities for these refiners to divide the market to the detriment of consumers. Some of the protective tariffs were therefore reduced again in 1955.[680] To encourage competition in the heating fuel market following energy shortages in 1955/1956, taxes on fuel oil were lifted in July 1956.[681] At the time, there was an excess of crude oil on world markets. The increasing volumes of Middle Eastern crude, but also the promise of new reserves in Libya, flooded the European market with cheap crude oil. This was further compounded by declining tanker rates in the wake of the Suez Crisis. As the market for motor fuels in West Germany was already saturated, the heating fuel market provided an outlet for excess crude oil.[682] Consequently, fuel oil prices in West Germany plummeted by 30 per cent from a price peak of 210 DM per ton in 1956 to 147 DM per ton in 1960, which was lower than crude oil prices in West German ports and neighbouring countries.[683]

Figure 9-3. Fuel oil imports and consumption in West Germany, 1950-59



Source: Witte, *Subventionen in der Mineralölwirtschaft*, 142, 144.

Figure 9-3 shows that between 1951 and 1959, West Germany relied heavily on fuel oil imports to meet rising demand, particularly between 1953 and 1956-57. In response to declining prices over the course of the 1950s, the demand for fuel oil rose rapidly after 1954. As West German refineries were not geared to the production of

[680] Witte, *Subventionen in der Mineralölwirtschaft*, 41.
[681] Ibid., 95.
[682] Plitzko, *Bemerkungen*, 57-58.
[683] Witte, *Subventionen*, 97; Plitzko, *Bemerkungen*, 58.

fuel oil, the share of imports soared from only 14 per cent in 1953 to 64 per cent in 1956 and 1957. North Rhine Westphalia accounted for over 33 per cent of the total fuel oil consumption in West Germany, but the available refineries in that area were specifically dedicated to the production of motor fuels.[684] The imports that covered rising demand were largely on account of independent traders and the sales and distribution subsidiaries of coal mining companies that moved into the fuel oil business to retain their clients. These parties imported mainly from countries with a cheap excess fuel oil supply, such as the Netherlands Antilles, Venezuela, the Netherlands and states in the Eastern bloc.[685] The oil companies were surprised by the speed at which fuel oil demand grew, but immediately started investing in refining capacity dedicated to fuel oil production from 1955 onwards. However, it took several years for these expansions to materialise, and imports of fuel oil continued to rise until 1958, when Esso AG's new refinery near Cologne became operational. From then on, domestic refining capacity was more in tune with demand, although fuel oil imports kept rising into the 1960s.[686]

Between 1952 and 1957, the rise in the share of oil product flows to West Germany of the total oil product flows from Rotterdam observed in Figure 9-2, corresponded to the sudden spike in fuel oil consumption in West Germany. As the domestic production of fuel oil picked up again from 1957 onwards, oil product flows from Rotterdam stabilised. Moreover, in late 1959, a tax on light and heavy fuel oil was reinstated to limit the growing volume of imports. This tax was imposed under cover of the 1958 EEC exemption clause that expired in 1963, which allowed West Germany to uphold its protective framework of fiscal instruments for the energy market.[687] Although the tax in itself did not limit fuel oil imports (after the decline in 1959, they rose again in 1960 and 1961), it did have a limiting effect on exports from Rotterdam. Exactly why this was is unclear, but the growth of imported fuel oil in the early 1960s primarily came from Italy, the Soviet Union and other countries in the Eastern Bloc.[688] Figure 9-2 shows that, between 1959 and 1961, exports from Rotterdam to West Germany did not grow, and only increased again in 1963 following the removal of the fuel oil tax in April of that year.

During the 1960s, the West German consumption pattern became increasingly skewed towards light fuel oil, with domestic refineries struggling to keep up throughout the decade. The inability of domestic refiners to cover growing

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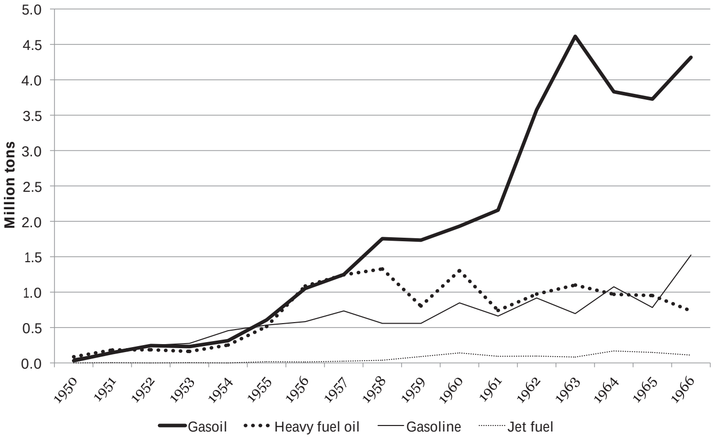
[684] Plitzko, *Bemerkungen*, 72. Union Kraftstoff, for instance, operated on a refining contract for Deutsche Shell and produced almost exclusively motor fuels (see Chapter 5).
[685] Witte, *Subventionen*, 96; Plitzko, *Bemerkungen*, 64.
[686] Karlsch and Stokes, *Faktor Öl*, 314.
[687] Witte, *Subventionen*, 104.
[688] M. Martiny and H-J. Schneider (Eds.), *Deutsche Energiepolitik seit 1945. Vorrang für die Kohle: Dokumente und Materialien zur Energiepolitik der Industriegewerkschaft Bergbau und Energie* (Köln 1981) 209-210.

demand for light fuel oil was caused by the inherent inflexibility of the refineries that were constructed in North Rhine Westphalia in the late 1950s to meet the increasing demand for heavy fuel oil. The case of Deutsche Shell's Rhineland refinery in Cologne (operational in 1960) is instructive. Whereas Royal Dutch Shell's Rotterdam-Pernis refinery was a balancing refinery, which was a highly flexible facility designed to balance Royal Dutch's market positions in Western Europe, Deutsche Shell's Cologne-Godorf refinery was much less flexible. Deutsche Shell estimated that without a refinery in the Rhineland, it would have supply shortfalls on the West German market of 2.1 million tons of gas oil (light fuel oil) and 2.3 million tons of heavy fuel oil. To address these shortfalls, the Rhineland refinery was designed to process Kuwaiti crude oil to maximise fuel oil output, the demand for which was expected to grow particularly fast. Although the chosen refinery design did indeed adequately address the short-term need for heavy fuel oil, it did not have the flexibility to simultaneously supply the growing demand for light fuel oil. Indeed, Deutsche Shell projected that in 1965 it would still have a shortfall of 1.4 million tons of gas oil, even with the Rhineland refinery operating at full capacity.[689]

Figure 9-2 suggests that Rotterdam functioned as a supplier of the products that could not be provided adequately by the Rhine-Ruhr refineries. As the pattern of West German consumption shifted from being dominated by heavy to light fuel oil, flows from Rotterdam to West Germany changed composition accordingly (Figure 9-4).

Figure 9-4. Oil product exports from the Netherlands to West Germany, 1950-1966



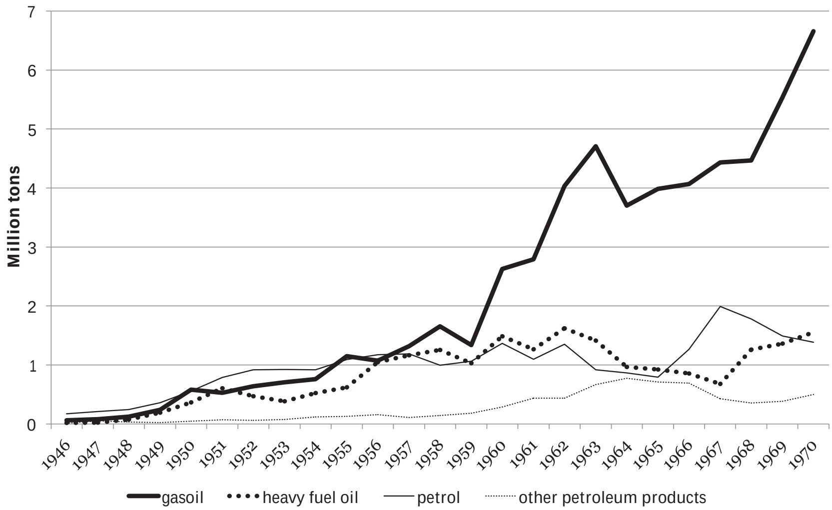
Source: CBS, *Maandstatistiek van de in-, uit- en doorvoer per goederensoort*, Utrecht, 1950-1966. Own calculations. The data refer to exports from the Netherlands. From Dutch sea shipping statistics, it can

[689] SHA, MF/48, Budget Revision New Rhineland Refinery, 15 March 1957.

be gleaned that in the period 1960-1975 over 90 per cent of oil products shipped from the Netherlands originated in Rotterdam. (CBS, *Statistiek van de Zeevaart*, 1960-1975). The period 1950-1966 was chosen because the shift from heavy to light fuel oil took place then.

In the mid-1950s, heavy fuel oil was marginally the most important oil product exported to West Germany from the Netherlands, save for gasoline. However, as the expanded refinery capacity in the Rhine-Ruhr hinterland took over, heavy fuel oil flows stabilised and fell off in the early 1960s, making way for lighter fuel oils and diesel (gas oil in this case comprises the range from light fuel oil to diesel), which became the majority of oil product flows from Rotterdam to West Germany. Rotterdam thus functioned as a supplier of those fractions that could not be properly covered by the limited flexibility of the refineries in the Rhine-Ruhr hinterland, as they were geared to produce heavier fractions.[690] The pattern of lighter fuel oil exports from Rotterdam to West Germany is also corroborated by data on the landside outgoing flows of oil products from the port (Figure 9-5).

Figure 9-5. Landside oil product outflows from Rotterdam, 1946-70.



Source: *Database on cargo flows in the Port of Rotterdam, 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, accessed 7 March 2014. After 1970, a breakdown of oil products is not available in the database.

Outflows of oil products were limited in the late 1940s. Then, when outflows started expanding in the early 1950s, heavy fuel became increasingly important, particularly between 1956 and 1960. Heavy fuel oil outflows then fell off after 1961, and gas oil made up the largest share of landside outgoing oil product flows. For Dutch Rhine

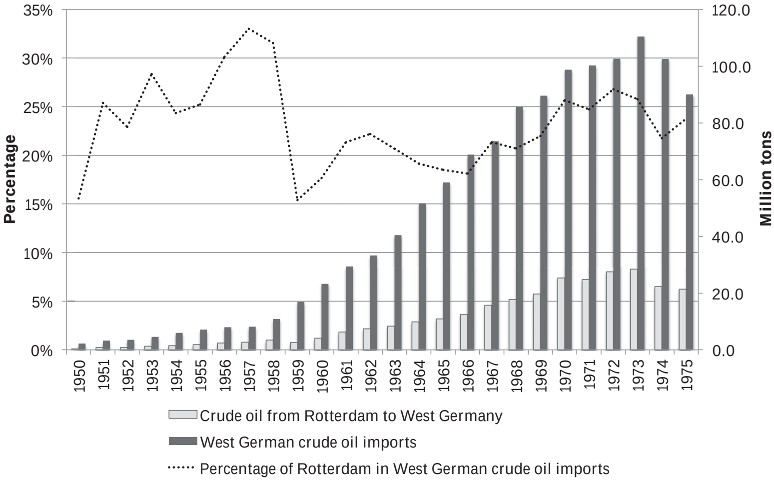
[690] Mulfinger, *Auf dem Weg*, 67.

tank ship owners, the gas oil imports into West Germany became a major part of their business. As the refineries in the Rhine-Ruhr area concentrated on gasoline and heavy fuel oil production, gas oil remained one of the few oil products that were shipped between Rotterdam and the West German hinterland. For most other oil products, inland tank ship owners were forced to look for cargoes in the so-called intra-German transport market.[691]

This section has revealed that the West German hinterland became increasingly important for the Rotterdam oil port. Although the hinterland provided few opportunities in the early 1950s, the West German economy's transition from coal to oil after 1956 quickly turned the country into the principal destination for (re-) exports of oil products from the Port of Rotterdam. Not only did the transition to oil of the hinterland provide the impetus for large-scale port expansion (Europoort), but also provided a market for Rotterdam's burgeoning refinery cluster. During the mid-1950s, heavy fuel oil seemed to be the major growth product in the West German oil market, but in the following decade, light fuel oil for household heating, among other uses, became the main oil product in terms of West German oil consumption. Exports from the Netherlands to West Germany and landside outgoing oil product flows from Rotterdam to the country changed accordingly and became dominated by light fuel oil (gas oil). However, if West Germany was important for Rotterdam, was Rotterdam equally vital for West Germany? The foregoing seems to suggest so, but a closer look is required. For crude oil, Rotterdam commanded an enduring link with the West German hinterland through the Rotterdam-Rhine pipeline, which secured the port a stable share of West German crude oil imports.

[691] VOA, 1260/257, Notulen Raad van Beheer en Directie, Verslag vergadering RvB, 16 Februari 1961, 2.

Figure 9-6. Rotterdam's share of West German crude oil imports, 1950-75



Note: For the full data, see Appendix B: Data Table 0-8. The West German oil supply from the Rotterdam oil port, 1950-75.
Source: CBS, Historie verkeer en vervoer van 1899, Goederenvervoer met pijpleidingen, http://statline.cbs.nl/StatWeb/selection/?DM=SLNL&PA=37406&VW=T, 12.10.2011; CBS, Statistiek van de zeevaart, Den Haag, 1946-1975; Mineralölwirtschaftsverband, Daten zum Mineralölversorgung, Mineralölverbrauch, Mineralölausfuhr, http://mwv.de/index.php/daten/statistikeninfoportal, 14.5.2009; RRP NV, Annual Reports, Rotterdam, 1960-1975. Statistisches Bundesamt, Die Binnenschiffahrt im Jahre, 1950-1957; Statistisches Bundesamt, Der Verkehr in der Bundesrepublik Deutschland, Reihe 1, Binnenschiffahrt, 1958-1961; Statistisches Bundesamt, Fachserie H Verkehr, Reihe 1 Binnenschiffahrt, 1962-1975; Statistisches Bundesamt, Die Seeschiffahrt im Jahre, 1948-1956; Statistisches Bundesamt, Verkehr. Reihe 2, Seeschiffahrt, 1957-1975; *Database on cargo flows in the Port of Rotterdam, 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, 13 October 2009.

Figure 9-6 portrays three distinct phases in Rotterdam's share of West German crude oil imports: growth, decline and growth again. At first, because of its strong position in Rhine shipping, Rotterdam acquired a rising share of these imports, up to a figure of 33 per cent in 1957. However, crude oil imports into West Germany were relatively modest during this period, and when they began to rise in the face of refinery expansions in the Rhine-Ruhr area, the share of crude oil shipped via Rotterdam declined rapidly to 15 per cent in 1959. The decline was primarily caused by the Nord-West Oelleitung, which started pumping crude oil from Wilhelmshaven to the Rhine-Ruhr area in 1958. The construction of the Rotterdam-Rhine pipeline increased Rotterdam's share slightly to 21 per cent in 1961, but this dropped again to 19 per cent in 1965 as the Southern European, Central European and Trans-Alpine pipelines opened between 1963 and 1965. From the late 1960s onwards, growing amounts of crude oil were shipped to West Germany by sea, increasing the Rotterdam share of the country's crude oil imports to 26 per cent in 1973. Rotterdam strengthened its position with consecutive port expansions in the 1960s, allowing the capacity of the Rotterdam-Rhine pipeline to also be expanded in 1968, keeping pace with the growth in demand for crude oil in West Germany. This provided Rotterdam with a stable and enduring share of Western Germany's crude oil imports.

A similar pattern can be found in the case of West German oil product imports. During the early 1950s, when these imports in the country were limited, Rotterdam commanded a high share of around 70 per cent (60 per cent if seaborne oil product flows from Rotterdam to West Germany are excluded; Figure 9-7). Rotterdam's share gradually fell in the late 1950s and early 1960s, stabilising at around 50 per cent between 1963 and 1975. Most of the (re-)exports of oil products from Rotterdam were performed by landside transport (primarily inland shipping, via a pipeline from 1968 onwards, and rail). A steady percentage was also transported by sea. It is impossible to ascertain whether these shipments were actual (re-)exports from Rotterdam or transit flows as part of what is known as horseshoe-traffic, namely German-German transport between the Rhine basin and the German North Sea ports. These seaborne shipments made up around one fifth of oil product flows to West Germany throughout the period. One of the reasons for the decline of Rotterdam's share in the early 1960s was the fact that refineries around Strasbourg started to export to Southwest Germany, while oil products also came from other origins.[692] In the mid-1960s, West German oil imports plateaued, presumably due to both an economic down-cycle that lasted until 1968 and refinery expansions in the Rhine-Ruhr area and Bavaria and Württemberg. Thereafter which imports rose sharply again. Oil product flows from Rotterdam followed suit and grew at a similar pace. A crucial factor in Rotterdam maintaining its share of West German oil product imports was the pipeline system between the port and Ludwigshafen (the Rhine-Main pipeline) that started operating in 1968. By 1971, this pipeline transported 47 per cent of the landside oil product flows from Rotterdam to West Germany.[693]

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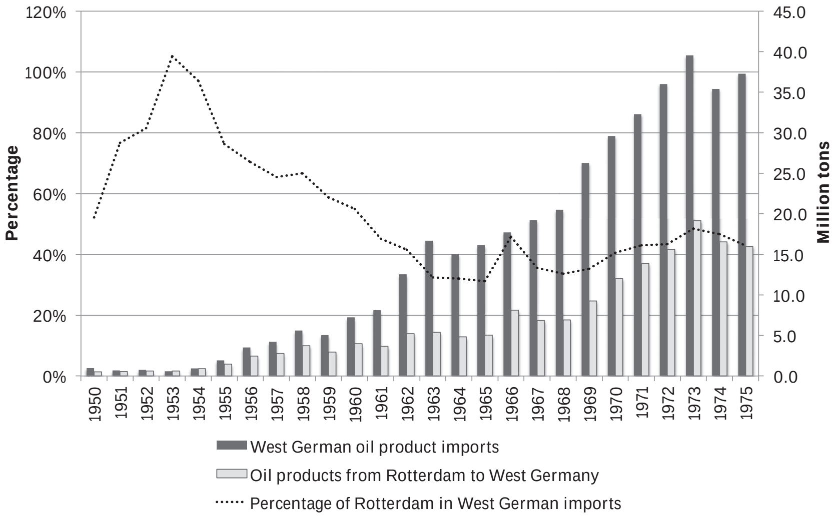
[692] VOA, 1260/257, Notulen Raad van Beheer en Directie, Verslag vergadering RvB, 16 June 1961, 2.
[693] Statistisches Bundesamt, Verkehr, Reihe 8 Binnenschiffahrt, Stuttgart, 1950-1975; Statistisches Bundesamt, Die Seeschiffahrt im Jahre, Stuttgart, 1948-1956; Statistisches Bundesamt, Verkehr. Reihe 2, Seeschiffahrt, Stuttgart, 1957-1975; CBS, Historie verkeer en vervoer van 1899, Goederenvervoer met pijpleidingen, http://statline.cbs.nl/StatWeb/selection/?DM=SLNL&PA=37406&VW=T, 12.10.2011; RRP NV, Annual Reports 1968-1975. Own calculations.

