

# Energy sector integration in Europe

The role of leading upstream oil & gas companies

(Summary version)

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FNI Report 20/2004

ISSN: 0801-2431

ISBN: 82-7613-466-1

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# 1. Introduction

## 1.1 The aim of the study

This summary database study is part of a wider project at the Fridtjof Nansen Institute (FNI), which explores similarities and differences in business structure development of major energy companies in Europe in the 1990s and beyond. This report reviews and compares data collected on business strategies and investment activities of six major incumbent upstream oil and gas companies operating in Europe in the period, and indicates *what* energy activities they invested in, *how much* they invested and *where* in Europe they made their investments. The six investigated companies are BP, Exxon, Hydro, Royal Dutch/Shell, Statoil and Total. The selection criteria stipulated that companies i) figured among the largest in terms of upstream oil and gas reserves and activities in Europe (the North Sea) in the period<sup>1</sup>; and ii) represented a geographical spread with respect to home market origin in Europe. In a longer version report available on request from the FNI, more detailed company studies are presented.

The study is preliminary to the extent that not all of the companies were equally forthcoming and information gaps remain to be filled. Revised data will therefore be incorporated during the course of the project. Having said that, data collected so far enable us to make broad conclusions concerning company strategies and patterns of similarities/differences.

The main question of this database study is whether these mainly exploration and production – based companies during the 1990s chose a *specialisation* or *diversification* strategy in European energy markets. Specialisation denotes here a narrow business focus on upstream oil and gas activities (exploration and production) together with downstream activities in the oil supply chain, activities that have constituted the traditional core business areas of the major oil and gas companies in Europe and elsewhere around the world. Diversification, on the other hand, includes: i) diversification through vertical mid- and downstream integration in the gas supply chain; ii) diversification into other functionally related energy supply chains (electricity and primary energy sources beyond oil & gas); and, iii) geographical diversification into new national downstream markets in Europe.

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<sup>1</sup> Since our focus will be on company investment/diversification strategies in Europe, we have chosen case companies that are among the largest upstream actors in European oil & gas provinces (British, Dutch and Norwegian sectors of the North Sea). Data from the Norwegian Ministry of Oil & Energy ranked Statoil, Hydro, Total, Exxon and Shell among the six top companies in terms of oil and gas reserves at the Norwegian continental shelf (in decreasing order). In the Dutch sector, Shell and Exxon have always been the dominating companies, and in the UK sector, BP is by far the dominating upstream company. All the six companies have a long history of integration downstream in various **oil** product chains in Europe (except for Norwegian Statoil and Hydro, which entered the oil & gas business in the late 1960s/early 1970s. As an industrial conglomerate, Hydro had operated other industrial activities in Europe for nearly a century).

Similarities and differences in emerging business strategies reported in this study will constitute the empirical background for subsequent studies by FNI. In these forthcoming studies we will discuss more thoroughly factors that explain *why* the companies sometimes coincided and sometimes differed in their strategic responses to regulatory changes in the energy sector in Europe from the late 1980s on.

## **1.2 Why is a study of oil company business strategies interesting?**

It has been documented that regulatory changes in Europe during the 1990s generated new investment opportunities and threats, and prompted massive energy industry restructuring, notably among electricity and gas utilities (Midttun and Finon, 2004). Regulatory changes in the electricity and gas sectors gave consumers more power to choose the energy supplier of their choice. Environmental regulations encouraged fuel switching and more efficient use of energy. The effect of total regulatory changes prompted competition among energy suppliers to supply new combinations of energy at favourable prices, cut costs and ensure good, extended service.

Studies show that many incumbent electricity and gas utilities responded by enhancing their expertise in downstream activities (marketing, trading and customer relations) and different supply modes to more flexibly meet the energy requirements of their customers. Another strategic response was rationalisation (cost cutting) and growth in order to buttress economies of scale. The new strategies materialised in the shape of many mergers and acquisitions reported in European energy markets in the 1990s and beyond, and in the reported organic growth of companies across European borders and energy sectors. The result of all this was that Europe at the end of the period saw the emergence of (up-scaled and up-scoped) new large energy companies doing business across countries in Europe and across the once relatively separate gas, electricity and heating sectors. ‘Up-stream’ based electricity companies diversified forwards in downstream activities (distribution and supply of electricity); ‘down-stream’ electricity distribution companies diversified backwards into production; and companies diversified ‘sideward’ into new energy carriers (natural gas, district heating) and primary fuels (production and use of renewables). Many electricity supply companies invested heavily beyond their traditional home markets, reflecting the new opportunities de-regulation of the European downstream energy markets had ushered in. Similarly, wholesale natural gas companies integrated forwards into retail gas supply, backwards into natural gas exploration and production and sideward into new energy carriers (electricity) and energy sources.

There are several reasons to study whether major upstream oil and gas companies responded by emulating company structures (diversification and vertical integration) pursued in other energy sectors. First of all, regulatory changes posed new *risks* also for the upstream companies. New environmental regulations aimed at increasing the demand for cleaner fuels, and to change the competitiveness of these fuels relative to that of oil and to some extent even

gas. We would expect this to stimulate investments by the oil majors in energy sources beyond oil & gas, and therefore ask whether such investments materialised? Moreover, EU energy market liberalisation aimed at increasing the power of energy consumers to substitute energy forms and energy suppliers. We would expect this to stimulate a new downstream customer focus among the upstream-based companies too, and therefore ask whether downstream natural gas-investments materialised?

Secondly, regulatory changes provided upstream companies with new *opportunities*. A purpose of EU liberalisation was to dismantle monopoly structures in national gas and electricity markets, and ensuring greater access for 'independent agents'. Upstream oil and gas majors represented a strong group of relatively independent actors in European downstream gas and electricity markets, whose control over European gas reserves assumingly would put them in a favourable position for downstream expansion. Moreover, the financial investment resources of the oil and gas majors outweigh by far those of most electricity and downstream gas companies in Europe, and their long experience with risk management and response to investment opportunities across national borders far exceeds that of most European electricity and gas utilities.

To sum up, it is not unreasonable, in light of the regulatory changes and structural changes in other energy sectors in Europe during the 1990s, to expect that also upstream oil and gas companies would respond by diversification and vertical integration in the natural gas chain.

### **1.3 Briefly on generic investment strategies**

The comparison of company investment strategies in this study applies a simple typology to represent both the 'extent' of diversification/specialisation and 'form' of diversification that can be made by the companies.

#### **1.3.1 'Extent of diversification'**

An upstream oil and gas company can choose to pool resources into a few core activities, traditionally the exploration and production of oil and gas. Such companies are highly specialised. If a company has integrated few activities outside its established core, the *extent* of diversification is low, and the strategy variable has the value 'Specialised Company'. If the company diversifies into many activities, the extent of integration is high, and the strategy variable has the value 'Energy Company'. The strategy variable is a continuous variable with '*Energy Company*' vs. '*Specialised Company*' as extreme values. The more primary energy sources, energy carriers (gas, electricity, heat) and downstream energy activities (trading, marketing) included in the corporate structure, and the greater their investment asset value compared to investment/asset values of oil and gas exploration and production in the company, the further the variable's value extends towards the 'Energy Company' end of the

scale. Divestment of activities reduces the value of the variable (from high to lower). We will be interested in relative differences between the companies.

### 1.3.2 Forms of diversification

Once an upstream oil and gas company has chosen to diversify beyond upstream activities, it can pursue

- Vertical integration downstream in the oil and gas supply chains
- Diversification into other energy carriers and primary energy supply chains

Vertical integration entails the development of new business activities along the oil and gas supply chains. Such activities can involve refining of the primary energy source and development of distribution channels early in the supply chain (production, transport and storage of LNG). More extended vertical integration downstream can involve direct supply to large industrial customers (of gas and refined oil products) as well as general distribution and retail sales of different refined oil and gas products to smaller industrial firms and households.

Diversification into other energy carriers involves investments in e.g. electricity and heat supply chains. If such investments include the use of natural gas as a primary energy source, it will also involve extended vertical integration in the gas supply chain. If integration extends to industrial supply or retail sales of electricity and heat, the company will in fact have vertically integrated in three functionally different but related energy supply chains, gas, electricity and heat.

Diversification into other primary energy supply chains would require company investments in energy sources other than oil and gas, such as coal, nuclear fuels, biomass energy, solar and wind power.

### 1.3.3 Typology of generic business strategies

When investing in energy activities, an upstream oil and gas company can choose either to remain specialised, by acquiring only new upstream business activities (pure horizontal integration) or to diversify through vertical integration in the gas and oil chain or through investments in energy supply chains beyond oil and gas. In such alternative energy supply chains, the company can choose involvement only in production activities or full-scale vertical integration. Hence, a typology of four generic strategies can be discerned.

