

Natural Gas in the Netherlands

From Cooperation to Competition?

Natural Gas in the Netherlands

From Cooperation to Competition?

Aad Correljé
Coby van der Linde
Theo Westerwoudt



ORANJE-NASSAU GROEP

We would like to thank NAM, Gasunie, and Shell
for providing a substantial number of pictures used in this book.

© Aad Correljé, Coby van der Linde, Theo Westerwoudt, and
Oranje-Nassau Groep B.V., 2003

Design by Marry van Baar
Infographics by Theo Barten BNO
Printed and bound by Drukkerij Hooiberg bv

All rights reserved. No part of this book may be used or reproduced in
any manner whatsoever without the prior written permission except in the case
of brief quotations embodied in critical articles and reviews.

For information, contact Oranje-Nassau Groep, P.O. Box 22885,
1100 DJ Amsterdam-Zuidoost, the Netherlands.

It was not possible to find all the copyright holders of the illustrations used.
Interested parties are requested to contact Oranje-Nassau Groep.

ISBN 90 5031 084 2

Table of Contents

Foreword 9

Chapter 1

Introduction: Natural Gas in the Netherlands 12

1.1 Radical Change? 14

1.2 The Benefit of Hindsight 16

1.3 Periodisation 20

Chapter 2

Groningen, the North Sea and the Development of the “Gasgebouw” 24

2.1 Slochteren: A Revolution in the Energy Market 26

2.2 Towards a New Dutch Gas Regime 30

2.3 The North Sea and Mainland-Mining Regime 40

2.4 Epilogue: Institutions and Economics 48

Chapter 3

The Market for Gas 50

3.1 Implementing the New System 52

The high-pressure network 54

Local distribution 54

Natural gas in the Dutch energy market 57

3.2 Marketing Strategies 58

Domestic use 58

Industry 63

Agriculture 66

The power sector 66

3.3 Gas Exports 67

Chapter 4

Oil Price Shocks, North Sea Production and Energy Scarcity 76

4.1 The Oil Shocks 78

The first oil shock 78

The first White Paper on Energy 80

The second oil shock 83

4.2	Natural Gas in the White Papers on Energy	88
	<i>Sales and pricing policy</i>	89
	<i>Export</i>	92
	<i>The small fields policy</i>	95
	<i>Import</i>	100
4.3	The Re-emergence of Non-scarcity	105
	<i>The times they are changing</i>	106
	<i>A change of heart</i>	108
	<i>Free fall</i>	109
	<i>Environmental impact: A bridge to the future</i>	110

Chapter 5

	New Paradigms, European Integration and Abundance	114
5.1	New Paradigms	116
	<i>Economic integration and energy markets</i>	116
	<i>Security of supply and security of demand</i>	117
	<i>Abundance in the European gas market</i>	121
	<i>European security of supply and demand</i>	124
5.2	European Integration	129
	<i>Energy market integration and the European Treaties</i>	136
	<i>The Gas Directive and the gas industry</i>	137
	<i>Third party access</i>	141
5.3	The Future Role of Gas in Europe	144

Chapter 6

	Hollanders, Count your Blessings	148
6.1	Small Fields	150
6.2	Big Business, also for the Government	152
6.3	Dutch Disease	153
6.4	A Fierce Debate on Funding	154
	<i>Gentlemen's agreement</i>	157
6.5	Not a Blessing, but a Curse	161
6.6	The <i>Fonds Economische Structuurversterking</i> (FES)	170
6.7	High Quality of Employment	172
6.8	Environment	177
6.9	Blessings are often Overlooked (Conclusions)	181

Chapter 7

	New Policy, New Questions and the Future of Dutch Natural Gas	184
7.1	The Third White Paper on Energy	186
7.2	Towards a Gas Act	186
7.3	Implementing the Gas Act	189

7.4	A Liberalising Market	198
7.5	New Strategies	199
7.6	The Dismantling of the Dutch System	203
7.7	Conclusions	210

Chapter 8

Conclusions: Natural Gas in the Netherlands	212
From cooperation to competition?	214

Annex 1

The Geology of the Netherlands in Relation to the Exploitation of Natural Gas and other Earth Resources

A1	Geological Natural Resources	222
A2	Natural Gas	222
	<i>Origin</i>	222
	<i>Composition</i>	223
	<i>Migration</i>	224
	<i>Seals and traps</i>	224
	<i>Reservoir</i>	225
	<i>Gas and oil fields</i>	225
A3	Exploration	226
	<i>Geology</i>	226
	<i>Geophysics</i>	226
A4	Drilling	227
A5	Evaluation	230
A5	Production	231
A6	The Groningen Gas Field	232

Acronyms & Glossary	234
References	236
Credits	240

INTERVIEWS

Stan Dessens

Former Director-general of Energy, Ministry of Economic Affairs 37

Koenraad Weber

Production Geologist 45

Peter Odell

Professor Emeritus of International Energy Studies,
Erasmus University Rotterdam 71

Karel Stigter

Managing Director of *Nederlandse Aardolie Maatschappij* (NAM) 86

Jaap Breunese

Senior Advisor for Resource Assessment 102

Jean Mathey

Senior Official for Nogepe 125

Peter Odell

Professor Emeritus of International Energy Studies,
Erasmus University Rotterdam 141

Ad Littel & Frans Vlieg

Dutch Ministry of Housing and Environment (VROM) 158

Rob Atsma

Director of the state entity *Energie Beheer Nederland* (EBN) 174

Noë van Hulst

Director-general of Competition and Energy,
Ministry of Economic Affairs 195

George Verberg

President of Gasunie 206

Foreword

In 1959 a gas field was discovered near Slochteren in the province Groningen in the northern part of the Netherlands. Although not immediately appreciated, further appraisal wells and field studies confirmed the field's potential to become a giant on-shore gas field by any standard.

It was the start of a revolution in the search for and use of gas as a primary energy source in the Netherlands and Western Europe.

In 1967 the Oranje-Nassau Groep became active in the so-called upstream (exploration and production) side of the oil and gas business, through its participation in the first round of licensing acreage on the Dutch sector of the Continental Shelf. With the objective of finding oil and gas, it remained close to its earlier business of exploiting mines and extracting energy in the form of coal from the subsurface in the southern part of the Netherlands.

In 1977, ten years after becoming involved in the upstream oil and gas business, Oranje-Nassau produced its first off-shore gas in the Netherlands, from the K14-FA field. This field is part of what is known as the Joint Development Area, operated by NAM. The other partners at the time were Cities Services, Louisiana Land and Exploration, Marathon and Signal Oil. Today the field is still in production.

Given the important decisions to be made with respect to privatisation and the role of Dutch gas and storage in an European context, we thought that a well-documented book on Dutch gas, written by leading experts in the field of energy in the Netherlands would be an asset for the interested layman and professional. We found Aad Correljé, Coby van der Linde and Theo Westerwoudt prepared to write such a book on the history of gas in the Netherlands, the forced development of the demand for gas and its substitution for other forms of energy, and naturally its fascinating impact on the Dutch economy.

The authors also describe the role of the different governments and their policies towards gas and the use of the State revenues. Annex 1 of the book describes the geological aspects of gas and hydrocarbons in general and was contributed by Wim van den Bosch, an experienced geologist and a member of our technical advisory council. While discussing the contents of the book, it was also suggested to include interviews with politicians, bankers and leading professionals to further illuminate the issues.

All aspects of the book's preparation was in conjunction with the authors, Aad,

Coby and Theo. It was not only fun to work with them but also inspiring and intellectually challenging. Thank you all. A last word of thanks goes to Marry van Baar, Theo Barten, Amy Mahan and Marijke Roelandschap, without whom the book would have mainly consisted of small print and no illuminating illustrations and certainly would not have been completed on time.

We trust that this book fulfils its objective of being accessible and easy-to-read, but also accurate and as thorough as possible on the subject of gas in the Netherlands. Finally, we hope that this book will be of assistance in the complex political and industrial decision-making processes on energy both for today and the future.

The Managing Board of Oranje-Nassau Groep

Dirk-Jan van Ommeren (Chairman)

René Mulder



Chapter 1

Introduction:

Natural Gas in the Netherlands



Gas production and agriculture closely connected. The Slochteren 2 drilling in September 1960.

1.1 Radical Change?

Over the past 40 years, the availability of natural gas to Dutch households, the collection of State revenues deriving from the exploitation of the Dutch natural gas reserves and the existence of a considerable gas industry, involving private as well as public interests, have been constant factors in the Dutch economy. Even though parts of the Dutch gas policy have been adjusted in response to changes in the geopolitical and economic environments, the main characteristic of the Dutch gas regime has been its relative stability.

This long-standing tradition ended in the spring of 2002 with the announcement by the Minister of Economic Affairs, Annemarie Jorritsma, that the governance structure for gas was to be radically reformed. It was argued that the prevailing structure could no longer be defended against accusations of abuse of market power made by the European Commission or by any party interested in gas trade. Moreover, a new and less constraining set-up would better facilitate gas industry operations in a liberalising European gas market. This new competitive market structure was to be brought about by unbundling the supply chain and by creating a business environment aimed at competition, rather than at cooperation between entities involved in production, transmission, distribution and (retail) trade. This context, it was stated, would provide much less leeway for state intervention and coordination of the system.

In less than a year, however, this restructuring process came to a halt, without having achieved any firm conclusions or results. During this period, a number of unrelated but coinciding developments and events had radically changed the perspectives of policy-makers, the general public and the industry interests involved.

First, the May 2002 elections brought about a new coalition government with a radically differing outlook from the preceding 'purple' social-democrat/neo-liberal coalitions. The coalition of the *Lijst Pim Fortuijn* (LPF), the Christian-Democrats in the CDA, and the neo-liberal VVD, however, had a rather unarticulated view on economic policy. The new Minister of Economic Affairs, Herman Heinsbroek announced that the process of economic restructuring and privatisation of the public sector, including of course the gas industry, would have to be re-evaluated in terms of the presence of sufficient checks and balances. After 87 days in government, and plagued by internal quarrels and a lack of direction, the coalition fell without having made any real progress regarding the gas dossier.

Second, the overall attitude towards the project of liberalisation of energy mar-

kets was already moving away from the wide-ranging (if sometime grudging) acceptance to a much more critical stance. Energy security of supply had, for various reasons, gained more prominence in many countries from 2000 onwards. These reasons included the oil price surge and European fuel price protests in 2000, uncertainty about stability of supplies to final end-consumers following the California crisis and subsequent electricity shortages of 2000, the increasing import dependency in the foreseeable future and the concentration of supplies in only a few countries, the escalating political conflicts in the Middle East and the 'war against terrorism' following the 11 September 2001 attacks on New York and Washington.

Third, particularly in the European gas market, serious misgivings emerged as to whether liberalised markets could provide the required level of security of supply. Gas producing countries, particularly Russia, Algeria and Norway, and some of the large oil companies and financing groups involved in gas projects, made clear, at conferences in Algiers, in May and September 2002, that further gas market expansion could be hampered by the process of liberalisation, particularly if long-term supply contracts were abolished. In response, the EU withdrew its total abolishment of long-term supply contracts. Even in the highly liberalised gas market in the UK, it was accepted that new supply contracts with Norway required the governance of long-term contracts, rather than being subject to the short-term dynamics of the market.

Fourth, particularly in the Netherlands, various parties were increasingly critical of the proposed division of Gasunie. Indeed, the special features of Dutch gas production and the structure of ownership – one very large gas field and many very small fields that were integrated in one system through Gasunie – posed constraints for the proposed changes in the market. Some political parties and oil companies argued that such a restructuring would jeopardise essential elements of the Dutch gas policy, including the small fields policy, the longer-term control over the national gas resources, conservation policy, State revenues, and so forth. Ultimately, many members of Parliament objected to the proposed changes before the process could be completed. By late October 2002, the Dutch Government – now officially out of function – announced that it would postpone a definite decision on the gas-case until after the 22 January 2003 elections when a new government would have taken office.

This subject of this book is about the way in which the Netherlands has dealt with the management of its gas resources. It illustrates how Dutch gas policy was established and adjusted over time, in reaction to the significant economic, political and technological changes that have taken place since the 1950s. We examine – *with the benefit of hindsight* – the structure of Dutch gas production and consumption, the choices and the impact of the preferred options. Hopefully, these insights will enable us to reflect on past discussions and controversies from an appropriate distance and help us to better consider the proposed changes for today.

The process of liberalisation in the European Union challenges the Dutch gov-

ernment to once more optimise its gas policy in a new market environment. Past deliberations on the structure of the gas industry in the Netherlands, and taking into account the specific features of the Dutch gas resources, may help Dutch society to determine how best to organise the management of the natural gas resources. The organisation of the Dutch gas industry should also reflect the position and the responsibilities of the Netherlands as an important supplier of energy to Western Europe.

1.2 The Benefit of Hindsight

In 1948, natural gas was discovered in the Netherlands. The gas was found near Coevorden, in the northern province of Drente. In 1951 its inhabitants were the first Dutch consumers to appreciate the advantages of using natural gas. By the late 1950s, in Slochteren, in the province of Groningen another field was found that was among the world's largest known fields at the time. Later even more gas was discovered in smaller on-shore fields and on the Dutch sector of the Continental Shelf in the North Sea, as illustrated in Figure 1.1.

With the discovery of the gas in Groningen, the Netherlands had gained access to a relatively low-cost, reliable and clean source of energy. By the end of 1963, the first Groningen gas was supplied to consumers and by 1968 all mainland municipalities had been connected to the gas grid. Dutch industry benefited enormously from the availability of natural gas, while Dutch households enjoyed the convenience of gas-fired central heating, cooking and hot water supply. It enabled the Dutch government to get rid of the onerous national coal industry at a much earlier stage – and in a more convenient way – than its neighbouring countries. The substantial revenues that the State collected over the years facilitated the development and preservation of the generous Dutch welfare state and the construction of an ambitious protection system against flooding. The export of natural gas to other Western European countries and the reduction of oil imports into the Netherlands contributed to a positive international trade balance.

The exploitation of gas did not only influence the national energy sector. The manner in which the gas was exported and marketed in neighbouring countries has been of decisive importance for the development of the European gas market from the mid-1960s onwards. From an early stage, Dutch gas secured a firm position in the consumption of European households and industry, despite competition from low cost oil products during the 1960s. Moreover, the exports laid the foundation for the current international gas market and the transport and distribution system that now supplies a growing number of European consumers with natural gas. The expansion of the gas market, as the bridge to a more sustainable energy supply, allowed for the substitution of coal and fuel oil.

From the start, the management of the Dutch gas reserves was subject to heat-

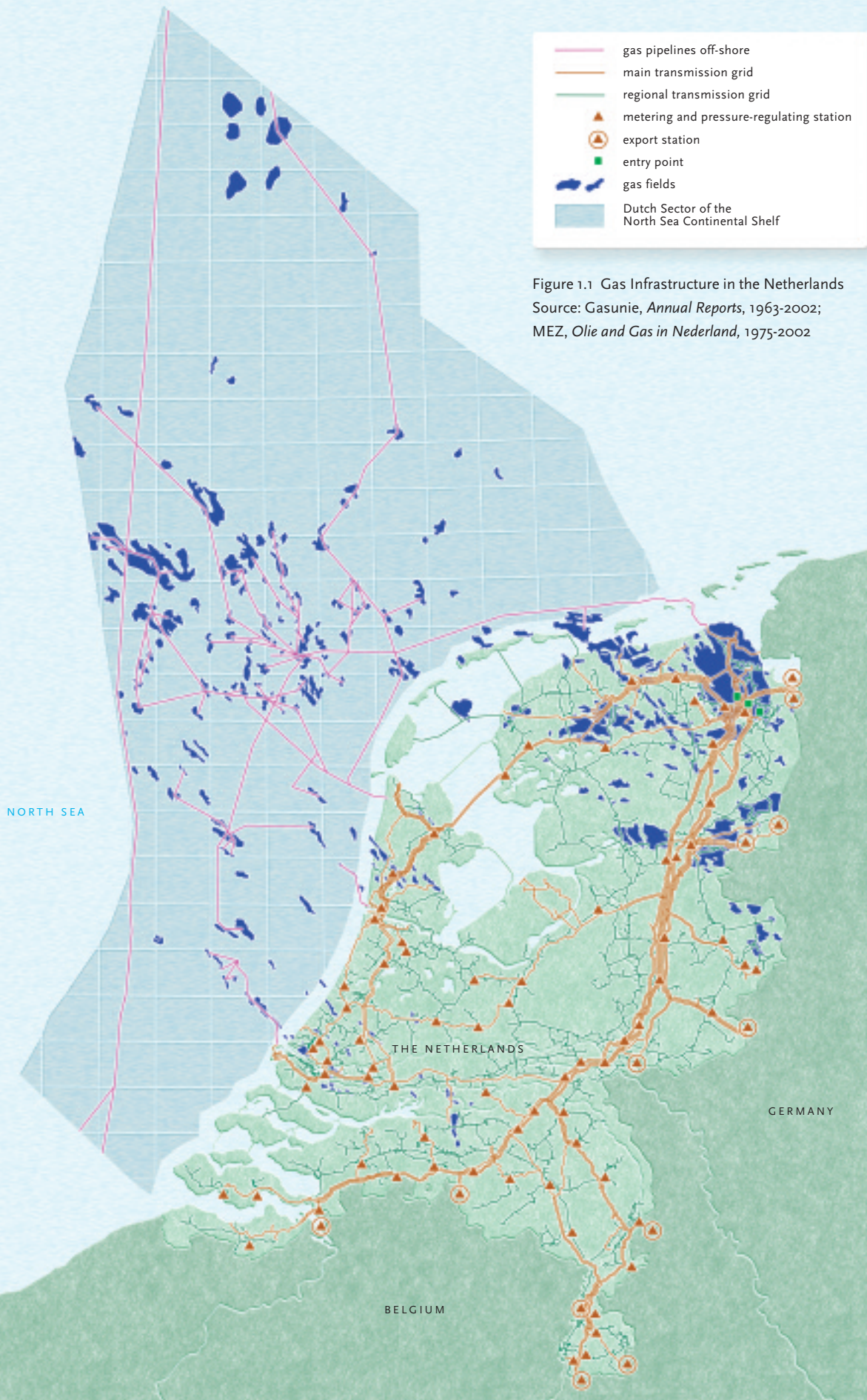


Figure 1.1 Gas Infrastructure in the Netherlands

Source: Gasunie, *Annual Reports*, 1963-2002;

MEZ, *Olie and Gas in Nederland*, 1975-2002

ed discussions both in and out of Parliament. Natural gas had quickly achieved a crucial position in Dutch energy supply, while state and private revenues associated with the exploitation were rapidly increasing. Significant economic, financial and political interests were involved in the production, commercialisation and the consumption of gas. Particularly after the first oil shock in 1973-74, natural gas consumption, security of supply, gas prices, distribution of profits and the environmental impacts of gas exploration and production were put high upon the political agendas.

Discussions have not always been particularly rational. The gigantic size of the Groningen field and the revenues associated with its exploitation (and the possible options for spending) captured the imagination of many and also helped to cultivate myths among citizens as consumers and voters, among economists and other scientists, and among politicians from the left and right. These ensuing discussions were undoubtedly fuelled by the atmosphere of secrecy around a number of crucial aspects of the Dutch gas policy. Examples include the size of the gas reserves, the subsidisation of specific industrial and agricultural sectors, the level of (export) prices, the (windfall) profits of the international oil companies and the agreements between the government and the oil companies on the spending of these profits in the Netherlands (the *Herenakkoord*).

In the present day it is clear that lack of confidence, allegations of incomplete or wrong information, outright conflicts of interest, and fundamental differences in perceptions regarding resource management continue to dominate current debates around, for example, gas production in the Waddenzee, earthquakes in the north and west of the country, and the disintegration (or not) of Gasunie.

In this study it becomes clear that in its interaction with a range of economic, social, political and technical aspects, the Dutch gas system has developed into an extremely complex phenomenon. Social and institutional aspects are crucial in the development of energy use and production. Nelson & Sampat (2001:48) state, "Just as the implementation of new physical technologies may require new machinery and new material inputs, as well as new institutions, the institutionalisation of these new social technologies may require new law, new organisational forms, new sets of expectations." This book explores how these requirements have emerged in the Dutch gas system as result of three driving forces, namely, institutional change, the development of technology, and changes in economic parameters.

A most intriguing aspect in the development of systems like that of Dutch gas supply is the origin of dynamism and change in the system. Institutional explanations of the functioning of systems, generally, highlight the stabilising effect of institutions. The question as to what causes institutional change forces us to look at the relationship between changes in institutions, in economics and in technologies. Invoking an evolutionary perspective, Nelson & Sampat (2001: 52), for example, argue that, "[...] individual and group learning processes winnow out [...] infe-



Gasunie building
in Groningen.

rior or self destructive practices [...] when new challenges or opportunities arise, there can be major changes in institutions which allow significant economic progress.” In addition, Callon (1998) points to the development of institutionalised market paradigms, involving commonly used standards and practices, such as definitions of ownership, quality, quantity, price, and instruments for evaluation and verification. However, in response to developments in ideas, technology, economics, political power, etc., these norms and standards are continuously being (re-) developed and adjusted, as a process of institutional change. North (1990) adds that interest groups may actively campaign and invest funds to change the institutional set-up, and its standards and practices.

As will become clear, the evolution of the Dutch gas system was influenced by (shifts in) economic, institutional and technological factors, including policy paradigms and ideas regarding scarcity, security of supply, social issues, the environment, and the impact of other realms of policy-making. The role of the Dutch government has been essential in both the development and the commercial strategy of the gas sector. Public policy was often a compromise between conflicting political objectives, like the level of gas prices, the size of the State revenues, the rate of depletion and the development of new reserves. Public policy was complicated by the intervening interests of the various oil companies involved in the exploration and production of gas, struggling to achieve reasonable remuneration. What we intend to show in this book is how a balance was struck between these interests in the subsequent periods, given changes like the level of oil prices, the supply of gas from abroad and shifts in environmental perspectives.

1.3 Periodisation

The history of Dutch natural gas exploitation can be divided in three periods, as illustrated in Figure 1.2 (next page). These periods are distinguished on the basis of the specific perspectives of policy-makers, industry, and consumers on the role of natural gas in energy supply. The first period covers the era between the discovery of the Groningen field in 1959 to the first oil shock in 1973-74. The perception of energy abundance, low oil prices, economic growth, a relatively closed process of political decision-making, and a rapidly increasing share of natural gas in Dutch energy supply characterise the policy paradigms of this period. In 1962 the Minister of Economic Affairs, Jan de Pous, laid the foundation for the development of the gas sector in the famous *Nota inzake het aardgas* (“*Nota de Pous*” – MEZ 1962). By the early 1970s the new Dutch gas system was well-established. However, several developments had an impact on the development of the network, the institutional set-up and the markets for gas. Further, the lucrative Dutch exports of gas stimulated the activities of other potential suppliers of natural gas, from the North Sea, Russia and Algeria.

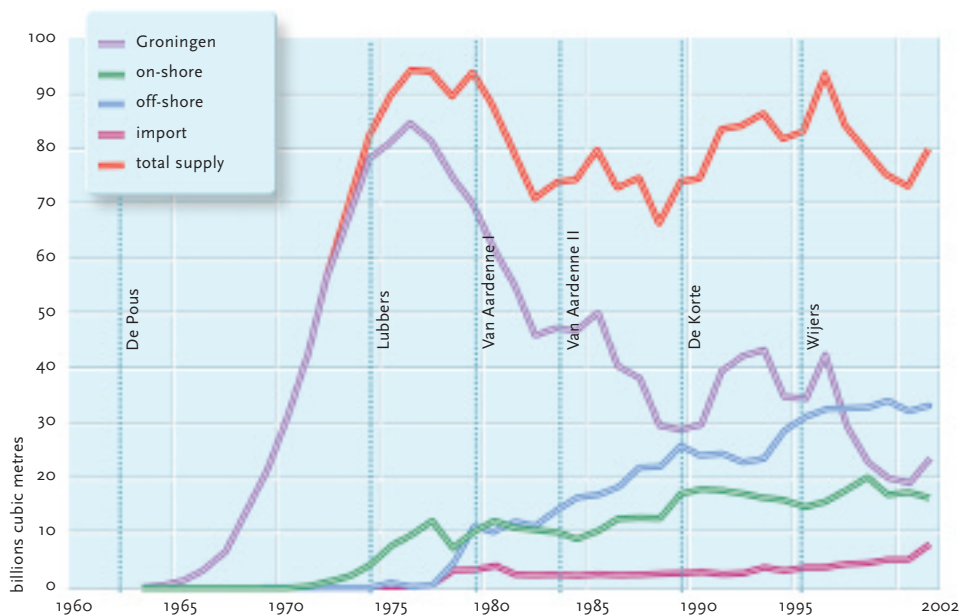


Figure 1.2
Supply of Gas and
Changes in the
Dutch Gas Regime
Source: Gasunie,
Annual Reports,
1963-2002

The second period commenced with the rise in oil prices, triggered by the 1973-74 oil shock. Key concepts for this period are perception of scarcity and economic recession. The political and social relations had become much more complex and natural gas was of crucial importance to the Dutch economy. The political context, conflicts of interest and divergent views on resource management resulted in sharp discussions about energy and gas policy. Against the background of increasing environmental awareness (Meadows 1972) the oil crisis gave rise to the first fundamental revision of Dutch gas policy.

As a result, security of supply gained prominence for gas policy and national consumption, export of gas was discouraged, and exploration and exploitation of new on- and off-shore fields was encouraged. Oil companies were now actively stimulated to find more new gas fields, by assurances that Gasunie – having the right of first refusal – would purchase their gas immediately, against acceptable prices and at an adequate rate of depletion. This policy led to the supply of increasing volumes of gas from the many small, but higher cost, off-shore fields from the mid-1970s onwards. The low cost Groningen field became a marginal source. As a swing producer, Groningen supplied the volumes of gas required to fill the gap between the increasing production of the new fields and Gasunie’s total requirements for market supply.

The process of liberalisation of European energy markets that began in the late 1980s indicates the third period. Despite much resistance, spill-over from competition in other industrial sectors, pressure by large commercial energy consumers, and potential new entrants to the gas and electricity industry motivated the EU Commission to develop its Gas Directive. By the second half of the 1990s, the ap-

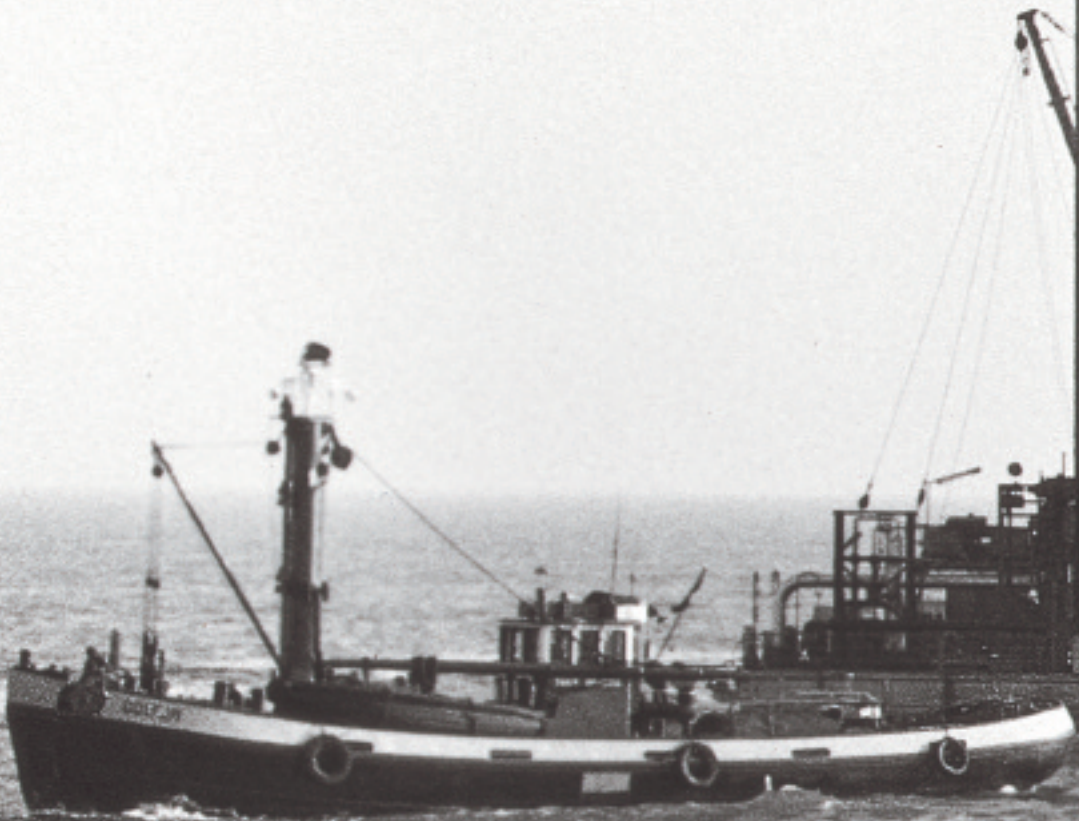
proval of the European Electricity (96/92/EC) and Gas (98/30/EC) Directives empowered the EU Commission to undertake a process of liberalisation in the European energy markets.

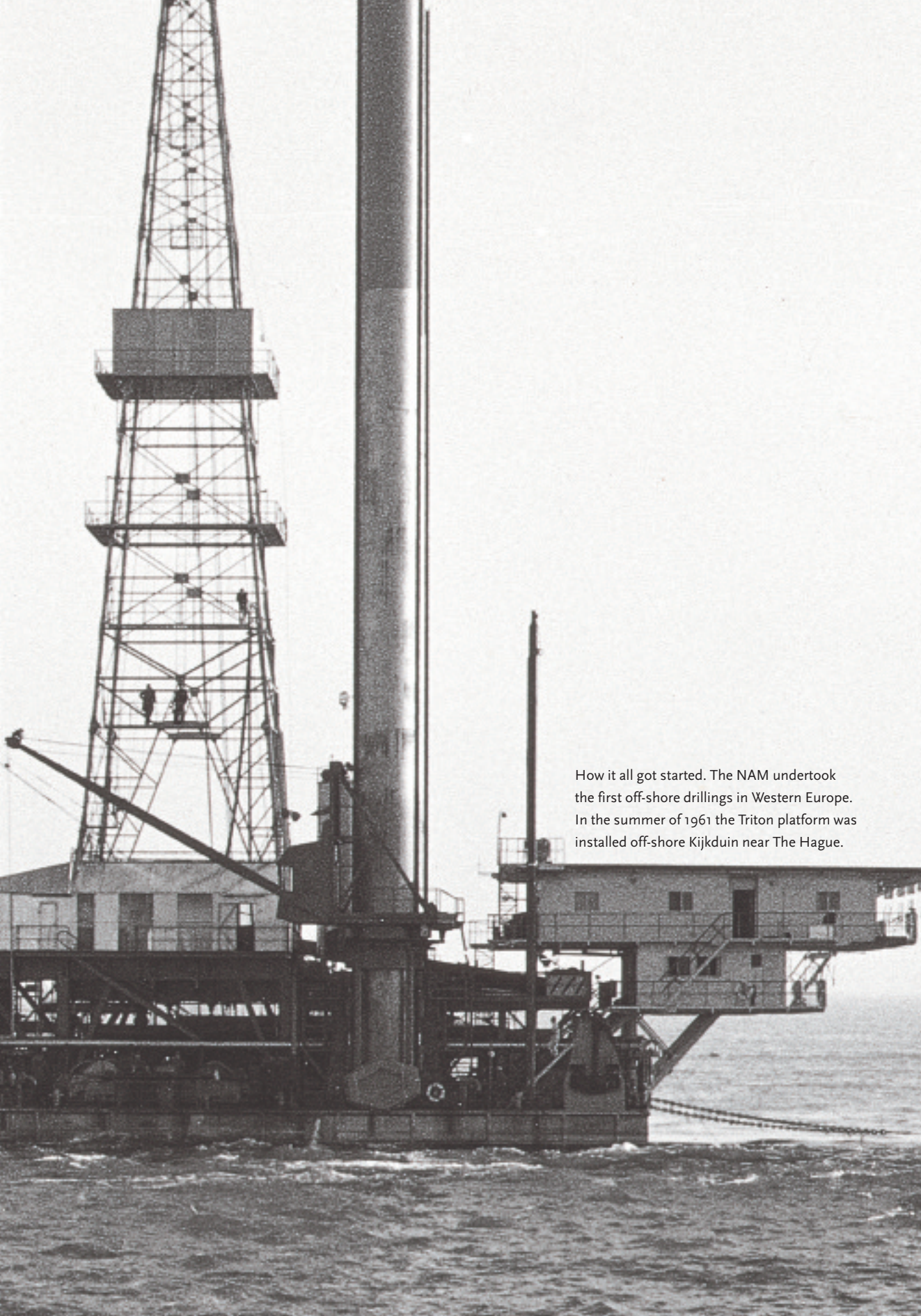
Even though the Netherlands had been amongst the staunchest opponents of the initiatives of the EU Commission, the 1995 Third White Paper on Energy indicated that fundamental changes to the traditional organisation and the operation of the Dutch gas industry were under way. The initial objective was to maintain the basic structure of the industry, with a key role for Gasunie and *De Maatschap/NAM*. However, more recent developments which included the development of guidelines by the Dutch energy market Regulator DTe, led to different insights on the required structure of a liberalised national and European gas market. These insights inspired the Minister of Economic Affairs, Jorritsma, as affirmed in a letter to Parliament in April 2002, to announce a radical separation of Gasunie's transport and trading activities and to propose an unbundling of ownership of the trading activities.

This reconstruction of the role that natural gas has played in Dutch society draws on a variety of sources of information. These sources include official policy papers, such as the several White Papers published by the Ministers of Economic Affairs, but also the many publications and studies by industry, advisory State agencies involved in policy-making, and other non-governmental organisations with environmental or social objectives. The many academic books and articles and newspaper accounts on the development of the Dutch gas system were indispensable for the completion of this study. Moreover, we were able to draw on the personal experience of people involved in the sector through a series of interviews. Taken together, these sources provide a clear view on the ways in which policy-makers, industry, the public, academics and the press thought about the exploitation of natural gas over time.

Chapter 2

Groningen, The North Sea and the Development of the “Gasgebouw”





How it all got started. The NAM undertook the first off-shore drillings in Western Europe. In the summer of 1961 the Triton platform was installed off-shore Kijkduin near The Hague.

2.1 Slochteren: A Revolution in the Energy Market

The history of natural gas in the Netherlands begins in Coevorden, in the province of Drente, in the north of the country. In July 1948, gas was found at a depth of nearly 2,800 metres and three years later, Coevorden was the first city in the country where households were cooking with natural gas. In the 1930s, the Shell subsidiary *Bataafse Petroleum Maatschappij* (BPM) had already acquired exclusive oil and gas exploration rights for the north-eastern part of the Netherlands (including Groningen, Friesland, Drente, Overijssel and Gelderland). During the Second World War, an oilfield was found in Schoonebeek, close to Coevorden. In 1947, BPM (Shell), and the Standard Oil Company of New Jersey (under the name of Esso, and later Exxon), established the *Nederlandse Aardolie Maatschappij* (NAM), a joint venture for oil and gas exploration and production in the Netherlands. NAM acquired a production permit and started producing oil at Schoonebeek. Encouraged by this success, NAM continued exploration throughout the country, including the IJsselmeer and the Waddenzee. In the 1950s, a number of moderately-sized fields of oil and gas were found.

However, gas exploration was a low priority for both NAM and for Shell. Oil was considered much more important. As stated by Shell managing director, Salvador Bloemgarten, “Stay out of gas, there is no money to be made” (cited in Kielich 1988: 19). This remark was motivated by the fact that, at the time, gas supply was considered to be a *public utility*, operated on a low profit cost-plus basis. Moreover, he foresaw competition between natural gas and oil products, the latter being much more lucrative for Shell.

Nevertheless, NAM continued its activities. On July 22, 1959, another gas field was discovered near Slochteren, in the Province of Groningen (see Figure 2.1). This field contained gas of the same composition and pressure as a field that been discovered in 1955, at some distance away. Shortly thereafter, other drilling in the same geological strata, near Delfzijl and Slochteren, produced similar results. On the basis of these discoveries, NAM estimated the size of the field to be 60 billion cubic metres (bcm), which at the time was considered enormous. For various reasons, NAM only informed the Minister of Economic Affairs, de Pous, and otherwise kept its discovery a secret. The NAM managing-director, Roel Bongaerts, argued that there was much uncertainty in such estimates. Moreover, NAM also preferred to keep other oil companies from exploration in the Netherlands. As NAM did not have an exclusive concession for exploration and production, it first wanted

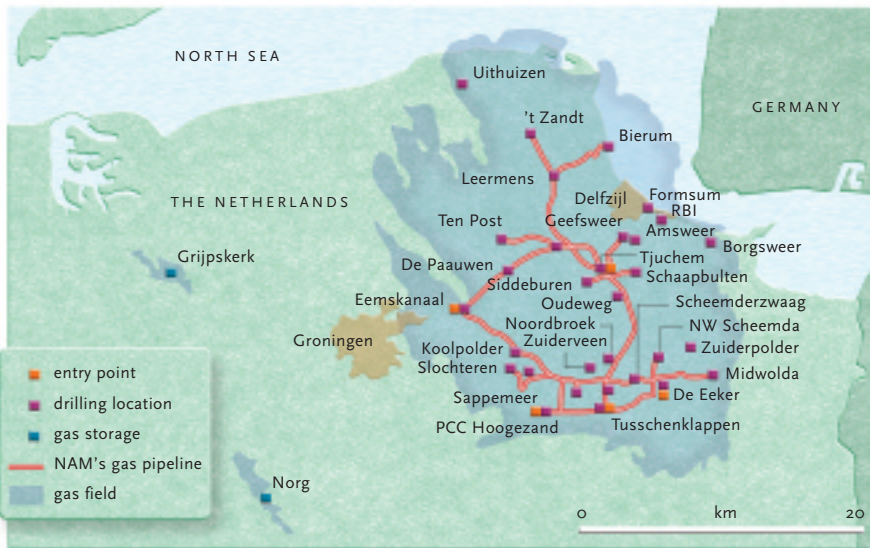


Figure 2.1
Groningen Gas Field
Source: IEA 2000

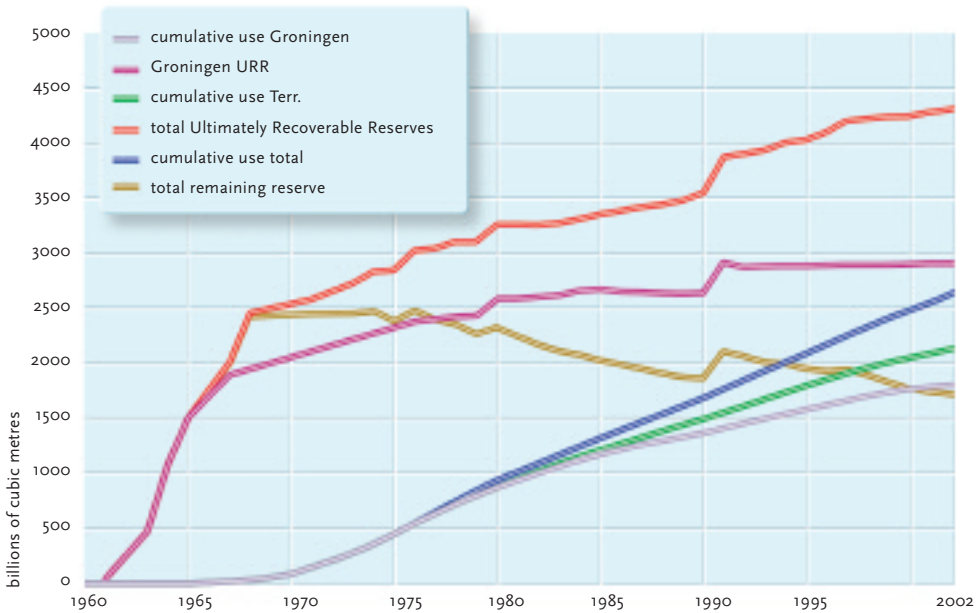


Figure 2.2
Estimates of Gas Reserves and the Depletion of Groningen and other Fields
Source: MEZ, *Olie en Gas in Nederland, 1975-2002*; Brouwer & Coenen 1968

to negotiate with the Dutch government about exploitation of the field. For more than a year nothing happened until in October 1960, newspapers published about the discovery of an enormous gas field in Groningen. NAM was forced to admit that the field was huge. Subsequent drilling resulted in the size of the field being re-adjusted several times: from 150 bcm to 470 bcm in 1962, to 1,100 bcm in 1963, and to 1,900 bcm in 1967. It became evident that the Netherlands' subsurface harboured one of the world's largest gas fields known at the time (see Figure 2.2).

Originally the Groningen gas field was called the Slochteren gas field, named after the village where the discovery well was drilled in 1959. The field occupies an area of about 900 square kilometres, with a tiny piece of the field extending into Germany.

The field is a faulted anticline, situated at a depth of about 3,000 metres. The sandstone reservoir, called the Slochteren Formation, lies on top of the mature, coal rich Carboniferous source rock. The seal is provided by the thick Zechstein salt. The sediments composing the reservoir were deposited in a desert environment during the Permian epoch. The reservoir is between 100 and 300 metres thick, is very homogeneous and has excellent porosity and permeability.

Gas reserves have been estimated at about 2,600 bcm. First production took place in 1963. The field produces from 29 fully automatic locations each with eight to twelve wells. The gas in the Groningen field contains about 82% methane, 3% heavier and wetter hydrocarbon gases, 14% nitrogen and 1% carbon dioxide and is therefore of low calorific value. Gas with a higher calorific value from other fields often has to be diluted artificially to the Groningen standard in order to be used by the numerous installations adjusted to this standard.

It immediately was clear to NAM and the Ministry of Economic Affairs, de Pous, that the Groningen discovery would have a large impact on Dutch society. Because it considered the prevailing gas exploitation regime inadequate for a field of this size, NAM announced that it first wanted to negotiate the production concession with the government, and de Pous agreed. Under the prevailing regime, NAM would have been forced to sell the gas produced to the State Gas Company (SGB), which took care of transport and delivery of the gas to a number of municipal gas companies. In addition to natural gas produced in the east of the country, the SGB supplied gas manufactured from coal and oil and purchased coke gas from the steel industry, from a coke plant in the west of the country, and from oil refineries.

From 1954, the SGB had distributed natural gas produced by NAM under a twenty-year agreement. NAM produced and sold the gas on a cost-plus basis to the SGB. Notwithstanding a relatively high consumer price of 33 Dfl cents per cubic metre, NAM only received between two and four Dfl cents, because the small scale of the gas system(s) caused high distribution costs. For a wide range of customers and applications, gas was not competitive with oil and coal. Until the discovery of Groningen, NAM complied with this regime because it considered the guaranteed take-off of gas important. Moreover, gas was simply a by-product of oil production as indicated by NAM's acronym: the Nederlandse *Aardolie* Maatschappij. With the discovery of Groningen, both NAM and the State wished to restructure this regime, and to adapt to the exploitation and marketing of the truly giant Groningen field (See Bakker & Salverda 1983a, b; Kielich 1988; Ausems 1996).



**MORGEN
IS HIER
AARDGAS**

GEMEENTE ENERGIEB... FD. GAS

POO

In the 1960s, Rotterdam switched from city gas to natural gas. The Municipal Energy Utility undertook an intensive publicity and information campaign.