Figure 9-7. Rotterdam's share of West German oil product imports, 1950-75[694]



Source: CBS, Historie verkeer en vervoer van 1899, Goederenvervoer met pijpleidingen, http://statline.cbs.nl/StatWeb/selection/?DM=SLNL&PA=37406&VW=T, 12.10.2011; CBS, Statistiek van de zeevaart, Den Haag, 1946-1975; Mineralölwirtschaftsverband, Daten zum Mineralölversorgung, Mineralölverbrauch, Mineralölausfuhr, http://mwv.de/index.php/daten/statistikeninfoportal, 14.5.2009; RRP NV, Annual Reports, Rotterdam, 1960-1975. Statistisches Bundesamt, Die Binnenschiffahrt im Jahre, 1950-1957; Statistisches Bundesamt, Der Verkehr in der Bundesrepublik Deutschland, Reihe 1, Binnenschiffahrt, 1958-1961; Statistisches Bundesamt, Fachserie H Verkehr, Reihe 1 Binnenschiffahrt, 1962-1975; Statistisches Bundesamt, Die Seeschiffahrt im Jahre, 1948-1956; Statistisches Bundesamt, Verkehr. Reihe 2, Seeschiffahrt, 1957-1975; *Database on cargo flows in the Port of Rotterdam, 1880-2000*, persistent identifier urn:nbn:nl:ui:13-n6w-g4s, 13 October 2009.

[694] The high shares of West German oil product imports originating from Rotterdam in the early 1950s do not seem credible. It could not be precisely established whether under-reporting in the import statistics or over-reporting in the German inland shipping statistics caused the seemingly anomalous values for 1952 in particular, and the high values throughout the 1950s in general. One possible explanation could be that the German trade statistics reported in *Erdöl und Kohle* do not include oil products received in German storage on foreign accounts, whereas the transport statistics do not differentiate between direct imports and imports in bonded storage. The amounts therefore differ and the percentage reported above is not entirely accurate; it is instead an indication of the share. A more precise method is not available, as trade statistics do not report the origin of imports at the level of individual ports. An additional problem with seaborne oil product shipments to Germany is that they could contain so-called horseshoe traffic between the Rhine area and German North Sea ports. Every year, several hundred thousand tons of oil products were shipped from West Germany to Rotterdam. Their final destination unknown; these flows were either exported to Rotterdam or elsewhere, or were destined for German North Sea ports as intermediates or balancing flows. For instance, inland tankers shipped a total of 600,000 tons of oil products to Rotterdam in 1961. Whether these were shipped to Germany cannot be established from the Seeschiffahrt statistics. Finally, the Dutch statistics mention that German customs overestimated inland shipping cargoes from Rotterdam (see Appendix B, Note on sources and definitions). For the full data, see Appendix B: Data Table 0-8. The West German oil supply from the Rotterdam oil port, 1950-75 (in tons).

West Germany thus developed into an important market for oil product exporters in Western Europe. As was demonstrated earlier, the country was the main destination for oil product flows from Rotterdam. The success of Rotterdam refiners in exporting to the Federal Republic lay in the flexibility of the large refineries of Royal Dutch Shell, Jersey Standard and BP in particular. Their ability to respond to the 'lightning of the barrel' (the demand for light oil products growing faster than that for heavy oil products) in the West German market provided them with a growing outlet for their production. Rotterdam was particularly successful in exporting so-called middle distillates, i.e. gas oil, but also lighter products such as naphtha for the petrochemical industry.[695]

9.3 Expanding the hinterland

The German hinterland remained the Port of Rotterdam's primary hinterland. Moreover, it developed into the single most important oil product market for the Rotterdam refineries. These findings do not, however, clarify the effects of energy transition on the composition of the German hinterland of the Rotterdam oil port: did the composition change between 1950 and 1975 and, if so, how and why? On the one hand, it could be expected that the Rotterdam port would extend its hinterland beyond the Rhine-Ruhr area, as its oil cluster gained competitive advantages from scale and agglomeration economies in the expanding port. On the other hand, the expanding production of oil products in the Rhine-Ruhr hinterland, as well as further south along the Rhine, could have reduced the demand for oil products from Rotterdam. Moreover, throughout the period, exports from Italy, France and Belgium, to name just a few, also competed with oil flows from the Dutch port. This section takes a closer look at the destinations of oil flows from Rotterdam to the West German hinterland.[696]

As the transition from coal to oil took shape, German inland shipping statistics reported a steady rise in the volumes of oil products on West German inland

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[695] WRR, *Onder invloed van Duitsland. Een onderzoek naar de gevoeligheid en kwetsbaarheid in de betrekkingen tussen Nederland en de Bondsrepubliek* (Den Haag 1982) 56-60.

[696] This section uses data from both Dutch and German cross-border inland shipping statistics. These data are supplemented with new data on crude oil and oil product flows by pipeline. The destinations of shipments are grouped by *Verkehrsbezirke* or traffic regions, which are regional groupings used by the West German statistical office to report transportation data. The Dutch statistics used similar regional groupings, but these were changed a number of times during the research period. The German traffic regions were changed once in 1969. However, the two systems of reporting data (before 1969 and after) are incomparable. The maps of the traffic regions both before and after 1969 can be found in Appendix D: West German traffic areas. This chapter looks only at inland shipping and pipeline data; rail and road haulage were of marginal importance and represented less than 3 per cent of the total cargo flows between port and hinterland.

waterways. In 1950, a mere 3 per cent of the total volume of cargo transhipped in inland ports consisted of oil products. By 1956, that percentage had doubled to 6 per cent, and doubled again to 12 per cent in 1961.[697] Behind this rising share was an important and fundamental shift in the pattern of supply of the emerging demand for oil in West Germany (Table 9-1). In the first half of the 1950s, the growing demand for oil in West Germany was increasingly supplied from imports, which rose sharply between 1950 and 1957 (Figure 9-7). As imports grew, the share of oil products with foreign origins transhipped in West German inland ports increased from an already impressive 40 per cent in 1950 to 52 per cent in 1956 (Table 9-1). By 1961, however, this figure had declined again to 31 per cent. Rotterdam was by far the most important origin of those inflows, although its relative position fell during the 1950s from 86 per cent in 1950 to 73 per cent in 1961.

Table 9-1. Oil products with foreign origins unloaded in West German inland ports, 1950-61

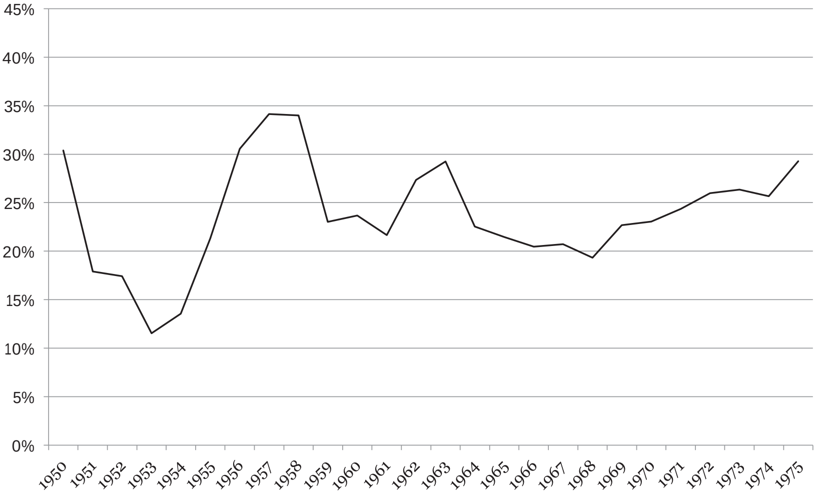
	1950	1956	1961
Oil products with foreign origins as a percentage of the total oil products unloaded in West German inland ports	40%	52%	31%
Oil products from Rotterdam as a percentage of the total oil products unloaded in West German inland ports	34%	40%	22%

Source: Statistisches Bundesamt, *Verkehr, Reihe 8 Binnenschiffahrt*, 1950-1961

The rising, and then declining, importance of oil products from foreign destinations in West German inland waterway transport can be explained by the construction of inland refineries in the Rhine-Ruhr area in the late 1950s. From the early 1950s to 1957-58, the share of oil products in West Germany's oil imports started rising sharply, from less than 15 per cent to 41 per cent in 1957 (Figure 9-8).

[697] Statistisches Bundesamt, *Verkehr, Reihe 8 Binnenschiffahrt*, Stuttgart, 1950-1961. Own calculations.

Figure 9-8. West German oil product imports as a percentage of total oil imports, 1950-75

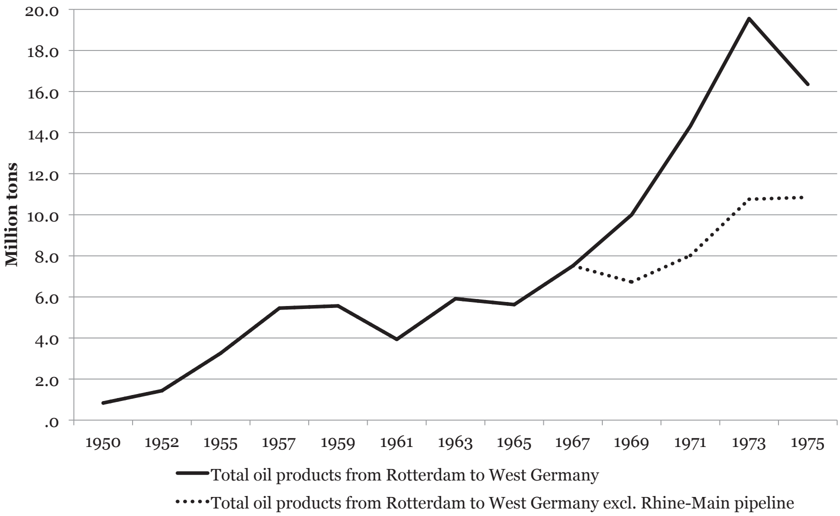


Source: Statistisches Bundesamt, *Statistisches Jahrbuch 1950-69* (1950 to 1969); Mineralölwirtschaftsverband, Daten zum Mineralölversorgung, Mineralölverbrauch, Mineralölausfuhr, http://mwv.de/index.php/daten/statistikeninfoportal, 14 May 2009 (1970 to 1975).

The refinery expansions of the late 1950s caused oil product imports to plateau, and the share of oil products in West Germany's oil imports fell back again to 20 per cent. As a result, deliveries of oil products in the country's inland ports increasingly originated from German refineries, while oil product flows from Rotterdam came to a halt and then declined between 1958 and 1961 (Figure 9-9). Then, between 1961 and 1963, West German oil product imports started to rise sharply again. However, further refinery expansions in both the Rhine-Ruhr area and further south along the Rhine in around 1963 kept inland tank shipments from Rotterdam at a stable level until 1965. From the mid-1960s onwards, West German oil product imports started rising again, as they were required to complement the domestic output of West German refiners, which struggled to keep up with demand. As a consequence, the share of oil products in West Germany's oil imports rose from 20 to 30 per cent.

Oil product flows from Rotterdam to West Germany started to rise again from 1965 (Figure 9-9). The bulk of this growth was attributable to exports via the Rhine-Main pipeline system between Rotterdam and the Main area, which became operational in late 1968. Between 1969 and 1973, the pipeline took over substantial shipments from inland tank shipping, increasing its share of landside shipments from Rotterdam to 45 per cent in 1973.

Figure 9-9. Oil products from Rotterdam to West Germany, 1950-75



Note: the data consist of oil products (excluding crude oil) transported from Rotterdam to West Germany by inland shipping and, from 1969 onwards, also by the Rhine-Main pipeline (RMR). The volumes transported from Rotterdam by rail and road tank car are negligible, and are therefore excluded.
Source: Inland shipping: Statistisches Bundesamt, *Verkehr, Reihe 8 Binnenschiffahrt*, 1950-1975; Rhine-Main pipeline: BP Archive, 21090 & 21093, RMR Progress Reports, 1968-1971. For the full data, see Appendix B: Data Table 0-10. The inland shipping of oil products between Rotterdam and West Germany, 1950-75 (in tons).

Royal Dutch Shell and British Petroleum controlled the Rhine-Main pipeline, and its rapid rise to dominance in landside oil product flows from Rotterdam to West Germany demonstrated that the international oil companies at the time still dominated the West German oil market. The decision by Royal Dutch and BP to invest in the Rhine-Main pipeline had a substantial impact on the operations of the Rhine tank fleet. Indeed, during the late 1960s and early 1970s, the entire Rhine tank fleet experienced falling freight rates and declining profit margins.[698] However, from the perspective of the Port of Rotterdam, the construction of the pipeline crafted a durable hinterland connection that gave the port permanent access to the Main area via the Rhine-Ruhr region. Moreover, the growth of demand in the Main area became increasingly important from the early-1960s onwards, particularly because it was less well served by local refineries than the Rhine-Ruhr region. Although Frankfurt boasted a refinery from 1963 onwards, it was the only one serving the local market. One of the key reasons why Royal Dutch and BP constructed the Rhine-Main pipeline was the decision to expand their Rhine-Ruhr refineries and supply the

[698] Boele and Van de Laar, *Geschiedenis Koninklijke Van Ommeren*, 81.

Main area from there rather than constructing a refinery in the location.

The various shifts in the pattern of the oil product supply in the Rhine basin translated into several shifts in the composition of the West German hinterland of the Rotterdam oil port between 1950 and 1975 (Table 9-2). Rising imports in the 1950s caused a surge in oil product flows from Rotterdam to the Ruhr area, in particular to the inland port of Duisburg, which received the majority of these flows from Rotterdam to West Germany between 1950 and 1960 (43 per cent). In the 1950s, Duisburg was by far the most important inland oil port in West Germany. In 1956, it received 17 per cent of all of the oil products unloaded in the country's inland ports. The second oil port was Mannheim, which received 11 per cent, followed by Frankfurt and Ludwigshafen, with 9 and 8 per cent shares respectively. By 1961, Frankfurt had become the largest West German inland oil port, with 13 per cent of the oil products unloaded in inland ports, followed by Duisburg with 11 per cent.[699] The drop in oil product flows from Rotterdam to West Germany that followed the construction of the Rhine-Ruhr refineries after 1959, particularly affected flows to the Ruhr and Cologne areas. Between 1960 and 1965, when oil product flows from Rotterdam to West Germany stagnated, the composition of the hinterland changed very little, save for a revival of the flows to the Cologne area, a steady growth in the flows to the Frankfurt area and a slight decline in the share of the Ruhr area.

[699] Statistisches Bundesamt, *Verkehr, Reihe 8 Binnenschiffahrt*, 1956, 1961. Own calculations.

Table 9-2. The composition of the West German hinterland of the Rotterdam oil port, 1950-75

	Volumes (mln tons)					**Share**				
	1950-55	**1956-60**	**1961-65**	**1966-70**	**1971-75**	**1950-55**	**1956-60**	**1961-65**	**1966-70**	**1971-75**
Ruhr area	1.4	5.1	6.4	10.3	14.5	30%	32%	27%	24%	18%
Düsseldorf	0.5	1.4	2.4	4.0	8.5	10%	9%	10%	9%	11%
Cologne area	0.2	1.1	3.4	8.4	19.0	4%	7%	14%	19%	23%
Bonn & Koblenz area	0.1	0.4	0.9	1.3	3.5	1%	2%	4%	3%	4%
Frankfurt & Main area	0.8	2.7	4.7	11.6	21.5	18%	17%	20%	27%	27%
Mannheim & Neckar area	1.4	3.5	3.0	3.6	5.9	30%	22%	13%	8%	7%
Upper Rhine area	0.3	1.6	2.9	2.7	4.9	6%	10%	12%	6%	6%
North German canals	0.0	0.1	0.4	1.0	1.3	0%	1%	1%	2%	2%
Other areas	0.0	0.0	0.0	0.5	1.8	0%	0%	0%	1%	2%
Total	4.7	15.9	24.1	43.4	81.0					

Note: The data consist of oil products (excluding crude oil) transported from Rotterdam to West Germany by inland shipping, and from 1969 onwards also by the Rhine-Main pipeline (RMR). The volumes transported from Rotterdam by rail and road tank car were negligible, and are therefore excluded. Although the total volume of oil products pumped through the RMR is known for the period from 1969 to 1975, the breakdown of the data into destinations is only available for the years 1969-1971. The RMR destinations for 1973 and 1975 are estimated based on the average distribution for the 1969-1971 period.
Source: Statistisches Bundesamt, Die Binnenschiffahrt im Jahre, 1950-1957; Statistisches Bundesamt, Der Verkehr in der Bundesrepublik Deutschland, Reihe 1, Binnenschiffahrt, 1958-1961; Statistisches Bundesamt, Fachserie H Verkehr, Reihe 1 Binnenschiffahrt, 1962-1975; BP Archive, 21090 & 21093, RMR Progress Reports, 1968-1971. The full data are reported in Appendix B: Data Table 0-10. The inland shipping of oil products between Rotterdam and West Germany, 1950-75 (in tons). For the composition and definition of the traffic areas, see Appendix D: West German traffic areas.

This trend persisted from 1966 to 1975: oil flows to Frankfurt, Cologne and Düsseldorf grew stronger than those to the Ruhr region, the Manheim-Neckar area and other destinations in West Germany. By 1970, Frankfurt was the most important destination for oil product flows from Rotterdam. Another striking trend was the decline in the share of the Mannheim-Neckar area. Between 1950 and 1955, flows to this region equalled the share of the Ruhr area, although that of the former quickly fell from the early 1960s onwards, especially after the construction of the refineries in Karlsruhe that were connected to the Southern European pipelines.

To compare the German hinterlands of the Rotterdam oil port and the port in general, a further clustering of the West German Rhine is required (Figure 9-10).

Figure 9-10. Sections of the Rhine in West Germany: inland shipping statistics

Source: Statistisches Bundesamt, Die Binnenschiffahrt im Jahre, 1950-1957; Statistisches Bundesamt, Der Verkehr in der Bundesrepublik Deutschland, Reihe 1, Binnenschiffahrt, 1958-1961; Statistisches Bundesamt, Fachserie H Verkehr, Reihe 1 Binnenschiffahrt, 1962-1975. The Rhine sections include tributaries and connected canals.

Table 9-3 shows that the Lower Rhine area was the most important destination throughout the period, even increasing its share from 45 per cent in 1950-55 to 53 per cent in 1970-75. Although at the lower end of the aggregation in Table 9-2, Frankfurt received the largest share of oil product flows from Rotterdam, while that of the Upper Rhine region as a whole actually fell from 53 per cent in 1950-55 to 41 per cent in 1970-75. The declining share of Mannheim/Ludwigshafen cancelled out the growing share of Frankfurt in the 1960s. The Middle Rhine was of little importance, primarily because the oil and chemical clusters were located in the Rhine-Ruhr area and near Frankfurt and Ludwigshafen.