**Table 1. Exploration and production-based oil and gas companies' generic business strategies**

	<b>No diversification into other energy sources</b>	<b>Diversification into other energy sources</b>
--	-----------------------------------------------------	--------------------------------------------------

<b>No vertical integration along the oil and gas supply chain</b>	Pure exploration and production company ( <b>specialised company</b> with no diversification)	Production-based energy company (some diversification)
<b>Vertical integration along the oil and gas supply chain</b>	Vertically integrated oil and gas company (some diversification)	Vertically integrated <b>energy company</b> (high level of diversification)

The boxes in the table indicate connections between *extent* and *form* of diversification. In the upper left-hand box, the company is not diversified at all (specialisation). In the lower right-hand box, the company is highly diversified, being vertically integrated in diversified energy supply chains. The upper right and lower left-hand boxes represent companies with some degree of diversification. In the upper right-hand box, the company invests in the production of other energy sources. In the lower left-hand box, the company invests only in downstream oil and gas activities. The typology represents idealised business strategies. In the real world, companies would only approximate these ideals.

## 1.4 Variation in companies' geographical focus

An important parameter is geographical distribution of investment activities. We assembled geographic information for the study because it would help us analyse likely correlations between company-external variables (notably EU and national government regulations) and generic investment type (specialisation vs. vertical integration/diversification) chosen by oil and gas companies in specific geographical locations. In a future study we intend to explore whether uniform risks and investment *opportunities* actually did evolve across Europe for different energy activities, and hence for pursuing the different generic investment strategies (geographically distributed unfavourable and favourable investment factors).

We will expect, *ceteris paribus*, companies to enjoy greater investment opportunities in geographical areas with which they have extensive prior experience (extended home market hypothesis providing favourable investment conditions). Consequently, barriers to investments in the *extended home market* will more severely limit a company's overall opportunities for diversification.

## 1.5 Design of the study

### 1.5.1 Comparative case study approach

This database study has been designed to facilitate the exploration and description of oil company investment/diversification strategies, actual investments and geographical distribution of investments, and comparisons between the companies<sup>2</sup>. For our methodology,

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<sup>2</sup> Explanations of similarities/differences found will be saved for later studies.

we chose a comparative case study approach, in which data were first collected for one individual case company. The procedure was then replicated for the other case companies. We examined the data for evidence of stability/changes in company –specific investment/diversification strategies, and sorted the strategies according to the typologies set out in the scheme above. Finally, we compared strategies and investment data across cases to see if patterns of inter-company similarities/deviations could be detected.

What we looked for were commonalities/differences in the following:

- State of energy diversification by early 1990s
- Generic investment/diversification strategies and modifications in the period 1990-2003
- Geographical focus of investments/diversification strategies

### **1.5.2 Collection of data**

We collected qualitative and quantitative company data from different sources to piece together strategies, and time series investment data for evidence of *changes* in investment strategies i.e. whether the company:

- Moved towards becoming a full-fledged energy company,
- Moved towards 'specialisation' or
- Remained unchanged (investments only leading to pure horizontal integration of activities already existing in the corporate structure).

The data collected on 'investment strategies' varied in terms of precision. The list below orders the different categories by 'degree of measurement precision':

1. *Declared strategies.*
2. *Organisational changes* indicating the readiness of management to adopt new strategies.
3. *Space allotted in company material intended for public consumption to descriptions of various business areas*, indicating relative importance given to various business activities in the companies.
4. *Number and nature of specific investments done* in different energy business activities.
5. *Actual capital invested in different business areas relative to the business area oil and gas E and P* – set out in annual accounting data (annual relative distribution of investment capital to business areas, and annual change in 'asset values' (tangible and intangible capital) for different business areas.
6. *Quantitative assessments of capital allocation to different business areas on a less aggregated level* (different renewables, electricity production, electricity sales, gas



transmission, distribution and sales, heat production, etc.) – measurement by aggregation of data collected from annual reports, and more detailed information from company sources.

Annual reports, management presentations, website information and press releases from the companies constitute our main sources of data. Interviews were conducted with key business area managers and others in key positions in some of the companies and energy industry observers. Energy journals and net-based energy information databases offered additional information; *Power in Europe* on investments made by the companies in electricity activities; and *Oil & Gas Journal* on gas-related investments.

Declared strategies (and declared changes in strategies) tend along with organisational changes/relative space allotted to different business areas to be published in annual reports. Management presentations, press releases and annual reports also often provide general information on present and planned investments and major divestments as well. Most of the companies publish general allocation figures on investment capital and asset profiles in their annual accounts. None of them, however, publish details on allocations of investment capital in specific energy activities or changes in their asset balance.

### **1.5.3 Notes on company methods for diversification and vertical integration**

In our search for investment data, we were aware of two main ways or *methods* by which companies can diversify. They are:

- By setting up a new business from scratch
- By mergers with or the acquisition of parts/all of the shares in an existing company

We were also aware of two additional methods by which companies can seek to maintain vertical integration despite of apparent moves to disintegrate. They are:

- By maintaining ownership and co-ordination of a holding company on top of a corporate structure of disintegrated subsidiaries
- By co-operative arrangements, such as long-term alliances with companies along vertical supply chains

If ownership is retained of disintegrated companies, or strong co-operative links are established between owners of different companies, activities remain integrated, though less strongly and visibly than before.

## **1.6 Organisation of the report**

In this summary report, we compare what we now know about the companies' various business strategies and investments in Europe in the period 1992-2002, and the extent and

forms of energy business diversification in the companies in the period. In chapter 2, we compare respectively the investment, turnover, and production figures as presented by the companies in 1992 and 2002. The financial figures simply indicate that the general economic strength and investment capabilities of the companies differed. Production data indicate the extent to which the companies focussed on extending core upstream activities. In chapter 3, we chart the degree of diversification in the companies at the start of the 1990s, as background for describing further development during the 1990s and beyond. In chapter 4, we describe and compare company investment strategies related to energy activities beyond upstream oil and gas in the period. Chapter 5 shifts to the geographical patterns in the investments made by the six companies. In chapter 6, we try to answer the questions posed in this introductory chapter and indicate topics for further research based on the data published in this database report.

## 2 Short on general company differences and similarities

The six companies studied differed highly in terms of oil and gas production, proven reserves of crude oil & gas and financial flows (turnover and profits) in the period studied. Hence, the companies differed in financial strength and investment capabilities, obviously impacting on the *total volume* of investments that could be made (see table 2.1 below for investment figures in two selected years, at the start and end of the period studied). Despite of these differences, it still makes sense to compare company diversification strategies, in that all companies had substantial investment funds that could be allocated to different energy activities. And, since all the companies had Europe as a fundamental geographical business area, indicated by the fact that they all figured among the top 10 in terms of upstream oil and gas production and reserves in the area, they were all exposed to the regulatory threats and opportunities that came from the European Union and member countries in the period, potentially impacting on their choice of investments in Europe.

Table 2.1. Investment figures 1992 and 2002

	Investments (bill US \$)	
	1992	2002
<b>BP</b>	3,5	13
<b>Exxon**</b>	6 (1996)	14
<b>Total</b>	2,8	9
<b>Shell</b>	7	20
<b>Statoil</b>	1,4	4
<b>Hydro</b>	1,1	5,2

\*\* Due to the lack of response from Exxon to requests for information for the period prior to 1996, we cannot provide information for 1992, as for the other companies in the study. Instead data from 1996 is presented

A closer look at changes in oil and gas production figures for the companies in the period (table 2.2 below) indicates that a major part of all the companies' investments in the period certainly went into strengthening the *upstream* oil and gas business. This was notably the effect of the mega-mergers in the period between Exxon and Mobil; BP, Amoco, Arco and Burmah Oil; Total, Fina and Elf Aquitaine; and Hydro and Saga.

Table 2.2. Production 1992 and 2002

	Production	
	1992	2002
<b>BP</b>	472 mill barrels oil 375 bill ft <sup>3</sup> natural gas	737 mill barrels oil 3178 bill ft <sup>3</sup> natural gas
<b>Exxon</b>	622 mill barrels oil 2066 bill ft <sup>3</sup> natural gas	911 mill barrels oil 3815 bill ft <sup>3</sup> natural gas
<b>Total</b>	169 mill barrels oil	582 mill barrels oil

	349 bill ft <sup>3</sup> natural gas	1697 bill ft <sup>3</sup> natural gas
<b>Shell</b>	783 mill barrels oil 2506 bill ft <sup>3</sup> natural gas	886 mill barrels oil 3439 bill ft <sup>3</sup> natural gas
<b>Statoil</b>	152 mill barrels oil 138 bill ft <sup>3</sup> natural gas	274 mill barrels oil 663 bill ft <sup>3</sup> natural gas
<b>Hydro</b>	48 mill barrels oil 80 bill ft <sup>3</sup> natural gas	131 mill barrels oil 248 bill ft <sup>3</sup> natural gas

Hence, the table shows that none of the companies neglected their core upstream business area during the 1990s. It does not, however, indicate anything about the magnitude of investments made in downstream activities and in primary energy sources other than oil & gas. We turn to such investment data in chapter 4.

### **3 Comparing degree of diversification in business activities at the start of the 1990s**

Before we compare company investments outside upstream oil & gas and hence, actual direction taken in investment strategies, it should be noted that already at the start of the 1990s the companies varied substantially in degree of energy diversification. The least diversified company was Statoil, which was fully specialised as an upstream natural gas company in addition to being a vertically integrated oil company. Beyond ownership of gas transportation infrastructure offshore, the company was not engaged further downstream in onshore gas transportation, direct marketing and retail sales. Statoil was neither engaged in other energy carriers or sources beyond oil and gas.