2.2 Towards a New Dutch Gas Regime

The importance of the Groningen field – and the enormous opportunities for gas in the Dutch economy – was clearly recognised by the State and NAM shareholders, Shell and Exxon. From 1960, these parties began negotiations to restructure the regime for exploiting the Groningen field. An essential issue was which customers would be offered gas at what price. Initially, Shell opted for market segmentation and price differentiation, selling gas to small-scale customers through the SGB and the local distributors, under the prevailing public utility, cost-plus regime. NAM would then supply other Dutch and large foreign customers in industry and power production. This plan was met with strong criticism from the Minister of Economic Affairs as well as from Exxon. The former feared that this arrangement would generate only moderate State revenues, the latter had had bad experiences with similar patterns of exploitation of large gas fields in the US (see Bakker & Salverda 1983a, b; Peebles 1980, 1999; Stern 1984; Kielich 1988; Ausems 1996; Correljé 1998).

A small Exxon taskforce, involving two Americans and two Dutchmen, subsequently developed a radically different proposal. In contrast to the Shell plan, that assumed that the segment of large users would be the most profitable to supply, the Exxon approach argued that the segment of small users could yield the highest revenues (see Correljé 1998; Heren 1999). Essential conditions for this proposal were: a) that the gas should be made available to domestic users on a very large scale, and b) that gas should be used in as many appliances as possible. This would require the construction of a large country-wide high-pressure transmission system to link the existing and newly established local distribution systems to the Groningen field. Domestic customers would have to be persuaded to switch from coal or oil, to gas-fired (central) space heating, thus expanding the domestic market for city-gas that traditionally was used only for cooking and hot water supply. To achieve this, it was argued, the cost to the users should be equal to the cost for coal or oil-fired heating, with progressively declining costs for higher levels of use. This approach indicated a completely new role for gas in energy markets, pricing strategies, and the relation between public and private activities.

Shell initially rejected this plan because of doubts that small-scale users would invest in new equipment and heating systems. Simulations of gas consumption, with a model based on data from the Hilversum municipal energy utility, however, allowed for the evaluation of all kinds of variables such as investment, and consumer pricing. Modelling demonstrated that the Exxon approach would be advantageous for users, the municipalities and their utilities, the State, and for the gas producers themselves. Thus, the alternative proposal of separate approaches for small and large users was rejected. The small, but high value users who would be locked into the gas market once they had converted to natural gas guaranteed a relatively price-inelastic consumption and, thus, became the cornerstone of the Dutch gas system. Moreover, for the so-called industrial premium markets, such as the chemi-

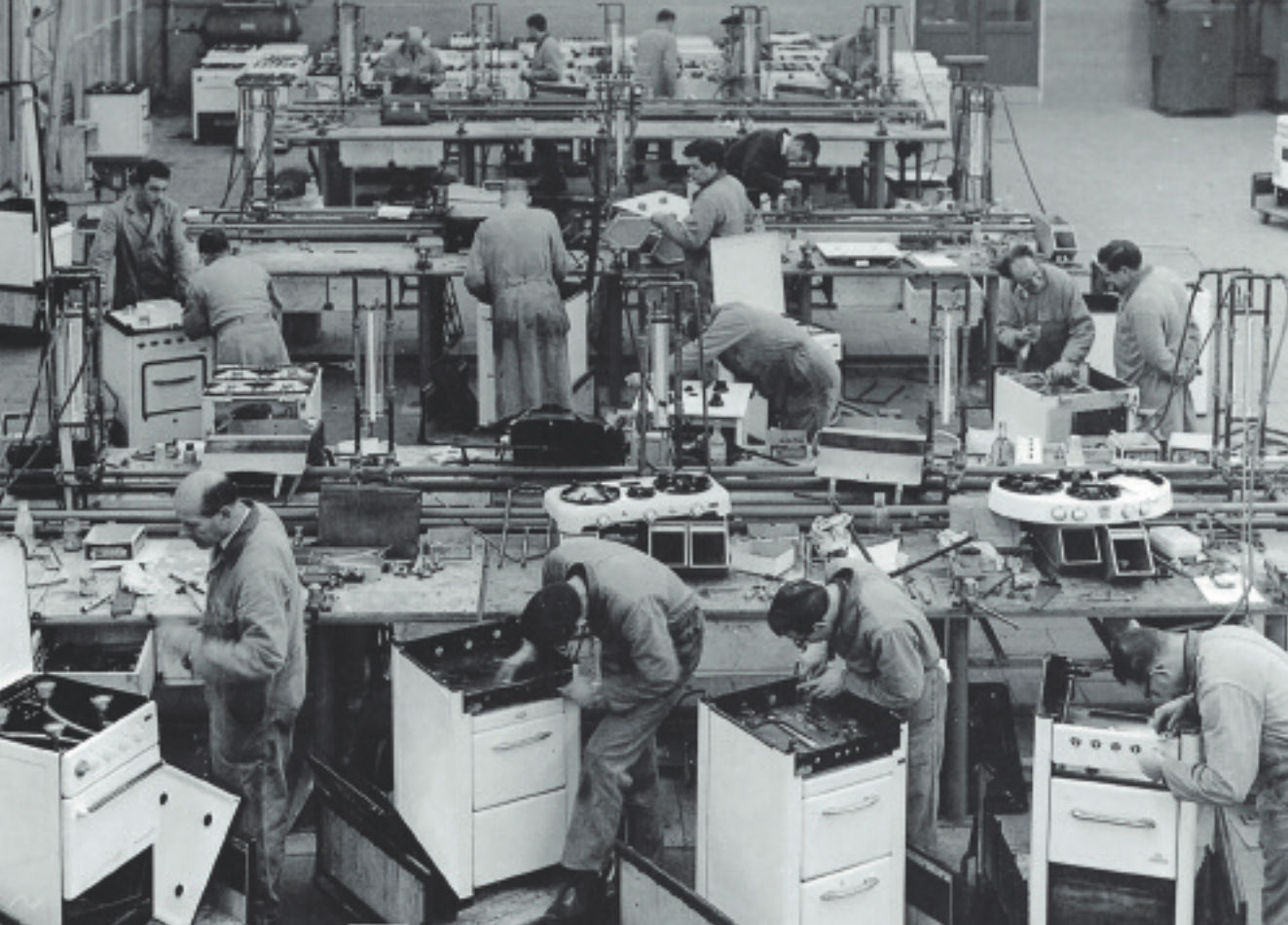


The coal man was a familiar figure.

cal, metallurgical and ceramic industries, higher cost gas did not have to compete with lower-priced fuel oil or coal, because of its technical superiority for these production processes.

Following Shell's acceptance of the marketing plan in early 1961, it was presented to Minister de Pous. De Pous mandated the *Staatsmijnen* (later Dutch State Mines, or DSM) to negotiate on his behalf with Shell and Esso regarding the further development of a concessionary regime, the marketing strategy and the role of the Dutch State. De Pous wanted a much larger profit share for the State than the usual 10% royalties plus corporate tax.

De Pous had several reasons to involve DSM in these negotiations, instead of SGB. To begin with, he considered SGB too much of a lightweight to confront the



At a central conversion workshop at the Feijenoord Municipal Gas Plant, city gas appliances were adjusted for the use of natural gas.

power and experience of the two large international oil companies. DSM, operating the Limburg coal mines, was an undertaking of considerable size that operated in international markets. Moreover, DSM produced, distributed and marketed manufactured gas in the south of the country, which constituted about 30% of the total Dutch market for gas. Finally, the transition towards natural gas would undoubtedly be at the expense of the coal sector. The involvement of DSM in the newly developing gas industry could be considered a form of compensation.

Two months later, the three companies presented a brief *Aide Mémoire* to the Minister, outlining the marketing policy and the position of the Dutch State. A new marketing joint venture for the Dutch market, incorporating the SGB through DSM was proposed. DSM, Shell and Exxon would all participate with equal shares, while DSM would have a veto right over the strategy of the marketing company. Separately, a second joint venture was to be established for the production and the export of Groningen gas, in which DSM would not have any influence, but would participate for a third in the costs and benefits. Despite the fact that de Pous considered the influence of the State to be too small, he did accept the general idea of the proposed structure as appropriate.

For further negotiations, the *Commissie van der Grinten* was established, involv-

ing three members of representative political and societal backgrounds: Professor Willem van der Grinten, the Chairman of the Mining Council and associated with the Catholic Party (KVP); Engineer and Dr. Theo Tromp, former Minister of Traffic and Water Management, a liberal, member of the Board of Philips and the Dutch Railways; Engineer Hein Vos, senator for the Labour Party (PvdA) and vice-president of the Mining Council. The Commission consulted Shell, Exxon, DSM, SGB, the Cooperating electricity producers (Sep), the United Gas Companies (VEGIN) and the Province of Groningen.

This Commission neatly reflected the compartmentalised and consensus-driven Dutch political model. Notwithstanding the functional separation of the primary Dutch social grouping (Socialist, Protestant and Catholic) into their own political parties, labour organisations, schools, etc., intensive contacts existed between the élite of these and the business élite. Sensitive political decisions were usually discussed in pre-arranged, representative, but informal Commissions, before being publicly presented in Parliament. The involvement of relevant representatives smoothed and legitimised political decision-making. Former Minister of Economic Affairs, Gijs van Aardenne, portrayed the atmosphere in the 1950s thus, “Dutch industry flourished and expanded [...]. In that, the government, particularly the Ministry of Economic Affairs, carried out a very active policy; necessary procedures were undertaken in record time, discretionary decisions were not avoided [...]. Specific elements [agreements, arrangements, etc.] were mostly geared towards individual firms” (van Aardenne 1987: 321).

The Commission’s report, presented in December 1961, addressed a number of important issues. The oil companies were willing to accept somewhat higher State share in the profits and larger influence on the board of the proposed firms, but they had serious objections to an open State participation in the gas production. Both Exxon and Shell in their oil producing activities elsewhere in the world were confronted with governments also claiming the right to State participation and did not want the Netherlands to provide a precedent. Only a short while previously, in September 1960, a number of oil producing countries had established the Organization of Oil Exporting Countries (OPEC), with which they fought for a larger stake in oil revenues, at the expense of the large oil companies profits. Exxon and Shell feared a weakening in their position vis-à-vis the OPEC governments, if they were to accept explicit State participation in the Netherlands – the home country of Shell and an EEC-member.

Shell offered a solution to this so-called *sheikh-effect*. The Slochteren concession would be given to NAM, which thus would become the formal owner of the field. In addition, the *Maatschap* (Society) was created, in which the cost of production and the revenues from the sales of the gas would be accounted for. Shell and Exxon opted each for a 30% share in the profits of the *Maatschap*, while another 30% would fall to DSM, operating as a commercial firm without civil servants on its Supervisory Board. Thus, the set-up would not attract the attention of the OPEC-gov-

ernments. The *Maatschap* would transfer the customary 10% royalty directly to the State, thus achieving a 30/30/30/ distribution, plus the State's 10% royalty share. The *Maatschap's* profits would be taxed at the normal corporate rate. Altogether, the State would collect around 70% of total profits. For the Board's management, however, the voting ratio was 50:50 for the State and both oil companies.

The *Maatschap* would sell the gas to a national transmission company (later baptised Gasunie, with the same shareholders as the *Maatschap* – DSM, Shell and Exxon), to transport the gas to the local distribution companies, owned by the municipalities. The van der Grinten Commission proposed a 50% share for DSM, but Shell and Exxon settled for a similar share as for the *Maatschap*; 40/30/30. A third company, NAM/Gas Export, would export the gas on behalf of Gasunie – in order to avoid the above mentioned *sheikh-effect*.

Negotiations continued along these lines between the Ministry of Economic Affairs, Exxon and Shell. Meanwhile, de Pous began negotiations with the large political parties in preparation for Parliamentary approval. The Council of Ministers and the Commission for Economic Affairs of the First and the Second Chamber accepted the draft paper without difficulty. However, Anne Vondeling, a PvdA Member of Parliament, resisted and proposed nationalising the Slochteren concession. When the oil companies accepted a 50% State share in Gasunie (10% direct and 40% through DSM), the PvdA yielded, against Vondeling's advice.

Thus, three years after the discovery of the large Groningen gas field in 1959, the Minister of Economic Affairs, de Pous, established the main principles of the Dutch gas policy in the *Nota inzake het aardgas* ("*Nota de Pous*" – MEZ 1962). In order to generate maximum revenue for the State and the holder of the concession, NAM, the Minister introduced the "market-value" principle as the basis on which the gas should be produced. The price of gas was linked to the price of alternative fuels that were most likely to be substituted by the different types of consumers (e.g., gas oil for small-scale users and fuel oil for large-scale users). Accordingly, consumers would never have to pay *more* for gas than for alternative fuels, but the market-value principle also ensured that they would not pay *less*. The application of the principle enabled the concession holders, Shell, Exxon, and the Dutch State, to secure much higher revenues than for pricing in which consumer prices were related to the low production costs of gas from the Groningen field.

An essential precondition for maintaining the market-value principle was, of course, that alternative supplies of low priced gas could not reach the market – a condition which was maintained in the Netherlands until recently and for Europe until the early 1970s (Odell 1969, 1973a, b). To this end, the second key principle in the *Nota de Pous* stated that the production of Dutch gas resources should be harmonised with the sales of gas achieved, in order to avoid disruptions in the energy market. Control over the supply of gas was thus understood to be a government responsibility. Yet, the *Nota de Pous* also stated that exploitation and marketing of the gas reserves should be undertaken by the private concession holders, Shell and

OVERZICHTSKAART
AARDGAS- EN AARDOLIE CONCESSIES
SCHAAL 1:1.250.000



ZITTING 1961—1962 — 6797

Nota locale des aardgas

GELEIDENDE BRIEF

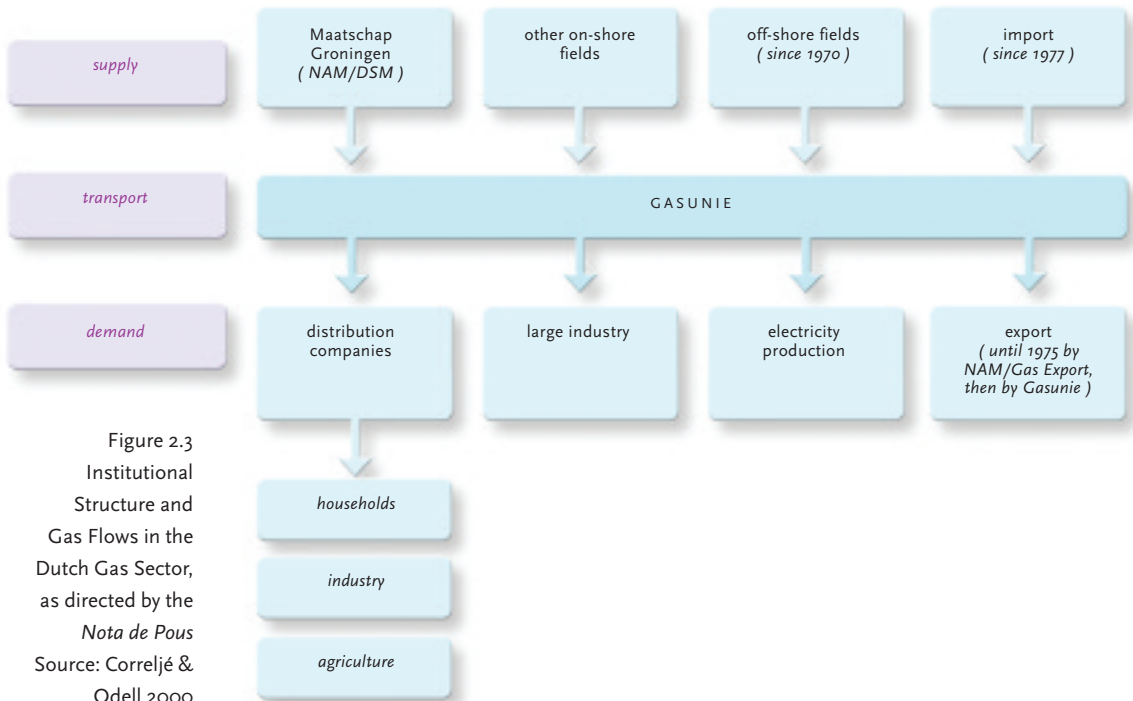
Nr. 1

Gravenhage, 31 juli 1962.

Conform mijn aanlegging tijdens de behandeling van hoofdstuk XIII der rijsoepening voor het dienstjaar 1962 heb ik de eer U Hoogedelgestreepte hierbij toe te raden een nota inzake het aardgas. Ik mag U verzekeren dat ikden Over Koning een exemplaar van deze nota te doen toekomen.

De Minister van Economische Zaken,
J. W. DE POUW.

The Nota de Pous.



Exxon, in order to enable the country to benefit from their knowledge, experience and financial resources. In 1963, the Dutch government and the two companies agreed upon a structure effectively uniting these principles (see Figure 2.3).

NAM produced the gas which Gasunie then sold to the distribution companies and some large users. Operating costs for the transmission system plus an annual statutory profit of 80 million Dutch guilders were deducted from Gasunie's gross revenues, and the remainder was transferred to the *Maatschap* (the entity in which the Groningen Concession was embedded). State revenues were secured in a number of ways; first, through corporate taxes (48%) on the profits of the *Maatschap*, Gasunie and DSM; second, through an additional 10% government surcharge on the profits of the *Maatschap*; and third, through the dividends and the State profit share paid to the State by, respectively, Gasunie and DSM. From the early 1970s, a State profit share was also applied to the *Maatschap* profits (see Wieleman 1982a: 12). The Ministry of Economic Affairs also formally confined its responsibilities to approving decisions taken by DSM and Gasunie with respect to prices, production, national and international trade volume, and the construction of transport and storage facilities. In practice, it was always consulted on strategic issues and could initiate discussion for any changes it thought necessary in terms of the national interest. The new set-up also generated a remarkable shift in the relationship between the State and the private sector in the Dutch energy sector. Indeed, the large State involvement in the Groningen Concession was at the time

certainly something new.

It can be concluded that these negotiations led to a completely new institutional set-up of the energy supply system. The various interests associated with the pre-existing energy supply system were either given favourable positions within the new structure, as with DSM and the municipal town gas companies that were endowed with the task to distribute natural gas, or compensated and bought out, like the steel mill *Hoogovens*. Adequate arrangements were achieved regarding the stranded assets in the public city gas and in the coal industry. The two main oil companies, Shell and Exxon, were at the forefront of these new developments. Other firms, such as Gulf, Texaco, Chevron, BP, Fina, etc., were less fortunate. They lost their potential shares in a large market for fuel oil in the industry, in power production and for heating oil to domestic households and small and medium-sized enterprises.

STAN DESSENS

Former Director-general of Energy, Ministry of Economic Affairs

Small Gas Fields Continue to Play a Significant Role

“Our small gas fields play an important role if you look at their contribution to the total Dutch production. Without them, the Groningen field would have been nearly depleted by now, and proven reserves would have been much lower. I think the small fields can, for years to come, still play a significant role. As long as there is a positive economic benefit, the government should try to continue this role. For the new *gasgebouw*, the State retains a strong position as well as some specific tools to stimulate exploration and production from small fields.”

These are some highlights of the interview with Stan Dessens, former Director-general of Energy at the Ministry of Economic Affairs in The Hague.

Mr. Drs. Stan Dessens is a physicist as well as a lawyer. During his 25-year career at the Ministry of Economic Affairs, he became an energy expert. From 1988 until 1999 he served as Director-general of Energy, responsible for formulating Dutch energy policy. He also represented the government in institutions such as Gasunie, the cooperation of electricity producers (SEP), Urenco (production of fuel for atomic energy plants), as well as in international institutions such as the European Union, the IEA in Paris, and the International Energy Treaty in Brussels.

During the Dutch presidency of the European Union in 1997, Dessens also played a most important role for his minister (Hans Wijers) in developing proposals for the first European directives on the liberalisation of the energy market in the EU. The most important and most difficult directives were about the opening of markets for electricity and for gas. Rules for countries that are very dependent

on energy imports and for countries that are net energy exporters, had to be integrated. Thereafter, Dessens played a leading role in the translation of these directives into Dutch national law.

In 1999 Dessens exchanged his position at Economic Affairs for an equally important senior function at the Ministry of Justice: Director-general of Law Enforcement.

Looking back, he describes the proposed changes to the original Dutch *gasgebouw*, with Gasunie in a central position as “logical”, in a European energy market that had changed from national energy sectors with strong government influence, to a free market.

One of the things Gasunie had achieved over the last decade of its forty-year existence was to build up its position not only as one of the most important gas exporters in the EU, but also as a trader in natural gas. Gas reserves in the Netherlands are gradually diminishing. More imports of gas from Norway, the United Kingdom and Russia were realised, as well as higher export volumes. Recently a new, large export contract was signed with the United Kingdom. Experts plead for the expansion of the gas import and gas trade function by investing in more underground storage facilities, possibly as an alternative to the contribution from small Dutch gas fields, when bringing these very small reserves into production becomes too expensive.

According to Stan Dessens “careful consideration on the Dutch position on European gas trading” is necessary, “because our reserves are not endless. I don’t think expanding trade will be any easier as our traditional *gasgebouw* is going to be split-up. You must realise that not only the two commercial stakeholders in Gasunie, Shell and Exxon/Mobil, will each take over a part of Gasunie’s existing contracts. They will each form a separate business for trading Dutch gas, imports and exports. But in the free European energy market that is emerging, there will be more partners striving for strong positions in gas trade.”

Dessens acknowledges that investing in more facilities for underground storage of gas could underpin the chances of Dutch gas trade, because the geological conditions are favourable, “but commercial circumstances have to be scrutinised carefully.”

For the time being, this experienced senior civil servant would still grant priority to the exploration and production of existing reserves in Dutch small gas fields. “They still play a significant role and I think that can be continued for years to come. Our economy, the government income, employment and the technological knowledge in this sector have very much benefited from the small fields policy we started in the 1970s. The longer we can continue this, the longer we maintain the important swing supply function of the large Groningen field.”

“Of course this policy can only be continued as long as production of small reserves delivers a positive benefit,” adds Dessens. “If that is no longer the case, it will stop. A field that contains only reserves of let us say 50 million cubic metres,

cannot be viably exploited. In my view, the State should not decide to take over and do the job itself. The State should function as a normal partner in the free market. Otherwise it will be accused of granting a state subsidy to this activity. Until now the exploitation of small fields has always been performed on a normal economic basis and that is how it should continue. For off-shore fields we did lower the fiscal burden, yes, to compensate the much higher costs. And in this respect the government still has some margin to manoeuvre, as long as the total fiscal burden for companies is higher than the corporate tax (now 35%). Once the total burden drops below this line you can't continue. The authorities in Brussels would regard it as a state subsidy."

But there is another tool for stimulating the small field policy, says Dessens, which the Dutch government also retains in the new *gasgebouw*. In the new *gasgebouw* the government will no longer have any involvement with the marketing of natural gas. However, through its representative in the *Maatschap Groningen, Energie Beheer Nederland* (EBN) with 50% voting rights, it will retain important influence on the level of production of the large Groningen field. Also EBN can and will in this *Maatschap* continue the promotion of the small field policy and thus give priority to the contribution of small Dutch fields in the total Dutch gas production, which is capped at 80 bcm per year. Another governmental tool that remains is of course fiscal policy.

Still, Stan Dessens thinks "it could be possible" that development and production might be endangered in the new structure, if the commercial partners Shell and Exxon/Mobil would, under certain price developments, regard the small Dutch fields as too expensive. In that case they could plead to give priority to increased production from the Groningen field. "In the old structure the oil companies had a strong interest in exploiting the small fields. I believe you can say that Shell and Exxon earned more per cubic metre on the gas from small fields than they did on Groningen gas, because the fiscal burden on the latter was (and still is) much higher. The partnership in the *Maatschap* used to be quite harmonious; it was a sort of natural cooperation. But I think this has changed somewhat. I understand that since the late 1990s decisions in the *Maatschap* have not always been taken unanimously."

"The contribution of the small fields became so large that the production of Groningen was lowered sharply. An interesting aspect is that for an important part this success was reached thanks to the efforts of the joint Shell/Exxon company *Nederlandse Aardolie Maatschappij*. All this meant that the commercial partners then pleaded for a higher total production and a higher volume from Groningen. Of course the government was equally interested in saving the reserves of the Groningen field, and maintaining its flexibility and swing function for a longer period in the future. A compromise was found by raising the production and the export somewhat on the one hand, and extending the gas sales contracts with our export countries on the other hand. As a result, the income from exports would be

guaranteed for many more years to come. From 1995 on, we at Economic Affairs, succeeded in realising an old ideal, setting the extra state income from higher exports and the revenues of increased oil prices apart in a special fund for investments.”

2.3 The North Sea and Mainland-Mining Regime

Announcement of the Slochteren discovery in 1960, engendered avid attention from other oil companies for the exploration of oil and particularly gas in the Netherlands. The Ministry of Economic Affairs received numerous requests for seismic research and exploration drilling permits on the mainland and in the North Sea. The Dutch regime of mining legislation, however, was incapable of effectively handling this enormous demand, for example no provisions had been made concerning activities on the Continental Shelf in the North Sea. Thus, in the early 1960s, the Minister of Economic Affairs, Koos Andriessen, announced a suspension of all drilling activities until new legislation could be developed. Seismic research, however, was allowed to continue.

At the time, existing legislation was essentially derived from the Mining Law that had been established in 1810 under Napoleon. This law, however, hardly addressed the exploration of subsurface resources, be it oil, gas or any other substance. It determined that when resources had been found, the fields could be exploited only after the State had given permission to the operator, through an exclusive production concession in a pre-determined area. The holder of this concession became effectively the owner of the mined resources. Society, via the State, had the right to collect a royalty, as a percentage share of the revenue on the sales of the mined resources. The Mining Law, however, did not contain provisions regarding the size of the royalty or how it should be calculated. Further, it did not allow the finder of the resources the natural (first) right to exploit its findings. This right was subject to negotiations with the State in each and every case. If negotiations failed, the finder had the right to claim a compensation fee which was related only to the cost of exploration, but not to the revenue on the future sales of the resources.

These principles had also governed negotiations regarding exploitation of the Slochteren field between the Dutch State and NAM in 1961. The 1810 Mining Law, however, only applied to the mainland and a three-mile coastal zone in the North Sea. The Geneva Continental Shelf Convention of 1958 had given the Netherlands – as a littoral state – the sovereign right to exploration and exploitation of natural resources in the seabed of the North Sea Continental Shelf. The International Court of Justice in The Hague established the division of the North Sea Continental Shelf in 1967, with later adjustments in 1970. The size of the portion allotted was related



Figure 2.4
Sectoral Division
of the North Sea
Continental Shelf

to the length of the bordering country's coastline – the so-called *equidistance principle*. Figure 2.4 illustrates that given the long Dutch coastline relative to the surface of the country, compared to for example Germany, the Netherlands was awarded 57,000 square kilometres, an area nearly twice as large as the Dutch mainland, or 10% of the Continental Shelf's surface (see Chapman 1978; Mackay 1975).

Lengthy discussion slowed the development of new Dutch mining legislation. In 1964, the Minister of Economic Affairs Koos Andriessen presented a draft Mining Law for the Continental Shelf. This law introduced a system of concessions for seismic research, exploration and production. As elsewhere in the world, production was seen as the responsibility of the oil companies, however, the State wanted to participate with a 40% share in each of the consortia established for gas produc-

tion in the North Sea. Because the government was forced to resign in April 1965, Andriessens' Law never reached Parliament. Getting the law passed was up to the new Cals government, with the Social-democrats' Joop den Uyl as the Minister of Economic Affairs and Anne Vondeling in the Department of Finance. It was immediately clear that these Ministers would be less accommodating to the oil companies than their Liberal predecessor Andriessen. Den Uyl and Vondeling were also more demanding than de Pous had been when negotiating the Slochteren concession in 1961-62. Den Uyl's draft law proposed that the State have *post-hoc* discretion for participation in production joint ventures, after becoming certain that oil or gas had been found.

In response, two different pressure groups were established, both reacting furiously to this proposal. About thirty international oil companies joined the Petroleum Industry Committee. A second group, the *Stichting Noordzee Mijnbouw*, was formed by Dutch firms in the civil works and shipping sectors, joined by Dutch banks and by Philips in electronics manufacturing. The latter group was headed by Jelle Zijlstra, the former Minister of Finance, responsible for establishing the Slochteren concession. Making extensive use of the media, both groups exercised strong pressure on the Cals government to block the den Uyl proposal. Eventually, Parliament voted against the Cals proposal. The religious (CHU, KVP, ARP) and liberal (VVD) parties, on the one hand, judged den Uyl's arrangement too socialist involving an unacceptably strong role for the State. The left-wing parties, on the other hand, including factions of den Uyl's own PvdA, were critical because of the alleged lack of State influence.

Finally, in September 1965, the *Mijnwet Continentaal Plat* (Continental Shelf Mining Law – MEZ 1965) was accepted in Parliament. This law provided only a framework – essential regulations, conditions and arrangements still had to be fixed in administrative regulations, or *Algemene Maatregelen van Bestuur* (AMvB). As a result of an amendment by the Catholic Member of Parliament, Pieter Blaisse, all these regulations had to pass through Parliament, as a draft law. The Social-democratic Minister of Finance, Vondeling, took action on behalf of the AMvB for the exploitation of the Continental Plat Shelf. His position is summarised in the following message to den Uyl, “There is only one acceptable point of departure: how do the Dutch Community and the State profit most. The oil companies are, perhaps, only a means to an end, nothing more. Hard negotiations are therefore necessary, based on the fact that an absolute owner [the State] is willing to involve others in the exploration and exploitation, if their input in knowledge, capital, etc. is sufficiently interesting to the State.” Vondeling was also of the opinion that the State had a good starting position: “the Minister of Economic Affairs is on a bed of roses. He has to be aware of his position of power! *If a man is in a hurry, the answer must be NO' (..)*”

Den Uyl had a different appreciation of his position. To begin with, policy-making was strongly delayed due to his disagreement with Vondeling, as he could not present his proposal in Parliament. At the same time, he was attacked by the pressure

groups and the opposition with the same arguments that he himself had used against Vondeling – namely that the delay in awarding concessions was causing serious economic losses to the Dutch economy. The oil companies again noted their problem with Dutch State interventions in the oil industry in creating a bad precedent (the *sheikh-effect*) and also noted the lack of security inherent in the den Uyl regime necessary to encourage investment. Indeed, until a production concession was awarded, the companies would never be sure of the degree of State participation. Nevertheless, den Uyl would never defend his proposal in Parliament, because the Cals government fell in the *Nacht van Schmelzer* (Night of Schmelzer), 13-14 October 1966, over a conflict about a minor budgetary deficit but also probably due to the other parties in the coalition wanting to get rid of the Social-democrat PvdA.

The subsequent interim government, headed by Zijlstra, accepted the revised AMvB. In January 1967 the Royal Decision (*Koninklijk Besluit* – MEZ 1967a) and the Continental Shelf Mining Law (*Mijnwet Continentaal Plat* – MEZ 1965) were implemented. Koos Andriessen's proposal provided for three different permits to be required for the subsequent stages of: 1) seismic research, 2) exploration drilling, and 3) production. The State-awarded production permits required the establishment of a joint venture by the interested oil company, or consortium, in which the public entity DSM-Aardgas (later EBN) would take a 40% interest. The State would participate in the cost of exploration *post hoc* and in the production of gas that would be found and produced. This arrangement, of course, shifted most of the risk in the exploration stage to the oil companies. Indeed drilling often produced dry holes without any gas and thus without compensation. In essence, this model followed the principles introduced by de Pous in 1962, such as the joint venture structure which generated most of the State revenues, instead of higher royalties through which the State had influence in production and investment decisions.

From 1968, similar requirements were formulated for on-shore concessions. In May 1967, the government accepted the Exploration Law (*Wet Opsporing Delfstoffen* – MEZ 1967b) that allowed for an effective coordination of the various companies' drilling activities. The Dutch territory was divided into sections and only one company could be awarded the exploration license for each section. In case of success, a production permit could be requested.

Exploration licenses were allocated by a tender procedure. The first North Sea licenses attracted much interest. For this first round, in August 1967, 20 consortia were bidding for licenses for 109 of a total of 180 blocks. Permits were awarded to 18 of these groups. In the second round, in 1969, 15 companies requested permits for 36 new blocks. The activities on the Dutch sector of the North Sea Continental Shelf and the mainland were relatively successful, but no second Groningen was found. A number of medium-sized and many smaller fields entered into production. In most cases the State participated in the joint ventures, for only five concessions was participation declined. Most of the newly produced gas was sold to Gasunie, and in only a few cases were direct supply contracts with foreign customers concluded. For ex-



The Schlumberger-methode was used to measure the electric resistance of geological layers, to correlate regional information on different drilling sites.

ample, the production of BP Bergen and Gaz de France is transported to Germany without commercial involvement of Gasunie, and the production of the TotalFinaElf Leeuwarden concession is transported (by Gasunie) to France.

KOENRAAD WEBER

Production Geologist

The Netherlands has a Unique Potential for More Gas Storage

Gas production from small fields in the Netherlands will diminish in about ten years. If a new moratorium on production of Waddengas is introduced, as the current Dutch government (November 2002) wants, and no new fields with significant reserves are found elsewhere, the small field policy will lose importance. Production of small fields will be thus reduced to 30% of the present level.

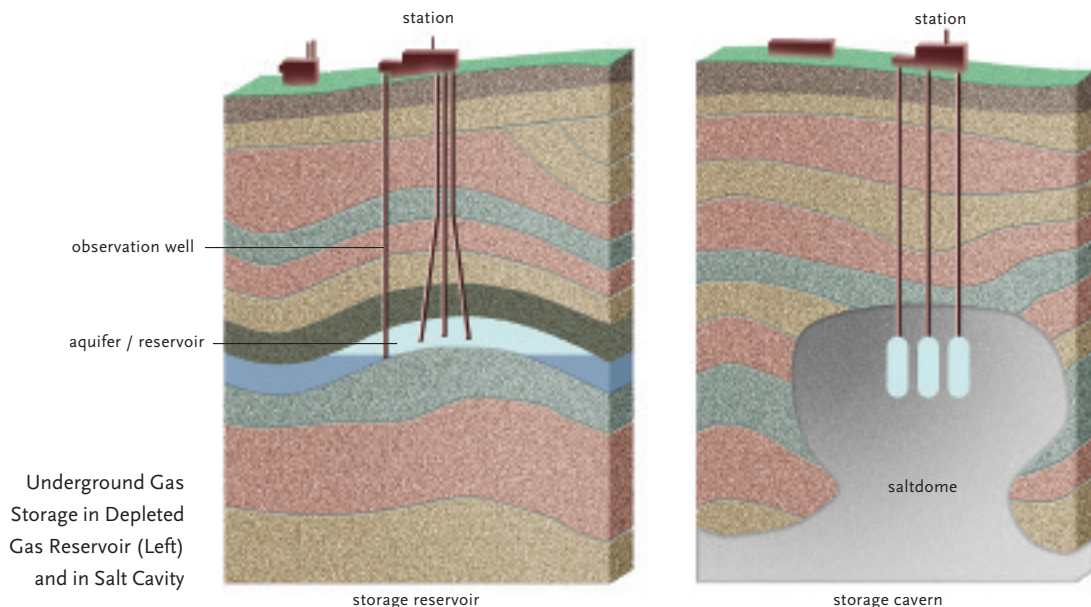
This estimate comes from Professor Emeritus Koen Weber (68), “the company’s guru on production geology” as his former employer Shell named him in a recent article. Weber joined Shell in 1960 as a young mining engineer from Delft University of Technology. In 1985, still very active for Shell, he was appointed part-time professor in Production Geology at Delft. Under his responsibility 75 young people finished their academic degree with a final research project in production geology. In 1993 Weber retired from Shell, but he continued at Delft until 1999.

“It was a very hard and tiresome combination, that period until 1993,” says Weber in his spacious and tastefully furnished apartment in The Hague. “I was head of the consultants in production and reservoir geology at Shell and was travelling all over the world. On top of that I lectured one day a week in Delft. In practise it meant that I also worked every weekend. On the other hand it was probably the most interesting time in my life.”

After 1993, Weber could devote more time to Delft. This allowed him to start a number of research projects together with colleagues, PhD and post-graduate students.

Koen Weber became a highly appreciated expert in reservoir geology. In July 2002 he received an Honorary Doctorate from Heriot-Watt University in Edinburgh. And, Shell noted, “He made many fundamental contributions to reservoir geology as a science and he is recognised world-wide for his key contributions.”

In the Netherlands, Weber’s advice is often sought by gas and oil producers on decisions of whether or not to invest in certain fields. His recipe for the gas policy of the Netherlands is, “Look very closely at the economics of gas production. Small field production is wonderful as long as there are significant reserves, not too far from a pipeline or a production platform where the gas can be treated. Of course, the importance of your employees and maintaining technical expertise, especially



for off-shore, also plays a role in these decisions. In some cases, even fields with reserves of 1 to 1.5 billion cubic metres of gas can be viable. But the costs of exploration, production and handling are relatively high. You have to separate flows of water from the gas, and then push the gas to a production platform with additives that prevent the formation of hydrates. These small reserves do not add much to the Dutch total. I think in many cases that importing Siberian gas is much cheaper.”

“If you want to maintain a significant contribution from the small fields, for instance 30% of the total domestic demand which is now around 40 bcm per year, then you have to bring a number of these small fields into production every year. I don’t think that will be successful for a much longer period if Waddengas cannot be produced, because too few new reserves are now found, and the new fields that are found generally tend to be smaller and smaller.”

“One has to look very careful at the costs. Exploring and developing very small off-shore gas fields is an expensive business, which is only feasible when nearby facilities of a larger field and a pipeline are available. Apart from the pipeline you also need a seismic survey, modern processing and analysis of the seismic data, then a rig to drill at least one well. Thereafter an appraisal well needs to be drilled, which may possibly be used for production. My conclusion is that importing Siberian gas in the summer must be cheaper. As long as the import and the trade in this gas delivers us a positive effect on our balance of payments, just like we have always done with oil and oil products, I see no objection to imports of more gas.”

“The Netherlands has a unique potential for much more underground storage of gas, which in the long run could be very lucrative”, says Koen Weber. “About ten more gas fields, all on-shore, are very suitable for storage because they have no water drive, they are well-located and have a high permeability in the layers of Rotliegen-

des sandstone. No country has such favourable natural conditions for storage.”

Weber thinks that “in ten years time it will be necessary for the Netherlands to import much more gas anyway (say 20 bcm more per year) in order to keep up the 50% share of gas in national energy consumption, and to enhance gas trading. Extra storage capacity would help to maintain and even raise our level of gas exports. A storage field like Langelo has an attractive working volume of 4 bcm and can hold a total volume of 22 bcm. There we have the possibility of producing at a peak of 60 million cubic metres per day, at which level production can be maintained for two months.”

Weber points out that Siberian gas, especially when bought during the summertime, is most attractive to import and store here. Russian suppliers would be glad to sell and transport more gas to the Netherlands during the summertime, when the pipeline and field production capacities are otherwise under utilised. Thus, a relatively low price could be negotiated. During the wintertime, gas could be sold at a much higher price. “In this respect I want to caution against a too strong influence of the European Union on our system. We must of course be free to buy low priced gas and free to trade it, in order to earn back the necessary investments in underground storage.”

Koen Weber’s view on natural gas is motivated, he says, by “a positive future perspective of a cleaner world. Gas is the cleanest of all fossil fuels, and an especially important fuel, because our oil companies and the chemical industry can make clean fuels out of methane. This process, pioneered by Shell in Serawak (Malaysia), produces light products out of methane. In addition to the absence of pollutants like sulphur, another advantage is the more homogenous nature of the gasoline and kerosene, which allows for a more efficient combustion in engines.”

“An aeroplane using this type of kerosene will not show the well known stripes in the air. The engines of planes and cars will have a much better and cleaner combustion process: CO, NO_x and SO₂ will no longer be emitted from exhaust systems, just pure CO₂ and water. With gas we can also produce methanol and hydrogen to feed fuel cells. Making hydrogen with gas is cheaper than making it from water.”

“If you consider these possibilities for future use of natural gas for a cleaner environment, it really is the fuel of transition. These techniques are much more prosperous and realistic for our energy supply than the share that windmills and biomass could deliver. That is why I cannot understand the opposition of the Greens against producing gas from important fields under the Waddenzee. New techniques now available to gas companies can prevent any damage to nature and fauna. All studies that have been done point out that gas production will not have any effect on the Waddenzee. No measurable subsidence of the bottom will appear at all. One should be realistic. The Waddenzee at present is an artificial sedimentary basin with very dynamic movements of water and sand, where, thanks to enormous yearly supplements of sand along the coast of the islands, the present situation is stabilised. Any local subsidence that would result from the depletion of gas

fields can be compensated by additional supplements of sand over the volume that is already supplied. The natural currents will distribute the sand and thus no local lower areas will occur.”

2.4 Epilogue: Institutions and Economics

The preceding paragraphs have illustrated how the discovery of large gas reserves in Groningen inspired a radical adjustment and expansion of the pre-existing gas regime, to facilitate the exploitation of Groningen and further exploration of the Dutch mainland and Dutch sector of the Continental Shelf. Most fascinating is the way in which the development of this new regime was influenced by a number of essential elements. First, the giant size of the gas field provided such a resource base that it allowed for a significant and long-lasting impact of gas in energy supply in north-west Europe. This facilitated and justified investment in the necessary construction and conversion of infrastructure and equipment. Of course, a second factor was of great help here, namely the rapid expansion and industrialisation of the European economies. Thus, economic development engendered a general increase in personal income and well-being, and a widespread sense of dynamism and modernisation. A third element was the world-wide shift from coal to oil, following the discovery of low cost oil reserves in the Middle East while the costs of coal mining (especially labour costs) were steadily increasing. In particular, the fact that two of the world's largest oil companies, with a commanding position in the development of Europe's energy and oil markets, were involved in the discovery of the Groningen field, allowed for a deliberate orchestration of the several institutional and economic determinants of the transition to gas in the several regional fuel markets – beginning with the Netherlands. A fourth factor of importance in this transition was the shape of the process of policy-making at the time, including ideas about the role of the State in the economy and the way in which the several stakeholders' interests were represented (or not). Indeed, the main players – the State and the two oil companies – were well-positioned to rapidly develop and implement a comprehensive transitional approach. In the context of dynamic economic growth and modernisation of society, most other stakeholders were either compensated or given a place in the emerging gas system. Citizens were primarily seen as potential consumers, wishing to enhance their well-being and comfort and responding rationally to economic stimuli such as fuel prices and purchasing costs for equipment. Indeed, environmental and other protest movements had not (yet) emerged. The next chapter will explain how markets were constructed, what marketing strategies were used, and how the gas was made available to society.



WAVIN employees transporting PVC pipe to the Hardenberg railway station, on the 26th of August 1960.



Chapter 3
The Market for Gas

3.1 Implementing the New System

After the concessionary arrangements and marketing strategy had been agreed upon, in 1962, the actual introduction of natural gas to the Dutch energy system could commence. To do so required new infrastructure. A system of high-pressure pipelines had to be constructed to transport the gas from the Slochteren field (stretching underneath a large part of the province of Groningen) to the municipal distribution companies' grids and other large users. The local distribution companies would have to extend their networks, so that all potential domestic and business households could be connected to the system. Because fuels, such as coal, city gas and heating oil were to be substituted by natural gas, cooking, hot water and heating appliances had to be adjusted to the caloric value and the higher pressure of natural gas. Additionally, consumers had to be convinced of the conveniences of gas and of its economic value, while arrangements had to be implemented to re-structure the coal sector and the local city gas systems.