In comparison to the total cargo flows by inland shipping from the Rotterdam port to West Germany, the hinterland of the oil port was much more extensive (Table 9-4). Although the respective shares of the Lower Rhine and Upper Rhine regions showed the same trend as in Table 9-3, the former was far more important for the total cargo flows than for the oil product flows, increasing from 72 per cent in 1950-55 to 79 per cent in 1970-75. Although cargo flows to the Upper Rhine doubled in absolute terms, its share of total cargo flows almost halved from 27 per cent in 1950-55 to 14 per cent in 1970-75. Laspeyre reached a similar conclusion in 1969 when she found that 70 per cent of goods shipped from Rotterdam to West Germany by rail, road and inland navigation were destined for the western Ruhr area.[700]

An oil product pipeline replaces barge and rail with a large central tank depot from which road tank cars cover the last mile to filling stations, industrial consumers and other local retailers. Although a pipeline delivered unrivalled transport cost reductions, the drawback was the necessity to construct one or two large tank depots or a system of branch pipelines with a number of smaller tank depots, adding substantially to the capital investment. A pipeline only made sense for the continuous transport of large volumes to a small number of central tank depots that were close to a major concentration of consumers.[701] The Rhine-Main pipeline thus led to a restructuring of oil product distribution, and, as a result, oil product flows from Rotterdam became centred on three major transhipment points: Frankfurt, Cologne and Duisburg.

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[700] Laspeyres, *Rotterdam*, 139.
[701] Heimerl, 'Neue Raffineriestandorte und Produkten-Pipelines', 535-536.

Table 9-3. Oil product flows from the Rotterdam oil port to the West German hinterland, 1950-75 (in million tons)

	Lower Rhine	Middle Rhine	Upper Rhine	Other	Lower Rhine	Middle Rhine	Upper Rhine	Other
1950-55	2.1	0.1	2.5	0.0	45%	1%	53%	0%
1956-60	7.7	0.4	7.8	0.0	48%	2%	49%	0%
1961-65	12.5	0.9	10.7	0.0	52%	4%	44%	0%
1966-70	23.7	1.4	18.1	0.2	55%	3%	42%	0%
1971-75	43.1	3.9	33.3	0.7	53%	5%	41%	1%

Source: Statistisches Bundesamt, Die Binnenschiffahrt im Jahre, 1950-1957; Statistisches Bundesamt, Der Verkehr in der Bundesrepublik Deutschland, Reihe 1, Binnenschiffahrt, 1958-1961; Statistisches Bundesamt, Fachserie H Verkehr, Reihe 1 Binnenschiffahrt, 1962-1975; BP Archive, 21090 & 21093, RMR Progress Reports, 1968-1971.

Table 9-4. The total cargo flows to West Germany by inland shipping from Rotterdam, 1950-75 (in million tons)

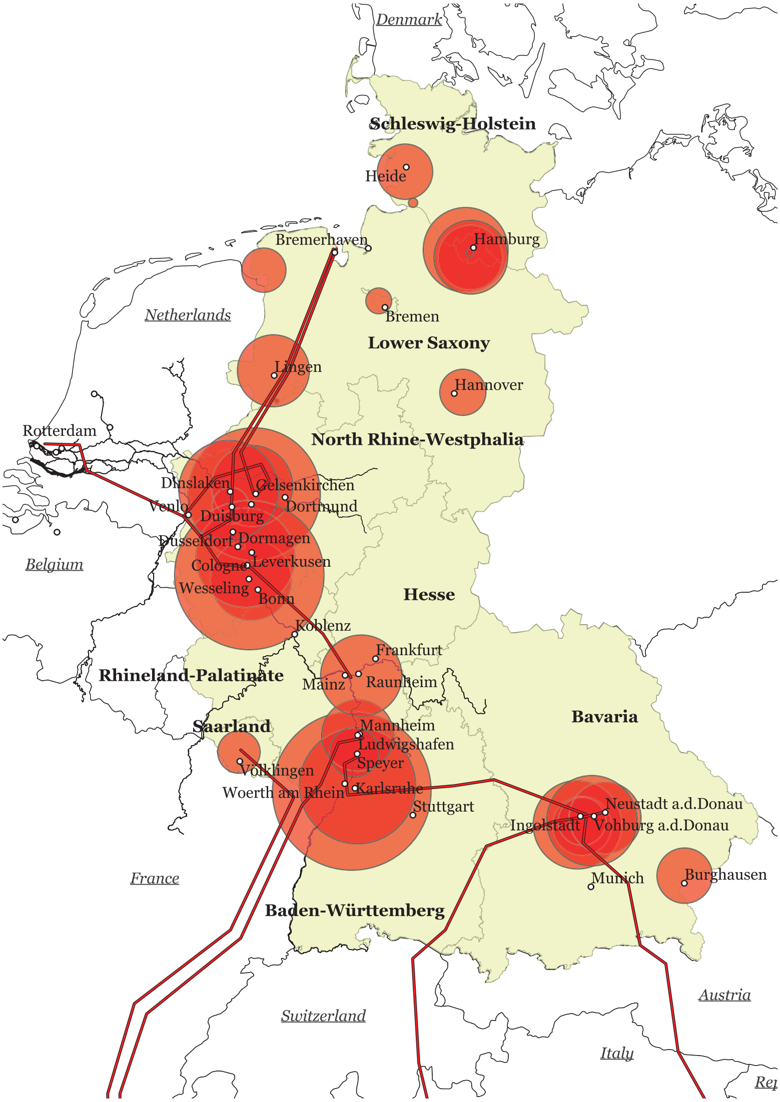
	Lower Rhine	Middle Rhine	Upper Rhine	Other	Lower Rhine	Middle Rhine	Upper Rhine	Other
1950-55	50.6	0.9	18.7	0.3	72%	1%	27%	0%
1956-60	80.7	4.9	34.3	0.9	67%	4%	28%	1%
1961-65	123.6	5.3	35.3	0.9	75%	3%	21%	1%
1966-70	165.9	11.6	31.8	1.9	79%	6%	15%	1%
1971-75	196.1	14.1	33.9	4.1	79%	6%	14%	2%

Source: CBS, Statistiek van de internationale binnenvaart, 1950-75. Own calculations.

As the largest transhipment hub in West Germany, Duisburg remained an important destination. Deutsche Shell, for instance, maintained a large tank depot in the Duisburg port. Cologne and Frankfurt, on the other hand, were primarily important as urban agglomerations, as also was the fourth largest destination, Düsseldorf. Less visible from the data, but equally important in terms of economic impact, was the supply of naphtha to the steam crackers of Bayer (Leverkusen, in the Cologne area), Hoechst (Frankfurt) and, in particular, BASF (Ludwigshafen). A stable, long-term supply of naphtha was crucial for the operations of these large chemical complexes, which remain to this day the core of these companies (although in the case of Hoechst the firm itself fragmented in the 1990s after several divestments and restructurings).

The Rhine-Main pipeline system was originally designed as a logistical solution for supplying oil products to the Rhine-Main and Rhine-Neckar areas from refineries in the Rhine-Ruhr region. By 1971, however, the largest flow of oil products through the Rhine-Main pipeline was between Rotterdam and the Rhine-Main area. The increasing importance of this area for the Rotterdam port was rooted in what has been called the oil-shed, which was an area across Western Germany where northern and southern oil pipeline systems did not reach. This relatively small band of just 125 kilometres comprised the area between Karlsruhe in the south and Frankfurt in the north and consisted of the German states of Hessen and the Rhineland Palatinate (Figure 9-11). These states also happened to be the two states with the least refinery capacity in the Federal Republic: Hessen had boasted one refinery since 1963, which was operated by Caltex and located southwest of Frankfurt; and the Rhineland Palatinate had disposed of two refineries since the mid-1960s, one in Speyer and another in Woerth. The Caltex refinery was supplied with crude oil from Rotterdam, while the Speyer and Woerth facilities were supplied from southern pipelines originating in Marseille and Trieste. Although the oil companies contemplated the idea of constructing an integrated trans-European pipeline system for crude oil in the late 1950s, in reality this did not materialise. The growing size of crude oil tankers dictated that pipelines from the North Sea enjoyed a cost advantage down to Frankfurt, while the southern pipelines maintained a cost advantage up to the Karlsruhe area.

Figure 9-11. Pipelines and refinery capacity in West Germany, 1970



Note: The circles denote the capacity of the refineries. The black lines represent crude oil pipelines. The refineries in the Ruhr, Cologne and Karlsruhe areas were the largest in the Federal Republic.
Source: W. Molle and E. Wever, Oil Refineries and Petrochemical Industries. Buoyant Past, Uncertain Future (Aldershot 1984) 164-169.

As a result of the oil-shed, the Rhineland Palatinate and Hesse were relatively less well served by local refineries than the other states of the Federal Republic throughout the period. Table 9-5 shows the refinery capacity per capita in the states of the Federal Republic between 1950 and 1970.

Table 9-5. The refinery capacity in West German states, 1950-70 (in tons per capita)

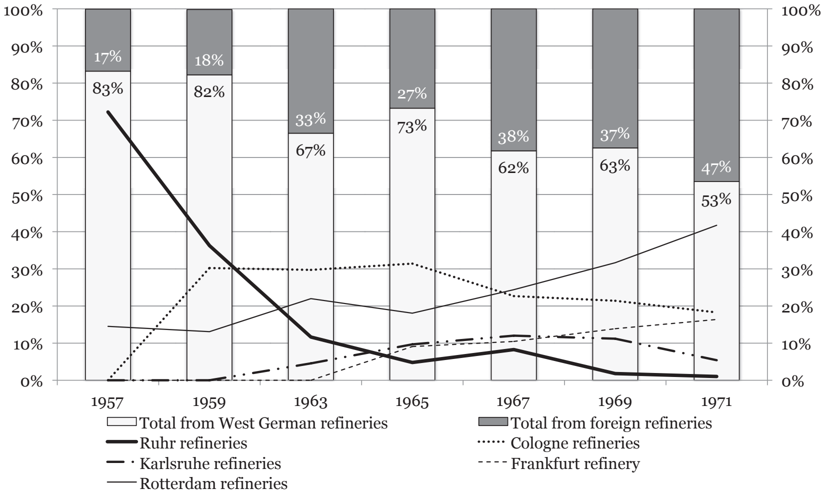
	1950	1955	1960	1965	1970
Baden-Württemberg	0.0	0.0	0.0	1.0	2.1
Bavaria	0.0	0.0	0.0	1.1	2.1
Bremen	0.9	1.1	2.0	2.0	1.9
Hamburg	1.1	2.7	4.3	5.0	7.0
Hesse	0.0	0.0	0.0	0.4	0.8
Lower Saxony	0.1	0.2	0.5	1.1	1.3
North Rhine Westphalia	0.1	0.4	1.4	1.8	2.3
Rhineland Palatinate	0.0	0.0	0.0	0.7	0.7
Saarland	0.0	0.0	0.0	0.0	2.1
Schleswig-Holstein	0.0	0.3	0.7	1.5	1.4

Source: Refinery data: W. Molle and E. Wever, *Oil Refineries*, 164-169; population data: Jürgen Sensch, (1947-2005 [2007]) histat-Datenkompilation online: Bevölkerungsstand, Bevölkerungsbewegung, Haushalte und Familien in der Bundesrepublik Deutschland 1947 bis 1999. GESIS Köln, Deutschland ZA8200 Datenfile Version 2.0.0, http://www.gesis.org/histat/de/project/details/413B42498BD990E2258A7F58DDA682D6, 2 April 2014.

Although only Bremen and Hamburg had refinery capacity to speak of in 1950, by 1965 and 1970 all German states had refineries serving the internal demand for oil. The least self-sufficient states by some distance were Hessen and the Rhineland Palatinate, leaving considerable demand for supplies from other states or foreign origins. The Rhine-Main pipeline was designed to service that demand, but as the West German refineries began to struggle to keep up (between 1965 and 1970, total refinery capacity was less than total consumption), supplies from the Rhine-Ruhr area were complemented by imports from Rotterdam.[702] The position of Rotterdam in the Rhine-Main area was therefore strengthened by the existence of the oil-shed, which was in itself the result of the Rotterdam port gaining a competitive advantage over other ports in supplying the Frankfurt area with crude oil. As one of the largest urban agglomerations in the Rhine basin that was least served by local refineries, Frankfurt largely relied on other areas for its supply of oil products, and increasingly those with foreign origins (Figure 9-12). Before the refinery expansions in the Rhine-Ruhr area, the Ruhr refineries, comprising the former hydrogenation plants in Gelsenkirchen, supplied 70 per cent of Frankfurt's oil product requirements. Additional supplies came from tank depots in Duisburg (not included in Figure 9-12) and Rotterdam.

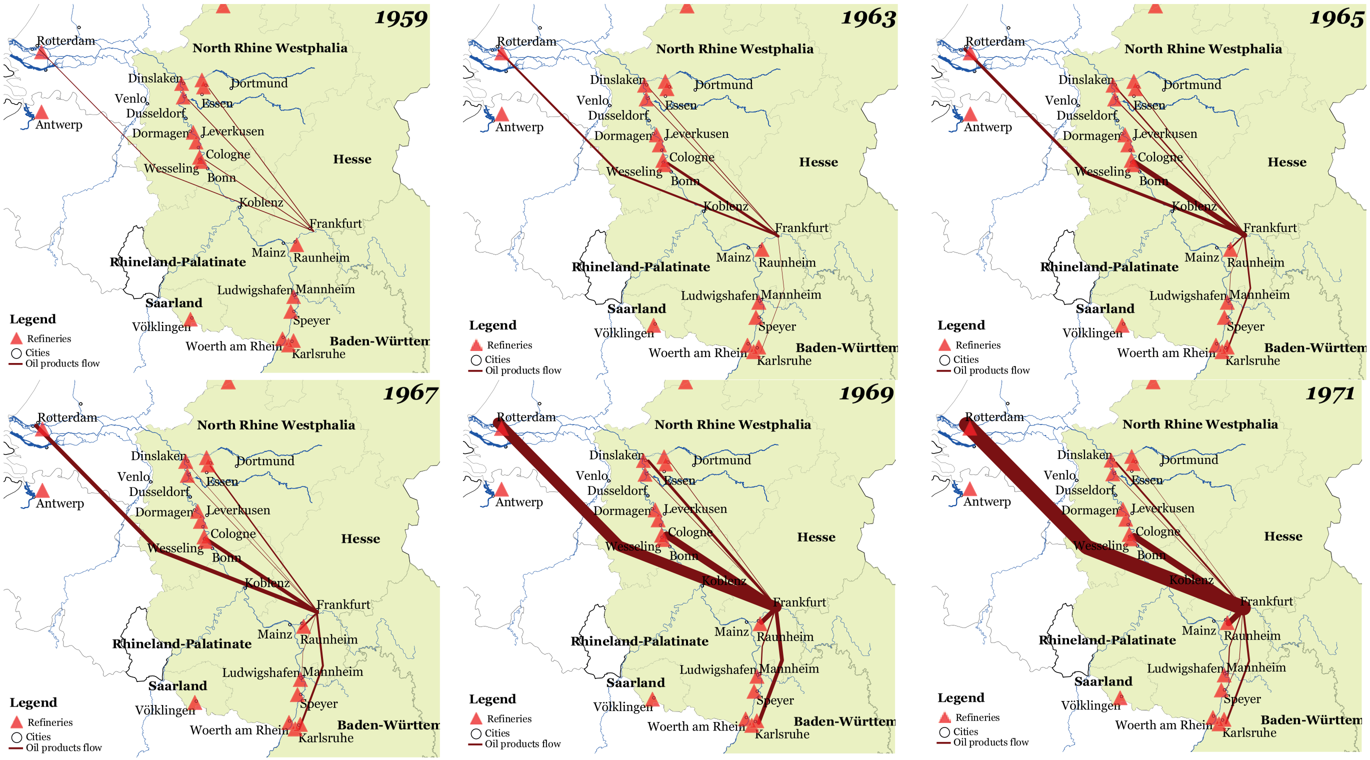
[702] See Figure 9-12.

Figure 9-12. The supply of oil products to the Frankfurt area, 1957-71



Note: The data on supplies are based on inland shipping data on delivered oil products (motor fuels and fuel oil) in the Frankfurt area (*Frankfurt Wirtschaftsgebiet*), supplemented with data from RMR deliveries (for the years 1969 and 1971). For the years 1969 and 1971, RMR transport was added to the flows from relevant traffic areas. Rail statistics were not included because rail shipments of oil products to Frankfurt were insignificant. This was because of the cost advantage of inland shipping over rail. Truck data were omitted because these typically involve intra-area transport (the last mile to the final customer).
Source: Statistisches Bundesamt, *Verkehr, Reihe 8 Binnenschiffahrt*, Stuttgart, 1957-1975; BP Archive, 21090 & 21093, RMR Progress Reports, 1968-1971 (RMR data). The data are reported in Appendix B: Data Table 0-11.

Figure 9-13. Oil product flows to the Frankfurt area, 1959-71 (in million tons)



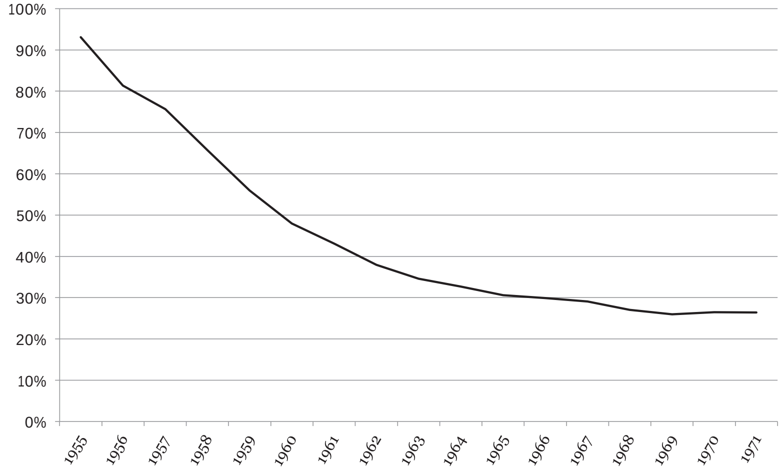
Note: The red triangles denote refineries. The lines represent oil product flows, and the size represents the volume. Exact volumes are not reported for the sake of clarity. The maps are designed to convey the relative proportions of the flows rather than the absolute volumes. The lines do not represent actual transport routes. The years were chosen based on ruptures in the supply pattern: 1959 was the last year before the Rhine-Ruhr refinery capacity was expanded; 1967 was the last year before the RMR started operating; it was at full capacity in 1971.
Source: Statistisches Bundesamt, *Verkehr, Reihe 8 Binnenschiffahrt*, Stuttgart, 1957-1975; BP Archive, 21090 & 21093, RMR Progress Reports, 1968-1971 (RMR data). The data are reported in Appendix 8.