Hydro was somewhat more diversified at the start of the 1990s in its role as a substantial electricity producer based on Norwegian hydropower capacity. Beyond this, Hydro was not engaged in downstream electricity distribution or in other energy chain activities, and apart from ownership shares in offshore pipelines, the company was not engaged further downstream in the natural gas market, i.e. in onshore transportation, direct marketing and retail sales of natural gas.

BP was a highly specialised upstream oil and gas company at the start of the 1990s, but had some assets representing vertical integration in the gas supply chain and diversification into other energy value chains. BP owned 25 % of Ruhrgas, the dominating German wholesale company for natural gas in Germany and had been involved since the 1970s in the manufacturing of solar power cells and in coal production.

Total was moderately diversified at the start of the 1990s. Total was not engaged in downstream natural gas activities and had no interests in electricity generation and supply. Total was, however highly diversified in other energy value chains. The company operated as

a mining company, and had considerable interests in nuclear fuel mining (uranium) and coal mining and some minor interests in the manufacturing and sales of solar power modules.

Exxon and Shell were more energy diversified at the start of the 1990s than any of the other companies studied. Both showed substantial vertical integration in the natural gas supply chain and had substantial interests also in other energy value chains. In the downstream natural gas supply chain, Shell and Exxon had for decades pursued a joint investment strategy in Europe, giving them large ownership shares in the wholesale/transportation company Gasunie in the Netherlands and Ruhrgas, BEB (originally the largest German upstream gas company) and Thyssengas in Germany. Shell had also acquired ownership shares in Belgian Distrigaz.

Shell was moderately diversified into other energy sources, mainly in coal and the manufacturing/sales of solar power modules. Exxon's energy diversification was mainly in coal and uranium production/sales as well as electricity production based on coal in Hong Kong and around 1200 MW of co-generation capacity installed at industrial sites.

Hence, at the start of the 1990s only Exxon and Shell operated somewhat as vertically integrated gas companies (basically mid-stream integration). In terms of 'horizontal' diversification, only Hydro had any considerable activities in electricity production. All but the Norwegian companies were engaged in the production of coal. Exxon and Total were engaged in uranium mining activities. Shell and BP were engaged in the manufacturing of solar power systems and Total in solar heating systems. None of the companies were highly diversified vertically in different primary energy sources, operating as true 'energy companies'.

Concerning geographical spread, Hydro and Statoil's activities were almost entirely limited to Norway and the Nordic countries. BP was highly internationalised in its upstream activities and downstream oil supply activities. Downstream gas activities were limited to Germany through the ownership share of Ruhrgas. BP's sales of solar photovoltaic systems had a global scale, with the UK as a centre of its activities. Total's upstream activities and downstream oil activities were considerably internationalised, and so were coal and uranium production activities. The production of solar heating systems took place in France, aimed at global sales. Shell and Exxon were highly internationalised in their upstream activities, and were in addition the major upstream actors in Europe. In downstream natural gas activities, the Netherlands was the definite 'home market' of the two companies, extended into neighbouring countries by part ownership in Germany and Belgian wholesale gas companies.

## **4 Comparing overall business strategies from 1990 onwards – specialisation or diversification**

## 4.1 Patterns of similar strategic orientation

Several patterns of similarities in strategic orientation appeared between the companies during the 1990s. There was a clear tendency in the period for the oil companies to divest non-energy industrial assets. All companies declared strategic intentions of growing, primarily in the upstream oil and gas business. For BP, Exxon and Total this was notably implemented by mergers with other major oil companies in the late 1990s, combining upstream assets in different geographical areas. For Shell, Statoil and Hydro, growth was ensured primarily through organic growth in new geographical areas. The strong impetus to divest non-energy assets and to gain upstream market shares would indicate that all the companies intended to become more *specialised*.

All the companies had, however, made known their parallel strategic intentions to *intensify diversification* in energy activities, notably forward in the natural gas supply chain, into retail gas marketing and sales, as a method to ensure increased demand for their upstream natural gas assets. They all pursued organisational changes in the period to facilitate implementation of this new downstream natural gas focus, and also actual investments by the companies indicate that stronger vertical integration in the natural gas supply chain materialised. All of the companies established retail marketing and sales businesses for natural gas and sought to grow strategically in electricity production based on natural gas. In the course of the period, however, all the companies gradually concentrated their marketing and retail supply activities into the market segment *large and medium-sized industrial and commercial users* of gas and electricity.

Hence, from initial differences in their rate of downstream natural gas diversification at the start of the 1990s, it is fair to conclude that subsequent investments made the companies more similar in strategic orientation as *vertically integrated oil and gas companies* in the course of the period. It is also fair to say that this orientation had a uniform direction.

With respect to 'horizontal' diversification into other energy supply-chains, the picture is somewhat more differentiated - both concerning volume of investments and what energy sources that were invested in. The companies differed widely at the start of the 1990s and continued to do so at the end of the period studied.

The largest four companies (Exxon, Shell, BP and Total) were at the start of the 1990s involved in coalmining and two of them (Exxon and Total) in the mining of nuclear fuels. After an initial period of expansion in these fuels, by the end of the period all the companies scaled down or exited the coal and nuclear industry. Total and Exxon retained activities in coal mining. Shell and Exxon invested in coal-based electricity generation in the period.

With the exception of Exxon, all the companies made investments into renewable energy, notably late in the period studied. In sum, Exxon scaled down their activities in other energy

sources whereas all the other companies increased their assets in energy fuels beyond oil and gas. Nevertheless, compared to total assets in the companies, their share in other energy sources was minor, and so were later increments made during the 1990s compared to total company investments.

So in terms of changed asset balance during the period studied, it is fair to conclude that the companies moved toward becoming 'vertically integrated oil and gas companies' more than complete 'energy companies'. As will be discussed in section 4.2, however, more detailed study reveals that despite of the general patterns of similar strategic orientation evolving between the companies in the period, considerable differences did also evolve.

## **4.2 Evolving differences between the companies**

Despite of similar patterns found in the companies' strategic orientation, differences that evolved in actual investments were still striking. The companies came to differ in 'timing' 'extent' and not least geographical focus of *downstream investments* made in the natural gas and electricity supply chains. Whereas some of them divested all their assets in coal and nuclear energy, others did not. And whereas some of them invested considerably in renewables, others refrained from this or made only negligible investments.

### **4.2.1 Investments in natural gas retail marketing and sales**

Exxon, Shell, Total and BP made far more extensive downstream natural gas investments than Statoil and Hydro in the period; they had far larger investment capacity and far greater geographical spread in their investments. Europe attracted the sharp attention of all the companies in downstream natural gas supply investments in the period. Exxon, Shell, Total and BP made large downstream investments in gas supply chains (including natural gas-fired electricity generation) also outside Europe in the period. The US gas market became an important downstream investment area not only for Exxon, but for BP and Shell too. By 2004, the BP Energy Division announced that BP was the top overall supplier of natural gas to the US market, among the top five in gas marketing and top ten in electricity trading. Gas marketing ventures were announced also in Latin America and Asia. The Shell subsidiary Coral Energy was by 2004 among the top ten retail energy marketers in North America (gas and electricity). The Shell Gas & Power Division announced projects in 35 countries around the world. Beyond Europe, Total became during the 1990s a substantial player in downstream natural gas activities in Latin America, following the increased presence of the company in upstream gas exploration and production. All the companies invested substantially in the period in LNG systems as a mode of transporting natural gas to customers not tied to pipeline infrastructure.

## *Downstream natural gas investments in Europe*

### *Shell and Exxon*

As discussed in chapter 3, Shell and Exxon enjoyed at the start of the 1990s the most favourable positions of the six companies for capturing market shares in natural gas retailing on the European continent through their extensive ownership in German, Dutch and Belgian natural gas companies and gas infrastructure. The companies chose, nevertheless, the UK as their testing market for expansion into retail gas sales and marketing to *industrial and commercial customers*, through the joint trading company Quadrant Gas, in 1989. This move reflected that the UK was the first country in Europe to allow large gas consumers to freely choose suppliers in the market. In 1997, the joint venture was split and the two companies embarked on different downstream natural gas strategies. Shell bought out Exxon and continued its activities in Shell Gas Direct. Exxon on the other hand discontinued its retail gas market activities in the UK. After the merger with Mobil in 1998, ExxonMobil sold out also Mobil's UK industrial and commercial customer portfolio, this time to Total. Shell, on the other hand continued to expand downstream in the UK gas market. In 1998, Shell acquired Texaco's industrial & commercial gas business in the UK and a portfolio of small and medium-sized industrial & commercial customers from Total. In 2001, it acquired the portfolio of medium-sized gas customers from Alliance/Statoil.