Figure 3.1 illustrates the complex puzzle confronting the gas industry (in this case Shell in 1969), when developing new markets. The main variables in this system are supply capacity and the development of demand for gas over time in the main market segments. The latter requires relatively stable demand for a) domestic cooking and water heating, and b) process heat in the industrial sector. The second segment is demand for space heating by households, the commercial and public sectors, and industry with a strong seasonal variability. The third segment involves short-term sales and longer-term contracts with interruptible industrial consumers and the power generation sector, which have facilities for fuel switching or can make adjustments in the timing of their production processes.

In a growing market, a key challenge over time is to maximise capacity utilisation of the system, as well as revenue, to cover high fixed costs, including an acceptable level of profit. The main instrument to achieve these goals is a supply portfolio that dynamically balances the sales to these several (sub) markets, as a function of the relative prices that these markets will bear and the capacity available in the system. An impediment to this is that the sale of gas for domestic and other space heating purposes is subject to an enormous seasonal load variance. Additionally, the dynamic market for interruptible supplies must also be served. Such variety in demand requires adequately-sized storage facilities. As is illustrated, a cyclical pattern develops over time. Continued growth in the stable, highly priced, market for domestic households' hot water supply and cooking is normally

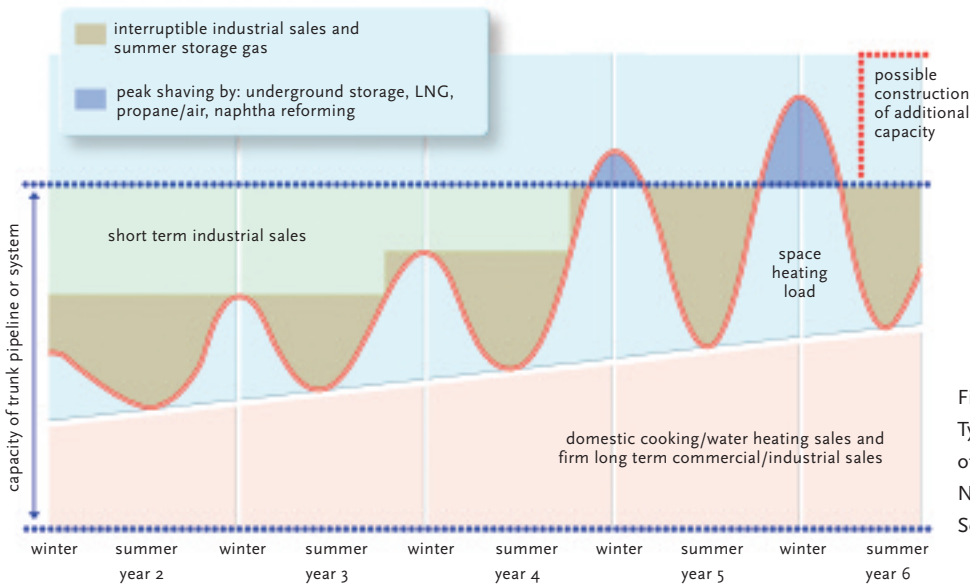


Figure 3.1
 Typical Development
 of a Market for
 Natural Gas
 Source: Shell 1968b

associated with increasing sales in the space-heating segment. Initially, the short-term and interruptible sales to industry were used to fill-up the capacity in the summer. Gradually, when the capacity limits are approached, the need and/or possibility to fill-up off-peak demand diminishes and problems begin to emerge with satisfying peak-demand in wintertime without resorting to expensive seasonal gas storage. If possible, given the resource base, this is the moment to expand capacity. Thus, the cycle starts over again.

This cyclical pattern is very significant for gas marketing in systems where, normally, a constant, close-to-supply, or wellhead, capacity production of gas is required for geological and techno/economic reasons. It is also significant for the planning of transmission capacity, distribution and storage systems, used to transport the gas from the wellhead to the areas of consumption and to individual consumers. The cyclical pattern imposes very stringent coordination of marketing and planning, and investment in production and transport capacity.

Crucial to the development of the Dutch system – and different from standard conditions – was the ability to produce flexible load curves from the Groningen field, because of its geological structure, and also because of large investments in wellhead production capacity of about 100 bcm annually. This capacity was sufficient to supply the required daily peak demand for the whole of the north-west European gas system in the early 1970s. Indeed, whereas elsewhere the required supply flexibility had required the construction of expensive storage facilities or lower priced short-term sales, in Groningen the field itself was able to produce the required variation. This rendered the process of load balancing, through supply portfolio management and variation in tariff structures much easier than had been the case elsewhere in the world. Thus, in addition to the field's gigantic size, an enor-

mous potential for additional supply was provided in terms of its production volume, the structure of the customer base, and the geographical distribution of consumption.

The high-pressure network

In 1963, the first steps were taken towards the construction of the high-pressure network to connect the municipal gas utilities with Groningen. Because of the lack of expertise in the Netherlands, the US company Bechtel was contracted. With much experience in pipeline construction in the Middle East and the US, Bechtel hired Dutch construction companies as sub-contractors. The actual design and construction of the system was fairly complicated. The system had to be designed to take into account different aspects such as agricultural sector interests, plans for the expansion of cities, road construction, water systems, railroads, archaeological sites, and military installations. For all landowners and other implicated parties, arrangements had to be made regarding compensation during the construction of the pipelines and for the use of the land thereafter. A wide range of public services and organisations were involved. Despite the large scale of the undertaking and the many difficulties, the network was constructed, as is shown in Figure 3.2a and b, in a very short period of time.

By December 1963, the first gas was produced at Groningen and precisely one year later the DSM plant near Geleen, in the far south was supplied with natural gas. By then, nearly 1,600 kilometres of high-pressure pipes had been built, while the total length of the local networks had doubled to more than 5,000 kilometres. In 1966, the system reached the western end of the country, in Zeeuws-Vlaanderen, and a pipeline crossed the IJsselmeer to North Holland. In 1968, Wijk aan Zee – an enclave on the terrain of the Hoogovens Steelplant – was the last municipality in the country to be connected. In 1973 the length of the central network reached 3,000 kilometres and the regional systems added up to more than 6,000 kilometres.

Local distribution

In parallel with the extension of the gas transmission system to the various parts of the country, municipalities had to prepare local distribution networks for receiving and further transporting natural gas to the consumers. Often municipalities had to negotiate with each other and with Gasunie about the most appropriate way of connecting to the main grid. This sometimes stimulated mergers among local gas distributors or the establishment of joint ventures. The utilities attempted to connect as many households as possible, which was also encouraged by premiums offered by Gasunie. In general, the grids were constructed in such a way that revenues could be maximised. The most densely populated areas were connected first, followed by rural areas – often in combination with lines to nearby industrial



Figure 3.2a Development of Gasunie High Pressure Transmission System 1965
 Source: Gasunie, *Annual Reports*, 1965



Figure 3.2b Development of Gasunie High Pressure Transmission System 1968

Source: Gasunie, *Annual Reports*, 1968

users. Revenues on sales to connected households in dense areas could thus be used to finance further rural expansion. Never had the municipal utilities been able to connect so many users to city gas in such a profitable way. In addition, comfortable arrangements were struck with the municipalities regarding the removal of their city gas manufacturing plants – leaving a heritage of heavily polluted soil, still to be solved.

To coordinate the connecting of Dutch consumers by the municipal gas utilities to the Groningen system, the Commission Co-operation Regional Bodies Gas supply (SROG) was established. The SROG maintained contact between the utilities and negotiated on their behalf with Gasunie about prices, connections of local systems to the high-pressure system, and adjustments to the local networks.

Natural gas in the Dutch energy market

Before natural gas was introduced into the Dutch energy economy, coal and oil were the primary sources of energy (see Figure 3.3). Traditional fuels were not replaced by natural gas for all applications. Because of technical reasons, including convenience in storage and handling, and engine design, oil products maintained their role in transport: petrol, diesel or LPG for automotive uses; diesel and fuel oil for shipping; and kerosene for aviation. For other kinds of consumption, fuel preferences were less strong. Industrial boilers or power plants, for example, can be fired with gas, coal or oil and fuel switching is possible. Price is an important factor here. Moreover, before investments are made in pipes, burners and other facilities,

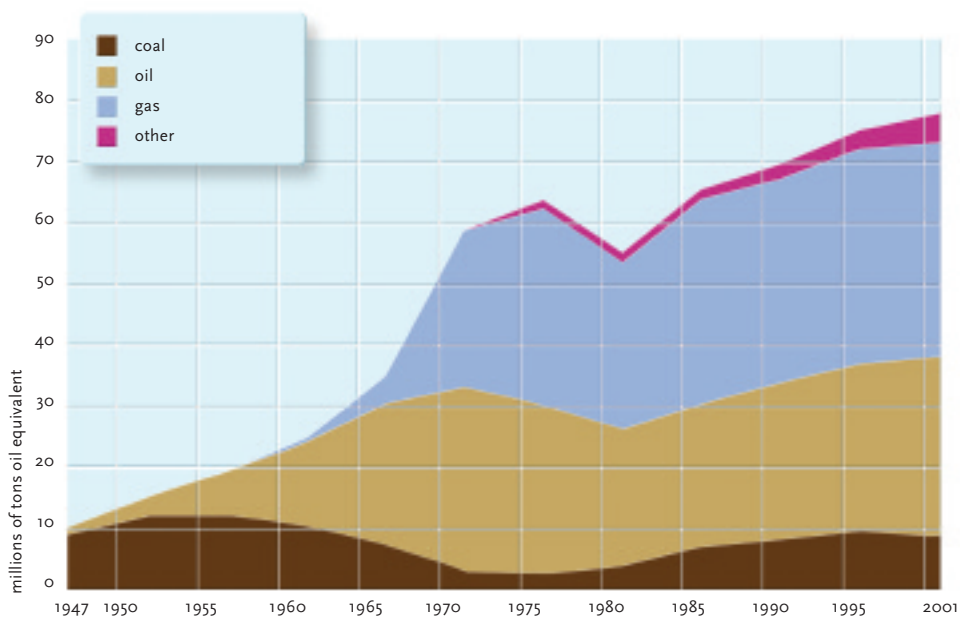


Figure 3.3
Consumption of
Primary Energy,
by Type of Fuel
Source: CBS
Statline 2002.

users want to be certain that gas will remain the preferred fuel over a longer period.

It is often said that natural gas took over from coal. Indeed, in 1963, the then Minister of Economic Affairs, den Uyl, announced the closure of the Dutch mines in Limburg, partly due to declining demand for coal. The coal sector labour force was rapidly reduced from 50,000 in 1963 to only half of that size by 1968. The last mine was closed in the early 1970s. These closures, however, were only partly a consequence of the increase in natural gas consumption. Coal was confronted with competition from increasingly cheap oil products from the late 1950s onwards. Before 1945, the importance of coal had already started to decline and between 1953 and 1963 the share of coal fell from 80% of total energy consumption to less than 50%. The share of oil products expanded from less than 20% to more than 50%. This shift was caused by the fact that oil products satisfied a large portion of the growth in energy use over this period, while the absolute consumption of coal remained stable.

In addition to this relative decline, the Dutch coal industry was also threatened by cheap imported coal from the US. American coal was produced using open cast mining, allowing for a strong degree of mechanisation, while the competitive position of the Dutch mines was weak due to difficult geology and high labour intensity. It was also becoming increasingly difficult to attract miners at reasonable wages in the flourishing Dutch economy, where other, more convenient, less dangerous and dirty, jobs were widely available. Basically, the Dutch mines had survived until the early 1960s on the basis of the profitable sales of coal for domestic house heating. Because it was precisely this market segment that was threatened by natural gas, the Dutch government opted for mine closures to avoid growing losses and the need for subsidisation. Due to the rapidly growing economy, former miners were expected to find jobs elsewhere in industry and the service sector without great difficulty. The State revenues from natural gas exploitation were partly spent on regional economic policy instruments and on the conversion of DSM (the largest mining company) to chemical production on the basis of gas.

3.2 Marketing Strategies

Domestic use

From 1945, the use of coal for home heating had increased only very slowly, as compared with the use of heating oil. Yet, by the early 1960s, coal supplied around 55% of total domestic energy use for home heating. Hence, a large potential market existed for natural gas as a substitute for coal. A large campaign was organised to convince domestic customers of the advantages of converting to natural gas. Information meetings were organised, leaflets distributed, and the media extensively covered the pending changes. To familiarise the public with the new gas, the convenience of natural gas in home heating were illustrated: gas made the dirty stor-



Dutch coal mine Oranje-Nassau 1
in Heerlen, in the Province of Limburg.

age of coal in the garden, the cellar or on the balconies redundant; it ended moving around coal containers and ashes; and starting up the gas system on a cold winter morning was much quicker than lighting up the coal stove with wood and newspapers. Easily controllable gas systems and central heating actually enlarged the effective space in houses by enabling the use of more rooms than only the central living room in the colder six months of the year. It also allowed quick heating adjustments in the late spring or the early autumn, when evenings could be chilly. All impossible with a coal stove!

The replacement of coal stoves, mostly placed in the living room, by gas-fired stoves or central heating systems, thus, was a leap forward in terms of comfort and convenience. Oil-fired heating systems, also normally restricted to the living room, were mostly of a more recent date. These could be replaced too, of course, but the overall progress was less significant than for the installation of a central heating system in the whole of the house, particularly, because gas-fired boilers could be placed in the attic, unlike oil-fired boilers. For cooking and hot water supply, natural gas radically replaced city gas, kerosene, and wood in rural areas. Again publicity campaigns and even courses for cooking on natural gas were used to familiarise housewives with the new phenomenon. Users were encouraged to exchange their old heating equipment, stoves and water heaters – at significant rebates – for new natural gas equipment, including central heating systems.

To further facilitate the introduction, it was necessary to sell gas to domestic consumers at an attractive price compared with prices for traditionally used fuels. Production costs at the Groningen field were very modest, less than 1 Dfl cent per cubic metre, but the gas was sold at a much higher price than expected by some. In accordance with the market-value principle, gas was sold at a price just below that of heating oil, anthracite and coke. Rather than price, the convenience of gas had to encourage its use. The utilities were supplied with gas at a price of 6 to 6.5 Dfl cents per cubic metre. The municipalities were forced to apply regressive tariffs – the more the consumption, the lower the price per cubic metre. For small-scale users, the first 300 cubic metres were sold at 25 Dfl cents per cubic metre, the next 300 cubic metres were sold at 20 Dfl cents and additional gas would be sold at 10 Dfl cents per cubic metre. Thus users did not reap a large advantage if they used the gas only for cooking and hot water supply. When also used for heating – particularly central heating – the advantage, however, increased substantially.

After the local grids had been constructed or adjusted, all hot water appliances, stoves, heating systems and metres had to be refit to accommodate natural gas. To this end a large-scale operation was undertaken and planned with almost military precision. When natural gas reached the *city gate*, all gas appliances were refit within a few days with new burners or replaced if they were too old. A large number of the recently closed city gas works staff were trained as gas fitters.

The policy was very successful as is shown in Figures 3.4 and 3.6 (p. 62-63). Gradually natural gas reached the Dutch domestic households in even the furthest

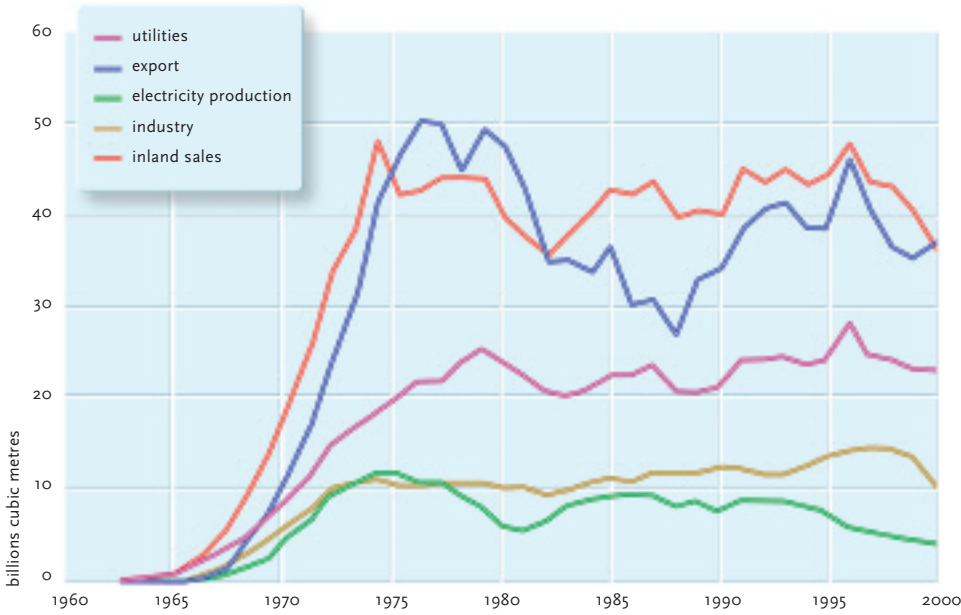


Figure 3.4
Natural Gas Sales to Main Categories of Users
Source: Gasunie, *Annual Reports*, 1965 and 1968

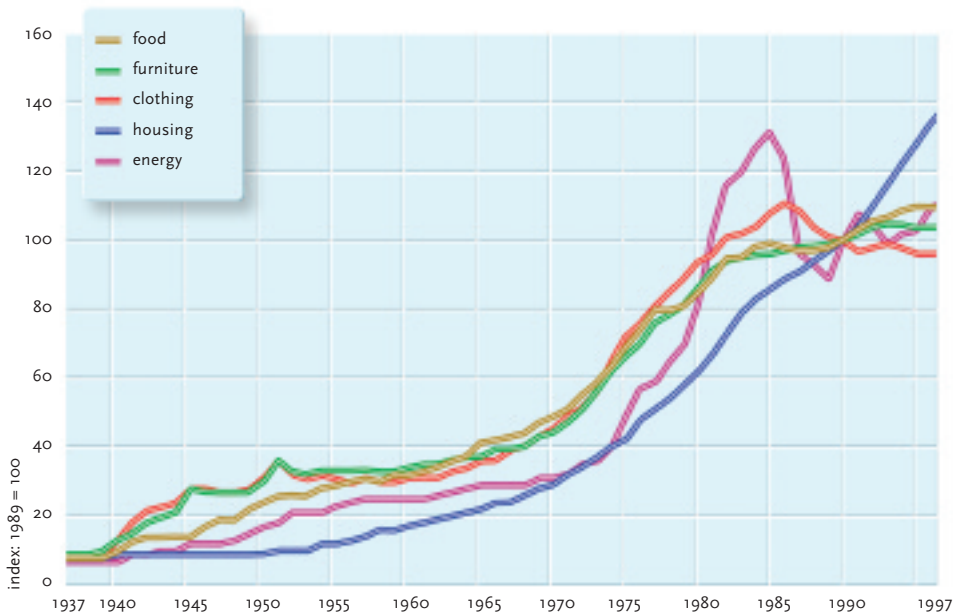


Figure 3.5
Energy Costs, Relative to Food, Furniture, Clothing and Housing Costs
Source: CBS Statline 2002

corners of the country. In 1969 about 80% of all Dutch houses were connected to the grid and 60% were heated with gas. The use of heating oil increased slightly after 1962, but all newly purchased heating installations were gas-fired from then onwards. A crucial factor in this regard was that during the 1960s a large part of the population realised significant increases in income. The cost of energy to households declined, relative to other expenses (see Figure 3.5). This brought the

Figure 3.6a
Industrial Energy
Consumption,
by Type of Fuel
Source:
IEA 2002b

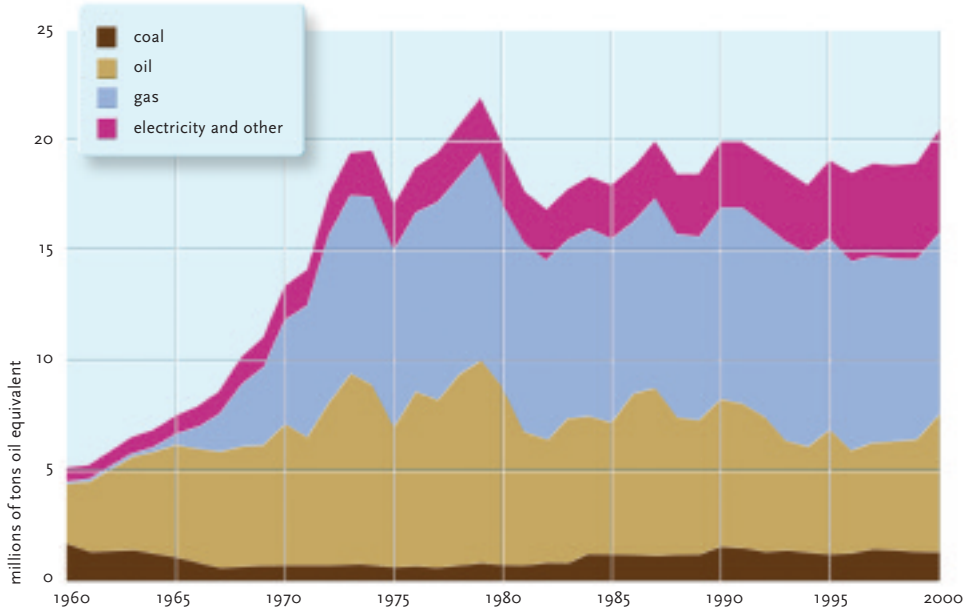
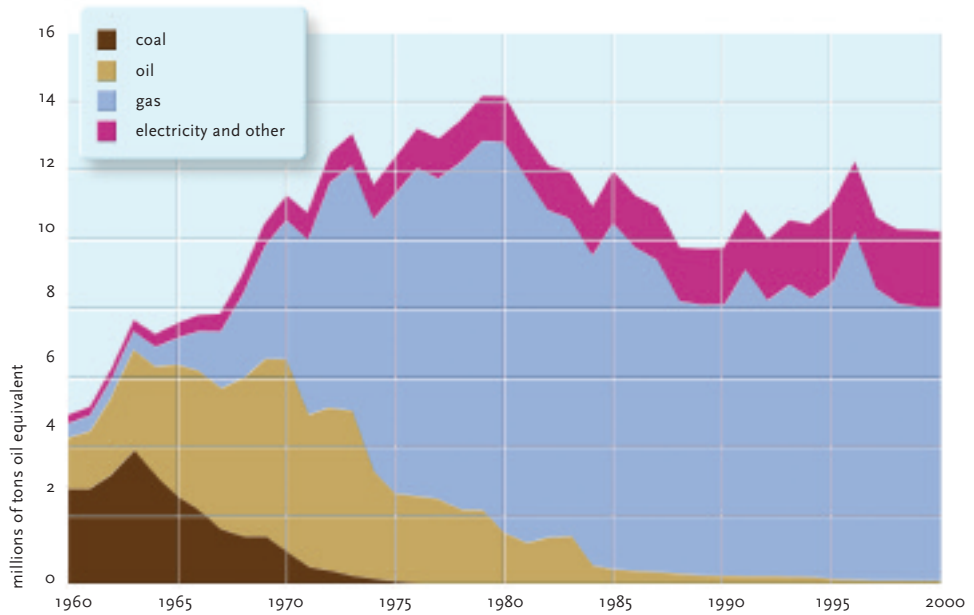


Figure 3.6b
Residential
Energy
Consumption,
by Type of Fuel
Source: IEA
2002b



comfort and conveniences of central heating within reach of a continuously expanding portion of the population. This was reinforced by the State-sponsored construction of an enormous amount of new single-family houses and apartments – mostly with gas-fired, often central – heating systems. Both housing corporations, as well as private house owners were actively approached to convince them of the advantages of gas-fired equipment.

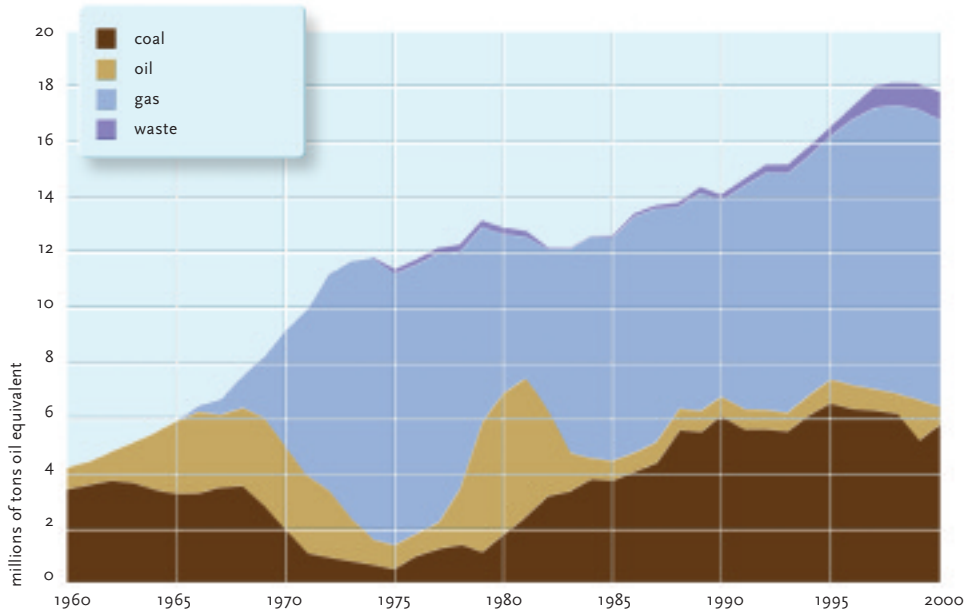


Figure 3.6c
Electricity
Generation Energy
Consumption,
by Type of Fuel
Source: IEA 2002b

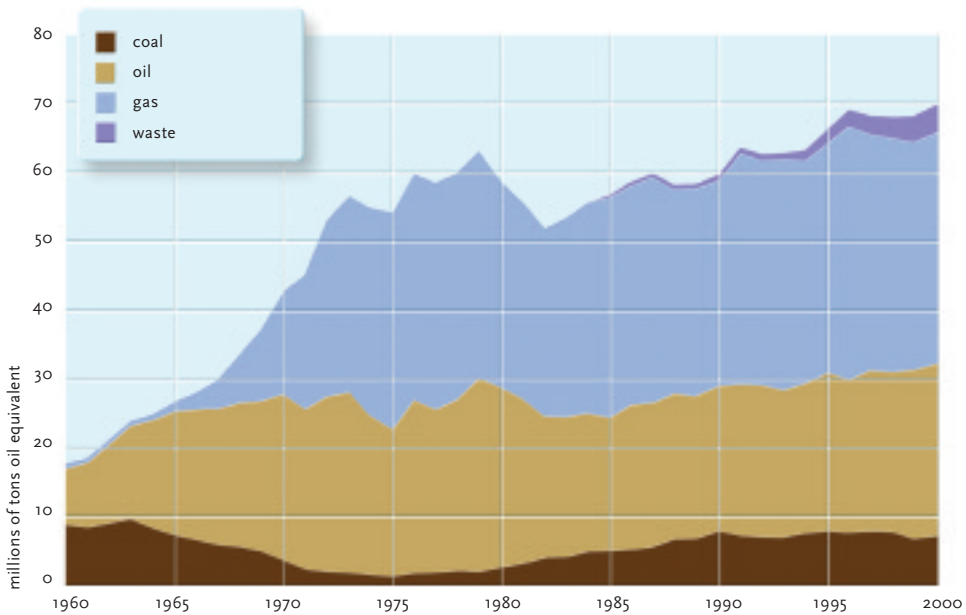


Figure 3.6d
Total End-use Energy
Consumption,
by Type of Fuel
Source: IEA 2002b

Industry

For industry, the share of oil in energy supply had increased much faster than in the domestic household segment, from 21% in 1953 to nearly 72% in 1963, again at the expense of coal. For industry, the advantages of gas proved to be large. Voluminous and expensive coal handling and storage facilities were no longer neces-

sary, while dirty ash and dust became something of the past. Moreover, gas-fired equipment could be controlled much easier and, thus, was more efficient in energy use and cost, while it also required fewer staff. Other advantages were that the supply was relatively independent from water and rail transport, and hence, the weather. In the past, frozen canals and lakes often had impeded the supply of coal and oil by ship in wintertime. Of course, the price was crucial. For industrial clients, the price of gas was calculated on the basis of the prices for fuel and heating oil. Considering the associated conveniences, the advantages of gas were considerable.

As with the domestic sector, gas was accepted very quickly in industry. Very large consumers were supplied directly by Gasunie. The smaller ones purchased their gas from the local distribution companies. In 1969, 65% of the larger firms had converted (partly) to natural gas. The use of oil did not decline, because natural gas particularly supplied the additional volumes of energy required by the overall growth of industry and industrial energy consumption. A main reason for this was that during the 1950s many firms already had converted from coal to fuel oil. The relatively new oil-fired installations were not converted to gas immediately, since the difference in cost was not that large. New facilities, however, were generally gas-fired and, thus, the growth in industrial gas consumption was associated with the strong expansion of the industry during this period. However, after 1969, industrial oil use gradually became negligible. In addition to being used as fuel, gas was also increasingly used as a raw material in the chemical industry, for example in the production of fertilisers. Thus, natural gas became the main raw material for the chemical production of the DSM in Limburg; the company that was built upon the ashes of the former State coal mines.

Step-by-step, de Pous' *premium market* principle was set aside. Initially, gas was to be sold only to the so-called premium markets in the chemical, metallurgical and ceramic industries, in which it would not have to compete with lower priced fuels. Yet, as is shown in Figure 2.2, there was continuous growth in the estimates of remaining gas reserves. The exclusive orientation towards premium markets became less relevant. Indeed, it was even feared at the time that it would be impossible to sell much more gas after 2000, because it was expected that low cost nuclear energy would by then have taken over much of the energy supply. Eventually, the power sector also started to use gas. Whereas the share of oil had grown from about 4% in 1953 to more than a quarter in 1963 at the expense of coal, now the expansion of the power sector caused a significant growth in the consumption of gas.

A number of sectors and firms were given the right to purchase gas at a special rebate. A special arrangement reserved a volume of 25 bcm of low-priced gas for the government, to be used as an instrument for regional and sectoral economic development policies. Examples were the aluminium factory ALDEL in Delfzijl, Hoechst in Vlissingen, the sea water-distillation facilities in Terneuzen, and chemical and metallurgical industries in the south of the country. Strangely, all of these



Aluminium factory ALDEL in Delfzijl.

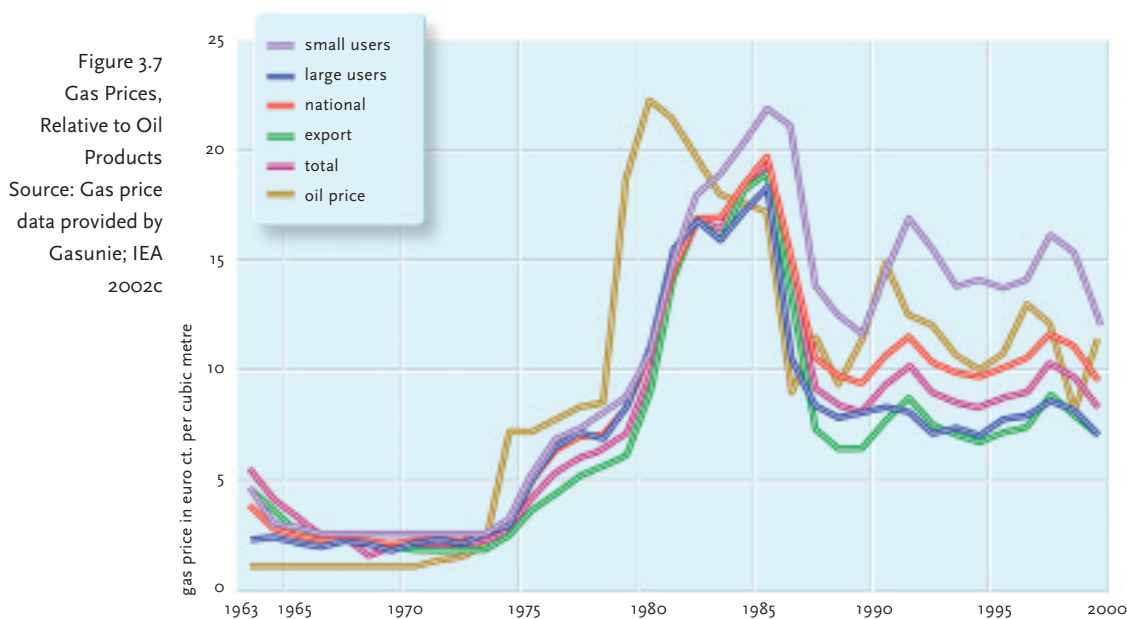
industries were far from labour intensive, so their contribution to the generation of jobs was not impressive. It did, however, stimulate the establishment of a relatively energy intensive, process-based, manufacturing industry in the Netherlands.

Agriculture

Not only the industrial sector reaped the benefits of low priced gas, as is illustrated in Figure 3.7. To further boost the use of natural gas in horticulture and greenhouses, in 1970 a special arrangement also provided these users with low-priced gas. They were offered the much cheaper tariff of that for large-scale consumers. In a strongly coordinated campaign, the sector converted very quickly to gas. By 1972, gas supplied around 50% of the sector's energy requirements. Particularly in western parts of the country the reduction of oil use in greenhouses contributed to a decline in smog. And, of course, the supply of low-cost gas allowed for the large-scale development of an export-oriented, greenhouse-based agricultural sector, in which the traditional ties of agricultural activities with the soil and the climate had been broken. Indeed, numerous varieties of sub-tropical vegetables and plants now were made available throughout the year, from Dutch soil.

The power sector

In 1969 Gasunie's Department of Marketing Research anticipated that by 1975 natural gas would fulfil around 65% of the total energy requirement for the Dutch



power generation sector. The actual figure in 1975 was above 80%. It was also expected that by 1980 the Dutch market would have reached its saturation point for natural gas (Portegies 1969). By then, gas would have taken over in all applications where it was technically and practically feasible. Indeed, gasoline, diesel and kerosene would remain the fuel of choice to the transport segment, while the steel industry would remain dependent on coke. Only on very cold winter days, with an absolute peak demand for gas, would the electricity industry be required to start-up oil-fired power plants, as a consequence of bottlenecks in the gas production capacity and the distribution system. The expansion of gas use in the Netherlands, thus, was much quicker and deeper than had been foreseen.

3.3 Gas Exports

In addition to the growing sales to the national customers, an increasing volume of gas was committed for export (see Figure 3.8). NAM/Gasunie-Export signed export contracts with distribution companies in Germany, Belgium and France and an international network of high-pressure pipelines was constructed to connect the areas of consumption with the Groningen field. In 1964, only 10 million cubic metres were sold to a German utility, just across the border in Oldenburg (Weser-Ems A.G.). Three years later, a hundred times as much gas was exported to other German firms, to Distrigas in Belgium and to Gaz de France. In 1971, contracts were signed with SNAM in Italy, and with Switzerland.

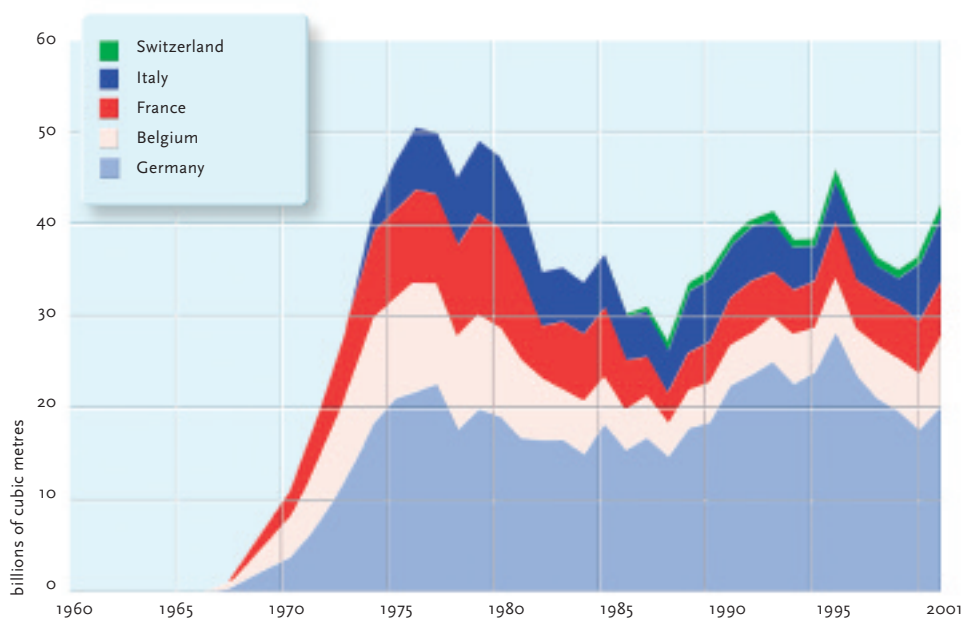


Figure 3.8
Export of Natural Gas
Source: Gasunie,
Annual Reports,
1963-2001

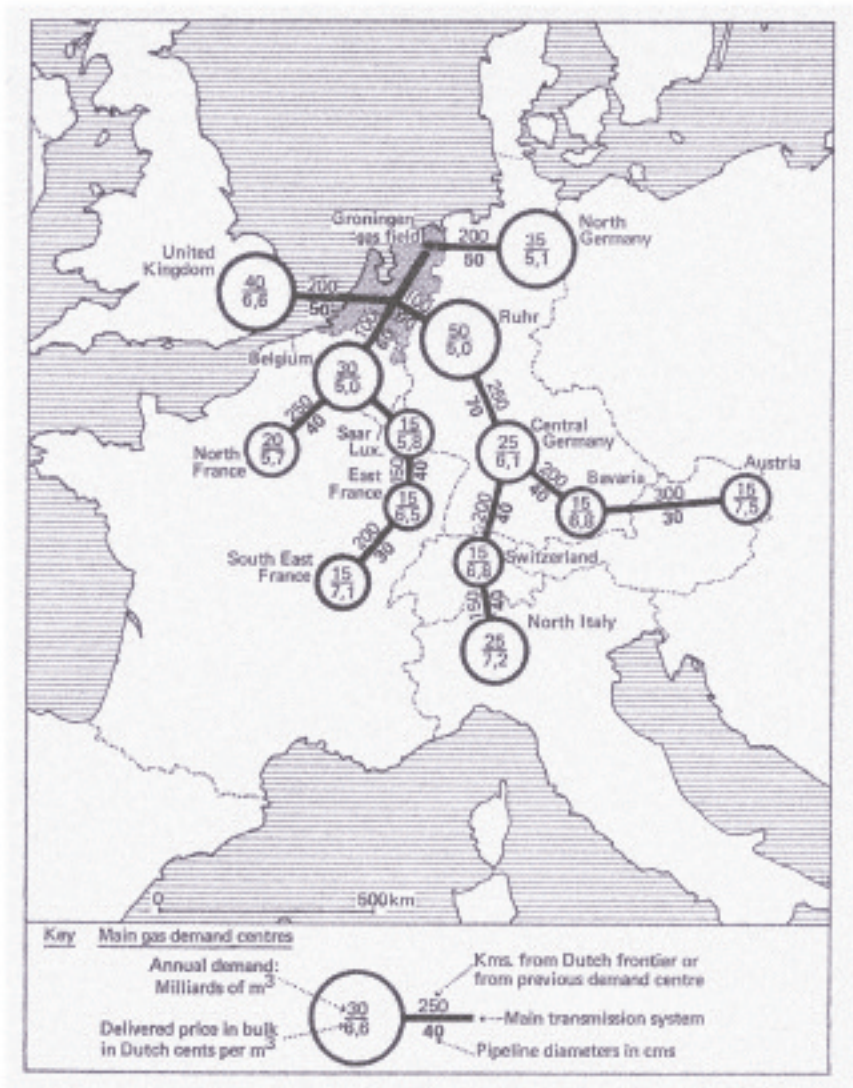
tion, in 1974, the annual amount exported was of the same magnitude as the national consumption, namely 41 bcm.

NAM/Gas-Export arranged the export of the gas, on behalf of and in coordination with Gasunie. As noted in chapter 2, Gasunie was not involved in name in consideration of the *sheikh-effect*. However, the relationship between NAM and Gasunie assured that the export of the gas would be coordinated, taking into account both the production at Groningen and national consumption. In addition, according to the *Nota de Pous*, the Minister of Economic Affairs would: “supervise, in order to secure that the exploitation of the [...] gas fields would yield optimal results for the Dutch economy” (MEZ 1962). The Minister, as provider of export permits, had influence in the choice of the destination of the contracted gas, and had to agree with the supply prices and tariffs, and pipeline construction and pertaining facilities.

The pricing for gas sold abroad was based on the assumption that the market value of the gas at the Dutch border would decline, the further the distance away from Groningen. Indeed, if the gas had to be transported over long distances, transport costs would increase. This involved the high fixed cost of capital-intensive pipeline construction and the variable cost of the energy required to move the gas through the pipelines. To be able to sell gas in far-away markets and to compete with other local fuels, the Dutch border price would have to be lower than the border price for supplies to neighbouring countries. The Gasunie Chief of the Department of Marketing Research, Portegies stated, “The area in which the Dutch natural gas can be sold, while maintaining reasonable revenues, includes western Germany, Belgium and the north of France” (Portegies 1969). Moreover, gas would only be supplied for premium use and not for uses in which it would have to compete with low priced fuel oil and local coal. Initially, as was pointed out above, these principles had also been applied for the coordination of national supplies, but in the late 1960s they had been abandoned (see the map in Figure 3.9).

Until the early 1970s, when there were no other substantial suppliers of gas in Europe, internally traded gas could only be provided by NAM/Gas-Export. This rendered the importers in Germany, Belgium and France fully dependent on Dutch gas supplies. Like in the Netherlands, supplying the new markets abroad, required large investment in the construction of transport grids, measurement and control facilities and the conversion of domestic and industrial appliances. NAM invested in the gas production capacity required at Groningen. Gasunie constructed the pipelines to the Dutch border. The owners of the transmission systems abroad, which involved the main (inter-)national gas producers and national and local distribution companies, invested in the large cross-country pipeline systems. All these parties ran the risk of lagging sales, unused capacity, lagging revenues and potentially the inability to cover their capital and other fixed costs. Thus, on the one hand, there was the consumers’ risk of being dependent on only one supplier, while, on the other, there was suppliers’ exposure to the economic risk of low revenues.

Figure 3.9
Export of Natural Gas
Source: Odell 1969



To provide a substitute for *security of supply* to the consumers, and *security of demand* to the suppliers of the gas and the infrastructure, long-term gas contracts with take-or-pay and destination clauses, and oil-parity as the pricing mechanism became the main vehicle of European gas trade. These contracts shielded the producers and infrastructure operators from the *volume risk*, as the purchasing parties had to pay for the volumes contracted, regardless of their actual off-take. Adequate revenues for the infrastructure operators were established as a function of their costs and the contracted volumes to be transported. The destination clauses assured that gas with a low price at the Dutch border, destined for far away markets such as Italy, could not be used to undercut higher priced gas sales in, for example, the German market. Hence, a localised market-value approach could be main-

tained. The producers assumed the price risk associated with movements in gas prices, aligned with those for oil products. In essence, this system assured that the construction of production and transport capacities was undertaken in strict coordination with the expansion of demand as foreseen by local utilities and large consumers. The practice of ironclad contracts secured – and rewarded – the provision of adequate information regarding the development of sales to specific sectors and local markets. This, of course, facilitated the planning and control of transport and supply systems. Most importantly, it also avoided volumes of non-earmarked gas surfacing on the market and jeopardising the market-value approach based on oil parity. Gas-to-gas competition was effectively excluded.