By 1963, the supply pattern changed after refineries in Cologne and the Karlsruhe area started operating between 1959 and 1963. Of the West German refineries, Frankfurt received the majority of its oil products from the Cologne area, followed by flows from the Ruhr region and Karlsruhe. However, because the refinery expansions of the late 1950s and the 1960s were aimed at supplying burgeoning West German demand, increasing amounts of oil product supplies to Frankfurt were imported, jumping from 18 per cent in 1959 to 33 per cent in 1963, of which Rotterdam supplied two thirds. The only refinery in the Frankfurt area, which was located southwest of Frankfurt and operated by Caltex, became operational in late 1963, after which it supplied a rising, but relatively small, share of Frankfurt's oil product requirements, illustrating the problem of local supplies.[703] Notwithstanding the growth in supplies from the Caltex refinery and refineries in the Karlsruhe area, increasing volumes of oil products were obtained from Rotterdam over the course of the 1960s (Figure 9-13), leading to the opening of the Rhine-Main pipeline from the port in late 1968. Although the Rhine-Main pipeline also provided access to the Frankfurt area for the BP refinery in Dinslaken on the Lower Rhine and Royal Dutch Shell's facility in Cologne-Godorf, it was particularly beneficial for the Rotterdam refineries of BP and Royal Dutch, as the West German refineries focussed on domestic demand. Rotterdam's share of oil product supplies to Frankfurt jumped as a result, from 24 per cent in 1967 to 32 per cent in 1969 and 42 per cent in 1971, turning the port into the single most important supplier of oil products to the Frankfurt area.

The foregoing suggests that Royal Dutch Shell was a major player in the Rotterdam port in general and key in shaping the hinterland access infrastructure for the Rotterdam oil port in particular. Its image as a major player is further strengthened by its share of oil product flows from Rotterdam to West Germany (Figure 9-14).

[703] The Caltex refinery was supplied by an extension of the Rotterdam-Rhine pipeline, but struggled with high transportation costs and low profit margins from the start. The refinery closed down in the early 1980s after sluggish demand in the wake of the 1970s oil crises dealt the final blow to the refinery. Source: 'Öl-Industrie – Gründlich verschätzt', *Der Spiegel*, 23 August 1982, 56.

Figure 9-14. The volume of oil products shipped by Royal Dutch Shell as a percentage of the total oil product flow from Rotterdam to West Germany, 1951-71 (5-year moving average)



Source: Method of calculation: the Royal Dutch Shell transportation of oil products from Rotterdam to West Germany by its captive fleet of inland tank ships (VOA, 1260/86-89, Vervoersstatistieken Internationale 1947-1975) plus Royal Dutch Shell's share of the RMR transport from Rotterdam to West Germany (BP Archive, 21090 & 21093, RMR Progress Reports, 1968-1971) divided by the total flow of oil products from Rotterdam to West Germany (derived from RMR data and Statistisches Bundesamt, *Verkehr, Reihe 8 Binnenschiffahrt*, Stuttgart, 1951-1971). Because no RMR data was available after 1971, the graph ends then.

The total volume of oil products shipped from Rotterdam to West Germany on account of Royal Dutch Shell grew from 0.4 million tons in 1955 to 3.5 million tons in 1971.[704] Although Royal Dutch's share of the total oil product outflows to West Germany fell from around 90 per cent to around 25 per cent in the late 1960s and early 1970s, Figure 9-14 clearly demonstrates that this company was, and remained, a major player in the Rotterdam oil port.[705] Moreover, the manner in which Royal Dutch organised this sizable flow of oil products greatly affected the development of the hinterland infrastructure of the Rotterdam port. When, in 1968, the opportunity arose to connect Rotterdam to the Rhine-Main pipeline, Royal Dutch wasted little time and replaced its already ailing captive fleet on the Rhine with a pipeline.

[704] VOA, 1260/86-89, Vervoersstatistieken Internationale 1947-1975; BP Archive, 21090 & 21093, RMR Progress Reports, 1968-1971; Statistisches Bundesamt, *Verkehr, Reihe 8 Binnenschiffahrt* (Stuttgart 1955-1971).
[705] The declining share is of course explained by the arrival of other major refiners in the port during the 1960s: Esso in 1960,

9.4 Conclusion

The Rotterdam oil port was highly internationalised as long ago as the early 1950s. This was due to Royal Dutch Shell's balancing refinery in Rotterdam-Pernis, which imported crude oil and intermediate oil products and exported a large share of its production.[706] The relationship between the Rotterdam oil port and the West German hinterland consisted of two functions, transit and production. Transit involved the transhipment of West German crude oil imports via Rotterdam. This function was already well developed at an early stage, with the vast majority of crude oil in transit destined for West Germany, although the volume was low in the early 1950s. The second major port expansion after World War II, Europoort, was directly related to the transit of West German crude oil imports. Europoort was originally intended to facilitate a crude oil pipeline to the Rhine-Ruhr area in the late 1950s by expanding the port out west in the search for deeper waters to accommodate larger crude oil tankers. Although the Europoort expansion created much more than just a transhipment facility, its success in adapting the port to the ever-increasing size of crude oil tankers in the 1960s put Rotterdam in a favourable position as a major crude oil transhipment hub for Northwest Europe. In the process, the importance of crude oil transit shipments to West Germany became relatively less important for Rotterdam's oil port, as transit shipments to Antwerp by pipeline, and to other North Sea and Baltic Sea ports by maritime shipping, expanded in the course of the late 1960s and early 1970s.

The productive function of the Rotterdam oil port was a different story. The importance of the West German hinterland for Rotterdam's oil port was modest in the early 1950s. At the time, motor fuels dominated the West German oil market. Although consumption was steadily rising as immediate post-war problems were overcome, and despite the fact that the Allied occupation authorities, the Marshall Plan and the nascent Federal Republic helped to boost the country's oil industry, Western Germany's oil market was still relatively small. Consequently, oil product exports from Rotterdam to West Germany were a sizable, but modest, share of total oil product exports from the Dutch port. This changed dramatically after West Germany opened up to foreign fuel oil imports, which started pouring in at a growing rate, especially in the wake of the 1956 Suez Crisis. Rotterdam joined in with this frenzy and saw its share of exports to West Germany rise. The West German share did, however, decline somewhat, as refinery expansion in the Rhine-Ruhr area took over heavy fuel oil supplies in the region from the late 1950s and early 1960s onwards.

Attempting to stem the competition between coal and heavy fuel oil, the West

[706] Between 1957 and 1963, the Pernis refinery exported on average 70 per cent of its production. The throughput data of the Rotterdam port suggest that this was also the case early in the 1950s. (Source: SHA, inv 976, file 114, Statistical data on Shell Nederland Raffinaderij NV, 1)

German government imposed several limitations on the production and importation of the latter. However, the rising demand for light fuel oil proved less easy to contain, growing faster than for any other oil product in the 1960s. West German refiners struggled to keep up with demand and the country's oil product imports continued to rise throughout the 1960s and early 1970s, particularly with respect to light fuel oil. The West German share of total Rotterdam oil product outflows rose accordingly, to 50 per cent in 1973. The growing importance of the West German hinterland for the Rotterdam oil port thus followed the path of West Germany's transition from coal to oil, and the respective changes in demand and supply were part of this. However, it is going too far to state that West German demand was driving the growth of Rotterdam's oil port; the refineries in the port fed many other markets in Western Europe and often served specific purposes within their corporate groups. Nevertheless, on the whole, an increasing share of the port's exports was destined for West Germany, which in the process became by far the most important market for exports from Rotterdam.

Conversely, Rotterdam was also important to West Germany. With two pipelines, the Port of Rotterdam had enduring access to the West German hinterland. These pipelines fixed some of the oil supply flows to West Germany, making the Rotterdam port vital for the West German economy. As a transhipment port for crude oil, Rotterdam carved out a share of 20 to 25 per cent of West German crude oil imports in the 1960s and early 1970s. It gained an even larger share of around 40 to 50 per cent of West German oil product imports. Crucial was the Rhine-Main pipeline system that connected the Rotterdam oil port with the Rhine-Ruhr and Rhine-Main areas and Ludwigshafen from 1968 onwards. The Rhine-Main pipeline answered the need for imports of sizable volumes of oil products for the West German oil market, thereby expressing the importance of Rotterdam's oil port for West Germany.

On the whole, the data presented in this chapter seem to indicate that West Germany was more important for Rotterdam than vice versa. Once the German energy transition took off in the late 1950s and early 1960s, the Rotterdam share of West German oil imports declined. Although this share gradually increased again over the course of the 1960s, not least because of the pipeline infrastructure that was put in place, the importance of West Germany for Rotterdam's oil exports was much greater. By the late 1960s, around half of all oil product exports from Rotterdam flowed to West Germany. There thus seems to be stronger evidence for the conclusion that German demand for oil fuelled the growth of the Port of Rotterdam than for the claim that the port fuelled the West German economic miracle. The *Wirtschaftswunder* was highly significant for the development of Rotterdam's port, and the West German energy transition did accelerate port expansion in the late 1950s and 1960s, which first and foremost reconfirmed the historical importance of the

German hinterland for the Rotterdam port. The composition of that hinterland, however, differed greatly between that of the port in general and the oil port in particular.

Over the period under consideration, the dominance of the Lower Rhine area in terms of oil product flows from Rotterdam to West Germany rose, while the share of flows to the Upper Rhine area fell. However, the share of the Upper Rhine in terms of oil product flows was much higher than for total cargo flows from the Rotterdam port, which remained strongly concentrated on the Rhine-Ruhr area. The partial shift in the composition of Rotterdam's West German hinterland was the result of the geographical evolution of the hinterland infrastructure. The interplay between the costs of transporting crude oil by maritime tankers and pipelines was such that the crude oil pipeline system serving West Germany was not fully integrated, instead remaining divided by an oil-shed, which was a 125 kilometre stretch between Frankfurt and Mannheim where the southern and northern pipeline systems did not reach. As they were at the end of both of these pipeline systems, the urban areas of Hesse and the Rhineland Palatinate disposed of relatively less refinery capacity than most other urban and industrial agglomerations in West Germany. Moreover, growing demand for petrochemical feedstock in the Rhine-Ruhr, Rhine-Main and Rhine-Neckar areas gave rise to increasing flows of naphtha. Large volumes of oil products were therefore shipped between those areas and additional supplies were sourced from Rotterdam. The Rhine-Main pipeline system transported those volumes and provided a fixed and enduring connection between Rotterdam and the Rhine-Main region, making the Dutch port the largest supplier of oil products to the Frankfurt area by the late 1960s.

Chapter 10 Final conclusions

This study has aimed to redress the limits of the local and national perspectives that have dominated the post-war historiography of both the Port of Rotterdam and the Ruhr area. Adopting a transnational perspective, the book has instead attempted to look at the connections between the respective histories, questioning how and why the transition from coal to oil affected the relationship between the Rotterdam port and the German hinterland. Three distinct areas of change were identified: the economic composition of the hinterland and its impact on the demand for transportation; the adaptability of the port and hinterland infrastructure in response to economic change in the hinterland; and the extent to which changes in transport demand and the infrastructure affected both the relationship of Rotterdam's oil port to the German hinterland and the latter's composition.

10.1 The transition of the German hinterland

Chapters 2, 3 and 4 questioned how and why the transition from coal to oil affected the demand for transport in the Rhine-Ruhr hinterland. This transition transformed the Rhine-Ruhr area fundamentally from the mid-1950s onwards. After the 1958 coal crisis, the Ruhr coal industry suffered a prolonged decline and was unable to match the competition from oil. Simultaneously, the Rhine-Ruhr area became a major industrial and consumer market for oil, with the region subsequently developing into West Germany's largest concentration of the oil and petrochemical industry.

Explaining the transformation of the Rhine-Ruhr economy is more complex than describing how it transformed. The roots of the energy transition were firmly established during the Allied occupation of Germany between 1945 and 1949. The Rhine-Ruhr area had been a key industrial region for Hitler's war economy, and many of its industries and plants had performed strategic tasks for the military. The Allies, in particular the Americans, sought to break the power of the area's industries by dismantling and decartelising the coal, steel and chemical sectors. Although the Allied occupation authorities attempted to increase the production of the Ruhr coal industry, the Americans devised ways to increase the consumption of oil, both as a means to resolve the energy shortages that hampered German reconstruction after 1947 and as a way to reduce Germany's dependence on domestic coal. However, for that policy to succeed, the Allied authorities needed the very chemical and oil facilities that were listed for dismantling. Plants established during the 1930s became key components in the Allied energy policy after 1947, re-establishing them as essential producers of fuels, fertilisers and electricity, among other commodities. The Bizonal Refinery Plan and its subsequent adoption under the Marshall Plan laid the foundations for an expanded Western European oil industry fuelled by the Anglo-

American controlled, and rapidly rising, oil production in the Middle East. Simultaneously, the coal policies of the Allied authorities hampered the reconstruction of the Ruhr coal industry and laid the foundations for its decline.

The Allied refinery expansion program in West Germany and Western Europe coincided with two major shifts in the global oil industry. A US national policy change in 1946 dictated that the US would strive to be self-sufficient in oil, only allowing imports from the Western hemisphere. Simultaneously, American oil companies manoeuvred to gain a major stake in Middle Eastern oil fields, uncovering an enormous oil reserve, demand for which had to be created, and was found, in Western Europe. The necessary rehabilitation and expansion of refining and marketing capacities in Europe to absorb the expanding production in the Middle East was partially accomplished under the Bizonal Refinery and Marshall plans. As a consequence, West German refinery capacity expanded from little more than 3 million tons at the end of World War II to 14.7 million tons in 1955. The Rhine-Ruhr area represented 32 per cent of West Germany's refinery capacity, up from around 10 per cent before the war. The Ruhr coal mining industry was less fortunate and faced reorganisation, which did little to help the outmoded production methods, chronic lack of investment and slow recovery of the industry. The situation was prolonged by the system of controlled low prices, which was enforced first by the Allied authorities, then by the federal government, and from 1953 to 1956 by the European Coal and Steel Community.

The energy crisis of 1950-51 laid bare the vulnerability of the Ruhr coal mining industry when it proved unable to adapt to the market and keep up with economic growth. The federal government responded by unleashing market discipline through the reduction of import duties on US coal and fuel oil. When the Federal Minister of Economic Affairs Ludwig Erhard declared in the mid-1950s that "[t]he competition between energy sources that we pursue, will result in a more efficient energy supply in the long run", he opened the West German economy up to an inflow of foreign oil and investment and triggered the take off of the transition from coal to oil.[707] Overproduction, declining prices and falling transportation costs in the wake of the 1956 Suez Crisis coincided with an economic down-cycle and rising coal prices, creating a crisis of unexpected magnitude in the Ruhr coal mining industry in 1958. As oil companies, both international and domestic, started planning new refineries in the Rhine-Ruhr area to supply the growing demand for fuel oil, Ruhr coal stocks piled up and the coal industry descended into a prolonged crisis.

Although the federal government attempted to stymie the displacement of

[707] Quoted in: M. Horn, *Die Energiepolitik des Bundesregierung*, 201. Original quote: "Die von uns geförderte Konkurrenz der Energieträger untereinander wird auf die Dauer zu einer besseren und wirtschaftlichen Energieversorgung führen."

coal by oil after the 1958 coal crisis, the demand for the latter could no longer be contained. The ordoliberal writ posed that the state served to guide technological change along its path of development, but the 1956 liberalisation of fuel oil imports was not meant to compete with coal head on; coal was to remain the core of the German energy supply, with fuel oil (and in due course nuclear power) meeting marginal demand, thereby allowing for rapid economic growth based on cheap energy; such was the broad perception of the future German energy balance at the time. However, once industries and households started to enjoy the lower prices and the more convenient fuel oil, coal became threatened in its core markets, industry and domestic heating. Although initial measures to stem the onslaught of fuel oil were directed at heavy fuel oil (the *Kohle-Öl Kartell* of 1958-9, direct taxation of fuel oil from 1960 onwards), light fuel oil consumption grew much faster. After the 1957 Treaty of Rome and the establishment of the EEC, which had the aim of reducing direct subsidies for industries and firms, the federal government attempted to restrict the growth of oil consumption by self-limitation and a system of licensing for new refineries and pipelines. These measures were, however, all to no avail, particularly in the case of light fuel oil.

The implications of the transition on the demand for transport in the Rhine-Ruhr area were considerable, as oil and petrochemical plants grew both in number and size from the early 1950s onwards. The presence of chemical complexes and the reactivated synthetic fuel and rubber plants in the region were important loci for growth and provided continuity in terms of geographical locations and the actors involved. This stability provided geographical pull locations to which new oil and petrochemical investments gravitated, developing a transport demand in the Rhine-Ruhr hinterland. The case of Royal Dutch Shell in Germany clearly illustrated this point. Its German subsidiary, Deutsche Shell, profited from the reactivation of the former hydrogenation plant of Union Kraftstoff in Wesseling, which started refining for Deutsche Shell in 1948. Subsequent location decisions with respect to refinery expansions in West Germany favoured the Wesseling area from this point onwards. The byproducts from that refinery contract allowed the establishment in 1953 of Rheinische Olefinwerke, which was the first petrochemical plant in West Germany. As Olefinwerke expanded to meet rising demand for plastics in the late 1950s, Deutsche Shell decided in 1960 to build its new refinery next to the plant, instead of somewhere further south along the Rhine. Further expansion of Olefinwerke in the early 1960s also required the expansion of the Cologne-Godorf refinery in 1965, instead of the construction of a new refinery in the Frankfurt or Karlsruhe areas. Input-output relations between oil refineries and petrochemical plants fostered clustering, while the subsequent utilisation of economies of scale led to the concentrated growth of transport demand in the Rhine-Ruhr hinterland for both crude oil and oil products. As a consequence, a historical accident could have major implications. The economies of scale and scope that characterise the oil and petrochemical industry were the drivers behind infrastructural and logistical scale shifts that transpired in Rotterdam's oil port and its hinterland connections.

10.2 Pipelines to the hinterland

Chapters 5, 6 and 7 questioned the extent to which the Port of Rotterdam was successful in adapting itself and the hinterland infrastructure to the energy transition in the hinterland, what the constraints on adaptation were and how these were overcome. The strong relationship between the Rotterdam port and the Rhine-Ruhr area did not seem to extend beyond the Rhine. The growing demand for oil in the hinterland required a new transport infrastructure: pipelines. Whereas the Rhine was geographically fixed and institutionally embedded in the supranational framework of the Central Commission for Navigation on the Rhine, the new pipeline infrastructure lacked any such regional embeddedness. Pipeline economics revealed that a number of ports could be used to supply crude oil to the Rhine-Ruhr area by pipe. In the mid-1950s, pipeline plans emerged that featured the German North Sea port of Wilhelmshaven, Rotterdam and Marseille. Rotterdam had no decisive advantages over the other two ports, and the pipeline plans of the mid-1950s accentuated the risks of relying on a foreign hinterland. Whereas the federal German government was inclined to accommodate Rotterdam's position in Rhine shipping, it felt no obligation whatsoever to accommodate the Dutch interest in establishing a pipeline connection between Rotterdam and the Rhine-Ruhr area. In other words, the consideration of different options for a pipeline system did not contain any decisive argument to opt for Rotterdam. Given this precarious position, Rotterdam had few options to advance its position or increase its chances of obtaining the pipeline connection.

The Port of Rotterdam did, however, have two potential allies, the Dutch government and Royal Dutch Shell. Both supported the port, but their opportunities to foster real influence in pipeline planning diverged, as did their respective interests. The Dutch national government supported Rotterdam's claim that the pipeline was in the national interest, but its ability to advance Rotterdam's cause for a pipeline connection was limited. Dutch Foreign Office personnel gathered information in West Germany, discussed the pipeline plans with Royal Dutch Shell and frequently exchanged information with Rotterdam City Council and the Municipal Port Authority, but did little beyond that; it simply lacked the means and arguments to go further.