In the Netherlands, Gasunie, 50 % owned by Shell and Exxon, had operated mainly as wholesale supplier to public energy utilities, which operated as both retail gas and electricity companies. When the Dutch gas and electricity markets were gradually opened up, Gasunie captured new industrial customers. From the very late 1990s, however, Gasunie experienced declining market shares in its home market. Shell decided to start up retail sales also outside the realms of the Gasunie Company in order to gain market share in the Benelux market. Exxon, on the other hand, refrained from going outside the Gasunie alliance. After Shell's first efforts at acquiring a major electricity generator in the Netherlands stranded, the company entered into a joint venture with one of the major public retail gas & electricity utilities aimed at establishing new electricity generation capacity and expanding further downstream into Dutch retail sales of natural gas and electricity. Also this venture stranded. Eventually, Shell started up on its own, under the name Shell Energy Europe, a subsidiary of the global Gas & Electricity Division. In 2003, however, Shell Energy Europe did not announce gas retail marketing activities in the Netherlands. The focus markets for sales of gas to large customers were the UK, Germany, Denmark and Spain.

In Germany, Exxon and Shell had been positioned in Ruhrgas since long before the 1990s. In the course of the 1990s Ruhrgas increased its vertical integration in the market through acquisitions of local public gas utilities. Being positioned in Thyssengas and BEB as well, which stepped up efforts to expand their position downstream in the German natural gas market, it is fair to conclude that Exxon and Shell initially strengthened their downstream



position in the German market. However, as part of a larger energy industry restructuring in Germany, Shell and Exxon sold their minority interests in Ruhrgas to the new German energy giant E.ON. Shell and Exxon sold out their assets also in Thyssengas. This reduced the companies' indirect downstream gas activities in Germany. Shell and Exxon retained their assets in BEB, however. BEB evolved during the 1990s as another major downstream agent in the German natural gas market, controlling major gas pipelines and storage facilities in the northern part of the country. As we have seen in other parts of Europe, Shell and Exxon decided in 2004 to split parts of their joint venture activities in Germany, discontinuing the gas marketing and retail trading activities of BEB and opting instead to start up separate gas trading businesses in Germany.

### *BP*

BP, like Shell and Exxon, was in the early 1990s positioned for further expansion downstream in the natural gas chain in Germany, through its 25 % ownership share of Ruhrgas. Like Shell and Exxon, however, BP sold its share to E.ON as part of the massive energy industry restructuring in Germany in 2002-3. In return BP got control over a large number of petrol stations by the acquisition of E.ON's shares in Veba, the owner of the Aral branded service outlets. BP chose, like all the companies studied, the UK as the first European country for integration downwards in the natural gas chain. In alliance with the two Norwegian companies Statoil and Hydro, BP established the gas marketing and retail sale subsidiary Alliance Gas in 1991. In 1996, following developments in the liberalised British gas market, Alliance Gas was restructured with BP and Statoil splitting the company in two equal parts, and Hydro leaving the business in the UK. When the Gas and Power business unit was established in 1999, vertical diversification efforts increased also elsewhere in Europe.

BP Energy established offices in Hamburg and Rotterdam, offering gas supply to business consumers in Germany and the Benelux countries. In Germany, BP Energie (Deutschland) GmbH also market electricity to businesses. BP Energie Deutschland announced in 2003 that it was aiming for a 15 % share of the German natural gas supply market but that lack of competition on the market had so far resulted in only five major industrial customers<sup>3</sup>. Recently, BP's subsidiaries in Italy and notably Spain have started up vertical integration in the natural gas chain, right down to retail marketing and supply to business consumers. In Spain, a new supply chain for LNG ensures gas resources. The gas is not only supplied directly to business consumers (a segment of the market where BP became the first foreign entrant in 2000, serving 10% of the market by 2002), but will be used to generate electricity at a BP power station at Bilbao, licensed to supply electricity to business consumers as well. Under the 'BP Energia' brand, BP now offer 'integrated energy' to these customers – whether in oil, lubricants, gas, power, solar etc.

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<sup>3</sup> Alexander's Gas & Oil Connections, vol 8, No. 20 17 Oct, 2003

## *Statoil and Hydro*

Statoil was fully specialised as an upstream company in the beginning of the 1990s. From then on, the company sought to diversify downstream into gas retail marketing and supply, mainly the British, Danish and Swedish markets. Statoil's downstream operations in the UK essentially took place through Alliance Gas (in partnership with BP and Hydro) and targeted the industrial and commercial segments of the gas market. When split in 1996, Statoil continued gas-marketing operations in the UK under the Alliance Gas brand. From 2000 onwards, Alliance Gas has focussed on fewer and larger customers, while also offering more integrated energy solutions. In 2001 Alliance Gas merged with Statoil UK and became a wholly owned subsidiary of Statoil ASA. This marked the start of vertical integration in the UK market in that the Statoil Group could sell its Norwegian gas to British consumers after the discontinuation of the Norwegian collective Gas Negotiation Committee system in July 2002, which had prevented licensee companies to individually sell and export natural gas from the Norwegian continental shelf. When Alliance Gas was split in 1996, Hydro sold its minority shares and went out of downstream natural gas activities in the UK in 1996. The company re-entered the UK downstream natural gas business in 2004, however, in a joint venture with German Wingas (HydroWingas company). The decision was prompted by the future prospects of the new Ormen Lange field and the new gas pipeline connecting UK to this field. By integrating vertically right down to retail sales, Hydro avoided transaction costs associated with selling/buying and negotiating in the wholesale market, leaving a higher margin in gas trade than competitors not vertically integrated could obtain. Other factors contributing to the decision to re-enter the UK downstream market was the abolishment of the Norwegian collective gas trading system and the fact that UK gas market regulations were seen as particularly favourable for independent newcomers like Hydro.

Statoil also integrated midstream in an onshore pipeline company in Germany in 1994 (20 % ownership in the Netra gas pipeline, linking northern and East Germany and 5 % ownership in the East German gas company Verbundnetzgas), providing the company with a position to further integrate downstream in Germany. The Netra pipeline, when it opened in the mid-1990s, transferred Norwegian GFU-contracted gas to East German Verbundnetzgas and later to Czech Transgaz. The Netra pipeline came to function as an extension of the offshore pipeline system that connected the Norwegian continental shelf to the German border. The investment notwithstanding, Statoil never expanded into retail marketing and sales in the German gas market for fear that it would interfere with their amicable relationship with incumbent German gas companies, Statoil's major customers in the German wholesale market.

Similar caution was employed by Hydro in Germany and other countries with major incumbent gas companies and slow opening of the gas market for competition. Hydro became a partner in the Netra pipeline project, but, like Statoil, was disinclined to compete with Ruhrgas in retail marketing and supply.

Statoil had established itself as a major downstream oil product company in Scandinavia and used this experience also for further expansion downstream in the natural gas market. In Sweden, Statoil acquired 14.5% of Vattenfall Naturgas AB in 1997 and increased its share to 30 % in 2001. The company purchased gas from Denmark for delivery to the Swedish market and owned and operated the gas transmission pipeline from Denmark to Sweden. Gas sales were approximately 1 billion cubic metres per year, delivered to local distribution companies and Swedish industrial firms. The company was later renamed Nova Naturgas. In Denmark, Statoil joined Naturgas Fyn of Denmark in 2003 to establish the retail gas marketing and sales company Statoil Gazelle. Vertical integration was ensured through a gas delivery agreement with Statoil for 300 million cubic metres of gas, to be supplied to 30,000 households and 1,200 commercial and industrial customers, accounting for about 7 % of the Danish market. Statoil planned to increase the share to 20 % once the market became fully liberalised.

Hydro chose northwestern Europe, and in particular the Netherlands, as geographical focus for its downstream natural gas strategy. Several factors were decisive for this choice. Hydro was already present in some of these markets as a major buyer of natural gas (for consumption in the agricultural business of the company) and the company had gained crucial insights into gas prices both from a consumer and producer perspective. The major Hydro Agri plant was located in the Netherlands, close to the Belgian border and the Zeebrugge terminal, in which Hydro had an ownership share, and hence, an entry point for its own natural gas resources. Hydro started its downstream gas marketing and sales venture in the Netherlands by auto-supplying its own industrial installations, which represented a significant part of total Dutch industrial gas consumption. This arrangement represented a strong form of vertical integration where Hydro would establish an interconnected gas chain from upstream activities right down to the use of gas for industrial purposes. The Norwegian Gas Negotiation Committee system still limited Hydro's options, and part of the gas supply had to be secured through the Interconnector that connected the liberal UK market and Zeebrugge from 1998 onwards. Hydro had negotiated rights to transmission capacity in the Interconnector, and Hydro Energy became the first industrial company importing natural gas directly from at the UK to the European Continent. The Interconnector also paved the way for expansion of Hydro's retail marketing and sales venture in the Netherlands, when the Dutch government opted for a fast opening of the market. Hence, Hydro gained experience and market shares in the Dutch market even before the GFU was abolished in 2001, allowing Hydro to freely trade its Norwegian gas resources. This event further consolidated Hydro's position as marketer of natural gas directly to Dutch industrial customers so that when US Duke Energy Europe Northwest decided to withdraw from the European market in late 2003, Hydro bought the company's Dutch gas trading business and agreements on access to transport and gas storage facilities. The deal boosted Hydro's market share for long-term gas deliveries in the Netherlands from 6 to 8 %.<sup>4</sup> The withdrawal of Duke Energy and other US trading companies

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<sup>4</sup> Hydro Press Release, 16 January, 2004

from European gas and electricity markets was interpreted by Hydro as a product of the companies' unfavourable combination of assets, primarily their lack of production assets. Hence, as gas trade evolved into a harsh competitive zero-sum game, activities could only be hedged with opportunities to play on production assets.