To secure future gas supply for the domestic market, NAM/Gas-Export and the Dutch government made only a limited amount of gas available for export. Demand in the potential export markets was much larger, but long-term security of supply for Dutch consumers could not be jeopardised as a result of overly ambitious export obligations, it was argued. However, Gasunie acknowledged that foreign consumers and their distribution companies would never convert to natural gas without a guaranteed supply of gas for a considerable period. In order to determine the size of the export contracts, a number of aspects were taken into account.

First, the size of the proven gas reserves mattered, particularly when these were upgraded during the 1960s. In 1965, the reserves were estimated at 1,000 bcm, in 1969 the figure was 1,850 bcm, and in 1973 an estimate of 2,500 bcm followed. The next factor was the estimated gas requirements for the Dutch economy. As illustrated above, it was expected that by 1973 around 70 bcm would be sold annually, of which 38 bcm would be consumed in the Netherlands. Indeed, it was expected that by 1980 national consumption would have reached its peak. Thereafter, national consumption would only grow moderately. The portion of reserves available for export contracts was then calculated by subtracting the requirements for 25-years' national supply from the estimated indigenous reserves. Additionally, it was noted that the production of the Groningen field was limited for geological and technical reasons. The annual maximum production of the field, minus the annual national gas requirements determined the annual amount available for export.

The duration of the contracts was determined on the basis of these calculations. In 1969, Gasunie's Chief of the Department of Market Research, Portegies, explained that: "The amount of Dutch gas available for export – projected on this large potential market – is relatively modest and will, in the context of the supply and demand game, be offered against a price such that unsaturated demand and a too rapid depletion of the reserves will be avoided" (Portegies 1969). Moreover, the authorities of importing countries also limited the markets for Dutch gas, because they wanted to avoid gas driving out other fuels, such as indigenous coal, fuel oil from domestic refineries, or nuclear energy, from their markets. Actual exports, indeed, were a function of both the national strategic market considerations in the importing countries and Dutch export policy.

This export strategy, motivated by *security of supply*, provided instruments to confine gas sales to those groups of consumers for whom natural gas indeed represented a technical and economic premium value and thus, who were prepared to pay the relatively high border price plus transport costs of the gas. Generally, contracts were agreed at fixed border prices of 4 to 4.25 Dfl cents per cubic metre. Portegies stated that additional volumes would become available for export should NAM discover new sizeable gas fields in Dutch soil, for which no national markets were available. In the event of new reserves, export markets further away could be penetrated and nearby lower value markets could be approached with lower export prices. The growing estimates of the Groningen reserves enabled NAM/Gas-Export to conclude more export contracts during the 1960s (see Figure 3.9). Indeed, as was already argued at an earlier stage by Odell (1969), the initial policy had been too cautious.

Dutch gas exports played an important role in maintaining and developing the use of gas in Europe. Without Dutch gas, the role of city gas in a number of regions would have been taken over by oil products and methane gas in bottles and containers. The traditional coal-based gas industry would never have been able to withstand the supply of low-priced alternatives. Moreover, the Dutch gas exports and the construction of the associated infrastructure created completely new regional and sectoral markets for gas. Most important, though, was the construction of a coordinated European gas infrastructure.

At the same time, however, the lucrative Dutch gas exports stimulated activity by other potential suppliers of natural gas. In the North Sea, producers became active in the UK, German, Danish, and Norwegian waters. Countries such as the Soviet Union, and North African countries like Algeria became other main contenders for the Dutch position. Thus, the Netherlands' export was undermined by its own success and, particularly in the 1970s when oil prices rose, these suppliers became increasingly important in the European gas market. Indeed, the linkage of gas prices to those of oil, now provided an enormous boost to exploration and exploitation and justified a further expansion of the trans-European gas network (see Odell 1973a, b).

PETER ODELL

Professor Emeritus of International Energy Studies, Erasmus University Rotterdam

European Gas: In Retrospect

Professor Peter Odell, the well-known and respected European energy expert, is seventy-two now, but still going strong. The flow of his – some times controversial – papers and recommendations continues. Between 1969 and 1991, Odell was a

professor at the Erasmus University in Rotterdam where he directed the Centre for International Energy Studies. After returning to live in England, Odell continued to teach courses on the international political economy of energy at the London School of Economics until recently. “At my age it became just a bit too much of a burden, so I stopped. But I still remain active in the energy field. This year I advised a special commission in the House of Commons. And I just finished an update of my recommendations on energy policy for a Department of Energy policy review to be published this year.”

The current ideologically-based European Union policy of gas liberalisation is well-nigh invariably presented in a highly favourable light, especially as a means of securing lower prices for final consumers through effective competition between suppliers. Odell, however, points to the serious problems for, and great potential dangers to, Europe’s welfare. In this respect, he stresses the need to develop awareness of the mistakes of the 1970s and 1980s, rather than simply knowing something of interesting elements in the history of European gas. Such a background is an essential component for evaluation of the EU’s ability to act wisely in respect of its Gas Directives.

The significance of Groningen lay not only in its own gas-supply abilities, but also in its demonstrated effects, both geological and political-economic. It quickly stimulated the search for additional gas reserves in the south North Sea geological province. As with Russian and Algerian gas later, these supplies were incorporated into the pre-ordered system within the framework of which overall supplies and use increased by almost 60% over the short period from 1971 to 1976. The ordered Groningen system essentially remained in place, though on a much larger scale and over a wider area, through a complex set of inter-relationships between a handful of suppliers and transmission companies.

Coincidentally, the initiation and expansion of the natural gas industry in Europe took place during the same period that witnessed a rising concern for adequate energy resources to sustain global and regional economic growth. Although claims of energy scarcity were largely specious, they were used by many of the entities involved in Europe’s emerging gas industry as a justification for high prices and limitations on the rate of expansion. These entities were thus not motivated to challenge the perceptions of scarcity propagated by ill-informed institutions that lacked any understanding of the dynamics of gas exploitation. Prospects for development were generally pessimistic in terms of how few years remained of potential supply in the context of reserves already proven, rather than in the more accurate context of proven reserves such as the “shelf-stock” of the industry which are replenished when required by further exploration and exploitation investments. The institutionalisation of this error was most noteworthy and significant in the case of Gasunie’s use of a 25-year proven reserves requirement as the up-side limitation on its willingness to market gas.

Needless to say, other vested interests – notably those seeking to protect coal

and nuclear power against natural gas – used these arguments to secure State subsidies and other advantages to maintain or expand their market shares in many European countries' energy sectors. More generally, in terms of energy policy decisions, formal restraints on gas supply were imposed by governments of the three important gas producing countries in Europe – the Netherlands, the UK and Norway. Additionally, the European Commission issued a Directive in 1978 (no.75/404/EEC) formally prohibiting the use of gas in so-called non-premium markets and especially for power generation. This remained in force for over 20 years during which time the EC's Energy Directorate failed to recognise the scale and scope of natural gas' potential contribution to Europe's energy supply in the long-term.

The consequence of these perceptions and policies was near-stagnation in Western Europe's indigenous gas production. It grew from $164 \text{ m}^3 \times 10^9$ in 1976 (at ten times the level of 1961) to only $198 \text{ m}^3 \times 10^9$ by 1991, a mere 19% increase over 15 years! Gas use was also constrained, albeit less dramatically in the context of the exporters to Western Europe, viz. the Soviet Union and Algeria, who achieved considerable market growth (from 11.6% in 1976 to 36.3% in 1991) at the expense of indigenous suppliers. Overall, the increase in the share of gas in the total energy market from 1976 to 1991 was a mere 1.8% (from 13.4 to 15.2%).

By the late 1980s the pessimistic view of gas had become so imbued that official forecasts for the industry's prospects indicated a near-future cessation of its growth overall and a decline in the indigenous production of gas. The alternative view I took at that time, viz. of a more than 50% growth in use by 2000 and a 30% growth in indigenous output was somewhat contemptuously dismissed as academic speculation. The contrasts between these forecasts are set out in Table 1 and are compared with the actuals.

Table 1 Contrast between the 1989 forecasts for gas in the Western European Energy Economy by 2000: and the actuals for that year (in $\text{m}^3 \times 10^9$)

	Official IEA/EU Forecasts	P.R. Odell's Forecasts	Actuals in 2000
Indigenous Production	155	228	262
Imported Gas	100	143	122
Total Gas Use	255	371	384
% Share of Gas in the Total Energy Economy	17.9%	26.7%	26.3%

In the context of falling international oil prices (to which the border prices of gas throughout most of Europe have been indexed) in the 1990s and of a much enhanced deliverability of gas via an enhanced transmission system between suppliers and markets – so leading to price competition between suppliers – gas use in Western Europe has been much intensified. This supply-side pressure reduced border gas prices by 47% between 1991 and 1999. It was, moreover, accompanied

by closer government examination of, and concern for, the monopolistic behaviour of the continent's small number of transmission companies (reflecting the situation put in place by Shell and Exxon during the period of Groningen gas dominance). Margins earned by these companies and by local distributors have thus been subject to more and more government intervention – thus also leading to real price reductions, in reaction to, or in consideration of, the EU's intensified competition policy in general and to the Gas Directive for liberalised markets, in particular.

Finally, belated recognition of Europe's indigenous gas reserves/resources potential finally emerged. In spite of enhanced depletion of known reservoirs – particularly by the UK where production increased almost two and a half times over the decade –remaining reserves have continued to increase. This process has now gone on for almost 50 years – as shown in Table 2 – and continues even now, in spite of the rapid increase in gas production and use.

Table 2 Evolution of Western Europe's Natural Gas Production and Recoverable Reserves, 1956-2005 (in $m^3 \times 10^9$)

Period	Cumulative Production to Date (by decade)	Period-End Remaining Recoverable Reserves	R/P Ratio (years) at end of Period	Gross Additions to Reserves (by decade)	Indicated Total Original Recoverable Reserves
Pre-1956	50 (35)	500	40	Not known	550
1956-1965	225 (175)	1,900	76	1,575	2,125
1966-1975	1,150 (925)	4,350	27	3,375	5,500
1976-1985	2,700 (1550)	6,500	36	3,700	9,200
1986-1995	4,645 (1960)	7,700	35	3,160	12,360
Forecast for:					
1996-2005	7,395 (2750)	8,195	28	4,425	16,785

Source: P.R. Odell's calculations



Special ships are employed for off-shore three-dimensional seismic surveying. These ships tow air guns and cables with hydrophones.

4.1 The Oil Shocks

The first oil shock

The first oil shock in 1973 announced the end of the post-war period of affluence and economic growth. By the end of 1973, the oil producing countries, united in the Organisation of the Petroleum Exporting Countries (OPEC), increased oil prices from less than US\$ 2 per barrel to around US\$ 12. In addition, the Arab OPEC members, united in the Organisation of Arab Petroleum Exporting Countries (OAPEC), threatened to reduce their production by 5% for each month that Israel continued to occupy the Westbank, Gaza and the Golan Heights. An embargo was declared on deliveries to the United States, the Netherlands, Denmark and some other countries, because of their outspoken friendly relations with Israel. The embargo was eventually terminated in 1974. The re-routing of oil by the international majors, in the end, prevented actual oil-shortages in the embargoed countries. However, the threat of being dependent on unreliable oil suppliers combined with the four-fold increase in prices set the tone for the den Uyl government's response and for the way it had bearing on the country: the keyword became *scarcity*. The 1973-74 oil-shock was a clear turning point for Dutch and world energy policy.

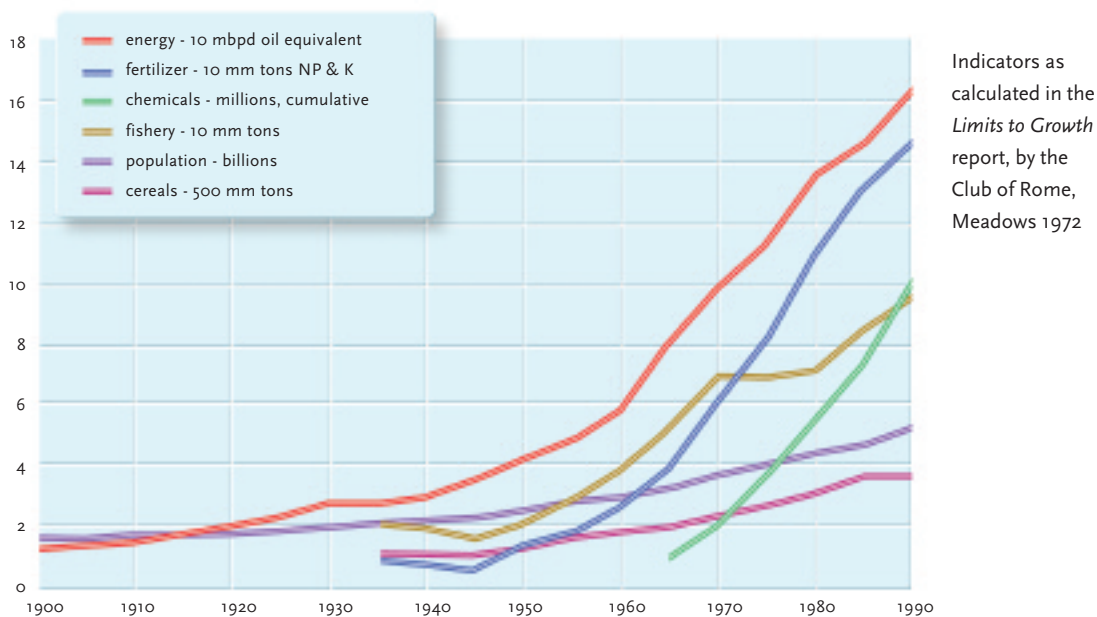
The oil shock had its origins in earlier shifts in the world economy and the energy and oil markets. The world economy had been plagued by increasing inflation and a weakened US dollar, caused by US funding of the war in Vietnam, and the reluctance of European governments to discuss revaluation of their currencies against the dollar. Eventually, this forced US President Richard Nixon to abandon dollar convertibility in gold and to impose a devaluation of the dollar. This inflationary loss of value of the US dollar caused the incomes of oil producing countries to fall and the cost of other raw materials to increase. International trade began to decline. Another important factor of change during the period prior to the first oil shock was that for most of the western world, increases in labour and capital productivity that had driven economic growth during the 1960s had come to an end. The new economic reality did not deter demands for higher wages. Workers, employers, unions and governments had become used to regular productivity growth and a corresponding growth in wages. In context of the revolutionary atmosphere after the end of the 1960s, left-wing political activity in many countries did not help governments to reduce these wage pressures.

Since its establishment in 1960, OPEC had been trying to get a larger share of the international oil companies' revenues on their sale of oil products. In 1970

these efforts were successful for the first time. Increasing demand for oil while growth in oil production capacity was lagging had enabled the OPEC Member States to demand slight increases in the price for oil in 1971 in Teheran, and in 1972 in Tripoli. In 1973, however, the market situation had further tightened and was further deteriorated by political tensions, caused by the attack of Egypt and Syria on Israel (the October or Yom Kippur War). This explosive mixture of economic and political tension provided the *political* arguments for reductions in oil supply and for the refusal to deliver oil to some western countries that induced – or exacerbated – the *economic* effect of a radical increase in oil prices.

The impact of the first oil shock was amplified by a gradual shift in thinking about human activity and the ‘State of the World’. The notion of a scarcity of natural resources had gained wider acceptance after the publication of the *Limits to Growth* report, by the Club of Rome, (Meadows 1972). This study predicted that continued growth of the world population and continued economic growth would cause a shortfall in the production of food, a serious depletion of the world’s raw materials and natural resources including oil, and an enormous increase in pollution. It was calculated, on the basis of the then known oil reserves, that within one generation the world would run out of oil. In the Netherlands, these warnings fell on fertile ground and the subsequent oil shock in 1973-74 was seen as a frightening sign that these predictions were becoming reality. Indeed, scarcity would cause oil prices to rise and that was what could be observed at the time!

Generally, the world was unaware that the reduced availability of oil that had caused prices to rise during that period was not related to the final depletion of oil



reserves, but to lagging investment in exploration and production capacity for new oil fields. Low prospects for profits caused by low oil prices in the late 1960s, had kept oil companies from investing sufficiently in exploration activities required to secure future supplies of oil. There was definitely no immediate shortage. In the Netherlands, the oil price shock and general perception of energy scarcity, inspired the den Uyl government to announce measures to “survive the oil crisis”. Initially, the refusal of the Arabian oil producing countries to supply oil to the Netherlands was used to underscore the heroic character of the Dutch position. Camels, oil barrels, Arab noses, dollar bills and caftans became much-repeated objects in political cartoons. Arabs and oil also inspired songwriters to unprecedented creativity in putting together vulgar popular songs for the Dutch carnival festivities, early in 1974. In this atmosphere, the announcement of radical measures did not meet much serious resistance, despite the fact that they were ineffective, given the situation of non-scarcity of oil and products. Nevertheless, as part of the emergency measures, Sunday car driving was banned from three o’clock Saturday night onwards. Of course, Saturday nightlife could not be impinged upon! For reasons of energy conservation, it was also advised to close curtains and to set heating at a lower temperature. Speed limits were reduced, and gasoline rationing was prepared and coupons were handed out but never actually used.

It soon became evident that the international oil companies were not really hampered in abundantly supplying the oil that western countries needed – even those countries suffering from the embargo. Re-routing of oil cargo was facilitated by the fact that the Rotterdam area was an important European oil refining and trading centre and a main connection with the German hinterland. Moreover, the oil companies strove to maintain a neutral position, neither wanting to inconvenience consuming countries, nor wanting to embarrass the Arab oil producing countries. Eventually, as the supply of oil continued while consumption was reduced, it became apparent that all storage capacity was full. Gradually during 1974, the crisis measures were withdrawn and gasoline never was rationed. What remained, though, was that the concept of an abundant supply of low priced energy had become a relic of the past; as expressed by Prime Minister den Uyl, in December 1973: “it will never be the same again.” He saw the Dutch system of energy supply in need of radical revision (see Hellema *et al.* 1998: 101-119).

The first White Paper on Energy

In March 1974, a taskforce was established to prepare for adjustments to the Dutch energy policy. Leaving behind the period of short-term crisis measures, the emphasis was shifted towards a more structural adjustment. Indeed, whereas energy shortages had not occurred, there was a prevailing perception that the bottom of the tank was in sight. In the same vein, the threshold of Dutch gas fields was believed to be nearer with each passing year. Dependence on oil supplied by the un-



A Sunday in November 1973,
the Coentunnel circuit as a cycling path.

reliable sheikhs and rulers in OPEC-countries – using oil as a political weapon – had become a deeply felt trauma in the western world. This then justified a widespread belief in the need for western governments to intervene in the energy industry. All over the world, energy ministries and departments were erected, producing White Papers on energy policy. In numerous countries, the State actively intervened in the industry – either through regulation of prices, investments and volumes of fuels produced and consumed in the private sector, or through public ownership of the industry.

The Netherlands established the Directorate General for Energy within the Ministry of Economic Affairs. In September 1974, a White Paper on Energy was published, under the responsibility of the then Minister of Economic Affairs, Ruud Lubbers. This plan embodied a radical change of the direction for Dutch energy and natural gas policy. On the one hand, it was geared towards stimulating energy and oil saving at any cost. This policy was intended to put an end to the wasteful use of energy and oil. In addition, dependence on oil was to be reduced by switching to nuclear energy and coal in electricity production. These measures, however, did not imply a remedy for the use of natural gas. The Dutch natural gas reserve in Groningen had become an unique fortune that had to be managed frugally so that, “the share of natural gas can be maintained at a reasonable level, as long as possible.” After more than a decade of perceived abundance of energy resources, gas suddenly had become a scarce strategic good. In line with this thinking, the first *Energienota* announced a number of important changes to the Dutch natural gas policy (MEZ 1974a).

The high gas prices inspired new arrangements regarding the distribution of profits for the oil companies and the State. Harry Langman, the Minister of Economic Affairs who had preceded Lubbers, had already negotiated an increase in the State profit share of the revenues per cubic metre from 70% to 85%, above a certain price level for national sales. This revision was associated with the higher national gas prices as a result of the increase in oil prices following the Teheran/Tripoli accords in 1972. Lubbers, in 1974, was able to add a third ‘tranche’. Hence, for the first 5.5 Dfl cents income per cubic metre of gas the Dutch State received 70%, for income up to 8.5 Dfl cents the State would receive 85%, and above 8.5 Dfl cents income per cubic metre the State would receive 95%. From then onwards, these enhanced profit shares would be calculated on national as well as export sales. The absolute value of these prices would be adjusted in accordance with changes in production costs and inflation (MEZ 1974b).

In response to the 1973-74 oil crisis, measures were announced to reduce the use of gas in the Netherlands and to trim down exports to neighbouring countries. Exploration activities to find new gas fields on-shore and off-shore in the North Sea were stimulated. And, indeed, the consumption of gas declined from the mid-1970s onwards – as is shown in Figures 3.4 and 3.5. This decline was primarily a consequence of the government-imposed reduction of gas use in the power sector.

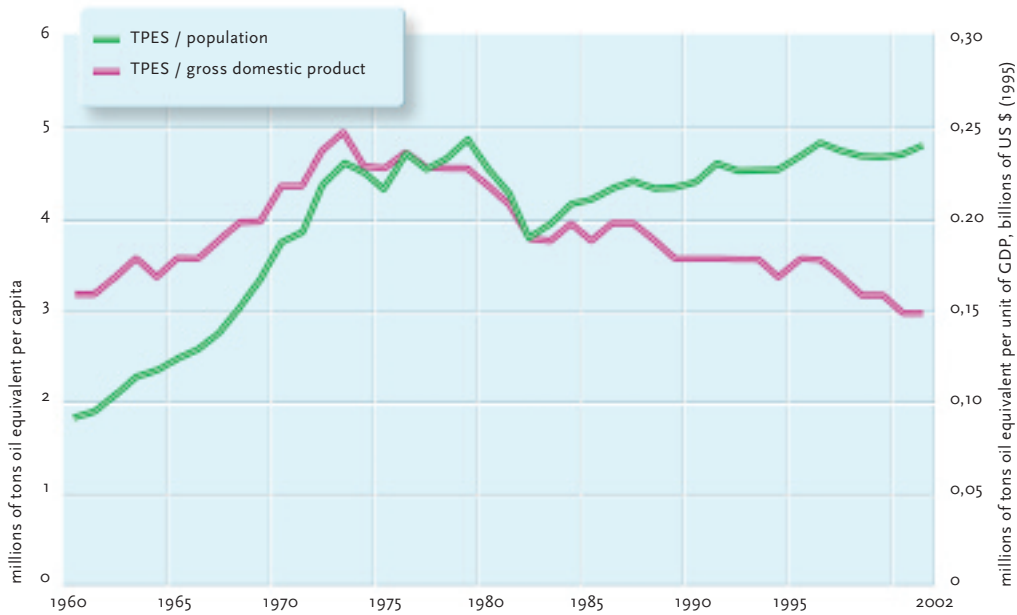


Figure 4.1
Intensity of Energy Use, per Unit of Economic Activity (GDP), per Person
Source: IEA 2002d

Another major factor was the energy savings programmes undertaken both in industry and domestic households. Yet, crucial to the fall in industrial gas consumption was the economic recession that emerged in parallel – and in conjunction – with the oil crisis (see Figure 4.1). This recession was also characterised by a structural change in the Dutch and other western economies. Many of the traditional industrial, labour intensive, manufacturing branches, such as textiles and metals, disappeared and these sectors were replaced eventually by less energy intensive services activities. As a result, the overall use of energy and natural gas in the Dutch economy declined.

The second oil shock

In 1979 a second oil price increase occurred. Political unrest and opposition to Shah Pahlevi of Iran resulted in massive strikes in the Iranian oil sector. Returning from exile in Paris, Ayatollah Khomeini became the leader of a successful Islamic revolution and Shah Pahlevi fled the country. The Iranian oil workers' strike during 1978-79 resulted in a failure to deliver on oil contracts with Japan. As a result Japan had switched to the spot-market to meet its domestic requirements and – as a consequence – oil prices shot upwards. In 1980, OPEC, against Saudi Arabia's advice, took a majority vote in adjusting OPEC prices to the level of the spot-market, from around US\$ 13 per barrel in 1978, to US\$ 36 per barrel in 1980. In 1981, war broke out between Iraq and its neighbour Iran. Until then, the Iranian army had been a dominant force in the Gulf-region, but after the revolution Iraq tried to take advantage of a weakened Iran and to enlarge its control over the Shatt al Arab

border river. The subsequent war dragged on for seven years and severely impeded oil production in both countries.

This second oil crisis and the Iran-Iraq war further fed into fears that oil would become increasingly scarce and that the world's oil reserves would be rapidly depleted. Again, a Dutch White Paper on energy was published, under the responsibility of Minister of Economic Affairs van Aardenne. In September 1979 the first general section of the *Nota Energiebeleid* appeared (MEZ 1979). In 1980 and 1981 sections on the use of coal and on fuel input into electricity generation followed. By and large, Dutch energy policy continued along the principles drawn up in 1974 of energy savings and reduction of oil dependence.

An amount of 500 million Dutch guilders was committed for the funding and technical support of several initiatives to conserve energy. Examples include the *National Insulation Plan* and plans for insulating buildings in the semi-public sector, energy savings in industry, and promotion of combined heat and power production (CHP). In combination with the economic recession, the energy saving plans were quite effective and from the 1980 onwards, the use of energy began to decline, as shown in Figures 3.3, 3.4 and 3.6. In 1985 total energy consumption equalled the volumes consumed in 1973, while the GDP was 25% higher. To reduce dependence on oil and natural gas, industry in general, and electricity production in particular, were intended to switch to imported coal and nuclear energy. The issue of nuclear energy use had become highly controversial since the 1974 White Paper. To channel the protests, Minister van Aardenne undertook the *Brede Maatschappelijke Discussie Energiebeleid*; a process of public consultation in which a wide range of involved individuals, interest and protest groups were given the opportunity to discuss their ideas on the application – or not – of nuclear technology in the energy sector. Decision-making would take place after the completion of this public debate. In 1984 the final report was published (SMBE 1984). It concluded that the expansion of the nuclear power production capacity was undesirable. Operational risk and the problem of nuclear waste disposal induced a majority of the participants to vote against nuclear power. A fraction of only 17 to 20% welcomed more nuclear plants to address the perceived scarcity problem for oil and gas. The commission concluded that nuclear power would be very low cost – if the problems of waste disposal were not taken into account. Half of the participants also voted against coal-fired capacity for environmental reasons – their slogan was *geen kernenergie of kolen, neem een molen* (no nuclear, no coal, use a windmill). Nevertheless, the government decided in 1985 to construct two to four nuclear power stations, to achieve environmental and diversification objectives. After the accident in Chernobyl in the Ukraine, this decision was quickly withdrawn and plans for nuclear energy were shelved.



An OPEC meeting,
12 March 2001 in Riyadh.

Dutch Small Gas Fields Policy is Indispensable

“The European Union has qualified our Dutch small gas fields policy as ‘best in class, an example for other producing countries’. Under this policy, NAM and the other producers have found at least 40% of the initial national gas reserves in new fields. That’s half of the large Groningen field. In terms of value, it is therefore vital for this country to continue these gas exploration and production activities.”

Karel Stigter, since November 2001 the Managing Director of the *Nederlandse Aardolie Maatschappij*, a 50:50 percent subsidiary of Shell and Exxon/Mobil, is convinced that new exploration and production technologies will turn a large part of the present Dutch gas futures (230-480 billion cubic metres) in due time into proven reserves. “I agree, in general that discoveries in the Netherlands over the past years have tended to become smaller. But look at the creaming curve: first we had Groningen and some of the larger reserves among small fields. Then we had 2D seismic research, later on came the 3D seismic that delivered us step changes in the curve: more and better prospects. Another step is now visible from seismic pre stack depth migration.”

“We are not at the end of our search yet, certainly not. Last year some interesting new reserves were found, among them 11 bcm by NAM, in the K15 block off-shore. A surprising feature of the Dutch gas reserve position is the statistical stability of the futures after forty years of exploration and production. Ten years ago the futures amounted to 300 bcm. They were a mix of different prospects. After drilling some appeared not successful, some disappeared, some were proven, and some new futures were added. After ten years of exploration activities we are again looking at an average of 300 bcm. Thus over all we have been successful in exploration, because in total we found another 300 bcm over the last decade.”

Keeping the futures steady in the next period will be “challenging”, says Stigter. “It depends in the first place on a stable investment climate for the gas industry, and on possible new technological developments, but also on society agreeing with these type of industry activities and providing the so-called licence to operate. With respect to the fiscal arrangements, the E&P industry had to face a serious set-back with last year’s abolishment of the right to depreciate at will for investments on the continental shelf. This concerns one of the most expensive parts of our exploration and production activities.”

The fiscal arrangement was installed in 1998 as a stimulus for off-shore developments. “Projects that were in the past not viable could under these arrangements be taken into development. Currently we will have to shelve over twenty projects, which means NAM will not invest 350-400 million Euro over the next five years. For the whole E&P industry this means that 27 investment projects are

not approved at the moment and another nine will be re-evaluated by the mother companies of several off-shore companies in the Netherlands. This means that 39 bcm of proven gas reserves will not be produced. Moreover the State income from *Aardgasbaten* will be reduced by 2.7 billion Euro. Stalled plans for exploration drillings now will diminish the volume of gas reserves to be proven in the coming years by an additional 50 to 80 bcm. That is lost value. For our own staff it might have serious employment consequences as well. The impact for contractors and suppliers will even be worse. Overall, this decision does not send the right signal to the Dutch investment climate.”

Leaving natural gas undeveloped off-shore the Netherlands does not correspond to the vision of the European Union, which is becoming increasingly dependent on energy imports. Commissioners in Brussels are very much interested in bringing into production as much as possible of the indigenous reserves of oil and natural gas. “Security of supply is evidently becoming a big issue”, assures the NAM-director. “I’m convinced the reserves of the Netherlands will become of crucial importance for the European Union in the near future.”

Against this background, the discussion on reserves under the Waddenzee – a precious wetland area between the northern coastline and the Wadden islands – is still at the hearts and minds of many people. For many years NAM tried to obtain the necessary permits for at least producing the proven reserves. But environmentalists and complex administrative procedures have succeeded in blocking this. “We are talking about a statistical margin of gas futures in this area of 70-170 billion cubic metres, of which some 40 billion have already been found. So yes, the contribution of the Waddenzee in the total of our Dutch futures is quite significant. Compare it with several years of Groningen’s production.”

NAM investments in seismic research and drilling in the Waddenzee total an amount of 700 million guilders (€318 million). Stigter notes, “In our view it is no longer an environmental issue, but a principle and political one. Of course we understand that people have concerns with regard to this issue. I would have had the same if I were not convinced that research institutions have looked thoroughly at all elements involved. The outcome is clear, no harm will be done to the precious ecology of this dynamic area. We continue to be in dialogue with various stakeholders since we are looking for a sustained solution where there is a win-win for all involved. On top of that, we are willing to produce proven reserves from existing land locations with our hand on the gas taps to continuously monitor the situation. And let me be clear on another aspect of the Waddenzee: we will not put drilling rigs in the Waddenzee itself.”

“If you want to move forward in this dossier, you have to try and create support in society. We are a serious company with a very good track record for environmental care and concern, we support sustainable developments in the energy sector. Natural gas, the cleanest of all fossil fuels, can help the transition into a greater use of renewable energy sources, for instance hydrogen. We are convinced that we are

able to conduct activities in environmentally sensitive areas in a responsible manner.”

“Furthermore, optimising our own Dutch gas production is much more attractive than importing from great distances, which has environmental disadvantages. The economy, the State budget, high quality employment and our technical capabilities, they all benefit a lot if we continue the small fields policy. It has been a success since the start and with new technologies we will meet new challenges. Against that background, we still believe the changing energy market will generate opportunities. But you’ll need a sustainable approach to get government licences and societal permission. I firmly believe that creating win-win situations is the key for the future.”

4.2 Natural Gas in the White Papers on Energy

In spite of the objective of the den Uyl government to achieve a greater degree of independence from OPEC and to improve fuel diversification, the share of natural gas in total energy use would not be expanded. Rather, Lubbers’ 1974 White Paper stated that the Groningen field was being depleted too rapidly and that this rate had to be brought under control (MEZ 1974a: pp. 88, 118-120). Groningen was considered a special field, with a key role in the Dutch energy supply system. However, by 1970 NAM had announced that the geological conditions of the field would allow a production of not more than 80 bcm annually in the longer-term. As the planned sales of gas for 1980 were estimated at around 100 bcm, it was concluded that the annual sale of gas had to be reduced and that the search for new fields had to be encouraged (Kielich 1988: 113).

The natural gas produced from most of the newly found fields was of a different quality and a higher calorific value than the gas originating from the Groningen field. In order to allow this new gas into the pipeline system and to use it with existing equipment, it had to be blended with Groningen gas. The subsequent growth of reserves would provide the country with sizeable extra volumes of a constant quality, as long as Groningen could be kept on-stream. An important factor in the policy was the geological structure of the Groningen field. It provided for a large capacity and the ability to change the production volume at a very short notice. This flexibility enabled Gasunie to make up for shortages in supply from the other fields, for example, on peak-days in the winter. Very few other fields have these characteristics.

In order to reduce the depletion rate of Groningen, three approaches were suggested. First, national and export gas sales had to be limited through a revised gas pricing and sales policy. Second, exploration for and production from other fields

in Dutch soil was to be encouraged through adjustments in the gas plan. Third, gas imports were planned from Norway and even from Algeria.

To enable the government to verify the Dutch gas reserve position relative to the production of gas and the contracted supply commitments, an annually updated longer-term gas supply plan had to be made. Each year, in the *Plan van Gasafzet*, Gasunie had to demonstrate how it would be able to secure a sufficient supply of natural gas for the Netherlands, for the next 25 years. Annual production and import volumes were set against the proven reserves, exports and other supply commitments, in such a way that sufficient gas would remain available for the next 25 years of domestic consumption. The possibility of any additions to the proven reserves or their re-evaluation was taken into account only in most conservative estimates of these 'futures'. Eventually, this implied that the future availability and the potential for production were substantially underestimated.

These gas policy objectives were repeated in the second White Paper on energy, published after the second oil shock in 1979 (MEZ 1979). Despite the awkward situation for the Dutch economy at the time, the 1979 White Paper underlined the scarcity argument and confirmed the requirement of the availability of a generation's use of natural gas. Thus, it downplayed the possibility for natural gas use on a larger scale, and forewent an associated expansion of State revenues on gas production, to resolve problems such as the balance of payments, the budget deficit, the international position of Dutch business, environmental policy, etc.

Sales and pricing policy

The 1974 White Paper had focussed on a reduction of energy demand by increasing consumer prices and a re-introduction of the allocation policy for gas to the electricity sector and large-scale users. Similar to the 1962-73 period, the new pricing and sales policy distinguished between three groups of consumers: the Dutch large scale industrial consumers, the small scale users supplied through the local distribution companies, and the export sector. Different principles were applied to these three categories, inspired by the original ideas formulated in 1962. The Dutch large-scale industrial consumers were supplied with gas according to a selective policy. This policy allowed the supply of gas only to industries in which gas actually provided an added-value and in which fuel oil or coal use was technically inferior. The small-scale users, were considered high value users and no limits were set on their use of gas. With regard to export contracts, no new contracts were to be concluded, but existing contracts would be respected.

Implicit in the sales policy was the attempt to (re)link the price for gas to the price of fuel oil (for industry), and heating oil (for domestic households and services sectors) – the so-called oil parity. To achieve oil parity, a law was passed in 1974 that enabled the government to intervene in the negotiations between Gasunie and the distribution companies, and to establish minimum prices for supply by



Incoming pipeline for Nogat-gas (green) and outgoing Gasunie-pipeline (grey).

producers to Gasunie as well as for Gasunie's supplies to the distribution companies. Until then, prices had been linked to those of oil products, but with a limited ability to follow those prices. When oil prices rose, the price for gas was only allowed to rise after a time-lag and by a reduced percentage. So, by early 1974 the average price for gas was 7 Dfl cents per cubic metre, while according to price developments in oil products, it should have been around 15 Dfl cents. For large consumers the difference between the actual price and the oil-parity price was about 9 Dfl cents. Small consumers paid only 11 Dfl cents, while their oil-parity based price would have been 30 Dfl cents (MEZ 1974a: pp. 90-93).

In 1972, following the first moderate increase in oil prices after the OPEC conference in Teheran, Shell and Exxon had urged the government to adjust gas prices for large users to the rising oil price and to withdraw the fixed limit on gas prices. Thresholds were established to reduce effects of sudden oil price fluctuations. The 1973 sales contracts were almost completely adjusted to the oil price. The 1974 White Paper on energy proposed to conclude contracts of three years' duration, based solely on the relatively high price of low sulphur fuel oil – instead of ten-year contracts linked to normal fuel oil. Prices for heating oil for domestic users had been seriously lagging since the early 1960s and had to be adjusted to the price of oil products as soon as possible. It was proposed to increase the gas price by 5 Dfl cents per year, until oil parity had been reached. This implied price increases of around 20% in the lower priced categories and of more than 50% in the higher priced categories. These latter categories particularly involved the domestic users. Indeed, it was considered unfair to burden only oil users with high oil prices. Moreover, the government feared that oil consumers, in areas where a connection to the gas grid had remained unfeasible would demand a connection to the gas grid now that oil had become much more expensive. Moreover, low energy prices would not encourage users to be efficient and to invest in insulation and other energy-saving measures. Eventually, prices for small users were increased by around 3 Dfl cents annually between 1974 and 1979, to 31.5 Dfl cents – still 13.5 Dfl cents below oil price parity (see Figure 3.7).

The second White Paper 1979-80 announced further price adjustments. To convince foreign customers of the need to increase the prices for Dutch gas, the Netherlands had to set an example. Indeed, it would be easier for Gasunie to negotiate for higher prices, if it could also show that the Dutch consumers were paying more. Since gas imports were planned, Dutch users would have to be prepared “to pay the prices that corresponded with the value of the gas to other foreign users” (MEZ 1979: pp. 111). Thus, Dutch consumer prices had to be consistent with the import price paid by Gasunie to its high cost foreign suppliers, while the Netherlands was located on top of the world's cheapest gas field.

In practice, however, it was not that easy to raise the price level to oil parity because all kinds of compensatory measures shielded consumers from the effects of price increases. Gasunie's 1974 Annual Report, for instance, stated the international

competitive position of large users should be taken into account, and thus these firms – for which gas and power were major cost elements – were treated cautiously. Also the utilities, united in VEGIN, refused to accept a full and immediate linking of gas and heating oil prices. They demanded that Gasunie supply their gas at the lower large scale users' tariff, arguing that there was no justification for charging such high prices for an essential service such as heating or hot water supply. Indeed, the number of people unable to pay their energy bill and being disconnected from supply was increasing. Quite a few protests were organised, by the FNV labour union and the *Stichting Konsumenten Kontakt*, representing consumers' interests. Gasunie's and the utilities' employees were even threatened when they attempted to disconnect non-paying customers.

Workers paid on the lower end of the wage scale were particularly hit by the price increases because the cost of energy constituted a proportionately large share of their income. Moreover, they usually resided in low quality, older, uninsulated dwellings, often rented from private landlords with little interest in the keeping the energy bill of their tenants manageable. The tenants, more often than not, refused to invest in insulation or efficient central heating. Public housing corporations were forced to take measures, but tenants in the private sector fell victim to high energy costs.

Export

In addition to reductions in consumption by both large and small users, gas exports accounting for more than half of the total sales of Gasunie in 1974 also had to be reduced. The Minister of Economic Affairs decided not to allow additional contracts for the export market. Existing contracts were honoured. These contracts had durations of 20 to 25 years to justify investments in transport and distribution networks, and consumers' appliances. As most of these contracts dated from the second half of the 1960s, it was foreseen that gas would be exported until the 1990s. Because most contracts included a price adjustment clause, price adjustment was also attempted in the export segment. From 1971 NAM/Gas Export had been negotiating gas prices with foreign customers to achieve a link with oil prices, just as Gasunie had attempted to do within the Dutch industry. By 1974, the oil parity principle was formally applied to about 85% of export volume. Nevertheless, it would take much more time before real fuel oil parity would be reached, because of the many transitional arrangements that had been agreed upon.

A special case was the 6 bcm contract with Italy that had been concluded at a fixed price in 1971. SNAM, the Italian importer, had managed to negotiate a contract with NAM/Gas Export at a price that was considerably lower than other contracts. Shell Chairman of the Board, Gerrit Wagner, made it clear that this contract was a consequence of pressure exercised by the then Minister of Foreign Affairs, Joseph Luns. Italy had had the intention to sign a second contract for the supply of

6 bcm gas from the Soviet Union. NATO, however, was not particularly enthusiastic about the growing Italian dependence on Soviet gas. It was argued that the contract with Gasunie was still profitable when signed in 1971, but soon it became clear that the price was too low, additionally because the contract did not contain an adjustment clause. In 1975 it was eventually adjusted, but it would not be until the 1980s that the actual price had been aligned with that of other countries. Regardless of the Dutch exports, Italy signed the Soviet contract after reaching agreement with NAM.

It proved very difficult to adjust export prices. By the end of the 1970s, it became evident that the negotiated increases were far too low to reach fuel oil parity levels. Revenues on gas sales were only between 65% and 85% of those on oil products. After the second oil shock, these differences increased further. After attempts by Gasunie and subsequently by Minister of Economic Affairs van Aardenne to raise export prices, the Minister appointed the experienced former diplomat Dirk Spierenburg as a government commissioner for gas export prices. Spierenburg visited all importers of Dutch gas in order to re-open the contracts and to achieve substantial price increases. In 1980 he managed to adjust a number of contracts, covering about 90% of the total export volume. Both the base prices and the impact factor for oil prices were adjusted. The impact factor was increased from 80% to 95% and the time lag during which adjustments were introduced was shortened from ten to five months. According to Spierenburg, it would have been possible to negotiate higher prices if he had been able to offer larger volumes of gas. Indeed, given the oil market situation there was great interest in obtaining imported gas from European suppliers. Spierenburg, however, was restricted from selling more gas by a Dutch government that was still wedded to the scarcity paradigm. Hence, during the 1980s Dutch export volume rapidly declined. In 1970 the Netherlands had sold 11 bcm gas abroad, in the mid-1970s annual exports reached 50 bcm, but by the end of the 1980s volume had fallen to 30 bcm. In some cases, duration of contracts were prolonged without adjusting the total volume, thus reducing the customers' volume on an annual basis.