Royal Dutch Shell also supported Rotterdam's port and frequently expressed its preference for it to host a pipeline to the Rhine-Ruhr area. However, Royal Dutch was a multinational enterprise, and was constantly weighing its regional, national and transnational interests. Although the company repeatedly signalled its support for the

Port of Rotterdam, it was not inclined to invest in the city if alternatives proved to be more attractive. Efforts by Royal Dutch and British Petroleum to destabilise the German pipeline consortium by promoting Rotterdam were primarily aimed at foiling the German plan to the benefit of Royal Dutch's trans-European pipeline proposal. Although discussions between the Dutch government and Royal Dutch revealed that the former was quite open to the Anglo-Dutch multinational, the company did not seem to have a preconceived goal of choosing Rotterdam out of a sense of national (Dutch) loyalty.

The trans-European pipeline plan was equally threatening to the position of Rotterdam's port, because it aimed to supply northwestern Europe, including the Rhine-Ruhr area and the Port of Rotterdam, with crude oil via the French Mediterranean Port of Marseille. However, the lack of legislative, fiscal and trade harmonisation between Western European countries, combined with general economic uncertainty at the time and discord over timing and tariffs within the consortium, ended the trans-European pipeline prematurely, to the benefit of Rotterdam. With less perceived friction between Western European national institutional frameworks, the trans-European pipeline project might have stood a greater chance of success. However, at the time, the Treaty of Rome had put forward a proposal that was yet to bear fruit. Other than in name, there was no Common Market in 1957.

The European fragmentation was not reserved for its political structure; European enterprises were also highly fragmented, with the production units in most countries tailored to serving domestic demand. This was a consequence of the disjointed landscape of idiosyncratic national markets that developed out of the disintegration of the First Global Economy on the eve of World War I. One of the key aims of US foreign policy in Europe after World War II was to clear away the rubble of this economic disintegration after 1914 by bringing about European economic integration.[708] Many multinationals in Europe inherited a corporate structure from the pre-war and war period in which national operating companies enjoyed a high degree of autonomy. For oil companies, forging a planning perspective at the European level might very well have suffered from the national perspective of their operating subsidiaries on the one hand, and the fragmented legal context on the other. Whereas most oil company operations were organised and operated at the national level, the pipeline was one of the few truly transnational projects undertaken by private firms at the time in Europe. Spearheaded by two multinationals, Royal Dutch Shell and British Petroleum, the trans-European pipeline project showed that European multinationals saw European fragmentation as much of a barrier to doing

[708] R. Geven, *Transnational networks and the Common Market – business views on European integration, 1950-1980* (Maastricht 2014) 260-261.

business as their American counterparts did.

It was only when the trans-European pipeline project faltered that the option of a Rotterdam-Rhine pipeline become attractive to Royal Dutch. This was both an important boost of confidence and an opportunity for the Port of Rotterdam, because it not only obtained its prized pipeline, but was also encouraged by Royal Dutch to accelerate the Europoort expansion plan in 1957. This is not to say that the future of Rotterdam's port hinged solely on the pipeline connection; Europoort hosted a number of other industries that would have contributed to paying the huge capital costs that the port authority incurred for its investment in the Europoort expansion, most importantly iron ore transhipment and the establishment of oil refineries and related industries. However, given that the port made most of its revenue from port dues – docking ships – not having a pipeline, or having a pipeline that supplied crude oil from Marseille, would have meant a substantial loss of income. The oil sector was therefore an important target industry for the port authority and the pipeline an important project. Indeed, it was experienced by the port authority as a litmus test for its stated objective to become a major oil port and the gateway to Europe.

The long-term impact of Royal Dutch Shell's decision to choose Rotterdam to serve the Rhine-Ruhr area was huge, leading to the construction of the Rotterdam-Rhine pipeline and the strengthening of the case for the Europoort expansion. This in turn provided the opportunity to expand the Rotterdam-Rhine pipeline, which subsequently made the connection of this pipe to the Rhine-Main pipeline possible, tying Rotterdam into the supply network of refineries and petrochemical plants from the Lower Rhine to the Rhine-Main and Rhine-Neckar areas. The collection of separate regional pipelines that emerged from the efforts of the trans-European pipeline plan cemented the position of the Rotterdam oil port vis-à-vis the German hinterland over the long term. The division of the central European hinterland between a southern and a northern pipeline system solidified as super tankers gave Rotterdam a decisive cost advantage over Mediterranean ports up to Frankfurt. A fragmented Europe was therefore as much a threat to as an opportunity for the Dutch port.

As an actor negotiating the various scales Royal Dutch Shell was crucial for the development of the Rotterdam oil port. The vested interests of Royal Dutch in Rotterdam, the Rhine and the Rhine-Ruhr region cemented relations between the company and the Port of Rotterdam. Royal Dutch managers inspired port authority planners to think big, and the latter often highlighted the importance of Jan Willem Ernste, the director of the Shell refinery at Pernis in this regard.[709] Through the alliance between Royal Dutch and the Port Authority, Rotterdam was able to keep a

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[709] W.F. Lichtenauer, 'Ernste, Jan Willem (1899-1971)', in: *Biografisch Woordenboek van Nederland*. http://resources.huygens.knaw.nl/bwn1880-2000/lemmata/bwn2/ernste, 14 April 2014.

foot in the door during the years that the chances of becoming the oil port of the Rhine-Ruhr area, and even Western Europe, seemed slim. As a transnational actor operating in diverse institutional frameworks, Royal Dutch Shell was able to mitigate the risks involved in realising hinterland access infrastructure across a political border.

A case study method runs the risk of bloating the role of the investigated company to the detriment of other firms that were not examined. Although Royal Dutch Shell was undoubtedly important for the Rotterdam oil port, it was not the only (oil) company active on a large scale in both port and hinterland; Jersey Standard, British Petroleum, Caltex and Gulf were the other major oil firms operating refineries, tank depots and transport modes in the Lower Rhine region. Even so, Royal Dutch boasted the longest presence in both the port and the hinterland. Moreover, Municipal Port Authority directors looked upon Royal Dutch as a leading company. The firm also played a key role in the planning, construction and ownership of the Rotterdam-Rhine and Rhine-Main pipelines.

10.3 The German hinterland

Finally, chapters 8 and 9 questioned how the transition of the hinterland and the adaptation of the transport infrastructure affected the composition of the hinterland of Rotterdam's oil port. Firstly, the energy transition changed the composition of the cargo flow through the port and subsequently altered the flows between port and hinterland. Land-based inflows hardly grew at all throughout the period, while land-based outflows grew rapidly as iron ore, crude oil and oil products flowed to the hinterland. In terms of destinations and origins, West Germany became of marginal importance for cargo inflows, while it remained by far the most important destination for cargo outflows throughout this time. Rotterdam thus became much less important for German exports than it had been in the pre-war period; German imports came to dominate the port-hinterland relationship in the post-war era. In particular, for the Rotterdam oil cluster, West Germany became the single most important market. The German economic miracle, and the transition from coal to oil that accompanied it, gave a strong impetus to the growth of the Rotterdam oil port, as testified by a growing share of oil product exports from Rotterdam flowing to the German hinterland from the mid-1950s until the early 1970s. Whether Rotterdam's oil port fuelled the German economic miracle seems less clear. Competition from other ports for the supply of Germany's demand for oil initially reduced Rotterdam's share of West German imports in the late 1950s and early 1960s. The implementation of a pipeline infrastructure did, however, stabilise and even increase Rotterdam's share somewhat over the course of the 1960s and early 1970s. The conclusion that Rotterdam responded to, rather than drove, the West German energy transition therefore seems to be warranted, which confirms the historical importance of the

West German hinterland for the Rotterdam port, even though the latter hoped that the post-war era would reduce this dependence.

In that respect, the post-war evolution of the Port of Rotterdam and its hinterland relations seem to be embedded in a path-dependent development that started with the port's initial growth in the late 19th century. As Rhine freight rates were falling relative to railway freights in the 1880s and 1890s, the Port of Rotterdam became the single largest bulk port in Europe, fuelled by the bulk imports and exports of Ruhr industry. As the port's economy was heavily reliant on the transhipment of a few bulk commodities, it suffered greatly from disturbances to trade and transport relations with the German hinterland. Seeking to break the dependence on German transit flows, Rotterdam City Council pressed on with an industrialisation program in the 1930s. Dominated by bulk cargoes, the port's management had developed a business philosophy based on tonnage maximisation, which also came to underpin the industrialisation of the port. The Port Authority carefully selected its industrial tenants on the basis of this principle; the scarce land in the port area should yield the highest possible volume of cargo. Employment was important too, but when the Dutch labour market became tight in the 1960s, tonnage maximisation remained the leading principle.

In terms of industries, the Port Authority focused in particular on the oil and petrochemical and steel sectors. Although the oil and petrochemical cluster could be considered a success, the port never succeeded in attracting blast furnaces and steel manufacturing plants. As a result, the oil industry came to dominate the port's throughput. In 1970, two thirds of the total cargo flow consisted of crude oil and oil products. More than half of these flows were transhipped and exported to foreign destinations, primarily West Germany. Although the dominance of the German hinterland in generating Rotterdam throughput was arguably lower after World War II, the industrialisation effort did not diminish the problem of one or two commodities dominating port traffic. The very name of the largest post-war port expansion – Europoort – was an expression of the continuation of Rotterdam's role as the raw material gateway to Europe, which was a function that it proudly proclaimed in the 1960s. Between 1945 and 1975, despite efforts to create a new path of development through industrialisation, the Rotterdam port had instead followed the well-trodden pre-war path of primaly providing transhipment services for bulk imports. Although the industrialisation effort had succeeded in creating an oil and petrochemical cluster, it was generally limited to feedstock and basic chemicals that were supplied to other countries with more developed and extensive *downstream* chemical industries, such as Belgium and West Germany. Despite the transition from coal to oil and the major impact this had on the European coal industries and the closely-related steel and chemical sectors, this did not radically change the function and position of Rotterdam as a bulk port dominated by a small number of commodities and with close ties to the German hinterland.

What did change historically was the composition of the West German hinterland. Indeed, although it did not change radically, over time the centre of gravity shifted from the Ruhr region to the Frankfurt and Cologne areas. The hinterland composition of the oil flows to West Germany had a wider geographical reach than the hinterland of other cargo flows to the country, which remained heavily dependent on the Ruhr area. This shift was caused by the pipeline infrastructure that developed between Rotterdam and the German hinterland. When the Rotterdam-Rhine pipeline was connected to the Rhine-Main oil product pipeline between the Ruhr area and Ludwigshafen, the supply chain of oil products to and within West Germany changed substantially. A dense network of small tank depots was replaced by a smaller number of large regional tank depots served by the Rhine-Main pipeline. As the pipeline operated most efficiently with large batches over long distances, Rotterdam increasingly became the principal supplier of oil products to the Frankfurt area. Situated on the extremity of the northern European oil pipeline system, the Frankfurt region was undersupplied by local facilities, which was a gap filled by the export-oriented refineries of Rotterdam. Although the likelihood of Rotterdam becoming the oil port of the Rhine-Ruhr area seemed to be small in the mid-1950s, relations between the port and the Rhine-Ruhr area became increasingly stronger after the construction of Europoort and the Rotterdam-Rhine pipeline, even extending the port's hinterland reach beyond the Rhine-Ruhr region.

10.4 Discussion

This study found that Rotterdam's relationship to the German hinterland was vulnerable during the economic and technological transformations that accompanied the transition from coal to oil during the 1950s and 1960s. This period presented both continuities and discontinuities in the relationship between port and hinterland, as well as in their respective histories. Explaining the impact of the transition from coal to oil on this relationship involved a combination of economic geography and history. According to Allen Pred, the extent to which a port can benefit from a growth in the demand for transport depends on the types of industry in the hinterland, the ability of the port to adapt its own infrastructure, and the existence of a hinterland infrastructure that connects the port and hinterland. Economic geography plays an important role, according to Pred. However, Theo Notteboom and Jean-Paul Rodrigue propose a more actor-oriented view. While acknowledging the importance of geography, they identify different levels of hinterland consisting of different sets of relationships between actors, each entailing a varying degree of influence for port authorities. On the macro-economic level, i.e. the economic, political and technological context in which ports and hinterlands develop, a port has little to no influence; it is dependent on the direction and intensity of economic and technological change and the political choices affecting it in the hinterland, particularly if the hinterland is largely located in a foreign country.

The transition from coal to oil in general, and the manner in which it affected the German Rhine industries in particular, provided Rotterdam with a fortuitous economic context to further its industrialisation policy, which was formulated before World War II. In terms of its enormous post-war growth, the Port of Rotterdam diverged from its pre-war transit function and transformed into an industrial port. As Western Europe's largest concentration of oil refinery capacity, Rotterdam became a key supplier of oil products and basic petrochemicals in northwest Europe. Nonetheless, the opening up of the West German oil market in the mid-1950s gave an additional boost to port expansion. The clear break with history imposed on West Germany by its American occupiers after 1945, which continued under the economically liberal Adenauer cabinets, set the Rhine industry on a new course. The Rhine-Ruhr area developed into West Germany's largest concentration of oil and petrochemical industries, and became an important destination for oil flows from Rotterdam, as well as a vital interconnection to other oil and chemical clusters along the German Rhine. The German hinterland thus once again became the most important destination for cargo outflows in Rotterdam, including oil. Notwithstanding the tempestuous growth of its industrial port, Rotterdam continued to be dominated by just a few types of bulk cargo. However, the decline of the German coal industry all but marginalised the port's export function for the German hinterland, which was a clear break with the pre-war period. Consequently, the transition to oil fostered both continuity and discontinuity in both the Rotterdam port and the German hinterland. While the discontinuity of the port's industrialisation has been stressed in its historiography, the continuity of the relationship between port and hinterland has generally been overlooked. Although the magnitude of the relationship was less articulate than in the pre-war period, simply because the large refinery cluster in the port diminished the share of pure transit in the port's throughput, the German oil market did become hugely important for Rotterdam's oil port. Nonetheless, this continuity was far from self-evident at the outset of the transition from coal to oil.

As Allen Pred rightly argues, a port can only benefit from a growing demand for transport in the hinterland if infrastructural connections are in place. For infrastructural adaptation, a port typically interacts with actors at the national and regional level, such as national subsidiaries of multinational enterprises and regional and local governments, presumably giving a port authority more influence over decision-making. However, the pipeline connections developed in the 1950s were entirely new, and the level of planning involved differed widely, e.g. the German perspective of the Esso AG consortium and the transnational view adopted by Royal Dutch Shell in the trans-European pipeline plan. The outcome was highly uncertain for the Port of Rotterdam and its means to interfere were limited.

Location theories seem to suggest that ports with an existing competitive transport infrastructure are more likely to benefit than ports without such an infrastructure from growth through a self-reinforcing mechanism based on internal and external economies of scale and declining transport costs. The case of iron ore might confirm that proposition, but was based on Rhine shipping. In the case of oil, the capacity of Rhine shipping was inadequate, but once pipelines were considered, Rotterdam lost the powerful position it derived from the Rhine and Rhine shipping. New infrastructure thus presented a barrier to the feedback mechanism suggested by location theories by which ports benefit from growth. That barrier was political rather than economic or geographical, thus requiring an institutional rather than a pure economic explanation.

Impeding Rotterdam's position were nationally-oriented infrastructures and transport policies in West Germany. European integration had only just started, and while a supranational organisation already governed the European coal and steel industries, nuclear energy, and international Rhine shipping, in other areas (infrastructure, transportation, oil and gas) policy-making remained at the discretion of national governments. Although West Germany was politically one of the most liberal countries in Europe, its federal system of government compounded the primacy of German over transnational interests. As such, governments constrained rather than promoted the implementation of cross-border infrastructure. From the 1960s onwards, the benefits of a transnational infrastructure became more generally accepted, although the case of the Rotterdam-Antwerp pipeline late in the decade showed how resilient national thinking in terms of questions of infrastructure and transportation remained.

This preponderance of national thinking also corresponds to current theorising about the organisation of global supply chains and the role of port authorities therein. The various actors involved in shaping supply chains, their interrelations and the distribution of power among them are essential elements for understanding why port-hinterland relationships are sustained or not.[710] Given the low degree of coordination within the EEC in the late 1950s and the 1960s, individual governments wielded considerable power over infrastructure development, to the detriment of the interests of the Port of Rotterdam in the case of West Germany. Firms, or at least multinational firms, had a more transnational perspective on European infrastructure development than national governments. As multinational oil companies were most influential in shaping the oil supply chains to and within

[710] S. Janssens, H. Meersman and E. Van de Voorde, 'Port throughput and international trade: have port authorities any degrees of freedom left?', in: R. Loyen et al (eds.), *Struggling for Leadership: Antwerp-Rotterdam Port Competition between 1870-2000* (Berlin 2003) 91-114.

Western Europe, they presented an integrative force on pipeline infrastructure development in this part of the continent. Multinational oil companies, in particular Royal Dutch Shell, were therefore key allies for the Rotterdam port to develop a transnational pipeline infrastructure to access the hinterland in the 1950s and 1960s. The configuration of actors and their respective influence on shaping the supply chain determined to what extent Rotterdam could benefit from increasing demand for transportation in the hinterland.

Earlier authors, such as De Goey, Brolsma and Posthuma, have alluded to the important role of Royal Dutch Shell in shaping the Port of Rotterdam after 1945. However, this study has demonstrated the conditionality of the relationship between Royal Dutch and the Rotterdam Municipal Port Authority. Whereas earlier authors have accentuated the importance of the relations with local Royal Dutch management in the port, this study has found that at a higher level of decision-making within the Shell group, the position of Rotterdam was weighed against other options. Indeed, although important to Royal Dutch Shell, Rotterdam was also just a node in the company's European supply chain. The focus of the Port Authority on its relations with the local management of Royal Dutch Shell might also help to explain the failure of the former to anticipate demand for crude oil pipelines in the German hinterland. The Port Authority's attention was directed at the port and the sea, not the hinterland, and it was with regard to the hinterland that the port needed Royal Dutch Shell the most. The episode of the trans-European pipeline plan illustrated that the interests of Royal Dutch and the Rotterdam Port Authority overlapped, but were not identical; the extent to which their interests aligned depended on the institutional context in Europe in the late 1950s. This context was not conducive to private, transnational infrastructure projects, which led Royal Dutch to opt for a regional rather than a trans-European solution.