### *Total*

Like all the other companies studied, Total chose in the early 1990s the UK as a testing ground for direct marketing and retail sales of natural gas to commercial and industrial consumers. In 1991, Total set up the UK subsidiary Total Gas Marketing. By 1995, Total reported on a 4% share of the available market in the UK. The merger with Elf in 2000 brought together the downstream gas business of the two companies in the UK. Elf Aquitaine had been present in the downstream UK market through shares in the company Agas, which in 1987 became the first independent supplier to contract gas for direct sales into the UK market. In 2003, new investments were made by the company in the UK market by the agreement with ExxonMobil to acquire Mobil's UK industrial and commercial gas marketing business. The acquisition gave Total a leading market position in terms of gas volume sales for the UK Industrial and Commercial sector, with around 60,000 sites supplied throughout mainland UK. By 2004, the British subsidiary Total Gas & Power Ltd. operated with a 20 % share of this market. Elsewhere in northern Europe, Total Gas & Power North Europe reported increasing sales of natural gas to commercial and industrial customers in northern France, the Benelux countries and Germany.

In France, Total acquired downstream natural gas assets from Gaz de France (GdF) against offering GdF upstream assets in the North Sea. The merger with Elf brought the Total Group deeper into gas marketing in France, notably based in pipeline systems in the southwestern part of the country (owned together with GdF). In 2003, Total and Gaz de France signed a 'protocol of intent' to separate their cross-shareholdings in France. Total announced that after the deal, the group would supply around 11 % of the French industrial and commercial customers.

Elf Aquitaine had acquired 45% ownership in the major Spanish gas company Cepsa in the 1990s. By 2003, Cepsa was operating as a vertically integrated company (with gas exploration in Algeria right down to retail marketing and sales of natural gas in Spain), planning for a 10 % share of the domestic natural gas market. LNG activities were an important part of Total's gas supply activities in Spain.

#### **4.2.2. Investments in electricity production and retail marketing/sales**

At the start of the 1990s, only Exxon and Hydro were engaged in the production of electricity among the six companies studied. Exxon's activities were confined to ownership of coal-fired generation capacity in Hong Kong (around 8,000 MW) as well as around 1,200 MW of co-

generation capacity at various industrial facilities. Hydro's capacity was around 1,700 MW of hydropower in Norway. In the course of the 1990s, all the companies made strategic plans for investments in generation capacity based on natural gas, though not all of them actually brought them to fruition. There were significant differences in the motivation for and mode by which electricity capacity was added to their assets too. Whereas some of the companies, notably Shell, searched the world for opportunities to invest in power plants, other companies invested primarily in natural gas co-generation capacity at their industrial sites (refineries and chemical plants) primarily as a mode of increasing the efficiency of energy use. Much of the 'independent' capacity added by oil companies aimed moreover in securing a market for upstream natural gas resources and was consequently sold in the wholesale market to other electricity suppliers. Nevertheless, as major users of electricity in production processes, the oil companies also developed trading competencies in the new liberalised electricity markets in the period studied. Most of the companies were planning to utilise this competency by developing retail *sales and marketing* businesses that would compete with incumbent electricity suppliers. Compared to intentions revealed in strategic plans, however, the companies seem to have faced problems in capturing electricity retail market shares. Those companies still in the retail business seem to focus on the industrial and commercial segment of the market. All the companies also reported in 2003 on supply of various energy services to the industrial and commercial segment of the market, such as energy counselling, energy portfolio management, etc.

### *Exxon*

By the end of 2003, Exxon had expanded its generation capacity to 13,300 MW, of which 2,900 was natural gas-based co-generation at around 80 generating plants at 30 of the company's own industrial premises (refineries) for auto-supply. Thus, Exxon chose to 'in-source' electricity supply to their industrial premises, prompted by energy-efficiency considerations (higher energy efficiency through the combined production of heat and power). Most of the capacity (1,550 MW) had been added at industrial premises in the USA. Only 650 MW (nine co-generation plants located at nine out of ten Exxon European refineries) had been installed in Europe. Exxon's primary reason for expansion in the power business was to aid upstream and downstream operations. In the longer term, however, the company view investment in electricity generation as a potential part of an overall plan for developing gas reserves. The focus on co-generation of in-house use entailed that retail marketing and sales outside the company did not become a major part of the power strategy.

### *Shell*

A far more active natural-gas power policy was pursued by Shell in the period, with less focus on in-house generation of co-generated heat and power. Shell invested in the engineering company InterGen, which actively sought out investment opportunities for new 'independent' natural gas fired capacity on a global scale. By late 2003 Shell's subsidiary InterGen had

brought around 14,500 MW of capacity into operation with another 1,650 in the planning stage at 21 power stations around the world. Most of the capacity was fuelled by natural gas. Around 3,000 MW was based on coal. Around 9,000 MW of natural gas-fired power capacity had been installed or approached inauguration in Europe. 2,400 MW had been installed in the UK at three different power plants to which Shell was supplying gas on long-term contracts. Around 3,800 MW of capacity had been installed at three plants in Turkey, making InterGen a major supplier with around 14 % of total installed capacity. Another 790 MW co-generation plant was installed in the Netherlands, supplying heat to one of Shell's refineries. A 790 MW plant was planned in Germany and a 1,200 MW plant was under construction in Spain.

Despite major efforts by Shell to come across as a retail electricity marketing company in Europe, notably in the Netherlands, most of Shell's actual electricity sales are currently taking place through the subsidiary Shell Energy Europe, and Norway was reportedly the only market with substantial activities, concentrated first and foremost in supplies to major industrial and commercial consumers. None of the locations in which the company was operating in the retail gas market (as supplier to industrial and commercial consumers) were mentioned as important markets also for retail marketing and sales of electricity.

#### *BP*

BP emulated Exxon with its strategy to install co-generation capacity at its industrial sites. By 2004, 4,500 MW of BP's total installed electricity generation capacity of around 5,600 MW was co-generation capacity installed at its industrial sites, mostly in North America. An additional 1,100 MW of independent power production capacity was installed mainly in Europe (Spain and the UK). Beyond the US, however, where BP in 2003 claimed to be among top ten electricity traders, and some activities in Spain and the UK, BP did not market itself as a retail electricity marketing and sales company.

#### *Total*

Total applied different investment modes in its involvement in the generation of electricity, but teamed up with local partners in natural gas-fired capacity in different geographical regions, investing most in Latin America (4,200 MW). Other investments were made in Thailand (350 MW planned extended to 1,400 MW) and Abu Dhabi (225 MW planned extended to 1,350 MW). In Europe, Total acquired electric power generation capacity both through the construction of co-generation at some of its own refineries (or refineries owned by subsidiaries), making use of the company's own natural gas resources (more than 900 MW electricity in Spain, 260 MW in France, a plant in the UK and 800 MW planned in Italy) and by the acquisition of shares in electricity generating companies (e.g. 40% ownership of 1200 MW capacity in the UK, 22% share in Elyo, with a generation capacity of 11,000 MW spread around Europe).

Through the company, Elf Business Energy, Total established a combined gas and electricity retail business in the UK, announcing electricity supplies to major industrial consumers. Beyond the UK, Total Gas & Power North Europe was established to market gas & electricity to consumers in the north of France, the Benelux countries and Germany. By 2003, Total was reporting sales of 1.3 TWh of electricity in these markets, mainly purchased on the French electricity exchange, Powernext, of which Total was one of the founding firms. Beyond direct retail marketing and sales by its subsidiaries, the company Elyo was involved in power retail marketing and sales in Europe, whose business idea was to minister energy supply and energy services outsourced by major industrial and commercial customers around Europe, mainly in France, but with substantial businesses also in the UK and Italy, and activities also in Germany, Spain and Portugal.

### *Statoil and Hydro*

Statoil and Hydro's venture into the electricity generation were initially very ambitious, but fell off in the face of an uncertain and changing regulatory environment. Joint Statoil and Hydro operations started as early as in 1994, when they founded Naturkraft together with the major Norwegian electricity generator Statkraft, aimed at utilising Norwegian gas resources to supply electricity to the Nordic market. Naturkraft were granted concession for the construction of two combined cycle gas turbine plants, each with a capacity of 400 MW, and were planning another 800 MW plant. Statoil became involved with a 20 % share in a company in plans for a co-generation plant in Norway, the surplus heat of which would, among other things, be used for the drying of biomass energy. During the 1990s, the company strategy evolved from supplying power directly to the grid to integrating generation capacity at industrial premises, and investment policy changed accordingly. As of 2004, however, the high current prices for gas delivery to the continent relative to Nordic electricity prices, and unsatisfactory framework regulations have thwarted plant construction. In light of these problems, Statoil acquired shares in the existing power generator Hafslund in the late 1990s as an alternative way of realising its electricity strategy. These shares were, however, divested shortly after.