These shifts in volume reflected the changing position of the Netherlands as a gas supplier to Europe. In spite of the considerable interest in Dutch natural gas as an alternative to expensive oil, and the fact that the Netherlands' neighbours were willing to pay higher prices, the Dutch government opted for a reduction of foreign sales and for the preservation of gas for Dutch customers. Further, lucrative Dutch exports of gas stimulated activity by other potential suppliers of natural gas. In the North Sea, producers became active on the UK, German, Danish and Norwegian areas of the Continental Shelf. Other contenders for the Dutch monopoly position in Europe's gas supply were the Soviet Union and Algeria. Particularly during the 1970s, when oil prices rose, these suppliers became increasingly important in the European gas market. Indeed, the linkage of gas prices to those of oil now provided an enormous boost to exploration and exploitation, and justified

Figure 4.2
Consumption
of Natural Gas
Supply in
European
Countries
Source: IEA
2002e

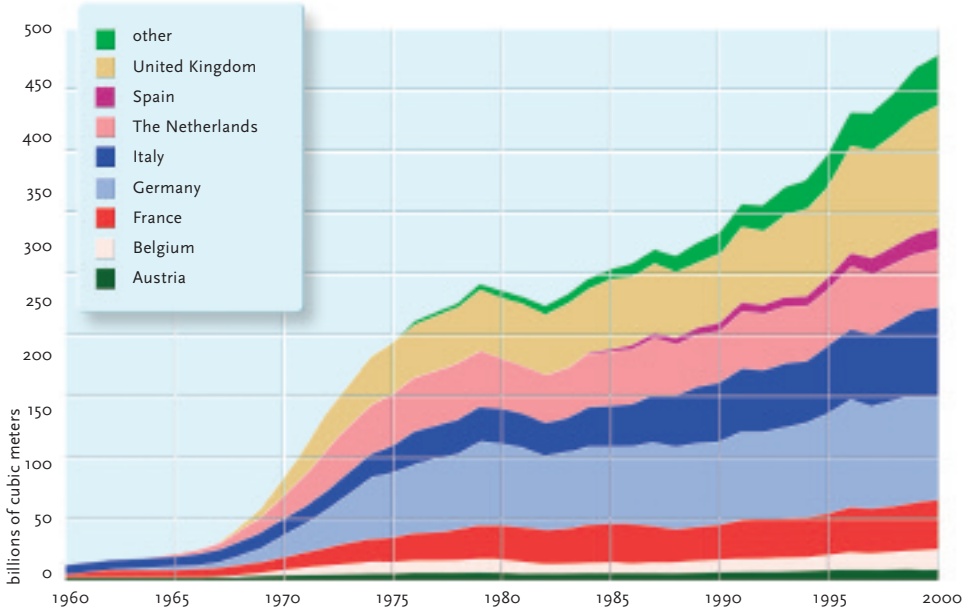
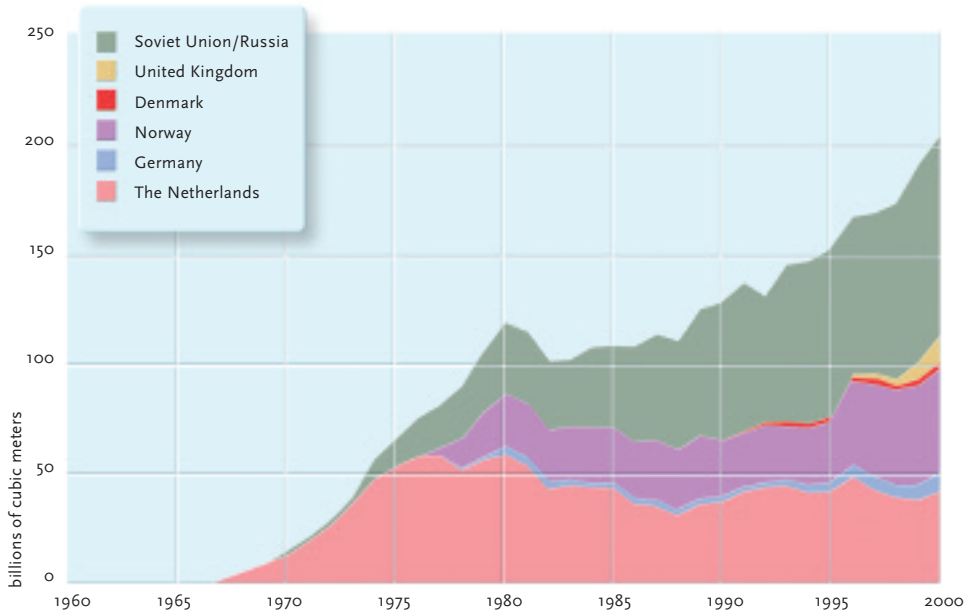


Figure 4.3
Gas Supplies to
Europe from the
Main Exporting
Countries
Source: IEA
2002e



a further expansion of the trans-European gas network (see Odell 2001). In 1970, the Netherlands still had a near monopoly supplying 92% of Europe's internationally traded natural gas (see Figures 4.2 and 4.3). In 1975, with 50 bcm sold, the Dutch share in the export market had fallen to 76% as a consequence of gas exports from the Soviet Union and to a lesser degree from Norway and Algeria. Until 1980 the volume supplied remained stable, but the share in exports further de-

clined to 45%. After Spierenburg's negotiations, the exported volume was reduced to 30 bcm per year, at a market share of 33% in 1985. By 1995, with a slight increase in volume (to 40 bcm), the Dutch share in the European gas market had been reduced to a mere 10%. The Soviet Union had become Europe's largest gas supplier, followed by Norway and Algeria – the latter mainly supplying Italy.

The small fields policy

As noted above, in addition to reductions in national and export sales, it was the government's intention to lower the share of Groningen gas in the total Dutch supply. Groningen was to be preserved for later generations. To achieve this, in addition to the import of gas, measures were implemented to stimulate the exploration and production for both on- and off-shore-fields, commonly known as the *kleine velden-beleid* (small fields policy).

Although the discovery of the Groningen field had generated high expectations of finding more comparable fields, this did not happen. The geological history of source rock, reservoir and structure on the Continental Shelf has not led to the same favourable conditions as those found in the Groningen field. As a consequence, only relatively small fields had been found and corresponding production costs were high. These depressing results caused a decline in oil companies' enthusiasm to further explore the area and to produce the fields found. Moreover, the outlook for selling these new gas supplies was not good. Gasunie purchased the Groningen gas through the *Maatschap*, from NAM. The profits of the *Maatschap* were transferred to the shareholders Shell and Exxon and the State. As long as these shareholders maintained the principle of profit maximisation, a continuous depletion of the Groningen field at low costs and with high revenues, after the price had been adjusted to the oil prices, would be more optimal. This would have required the oil companies with other fields to queue before they could sell their gas and earn back investments. This, of course, further reduced the inclination to explore for more gas in the Netherlands.

The assumed oil and gas scarcity in the 1970s motivated the Minister of Economic Affairs, Lubbers, to encourage oil companies to explore for and produce smaller fields in the North Sea and on the mainland as per the small fields policy. The essence of this policy was that Gasunie, having the right of first refusal, would contract the gas produced from these fields at a more or less continuous flow, with priority over the gas taken from Groningen. Thus, a situation in which the oil companies would have to wait until Gasunie had depleted the older fields – including Groningen – was avoided. The prospect of an immediate flow of revenues upon completion of the production facilities would encourage the oil companies to produce from these marginal gas fields. Together with the higher oil prices and the tighter linkage of gas and oil prices already in place, the exploration and production of smaller fields became much more lucrative. The essence of this policy was



The K15-FB-1 production platform in 1983.

that it expanded the portion of the resource base that was economically exploitable and thus stimulated the producers into action.

With the decision to give priority to gas from non-Groningen fields, economic barriers for new exploration were removed. This resulted, however, in a significant increase in the cost of supply, because the production of gas at small national and off-shore fields was much more expensive than the low cost production at Groningen. And, Groningen was still far from empty. Since consumer prices were based on oil parity rather than cost-based, the substitution of gas from Groningen for higher cost non-Groningen gas, caused the per unit revenues of the *Maatschap* and the profits of the State and Shell and Exxon to decline, in principle. However, this cost effect was hidden by the post-1974 increase in gross gas prices, causing a strong growth in Gasunie's revenue and in the oil companies' profits (including the government share). Thus, the financial consequences did become acceptable.

The implementation of the small fields policy clearly demonstrated that the objective to guarantee a sufficient supply over the longer-term was more important to the den Uyl government than maximising profits and State revenues. The substitution of Groningen gas by the production from small fields implied the extension of Groningen's productive life. The main advantage of this strategy was that the unique flexibility of the field's production could also be maintained much longer. Groningen, thus, could continue to play its role as the swing supplier, filling the gap between, on the one hand, the demand for gas in the Netherlands and the importing countries and, on the other, the increasing volume of gas supplied from the small fields. The low cost Groningen field became a marginal source. Figure 4.4 illustrates

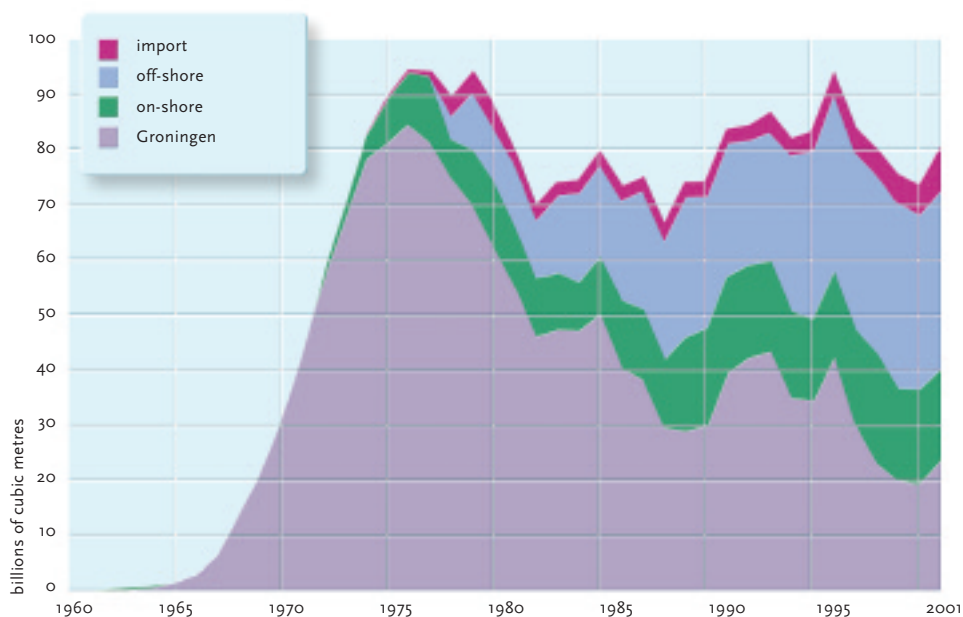


Figure 4.4
Gas Production at Groningen, On-shore and Off-shore Fields
Source: Gasunie, *Annual Reports*, 1963–2001; MEZ, *Olie en Gas in Nederland*, 1995–2002.

the decline in production at Groningen from around 85 bcm in 1976, to 45 bcm in the early 1980s, to 30 bcm in the early 1990s.

It is important to note that this flexible use was technically feasible only because of the particularly favourable geological circumstances, its large scale and the many production wells drilled. Normal exploitation of gas fields demands a much more constant and stable extraction rate. The flexibility in supply is crucial to the system because, as is shown in Figure 3.1, there is a large seasonal variation in the consumption of gas in the Netherlands and abroad. In addition, there are large daily variations in consumption in winter and in summer. It is clear that the production as well as transport capacity of the system have to be sufficient to provide the maximum volumes demanded and that supply has to be able to immediately respond to changes in demand.

The consequences of the small fields policy for the gas supply system were considerable. NAM saw a decline in its sales from the Groningen field, while producers at smaller fields, including NAM, saw their sales grow. In 1975 Groningen contributed around 90% to total Dutch production, in 1987 this share had fallen to less than 60%. In particular, off-shore production was growing rapidly to around a quarter of total production, as shown in Figure 4.4. Meanwhile, revenue per cubic metre, because of linkage with the price of oil, increased considerably – as illustrated in Figure 3.7. Gasunie passed on these higher prices and revenues to the gas producers. In this respect, it is interesting that the purchase prices paid by Gasunie to non-Groningen producers were determined as a function of the price for oil products in the various local markets supplied with Dutch gas (i.e. the Netherlands, Germany, Belgium, France, Italy). The amounts paid to the *Maatschap* were determined as a residual sum, after all of Gasunie's purchasing and operating costs (including a statutory profit share of 80 million Dutch guilders annually) had been deducted from its revenues on sales. In general, this led to somewhat higher prices for gas purchased from the Groningen field. In a way this can be interpreted as remuneration both for the delayed production of the field as compared to the initial planning and for the provision of flexibility in supply through the continuous availability of capacity to supply whatever volume on very short notice.

This new policy induced an enormous increase in exploration activities, resulting in a large number of fields being found and brought into production (illustrated in Figures 4.5, 4.6 and 4.7). Until 2001 around 800 bcm of gas had been found on the Continental Shelf. Taken together, this was around half of the known and proven estimates of the volume of the Groningen field. Despite an increase in the annual production to around 100 bcm annually, the reserve position remained considerable, as shown in Figure 2.2.

As a consequence of off-shore production developments, the North Sea seabed was covered with a large network of transport pipelines to take the gas from the production platforms to one of the terminals on the Dutch shore (illustrated in Figure 4.8). However, integration of the new sources into the gas system posed

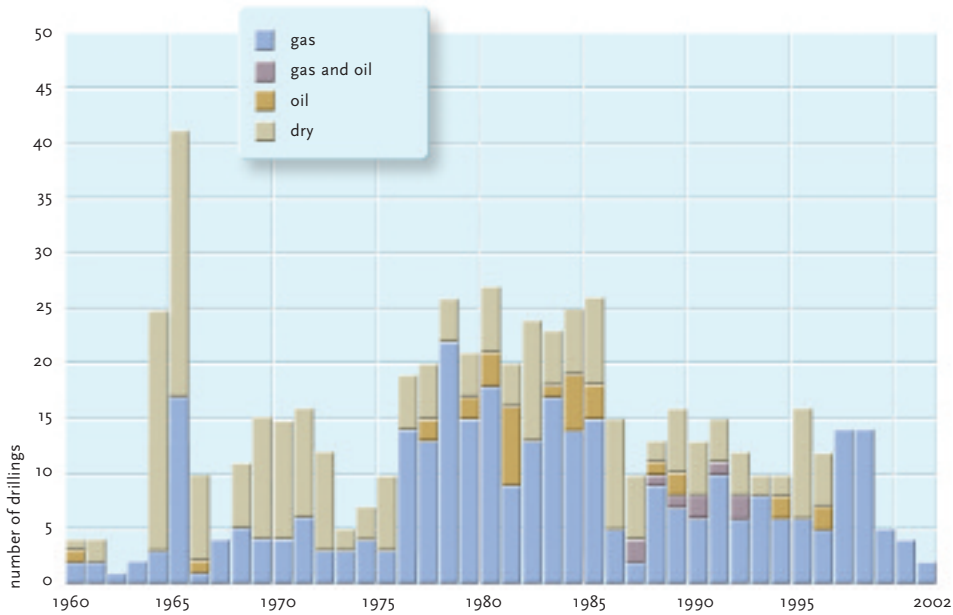


Figure 4.5
Exploration and
Evaluation Drilling
on the Mainland
Source: MEZ, *Olie
en Gas in Nederland,
1975-2002*

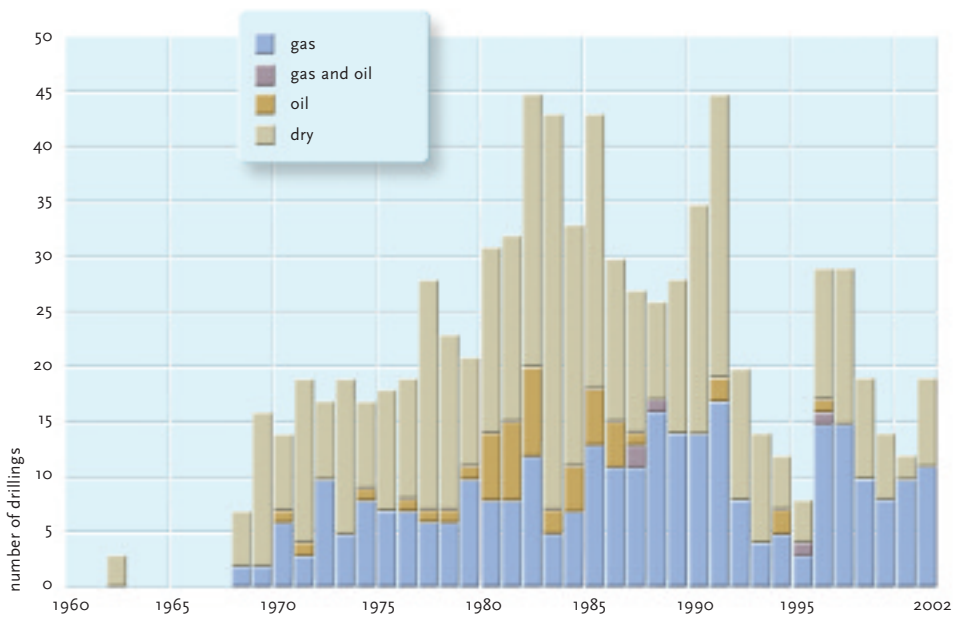
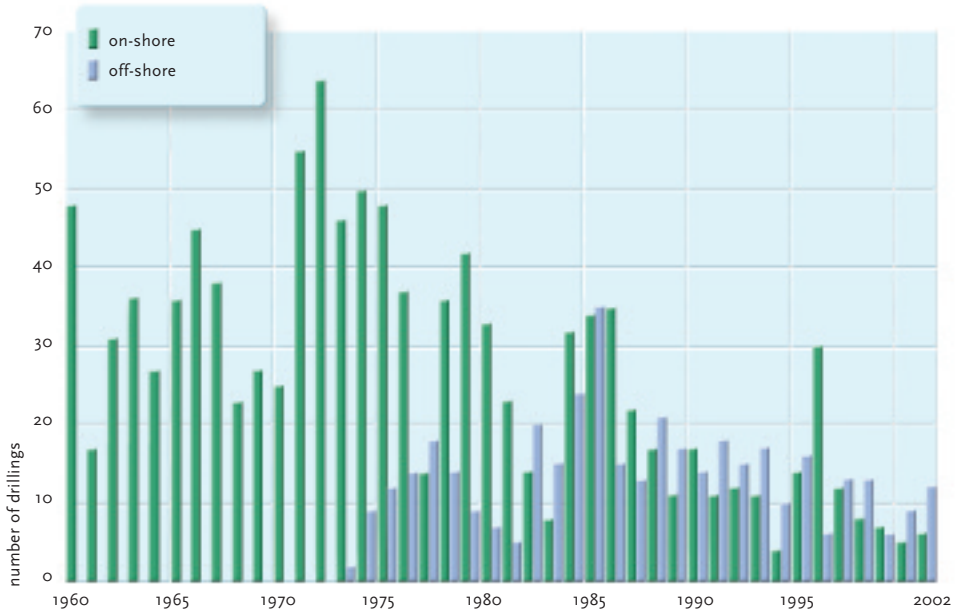


Figure 4.6
Exploration and
Evaluation Drilling
on the Continental
Shelf
Source: MEZ, *Olie
en Gas in Nederland,
1975-2002*

some problems. Many of the smaller fields contained gas of higher or lower calorific values than the gas from Groningen, to which all appliances were adjusted. A number of measures had to be taken to include these flows. Installations of large industrial users were converted to H-gas and a second transmission system was built to supply H-gas to large industrial users. H-gas and L-gas were mixed to produce a gas of Groningen quality, and H-gas was mixed with nitrogen to produce Groningen quality.

Figure 4.7
Production
Drilling on the
Mainland and
Continental Shelf
Source: MEZ,
*Olie en Gas
in Nederland,
1975-2002*



Import

In addition to both reduction in gas demand and the stimulation of exploration to enhance indigenous Dutch gas reserves, the first White Paper on Energy (1974), developed a third approach to delay Groningen’s depletion. It proposed importing natural gas from Norway, Algeria, Iran, the Soviet Union and Nigeria. Because long distances impeded the transport of gas through pipelines from Algeria, Iran and Nigeria, it was envisaged to import Liquefied Natural Gas (LNG) by tankers from these countries. Gas from Norway and the Soviet Union could be imported via long-distance pipelines. On the Norwegian sector of the Continental Shelf a joint venture with a number of European gas importers produced gas from the Ekofisk field. In 1977 the first volumes of gas were landed through the long underwater pipeline at Emden in Germany and transported to Groningen. Through the same pipelines, Gasunie also transferred gas from Norway to Belgium and France. Later, Gasunie imported gas from other newly discovered Norwegian fields, such as Statfjord and Heimdal, further away in the North Sea (see Figure 4.8).

The plan to import LNG from Algeria and Nigeria was developed to a high degree of detail and a contract was signed with Algeria. Eventually, however, the plan was shelved. Between 1973 and 1980 heated discussions took place around the construction of a re-gasification plant and a terminal for LNG tankers on the *Maasvlakte* near Rotterdam, or in Delfzijl, a port along the Eems in the province of Groningen. Jobs, safety (the impact of an exploding LNG carrier was compared with that of a nuclear bomb), the environment – all possible arguments were used for and against the project. Eventually, after Delfzijl had been chosen, the project

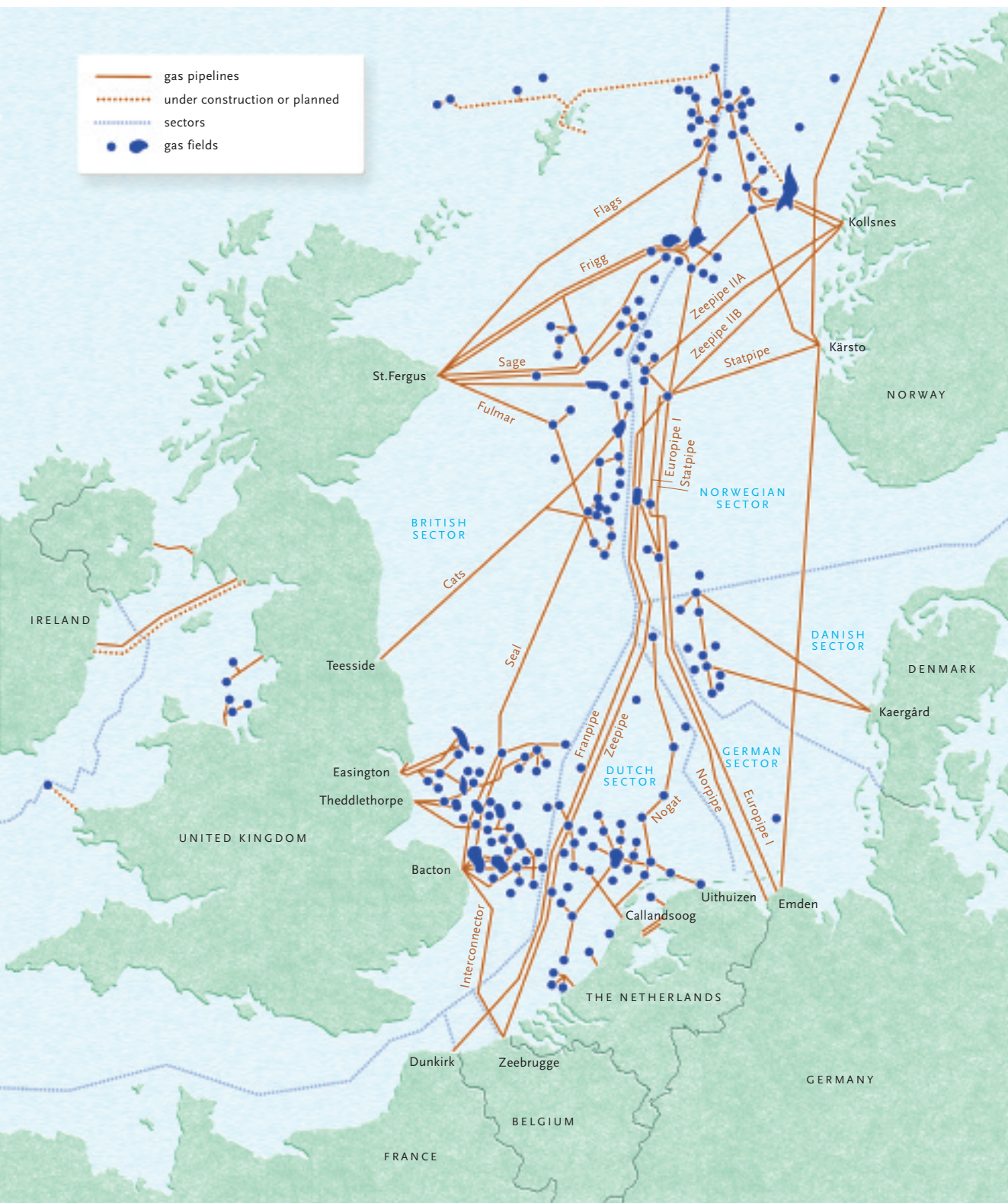


Figure 4.8 Gas Production and Transport Infrastructure on the Continental Shelf

was cancelled. The new Algerian president had different ideas than his predecessor, who died in 1978, and shelved the project. The Nigerian contract party broke-off negotiations because it thought the cost of the project too high (see Stern 1984: 81, 112). With the benefit of hindsight, it is clear that these undertakings could not have been profitable given the changes in energy markets in the late 1980s. Presently, the development of LNG markets is again becoming attractive.

The second White Paper on Energy of 1979-80 still advocated an “active – or possibly even aggressive – purchasing policy.” This implied that the Soviet Union had become attractive as a potential supplier. A project was undertaken to move large volumes of gas through pipelines from Siberia to Europe. Gasunie was interested in importing around 5 bcm on an annual basis. But this plan was also shelved. Despite the fact that funding had been arranged to a large extent by Dutch banks, Dutch industry had not received any orders for the construction of equipment. According to the chairman of the project group, Shell Chairman of the Board, Gerrit Wagner, Dutch industry had not shown much initiative in this respect, as compared with, for example, western Germany. Hence, the import of gas remained limited to the Norwegian contract (v. Seumeren 1989).

JAAP BREUNESE

Senior Advisor for Resource Assessment

Continuity in Exploration is Essential for Security of Gas Supply

“If we want to make the best out of our remaining Dutch gas reserves, continuity of exploration activities is most essential,” says Dr. Jaap Breunese in his office in a brand new building in the University Centre at the outskirts of Utrecht.

“What many non-experts underestimate is the level of investments, the long lead times in the exploration business, and the importance of keeping the infrastructure for production, transport and treatment of gas in shape.”

Jaap Breunese, a physicist, works at the Netherlands Institute of Applied Geoscience (TNO), and is Senior Advisor for Resource Assessment for the Ministry of Economic Affairs. He works in a group of geoscientists. “We are a typical extension – a sort of ‘ear’ for the Ministry. For instance, we tell the policy-makers at the Ministry that figures representing futures only have a real value if and when the reserves are actually proven by drilling.”

Asked about the future role the many small gas fields both on-shore and on the Continental Shelf could play given that reserves in newly discovered fields are tending to be smaller, Breunese explains, “The Netherlands is a mature gas area, but we still have a lot of very interesting futures in small fields. Not all of them will be economically viable to produce. That will depend on factors like the quantity



Hydrocarbon carrying formations do not care where coastlines are. At Ameland one can observe the differences between on- and off-shore gas production.

and quality of the gas in place, the availability of a pipeline and a production platform, or whether subsea completion is possible. But if we want to encourage exploration for as many of these futures as possible and bring them into production, a steady and stable investment climate is of great importance.”

The Dutch small fields policy was started in 1974, after the 1973 oil embargo against the Netherlands and the United States. The aim was to preserve the reserves of the large Groningen field. This policy is officially still supported, but in the Tax Plan for 2003 the government decided to end the so called ‘depreciation at will’ for investments in off-shore projects. This incurs immediate negative repercussions for a series of off-shore projects. Breunese comments, “In the present situation, at least the preservation of measures intended to stimulate investments in this sector would be desirable.”

What worries Jaap Breunese in particular is the ageing of the off-shore infrastructure, especially when exploration activities are delayed due to changing fiscal conditions. In the Dutch part of the North Sea the first depleted gas fields have been taken out of production. “Within the next ten years there will be a significant decline of the number of platforms. Off-shore production is important to the Netherlands, since about half of the 160 producing gas fields are located at sea. Technical innovations like subsea completion (remote controlled small production units on the sea bed) might be a solution for some of the smaller fields, but you still need a platform that is not too far away.”

In terms of proven gas reserves, Breunese thinks the three most important west European production countries, Norway, Great Britain and the Netherlands are of comparable size. In terms of futures though, Norway outweighs the Dutch position by far. British futures also seem generous. Still, the futures in remote areas like West of Shetland and the Barentz Sea have a very large range of uncertainty as to their existence and size, says Breunese.

“But security of supply can only be achieved with timely and proven reserves. In this respect the Netherlands can still be an important player for Western Europe’s gas supply for some years to come. All together we foresee a reserves to production ratio (proven reserves divided by present yearly consumption) for the European Union (Norway excluded) of twelve years. By that time depletion of most North Sea reserves will be in sight. We expect the Dutch off-shore production will begin to decline after 2006. Production from the Groningen field will probably have to be gradually expanded. Also during that period, the role of Dutch futures in the non-Groningen part of our supply, will increase in importance.”

“Looking at the gas supply of Western Europe as a whole, one must conclude that domestic gas reserves are by far insufficient to match the strong rising demand in the EU. Imports from Russia and other suppliers like Algeria, Libya and perhaps the Caspian region and the Middle East are inevitable. Dutch small fields will have to be developed before this great change of supply takes effect and economics of the gas business are potentially changed drastically. The Netherlands should consider

whether we want to rely on imports, or whether we are going to invest in a position as the (underground) storage country for gas supply in Europe.”

Concerning the small Dutch gas fields, Breunese points out that “geology often offers good prospects, but the limitations appear when you start with exploration. Of the Dutch remaining proven reserves of around 600 bcm, about 70 bcm is considered difficult to produce because of bad reservoir quality and/or low quality of the gas. Moreover, in economic terms not very much is needed to reduce the estimated futures volume to half of what would be possible under favourable circumstances. For instance, our futures portfolio contains many small possible reserves, but also traps which may hold in the order of 50 bcm. Regrettably the chance that exploration of the latter will be successful is less than 10 percent! Exploration is full of risks. You have to determine the risks and the rewards. Nature has provided us with few large reserves and a lot of small ones. In the Netherlands’ case fields with reserves of 2 to 5 bcm contribute the most to the proven reserves. If you find a field of 10 to 15 bcm, you are on the high side of chance on a good reward.”

“We also look at proven reserves per exploration well, to deduce a figure for exploration efficiency. If that figure were to drop, I would be worried, but this is not the case. In general the efficiency is still satisfactory. We do see a differentiation between what we call our central off-shore area with a lot of activity, and the outskirts of the Continental Shelf where explorers run more risks, geological as well as economical, and where distances to pipelines and platforms are longer.”

4.3 The Re-emergence of Non-scarcity

In the post-1980 period, the situation in the world oil market began to change. Demand was depressed due to the sharp recession and high oil prices. A decline in economic activity and a relative fall in income caused an overall reduction in energy demand. At the same time, improving efficiency in energy and oil use and the substitution of expensive oil for coal, nuclear energy and gas caused a decline in the share of oil for total energy requirements.

In the early 1980s, it became more widely acknowledged that oil price increases had been a consequence of political and economic factors, rather than an indicator of actual depletion of oil reserves. The cause of this misinterpretation was due to projections of the amounts of oil available having been based on the proven reserves of oil and gas reserves which could be produced at the going oil price and the technological state of art at the time. It was not taken into account that exploration activities had been very low during the 1960s, when oil prices were relatively low. Moreover, many parts of the world had not yet been intensely explored, and

new technology would bring much more oil within reach. These factors allowed for an upward adjustment of the stocks of proven reserves.

The relatively high oil prices during the 1970s, and the fact that oil companies were no longer welcome to explore for oil in most of the OPEC Member States, stimulated oil exploration outside of the OPEC area. To be sure, much oil was found, for example in the North Sea and Alaska. The fear that fossil fuels would soon be depleted began to lose ground. Eventually, the increasing supply of newly found oil from non-OPEC origins forced OPEC to abandon its pricing and volume policy. Even Saudi Arabia was no longer willing to carry the burden of production cuts and income reductions to balance the supply and demand at such a level that prices remained within an acceptable range. In 1985, this development induced a fall in prices that did not stabilise until it had reached a level of around US\$ 13 per barrel in 1986.

The times they are changing

In the early 1980s, radical changes began to take place for the Dutch position in the European gas market. National and export sales of gas had fallen significantly, while the reserve position had improved. State revenues on gas sales were declining relatively, and considerable amounts of foreign gas were offered in Europe by Norway, the Soviet Union and Algeria. As shown above, the decline in sales was the direct consequence of the government's post-1973 policy. As illustrated in Figure 3.4, from 1974 onwards the growth in gas consumption began to level off, and by 1979-80 consumption actually declined. This meant that total sales of Dutch gas dropped from a maximum of around 100 bcm in the 1970s to only 73 bcm in 1982. After a period of continuous growth since the mid-1960s, the overall national gas consumption reached a peak of about 25 bcm in 1979. Thereafter, consumption declined by about a fifth to a level of 20 bcm in 1982. Industrial use remained stable from 1974 onwards at a level of 11 bcm, until dropping to 9 bcm in the early 1980s. In part, this drop was a consequence of the economic recession and the closure of a large number of industrial undertakings in the traditional economic sectors, such as the textile and metal industries. Additionally, energy was being used with increasing efficiency. Domestic households as well as industry began to invest in energy-saving and insulation measures. During the 1960s, gas-fired heating equipment had been installed in completely uninsulated houses and buildings. Although the gas price had not yet reached fuel oil parity, it was high enough to motivate house owners to install double glazed windows, to insulate roofs and walls, and to use intelligent thermostats. For industry, energy had become a significant cost factor after prices had been adjusted upwards, turning insulation and other measures into a rational means to earn money. Users were encouraged to save energy via subsidies and tax credits, information campaigns, technical support and the increasingly sharper requirements for the construction of houses and build-

Natural gas is purchased by Gasunie.
Gasunie takes care of the transport and
delivery to customers in the Netherlands
and abroad.



ings. For both of the other large sectors of consumption, export and power production, reductions resulted because of the political decision to make less gas available. For the power sector, gas use declined after the termination of the first ten-year supply contracts (after 1977) from nearly 11 bcm to only 6.5 bcm. For the export segment, the lower off-take, at extended contract duration and a constant contracted volume, caused a decline from above 50 bcm in 1977, to only 35 bcm in 1982.

In the mean time, the reserve position had improved dramatically. The small fields policy had yielded a large number of new gas fields. While producing significant amounts of gas, the size of the proven reserves remained constant, as shown in Figure 2.2. Indeed, the production had shifted from Groningen to the smaller on- and off-shore fields, as shown in Figure 4.4. Thus, the policy had proven successful!

A change of heart

The results of the scarcity-driven policy however were not deemed a complete success. By 1982, the diminishing market share of the Netherlands in the European gas market became obvious. Falling sales and a reduced off-take from the low cost and highly profitable Groningen field began to threaten the State revenues from gas. Eventually, this induced the then Minister of Economic Affairs, Jan Terlouw, to allow Gasunie to sell 20 bcm extra to the electricity sector during 1982-87. Gasunie did not produce a *Plan van Gasafzet* in 1982, because the long-term perspective was too unclear! Advice was sought on gas policy from the General Energy Council (Algemene Energieraad 1983) and the Social Economic Council (Sociaal Economische Raad 1983). These reports, as well as a revised future perspective by Gasunie (1982) argued for the preservation of the Dutch position in the European gas market.

The State budget for 1984 (MEZ 1984b), clearly indicated that the quota approach for specific economic sectors should be terminated and that export contracts could be concluded “in a responsible manner”. Gas imports for national consumption were to be terminated. This change in policy implied the immediate withdrawal of restrictions on the use of gas in power plants. Only this sector – through dual-fired power plants and shifts in the pattern of employment of plants – was able to absorb significant volumes of gas on such short notice. Indeed, this was what the government sought to achieve – a rapid increase in gas sales, so that the State revenues would recover. It was particularly important that the growth in sales would at least maintain production levels at the profitable Groningen field.

Export restrictions were also lifted. New export negotiations could be undertaken as long as Gasunie’s long-term planning indicated that the proven reserves would be sufficient to allow for a 25-year period of supply on the basis of contracted demand. The conditions for gas export were carefully formulated and remained restricted by the long-term security of supply considerations. Exports were allowed

only if new reserves had been proven, or if secure imports of gas had been contracted.

Reference was made to the concept of Gasunie as a *Gas Bank*. In particular, the opportunity for the Netherlands to provide flexibility and security of supply was highlighted. The supply of gas from the Soviet Union, Norway and Algeria was at constant and high volumes, contracted for a long-term period. Indeed, to justify the enormous investments in production and pipeline capacities, high levels of throughput and capacity utilisation were a strict requirement. As explained above, however, demand for gas is strongly tied to seasonal patterns, particularly for domestic households. Flexible supplies of Groningen gas were expected to satisfy peak-demand and to provide back-up capacity in case of supply failures. Yet, at the time, no further operationalisation of these plans was undertaken. It was not until the end of the 1990s that formal contracts of this kind were concluded.

With regards to pricing principles, oil parity was maintained. Nevertheless, it was foreseen that gas-to-gas competition would at some point become possible. It was argued that this would require a pricing system that would distinguish and formulate prices for the separate services provided by Gasunie, including transport, varying degrees in flexibility of supply, peak-supply, storage and blending, and so forth. Traditionally, prices for these elements of the supply chain had been included in the 'all-in' Gasunie tariffs. In 1984, it was not considered necessary to change the pricing structure because there was no competition at the consumer level in the gas market.

For domestic users, continuation of oil parity pricing implied price increase of 3 Dfl cents annually for a period of three years, from 1984 onwards. The price difference for heating oil was still 9 Dfl cents and the price for domestic households in the Netherlands was low, compared with Germany, France and Belgium. In the CDA-VVD coalition accord of 1982 reference was made to the cessation of this "hidden subsidy". For domestic consumers and the small and medium-sized enterprises, these price increases implied that subsequent to funding the social security system in the 1970s, they now were funding the reduction of the State deficit. In contrast, energy price subsidies were given to the internationally competing energy-intensive industry. Whereas the price of low sulphur fuel oil remained the yardstick for large consumers generally, specific internationally competing firms were given the possibility to negotiate the price of gas in their supply contracts. Overall, this period concluded the policy measures that were taken as a result of the general perception of energy scarcity that had determined energy and gas policy since 1973.

Free fall

The decline in oil prices in 1985-86 marked the beginning of a new era in the energy market. The notion of scarcity, as it had developed after 1972 and the prospect of everlasting sky-high oil prices, as had emerged in 1979-80, disappeared. OPEC's

strategy to maintain high prices by reduction in oil supply and the nationalisation of the oil companies' production assets had stimulated a great deal of activity in exploration in areas outside OPEC, such as the North Sea and Alaska. Indeed, high oil prices justified costly investments, because revenues would be large and shielded by OPEC price policies. The successes of this wave of exploration, after a period of relatively weak efforts during the 1960s, unambiguously illustrated the abundance of resources. Instead of running out, the world was running into oil (see Odell 2001). Moreover, high oil prices made other sources of – initially too expensive – energy, such as coal and nuclear energy (until Chernobyl), attractive again. High energy prices also encouraged energy saving. Indeed, in 1980 the US petroleum economist Adelman had called OPEC the *clumsy cartel* but, in 1986, it became fully clear that OPEC had overplayed its hand (Adelman 1980).

Environmental impact: A bridge to the future

For the Dutch energy sector this did not imply that the abundance of the 1960s could be revived or that gas production would be allowed to return to its past levels. There was a need to impose the traditional Dutch quality of thriftiness on the kind squandering behaviour that resource abundance tends to provoke (see Odell 1987). In increasingly wide social circles, environmental conscience was gaining acceptance. This went beyond the environmental caution of the 1970s, when tangible environmental impacts, like sulphur and dust emissions, could be solved by recourse to end-of-the-pipe technologies. In the second half of the 1980s, a new threat to the environment was identified that was much more encompassing in its assumed origins and consequences. The greenhouse effect, or global warming was attributed to CO₂ emissions caused by fossil fuels such as coal, oil, and natural gas. These were causing temperature increases, thus destabilising the current climate system, creating agricultural problems, and causing the sea level to rise – all with adverse consequences. Global warming, however, could not be remedied with filters and new burners – the only remedy being *not* to burn fossil fuels.

In March 1987, the Brundtland Commission published its report *Our Common Future* (1987). This report called for the notion of *sustainability* to become one of the central policy objectives of western governments. The essence of sustainable development is “development that satisfies in the needs of the current generations without jeopardising the future generations possibilities to fulfil their needs.” In the Netherlands, the State Institute for Health and Environment (RIVM 1988) published its famous report *Zorgen voor Morgen* (Concern for Tomorrow), containing an inventory of the many adverse impacts on the Dutch environment. Based on the concept of sustainability and taking note of the specific Dutch circumstances, the Minister of Environment, Spatial Planning and Housing, Ed Nijpels, developed the first integral National Environmental Policy Plan (NMP) in 1989 (VROM 1989).



Construction of the Dutch network of pipelines.

For energy and gas policies, the environment was becoming an essential driving force, influencing not only energy saving objectives, but also exploration and depletion policies. In 1990, the White Paper on Energy Saving (MEZ 1990) presented a new, quite ambitious, approach to energy saving, while a gas depletion policy was formulated with the sustainability objective that sufficient gas had to be passed on to the next generations. Environmental considerations, nevertheless, justified the enhanced use of gas in power production, particularly in decentralised combined heat and power plants.

Thus, it can be concluded that over the period 1973-86, the objectives of energy saving and a reduction in the use of gas were motivated by the widely accepted notion of scarcity and by higher prices. After 1986, the functional policy objectives remained about the same, but the underlying motives were now primarily based on environmental and inter-generational equity considerations. Efficient use of gas was now motivated by the perspective of gas being the cleanest fossil fuel and of being thought to provide the *bridge to the sustainable energy systems of the future*, which will be based on renewable resources.

Chapter 5

New Paradigms, European Integration and Abundance





The underground gas storage facility near Langelo is constructed in a partly depleted gas field.

5.1 New Paradigms

During the post-oil-shock period a gradual shift in economic thought began to take shape as a prelude to the profound restructuring of markets and in particular a reduced role of the state. During the course of 1980s, this restructuring process was reinforced by a general trend towards economic integration of national and regional markets. The deepening integration of the EU during that period was a case in point. This comprehensive shift in thinking and approach to the economy was further stimulated by a perceived abundance of fossil energy resources, not only for coal and oil but also increasingly for natural gas.

In retrospect, this shift in both theoretical thought and policy-making on the roles of the State and the market, can be considered as a fundamental change (see Newbery 2001). Yet, at the time, in centre-left circles, it certainly was not seen as such. Instead, it was considered to be an amoral, ideologically-driven, experiment in policy-making of the (extreme) right-wing governments of Chile, Britain and the US. Indeed, amongst the main driving forces was the aim to liberate the economy from State intervention and labour unions, and to restore the competitive market, as exemplified by Margaret Thatcher's struggle to "Roll back the State" (Parker 2000). In the US, the Reagan Administration was inspired by monetarists, such as Milton Friedman, and other free market advocates. The essence of this economic thought and policy-making was that the State would never be able to coordinate the economy more efficiently than the market, because the State could never acquire and process the necessary information to do so. Government failures would undermine the economy's efficiency. Moreover, in the process of planning, the government ran a serious risk of being captured by interest groups. Here, obvious references were made to labour unions and well-paid workers in the public sector and to the various protected private industries. Finally, these thinkers argued, there was the state's tendency to expand towards new activities and sectors. Thus, it would absorb an increasing share of the GDP and drive-out private actors. As private initiatives were considered to be more efficient and innovative, such developments would lead to a relative decline in the overall generation of welfare, cause social, cultural and technological stagnation, and conservatism in society.

Economic integration and energy markets

International trade theory also argued in favour of the liberalisation of internation-

al goods markets as a way to maximise economic welfare. Under a free-trade regime, production could take place in the most efficient location or country. Since countries differed widely in their energy endowments, trade in energy was important to allow energy needs to be satisfied. This required energy to be freely traded and transported from one country to another. National (energy) markets would thus be required to integrate to the extent that the process of producing and trading energy was not confined to national territories. Thus to facilitate trade, national trade regimes should not place any explicit restrictions on international trade and should remove existing barriers; and second, physical infrastructure to efficiently transport energy between and within countries, such as pipelines, ports, and railways, is required.