Once the infrastructure was in place, Royal Dutch Shell remained an important ally, because it was a key player in organising logistics in the Rhine basin. On this so-called logistical level, port authorities presumably have the most influence in attracting, for instance, cargo through pricing, facilities, hinterland connections and close contact with the local agents of firms and governments. This study has clearly shown that, once in place, the combination of deep-sea ports, industrial sites and pipeline connections to the hinterland provided Rotterdam's oil port with a competitive advantage over other Western European oil ports. Although its share of the total oil flow through the Port of Rotterdam diminished over time, Royal Dutch continued to be very important, not least because it disposed of the largest captive inland tank fleet on the Rhine, and also extended and expanded the pipeline connections between the port and the German hinterland. Combined with the rather fortuitous growth of maritime oil tankers, the pipelines provided the Rotterdam oil port with a captive German hinterland that extended south along the Rhine to

Frankfurt am Main and Mannheim-Ludwigshafen. In itself, this presented a significant discontinuity, because the oil flows to West Germany were much less focused on the Rhine-Ruhr area than most other, more traditional, types of cargo such as iron ore. This was particularly attributable to the development of an oil cluster in the port. Rotterdam was no longer just the provider of transport and trade services to the German hinterland; between 1945 and 1975, it became one of West Germany's principal suppliers of oil products. Accordingly, even though the close relationship between the Port of Rotterdam and the German hinterland continued through the transition to oil, it was of a different type, substance and direction.

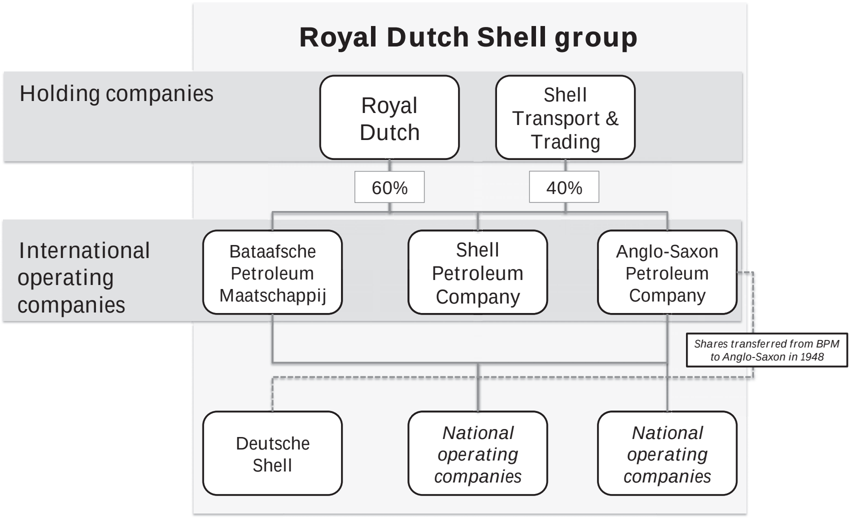
Appendices

Appendix A: The organisational structure of the Royal Dutch Shell group

The Royal Dutch Shell Group (until 2005 Royal Dutch/Shell) is one of the largest oil companies in the world and has operations across the globe. Its company structure is complex, and decision-making takes place across many levels between the operating companies, the holding companies and the two parent companies, Koninklijke Nederlandse Petroleum Maatschappij (Royal Dutch, for short) and the Shell Transport and Trading Company (Figure 0-1). Until the late 1950s, when the firm's structure was changed, Bataafsche Petroleum Maatschappij in The Hague and the Anglo-Saxon Petroleum Company in London were the group's main international operating companies, which owned the shares in and controlled the vast array of national operating companies that operated around the globe. In general, Bataafsche focused on exploration, production and refining operations, while Anglo-Saxon concentrated on trading and marketing. The Shell Petroleum Company in London managed the group's sales, while the group's activities in Germany were managed by Deutsche Shell AG (formerly Rhenania-Ossag). Until 1948, Bataafsche held shares in Deutsche Shell, but transferred these to Anglo-Saxon that year to better protect the group's assets in Allied occupied Germany.[711]

[711] Howarth and Jonker, *Stuwmotor van de koolwaterstofrevolutie*, 96-97.

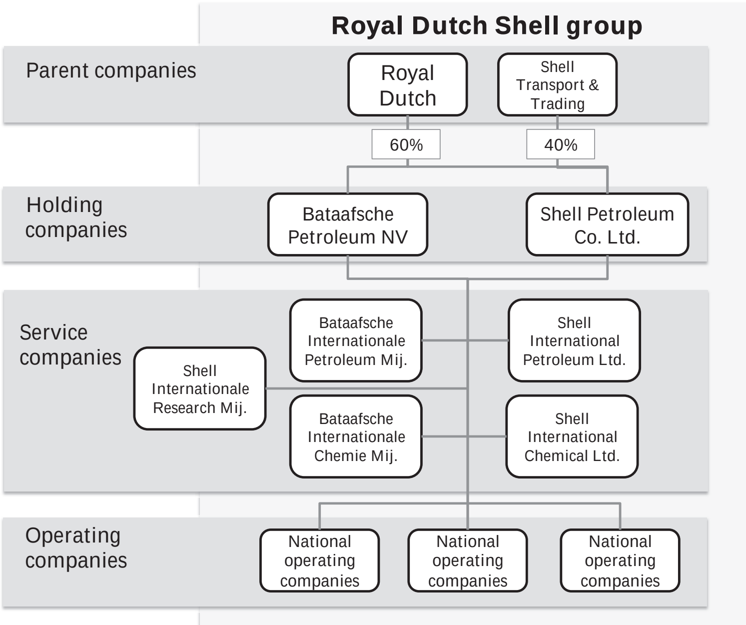
Figure 0-1. The company structure of the Royal Dutch Shell Group, early 1950s



Source: J. Jonker and J. Luiten Van Zanden, *Van nieuwkomer tot marktleider, 1890-1939. Geschiedenis van Koninklijke Shell, deel 1* (Amsterdam, 2007) 84, 90, 160; S. Howarth and J. Jonker, *Stuwmotor van de koolwaterstofrevolutie, 1939-1973 Geschiedenis van Koninklijke Shell, deel 2* (Amsterdam, 2007) 96-97.

In the late 1950s, the Shell group was reorganised to streamline the organisation, in particular the coordination between the group's geographical and functional units. Figure 0-2 shows the group structure after the reorganisation. The group decentralised its decision-making by transferring responsibilities to the national operating companies, while also strengthening regional and functional reporting to the group's Committee of Managing Directors. During the 1960s, the national operating companies thus became increasingly autonomous. Bataafsche, Anglo-Saxon and Shell Petroleum were transformed into holding companies, and their former advisory and controlling tasks were transferred to five service companies. These maintained the former division between exploration, production and *midstream* on the one hand, and marketing, sales and distribution on the other. Anglo-Saxon and Shell Petroleum were merged. The rise of petrochemicals in the 1950s and 1960s also led to the separation of the chemical business from the oil business. R&D services, meanwhile, were housed in a separate service company.

Figure 0-2. The company structure of Royal Dutch Shell, 1960s



Source: S. Howarth and J. Jonker, *Stuwmotor van de koolwaterstofrevolutie, 1939-1973 Geschiedenis van Koninklijke Shell, deel 2* (Amsterdam 2007) 145.

The Shell group has been active in the Lower Rhine region almost since its inception. In 1902, when Royal Dutch and Shell were still separate companies, the former started to export crude gasoline from the Far East to Europe, which it refined in gasoline refineries in Rotterdam and Reisholz near Düsseldorf in Germany. Thereafter, Royal Dutch extended its operations by expanding its refinery in Rotterdam, enhancing its marketing, and deploying its own captive fleet of inland tank barges on the Rhine between Rotterdam and Germany. Since the early 20th century, Royal Dutch Shell has been operating in the Lower Rhine region in terms of all aspects of its downstream business and continues to do so today.

Appendix B: Data

This appendix lists all the underlying data used in this study. Data tables that could be printed are included in this appendix. Some of the data comprise multiple tables or tables that were too large to print in the confinements of this book. These data are available on request and will be made available online at a later date.

Data for Chapter 2

Table 0-1. The refineries in Germany in 1938 (capacity in 1,000 tons)

Company	Place	Capacity (1,000 tons)
Brenntag Brennstoff-Chemikalien- und Transport AG	Berlin	50
Deutsch-Amerikanische Petroleum-Gesellschaft (Jersey Standard)	Berlin	30
Mineralölwerke Lichtenberg GmbH & Co KG	Berlin	25
Deutsche Vacuum Oel AG	Bremen Oslebshausen	80
Deutsche Gasolin AG	Dolbergen	40
Mineralölwerke Peine (Julius Schindler)	Peine	20
Deurag-Nerag	Hannover Misburg	300
Westflische Mineralöl- und Asphaltwerke, WH Schmitz KG	Dortmund	20
Deutsch-Amerikanische Petroleum-Gesellschaft (Jersey Standard)	Düsseldorf	25
Rhenania-Ossag AG (Royal Dutch Shell)	Reisholz	65
Deutsche Gasolin AG	Emmerich	60
Minerallwerke Albrecht & Co. KG	Hamburg Grasbrook	30
Rhenania-Ossag AG (Royal Dutch Shell)	Hamburg Grasbrook	130
Ernst Schliemann's Oelwerke	Hamburg Grasbrook	65
Deutsche Vacuum Oel AG	Hamburg Schulau	20
Ebano Asphaltwerke AG	Hamburg Harburg	400
Eurpische Tanklager und Transport AG	Hamburg Petroleumhafen	400
Rhenania-Ossag AG (Royal Dutch Shell)	Hamburg Harburg	550
Oelwerke Julius Schindler GmbH	Hamburg Wilhelmsburg	40
Rhenania-Ossag AG (Royal Dutch Shell)	Hamburg Wilhelmsburg	70
Deutsche Petroleum AG	Hamburg Wilhelmsburg	65
Holsteinische Erdoelwerke GmbH	Heide	150
Mineralöl und Asphaltwerke AG (MAWAG)	Brunsbüttel Ostermoor	150
Rhenania-Ossag AG (Royal Dutch Shell)	Monheim	115
Rhenania-Ossag AG (Royal Dutch Shell)	Regensburg	30

Deutsche Petroleum AG	Rositz	120
Erdöl-Raffinerie Salzbergen GmbH (Ersag)	Salzbergen	50
Westflische Minerall- und Asphaltwerke, WH Schmitz KG	Dortmund	20

Source: Shell Historical Archive, Germany country book IV, Dr. P. Schwarz, 'Germany strives for self-sufficiency', World Petroleum (October 1936)

Table 0-2. The hydrogenation plants in Germany, 1938 (capacity in 1,000 tons)

Company	Place	Feedstock	Capacity (1,000 tons)
Oberschlesichse Hydrierwerke AG	Blechhammer Nord	Tar	200
Oberschlesichse Hydrierwerke AG	Blechhammer Süd	Bituminous coal	300
Ruhrchemie	Bottrop-Welheim	Tar	100
Gelsenberg Benzin AG	Gelsenkirchen-Horst	Bituminous coal	350
Hydrierwerk Scholven AG	Gelsenkirchen-Scholven	Bituminous coal	400
Hydrierwerke Plitz AG	Stettin-Plitz	Bituminous coal & tar	600
BRABAG AG	Böhlen	Tar	300
Ammoniakwerke Merseburg AG	Leuna	Lignite & tar	600
Wintershall AG	Lützkendorf	Tar	125
BRABAG AG	Zeitz-Trglitz	Tar	350
BRABAG AG	Magdeburg	Tar	250
Union Rheinische Braunkohlen Kraftstoff AG	Wesseling	Lignite	200

Source: Fischer-Tropsch Archive, microfilm reel B1870, item 11, 'Petroleum Facilities of Germany', March 1945, http://www.fischer-tropsch.org/Tom%20Reels/Linked//B1870/B1870_toc.htm, 11 December 2012.

Table 0-3. The refinery capacity in West Germany, 1950-75

Name company	Location	Region	1950	1955	1960	1965	1970	1975
Elf	Brunsbuettel	Schleswig-Holstein	0.0	0.1	0.2	0.5	0.5	0.5
Texaco	Heide	Schleswig-Holstein	0.1	0.6	1.5	3.0	3.0	5.5
Haltermann	Hamburg/Wilhelmsburg	Hamburg	0.1	0.1	0.0	0.0	0.0	0.0
Julius Schindler	Hamburg/Neuh.	Hamburg	0.1	0.3	0.3	0.3	0.4	0.4
Shell	Hamburg/Harburg	Hamburg	0.4	0.9	3.0	3.0	4.0	4.2
BP	Hamburg/Fink.	Hamburg	0.7	1.5	2.1	2.5	4.6	5.4
Esso	Hamburg/Harburg	Hamburg	0.5	1.9	2.5	3.3	3.5	5.5
Deutsche Gasoel	Dollbergen	Lower Saxony	0.1	0.2	0.0	0.0	0.0	0.0
Wintershall	Salzbergen	Lower Saxony	0.1	0.1	0.1	0.3	0.3	0.3
Gewerkshaft (Shell)	Hannover	Lower Saxony	0.4	0.7	1.0	2.1	2.5	2.5
Wintershall	Lingen	Lower Saxony	0.0	0.6	2.2	3.5	3.9	4.7
Edoelwerke Frisia	Emden	Lower Saxony	0.0	0.0	0.0	1.5	2.4	2.4
Mobil Oil	Bremen	Bremen	0.5	0.7	1.4	1.4	1.4	1.5
Shell	Monheim on the Rhein	North Rhine Westphalia	0.2	0.2	0.3	0.3	0.3	0.4
Fina Bitumenwerke	Mühlheim on the Ruhr	North Rhine Westphalia	0.0	0.3	0.3	0.5	0.5	0.5
Elf Bitumenwerke	Essen	North Rhine Westphalia	0.0	0.1	0.1	0.4	0.6	0.9
Veba Chemie	Gelsenkirchen	North Rhine Westphalia	0.0	1.1	2.5	2.5	4.4	10.3
URBK	Wesseling	North Rhine Westphalia	0.3	1.4	3.0	3.0	4.4	6.2
Gelsenberg/Veba Oel	Gelsenkirchen	North Rhine Westphalia	0.6	2.4	4.2	6.4	7.2	7.4
Fina Raffinerie	Duisburg	North Rhine Westphalia	0.0	0.0	1.0	2.0	2.0	2.0
Esso	Cologne	North Rhine Westphalia	0.0	0.0	3.4	4.8	5.4	5.7
Shell	Cologne (Godorf)	North Rhine Westphalia	0.0	0.0	3.9	3.9	8.1	8.1
BP	Dinslaken	North Rhine Westphalia	0.0	0.0	4.0	5.4	5.4	10.6
Caltex	Raunheim	Hesse	0.0	0.0	0.0	2.1	4.4	4.4
Elf	Speyer	Rhineland Palatinate	0.0	0.0	0.0	2.5	2.7	2.8
Mobil Oil	Woerth on the Rhein	Rhineland Palatinate	0.0	0.0	0.0	0.0	0.0	3.7
Saarland Raffinerie	Voelklingen	Saarland	0.0	0.0	0.0	0.0	2.3	2.7

Erdoelraff. Mannheim	Mannheim	Baden-Württemberg	0.0	0.0	0.0	2.7	3.9	6.1
Oberrh. Mineraoelwerke	Karlsruhe	Baden-Württemberg	0.0	0.0	0.0	2.0	6.3	6.3
Esso	Karlsruhe	Baden-Württemberg	0.0	0.0	0.0	3.8	8.6	9.0
Erdoelraff. Neustadt	Neustadt on the Donau	Bavaria	0.0	0.0	0.0	2.7	3.9	6.1
Shell	Ingolstadt	Bavaria	0.0	0.0	0.0	2.3	2.6	2.7
Esso	Ingolstadt	Bavaria	0.0	0.0	0.0	3.3	4.8	5.0
Erdoelraff. Ingolstad	Ingolstadt	Bavaria	0.0	0.0	0.0	2.5	3.2	6.4
Marathon	Burghausen	Bavaria	0.0	0.0	0.0	0.0	3.0	3.2
BP	Vohburg on the Donau	Bavaria	0.0	0.0	0.0	0.0	4.9	5.4

Source: W. Molle and E. Wever, *Oil refineries and petrochemical industries in Western Europe: buoyant past, uncertain future* (Aldershot 1984) 164-169.

Data for Chapter 6 (footnote 493)

Table 0-4. Tanker transportation costs: Persian Gulf via the Cape of Good Hope and returning via the Suez Canal, 1957

	Transportation costs per ton			Differences			
(US dollars)	**45,000 dwt**	**60,000 dwt**	**80,000 dwt**	**45,000 dwt**	**60,000 dwt**	**80,000 dwt**	**Decrease in difference**
Lavera	1.05	0.93	0.83				
Rotterdam	1.18	1.04	0.92	0.13	0.11	0.09	-31%
Wilhelmshaven	1.20	1.05	0.93	0.15	0.12	0.10	-33%

Source: BPA 43379, Sappeur NV minutes of meetings, 'SAPPEUR NV. Aide memoire to a General Meeting of Shareholders' Experts held in The Hague on the 31st January 1957', undated, Attachment 3, 'Tanker transportation cost. Persian Gulf via Cape of Good Hope and return via Suez Canal'.

Data Chapter 7

Table 0-5. The Rhine-Main pipeline flow data, 1968-71 (in million tons)

From	To	1968	1969	1970	1971
Pernis	Dinslaken	0.00	0.02	0.10	0.16
	EC Dormagen	0.00	0.24	0.73	1.23
	Cologne-Godorf	0.30	1.38	1.58	1.60
	Flörsheim	0.08	0.55	0.73	0.63
	Ludwigshafen	0.02	0.38	0.57	0.45
	Köln-Niehl	0.02	0.11	0.61	0.54
	Gustavsburg	0.06	0.55	1.10	0.97
	Raunheim	0.00	0.05	0.47	0.72
	Koblenz	0.00	0.00	0.00	0.00
	From Pernis	***0.48***	***3.27***	***5.89***	***6.30***
Dinslaken	EC Dormagen	0.24	0.74	0.46	0.38
	Köln-Niehl	0.07	0.28	0.23	0.15
	Gustavsburg	0.15	0.42	0.25	0.36
	Flörsheim	0.00	0.01	0.00	0.00
	Ludwigshafen	0.00	0.00	0.00	0.00
	From Dinslaken	***0.47***	***1.46***	***0.94***	***0.90***
Cologne-Godorf	Flörsheim	0.19	0.60	0.83	0.81
	Ludwigshafen	0.16	0.55	0.71	0.73
	Oppau (BASF)	0.09	0.44	0.36	0.25
	Gustavsburg	0.01	0.02	0.02	0.01
	From Cologne-Godorf	***0.45***	***1.60***	***1.92***	***1.81***
Total		**1.39**	**6.33**	**8.74**	**9.00**

Source: BPA, 21090 and 21093, RMR Progress Reports, 1968-1971.

Table 0-6. The refinery capacity in Western Europe by region, 1950-75 (in million tons)

Available on request

Data Chapter 8

Table 0-7. The Port of Rotterdam cargo flows, 1950-1975 (in tons)

Available on request

Data Chapter 9

Table 0-8. The West German oil supply from the Rotterdam oil port, 1950-75 (in tons)

Available on request

Note on sources and definitions

For the years 1955 to 1958, Figure 9-1 reports anomalous percentages, which are derived from a discrepancy between Dutch and German transport statistics. The data used for Figure 9-1 are taken from the database on cargo flows in the Port of Rotterdam (for the total volume of crude oil shipped from Rotterdam) and the German inland shipping statistics published by the Federal Statistics Office (*Statistische Bundesamt*). The data from the database on cargo flows in the Port of Rotterdam are originally derived from the Rotterdam Chamber of Commerce's annual publication on Statistics of Trade, Industry and Transport (*Statistiek van de Handel, Nijverheid en Transport*), which are in turn based on the Monthly Statistics of Sea Shipping and Port Traffic (*Maandstatistiek voor de zeevaart en het havenverkeer*) published by the Dutch Central Statistics Office (*Centraal Bureau voor de Statistiek, CBS*). Table 0-9 shows two possible causes of discrepancies when combining the Dutch and German sources.