Beyond the home-market, Statoil has recently been constructing a 400 MW natural gas-fired power plant in Dublin together with Ireland's Electricity Supply Board. Statoil would have 30 % ownership of the plant and supply the gas needed as feedstock. In a joint venture with ABB, Statoil also launched plans for the construction of a 400 MW power station in the UK. Nevertheless, as of 2003, Statoil had still no generation capacity in operation. Hydro had only realised minor expansions of its generation capacity at hydropower plants in Norway in the 1990s, and had a generation capacity of around 2,000 MW by 2003.

Statoil had pronounced ambitions with the establishment of the Nordic Energy Unit in 1999 of becoming an integrated energy company, and did establish substantial electricity customer

bases in Norway (48,000) and Sweden (around 60,000). The company was not pleased with the return on their investments, however, and found it difficult to maintain a system with so many customers spread over a large geographical area and eventually sold off its customer base of small end-users in Sweden and Norway. Statoil's divestments in the electricity business were consistent with the company's revised electricity strategy, which now targeted only the large industrial customers in the Nordic market. In 2003, Statoil acquired shares in the energy consultancy firm Neras in order to expand the range of products offered to its portfolio of large industrial customers in the Nordic countries and Germany. The acquisition of a 40% ownership share of the Danish EC Power in 2000 was also a consolidation of the large industrial customer segment. EC Power installs and operates micro CHP units based on diesel and natural gas at factories, mostly in Denmark.

Hydro gained early experience in Europe with market-based trading of electricity after the Norwegian electricity market liberalisation in 1990 and subsequent establishment of the exchange in 1992, from 1996 also covering the larger Nordic area. Hydro had started up end-use supplies to Nordic customers based on trading at the Nordic exchange, and given the competencies in energy management the company gained as a major electricity-intensive industrial group, it began to offer energy management services – such as energy portfolio management - to other companies in the industrial sector. In its combined gas and electricity supply role, Hydro offers industrial customers either individual electricity and gas contracts or various packages of energy products. Large energy buyers in Europe (whose energy costs constitute a large part of total production costs) often choose separate contractual relations since electric power and gas markets in Europe are still not integrated in the sense that the prices of gas reflect those of electricity. Smaller industrial firms on the other hand (whose energy costs are small compared to other production costs) tend to save transaction costs by entering into 'collective' energy contracts that include a mix of energy carriers and sources.

Repeating its policy in the natural gas value chain, Hydro decided to concentrate end-use sales to customers in the industrial segment and not to smaller household consumers in the mass market. Electricity sales are currently confined to the Nordic area, though sales of energy services (energy management) to industrial customers extend to the continent. In the Scandinavian market joint gas and electricity contracts are constrained by the absence of gas infrastructure in Norway and most of Sweden.

#### **4.2.3. Investments in other energy sources**

##### *Coal and uranium mining*

The six companies studied differed markedly in their relative involvement in energy sources beyond oil and gas, not only in the defined period, but before the 1990s as well. The four majors, Shell, Exxon, Total and BP had been engaged in coal mining since the oil crises of the 1970s, mainly outside Europe. In 1997, all the four companies still ranked among the 40



largest coal producers in the world (Exxon figured as number 28 with 16.5 million tons, Shell as number 32 with 13.5 million tons, BP as number 38 with 7.2 million tons and Total as number 39 with 3.2 million tons)<sup>5</sup>. After this point in time, however, most of the companies started to divest themselves of their coalmining assets. Shell divested their final coal assets in the late 1990s, except for a quite substantial coal-fired power generation capacity established in Asia and Australia. BP divested their final coal assets in 2003, and Exxon sold out most of its coal mining activities in 2002. Exxon remained committed to the use of coal through its US mining assets and investments in coal-based electricity generation capacity in China. Total was the only company that actually increased its assets in coalmining in the period, through acquisitions in South Africa. In 2000, the company also expanded activities further downstream the coal chain in Europe, through the acquisition of the coal trading business of CdF.

Exxon and Total had been engaged also in the mining of uranium before the 1990s. Exxon discontinued its engagements here, while Total scaled down activities during the 1990s, selling off its uranium mining assets to Cogema against shares in the company. When the French state restructured and assumed greater co-ordinating control over the nuclear industry in 2001 under the newly founded Areva Group umbrella company, Total retained a commitment to nuclear energy by the acquisition of a small ownership share in the company.

### *Renewables*

The six companies differed fundamentally with respect to diversification into renewable energy sources in the period. At one extreme, Exxon refrained from investing in renewables. Shell, on the other hand, had invested in solar power already prior to the 1990s, and continued to invest quite broadly in renewables during the 1990s and beyond, notably in wind energy, solar energy and biofuels. Also BP committed substantial resources to investments in renewables in the period, notably in solar power, some smaller wind energy plants and the manufacturing of biofuels. The biofuels business was, however, divested by the company in 2003. Hydro had invested substantially in hydropower before the 1990s, but had not committed substantial resources to renewables after this point in time. Small investments were made in wind power, wave power and marketing of bioenergy. Hydro did not become engaged in the manufacturing of transport biofuels, as the company sold out its refinery capacity in the period. Total had made some small investments in solar energy before the 1990s, after which they turned to solar power investments, some small wind energy investments and investments into biofuel production. Statoil had not been engaged in renewable energy before the 1990s. Only in the late 1990s did the company make investments in bioenergy, notably in wood pellets as an alternative to oil in central and district heating. Statoil has never engaged in the manufacturing of transport biofuels.

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<sup>5</sup> Natural Resources Defense Council, *An overview of the fossil fuel industry* (<http://www.nrdc.org/globalwarming/carbon/part1.asp>)

To sum up, the oil industry targeted primarily solar power, wind power and biofuels among renewables in the period. Investments made by the companies in renewables, were, nevertheless, minor compared to conventional business areas. Some investments were quite substantial as niche investments, however, making the companies market leaders for the specific energy sources. Shell and BP figured by 2003 as two of the main manufacturers of solar power, each responsible for around 20% of total solar power capacity installed globally. Total's position was not of this kind, but investments did increase after 2000.

By 2003 Shell had installed wind power capacity of around 700 MW, which placed it among the top ten wind power owners in the world (global installed wind power capacity in 2002 was around 31,000 MW, of which 75 % had been installed in Europe and 15 % in the United States). Shell had made most of its wind energy investments in the United States, but major projects were in the pipeline in Europe. By comparison, the other companies figured with only minor wind power investments. Hydro operated with investments in a 40 MW plant in Norway. BP operated with 22.5 MW wind power installed at its Nerefco refinery in the Netherlands and Total operated with 12.5 MW capacity at one of its French refineries. Exxon and Statoil had not ventured into wind power.

In the area of bioenergy, the most readily available primary energy source substitute for fuel oil in stationary heating markets and for gasoline and diesel in the transport fuels market, none of the companies operated as global development leaders, though Statoil has evolved as a major niche manufacturer of biofuels for space heating in the growing Scandinavian market for wood pellets. Through a series of acquisitions, Statoil had established itself by 2003 as one of the major producers and suppliers of wood pellets in Scandinavia, controlling around 50 % of the market in Norway and Denmark and around 10-20 % in Sweden. Part of the business also supplied heating systems fuelled by wood pellets. Hydro was an early investor in Norwegian bioenergy production and briefly also involved in wood pellet production in Denmark. However, as of 2003, Hydro had divested its production assets and was engaged only in marketing and sales of bioenergy and the supply of heating systems based on bioenergy. Shell downgraded its bioenergy activities in the period too. In the late 1990s, Shell made bioenergy one of its major renewables investment areas, and announced plans to invest along the whole bioenergy chain, from forest plantations right down to electricity production based on bioenergy. In Europe, Scandinavia featured as the most promising geographical area for investments. Nevertheless, after failed investments in Norway and increased international focus on the problematic environmental aspects of forestry activities, Shell refrained from further bioenergy investments. BP, Total and Exxon did not report on bioenergy supply for heating or electricity production in the period.

Concerning biofuels in the transport fuels market, Shell and Total were by 2003 the only companies reporting substantial activity in 2003. Shell, in co-operation with Canadian Iogen, announced in 2004 a break-through in the production of transport biofuels and initiated

demonstration projects in Germany and Canada. Total was working with the French agricultural sector and announced itself as a major supplier of biofuels in France.

### *Hydrogen*

After 2000, most of the companies reported increased investments and activities in fuel cell and hydrogen technologies. Several of the companies announced such activities to be highly relevant as hydrogen produced from methane (natural gas) would not constitute a threat to their natural gas business but rather a consolidation with natural gas finding a new application area, at least in the short term. Shell and Hydro announced the most extensive investments in the area.

## **5 Geographical patterns found in oil company investments beyond oil and gas exploration and production.**

### *Natural gas retail marketing and sales*

If we ask *where* the companies conducted different investments for realising their larger energy strategies, instead of focusing on specific company strategies, some interesting patterns begin to appear. There was a clear tendency for most companies to seek to become active in natural gas retail supply and electricity production based on natural gas in areas where they controlled major upstream resources, i.e. to integrate vertically in the natural gas supply chain around the world. Hence, Total's major upstream investments in Latin America in the period were followed by later downstream investments. Shell and BP became important downstream players in the United States, where they also held major upstream businesses. The study has shown that Europe continued during the 1990s to constitute an important investment area for the companies in downstream natural gas activities. Here, all the companies operated as major producers and wholesale suppliers of natural gas, and the companies sought to consolidate and expand their positions further downstream in various European markets.