During the 1950s, trade liberalisation was adopted among six European countries, partly in order to make the economies so interdependent as to become an obstacle for new military conflicts. The present European Union grew out of the European Coal and Steel Community (enacted 23 July 1952), the European Atomic Energy Community (Euratom, enacted 1 January 1958), and the European Economic Community (EC Treaty, in its original version the Treaty of Rome, enacted 1 January 1958). The Treaty of Rome established a customs union between the six Member States (Belgium, Italy, Germany, France, Luxembourg and the Netherlands). The customs union implied the harmonisation of customs tariffs towards non-members. The Treaty of Rome also defined the “four economic freedoms” that should be accomplished within the Union: the free movement of goods, labour (workers), services and capital. At the time of the first enlargement in 1973 (adding the UK, Ireland and Denmark), the customs union’s development was supplemented by the establishment of regional and sectoral support systems, aimed at achieving economic and social cohesion amongst the Member States.

Historically, free trade in energy has been a fairly uncommon phenomenon. Generally, production and trade in fuels has been limited and restricted by a range of regulations, conditions, concessions and subject to levies and import and export tariffs. As a rule, the construction and operation of international energy transport infrastructures has been subject to policy intervention and political pressure. Countries have customarily devoted large amounts of capital and resources to the indigenous production of comparatively expensive energy, while more convenient and low cost substitutes are readily available in the world market or even in neighbouring countries. Essentially, this has been a consequence of contemporary interpretations of the concept of security of supply (see Clark 1990).

Security of supply and security of demand

Historically, security of supply was based on the idea that dependence on external energy (and some other) resources would be a strategic disadvantage during times of war or trade conflicts, and could thus affect the sovereignty of nations. It could

also make countries vulnerable to price fluctuations in international markets, creating disturbance in their balances of payments, etc. Several types of risk are distinguished in this respect (see Bohi *et al.* 1996). These involve technical risk, involving supply disruption due to technical reasons, such as pipeline failure or compressor failure; Delivery risk affecting long-term supplies from existing or new fields; Commercial risk addressing commercial disputes and contractual breakdowns; Political risk, such as the disruption of existing or potential supply for political reasons; and, Regulatory risk, such as administrative interventions that may have adverse effects on production and transportation.

The reality of these supply disruption risks notwithstanding, the argument of security of supply is often used while the underlying motivation is, actually, the protection of national industrial energy sector activities and interests, the workforce and technology clusters involved, or the fact that the State collects revenues on the exploitation of such ventures. Finally, it is often said that national resource endowments should be exploited for national benefit and be reserved preferably for use by its nationals – as if these nationals have a natural exclusive right of access to these resources.

Given such preponderant issues, the integration of national energy markets is an ambiguous objective, torn between arguments of economic efficiency and *inter*-dependency on the one hand, and those associated with political preferences and *inde*-pendency on the other. Until the mid-1980s, the objectives of European integration and cohesion were achieved only in a limited number of areas and in an incomplete manner. External and internal developments, such as competition from Asia and the US in world markets and the increasingly widespread acceptance of the free market paradigm, following the approach taken in the US and the UK, provided a new impetus for the project of European integration. This resulted in the Single European Act (enacted 1 July 1987) which defines political powers of the European Commission (effectively the European Government) and the European Parliament alongside the powers of the European Council (constituted of representatives of the national governments and effectively the most decisive political institution).

Whereas not particularly ‘freely’ traded, energy has always been traded internationally. Some countries are endowed with energy resources, while others have nothing – in an absolute sense. In a relative sense, for some countries the cost of developing an indigenous supply of energy was simply too expensive. It would be way beyond that which could be justified on the basis of political sovereignty. For energy sources such as coal and oil for which production is tied to the physical presence of the resources, international trade became common practice – albeit often couched in all kinds of specific trade arrangements and regulations. Indeed, the argument for dependency was weakened because ports, ships and refineries could be used to move and process coal and oil from a number of potential suppliers.

This was, however, less so in the case of gas and electricity network industries



Pipelines carry the gas through the Russian tundra to Europe.

for which cables and pipeline are specifically constructed for transport from point A to B. If A fails or refuses to provide the gas or electricity to B, the highly expensive connection becomes useless. As a consequence, international trade in gas and electricity is considered to be very vulnerable. Trade in network-bound types of energy is generally more politicised and requires a great deal of trust and commitment.

As a consequence of developing national network supply systems, most countries also developed their own organisations and institutional structures reflecting particular national characteristics such as resource endowment, spatial distribution of activities and production, access to technology, political preferences and pressure by interest groups. These specificities, in turn, impeded large-scale interconnection and trade between the national systems. As a result, European national networks only gradually engaged in trading electricity. In the case of international (city) gas trade, objectively the same situation applied. Nevertheless, as described above, an international transmission network was constructed for the exploitation of Dutch natural gas. A very small number of actors, dominated by the two large international oil companies, Shell and Exxon, in coordination with national and local authorities developed these systems in a controlled way, taking into consideration the specific national circumstances.

During the course of the 1980s, the perception that the economies of most countries would be better off if linked – through integration and/or internationalisation – was gaining widespread recognition. European countries were increasingly confronted with large internationally operating firms from the US and Japan, selling goods and services in their markets. European companies had relatively small and often somewhat protected home-markets and, thus had a comparative disadvantage in international markets. A solution to this problem was a strategy to further integrate the European economies, thus creating a *Single European Market* with a comparable size to that of the US. This would provide firms with the possibility to gain sufficient size – and corresponding economies of scale and scope – to become internationally operating companies. Competition in the single European home market would implicitly force out those firms unfit to compete abroad. This perspective was endorsed using common economic theory, arguing that the state-led arrangements reduced the efficiency of the system and that the public and/or traditionally regulated energy companies misused their monopoly position to their own advantage.

In 1985, Jacques Delors, supported by powerful European industrial leaders, launched the Single European Market initiative, which provided new momentum to the lagging process of European integration. The aim was to achieve a free market covering the whole community by dismantling impediments to the free movement of goods, services, labour and capital. In 1986, the *European Act* simplified procedures for decision-making and during the second half of the 1980s, European integration flourished.

Within this context, the cost of energy supply became an important issue. International competition made differences in energy costs between Europe, Japan and the US an important factor in their competitive advantage, particularly for energy intensive industries. Indeed, as a spill over from competition in other industrial sectors and under the pressure of large, commercial energy consumers and potential new entrants to the gas and electricity industry, the EU Commission was induced to work towards a Common Energy Market. In 1988, efforts regarding the energy sector were spearheaded by a proposal for an Internal Energy Market (IEM).

By then, the relatively abundant supply of low-priced oil and gas, plus the emergence of new technologies in the power sector such as CCGT, stimulated the exporting energy intensive industries to pressure the Commission and national governments to engage in liberalisation of the sector and to harvest the gains of the abundant supply situation in the form of low energy prices. The newly emerging situation in the oil market seemed to further justify a reduction of State intervention. It was expected that the market, with a lot of independent producers, would guarantee an adequate supply of energy. This was illustrated convincingly during the 1991 Gulf War, when despite the devastation of production facilities in Kuwait, and later in Iraq, the international oil market reacted calmly and regained stability within a relatively short time.

Abundance in the European gas market

The high oil and gas prices post-1973 and the perception of scarcity caused an impressive increase in exploration efforts and investment in production and transport facilities all over the world. As a consequence, substantial volumes of gas were available in Europe, produced particularly through an expansion of activities in the UK, Norway, in the now former Soviet Union – particularly Russia – and in Algeria. Moreover, from 1989, Russia made increasing amounts of gas and oil available for export because internal demand had dropped after the demise of the Communist regime. From a situation in which Europe had been dependent on only one exporter – the Netherlands – a situation emerged in which the continent could be supplied by a number of potential suppliers.

The fall in oil and gas prices in 1986 revoked the earlier perception of scarcity but had also put strong pressure on the revenues and profits of oil companies. Compelled to reduce exploration and production costs, companies turned to new technologies, such as three-dimensional seismic research, improved drilling techniques, and methods to enhance oil and gas recovery. In addition, large-scale rationalisation and specialisation was undertaken in the industry. The oil companies further developed strategies to contract out specific jobs to specialised firms in shipping construction, engineering and data analysis. They were thus able to shed expensive staff and equipment, contracting services only as needed.

European supply can best be characterised as a set of concentric rings. Around

the centre of consumption, north-west Europe, are located the gas provinces that provide Europe with gas – albeit at increasing costs (see Figure 5.1). As shown in Figure 4.3, the lion's share of Europe's gas demand has been satisfied through countries' indigenous supply and by imports from the Netherlands and Norway. The remainder is supplied by Russia and Algeria, the latter selling its gas mainly in southern Europe. Central to Europe are the UK, Norway and the Netherlands, as the current main producers and exporters. In addition, Denmark and Germany export small volumes of gas. From 1998 onwards, gas has been supplied to the continent from the UK and vice versa, through the Interconnector pipeline via Zeebrugge in Belgium. On short notice, Norway will also be able to provide gas from the new Troll field, the largest European field after Groningen. This gas will be transported through newly constructed pipelines that land in Germany and Belgium and as recently announced, in the UK.

In Europe, around 5,000 bcm of proven reserves is available. The fields can be produced profitably with current technologies and at gas prices of below an equivalent oil price of US\$ 20 per barrel. In addition, another 3,000 bcm are likely to be found, which can also be produced and marketed in the current context. Most of these fields are in the British and Dutch sectors of the Continental Shelf in the North Sea, or the Norwegian sector of the Continental Shelf, where production and transport systems exist that can be adjusted or expanded at a relatively moderate cost. Reserves in the currently known fields will also be up-graded in the future, as they have been repeatedly in the past. The experience with Groningen and other UK fields has shown that a considerable period of production is required to accurately ascertain the actual size of a field. In the North Sea, this upgrading process has not yet fully taken off, Norwegian production in particular is still young. Other European coastal areas show promising geological structures as well. Finally, these estimates are of course produced by the oil and gas industry itself. As long as there is no need to look for new reserves, because the existing stock of known reserves is sufficient to guarantee production for an acceptable time-horizon, no additional investments are committed to exploration in new areas, and no additional volumes are found (Odell 2002).

Adjacent to the European market, are the major gas producers and exporters Russia and Algeria which both have large reserves. In the medium-term these exporters are expected to gain enormous importance in the European market, as indigenous gas reserves decline and consumption grows. At even greater distances from the European markets, are other countries with large reserves, such as Iran, Iraq, Qatar, Turkmenistan, Kazakhstan, Egypt, Nigeria, and Venezuela. These countries are expected to become suppliers of gas at the longer-term (in 15 to 25 years), supplying through pipelines or by tankers in the form of Liquefied Natural Gas (LNG).

The question as to when and how this gas will be brought to the European markets is dependent on a number of factors, including the availability of transport

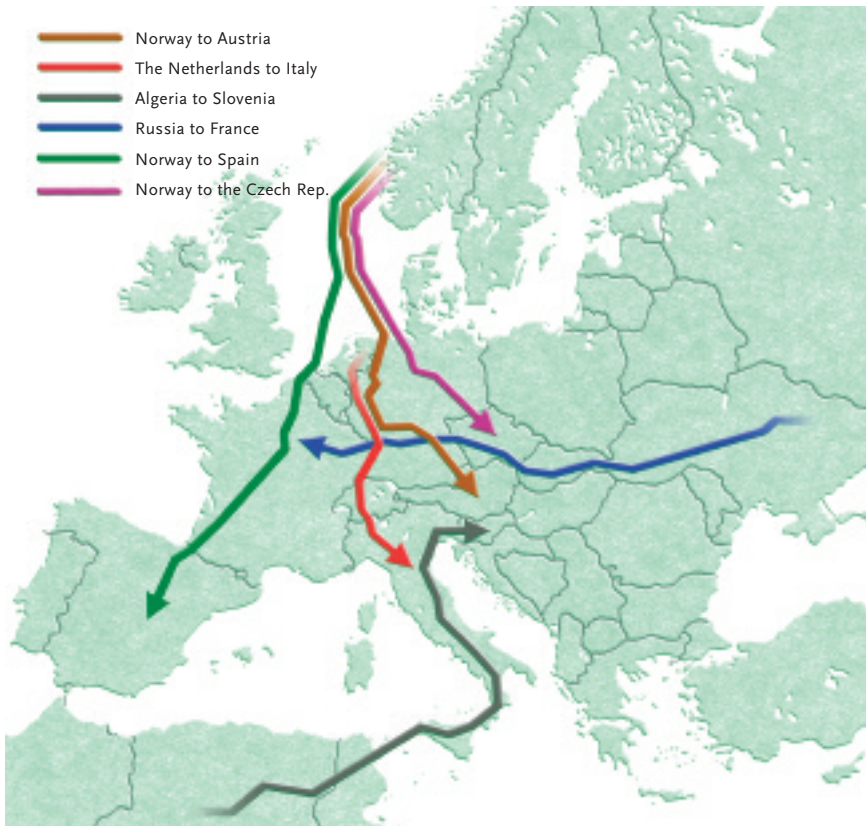


Figure 5.1
Supply of Gas to
Europe

systems, market developments, geopolitical circumstances and production capacity. Over the years, the European international network of pipelines has been rapidly expanded within Europe and from Russia and Algeria, to facilitate the transport of gas from the fields to the European market. An increase in imports of gas from new fields will require further expansion of the system in terms of capacity and connections to the new fields.

The price that consumers are prepared to pay for gas and the possible competing fuels are crucial elements for market development. A higher gas price, in principle, facilitates the development of gas reserves at larger distances from the users, or in difficult environments, such as the Arctic or deep-sea. As oil and gas are main substitutes, higher oil prices justify higher gas prices and thus facilitate the development of these far away fields and investments in transport systems. In contrast, continuing low oil prices will depress gas prices, and thus delay investment in exploration, development and transport facilities required to enhance the supply base.

A determining factor for a further increase in gas production and supply from Europe's neighbouring areas, like Russia, Algeria and the Middle East, is the willingness of oil companies and international banks to invest in projects. Main issues

in this respect are, first, the political – and policy – stability of those countries, many of which are plagued by internal political unrest, problems with ethnically and religiously driven groups and corruption. A second requirement is an adequate institutional and legal framework that allows firms to invest, operate and repatriate the profits, and that provides a stable and reasonable fiscal framework. A third element involves the fact that gas supply pipelines have to transit many countries, like the Ukraine, Byelorussia, Turkey, Georgia, Azerbaijan, Iraq, Iran, etc., between the fields and the European borders. The larger the transit fees and the lower priced deliveries of gas to these transit countries are, the more difficult it becomes to sell the gas at a profit in the European markets. Lack of confidence with respect to these issues and the fear of a too great exposure to risk in the transit countries currently generates much doubt for producing and importing oil and gas companies, bankers and importing countries with regards to engaging in such supply projects.

It is often assumed that oil and gas production will stimulate economic development, enhance welfare and thus bring about political stability in the producer countries. In the same vein, it is also believed to encourage these countries to open up their economies, initially to foreign oil and gas companies and subsequently for other firms. Yet, reality shows that more often the presence of oil and gas reserves induces the so-called *mineral curse*. This refers to a situation in which governments lack legitimate or effective power to govern the country but stay on through bribes, clientelism and sheer repression, funded by the export and sales of the resources produced. Indeed, in only very few countries has mineral resource exploitation stimulated a politically and socially sustainable pattern of development. Often, at best, it is the external image of a country that is adjusted to the requirements of trade relationships with the democratic countries in the West.

European security of supply and demand

Moral issues aside, it is also argued that the need for *security of supply* sought by importing countries is mirrored by the objective to achieve *security of demand* by the gas supplying countries outside of Europe. Indeed, these countries are fundamentally dependent on the revenues of gas exports as revenues from indigenous sales often barely cover costs of production and transport. Moreover, the production of oil and gas is often a main source of foreign currency, for countries like Turkey and Morocco that allow the pipelines to pass through their territories. These latter countries are also supplied with gas through these systems. As such, it is in the interest of these countries to maintain an image of a reliability, even if this implies local unrest being forcefully repressed.

The objective of involving western technology, finance and access to markets in the development and renovation of the oil and gas sector of the former Soviet Union prompted the Dutch Prime Minister, Ruud Lubbers, to launch the *European*

Energy Charter, in June 1990. This Charter, signed in December 1991 by 48 countries, established a legal framework for the exploration, exploitation and transport of oil and gas. The rights and obligations of governments of participating countries, as well as the companies involved, were explicated, to create clarity and stability. The idea was to facilitate the mobilisation of western capital and technology for the further development and modernisation of oil and gas production in the former Soviet Union, including in the promising Caspian Sea area. Willingness to invest is determined by expected revenues and the quality of the investment climate, involving rules about the appropriation of profits and the State influence in the operations. The Charter would guarantee to western companies that their investments and trade would be shielded from political and regulatory risk such as expropriation, excessive tax collection, exclusion of access to transport networks, and so forth. In essence, the Charter could have transformed Europe's oil and gas rich eastern backyard, like NAFTA had done by connecting the US to the supply of Canadian and Mexican gas and oil.

Unfortunately, the Charter has yet to engender such developments and has remained only a political declaration of intentions. A crucial point was that a dominant group of actors was not made party to the process around the Charter, namely the banks, as potential funders and investors of the development of the supply systems. Another factor that reduced the potential of the European Energy Charter was that for political reasons many countries outside of Europe had to be made party to the Charter and thus frustrated the development of a wider European oil and gas market.

JEAN MATHEY

Senior Official for Nogepa

The Importance of a Long-term Stable Investment Climate is often Forgotten

We have come to know Jean Mathey (62), the Secretary-general of the Dutch oil and gas producers association Nogepa, as a composed and deliberate character. In the current context of his long experience with the mining sector he is as deliberate as ever, but also very worried. Worried about the future of the gas sector and worried about the investment climate in the Netherlands, "which is so very important if a country wants to make the best of exploring and producing its natural resources, especially when, like in the Netherlands, it is all about smaller new reserves."

Just two and a half years ago, after extensive lobbying by Nogepa, the Dutch government proclaimed a series of fiscal measures to improve the investment climate, especially for the off-shore sector. This package was meant to stimulate ex-

ploration and production by oil and gas companies on the Continental Shelf. Due to a sharp fall of oil prices in 1998 and 1999 exploration activities were at a very low level. In the early 1990s, the average number of drillings hovered around 35 per year, by 1998 this number had declined to 23, in 1998 and 1999 only ten drillings per year were counted. In June 1998 a first measure to counter this trend had been introduced: the right to depreciate at will on investments in the off-shore industry. Subsequently, due to this fiscal alleviation together with the effects of higher oil prices, the exploration and production sector showed some revival over the last two to three years. The number of drillings for 2002 is estimated at 20, double that of 1999. Last year exploration activities as a whole were more successful: 30 to 40 billion cubic metres of new gas reserves were found.

In 2002 the incoming cabinet of Prime Minister Balkenende before its installation was confronted with a serious deterioration of the economy. In a short time the Dutch government budget shifted from a small surplus into a deficit, forcing the government to drastically cut expenses. Much to the discontent of the off-shore oil and gas sector was the decision to abruptly end the right to depreciate at will.

Thus far Nogepe's warnings to the government have produced no positive outcomes for the sector. "Strange thing is", says Mathey, "that in the past ministers have often stated the importance of a stable investment climate, especially for continuing the success of the small (gas) fields policy. But this decision of the government shows again that the need to offer a *long-term* stable climate often is forgotten."

"One of the most serious problems in this job is that you run into members of Parliament and other people who play an important role, who tell you that the partners in this industry are the big, powerful oil companies who do what they want. They continue to say that there is presently no problem because the oil companies are having the time of their life with high oil prices. But they don't realise that this sector here in the Netherlands is a branch industry that's very dependent of decisions made in the head offices in the United States, in London and Paris. As a branch of one of those majors, you have to fight for sufficient investment funds in the Netherlands. As a consequence of this decision to abort the right to depreciate at will, the return on investment is decreased sharply, in some cases halved from 20% to 10%, and knowing that for instance Shell attempts to achieve an average rate of 15%, you can imagine what that means. The possible return on investments for projects is not calculated on oil prices at the time of the decision, but on estimated prices over a long period of exploration and production. We know that some companies have put approval of new investments on hold. This measure of the government will mean that some projects will be stopped, or not started at all."

In January 2003, Nogepe informed the government it had determined from its members that 27 Dutch off-shore projects in new fields, platforms, and pipelines had not been approved by the mother companies due to the termination of the depreciation at will. And, another nine projects will be re-evaluated. This means 39



The NAM F3-FB accommodation module was built by HSM in Schiedam, in 1993. It comprises three parts: jacket, substructure and topsides.

billion cubic metres of proven gas reserves will not be produced, of which 9 bcm will be re-evaluated. The income for the State from natural gas production consequently would be reduced by €2.7 billion. Stalled plans for exploration drillings would diminish the volume of gas reserves to be proven in the coming years by an additional 50 to 80 million cubic metres.

Jean Mathey cites a Wood Mackenzie report which estimates the decline in value of the off-shore gas fields at some €200 million, or 3% in total for oil and gas fields on the Dutch Continental Shelf. But in projects for future developments an average decrease of value of 10% is calculated. Rates of return for future projects “are also reduced significantly in all cases. We conclude that there will undoubtedly be marginal projects that no longer show sufficient expected return for investments to be made.” In a separate benchmark study published in February 2002, before the abolition of depreciation at will, the Dutch Continental Shelf was ranked 21st on exploration value, among 57 of the most important global petroleum producing regions. The abolition puts this middle ranking of the Dutch sector at risk of being demoted to the lower rankings “without accounting for the implied loss of stability and increase of political risk due to a government that seems to be willing to reverse trends in policy at short notice.”

“In the short-term the government, due to its decision, gains 50 to 100 million Euro of tax income per year, but at the same time loses a multiple amount by undermining the long-term investment climate that is so vital for the national energy policy. This is clearly a short sighted decision.”

Another, perhaps even more important reason for Jean Mathey’s “serious worries for the future” are the government’s plans for privatising and splitting-up the national distribution company Gasunie. These plans represent a very radical change in the structure of Dutch gas policy that in particular made the exploration and production from small fields such a great success. The small fields currently contribute 70% of total Dutch gas production, thereby saving the reserves of the large Groningen field for the future, and maintaining its function as a swing producer. Until now Gasunie buys the production from the small field operators with priority and on the basis of net back value, linked to the price for gas from the Groningen field. This enables producers to exploit fields even with reserves less than four billion cubic metres.

Secretary-general Mathey cannot comment on behalf of his association on the split-up, because one of the members, the *Nederlandse Aardolie Maatschappij* (NAM), is owned 50:50 percent by Exxon/Mobil and Shell. As operator of the Groningen field and by far the most important producer in the Netherlands, NAM and its shareholders have quite a different interest in the plans for a new Dutch *gasgebouw* compared with that of the producers of the small fields.

But Mathey is willing to give his personal opinion. “My personal advice to the government would be to postpone any decisions until the year 2007. The present EU Gas Directive will be followed by a second directive. The present directive does

not oblige the government to privatise Gasunie, only to unbundle the trade and transport functions. That has been already achieved by Gasunie itself. So, wait and see what the changes of the second directive will be, because this present plan may be very harmful for the development of small gas fields.”

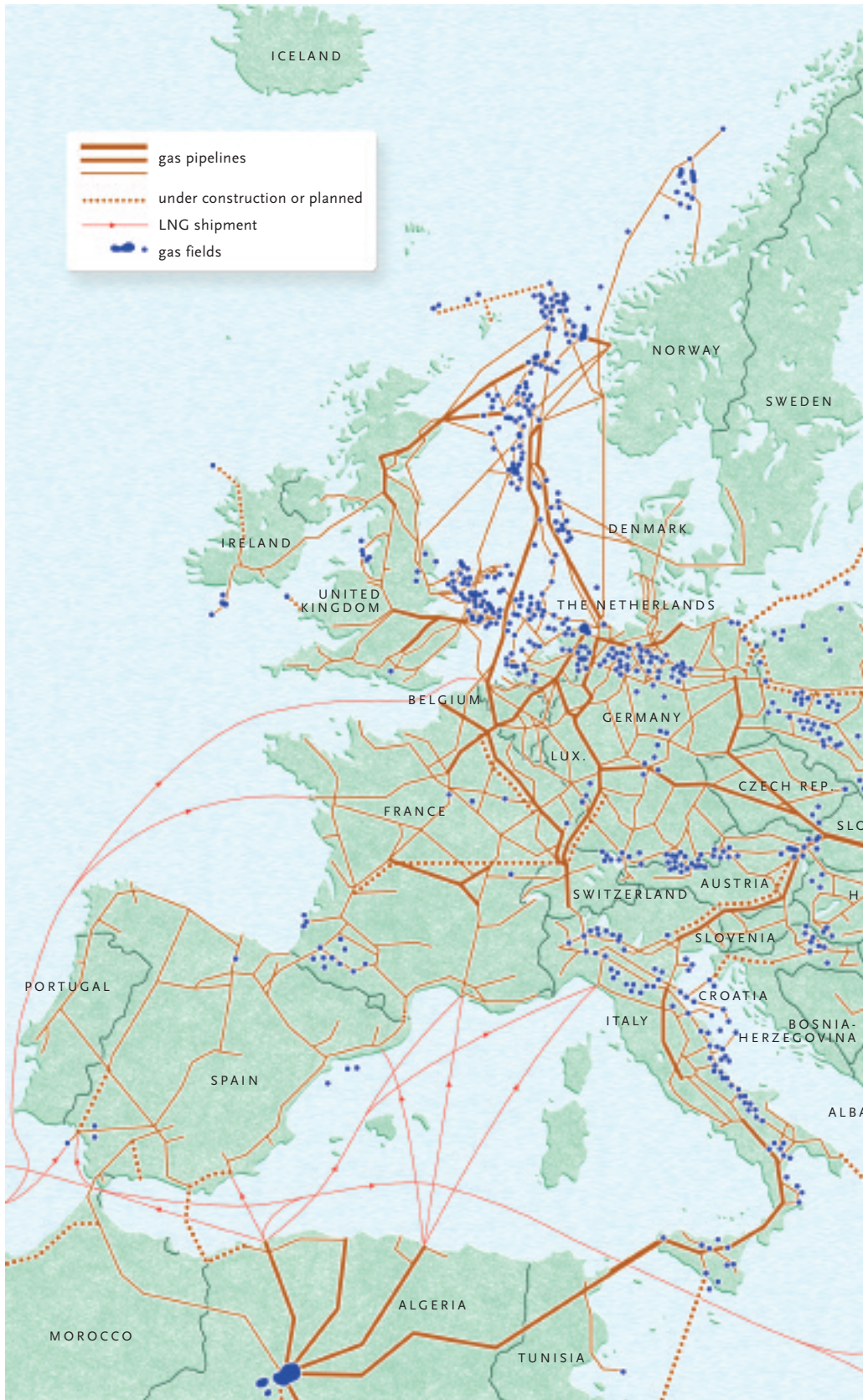
“Yes, I know that at the moment it is being considered to bring the State entity EBN within the Groningen partnership, responsible for buying all the gas from small fields. The small field producers want to take a step further to ensure their position in a new framework (*gasgebouw*). They prefer EBN taking over all the present tasks of Gasunie. That would mean that the government recreates an entity identical to Gasunie and a monopolistic position for all gas from the small fields. In that case, I do not exclude that any new government in the future might have to decide to also privatise EBN! Just look at what happened as a result of the privatisation of the gas sector in the UK. There is no longer any government influence on the depletion of fields, like we still retain here in the Netherlands, or on storage for the future. In five years from now the British will have changed from exporters of gas to net importers.”

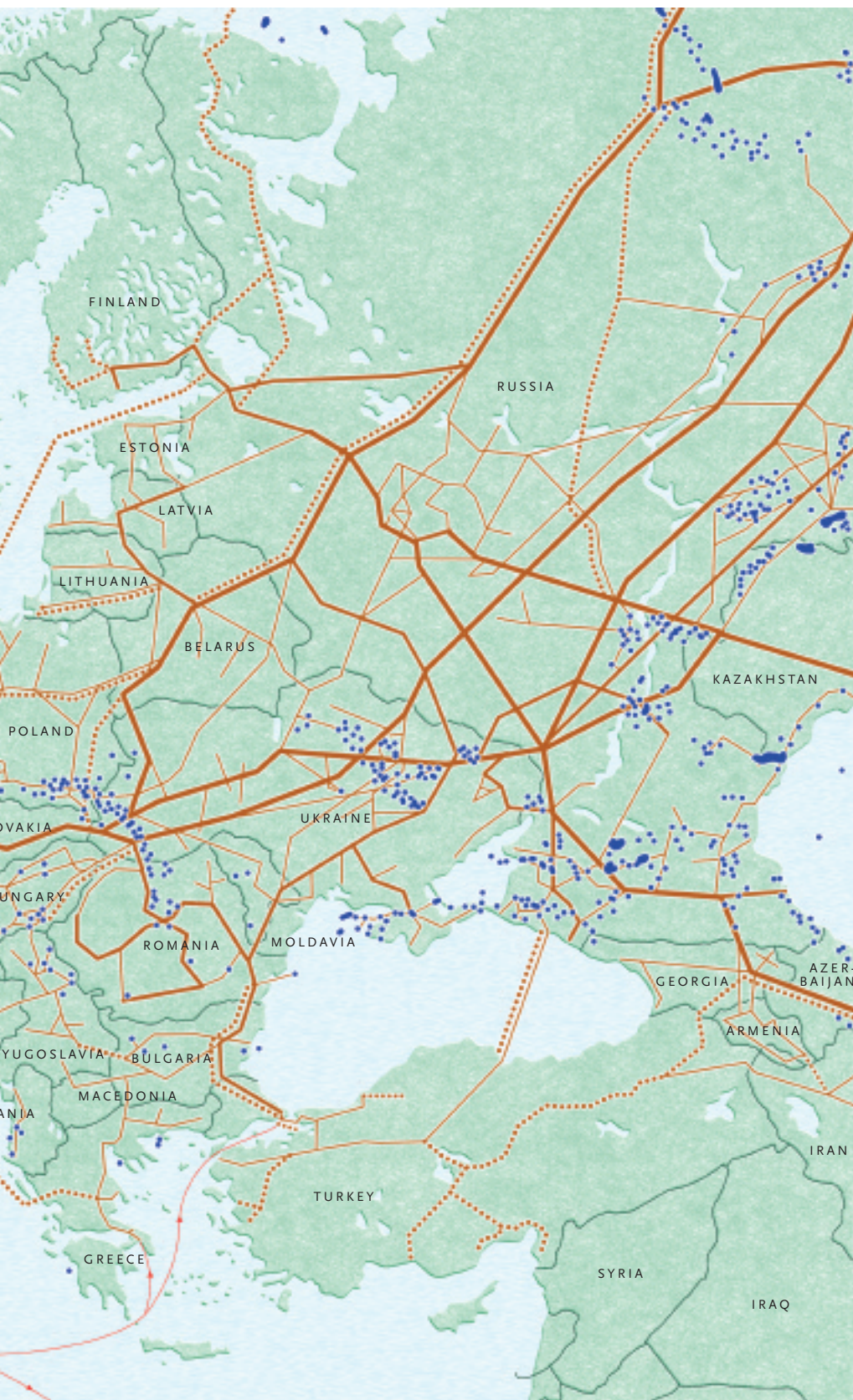
5.2 European Integration

Meanwhile, the integration of the European energy had begun to unfold. It has become customary to associate the concept of energy market integration in Europe with the developments that unfolded following the publication of the EU Commission's report *The Internal Energy Market* in 1988 (CEC 1988). Nevertheless, as shown above, a great deal of cross-border trade in gas was already taking place, strongly coordinated by a limited number of public and private actors. Towards the end of the 1980s, a tendency became visible in which relatively small amounts of gas were being traded outside the established, controlled system. Very gradually a kind of market-driven integration began to develop. The maturity of the gas system in parts of Europe, and the risk of not being able to cover fixed costs in a competitive situation had greatly decreased in these areas. These factors can be considered as major driving forces behind the current process of liberalisation (see Stern 1998: 18). During the 1990s, two other sets of arguments supported the EU-Commission's campaign for a liberalisation of the gas market, one set pertained to the supply side, the other to the demand side.

Regarding the supply side, the construction of additional pipelines, which, contrary to tradition, were built on a (partly) speculative basis were making uncontracted supply capacity available. There was no secured market for the gas transported to the market through these lines and hence it had to compete with other gas and alternative fuels. This created a situation in which the traditional suppli-

Figure 5.2
European Gas System





ers, in contrast with their actual objective to maintain the controlled market, were forced to anticipate a more competitive market and to adjust their strategy, thus actually strengthening the development of competition. In this respect, the producers were confronted with the classical problem of an oligopolistic market in which, as the market becomes more complex, it is increasingly difficult to keep the circle closed (see Odell 1996; Stern 1998; Radetzki 1998).

Complexity in the European gas market emerged as a result of different factors. The crumbling of the Soviet Union and its economic system forced Russia to depart from the traditional practice of selling gas at the border to the European wholesale transmission companies. A fall in its domestic sales and problems with payments made considerable volumes of gas available for export, while the influx of foreign currency from gas sales became crucial to Gazprom and to the Russian State (see Weenink & Correljé 1999). In order to capture a larger share of the market, downstream marketing joint ventures in European countries were established. In addition, the existing structure of transmission pipelines to west and central Europe was affected by the disintegration of the Soviet Union and the resulting tensions between the new republics, Russia, the Ukraine and Byelorussia. Hence traditional control over the use of supply capacity was weakened somewhat when additional excess capacity was put in place.

An important factor for the opening of the market has been the strategy of the German gas supply company Wingas, a joint venture of Gazprom and Wintershall (a subsidiary of the chemical manufacturing company BASF). In 1989, Wingas announced the construction of a new pipeline (the Midal pipeline) from Emden where Norwegian gas enters Germany, to Ludwigshafen in the centre of Germany, the location of the main BASF plant. The construction of this pipeline was a response to the outcome of a struggle between BASF and its traditional gas supplier Ruhrgas which was not prepared to lower the price for gas delivered to BASF based on the market-value principle. Hence, BASF engaged in international gas trading through its subsidiary Wingas, initially a small gas production company.

This episode proved crucial for the further development of the German and European gas market as a consequence of the unification of East and West Germany. The appearance of Wingas, an independent outsider to the traditional network of transmission companies, was particularly important because it induced gas-to-gas competition over the supply of the former East Germany. Subsequently, several new pipelines were constructed: to Russia by Wingas, and to Norway by Ruhrgas. New gas supplied through these pipelines is deemed to have caused gas-to-gas competition to emerge in other parts of Germany and Europe (see Stern 1998; 1999).

A further major challenge was the construction of the Interconnector between the UK and the continent. In part the Interconnector was meant to carry gas sold under long-term contracts, but a considerable portion of its capacity was to be open for short-term and spot-market deals. Initially, in the context of excess supply

and a competitive market in the UK, lower priced gas was supplied to the continental market, in particular to the Netherlands.

In southern Europe, Algeria has been making an inroad into the European gas system through the construction of the Gazoduc Maghreb-Europe (GME) pipeline. The GME system will primarily supply gas to the Iberian Peninsula. It is difficult to assess the consequences of this addition. Sonatrach still supports the traditional approach but the current political instability in Algeria may lead to unforeseen developments. It is also unclear to what extent a likely liberalisation in north-west Europe will have a direct effect in the southern European markets for natural gas.

The two other traditional supplying countries, the Netherlands and Norway, have adjusted their operations strategies in the more competitive context. Despite the fact that the Netherlands' government was amongst the staunch defenders of the controlled market, by the end of 1995 it declared that it would no longer resist liberalisation of the gas market. By and large this meant that Gasunie would seek a future strategy in the provision of additional flexibility and storage capacity and in a major role as a gas trader. To-date it is not anticipated that much larger volumes of Dutch gas will be made available for export, as the government still uneasily attempts to reconcile former objectives of energy policy (such as security of supply on the basis of indigenous resources, etc.) with a more liberal stance.

The other traditional supplier, Norway, also has taken a moderate position. On the one hand it is still committed to maintaining the *status quo*. On the other, it takes advantage of the new situation by offering gas to central European countries, while bringing about a potential increase in supply capacity by optimising existing systems for export to UK and central Europe. Norway, is a member of the European Economic Area (EEA) and bound by EU Directives. Recently the EU has forced Norway to restructure the way it sells natural gas to other European countries. Traditionally, Norwegian gas was sold through the *Gassforhandlingsutvalget* (GFU – the gas sales negotiating committee), dominated by the two main Norwegian companies Statoil and Norsk Hydro. Like Gasunie in the Netherlands, the GFU sold gas produced by the different companies in Norway, which the EU stated violated fair trading practices. In July 2002, Norway and the European Commission resolved this dispute. The Commission accepted the continued use of long-term contracts in return for the promise that Statoil and Norsk Hydro sell a considerable amount of gas to new European customers that had no previous GFU contracts. A major constraint for upstream gas companies competing for sales in the newly deregulated market will be the limited infrastructure to take the gas out. Norway supplies gas to Germany through the Europipe I and Statpipe/Norpipe systems and the Europipe II line to Emden. About 20% of the gas that Germany currently consumes comes from Norway. Belgium is supplied via the Zeepipe trunkline to Zeebrugge, and the NorFra pipeline transports gas to Dunkerque in northern France. About half of this gas is moved to Italy and Spain. There are also pipelines to the UK, the largest natural gas market in Europe. Norway once sup-



In the early 1970s, greenhouse horticulture massively switched from fuel oil to natural gas.

plied up to a quarter of British demand in the 1980s, but this amount dwindled as the Frigg field, that supplied the gas, became depleted. New connections are, however, established to expand supplies. Recently, in July 2001, BP announced a fifteen-year contract to buy natural gas from Statoil and in June 2002, Centrica signed a ten-year deal.

On the demand-side, pressure to liberalise was exerted particularly by power generation and large energy intensive industries, for which energy was an important element in their cost structure and thus in their competitiveness versus industry elsewhere (see Stern 1998: 60-68). For the power sector, there is a noticeable trend of moving away from coal-fired and nuclear power generation – for economic, environmental and safety reasons. Cogeneration is making rapid inroads into some of the national electricity systems. It should be noted, however, that there are strong variations in the extent to which this trend affects different country's situations.

Large industrial consumers, and to a lesser extent medium-sized undertakings, have played an important role in national developments. Believing that cheaper gas could be purchased either from abroad or from alternative national suppliers or that their competitors abroad would receive their energy supplies at lower costs, they took action. They pressed their traditional suppliers (either the transmission companies through direct supplies, or local distribution companies) to change their price and supply conditions. If necessary, they persuaded their national governments to adjust the system in such a way as to allow them to also benefit from lower gas prices. As such, national developments are to a large extent a function of the (potential) role of natural gas in industrial energy supply and power generation.

When a market-like structure begins to develop, it inevitably spills-over to smaller consumers as well. The need for suppliers to establish a broad consumer base, increase volumes and shave supply peaks, creates a trickle down-effect. Moreover, when smaller consumers learn that larger consumers are being supplied at lower costs, they too seek the right to obtain lower cost supplies. The extent to which differences in the (potential) role of natural gas in national energy supply systems have influenced national liberalisation policies will be considered in some detail below.

Up to 1990, the development of the European gas cross-border transmission network took place in a controlled mode. Governments, production and transmission companies and local utilities acted in accord to ensure that the supply and consumption of natural gas evolved in a balanced manner – secured by a system of long-term take-or-pay contracts. Hence the risks involved for investing in the industry and transport systems were limited. It is important to note that apart from a number of specific projects, the development of the market or regulation-driven integration – post 1988 – took place with an infrastructure that was constructed by and large during the period of controlled integration.

The explicit aims of the EU-policy in 1988 were to adjust the existing regimes in such way that international trade in energy would become subject to free trade

and competitive market conditions. This objective, characterised as regulation-driven integration, developed in a dialectical manner as a function first, of the EU Commission's objective to extend the single market in goods in general to the energy sector; second, of the interests and preferences of the several Member States, each with its specific configuration of national interest groups and resource endowments; and, third, of external circumstances that shaped both the perceptions of the several actors involved in the process of integration, as well as the objective conditions under which the process evolved. These circumstances were based on a presumption of there being an abundant supply of oil at low prices and the ample availability of natural gas fields around Europe, ready to be transported and sold to the consumers.

Energy market integration and the European Treaties

As stated above, the European Union developed out of the European Coal and Steel Community (ECSC), the European Atomic Energy Community (Euratom), and the European Economic Community (EEC). Despite the fact that two of these three agreements dealt with energy, the European Community has been notoriously weak with respect to its grip on energy sector developments and energy policy. This has been because of the Member States being unprepared to cede any sovereignty in this respect to the Community's institutions for reasons outlined above. Moreover, their energy policy objectives and solutions in times of crisis were rather divergent – depending on the specific circumstances within their national energy sectors (see Linde & Lefebvre 1988).

Reflecting this legacy from the past, the Single European Market in principle does not provide for any special treatment of energy and energy resources with respect to the “four economic freedoms” (Art. 85 EC Treaty). This implies that the creation of a Single (competitive) Market in principle also extends to the energy industries. Yet, national governments have given extensive monopoly rights to utilities in network industries (telecommunications, electricity, gas), while Article 90 of the Maastricht Treaty provided that exemptions from competition may be given to such firms, having been mandated to fulfil public service obligations.

In 1990, an EU Directive was adopted with the intention of providing transparency in prices for large industrial users. The authorities in Brussels were to be notified of the prices fixed in contracts to provide better information to other users. In 1991, a Directive was passed to enable international trade in power and gas, over the international transmission network for power and gas. In 1996, the European Electricity Directive was approved (96/92/EC), empowering the EU-Commission to undertake a process of liberalisation in the electricity sector. The Member States, however, rejected the first proposals for further liberalisation of the national gas sector.

The initiative to liberalise the energy market met with resistance from most of

the parties involved with the exception of the lobbying groups of the large-scale energy end-users. This resistance, in combination with the strong tradition of regulation and State intervention in the energy sector, caused the liberalisation to proceed only slowly with difficult and protracted negotiations. Many arguments were voiced. The EU Member States' governments wanted to maintain their sovereignty over strategic energy issues. In addition, the national energy sectors all reflected the local geological, technical and economic characteristics, harbouring forceful interest groups, associated with the industries – the incumbents – who were not particularly enthusiastic about competition in their wealthy sectors. Moreover, governments feared that they would lose the policy instruments through which they could influence the economy. Indeed, in many countries, the energy sector was used as a vehicle for regional, social or environmental policy. Germany and Spain, for example, subsidised coal mines to maintain jobs in problem-ridden regions. In the Netherlands, environmental and energy saving policies were implemented and carried out through the local energy distribution companies, via an environmental levy. In addition, energy taxes and levies in many guises significantly contributed to State revenues. Finally, security of energy supply was generally thought of as a public good – too important to be left to the market.

Other arguments were that free access to the transmission networks was already provided for as Norwegian gas was transported to Belgium and France, etc. It was feared that liberalisation would stimulate an excessive growth of regulation. The costs of the required systems of control, data-management and third party access would eventually reduce the cost advantages of a liberal energy market. It was argued that liberalisation would discourage the necessary large investments in production capacity, pipelines and storage facilities, because of the enhanced uncertainty regarding pay-back periods and revenues. Indeed, long-term supply contracts with take-or-pay and destination clauses were to be removed. Finally, it was thought that price reductions would fall to the large-scale users only, and that gas suppliers would compensate for their declining revenues by charging higher prices to the captive small customers.