Table 0-9. Comparing Dutch and German transport statistics

	CBS	Statistische Bundesamt
Source	Dutch customs data.	German customs data. According to the CBS, these data misrepresent the port of loading for inland shipping from the Netherlands.
Definition of Rotterdam	Municipal ports of Rotterdam, excluding other New Waterway ports such as Europoort and Vlaardingen, among others.	All ports along the New Waterway, i.e. Rotterdam's municipal ports, Europoort, Vlaardingen, Schiedam and other ports.

Source: CBS, Maandstatistiek voor de zeevaart en het havenverkeer, 1961, 1965; CBS, Statistiek van de internationale binnenvaart, 1961; Kamer van Koophandel, Statistiek van de Handel, Nijverheid en Transport, 1963; Statistische Bundesamt, Verkehr, Reihe 8 Binnenschiffahrt, 1957-1975

The first problem arises from the source of the statistics, which in the German case are said to misrepresent the Dutch port of loading for inland shipping flows from the Netherlands to Germany. This may inflate the volume of oil going from Rotterdam to Germany. The second problem derives from differences in the definition of Rotterdam. The CBS data in the particular tables used for the database on cargo flows in the Port of Rotterdam define Rotterdam as just the municipal ports, excluding all other ports on the New Waterway. The German inland shipping statistics – indeed all German transport statistics – use the traffic area the New Waterway (*Verkehrsbezirk Nieuwe Waterweg*) to denote shipments to and from Rotterdam. This involves a number of ports that are not included in the CBS data. Combined, these two problems can cause differences in the volumes transported between Rotterdam and West Germany, which can be particularly distorting in the case of smaller volumes.

There is no obvious solution to problems that are derived from the combination of statistics compiled by separate entities in different countries. There are other Dutch sources on international inland shipping available, but other problems arise with these, such as the different classification of goods or the complete lack of a breakdown in terms of types of product. Moreover, a major limitation of the Dutch international inland shipping statistics is the lack of a coherent and stable definition of traffic areas in the German hinterland, which the German inland shipping statistics do provide.

Table 0-10. The inland shipping of oil products between Rotterdam and West Germany, 1950-75 (in tons)

Available on request

Table 0-11. Oil product flows to the Frankfurt area, 1959-71 (in million tons)

# Traffic area 1950-68	# Traffic area 1969-75	Name	1957	1959	1963	1965	1967	1969	1971
24-26	84	Ruhr area (Essen)	0.22	0.16	0.28	0.13	0.22	0.10	0.07
29	82	Lower Rhine under Ruhr area			0.19	0.22	0.06	0.43	0.36
30	83	Duisburg	0.02	0.04	0.18	0.16	0.08	0.10	0.11
34-37	94	Lower Rhine around Cologne		0.13	0.71	0.83	0.60	1.15	1.31
44-45	151 / 143	Mannheim/Ludwigshafen				0.07	0.06	0.19	0.22
46-47	152	Upper Rhine around Karlsruhe			0.11	0.25	0.32	0.60	0.39
142	142	Kaiserslautern							0.11
55	123	Main in Hesse				0.24	0.27	0.75	1.17
		Total from intra-German areas	***0.25***	***0.36***	***1.59***	***1.93***	***1.62***	***3.36***	***3.84***
		Percentage from total	*83%*	*82%*	*67%*	*73%*	*62%*	*63%*	*53%*
231	350	Rotterdam	0.04	0.06	0.53	0.48	0.64	1.70	2.99
232	351	Amsterdam		0.01	0.13	0.08	0.12	0.14	0.15
233	353	Other Dutch areas					0.06	0.05	
236	360	Antwerp			0.05	0.11	0.10	0.09	0.17
		Total from foreign areas	***0.05***	***0.08***	***0.80***	***0.70***	***1.00***	***2.01***	***3.34***
		Percentage from total	*17%*	*18%*	*33%*	*27%*	*38%*	*37%*	*47%*
		Total oil products to Frankfurt	**0.30**	**0.44**	**2.39**	**2.63**	**2.63**	**5.37**	**7.17**

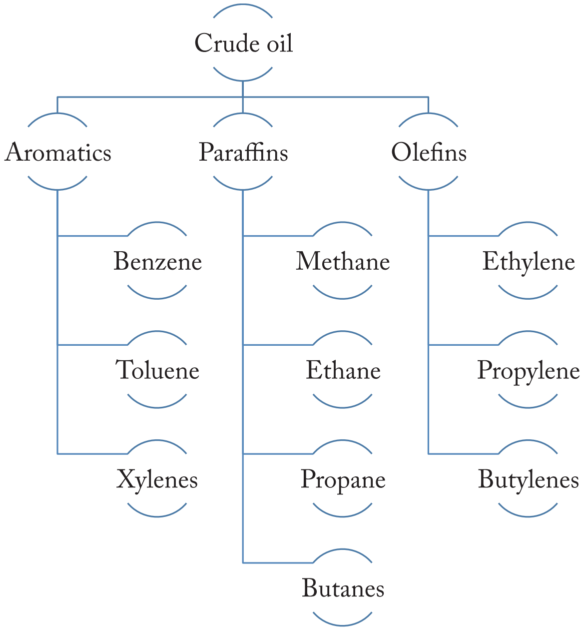
Note: The data on supplies are based on inland shipping data on delivered oil products (motor fuels and fuel oil) in the Frankfurt area (*Frankfurt Wirtschaftsgebiet*), supplemented with data from RMR deliveries (for the years 1969 and 1971). For the years 1969 and 1971, the RMR transports were added to the flows from relevant traffic areas. Rail statistics were not included. This is because rail shipments of oil products to Frankfurt were insignificant due to the cost advantages of inland shipping over rail. Truck data were omitted because these typically involve intra-area transport (the last mile to the final customer).

Source: Statistisches Bundesamt, Verkehr, Reihe 8 Binnenschiffahrt, Stuttgart, 1957-1975; BP Archive, 21090 & 21093, RMR Progress Reports, 1968-1971 (RMR data).

Appendix C: Basic petrochemicals

Figure 0-3 presents a simplified diagram of the main groups of basic petrochemicals derived from crude oil by the cracking of petroleum fractions. Most of these can also be derived from natural gas. Naphtha, which is a liquid fraction derived from crude oil distillation, and cracking gases, which are a byproduct of the cracking of heavy oil fractions, were the most widely used sources of olefins and aromatics in Europe during the research period.[712] In the US, natural gas was more important. Aromatics and olefins are, in terms of volume, the two most important groups of basic petrochemicals. Benzene is the most widely-used aromatic, and ethylene and propylene the most widely-used olefins.

Figure 0-3. Basic petrochemicals from crude oil



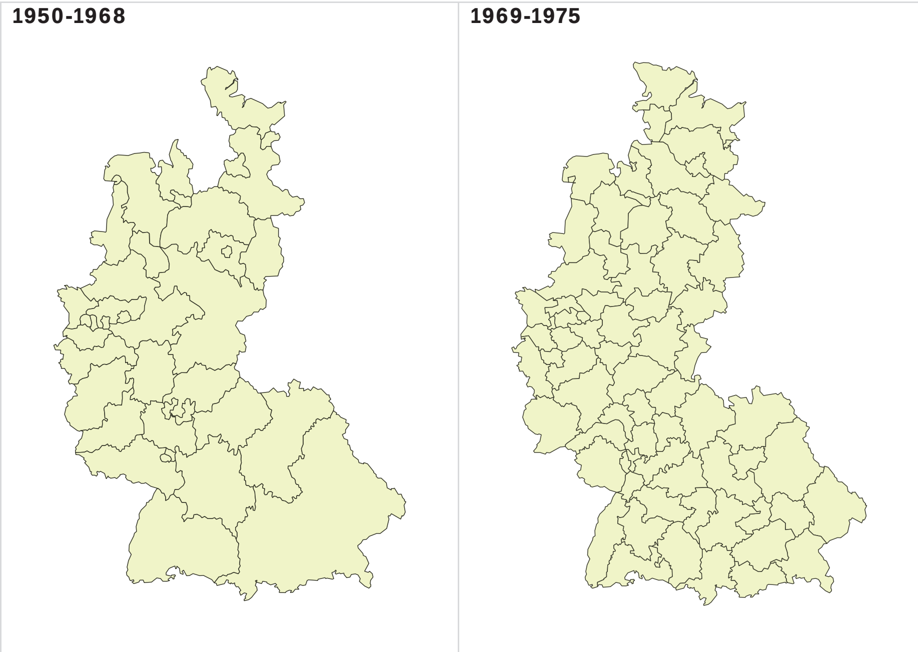
Source: W. Molle and E. Wever, *Oil Refineries and Petrochemical Industries in Western Europe. Buoyant Past, Uncertain Future* (Aldershot 1984) 17-19; Shell International Petroleum Company Ltd., *The Petroleum Handbook* (London 1966) 320-321.

[712] Molle and Wever, *Oil Refineries*, 19.

Appendix D: West German traffic areas

The Statistische Bundesamt used a system of spatial groupings according to which transport statistics were reported. These were known as the so-called traffic areas (*Verkehrsgebiete*). Between 1950 and 1968, the definition of the areas remained unchanged, but in 1969 the areas were realigned to ensure that they corresponded better with the administrative borders within West Germany. Figure 0-4 presents the system in use until 1968, as well as its successor. Both maps clearly differ from each other.

Figure 0-4. West German traffic areas



Source: Statistisches Bundesamt, *Die Binnenschiffahrt im Jahre* (Stuttgart 1950) (for the traffic regions used between 1950 and 1968); Statistisches Bundesamt, *Verkehr, Reihe 8 Binnenschiffahrt* (Stuttgart 1969) (for the traffic regions used after 1969). The 1968 and 1969 traffic areas are incomparable, because existing areas were split up and partly subsumed in newly-created areas. Maps created by the author.

Table 0-12 and Table 0-13 contain the names and numbers of the traffic areas.

Table 0-12. West German traffic areas, 1950-1968

Number	Name
1	Lübeck
2	Schleswig-Holsteinisches Ostseegebiet (ohne 1)
3-4	Unterelbegebiet und schleswig-holsteinisches Nordseegebiet
5	Hamburg
6-7	Elbe und ihre Seitenwasserstrassen oderhalb von Hamburg und Lübeck
8	Unterewesergebiet (ohne 9)
9	Bremen
10	Mittelweser zwischen Minden und Bremen (je ausschlieslich) und Aller
11-13	Oberweser ab Minden (einsschlieslich) sowie Weser und Fulda
14	Mittellandkanal zwischen Rühe und Peine (je einschlieslich)
15	Mittellandkanal zwischen Peine und Minden (je ausschlieslich, ohne 16)
16	Hannover
17	Mittellandkanal zwischen Minden (ausschlieslich) und Bergeshövede (ausschlieslich)
18	Emden
19	Jade- und Huntegebiet sowie die ostfriesischen Inseln
20	Dortmund-Emskanal und Ems unterhalb Bergeshövede (ohne 18)
21	D-E kanal nördlich der Lippe bis Bergeshövede (einschlieslich)
24	Rhein-Herne-Kanal, Ruhrkanal und D-E kanal südlich der Lippe (ohne 27 und 28)
25	Wesel-Datteln-Kanal
26	Datteln-Hamm-Kanal
27	Dortmund
28	Essen
29	Niederrhein unterhalb des Ruhrgebietes
30	Duisburg
31	Rheinhäfen des Ruhrgebietes (ohne 30)
32-33	Niederrhein um Düsseldorf (von Krefeld bis Monheim - je einschlieslich)
34-37	Niederrhein um Köln (von oberhalb Monheim bis oberhalb Lülsdorf)
38	Mittelrhein von Lülsdorf bis Koblenz (je ausschliesslich)
39	Mittelrhein von unterhalb Koblenz bis unterhalb Bingen
41	Lahn
42-43	Mittelrhein um Mainz und Wiesbaden (von unterhalb Bingen bis unterhalb Mannheim)
44	Ludwigshafen
45	Mannheim (Wirtschaftsgebiet)
46-47	Oberrhein um Karlsruhe
48	Oberrhein um Kehl
49	Oberrhein von oberhalb Kehl bis Weil (einschl.)
50	Hochrhein und Bodensee
52-54	Neckar
55	Main in Hessen
56	Frankfurt (Wirtschaftsgebiet)

58	Main um Aschaffenburg (von Kahl bis Klingenberg je einschl.)
59	Main um Würzburg (von oberhalb Klingenberg bis oberhalb Würzburg)
60	Main oberhalb Würzburg (ausschl.)
61-62	Ludwigkanal in Mittel- und Oberfranken
63-66	Donau nebst Zuflüssen und der Ludwigkanal südlich von Nürnberg and Fürth

Source: Statistisches Bundesamt, *Die Binnenschiffahrt im Jahre* (Stuttgart 1950)

Table 0-13. West German traffic areas, 1969-1975

Number	Name
011	Flensburg/Husum
014	Heide
015	Kiel
018	Lübeck (Stadt)
019	Itzehoe/Ratzeburg
020	Hamburg (Stadt)
031	Stade/Harburg
032	Lüneburg/Uelzen
033	Soltau
034	Brake
035	Verden/Nienburg
041	Emden (Stadt)
042	Wilhelmshaven
043	Meppen
044	Oldenburg
045	Osnabrück
051	Hannover
052	Braunschweig
053	Göttingen
061	Bremen (Stadt)
062	Bremerhaven (Stadt)
071	Münster
072	Moers
081	Hamm
082	Dinslaken
083	Duisburg (Stadt)
084	Essen
085	Dortmund (Stadt)
091	Hagen
092	Düsseldorf
093	Solingen
094	Köln
095	Bonn
096	Aachen
101	Bielefeld

104	Paderborn
105	Arnsberg
106	Siegen
111	Kassel/Waldeck
112	Hersfeld/Eschwege
113	Giessen/Marburg
121	Fulda
122	Frankfurt
123	Wiesbaden
124	Darmstadt
131	Trier
132	Koblenz
141	Mainz
142	Kaiserslautern
143	Ludwigshafen
151	Mannheim
152	Karlsruhe
153	Heidelberg
161	Freiburg
162	Konstanz
171	Heilbronn
172	Stuttgart
173	Ulm
174	Tübingen
175	Ravensburg
181	Aschaffenburg
182	Würzburg/Schweinfurt
183	Bayreuth/Bamberg
184	Nürnberg
185	Ansbach
191	Landshut
192	Regensburg
193	Passau/Straubing
201	Ingolstadt
202	Augsburg
203	Kempten/Kaufbeuren
204	München
205	Garmisch-Partenkirchen
206	Rosenheim

Source: Statistisches Bundesamt, *Verkehr, Reihe 8 Binnenschiffahrt* (Stuttgart 1969)

To render the two systems of reporting comparable, the author devised new subgroups to be able to better compare the composition of the hinterland throughout the entire research period. Table 0-14 and Table 0-15 present the regrouped traffic areas for the 1950-68 and 1969-75 periods, respectively.

Table 0-14. The regrouped traffic areas, 1950-68

Number	Name
24/26 27 28 30	Ruhr area
32 33	Düsseldorf
34/37	Köln
38 39 40 41	Koblenz
42 43 55 56 57 58/60	Frankfurt & Main area
44 45 52/54	Mannheim & Neckar area
46 47 48 51	Upper Rhine area
14 15 16 17 18 20 21/23	North German canals
(all other traffic areas)	Other areas

Source: Statistisches Bundesamt, *Die Binnenschiffahrt im Jahre* (Stuttgart 1950)

Table 0-15. The regrouped traffic areas, 1969-75

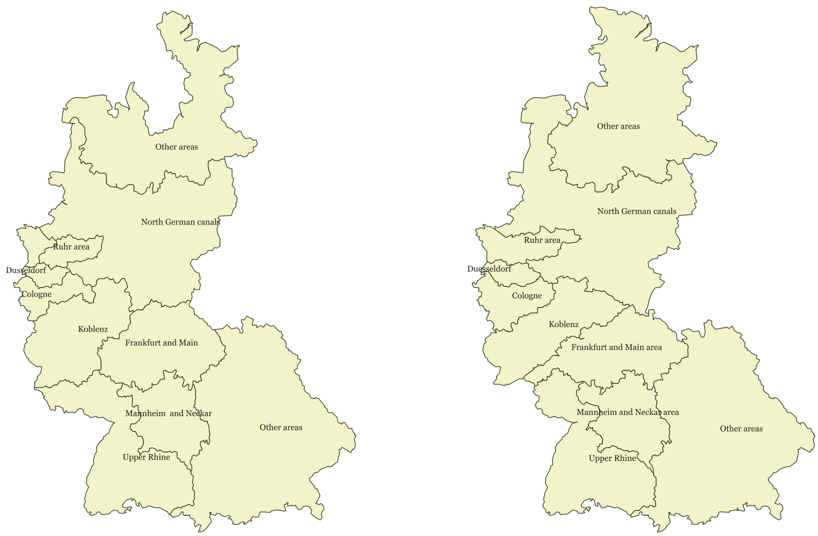
Number	Name
72 81-85	Ruhr area
92-93	Düsseldorf
94-96	Köln
113 131 132	Koblenz
121 122 124 141 181	Frankfurt & Main area
143 151 171-173	Mannheim & Neckar area
142 152 161 162 174 175	Upper Rhine area
41-43 45 51 53 91 101 104 105 111 112	North German canals
(all other traffic areas)	Other areas

Source: Statistisches Bundesamt, *Verkehr, Reihe 8 Binnenschiffahrt* (Stuttgart 1969)

Although there are still a number of differences between the regrouped traffic areas before and after 1969, the boundaries between the major Rhine ports and the inland ports on the major tributaries and canals are fairly accurate. The Ruhr, Düsseldorf and Cologne areas are almost the same. The Koblenz area (or Middle Rhine) from Bonn to Mainz is slightly smaller after 1969, but still comprises the Mosel region and the ports of Koblenz and Mainz. The Frankfurt and Main area, the Mannheim and Neckar area and the rest of the Upper Rhine area are almost the same, as is the North German canal area, which comprises the Dortmund-Ems and Mittelland canals. Other traffic areas fall outside the river system of the Rhine, and its tributaries and canals and are therefore grouped together under the term ‘Other areas’.