Only the UK natural gas market attracted downstream investments from all the companies. The UK gas market became in fact a test market for all of the companies' gas marketing and retail supply activities. With the exception of Exxon, all of the companies still operated in this market also in 2004 (Hydro went out of the UK market in 1996 but re-entered in 2004).

It is also clear that the Dutch and German gas markets represented particularly interesting investments areas for all of the companies. Shell and Exxon were deeply involved in both markets already before the 1990s through their interests in Gasunie, Ruhrgas, Thyssengas and BEB. BP was involved in Germany through their interests in Ruhrgas. In the Dutch market, Gasunie first came to gain market shares in retail supply to industrial and commercial

consumers, but recently experienced a significant loss of market shares to other fiercely competitive national and foreign companies. One of these was Hydro that won a large share of the market in the period. All the 'incumbent' companies (Shell, Exxon and BP) lost their position in the German gas market as well. This was due to other reasons than in the Dutch market, however. In Germany, the large industrial conglomerates Viag and Veba, which controlled many of the major electricity and gas companies in Germany, merged to form the energy-service company E.ON in 2000. When E.ON acquired a majority position in Ruhrgas in 2001-2, the international oil companies lost considerable influence in the company, contributing to their decision to sell their minority assets to E.ON. In a similar process, the major electricity generator RWE acquired a majority share in Thyssengas, eventually leading Exxon and Shell to sell their remaining shares to RWE. These structural changes caused substantial loss of market position for the oil companies in the German gas market, creating growth opportunities for German companies. Shell and Exxon remained in the German market through their ownership of the BEB Company, and sought to develop their downstream presence from these assets. BP sought a fresh start with its new subsidiary BP Energie Deutschland. BP, as the only 'newcomer' of the companies, found it difficult to capture market shares in the German retail gas market. In 2003, the company blamed this partly on a lack of competition on the market. The positions taken by Statoil and Hydro in the German market also suggest that high barriers to competition may have resulted from the structural changes there. Statoil and Hydro remained throughout the period reluctant to start retail gas businesses in Germany, fearing it could harm their relationship with the major German energy companies, important customers in the European wholesale gas market.

Further south, the French gas market seemed apparently closed to investments by the companies. Only the French company Total managed in the period to acquire any substantial market shares in the French retail natural gas market. In a series of acquisitions and agreements made with GdF, Total came out as owner of transmission capacity in the southern part of France. As the period draws to a close, the Spanish gas market starts to attract investments from several of the companies. Through long-term involvement of Elf Aquitaine in the major independent gas company, Total evolved a leading position among foreign companies in the Spanish retail gas market. Shell and BP have also recently entered the Spanish natural gas retail market. In other southern European markets, the companies have scant reporting on downstream natural gas activities, though BP announced in 2003 penetration of the Italian retail gas market.

In the far north of Europe, the Scandinavian countries attracted few downstream natural gas investments in the period. In this part of Europe, only Denmark has a well-developed natural gas infrastructure. Statoil recently initiated a series of investments in the regional gas market in Sweden and in the more developed Danish market. Of the other companies, only Shell announced investments in the Danish retail gas market.

### *Electricity generation and supply*

If we look more closely into the companies' investments in the electricity supply chain, a wider geographical focus emerges for electricity generation and a more narrow focus for retail supply activities. A strategy seen for all but Statoil and Hydro was to use existing industrial sites to locate investments in co-generation plants. These investments were put in place to facilitate auto-supplies of heat and electricity rather than establish retail supply businesses. The most notable exceptions were Shell and Total, who actively invested also in electricity generation capacity outside their own industrial premises, partly as a mode of creating supply for own natural gas resources and partly as a mode of creating a new independent supply chain business for the company. Geographically, Shell, Exxon, Total and BP carried out much of their investments in electricity generation outside Europe.

Within Europe, the UK attracted most investments by the companies in natural gas-based electricity generation. Shell was the major investor in the UK, but Total (Elf Aquitaine), BP and Statoil erected power plants too. Exxon established co-generation units at their UK refineries. And Turkey became a major catchment area for independent power production investments by Shell, who came to control around 14 % of total national capacity.

In the mid-1990s Shell sought out different avenues for investing in natural gas-based power production capacity in the Netherlands, eventually leading to the construction of one co-generation plant near one of its refineries. Also Exxon established a co-generation plant at its refinery in the Netherlands.

Later in the period, the companies started to target Spain for new power generation capacity, notably the Total subsidiary Cepsa, which erected several co-generation plants at its industrial sites. Shell and BP established one plant each, not connected to refinery activities.

Germany and France attracted relatively few investments in the period. In Germany, Exxon put off co-generation units at its two refineries, and by 2003, Shell was in the process of planning a major gas-fired plant. In France, Exxon and Total erected co-generation units at their refineries. Total's activities were carried out in co-operation with EdF. The alliance gave birth to another gas-fired power plant in Corsica. In Italy, Exxon established co-generation units at its refineries while Total has recently announced similar plans. Exxon built a co-generation unit at its Belgian refinery.

In the very north of Europe, Hydro and Statoil became engaged in the planning of several natural gas-fired power plants in Norway (CCGT plants), some of them aimed at supplying power to the market and others at auto-supply for the companies' industrial plants. None of them had been realised by 2003, and Norway and the other Scandinavian countries failed to attract any investments in electric power production capacity by the oil companies in the

period studied. Exxon's refinery in Norway was the only European unit where the company had not installed co-generation capacity.

Further downstream the electricity supply chain (retail electricity supply), several of the companies announced plans for major investments in the period, without it appears, many of them leading to sustainable businesses. By 2003, penetration of the downstream electricity supply chain was relatively modest. The UK and Norway/the Nordic area became testing grounds for several of the companies. By 2003, Statoil, Hydro and Shell were active in the electricity supply market in Norway, notably to large industrial and commercial consumers. Norway was the only country in Europe where Shell Energy Europe reported in 2003 retail electricity supply activities. Statoil and Hydro supplied industrial and commercial customers also in Sweden and Denmark. In the UK, Total and BP reported electricity retail supply activities, also focussing on large industrial and commercial consumers. More recently, Total reported retail supply activities in France, Benelux and Germany, trading on the French power exchange, Powernext, where it was one of the major investors.

#### *Other energy sources*

Turning to investments in other energy sources, primarily renewables, we note certain clear geographical patterns. The solar photovoltaic manufacturing businesses of BP, Shell and Total operate in a global marketplace. BP announced in 2004, for instance, that it had installed PV systems in 160 countries around the world. Shell and BP had major manufacturing plants in the United States. In Europe, Germany, Spain and France can be singled out as major markets for the companies. BP's only manufacturing plant in Europe, as per 2003, was in Spain, though the largest sales and distribution network was in Germany. In alliance with the French solar PV company Apex dating back to 1999, the French subsidiary has supplied the southern European and African markets. Shell constructed a major manufacturing plant in Germany, where additional growth came from the acquisition of Siemens's solar business, the construction of the Gelsenkirchen manufacturing plant and location of its sales offices for Europe, Africa and the Middle East. Shell also had a manufacturing plant in Portugal. In the period, Total located their manufacturing plants in South Africa, Belgium and another one planned constructed in France. Besides headquarters in France, Total's solar energy company TotalEnergie had a subsidiary located in Germany in 2003.

Concerning the companies wind energy investments and markets, Germany, the Netherlands and Spain appeared particularly interesting. The only significant wind energy producer was Shell, with European wind power farms in Germany, Spain and the UK. A major offshore wind farm in Dutch territorial waters was in the pipeline. BP's only wind energy plant was at its Dutch refinery. Hydro had a wind energy farm in Norway, but constructed together with Dutch energy company Nuon, tailored for the Dutch green electricity certificate market.

Total's minor plant was located at one of its refineries in France. By 2003 Total were planning new investments in Spain.

With respect to bioenergy investments for stationary energy use, Statoil was the only company to actually invest in production capacity and supply of wood pellets and heating systems in Scandinavia (Norway, Sweden and Denmark). Hydro's minor role in bioenergy and heating systems was restricted to Norway and Denmark. Shell, which had major bioenergy plans in the late 1990s, had also targeted Norway and the wider northern European area for their investments. With respect to liquid biofuels, Germany was chosen as a major application area by Shell while France was the main target area of Total's production and sales.

The companies' involvement in coalmining and coal-based power generation was outside Europe. Total did, however, increase its investments in coal trading capacity by acquisitions in France.

## **6 Conclusions and further research**

### **6.1. Conclusions**

The main research question that guided this database study was whether the investigated exploration and production – based oil and gas companies during the 1990s chose a *specialisation* or *diversification* strategy in European energy markets. The question was triggered by other studies showing large structural changes and diversification in other major European energy sectors in the period. Hence, the study has focused on whether the upstream companies did emulate this diversification forward in the gas supply chain and into other energy carriers and sources beyond oil and gas. Pure diversification forward in the gas supply chain would represent 'vertical integration' for the companies. Strong vertical integration in diversified energy sources would entail intentions by the companies of becoming full-fledged energy companies.