It would take nine years of negotiation before the European Council accepted the outline for a European Gas Directive in December 1997. The Directive offered the Member States considerable freedom to adjust their national arrangements and provided for all kinds of exemptions. It clearly represented a compromise between the Commission's ambitions and the lack thereof amongst most Member States.

The Gas Directive and the gas industry

The EU Gas Directive (98/30/EC) mandated that Member States of the EU had to adjust the organisation and regulation of their national gas sectors in such a way that consumers would receive the right to conclude gas delivery contracts with national or foreign gas suppliers of their choice. It had fundamental consequences

for the structure of the existing gas market and the way in which the gas was produced and moved to the final consumer.

Traditionally, six main types of actors had been active in the European market. The *producers* – mostly oil companies – undertook the exploration and production activities and sold the gas produced to the national whole-sale buyer and *exporter*, such as Gasunie in the Netherlands, British Gas in the UK, GFU in Norway, Gazprom in Russia and Sonatrach in Algeria, that coordinated the production and sales both nationally and abroad with other suppliers.

These whole-sale buyers and exporters sold the gas at the border to *transmission companies*, and/or *traders*, that took care for the transport of the gas through Europe and the supply of the local, or national, gas distribution companies and large industrial customers. With exception of Germany, every country in Europe had one transmission company, operating the whole national high-pressure transport system. The local – often municipal – distribution companies operated and owned the local, low-pressure network, through which the gas was transported to the small domestic users and businesses.

Trade between the several parties in the gas chain was arranged through medium to long-term contracts. The producers delivered the gas via long-term contracts, of 15 to 20 years duration, to transmission companies. These then negotiated medium-term contracts (one to five years) with the local distribution companies and large-scale users. The small users had supply agreements with their local distribution companies.

Everywhere in Europe, the transmission companies and local distribution companies had been given a local monopoly for pipeline operation and distribution, as pipeline transport and distribution is generally considered a *natural monopoly*. Economies of scale and scope gave the *first* operator monopoly power over other potential entrants, as the former could always supply gas at the lowest costs per unit delivered. This monopoly position was reinforced by the high capital intensity of operations in distribution as well as production segments. In a competitive market, it was argued, no private entrepreneur would be willing to commit large sums under such high risk without a monopoly context. So, the firms in the sector, as well as the consumers, needed protection from unwanted cut-throat competition and the security to make the required investments to provide a stable system of supply. By means of concessions, public ownership, indicative planning, cost plus pricing and regulated prices, the risk for producers, distributors and consumers was reduced (Newbery 2001: 27-30).

Through the State-accorded monopoly position and by specific clauses in the supply contracts, the *producers*, the *transporters/traders* and the *distribution companies* were able to coordinate purchase and sales volumes of gas, and prices. Through these contractual provisions, the risk involved in the funding of the extremely expensive production and transport facilities over the longer-term was reduced. This, of course, stimulated enormous investment in the expansion of the



Get up in a rig and look down in the depth,
only then do you get a sense of what's going on

system, as long as gas could be produced and transported at such a cost that the end-use price allowed for a reasonable profit. An important element to the contracts were the so-called take-or-pay clauses, obliging the distributor or consumer to pay, even when the whole volume of gas agreed upon had not been taken from the system, for example, because of lagging demand development.

The existing monopoly operators, of course, did refuse outsiders in gas supply access to their systems to avoid competition. Hence, the only competition to gas emerged from the threat that consumers would switch to other energy sources, of which oil was the most relevant. Yet, the end-use gas prices were always slightly below local prices for substitutable oil products. Crucially, the contracts contained destination clauses through which the volumes of gas were committed to a specific area and could not be sold elsewhere at a higher profit, or undercut official sales. The revenues to the producers were, thus, dependent on the retail prices for oil products to the several types of end users (the netback principle).

The transporters and distributors were remunerated with a fixed fee which was dependent on the cost of the pipeline and the negotiation position of its operator (normally having a monopoly position). This implied that when the gas prices fell, as in 1986 or at the end of the 1990s, the lower revenues were passed on to the producing companies and the governments of the Netherlands, Norway, Russia, the UK, and Algeria. The revenues to the pipeline operators and distributors did not change.

As stated, the Gas Directive mandated that EU Member States had to adjust the organisation and regulation of their national gas sectors in such a way as to grant consumers the right to conclude gas delivery contracts with national or foreign gas suppliers of their choice. To start with, the Member States had to open up a first tranche of 20% of the national market and after ten years 35% of the market had to be open for supplies by third parties.

To facilitate suppliers and trader access to consumers, two main changes were necessary. First, the EU Member States had to adjust their rules so that producers would no longer be forced to sell their production to one national wholesale gas buyer. The *EU Hydro-carbons Directive* determined that producers were to be given the right to sell their gas to anybody interested and acceptable to them, including large consumers, intermediate traders and retail sellers. To achieve this, a second important requirement was that the existing transport and distribution network had to be made accessible to third parties. Producers, traders and consumers should be given the right to contract transport capacity in these systems, to transport the gas to the customer at the end-use location. Instead of selling the gas to the network owners and traders, the producers and independent traders had to acquire transport and distribution services at a fee.

Third party access

Third party access requires a large organisation and complex administrative system to carry out and control all these transactions. Moreover, strict and independent regulatory oversight is required to avoid owners of distribution networks, or others, abusing their dominant economic positions. Indeed, such transport systems remain natural monopolies, of which the owners and operators are in the position to jeopardise others' interests. Indeed, traditionally the role of network operator/transport was combined with trading. A (natural) monopoly in transport or control over so-called essential facilities, thus, also yields a dominant position in trade activities. Hence, the EU Gas Directive requires an unbundling of the roles of transporters and traders, while the activities of the transporters should be regulated to the extent that they provide non-discriminatory access to every potential user, while the trade segment should engage in the supply of gas to the consumers, in competition with other potential suppliers.

For consumers, these new arrangements imply that in principle they have the right to select their supplier of choice. The existing concessions, under which one distribution company had the sole right to supply gas and/or power and heat in a determined area, will be terminated. More suppliers will be offering their gas or power alongside – and in competition with – each other, at specific market prices and supply conditions.

Analogous to developments in the telecom sector, different contract forms are arising, taking into account specific patterns of use, including capacity requirements, load-profiles and the timing of demand. The customer is then in a position to select the supplier with the most attractive conditions. It is expected, of course, that suppliers will try to gain, or protect, their market share by improving supply and price conditions. At the same time, these firms will of course exhibit strategic behaviour and adjust their structure and operations – through mergers and acquisitions – so that their size and activities fit the requirements of the newly emerging competitive market. The traditional whole-sale traders and distribution companies will have to develop new strategies and adjust their organisations, as they will lose both their secured market and the integration and coordination between their several types of activities in the supply chain.

PETER ODELL

Professor Emeritus of International Energy Studies, Erasmus University Rotterdam

European Gas: Prospects

Western Europe's gas use in 2000 was of the order of $385 \times 10^9 \text{m}^3$ and its share of the energy market above 26%, with the most noteworthy developments in the

power generation and industrial markets – at the expense of both coal and oil. Every country is now linked into the gas transmission and delivery systems, so making Europe a near fully-fledged three fuel economy. Indeed gas is now poised to become the region’s single most important energy source – having overtaken coal in 1993 and now closing the gap with oil in many countries.

Inconsistencies of Liberalisation

Earlier constraints on gas expansion in Europe effectively disappeared in the 1990s. This, in part, was a result of liberalisation measures, but the development in fact owed much more to a specified range of other factors, according to Odell. Subject to the continuing importance of these factors, plus the rapidly increasing influence of gas’ environmental advantages over coal and oil, growth in its use will persist irrespective of the organisational structure of the industry. Unhappily, the EU’s ideological commitment to liberalisation seems likely to threaten, rather than encourage, the prospects for growth, given the inconsistencies inherent to the process as set out in the Liberalisation Directive and the consequential uncertainties which undermine confidence across the industry from exploitation to final consumption.

First, the inevitable uneven application of the Directive from country-to-country will give rise to at least a decade of unpredictability for both companies’ and users’ fortunes and lead to the creation of an unacceptably wide range of levels of benefits, dependent on the location of the interested parties with respect to the contrasting speeds and forms of the liberalisation procedures.

Second, liberalisation in itself produces conflict between environmental objectives and economic considerations, notably over the taxation of gas use (leading to higher prices and lower demand), thus threatening net-back prices, and hence the revenues achievable by suppliers.

Third, the elimination of long-term, take-or-pay contracts may reduce prices in the short-term, but could well increase them over the longer-term, as their absence increases upstream investment risks for suppliers.

Overall, these factors arising as a consequence of strategies based on a free-market ideology carry the seeds of supply problems post-2010, given the expected market developments shown in Table 3.

Table 3 The Evolution of the Overall European Gas Market, 2000-2020

	Actuals	Current Expectations for	
	2000	2010	2020
Gas Use	428	580-650	675-900
Indigenous Gas Production	282	320-350	350-425
Imports from External Suppliers	146	260-300	325-475
Import Dependence	34.1%	44.8 to 46.2%	48.1 to 52.8%

Source: Stern, J.P., *Traditionalists versus the new economy: Competing agendas for European gas markets to 2000*, Royal Institute of International Affairs, Briefing Paper, New Series no.28, London, 2001

Liberalisation at what Price?

The currently expected modest international oil prices to 2020 (at US\$ 20 plus/minus US\$ 3 per barrel in 2000 US\$) will sustain an indexed border price for gas in Europe of only US\$ 3+ per mmBtu. This could restrain both indigenous gas production and gas import availability, given an expected long run gas supply price curve rising to US\$ 4 per mmBtu.

In these circumstances of oil-indexed gas pricing – whereby gas prices have, generally, to date been kept well above its long run supply price – the impact of an ideologically imposed liberalisation could result in future gas prices rising above their oil equivalents (as in the United States in the recent past). This would not only be intensely ironic (as liberalisation is promoted as a structural change to reduce prices), it would also be a market de-stabilising result.

Liberalisation and Security of Supply

Liberal ideology, of course, presumes a competitive gas supply system. This however leads to the exposure of the producers with respect to the viability of their upstream investments, given both the long lead-time for the development of production capabilities and the high volume of investments required for securing the required economies of scale in the associated transmission systems. Under such conditions, arising as a necessary consequence of the free-market structure demanded by the EU Gas Directive, there will be a powerful motivation for suppliers' collusion. This seems likely to lead to a formal or informal Organisation of Gas Exporting Countries to Europe (OGECE), possibly with an OPEC-like production quota system for its members (Russia, Turkmenistan, Iran, Qatar, Libya and Algeria), which would not be bound by the inherent requirement of free trade in gas in the Liberalisation Directive.

Norway, while remaining a non-member of the EU, has given commitments to the EU to pursue non-restrictionist policies which would under the circumstances of an OGECE nevertheless have an option to become a member (at the cost of counter-measures which would be taken by the EU) and thus enhance price levels; or it could become a free-loader by virtue of its ability to ensure that the price for its gas to Europe reflected the going-price generated by the cartel of suppliers external to the European system.

Such possible developments would, of course, not only be adverse for the anticipated Eurogas market (see Table 3), but they would also be more generally disadvantageous for Europe's economy. Thus, increasing dependence on gas supplies from external sources (from only one-third in 2000 to about 50% in 2020) arising

as a consequence of liberalisation, requires much more attention than that given to date.

Gas is NOT “just another commodity”

With energy customers increasingly committed to gas supplied through expensive and dedicated pipelines, flows have to be uninterrupted. “Alternative supply sources” – the usual backstop argument by liberalisation proponents – are a theoretical concept only – except in the long-term (by when the customers are dead) as they imply costly investments in production and transmission facilities to ensure their instant availability.

In these circumstances long-term, take-or-pay contracts – as sought by suppliers – are “of the essence.” As in the requirement for continuing involvement of governments in both the negotiations for, and in the monitoring of, the agreements. The EU will outlaw such contacts at its peril – both political and economic.

As with international oil (now “re-ordered” as the United States came to recognise the inherent perils of a “free” market), so an ordered Eurogas market – at least in respect of relationships between EU gas importing countries and external suppliers – is not only the safer option, but also the most likely way collectively to maximise the benefits to the parties concerned. In this context, “Back to Groningen” could well become the Eurogas industry’s rallying cry by 2010.

5.3 The Future Role of Gas in Europe

It is generally expected that, unless Europe radically changes its position on nuclear energy, increased dependence on gas imports will be a given for the foreseeable future. Europe will need to arrange at least 50% of its energy requirements through imports of fossil fuels. Gas is considered the preferred fuel, with a possible share in the EU primary energy portfolio of around 30% (IEA 2002a; CEC 2001). In principle, there is enough gas in the EU’s neighbourhood to meet Europe’s additional demand for energy for the foreseeable future, because the many potential suppliers of gas and LNG provide a second potential source of supply.

Recently, however, doubts have been cast over this supply perspective, as it is maintained that policy-makers in the consumer countries fail to accept the conditions necessary to bring this gas to the EU markets. It is argued that fundamental differences exist between the exploitation of gas and of oil resources. Because there is a global market for oil (and to a lesser extent for coal), oil producers can bring new fields into production, even in remote locations, knowing that the fuel can always be sold somewhere, at the going price. The exploitation of remote natural gas resources, however, does not offer such assurance, because of the need to



Liquefied Natural Gas is stored at the Maasvlakte near Rotterdam to provide extra supply capacity to satisfy demand at the peak.

construct an expensive dedicated pipeline infrastructure from the remote fields to the market. The size of the investments, their timing and the quantities of gas involved in the new developments are such that producers and suppliers from outside the EU cannot undertake these ventures without a high degree of certainty that the gas will be taken by the market, at the time it will be produced. This implies that such supplies need to be carefully arranged with the contractual (and other) support of those buyers in the market, which have the ability to evaluate and aggregate the many small parcels of demand in local markets.

Over the past 40 years, the European gas industry did obtain security of demand, by means of long-term supply contracts with provisions on take-or-pay basis, providing limited flexibility, and price indexation ensuring the competitiveness of gas in the specific markets. As noted above, this specific industry structure is currently being dismantled and a new system is being introduced which focuses on short-term rather than long-term deals. This is causing significant uncertainty regarding the market and the business environment. Gas producing countries, particularly Russia, Algeria and Norway, and some of the large oil companies and financing groups involved, are showing signs of confusion and discontent with these developments. For example, at conferences in Algiers, in May and September 2002, with exception of Norway and the Netherlands, it was made clear that the concepts that have emerged from the process of liberalisation are not helpful in creating the environment for a further expansion of the gas market.

This raises questions about the potentially conflicting objectives of liberalisation and the need for many of the Member States to secure additional future gas supplies. Successful growth of the gas market may conflict with the measures introduced and envisaged, regarding the liberalisation of the market. Indeed, it is even argued that market liberalisation may inspire the producing countries to turn their Forum of the Gas Producing Exporting Countries into a GASPEC, and that, paradoxically, is precisely the liberal market situation that allows for the potential effectiveness of such an OPEC-like cartel. And, at the same time, of course, a GASPEC-like cooperation between the non-European gas exporters could be a most effective means to block any attempts to further producer-consumer cooperation.

Chapter 6

Hollanders, Count your Blessings





Overview of the gas treatment facilities near Den Helder, and the control centre through which the off-shore gas production is coordinated.

6.1 Small Fields

More than forty years of natural gas production has provided the Netherlands with great wealth; 97% of all Dutch homes are heated with this relatively clean fuel; more than 11,300 people work in the gas sector and the government has thus far collected more than €130 billion in additional income. What would the country have been like, without this godsend?

In Grijpskerk (in the northern province of Groningen) February 1992, Ben Warner, the experienced and outspoken spokesperson for Gasunie, was elated with the test results of this new gas field. The Grijpskerk field added at least 10 billion cubic metres (bcm) natural gas to the Dutch proven reserves. The new field was another successful example of the Dutch *small field policy* and became, after its partial depletion in the second half of the 1990s, a strategic location for underground storage.

“Hollanders, count your blessings,” said Warner, referring to the role of the small gas fields in the overall gas production of the country. The Dutch policy to bring as many small fields as possible into production, enables Gasunie and the exploration and production company *Nederlandse Aardolie Maatschappij* (NAM) to conserve the reserves of the nearby huge Groningen field (still the largest on-shore field in the EU) for as long as possible. That is important as it allows the Groningen field to be used as a ‘swing supplier’ for the Dutch gas system. “It is the balancing-role of Groningen that makes it possible to produce from more small fields. Whenever there is a shortage of gas, on the domestic market or in our exporting countries, Groningen can fill the gap. It is a wonderful combination,” said Warner.

The government pursued the small field policy from 1975, subsequent to the first oil crisis of 1973. Dependence on oil imports and coal had been substantial for both the Dutch energy supply and the economy in general. Moreover, this dependency had been rising because of a growing population and fast expanding industrial and transport sectors. Any opportunity to challenge this trend was welcome. A greater role for the indigenous gas production seemed logical and very advantageous because more and more households, offices and industrial enterprises were being connected to the gas-grid.

Grijpskerk added, as many small fields had before, another year to the life of the Groningen field and gave hope for more smaller fields to come on-stream. At that time, Gasunie and NAM had great expectations of obtaining the necessary li-

censes for exploration and production of some very prosperous, and earlier discovered, fields under the Waddenzee, north of the provinces Groningen and Friesland. In 1994 a ten-year moratorium on gas production in this carefully protected area of wetlands, rich with fauna such as birds and seals, came to an end. The gaspeople thought they could convince environmentalists and the government that with modern technology and much extra care, no harm would be done to the precious ecosystem in the Waddenzee. The government officially kept their options open. Every procedure to grant a license to the NAM for test drillings, however, was fundamentally and ultimately successfully contested in the courts. On several occasions, when Ministers of Economic Affairs had attempted to reverse this situation, they were thwarted by the State Advisory Committee (Raad van State).

Presently (2003), prospects for exploitation of 'Waddengas' are weak. Prior to the May 15, 2002 elections, there had already been little political support in the Lower House of the Dutch Parliament for granting NAM the necessary licenses (Westerwoudt 2002). The new coalition government of Prime Minister Jan Peter Balkenende (Christian-democrats, Liberals and the populist party LPF) intended to achieve a new ten-year moratorium on drilling under the Waddenzee. Yet, a minor breakthrough for industry was the new government's intention to allow, under strict ecological pre-conditions, production from three fields at the outskirts of the Wadden-area.

Nonetheless, the government continues its small field policy. This gas policy has been very successful and has greatly stimulated the exploration and development of new reserves. Without the production from the small fields, the large Groningen field would have been by now virtually depleted. During the period 1979-2000, the share of small fields in the total production grew to about 70% of the total Dutch production.

The estimated remaining reserves in the 350 now proven, small fields were in 2001, 380 bcm (for both on-shore and off-shore in total), and for the Groningen field 1,165 bcm. In addition, experts predict that futures (non proven reserves) will range from 230 to 480 bcm (see Figure 2.2).

With the current total production rate of about 70 bcm per year, production of natural gas in the Netherlands could be continued for another 30 to 35 years (Peeters et al. 2002). The production of more small fields helps to prolong the flexibility of the Groningen field and its important swing producer role, and could also contribute to improving the depletion recovery of existing small fields. To reach these goals, the Dutch gas business needs a high level of activity in exploration and production (E&P sector). Since the second half of the 1990s, however, this level of activity in the upstream gas sector has fallen dramatically (Peeters et al. 2002), despite a more favourable fiscal regime. During 2000 and 2001 there was a slight recovery.

A combination of economics and the long procedures for obtaining licenses has reduced interest in Dutch small gas fields, particularly for some of the interna-

tional oil companies. For these companies, investments in the Netherlands have to compete with other oil and gas projects, particularly in the Caspian Sea region, Asia, Africa, the Middle East, and South America. Because the new fields in the Netherlands are getting smaller and smaller, exploitation is often critically dependent on the proximity of transport infrastructure (pipelines). Moreover, delays in granting licenses for exploration and production during the course of a project can make the difference between profit and loss for such a venture. It is easy to understand that companies opt for the world's more prosperous areas, rather than risk investment capital on these marginal fields – particularly when political support for these investments is unclear.

Nevertheless, the Netherlands possesses the largest gas reserves in the EU and supplies nearly 20% of the EU's total gas consumption. Due to the unique features of the Groningen field, the Dutch gas sector can cope with fluctuations in demand and supply in Western Europe as necessary. Successful continuation of the small field policy, which would underpin this swing production function of the large Groningen field for the future, is of enormous importance to the security of natural gas supply in the Netherlands, and in the EU.

In 2002 the Minister of Economic Affairs, Annemarie Jorritsma, emphasised that there were “compelling reasons of public interest to produce gas wherever that is possible” in the Netherlands (MEZ 2002). To that end, her government wanted to offer an attractive investment climate and made attempts to shorten procedures for granting licenses for new production areas. However, the new government's first steps in gas policy-making were not reassuring because they also announced the abolition of certain tax advantages and restructuring of the *gasgebouw* which added to investor uncertainty.

6.2 Big Business, also for the Government

From the beginnings of gas production in the early 1960s, the sum of the *Aardgasbaten* rose from 29 million Dutch guilders in 1964, to 24 billion Dutch guilders in 1984, and then decreased sharply after 1985 as a result of lower oil prices (see Figure 6.1). During the period of gas production (revenues to the State began to flow in 1966) up until 2002, the Dutch government earned more than €130 billion (*Aardgasbaten*) in profits generated by exploration and production activities of natural gas in the Netherlands.

These State revenues derive from various taxes and special arrangements on windfall profits (1973-85). Moreover, production costs for the large Groningen field were even lower than expected. Over the course of the next 30 to 35 years, given an upswing of E&P activities for the small fields, Policy Research Corporation estimates that in total €145 billion of cumulative *Aardgasbaten* for the government could be achieved (“related to future gas production”) (Peeters et al. 2002).

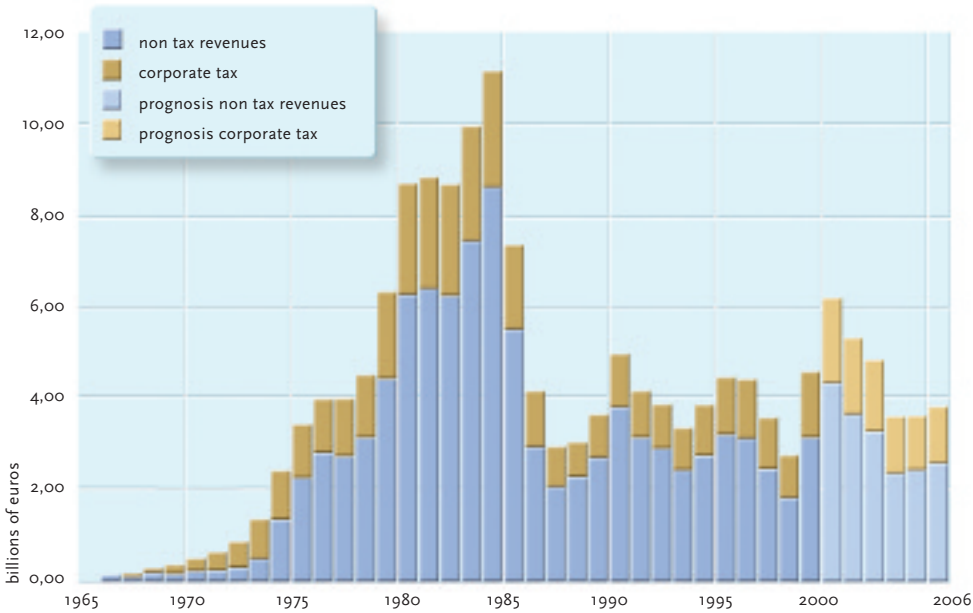


Figure 6.1
State Revenues from
Gas Production
Source: MEZ, *Olie
en Gas in Nederland,
1975-2002*

6.3 Dutch Disease

Government income from gas production has been substantial. How have these billions been spent thus far, and what would the Netherlands look like today, if this godsend had not taken place? Were it not for gas, the Dutch would not have had recourse to an important indigenous clean and relatively cheap source of energy that other European countries (such as Belgium, France, Italy, Spain, Portugal, Greece) have to import in order to switch from dirty and dusty coal in order to reduce CO₂ emissions. The Dutch were able to make this switch much earlier, based on indigenous production rather than imports. From 1967, Dutch domestic consumption of natural gas rose quickly, to about 50% of total energy consumption in 1972, a level that has been sustained ever since.

Without this precious resource the Netherlands would have been dependent on imports of natural gas, coal, or very likely, would have opted for more nuclear energy. Without the now mature gas sector, there would not have been the strong support for the economy, employment and the public sector. Nor would there have been domestic sales, export sales or revenue from transport of gas.

The country would very likely have had more difficulty in meeting the Maastricht criteria (for the Economic and Monetary Union [EMU]) for reduced government debt and fiscal deficit. Without the gas revenues, the Netherlands would not have suffered from ‘Dutch disease’ – referring to the earlier spending of the *Aardgasbaten* directly in the public sector, for an important part of open-ended social welfare policies, that had to be redressed later on. Regrettably, an effect of the *Aardgasbaten* was that during the 1970s the much needed discipline on govern-

ment spending diminished to a low level. The *Aardgasbaten* obfuscated the seriousness of budget problems.

On the other hand, without the *Aardgasbaten*, investments in the very capital intense waterworks (the Deltaplan) to protect the country from flooding, and expensive infrastructure works, such as railways, would have been completely financed out of the government budget (derived from taxation). Since the second half of the 1990s these investments are now financed through a special fund, the *Fonds Economische Structuurversterking* (FES – Fund for strengthening the Economic Structure) that in large part is fed by the *Aardgasbaten* and a few other exceptional sources of non-tax government income.

From an environmental perspective, the rich gas resources have helped to reduce the use of coal and oil products for industrial and heating purposes. Other European countries are only now beginning to switch away from these fuels in favour of the cleaner gas. Today, the important role of natural gas in the total energy supply helps the Netherlands in meeting the Kyoto Accord standards for reduction of CO₂ emissions. Natural gas is the cleanest of all fossil fuels and is regarded by the government as the transition fuel to a (more) sustainable energy supply, with a much greater role for renewable energy sources in the future.

Last but not least, the gas business in the Netherlands has boosted high quality employment with more than 11,300 full time jobs in the upstream sector and several hundreds of jobs at the national distribution company, Gasunie.

6.4 A Fierce Debate on Funding

In the early 1960s, only a few years after the discovery of the Groningen field, the Minister of Economic Affairs, Jan de Pous proposed to create a special fund into which would flow all or the greater part of the State income from gas production. According to de Pous, this fund would serve as a buffer fund and could be used for investments to strengthen the Dutch economy. De Pous wanted to set aside this additional income for the State, rather than treat it as general government revenue, which would only lead to a boost in public spending. At that time, the income generated by gas production was viewed as modest, since the first estimates of gas reserves in the Groningen field amounted to only 60 bcm. Soon, however, estimates were adjusted upward and Jan de Pous again stressed the importance of treating the gas income as an out-of-budget source of financing. De Pous' plan was opposed by the Minister of Finance, Jelle Zijlstra, who was very pleased with the additional income for the State, and flatly vetoed the idea of a special fund.

According to many of the politicians involved, how to spend the surprisingly large gas income in the most sensible manner was fiercely debated for many years. But even harsh Parliamentary criticism on the broad expansion of public spending during the period of the left-centre cabinet of den Uyl (1973-77) did not have much



Blending facilities in Pernis.

impact on the habit of the so-called *potverteren* (spending the pot of money as a treat for all). The treat was the rapid expansion of the Dutch welfare state and the public sector as a whole. The nasty consequences of this included a far too large expansion of government spending, and an irresponsible rise of the fiscal deficit and the State debt. These all had to be corrected in the 1980s and the first half of 1990s, when it became clear that public spending had become unsustainable. The result was a long period of painful State retrenchment, with ups and downs, that finally led to meeting the standards of the EMU in the 1990s. During the second half of the 1990s the fiscal deficit was finally much lower, achieved a small surplus in 2001, and, due to an economic down-swing, resulted in a small deficit in 2002.

After the first oil crisis (1973-74), when oil prices increased four-fold, the gas prices of export contracts were renegotiated. This resulted in a more direct link between the prices for crude oil and for natural gas. Soon the flow of gas income to the Dutch State rose dramatically, partly as a result of windfall profits due to oil price increases. In the 1975 government budget, the *Aardgasbaten* covered nearly 10% of all public expenditure (Kam 1997). However, the fiscal deficit was rising, much to the chagrin of certain parties in Parliament – the liberal opposition as well as the financial experts of Christian-democrats in the Lower House (*Tweede Kamer*) (Notenboom 2002).

In the early 1980s, the *Aardgasbaten* increased to a share of 20% of total government expenditure and in 1985 to 25%. In 1985, a reverse oil shock, caused by a dramatic drop in oil prices, quickly reduced the share of the *Aardgasbaten* to 5% of Dutch public expenditure. Despite the reduction in the share of government income and expenditure, the contribution of the upstream gas industry is still substantial, accounting for 2.1% of the gross national product, 3% of the government income and more than 11,300 workers (Peeters et al. 2002).

From the beginning of Dutch gas production, many politicians became addicted to this important source of additional government income. During the 1970s, unemployment was high and the government decided to stimulate the economy according to Keynesian economic principles. Demand for products and company investments were propped up by subsidies. Employment was stimulated by lower employer contributions to workers' social security, with the *Aardgasbaten* being donated directly into social security funds. In this way, the impact of a sudden downturn of the economy could be softened (Correljé 1998). Yet, many public finance experts believed that the billions of Dutch guilders earned via gas production had blurred the seriousness of the State's fiscal problems. Traditional signals such as a deterioration of the balance of payments and a growing fiscal deficit were ignored and the appropriate and necessary measures were not, or only half-heartedly implemented.

Gentlemen's agreement

The *Nederlandse Aardolie Maatschappij* today still holds the concession for production of natural gas from the large Groningen field, which began in the early 1960s. Shell and Exxon/Mobil (the parent companies of NAM), were very satisfied with the original agreement for sharing the Groningen gas profits. While both the sold volume of this gas and the market price per cubic metre were rising, NAM received 30% of the profits, the other 70% went to the Dutch State, according to the first agreement in the *Nota de Pous* (MEZ 1962).

After several rounds of new negotiations with Shell and Exxon the government succeeded in raising its share of the gas profits. In 1972 the 70% State share was, for domestic sales exceeding a certain market price, increased to 85%. The oil crisis of October 1973 brought important windfall profits not only to the Arabian oil producing countries, but also to gas producers because of the gas price link to oil product prices. In a new agreement with the shareholders of NAM, the State profit share from 1975 onwards was raised to 95% for sales that realised a price level higher than 8.5 Dfl cents per cubic metre.

After the second oil crisis of 1979-80 political parties and trade unions increased pressure on the two oil companies and the government to further raise the State share. While the State already benefited much more from the windfall profits than the oil companies, the rationale was that Shell and Exxon filled their pockets easily during periods of very high prices, while their investments were relatively low.

New negotiations did not result in another higher percentage for the State. But in a gentlemen's agreement it was determined that Shell and Exxon would invest up to 1984 an amount of 13.9 billion Dutch guilders in the Netherlands. During the subsequent period to 1989, these investments would be increased to 22 billion Dutch guilders. As a result, two large refinery modernisation projects in Rotterdam were realised: Shell's Hycon and Exxon's Flexicooker. Shell also made a large investment in its chemical plant at Moerdijk.

The gentlemen's agreement has often been subject to critical debate in Parliament. MPs have complained about being unable to verify whether the investments had a positive effect on the Dutch economy due to a lack of information. Subsequent Ministers of Economic Affairs have defended the deal and the significance of the investments made by Shell and Exxon. After the gentlemen's agreement ended in 1989, the social-democrats in Parliament were unsuccessful in attempts to extend it, or to establish a higher profit share for the State from natural gas production.

The then Minister of Economic Affairs, Koos Andriessen, alleged that the oil companies would continue to invest in the Netherlands even without a new agreement. Further, windfall profits were not to be expected in the foreseeable future, as oil and gas prices had fallen considerably after 1986.

We Need to Invest in Better Information on the Consequences of Gas Production

We need to invest in much better information about the consequences of gas production for nature reserve areas. That could help a lot to convince society on this very sensitive political matter. One or two experiments with gas production on a small scale, in the nature reserves Biesbosch and Waddenzee, with ‘the government’s hand on the tap’ would be useful. This could provide a lot of information, for instance on possible subsidence and the potential need for extra sand supplementing in the Wadden area.

These are a few of the issues raised in an interview with two civil servants, experts from the Ministry of Housing and Environment (VROM) in The Hague: Ad Littel and Frans Vlieg.

Ad Littel, a biologist, works at a high level in the directorate-general of Spatial Planning in the Ministry, and is senior advisor for policymaking on gas production in nature reserves. Frans Vlieg, a chemist specialising in natural science, is acting Head of the Division Energy and Transport Technology within the directorate-general of the Environment. His main task is to design the most effective content for the Dutch national ‘climate policy’, in line with the obligations of the international Kyoto Protocol. For the policy of reducing greenhouse emissions, the Ministry considers natural gas to be the most important transition fuel in the gradual switch from the present energy supply system based mainly on fossil fuels, to a system of sustainable energy supply.

Littel and Vlieg both acknowledge the paramount importance of using Dutch national gas reserves for energy supply in the Netherlands and Europe as a whole. But they are simultaneously responsible for ensuring that flora and fauna and the environment, not only in the natural reserves, are protected in the best possible manner.

Ad Littel underlines the importance of preventing subsidence in the precious area of the Waddenzee, as a consequence of bringing important gas reserves into production. “If we only had more information and better figures on the expected risks in preserved areas. Thus far, investment in information mainly concerns the economic and financial aspects, but little investment is made on collection of information about environmental risks. In the past politicians have sometimes appeared to hide behind risks of unknown extent and significance. We regard the reports from *Nederlandse Aardolie Maatschappij* (NAM) as insufficient to provide answers to the kinds of questions that the *Waddenvereniging* (NGO for the protection of the Waddenzee) is posing. Littel describes the case of what often is called the Waddengas as “an example of plans that get stuck on lack of knowledge.”

Frans Vlieg: “Our Ministry participates in an important commission, the *Overleggroep Olie en Gas* (OOG) that tries to surmount these dilemmas by letting all involved parties participate in its discussions. We believe this can help a lot in generating the necessary information. One of the objectives of OOG is to create win-win situations from gas projects. In the national park the Biesbosch, for example, improvements in the local water regulation system and in protection of nature could partly be financed by revenues from gas production. I think on politically sensitive issues such as these, all involved ministries and organisations need to work together, on the basis of sufficient information.”

Ad Littel: “Yes, one cannot expect environmental organisations to join in such a win-win project without sound and detailed information. This would make them very vulnerable to accusations of only doing this for the money. As a contribution to obtaining additional information, about possible damages and about subsidence, I would be willing to participate in a few experimental projects given that necessary provisions were effected and guarantees were given that production would be stopped (hand on the tap) when things seem to be going wrong.”

“For instance in the Biesbosch, where gas reserves are believed not to be very large, subsequent subsidence would not be a great problem. A second experiment could be done in the eastern part of the Wadden area, around Lauwersoog, Paessens and Moddergat. This area is relatively small and not as well-supplied with sediment as the western part of the Waddenzee. It could provide a clear and useful experiment, to investigate whether in this area subsidence is sufficiently compensated with sediment.”

“Sometimes subsidence works, also in the Wadden sea area, favourably for nature conservation. Recently a new permit was granted for gas production under the Lauwersmeer, where subsidence would be helpful because of desiccation on the shores.”

Frans Vlieg: “We think all parties interested in gas production also should better promote the small fields policy in terms of the tight relation with depletion of the Groningen field and its balance and swing production functions. This requires information about what level of reserves are the minimum necessary to continue, and for how many years. The present motivation I think is not sufficiently convincing, especially in terms of the small fields contributing to the transition to a sustainable energy balance in the future.”

Ad Littel: “There are many gas fields under the Waddenzee. What if they all show subsidence after some years? NAM so far, for example, has only given us one-sided reports on subsidence for Ameland Island, but not for the Amelander Wad (the part of the gas field under the Waddenzee). They have recently started monitoring there now. But this proves how weak the story is. We know too little about the effects of sand supplementing in the province of Noord-Holland, the Wadden islands and the Waddenzee itself. What is the total need for extra sand, and what would the extra need be when subsidence occurs? How long will the

period of recovery be? The Government Institute for Coast and Sea should provide us with more studies on sand balances per area.”

A dilemma for some years, says Littel, has been the question of whether to begin gas production as soon as possible, in order to allow the ecosystem a long recovery period after a serious subsidence in the Waddenzee, or whether to postpone gas production for as long as possible and meanwhile improve our knowledge about subsidence. Postponement could possibly lead to a combined effect of subsidence due to gas production and of the expected rise of the sea level, due to global warming. “I think the first possibility, making the period for recovery as long as possible, is by definition the best. An experiment with gas production would show us more about the behaviour of the ecosystem, and could produce factual knowledge. For instance, if we know that during five years a part of the Waddenzee would not fall dry during low tide, this causes (amongst other effects) that, let’s say 30,000 rose grutto birds could not forage in this location. We know that is serious, but it is not threatening for the population. So in this way we learn exactly what risks we are talking about.”

Important factors concerning Dutch gas production are on the one hand, the environmental advantages of this relatively clean fuel, and on the other hand, the fact that newly found small fields are tending to get smaller, the large Groningen field will be depleted sooner if this trend continues, and the problem of ageing infrastructure off-shore.

Frans Vlieg: “So as the future looks now, between 2020 and 2025 the success story of Dutch natural gas comes to an end. Possibly, we will become dependent on large imports. But one strategic advantage will remain: lots of capacity for underground storage of CO₂. This may in the longer-term become an important tool in meeting our Kyoto obligations. We work with three tracks towards transition: energy saving, renewable energy sources and clean fossil technology combined with CO₂-storage.”

Ad Littel: “NAM is one of the experts in the underground storage. I think in their profile they should concentrate more on that.”

Frans Vlieg: “It is a pity that in this period of an economic downturn there is limited money available. Two pilot projects for CO₂ storage have been submitted: one by NAM and one by Gaz de France. Economic Affairs and VROM have to make a choice soon.”

Ad Littel: “According to the latest information the present pace of additions from new small fields to the national reserves is ‘alarmingly small’. If given this situation, the gas under nature reserves cannot be touched, we run the risk of losing some small fields, because oil and gas companies might not be willing to produce very small, economically unattractive fields. This all causes faster depletion of the Groningen field. The question is, will companies return to our small fields, knowing that they also have to invest in the infrastructure?”

Many experts say that everything should be done to increase activities in small

fields, because our own national production and of course continuation of the State income (*Aardgasbaten*) is much more attractive than costly imports of gas. In this situation the worries about a possible new moratorium on the Waddengas are understandable. But we hope that information and figures will be provided, also per area, about the small fields so that the problems are clearly demonstrated.”

Frans Vlieg: “So far I think the message from the energy sector and from the energy policymakers is too limited and too one-sided, focussed on costs and supply. On such a sensitive political issue as gas production in nature reserves, you need a very well supported message to convince society. Otherwise you land all too soon in the trenches and discussion is killed.”

6.5 Not a Blessing, but a Curse

“Not a blessing, but a curse” is what **ex-Prime Minister Ruud Lubbers** called the *Aardgasbaten* in a speech to students at Erasmus University in Rotterdam (1976). He went to say that there was: “a lack of discipline on our part [the government]. The *Aardgasbaten* are no blessing, they are a curse. We lost discipline and a critical perspective on public spending.”

Ruud Lubbers, Prime Minister from 1982 to 1994, is now the High Commissioner of the United Nations for Refugees, and was Minister of Economic Affairs in the Social democrat-Christian-democratic cabinet of Prime Minister den Uyl from 1973 to 1977. In his years as Minister of Economic Affairs he had tried to convince his colleagues that it would be much better to avoid the *Aardgasbaten* becoming part of the government income flow, but as Jan de Pous had pleaded, to set them apart in a special fund. Lubbers also failed to convince his colleagues in the administration. “But with my colleague Duisenberg (Finance Minister) I did succeed in developing a new system to stimulate private investments with public money. It was very important during that period of slow economic growth and high unemployment to strengthen the economy. Duisenberg was quite generous in reserving money to subsidise investments in the private sector through the new *Wet Investerings Rekening* (WIR) that we presented together. In part, the effect of the law was the same as what could have been done with a special fund for the *Aardgasbaten*. When we later terminated the WIR system of investment subsidies – partly because there was a lot of abuse of the system and partly because investments were booming regardless – it was clear that we needed to continue with some sort of system to strengthen the structure of the economy. During my second cabinet (Lubbers II 1986-90), the idea to set money aside for this purpose was back on the agenda. Two Secretaries-general of the Ministry of Economic Affairs, Frans Rutten and his successor Ad Geelhoed, prepared a proposal. During the



The Delta Project protects the lower parts of the Netherlands against flooding.

third and last Lubbers cabinet (1990-94), the new Minister of Economic Affairs, Koos Andriessen adopted the proposal and presented a bill of law to Parliament. Soon the *Aardgasbatenfonds*, later named *Fonds Economische Structuurversterking* (FES) was born. And I think it has worked and still is working very well.”

Koos Andriessen, who succeeded Jan de Pous as Minister of Economic Affairs back in 1963, still remembers very well the dispute in the early 1960s regarding a special fund for the government gas income. “All the income was gathered by the Minister of Finance, and he wanted to keep the number of special funds fiercely limited to the minimum. Zijlstra wanted to keep his colleagues from spending too much, he wanted to keep track and uphold responsibility over all government income, whether it was fiscal or non-fiscal, and the spending of it. It has taken many years of debate, but in the 1990s at last we succeeded to set aside an important part of the income from the gas production from the regular public sector, with the purpose to invest in strengthening the economy.”

Andriessen returned to government as Minister of Economic Affairs in the cabinet of Lubbers-III and was easily convinced by his Secretary-general, Ad Geelhoed, to present a proposal to Parliament for setting-up the special fund.

“Of course I understood the arguments of the Department of Finance and its ministers in the past. They feared that such a special fund could easily boost the expenditures even more. I experienced that directly after the FES was formed. My colleague Jo Ritzen (Education) jumped at the opportunity and asked for money to set up a knowledge-infrastructure with computers and software, which of course was of vital importance to a modern economy! So the art was to very carefully delineate the limits of what the fund could do.”

“I am sure that this investment fund allows us much better than before to set priorities for the economic structure, especially in infrastructure. Moreover, we can select good projects and keep track of the results. In the past, you had to do that with the Minister of Finance in a manner of speaking in one afternoon, because he had so many departments to negotiate budgets with and was beleaguered by so many political priorities. That was a virtually impossible task. Now the projects are selected carefully by a group of well-informed and financially-trained officials.”

“We have learned a lot from the Norwegians, who set up their State Petroleum Fund by 1990, to keep an important part of the petro and gas revenues separate from the government budget, and set it aside for the economy. In times of inflation you have to be careful, in times of recession the fund gives you the means for an additional stimulus to the economy by boosting investments. For instance, I think we should have done more for the economy in our northern provinces where the greater part of our national gas is produced. Now, important projects like the *Oosterschelddedam* (a giant dam to protect the southern province Zeeland against flooding by the North Sea), the *Betuwelijn* (a cargo-railway to Germany), and the *HSL* (High Speed Train to Antwerp) have been and are financed through the Fund.

I think in the long run that is a far better investment of this extra money than to *verjubel* it (put it in the big pot of collective and consumptive expenses) like we did in the 1970s and 1980s.”