Figure 0-5. The regrouped traffic areas, 1950-68 and 1969-75

1950-1968 **1969-1975**

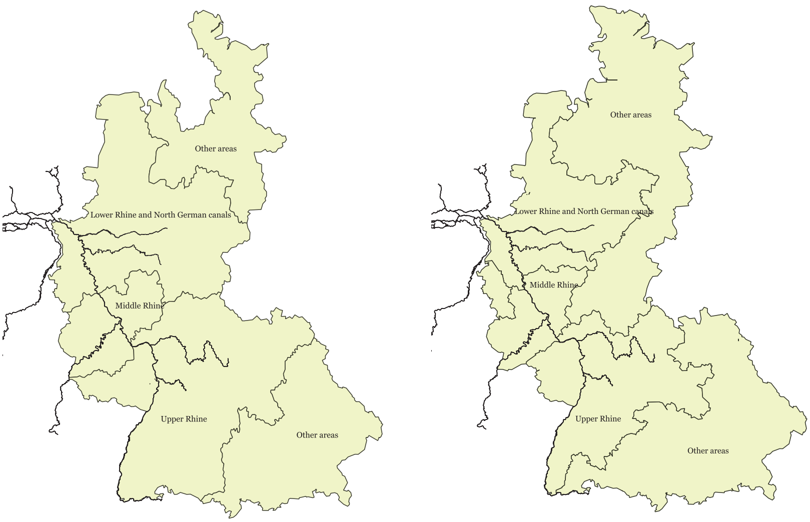


Source: Statistisches Bundesamt, *Die Binnenschiffahrt im Jahre* (Stuttgart 1950) (for the traffic regions used between 1950 and 1968); Statistisches Bundesamt, *Verkehr, Reihe 8 Binnenschiffahrt* (Stuttgart 1969) (for the traffic regions used after 1969). The regrouping is defined by the author.

A second clustering of the traffic areas was undertaken to examine the distribution of the cargo flows to the various parts of the Rhine, i.e. the Lower, Middle and Upper Rhine. The Lower Rhine consists of the Rhine from the Dutch border up to, but excluding, Bonn. The Middle Rhine stretches from just below Bonn to Bingen, just below Mainz. The Upper Rhine comprises the entire stretch between Bingen and the Swiss border. Figure 0-6 shows the boundaries of the sections of the Rhine based on the definition of the traffic areas both before and after 1969. For the purpose of the analysis, the various sections of the Rhine also include the tributaries and canals connected to the particular section. Although the boundaries are not identical between the two maps in Figure 0-6, the sections of the Rhine are accurately demarcated, rendering both maps comparable.

Figure 0-6. Sections of the Rhine, 1950-68 and 1969-75

1950-1968 **1969-1975**



Source: Statistisches Bundesamt, *Die Binnenschiffahrt im Jahre* (Stuttgart 1950) (for the traffic regions used between 1950 and 1968); Statistisches Bundesamt, *Verkehr, Reihe 8 Binnenschiffahrt* (Stuttgart 1969) (for the traffic regions used after 1969). The regrouping is defined by the author.

Appendix E: The composition of the German metropolitan regions

The German metropolitan regions (*Metropolregionen*) emerged in the 1990s and were developed by German spatial planning institutes and government agencies in response to EU efforts to foster a regional perspective in European and national policy-making.[713] The Rhine-Ruhr metropolitan region stretches from Bonn in the south to Mönchengladbach in the west and Hamm in the north. However, the region has few historical roots, consisting of at least four economic areas with highly diverse historical experiences. The Ruhr area is probably the most well known. The use of the term Rhine-Ruhr to denote a historical region therefore seems to be a-historic, but is currently the most accurate label available to denote the area relevant to this study. The older and well-known regional unit of the Ruhr area is too restrictive for the research domain of the study, which necessitates the inclusion of large urban concentrations such as Cologne and Düsseldorf, as well as chemical centres such as Bayer's headquarters in Leverkusen. Other metropolitan areas that have been identified since the 1990s are also relevant. Figure 0-7, Figure 0-8 and Figure 0-9 show the geographical composition of the Rhine-Ruhr, Rhine-Main and Rhine-Neckar regions consisting of *Landkreise*, a German administrative unit between the level of municipalities (*Kreise*) and states (*Länder*).

[713] H.H. Blotevogel, 'The Rhine-Ruhr metropolitan region', *European Planning Studies* 6 (1998) 395-410, here: 395-396, 401; Federal Office for Building and Regional Planning (*Bundesamt für Bauwesen und Raumordnung*), *Metropolitan areas in Europe* (Bonn 2011) 7-24.

Figure 0-7. The Rhine-Ruhr metropolitan region with *Landkreise* and cities (of more than 50,000 inhabitants)

Source: Map created by the author based on regional definitions provided in: Bundesamt für Bauwesen und Raumordnung (BBR) and Initiativkreis Europäische Metropolregionen in Deutschland (IKM), *Regionales Monitoring 2008. Daten und Karten zu den Europäischen Metropolregionen in Deutschland* (Bonn 2008) 7. http://www.deutsche-metropolregionen.org/fileadmin/ikm/IKM-Veroeffentlichungen/IKM-Monitoring2008_lite.pdf, accessed 11 July 2014.

Figure 0-8. The Rhine-Main metropolitan region with *Landkreise* and cities (of more than 50,000 inhabitants)

Source: Map created by the author based on regional definitions provided in: Bundesamt für Bauwesen und Raumordnung (BBR) and Initiativkreis Europäische Metropolregionen in Deutschland (IKM), Regionales Monitoring 2008. Daten und Karten zu den Europäischen Metropolregionen in Deutschland (Bonn 2008) 7. http://www.deutsche-metropolregionen.org/fileadmin/ikm/IKM-Veroeffentlichungen/IKM-Monitoring2008_lite.pdf, accessed 11 July 2014.

Figure 0-9 The Rhine-Neckar metropolitan region with *Landkreise* and cities (of more than 50,000 inhabitants)

Source: Map created by the author based on regional definitions provided in: Bundesamt für Bauwesen und Raumordnung (BBR) and Initiativkreis Europäische Metropolregionen in Deutschland (IKM), *Regionales Monitoring 2008. Daten und Karten zu den Europäischen Metropolregionen in Deutschland* (Bonn 2008) 7. http://www.deutsche-metropolregionen.org/fileadmin/ikm/IKM-Veroeffentlichungen/IKM-Monitoring2008_lite.pdf, accessed 11 July 2014.

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2.06.125 Ministerie van Economische Zaken (Directie Wetgeving en andere Juridische Aangelegenheden)

2.17.03 Ministerie van VROM (Centrale Sector)

Stadsarchief Rotterdam (GAR)

Archief Havenbedrijf, Rotterdam (AHB)

Bundesarchiv, Koblenz (BAK)

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Z 14 Der Berater für den Marshallplan beim Vorsitzer des Verwaltungsrates des Vereinigten Wirtschaftsgebietes

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B 136 Bundeskanzleramt

B 146 Bundesministerium für den Marshallplan/Bundesministerium für wirtschaftliche Zusammenarbeit (bis 1957)

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Summary in Dutch

Deze dissertatie onderzoekt de gevolgen van de transitie van kolen naar olie als belangrijkste energiebron voor de relatie tussen de Rotterdamse haven en het Duitse Rijn-Ruhrgebied. Tussen 1880 en 1914 ontpopte de Rotterdamse haven zich tot de grootste haven van Europa dankzij de im- en export van bulkgoederen van de kolen- en staal industrie in het Duitse Ruhrgebied. Met de Rijn beschikte Rotterdam over de goedkoopste transport modaliteit, binnenvaart, voor bulkgoederen. IJzererts, kolen, hout en graan waren de belangrijkste goederen die in Rotterdam werden overgeslagen. Na de Tweede Wereldoorlog kwam de kolenproductie moeizaam op gang, met name in Duitsland. Aanvankelijk was een gebrek aan mankracht en voedsel het voornaamste probleem maar toen de Duitse economie onstuimig begon te groeien vanaf het begin van de jaren 1950 bleef de kolenindustrie onderbemand. Er was volop werk en de mijnen waren geen aantrekkelijke werkomgeving. Omdat de lonen sterk stegen, steeg ook de prijs van kolen aanhoudend. Bovendien lukt het de kolenindustrie maar niet de productie te verhogen met het tempo van de groeiende vraag naar energie.

Vanaf het einde van de oorlog poogden de geallieerde bezetters en na 1949 ook de Duitse Bondsregering om de Duitse energiebalans aan te vullen met geïmporteerde energie. De Amerikaanse en Britse bezetters trachtten vanaf 1947 de olieraffinage capaciteit in hun bezettingszones te verhogen om energie en brandstoftekorten aan te vullen met geïmporteerde ruwe olie. De vondst van grote voorraden olie in het Midden-Oosten door Amerikaanse oliebedrijven opende een nieuwe energiebron voor West Europa. Het Marshall plan financierde de import van Midden-Oosten olie in Europa, alsmede de verdere uitbouw van de raffinage capaciteit. Duitsland bleef niet achter. Als energiebron had olie ten opzichte van kolen een belangrijk voordeel. De prijs had een dalende tendens, zeker na de Suez crisis van 1956. In een poging de kolenindustrie te dwingen tot prijsconcurrentie om de energiekosten voor de Duitse industrie te doen dalen, opende de Bondsregering in 1956 de Duitse markt voor stookolie. Motorbrandstoffen concurreerden niet direct met kolen, stookolie daarentegen wel. Huishoudens, lichte industrie maar ook zware industrie konden vrij eenvoudig omschakelen van kolen op stookolie als de prijs dat aantrekkelijk maakte. Toen de stookolieprijzen en de maritieme transportkosten kelderden na het einde van de Suez crisis in 1957, stroomden grote hoeveelheden stookolie de Duitse markt op. Tegelijkertijd groeiden de onverkochte voorraden kolen bij de mijnen in het Ruhrgebied. Vanaf 1957-58, het begin van de kolencrisis, zette het verval van de Duitse kolenindustrie in en kwam deze nooit meer te boven. Olie, daarentegen, groeide onstuimig, met name in het Duitse Rijn-Ruhrgebied met haar grote concentratie industrie en stedelijke agglomeraties. De aan de Rijn gevestigde Duitse kolenchemie-industrie, waaronder de meest innovatieve bedrijven ter wereld, slaagde erin haar productie over te schakelen op olie. Daarmee herwon het haar vooroorlogse voorname positie in de wereld. Het betekende ook de basis voor een

enorme concentratie olie en petrochemische industrie in het Rijn-Ruhrgebied die zich tussen 1950 en 1975 ongebreideld ontwikkelde.

De enorme groei en schaalvergroting van de olie-industrie na 1945 in West-Europa had grote implicaties voor het Europese transportnetwerk van zeehavens, binnenhavens, spoorlijnen en wegen. Als gevolg van de groeiende vraag naar olie, werden nieuwe transport modaliteiten geïntroduceerd. Het vervoer per vrachtwagen steeg veel sneller dan het vervoer per binnenwater of spoor. Pijpleidingen werden aangelegd omdat het binnenwater en het spoor het groeiende vervoer van ruwe olie niet konden verwerken. Olietankers groeiden voortdurend in omvang, wat ingrijpende havenaanpassingen tot gevolg had om de grotere schepen te kunnen lossen. Om maximaal van de schaalvoordelen in het olietransport te kunnen profiteren werden havens ook aantrekkelijke locaties voor olieraffinaderijen. Ook Rotterdam profiteerde van de trend en groeide uit tot Europa's grootste concentratie van raffinage capaciteit in de jaren 1960 en 1970. De industrialisatie van de Rotterdamse haven – gemeentelijk beleid ingezet na de vele crises die de Duitse transitohandel verstoorden tussen 1914 en 1945 – was daarmee succesvol. De drie grote havenuitbreidingen tussen 1945 en 1975 – Botlek, Europoort en Maasvlakte I – en de groei van de olie-industrie zorgden ervoor dat Rotterdam zich al in 1963 de grootste haven van de wereld mocht noemen. Dit was echter geen vanzelfsprekendheid wat met name in de relatie tussen haven en achterland duidelijk werd.

De groeiende vraag naar het vervoer van olie in het Duitse achterland stelde de Rotterdamse haven voor grote uitdagingen. In 1955, bereikte de haven het bericht dat een groep oliebedrijven, waaronder de Duitse dochterondernemingen van Standard Oil (het huidige ExxonMobil), Koninklijke/Shell en het Britse BP een ruwe oliepijpleiding wilden aanleggen naar hun nieuwe raffinaderijen in het Rijn-Ruhrgebied. De groep bedrijven had twee havens op het oog: Rotterdam en het Noord-Duitse Wilhelmshaven. Esso AG, de Duitse dochter van Standard Oil, had haast bij de besluitvorming omdat diens raffinaderij al in 1959 in productie kwam. Een pijpleiding moest voordien aangelegd zijn. Esso wilde de grootste in de vaart zijnde tankers inzetten om de pijpleiding te bevoorraden. Het Rotterdamse Gemeentelijk Havenbedrijf schrok van de omvang van de plannen. Omdat de bestaande havenbekkens niet voldeden aan de eisen van de Esso begon het Havenbedrijf inderhaast met plannen voor nieuwe havenbekkens. Uitmondend in 1957 in het uitbreidingsplan Europoort, Rotterdam's grootste naoorlogse havenuitbreiding, gaf het Havenbedrijf er blijk van de tekens van de tijd begrepen te hebben. Wilde de haven een deel van de groeiende ruwe olie-import in West Europa verwerken dan moest het haar haven drastisch aanpassen. De diepwater bekkens van Europoort konden de steeds dieperstekende tankers ontvangen. Daarmee was echter het probleem van de pijpleiding niet opgelost, die was namelijk aan Wilhelmshaven toegewezen. De financiële hulp van de Duitse Bondsregering en de snellere oplevering van de havenaanpassingen aldaar hadden Rotterdam afgetroefd. Het was duidelijk dat de groep onder leiding van Esso op Duitse sentimenten en belangen had ingespeeld.

Het enige bedrijf dat zich onttrok aan de Wilhelmshaven pijpleiding en de Rotterdamse haven bleef steunen was Koninklijke/Shell. Rotterdam was de thuisbasis voor Shell's grootste raffinaderij in Europa en sinds 1902 een belangrijke schakel in de Europese activiteiten van de Groep. Echter, de steun voor Rotterdam was niet onvoorwaardelijk. Het management in de hoofdkantoren van Shell in Den Haag en London waren van mening dat de potentiële schaalvoordelen van het vervoer van ruwe olie per tanker en pijpleiding niet konden worden gerealiseerd zolang pijpleidingen op nationaal niveau werden gepland. Shell nam daarom in 1956 het initiatief tot een onderneming die tot doel had een Trans-Europese pijpleiding te bestuderen. De onderneming, Sappeur, slaagde erin vrijwel alle grote en kleine Europese oliebedrijven met raffinaderijen op het continent aan tafel te krijgen. Het plan was om de totale Europese vraag naar ruwe olie uit het Midden-Oosten via Marseille te voldoen. Een pijpleiding zou Marseille via Straatsburg en Keulen met Rotterdam, Antwerpen, Wilhelmshaven en Hamburg verbinden. Voor Rotterdam betekende dit plan een tweede schok. Alhoewel Rotterdam zou beschikken over een pijpleiding tussen Rotterdam en het Rijn-Ruhrgebied, zou de pijpleiding in de verkeerde richting pompen. In plaats van ruwe olie uit binnenlopende tankers te verpompen naar Duitsland, zou de olie vanuit Duitsland naar de Rotterdamse raffinaderijen vloeien. Daarmee zou de haven jaarlijks miljoenen guldens aan inkomsten van lossende tankers derven, wat de exploitatie van de voorziene havenuitbreiding in het plan Europoort in gevaar zou kunnen brengen. Na twee jaar onderzoek en onderhandeling strandde het Trans-Europese pijpleiding plan echter. De grote verschillen in wetgeving tussen de verschillende landen die de pijpleiding zou doorkruisen, onzekerheid over de ontwikkeling en timing van de vraag naar ruwe olie en een periode van lage conjunctuur maakte consensus tussen de bedrijven onmogelijk. Het geplande Trans-Europese pijpleidingnetwerk viel uiteen – mede door het gebrek aan Europese integratie wat toen nog goeddeels opgang moest komen – in een aantal regionale pijpleidingen die enerzijds de Noordzee havens Rotterdam en Wilhelmshaven en anderzijds de Mediterrane havens Marseille, Genua en Triest verbonden met Duitsland. De noordelijke leidingen reikten tot Frankfurt, de zuidelijke leidingen tot Karlsruhe en Mannheim.

In 1957 werd duidelijk dat Koninklijke/Shell de komst van een Trans-Europese pijpleiding niet langer afwachtte en besloot om een pijpleiding tussen Rotterdam en Keulen aan te leggen. Zo kreeg Rotterdam toch nog haar vurig gewenste pijpleiding naar het Duitse achterland. Deze pijpleiding werd in 1968 aangevuld met een grotere ruwe olieleiding en een olieproductenleiding die de Rotterdamse raffinaderijen verbond met de grote industriële en urbane centra langs de

Rijn: het Rijn-Ruhrgebied, het Rijn-Main gebied en het Rijn-Neckar gebied. Opnieuw was Koninklijke/Shell, middels de Duitse dochteronderneming van groot belang. Het besluit van Duitse Shell om in 1965 een olieproductenpijpleiding aan de leggen tussen Keulen, Frankfurt en Mannheim in plaats van het bouwen van een nieuwe raffinaderij in Frankfurt leidde tot de aanleg van de Rijn-Mijn pijpleiding. In 1968 werd deze aangesloten op Rotterdam.

De pijpleiding-episode maakte duidelijk dat Rotterdam niet de gedoodverfde kandidaat was om de belangrijkste oliehaven van het Duitse achterland te worden, niettegenstaande de grote importantie die de haven voor het Ruhrgebied had in het vooroorlogse tijdperk van kolen. Nationale belangen en de transnationale blik van multinationale ondernemingen bedreigden het tot stand komen van een pijpleidingverbinding tussen Rotterdam en het Rijn-Ruhrgebied. Geholpen door de Rotterdamse belangen van Shell en het falen van het Trans-Europese project kon Rotterdam zich alsnog vestigen tot de belangrijkste oliehaven van het Rijn-Ruhrgebied. Voor ruwe olie moest het die plek delen met Wilhelmshaven maar de omvangrijke capaciteit van de Rotterdamse raffinaderijen en de expansie van de pijpleidingverbindingen met Duitsland in 1968 leidden ertoe dat Duitsland Rotterdam's grootste oliemarkt werd, terwijl Rotterdam zich een aanzienlijk aandeel in de Duitse olie-import verwierf. Mede door de aanleg van pijpleidingen ontwikkelde de Rotterdamse oliehaven een groot en vrijwel onbedreigd achterland in het Duitse Rijngebied. In combinatie met de diepe havenbekkens van Europoort en Maasvlakte I beschikte Rotterdam over een combinatie van havenfaciliteiten en achterlandverbindingen die het tot op de dag de grootste oliehaven van Europa maken.

Curriculum Vitae

Marten Boon was born in 1978 in Amsterdam. He studied history (BA) and media and journalism (MA) at the Erasmus University in Rotterdam. Then, after four years at a media consultancy, he returned to Erasmus University to take his PhD in economic and business history. Between 2009 and 2014, Marten worked as a PhD candidate on the NWO-funded research project *Outport and Hinterland. Rotterdam Business and Ruhr Industry, 1870-2010*. Marten also lectured on several courses in the history curriculum at undergraduate and graduate level and is currently still a lecturer at Erasmus. He lives in Rotterdam with his partner and two children.

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