We have shown a tendency during the 1990s that the upstream companies divested their non-energy assets and invested heavily in upstream oil and gas assets. This indicated a move towards specialisation. However, the study has also shown that all the companies made substantial investments in retail marketing and sales of natural gas, notably in the market segment industrial and commercial customers, implementing strategic shifts in the period intended at vertical integration in the natural gas supply chain. Some companies were more vigorous and successful in implementing the strategy than others. Moreover, we have shown that all the companies made plans for investments in power production in the period based on own natural gas resources. All but Statkraft and Hydro materialised these plans to a great extent. The motivation for engaging in power production differed, however. Whereas Exxon and BP invested substantially in co-generation of heat and electricity at its industrial sites

(refineries and chemical factories) aimed at increasing the efficiency of own energy use, Shell and Total invested in 'independent' power generation projects around the world, some of them supplied by own natural gas resources. Hence, a great deal of the investments in power production actually represented vertical integration in the gas supply chain, a mode of ensuring a market for upstream resources. Most of the companies, with the exception of Exxon, made plans also for forward integration in the electricity supply chain, into retail marketing and sales. Some of the companies made successful ventures, notably BP in the USA, but none of the companies evolved as major downstream retail players in the European electricity market.

We have also shown that apart from Exxon, all of the companies sought to diversify into other energy sources than oil and gas, notably renewable energy sources. All the companies but Total divested all or most of their assets in coalmining activities in the period. Total actually increased their coal-mining assets. Shell invested substantially in coal-based power and Exxon retained their minor coal-mining assets in the USA and coal-based power production assets in Asia. Total divested most of its assets in the uranium mining industry.

All the companies but Exxon invested in renewable energy in the period, though they focused on different renewables, albeit with varying enthusiasm and success. The companies targeted primarily solar power, wind power and biofuels among renewables in the period. Investments made by the companies in renewables, were, nevertheless, minor compared to their major investments in conventional business areas. Some investments were, however, quite substantial as niche investments, making the companies market leaders for the specific energy sources. Shell and BP figured by 2003 as two of the main manufacturers of solar power, each responsible for around 20% of total solar power capacity installed globally. Total's position was not of this kind, but investments did increase after 2000. By 2003 Shell had installed wind power capacity of around 700 MW, which placed it among the top ten wind power owners in the world. Shell had made most of its wind energy investments in the United States, but major projects were in the pipeline in Europe. By comparison, the other companies figured with only minor wind power investments.

Somewhat surprisingly, bioenergy attracted few investments from the companies in the period, despite being regarded by the European Commission and a range of international energy analysts as the source of energy to contribute most to the short-term regional and global increase in renewables. Bioenergy is today commercially available in various geographical locations as substitute to fuel oil in the generation of heat. By 2003 only Statoil was engaged as a major niche manufacturer of biofuels for space heating in the growing Scandinavian market for wood pellets. Statoil served around 50 % of the Norwegian and Danish markets and 10-20 % of the Swedish market. Hydro was an early investor in the Norwegian bioenergy market but divested its production assets in the late 1990s. Shell made bioenergy one of its major renewables investment areas in the late 1990s, and announced plans to invest along the whole bioenergy chain, from forest plantations right down to



electricity production based on bioenergy. Nevertheless, after failed investments in Norway and increased international focus on the problematic environmental aspects of forestry activities, Shell refrained from further bioenergy investments. BP, Total and Exxon did not report on bioenergy supply for heating or electricity production in the period. Concerning manufacturing of fuels from biomass for the transport fuels market, Shell and Total were by 2003 the only companies reporting substantial activity in 2003.

Despite some companies taking a lead in niche development of renewable energy sources, the asset share and increments of other energy sources was so minor in all the companies during the 1990s, that it is fair to conclude that whereas all companies moved toward becoming 'vertically integrated oil and gas companies' none of them earn the epithet 'full-fledged energy company'. Some of the companies did revise strategy in the period, at least in Europe. Exxon actually withdrew or scaled down natural gas retail marketing in several European countries, moving the company towards greater 'upstream' specialisation there. And those companies that started out with aims of becoming electricity and gas suppliers as such later scaled down their ambitions to concentrate on large industrial and commercial customers.

The report has also shown that the geographical location of investments varied substantially, across companies and across energy carriers and sources. There was a clear tendency for most companies to seek to become active in natural gas supply to large customers and electricity production based on natural gas in areas where they controlled major upstream resources or planned LNG-facilities, i.e. to integrate vertically in the natural gas supply chain around the world. In Europe, only the UK natural gas market attracted early downstream investments from all the companies. With the exception of Exxon, all of the companies still operated in this market also in 2004 (Hydro went out of the UK market in 1996 but re-entered in 2004). It is also clear that the German downstream gas market represented an interesting investment area for many of the companies, but that they seemed to face far larger problems when seeking to establish there due to the position gained by the major incumbent German gas company. The French downstream market seemed quite close for investments by foreign companies in the period, in that only Total established downstream activities there. Several companies established downstream gas activities in the Dutch market, notably Shell and Exxon, as owners of Gasunie, and Hydro that won a large share of the market in the period. As the period draws to a close, the Spanish gas market starts to attract investments from several of the companies. In other southern European markets, the companies have scant reporting on downstream natural gas activities, though BP announced in 2003 penetration of the Italian retail gas market. In the far north of Europe, the Scandinavian countries attracted few downstream natural gas investments in the period. In this part of Europe, only Denmark has a well-developed natural gas infrastructure. Statoil recently initiated a series of investments in the regional gas market in Sweden and in the more developed Danish market. Of the other companies, only Shell announced investments in the Danish retail gas market.

If we look more closely into the companies' investments in the electricity supply chain, a wider geographical focus emerges for electricity generation and a more narrow focus for retail supply activities. A strategy seen for all but Statoil and Hydro was to use existing industrial sites to locate investments in co-generation plants. Shell and Total also invested substantially in electricity generation capacity outside their own industrial premises, partly as a mode of creating supply for own natural gas resources and partly as a mode of creating a new independent supply chain business for the company. Geographically, Shell, Exxon, Total and BP carried out much of their investments in electricity generation outside Europe.

Within Europe, the UK attracted most investments by the companies in natural gas-based electricity generation. Turkey became a major catchment area for independent power production investments by Shell, who came to control around 14 % of total national capacity. Shell scaled down early plans for substantial investments in natural gas-based power production capacity in the Netherlands. Nevertheless, several of the companies erected power plants at their refineries there. Later in the period, several companies started to target Spain for new power generation capacity. Germany and France attracted relatively few investments in the period. In Italy, Exxon established co-generation units at its refineries while Total has recently announced similar plans. Exxon built a co-generation unit at its Belgian refinery. In the very north of Europe, Hydro and Statoil became engaged in the planning of several natural gas-fired power plants in Norway. None of them had been realised by 2003, and Norway and the other Scandinavian countries failed to attract any investments in electric power production capacity by the oil companies in the period studied. Further downstream the electricity supply chain (retail electricity supply), several of the companies announced plans for major investments in the period, without it appears, many of them leading to sustainable businesses. By 2003, penetration of the downstream electricity supply chain was relatively modest. The UK and Norway/the Nordic area became testing grounds for several of the companies. By 2003, Statoil, Hydro and Shell were active in the electricity supply market in Norway, notably to large industrial and commercial consumers. In the UK, Total and BP reported electricity retail supply activities, also focussing on large industrial and commercial consumers. More recently, Total reported retail supply activities in France, Benelux and Germany

Turning to investments in other energy sources, primarily renewables, we also note certain clear geographical patterns. In Europe, Germany, Spain and France can be singled out as major markets for those companies investing in the manufacturing of solar photovoltaic systems. Shell also had a manufacturing plant in Portugal, and Total located one of their plants in Belgium. Concerning the companies wind energy investments and markets, Germany, the Netherlands and Spain appeared particularly interesting. The only significant wind energy producer was Shell, with European wind power farms in Germany, Spain and the UK, and with a major offshore wind farm in Dutch territorial waters in the pipeline. Hydro had a wind energy farm in Norway, but constructed together with Dutch energy company Nuon, tailored for the Dutch green electricity certificate market. Total's minor plant was

located at one of its refineries in France. By 2003 Total were planning new investments in Spain. With respect to bioenergy investments for stationary energy use, Statoil was the only company to actually invest in production capacity and supply of wood pellets and heating systems in Scandinavia (Norway, Sweden and Denmark). Hydro's minor role in bioenergy and heating systems was restricted to Norway and Denmark. Shell, which had major bioenergy plans in the late 1990s, had also targeted Norway and the wider northern European area for their investments. With respect to liquid biofuels, Germany was chosen as a major application area by Shell while France was the main target area of Total's production and sales.

## **6.2. Further research**

The patterns presented above provide a basis for more research at the Fridtjof Nansen Institute during 2005 where we shall be seeking to explain inter- company differences in choice of extent and form of diversification. We will also seek to explain differences in geographical focus chosen by the companies for different types of investment. Here, we will in particular be investigating the impact of regulatory changes by the EU and member states throughout the 1990s on non-upstream investments and choice of investment areas.

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