Ex-Commissioner of the European Union **Frans Andriessen** (no family-relation with ex-Minister of Economic Affairs Koos Andriessen), was the political leader of the former Catholic party KVP in the 1970s and became Minister of Finance in December 1977 in the first cabinet of the Christian-democrat Prime Minister Dries van Agt. Frans Andriessen had criticised the former cabinet (den Uyl) strongly for its expansion of government spending. In the new cabinet he was the lynch pin in executing a plan called *Bestek '81*. The sumptuous spending of their predecessors, was to be curtailed by cutting back ten billion Dutch guilders in government spending and by significantly lowering the budget deficit.

“As a member of Parliament, I always warned against spending taxpayers money for consumptive purposes and tried instead to argue for expenditures that were constructive for society. As Minister of Finance, you had to constantly be on guard of overspending of government income by colleagues from funds that were collected and spent beyond the budget. I can't remember proposals for a fund for the *Aardgasbaten*, but I would not have supported it. I knew that Economic Affairs at that time was a big spender! Besides, the estimates of the Dutch gas reserves were rather pessimistic then, by the end of the 1980s or the beginning of the 1990s they were expected to be completely exhausted. And I already had had quarrels with my colleague Leen Ginjaar, who was responsible for the protection of the environment. He wanted to collect large sums in a special fund and then spend money beyond the budget. We already had some special funds, e.g. for social affairs. These expenses were called 'conjunctural'.”

“Whenever there were windfall profits, in the case of the *Aardgasbaten* resulting from high oil prices, there was talk of more conjunctural spending and conjunctural stimulating programs, for instance pouring money into the funds for social security. My colleague Wil Albeda, the Minister of Social Affairs, was the main leader of these debates and of earmarking 'conjunctural projects'.”

“I was the most responsible cabinet member to fight over-spending and to keep us close to an acceptable level of expenditure. This was all the more important because of the very high rate of inflation at that time. Of course it was difficult for all colleagues to keep this mandate in mind, because they did not get any compensation for inflation in their budgets. And maybe, looking back, it would have been better to set aside the *Aardgasbaten* in a fund, because we all know that for the greater part this additional income has been spent in consumption, for an important part in expanding social security.”

Andriessen did not succeed with his plans to drastically reorganise the budget. He resigned after just over two years, officially because of a conflict of opinion within the cabinet on the financial-economic policy. There were, however, three important reasons why he did not get his way. First, the other ministers supported

Prime Minister van Agt in his opinion that more cuts to government spending could cause an unmitigated political crisis. Such a crisis was inopportune because Queen Juliana was planning to abdicate, leaving the throne to her daughter Beatrix. Second, van Agt was of the opinion that a political crisis would thwart the planned and deemed very necessary cabinet measure to strictly limit the rise in private sector wages. Third, support for Andriessen's position was not only lacking support from his colleagues in the cabinet, but also from his congenial Christian-democratic group in Parliament (Notenboom 2002).

Years later, when Frans Andriessen was a much respected member of the European Commission in Brussels, he saw to his satisfaction that: "Although the Netherlands was late with reorganising the State budget, it was the first Member State to bring its budget under control and to meet the criteria of the Economic and Monetary Union [EMU]. [...] We were lucky with the period of sound economic growth when the Treaty of Maastricht and the EMU-criteria were accepted. The Netherlands was the first to be successful. At the outset, the Dutch State debt was 85% of the gross domestic product (GDP), now it's less than 50%, and in 2001 the fiscal deficit turned into a surplus, regrettably followed by a small deficit again in 2002, caused by an economic downturn. The reorganisation started with Minister of Finance Onno Ruding in the second cabinet of Prime Minister Ruud Lubbers. In the Lubbers III cabinet, Minister of Finance Wim Kok achieved a reasonably good result around the time of the Maastricht Treaty and the reorganisation was concluded successfully by Minister of Finance Gerrit Zalm in Prime Minister Kok's first cabinet. Yes, sure, the *Aardgasbaten* did help, they provided billions of extra Dutch guilders, every year."

Wim Duisenberg the Dutch Minister of Finance from 1973 to 1977 and presently President of the European Central Bank (ECB) in Frankfurt, agrees more or less with former Prime Minister Ruud Lubbers' view on the impact of the *Aardgasbaten*. "Looking back, one could argue that the abundantly flowing *Aardgasbaten* had, to a certain extent, blurred our view on the seriousness of the macro-economic and budgetary situation. After all, the extra income from the gas production cushioned the deterioration of the balance of payments and the budget deficit."

But the idea of reserving the *Aardgasbaten* in a fund for earmarked expenditures "was in the political and economic circumstances at that times (the 1970s), in my opinion, not a real option", says Duisenberg. Under present circumstances it is totally different: the ECB president very much welcomes a fund for reserving extra State income from the 'subsurface'.

"What could (in the 1970s) have been the role and meaning of such a fund? It would have implied that the income that was put into the fund and the expenditures that were financed from it, would materialise outside the normal process of consideration of the budget plans. For the 1% policy (the plan Duisenberg launched in August 1975 to limit the growth of the collective tax burden [taxes and social security costs]), excluding the income from natural gas exports, to 1% point of the



The NOGAT gas transport pipeline crossing the dunes, after a restoration of the dunes and the flora in the summer of 1991.



national income [NI] per year), the income from gas exports was already set aside in the standard for the burden of the public sector. We (the cabinet) meant to use this income for special government actions. But partly because this income from gas exports was not dedicated to the reduction of the tax burden and social security costs, nor earmarked for expenditures to strengthen the economic structure, they were actually to a large extent spent on the general running expenses of the government.”

“Furthermore, you must take into account that the government income from natural gas was at first estimated much lower (than later on materialised). That is why earmarking them for a fund was not at all obvious.”

“But today, now that healthy public finance has returned to the Netherlands, the situation is completely different. A Fund could now be useful, particularly to avoid the subsurface fortune being used to finance running government expenditures rather than to finance productive government investments, or to reduce public debt.”

Wim Duisenberg also referred to the Norwegian State Petroleum Fund, which was set up in 1990 and was fed for the first time with State oil income in 1995. “This fund allows oil-income to be transferred into financial assets, for the greater

part in foreign investments. This is very interesting because the subsurface fortune is being transformed into profitable financial assets of which future generations can also take advantage.”

“Also, the non-oil part of the Norwegian economy is protected this way from the shocks that periodically hit the oil industry. Because of these foreign investments the exchange rate is much less influenced by energy price fluctuations. Thus the risk of undesirable effects on wages and prices, i.e. on the competitive position of the country and on employment, is mitigated. Also, the financial assets in the fund can be used to absorb the extra costs of ageing of the population (pensions, health care). However, in the political and economic climate of the Netherlands in the 1970s, with rising unemployment and a demand-side dominated view (for the economy and the role of government) such a solution was absolutely unfeasible.”

Nout Wellink, president of the Dutch Central Bank, demonstrated his gift for math in the 1950s when he was a pupil at the Roman Catholic primary school Saint Theresia at the Parkietlaan in The Hague, where his father was the stringent headmaster. He rushed through his studies (economics and finance), started working at the University of Leiden, thereafter at the Ministry of Finance in The Hague and was appointed member of the Board of Directors of the Central Bank in Amsterdam in 1982. Since July 1997 Nout Wellink is the president of *De Nederlandsche Bank* (the Dutch Central Bank).

During the 1970s, when State income from gas production and sales accelerated, Wellink was, due to his position at the Ministry of Finance, an insider in the discussions on how this income should be best taken advantage of.

In 1984 (when Wellink was already a director of the Central Bank) he said in a speech to a group of energy experts that the State’s gas income became of vital importance for the economy after 1973. “The Netherlands could feel a bit like an OPEC-country. Our national income [...] in the period 1973 to 1984 went up in total by 17.5%. Natural gas contributed between one-fourth to one-third of that increase, due to the explosive price developments.”

In 1984 the *Aardgasbaten* totalled 20 billion Dutch guilders and the direct total contribution to the Dutch balance of payments were calculated by Wellink to be 30 billion Dutch guilders. The next year, 1985, a record 24 billion Dutch guilders of *Aardgasbaten* was registered. Thereafter a sharp fall of the oil prices pushed the *Aardgasbaten* downwards.

Today, Nout Wellink shows great satisfaction that since 1995 a large part of the *Aardgasbaten* is set apart in the Fonds Economische Structuurversterking (FES) and that another large part is used to reduce the government-debt. It is “with some regret” he stated in 1984, that this had not been done much earlier. “Intellectual arguments were then decisive. Funding seems senseless when the authority that governs the fund, is the same as the one that decides on public expenses. But still there is a difference. When setting the *Aardgasbaten* aside into a fund, they would not have been so easily mixed with other sources of State income and subsequent-

ly they would not have become a financing source for general public spending as has been the case (since 1973).”

After the year of the first oil crisis, a period when government expenses rose by 14 percentage points to 46.5% of the national income, the budget deficit increased to 9% of the national income, while the *Aardgasbaten* reached 5% of the national income. “Looking purely at the State budget, the Netherlands after 1973 have lived to a large degree on gas and air.”

Nout Wellink comments now, “The Ministry of Finance feared at that time that setting up a special fund for the *Aardgasbaten* would result in an even stronger growth in government spending. That argument, I think, was understandable. The idea was that the ministry could at least keep some control over the use of *Aardgasbaten* by not setting aside the income in a fund. But not everyone at the Treasury shared this approach. Some were of the opinion that in failing to set aside the *Aardgasbaten* into a fund, this income would end up as part of the big wad, while spending was not very well controlled. Personally I think that a rational use of the *Aardgasbaten*, whether or not through a special fund, had become impossible because of the unrestrained development of the collective sector (government spending and social security together).”

Looking back at the 1970s, Wellink explains that as a consequence of the high level of the *Aardgasbaten* due to the oil price shock, the Dutch guilder became overvalued. This in turn impaired the competitive position of the non-energy sectors of the Dutch economy. On the other hand the extra income had in itself a favourable influence on the nominal level of interest rates and on inflation. “But these propitious consequences could only result in a positive effect on the economy if the development of the wage costs had been moderate. This was not at all the case in the 1960s and 1970s. These costs rose unrestrainedly, which caused the deterioration of the competitive position of our non-energy industry and trade sectors and that caused ‘Dutch disease’.”

In Wellink’s view the present state of affairs is “satisfactory, and needs no changes”. The bank president points to a special financial problem for the Dutch government: the future costs of the ageing population, especially in terms of health care and pensions. “For a solid system of financing these extra costs, the government debt should be completely cut down to zero by around 2025. An alternative solution would be to create a special ageing fund that could be fed with *Aardgasbaten*. One advantage would be that the government ties its own hands here, for the reserved money cannot be used, in the case of an economic downturn, for tax incentives or general government spending, including social security. This argument was certainly valid in the 1970s, but not in the present situation, since the government now regards making the State budget ‘ageing-proof’ as one of its leading principles. The government strives at a budget surplus of 1% of the gross national product by 2006. The only remaining argument for creating a fund would be that higher yields could be achieved by investing the reserves of *Aardgas-*

baten in company-shares. But given the recent experiences with the stock markets, we know this is not at all certain. So it is more sensible that the government continues to use the *Aardgasbaten* for further debt reduction. This way the obligation to pay interest and the redemption of State loans are diminished and, as with a special fund, future generations will benefit from the *Aardgasbaten*.”

6.6 The *Fonds Economische Structuurversterking* (FES)

Nearly 30 years and 12 ministerial cabinets after Minister of Economic Affairs Jan de Pous tried to set up a special fund to safeguard the additional State income from the production of natural gas, the *Aardgasbatenfonds* was instituted in 1995, and later re-named *Fond Economische Structuurversterking* (Fund for strengthening the Economic Structure, or FES).

The purpose of the FES is “to finance investment projects of national importance with the aim of strengthening the economic structure” of the country.

The current income of the fund consists of 41.5% of the non-tax part of the *Aardgasbaten*, and the savings for the State on interest-payments related to reduction of the public-debt.

Initially, State revenues from the privatisation of companies (sale of the government-share) were channelled into the FES. But since 1999 these revenues are directly used to lower public debt. Instead a direct link between the reduction of the public debt and the FES was realised by channelling the savings on interest payments due to a lower public debt into the FES. Additional flows into FES were realised from 2001 onwards when a sum of €121 million per year, related to the auction of licenses for third generation mobile telephone frequencies, were channelled into the fund (MF 2002a)

The planned expenditures from the FES on infrastructure projects (e.g. new railways, transport and traffic, regeneration of land in polluted areas, improvements on and around the Schiphol national airport, improvement in cities, knowledge infrastructure) are estimated as follows: €2.7 billion in 2002, €2.9 billion in 2003, €1.8 billion in 2004, €1.6 billion in 2005 and €1.6 billion in 2006 (MF 2002b).

Some of the infrastructure projects, like the cargo-railway *Betuwelijn* and the fast rail-track (HSL) from Amsterdam to Antwerp have been highly controversial. The *Betuwelijn* is closely linked to the expansion and the improvement of Rotterdam harbour and its hinterland. The rail-track is intended to promote Dutch exports and provide an environmentally friendly solution for the transport of a growing volume of containers and goods to the German industrial regions. Many critics however have argued that not only would the environment and the landscape be harmed by these huge projects, but also that the *Betuwelijn* would not be economically feasible. Nevertheless, the Kok cabinet received, after lengthy debates, a majority Parliamentary support for these plans. The new government that took office in July 2002

promised to investigate possibilities for making the *Betuwelijn* more profitable.

Between 1995 and 2000, total expenditure from FES was €6.2 billion and the estimated total cumulative expenditure to 2010 is a projected €26.4 billion (MF 2002a). Every year the budget of FES is discussed in Parliament and regulated in detail by a separate law.

According to **Bernard ter Haar**, top official of the Ministry of Finance in The Hague, the rate of 41.5% of State income from gas production into FES has been introduced to stabilise the income of the fund. This steady inflow has been realised in order to make the FES income less dependent on future decisions of Gasunie. “In the last couple of years FES income became less transparent, when Dutch gas production and subsequently the additional income for the government was lower. This was partly due to Gasunie declaring that, ‘this part of our regular export, we imported ourselves,’” says ter Haar. “Gradually, Gasunie is going to seek more business in gas-trading, so we had to find a solution.”

Asked if the prospect of another 25 years of Dutch gas production and many billions of euros flowing into the Treasury’s coffers over that period, and of the 41.5% flowing into FES, would be desirable, ter Haar answers: “No, I don’t think that’s necessary, because the FES was especially created to stimulate investments by the government. Some ten to twenty years ago the investment level was low, but now it is adequate and the FES has helped very much to achieve this since 1995. Today we are determined to further bring down the public debt. Therefore we keep the budget deficit as low as possible and try to turn it into a surplus again, like we had in 2001. For this priority in government policy, we need all the government income we can get, along with extra measures to reduce spending, now that the economic situation is a lot less favourable than in 2001.”

Ter Haar emphasises that just a few years ago the FES law was expanded with a bridge between the government budget and the budget of the fund. Whenever FES is short of money to finance already approved investment projects, the government will supply extra money. And vice versa, when projects slow down, the money that is not directly spent by FES flows temporarily back to the State. “That way there is no uncertainty about the realisation of projects.”

According to the government, “the system of integral investments in which the FES contributes, to solve spatial-economic problems in the Netherlands, is an effective one.”

As stated by Frans Andriessen, in the 1990s the Dutch government had been successful in bringing down the fiscal deficit and public debt. This was the result of clear and consequent political choices by different cabinets. Moreover, since FES’ inception in 1995, investments in infrastructure have increased substantially and with priority. Both of these developments are demonstrated in Figures 6.2 and 6.3 (next page). The *Aardgasbaten* and the FES system have contributed enormously.

6.7 High Quality of Employment

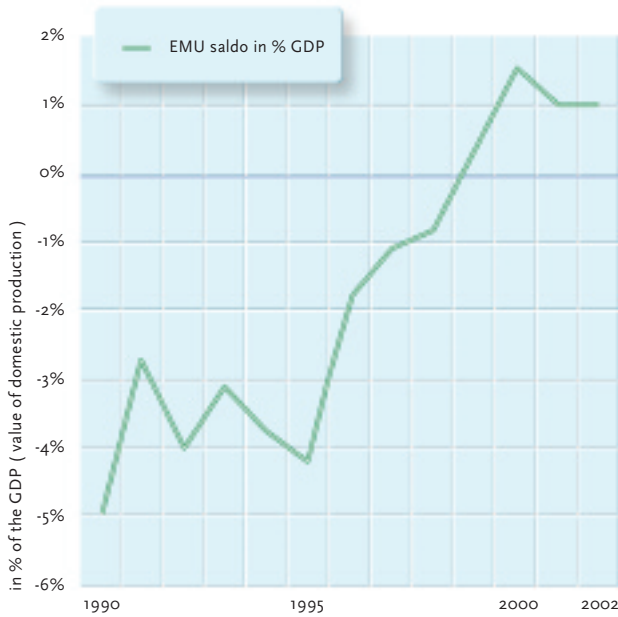


Figure 6.2a
Progression Towards
EMU Balance, and
Corresponding
EMU Debt
Source: MF 2002c

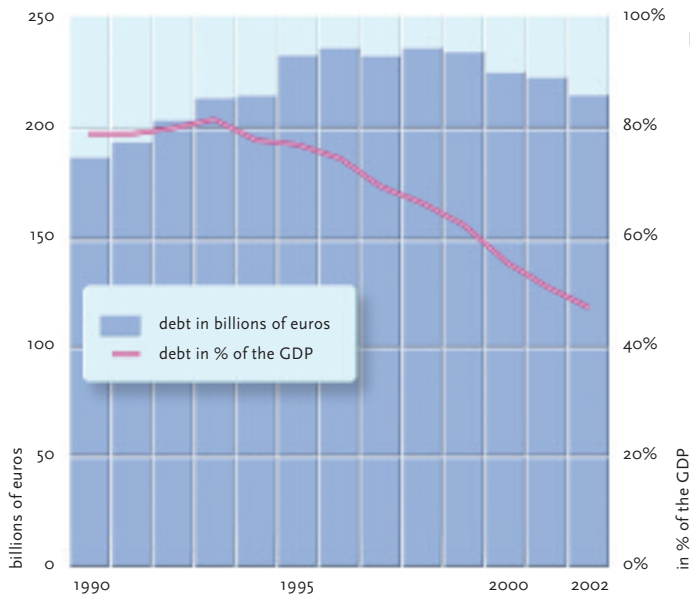


Figure 6.2b

Employment in the Dutch upstream gas and oil industry amounts to over 11,300 workers. These workers have a relatively high level of education, and more importantly, they represent a very high average value-added per worker, approximately 40% higher than the average for the economy as a whole (Peeters et al. 2002). Moreover, 90% of the workers are of Dutch nationality.

In 2000, direct employment in the sector amounted to 3,690 full-time work-

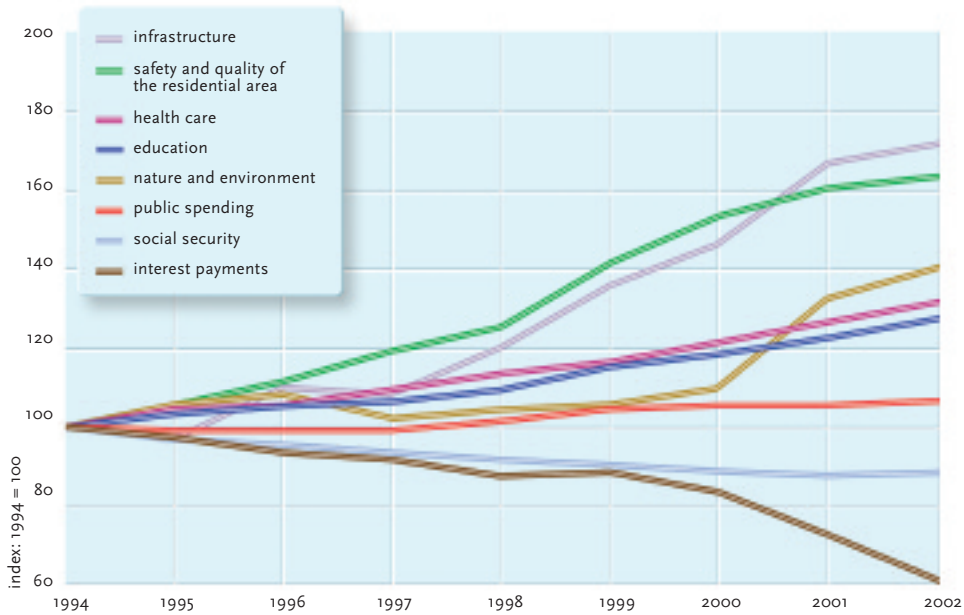


Figure 6.3
Growth of Real
Expenditure in the
Collective Sector
Source: MF 2002c

ers, and more than 7,600 full-time workers were active in upstream gas sector related companies, such as the supply and service industry, and the off-shore sector.

The picture of employment in the gas sector becomes more complete when it also includes the people involved in the gas related trade activities and gas exports. The greater part of the current 1,400 workers of Gasunie can also be added to the 11,300 workers involved in the upstream sector. However, the activities of hundreds of workers of the regional distribution companies should not be counted, because their work is not especially related to the exploitation of the Dutch national gas reserves. They would be doing the same work if there were no Dutch gas reserves and they were handling imported gas for the domestic market.

For Gasunie to be split in the near future into separate companies for trade and supply and for transport services, this is a different matter. Gasunie, established 40 years ago, developed into a company which handles low and high caloric molecules, blends, sells, stores, exports, distributes, trades, transports, and conducts research on Dutch, European and other gas markets. If the Netherlands had had no natural gas reserves and domestic gas demand had been met with imports, a national distribution company could have sufficed to handle the imports and to distribute the gas, with perhaps a few hundred workers.

The level of education in the upstream sector is relatively high: 40% have completed Polytechnic (high professional education) and university degrees. This is double the completion rate for the total Dutch working population which is just over 20%.

The sophisticated technical and safety levels necessary in this industry require a high-level of knowledge, which is continuously upgraded through course at work

and additional in-company education. Seismic and geological research for new fields and research in new technologies have led to a close relationship with the IT-sector. Specialised computer programs and software have been developed for the integral technical processes of exploration and production, which in itself stimulates human capital development.

ROB AT SMA

Director of the state entity Energie Beheer Nederland (EBN)

Steering of the Dutch *Gasgebouw* will Remain Robust

The government influence in the new Dutch *gasgebouw*, where depletion of the Groningen field and the small fields policy are concerned, will not change. *Energie Beheer Nederland* (EBN) will continue its role in the *Maatschap Groningen*, the upstream part of the *gasgebouw*, and in the exploration and production outside Groningen. EBN will retain its stake of 40% in the *gasgebouw* and will, on behalf of the State, gain therefore 40% of the revenue. With EBN's 50% of the voting rights, "steering of the new Dutch *gasgebouw* will remain robust."

Rob Atsma, Managing Director of State entity EBN, gives in five minutes a clear explanation of the relations and different roles within the new Dutch *gasgebouw* as proposed by the government in 2002. Suddenly the changes look a lot less complicated. Through EBN the State ensures that it maintains a continuing influence on production and small fields policy, and a substantial income from the production of natural gas. The downstream part of the *gasgebouw*, Gasunie, will be split into three parts: Transport (the pipeline network) will be taken over by the government; Trade and Export of natural gas will be divided between Exxon/Mobil and Shell; and Gasunie's public task with respect to execution of the small fields policy will shift to the *Maatschap*.

Atsma (57) has served as Managing Director since 1998 and works with a highly-skilled staff of forty, in the office of chemical company DSM in Heerlen, a city in the southern province of Limburg. Why Heerlen, and why DSM which is far away from the northern provinces Groningen and Drenthe where the greater part of the action in the gas business is located? Simply for historical and practical reasons. DSM was a State coal mining company until the 1960s, when the production and distribution of coal was the biggest energy business and coal was the most important energy source in the Netherlands. As part of the coal business, DSM produced and marketed its own coke-oven gas through its own grid to the market in the southern part of the Netherlands.

When granting the Groningen concession to NAM, a Shell-Exxon/Mobil joint venture, the State took advantage of the skills and knowledge of DSM in the energy

business. DSM was invited to participate in the new *gasgebouw* and continued its gas business (market and grid) in exchange for part of the profits. On behalf of the State, DSM received a 40% stake in the new partnership *Maatschap Groningen* for the production of natural gas from the large Groningen field, and also a stake of 40% in the Dutch Gasunie, the new distribution and trade company for natural gas.

Later on, the State designated DSM to participate for 40% on its behalf in other concessions and permits for the production of gas and oil. In 1989, when DSM was privatised and listed at the stock exchange, the tasks of DSM in the gas and oil business were continued on behalf of the State by *DSM Aardgas b.v.*, which later changed its name to: *Energie Beheer Nederland* (EBN). The State acquired 100% of EBN shares, but DSM continued to run EBN for the State. Meanwhile EBN takes part in 88 concessions and production permits and since 2000 also participates in more than 25 exploration permits.

As a consequence of European energy market liberalisation, the Dutch government in 2002 announced changes to the existing structure of the *gasgebouw*, the cooperation between the State and the private partners Exxon/Mobil and Shell. The tasks of Gasunie were to be unbundled, and the government decided to withdraw its 10% stake and also EBN's 40% stake in Gasunie and to leave the commercial Gasunie-business in trading Dutch natural gas completely to Exxon/Mobil and Shell. The existing contracts, including the existing purchase contracts for small gas fields, will be divided amongst the two commercial partners.

Rob Atsma is aware of the other gas producers' concerns about the restructuring. In September 2002 the producers sent a letter to the minister of Economic Affairs and to Parliament, in which they expressed their deep worries about the new *gasgebouw*. Under the old *gasgebouw* these producers had the advantage of Gasunie prioritising purchase of their gas produced from small fields at market prices. Gasunie also showed great flexibility in the execution of the contracts, especially in cases of e.g. production problems, use of so-called carry forward, etc. They fear that in the new situation when the business is run by Exxon/Mobil and Shell, contracts will be tougher, making the small fields less attractive to exploit.

"I fully understand their worries", says Atsma. "But I have told them that they may expect that the government will make a sound agreement with the oil companies to continue the small fields policy as best as possible. Both the government and Parliament want that; and I am convinced the State will only execute the changes in the gas building if it is convinced that optimal conditions for the exploitation of the small fields can be continued."

"The government has assured the operators of the small fields that in the new situation, when gas purchasing contracts are taken over by Exxon and Shell, EBN will be at the negotiating table to guard everyone's interests", stipulates Rob Atsma. "And in the *Maatschap Groningen*, the State will still be represented through the partnership of EBN and NAM, each having a voting right of 50%. This means that the State will retain the key position when it comes to the pace of depletion of the

Groningen field. Finally, the government always retains, as a stick behind the door, the instrument of issuing a new bill of law. That's a potential pressure on the partners, but I don't think this will be used easily."

"And, don't forget that an important part of the small fields policy is strong investments in compressors on the Groningen field, in order to keep it in condition and maintain the pressure necessary to let it fulfil its function as a swing producer. Though, in about twenty years the old lady in Groningen will no longer be so lively as to maintain, besides her own production, also this important balancing function. Still, we estimate that with some luck, with the contribution of small fields, the old lady can produce for another forty years."

The EBN Managing Director estimates that the domestic gas production in the Netherlands may be continued at the present level (around 70-80 bcm per year) for over twenty years, providing that the small fields policy continues and that new gas reserves are found and developed. At present, remaining reserves amount to 1,800 bcm, of which 200 to 400 bcm are futures (not proven reserves). "We think the estimates of the futures have a sound basis. But if a new moratorium were to be issued on the production of important reserves under the Waddenzee (as the present government wants) then the 200 to 400 bcm futures might be too optimistic, as would be the 20 years of production at the present level. Of course the level of exploration and the search for new reserves, will then even more depend on the conditions for mining activities. Will it still be attractive enough for the oil companies?"

Atsma would very much regret an absolute ban on the production of Waddengas. "It is always a pity to leave interesting reserves, so close to the market, in the ground. This is even more so true knowing that Europe is already a big importer of gas and will become more dependent on imports from far away, due to decreasing indigenous production and increasing consumption of gas. That gas will have to be imported from great distances."

"Of course, yes, the Netherlands has a favourable position when it comes to higher imports. This will require more storage close to the western European market, and Holland has good possibilities for building more underground storage facilities. That's a business opportunity. But you always have to carefully examine the marginal costs of imports, compared with those of our small fields. The distance is an important cost, and there are environmental and political issues. For gas from Siberia, about 30% of the caloric value is necessary to push it through the grid over thousands of kilometres. And this is without mention of possible leakage or political risks. So, maximising the production of Dutch gas is good for all stakeholders. EBN will do its very best to help that being realised. We are proud to be part of the gasgebouw, old and new!"

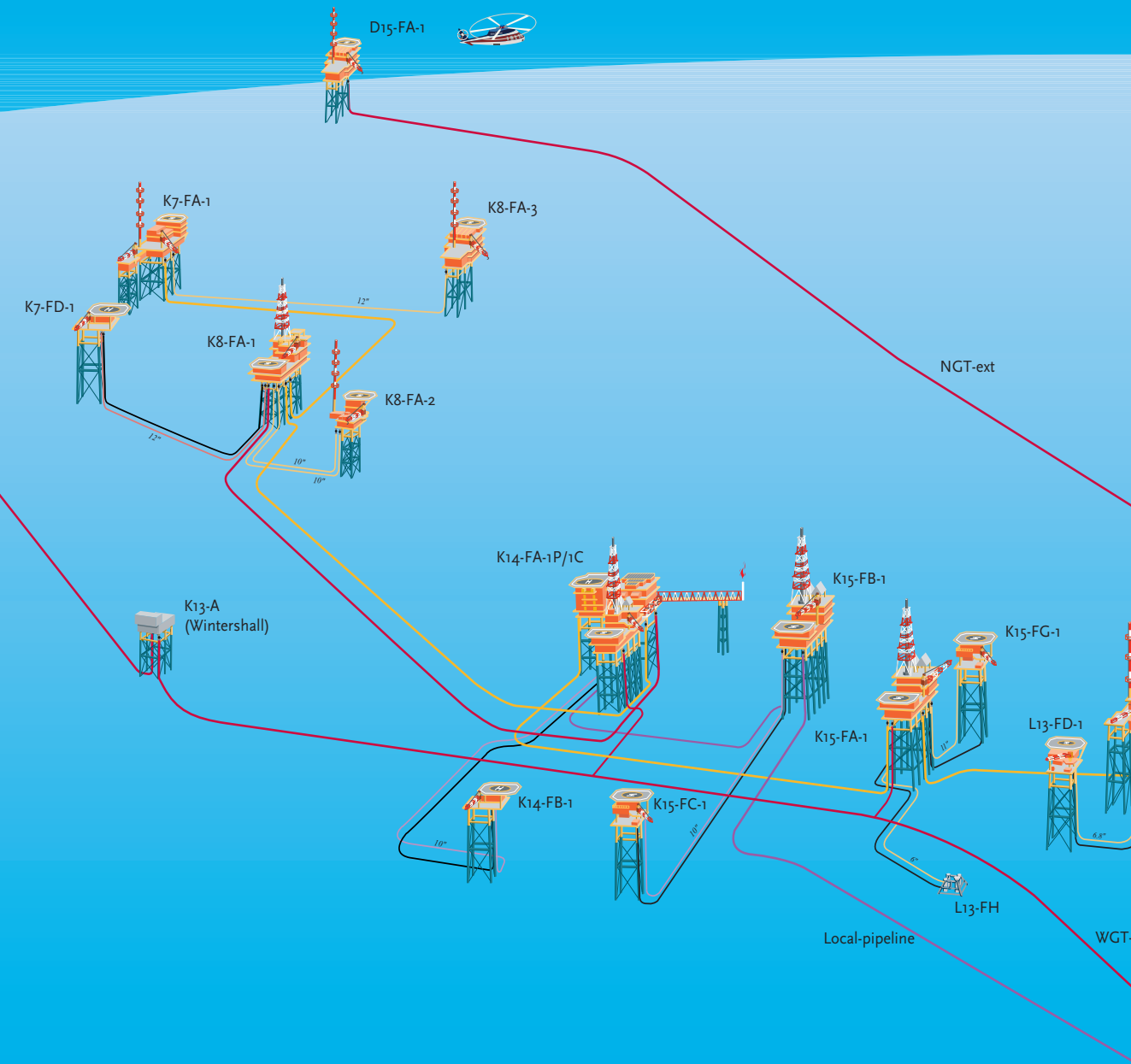
6.8 Environment

The environmental aspects of oil and natural gas production in sensitive areas receive very close attention from Dutch society and policy-makers. The use of gas as a fuel, however, is widely accepted and appreciated. Abundant Dutch reserves of natural gas have made it possible for nearly all households, offices and industrial enterprises in the Netherlands and for many in the export countries (Germany, Belgium, France, Italy and Switzerland), to switch from dirty and dusty coal to the relatively clean natural gas.

It is widely acknowledged that natural gas is the cleanest of all fossil fuels, in terms of CO₂ emissions, as well as for efficiency. But the idea that gas, because of these qualities, would be the best fuel for transition from the present energy structure to a (more) sustainable energy supply system in the future, seems neither widely known nor accepted in the Netherlands. The various stakeholders are still suspicious of gas sector arguments for expansion into the environmentally sensitive sectors to maintain production in the future, and claims by the industry that new drilling and other technologies will allow this production to take place under very strict conditions. This latter is a result of the efforts of the sector to limit the so-called footprint within the areas that they operate. Indigenous production of natural gas would better facilitate an active policy of transition towards a cleaner and more sustainable energy supply than would a system based on imports. This relatively advantageous Dutch position has not been completely grasped and certainly is not guiding the programmes of the main Dutch political parties.

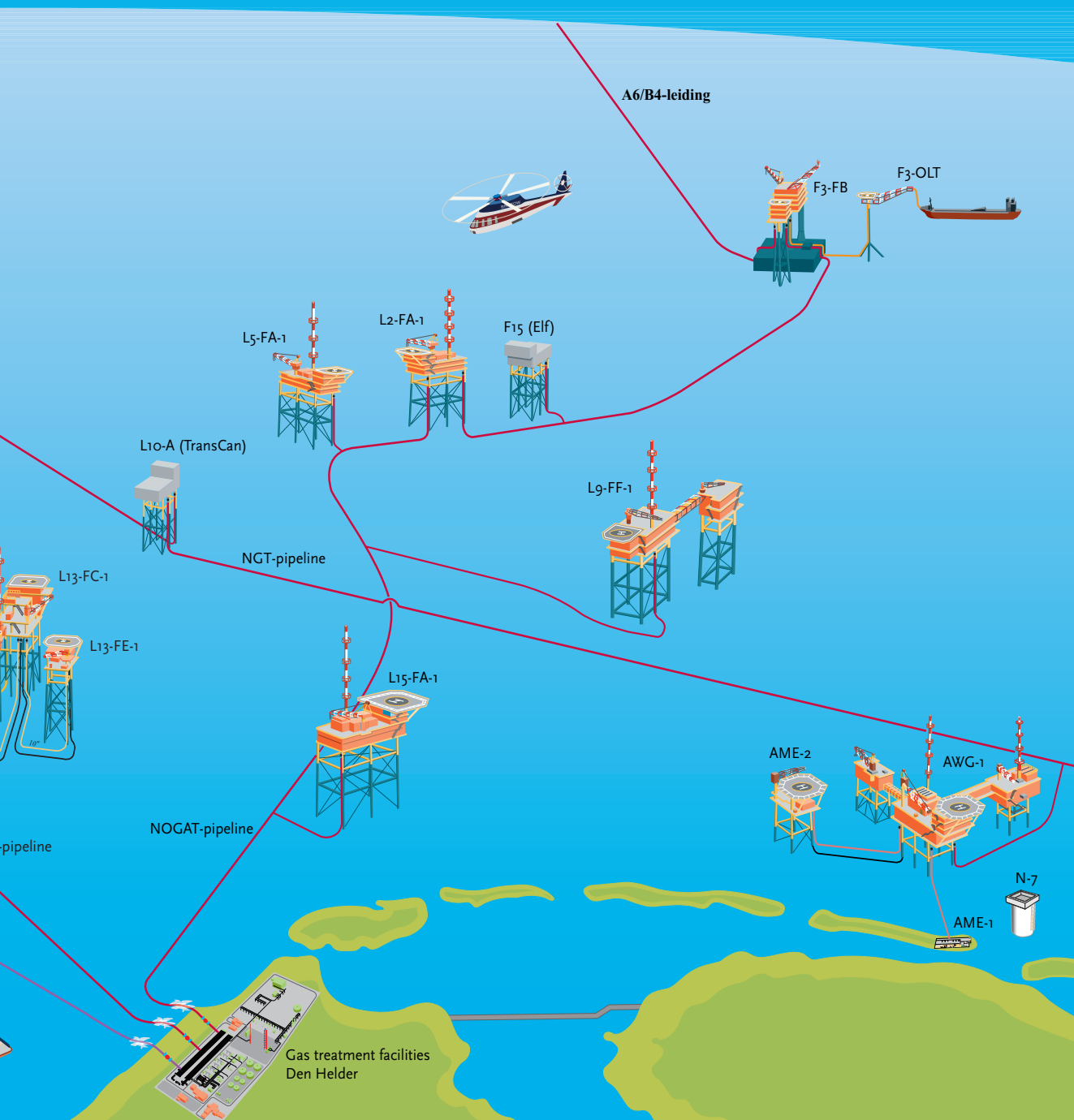
The development of gas resources has not been without opposition by organisations wanting to protect the environment and ecologically sensitive areas. Despite the substantial contribution to the Dutch economy and to the security of supply, exploration for gas became increasingly contentious when the sector moved off-shore. Particularly the exploitation of gas reserves under the Waddenzee was, and still is, fiercely opposed. It became more and more difficult to obtain the necessary permits for on-shore exploration. During the 1980s when oil prices declined, public perception of energy scarcity was replaced with the perception that the environment was scarce. Groups that had been opposed to drilling in these environmentally sensitive areas gained the upper-hand in public debates and plans to exploit these resources were shelved. Decisions to postpone the exploitation of the important Waddenzee resources were a disappointment to NAM (which holds a large part of the area in concession), particularly because exploratory drilling was also disallowed. However, as a result, more and more small fields in less sensitive areas (the North Sea and also on-shore) were developed. The small fields policy was especially successful in context of the fortunate combination with the large reserves in the Groningen field. The Groningen field plays an important role as swing producer and as a buffer. Whenever production from smaller fields falls short, the taps on the Groningen field are opened wider. Experts such as George Verberg, CEO of Gasunie, calls Groningen “the mother of our small fields”.

- high pressure, dry gas
- low pressure, dry gas
- low calorific, dry gas
- oil
- high pressure, wet gas
- low pressure, wet gas
- low calorific, wet gas
- power



Gas production and transport infrastructure on the Dutch sector of the North Sea Continental Shelf.





A6/B4-leiding

F3-FB

F3-OLT

L5-FA-1

L2-FA-1

F15 (Elf)

L10-A (TransCan)

NGT-pipeline

L9-FF-1

L13-FC-1

L13-FE-1

L15-FA-1

NOGAT-pipeline

AME-2

AWG-1

AME-1

N-7

Gas treatment facilities
Den Helder

This trait of the Groningen field will not last forever. Many years have been added to the life of the Groningen field by the contributions of smaller fields to national gas production. The end of this particular feature of Groningen is coming near because in 2002 about half of the initial reserves of the Groningen field were produced. If the Waddenzee resources were to be exploited, the life of Groningen could again be extended. However, if the fields with significant reserves such as those under the Waddenzee are unexploited and no further fields with significant reserves are discovered, the total reserves of all these smaller fields will be halved in about five-years time. This would result in the Groningen field being depleted at a much faster rate than previously.

Most of the Dutch political parties oppose exploitation of the Waddenzee resources. The first ten-year moratorium on gas production from under the Waddenzee had ended formally in 1994, but by 2003 still no permits had been granted for exploration drillings. In 2002, the short-lived coalition government of Prime Minister Balkenende agreed to try for another ten-year moratorium. Another moratorium would most probably outlive the balance function of the Groningen field. This would make exploitation of many existing small and marginal gas fields very uncertain.

Nevertheless, the European Commission wants to stimulate the supply and use of natural gas, in order to improve the security of supply of energy and to meet the obligations of the Kyoto Accord and related international climate agreements to diminish emissions of greenhouse gasses. Indigenous gas production in the EU, in the view of the European Commission, is an important key to achieve these goals. The Dutch gas reserves could, if changes are made, still make a substantial contribution to the future energy supply of the EU, as has been the case for more than thirty years.

The greatest fear of the environmentalists is that gas production from under the Waddenzee could result in subsidence, which could harm fauna, for instance through constant flooding of feeding grounds for birds on *wadplaten* that without subsidence would become dry during low tide (ebb tide).

Some geologists and other experts contest that gas production from under the Waddenzee or comparable shallow marine water systems would eventually result in any significant remaining subsidence, because any temporary subsidence would be compensated by strong water and sediment movements, and if necessary, by extra supplementing of sand (see interview with Weber this book; Dankers 2003; NAM 1999; Storms 2002).

Experts also point to the future problems of rising sea levels as a result of global warming. If gas production is eventually approved, they argue, it is better to start sooner rather than later, because that would allow the sedimentary system of the Waddenzee to compensate for any possible subsidence before sea level rising becomes a real, much greater threat to the area.

In 2002 the Overleggroep Oil and Gas (OOG) consisting of experts from all in-

volved Dutch ministries, from the Dutch upstream oil and gas sector, from environmental organisations, and independent representatives from universities and organisations like the Clingendael International Energy Programme, submitted an extensive report on the Dutch gas policy. The main conclusions were: the (upstream oil and gas) sector is an important partner in transition to a sustainable energy household; from an environmental view as well as for the economy, Dutch natural gas production is important; and understanding and support from society, a common view and political will are indispensable.

The OOG is planning a new round of meetings in 2003 to try to develop a common view between all parties involved on the need and the conditions for the production of more indigenous Dutch natural gas. Also it is suggested that one or two experiments with gas production on a small scale in the Biesbosch and Waddenzee nature reserves could be carried out with ‘a government hand on the tap’. These experiments could provide a lot of information, for instance, on possible subsidence and the possible need for extra sand supplements in the Wadden area. They are described as potential win-win projects, when a portion of the revenues from production are spent on improvement of the (local) nature and water conditions in these sensitive areas. In turn the effects of these win-win projects could be helpful in achieving support from society and from policy-makers.

Environmental conditions for exploration and production of oil and gas in the Netherlands are strictly verified by the State supervision of mines, under the responsibility of the Minister of Economic Affairs. In its Mission Statement, the supervisory organisation says, “State supervision of mines ensures that the production of minerals in the Netherlands and the Dutch part of the Continental Shelf is carried out in a responsible and socially acceptable manner.”

In 1995, new environmental goals for the production of minerals were agreed to by the mining companies and the government (the ministries of Economic Affairs, Traffic and Public Works and Housing, Public Space and Environment). The Inspector-general of the Mines, Mr. A.K. van der Tuin, says in his Annual Report of 2001, “The mining sector is well on its way” to achieving these goals. “The target figures for reduction of emissions of CFKs, methane and CO₂ have already been met plentifully. The reduction of emissions of SO₂, NO_x and volatile hydrocarbons moves on (the agreed) scheme. No sound agreement has been made yet on goals for the compartment ‘water’, but the reduction on emissions of alifatics and aromatics (in this case light hydrocarbons in production water) is considerable.”

6.9 Blessings are often Overlooked (Conclusions)

‘Gas people’ from quite a few oil companies have brought the Netherlands enormous extra wealth over the past forty years, by exploring and producing natural gas, not only from the large Groningen field, discovered in 1959, but also from the

many smaller fields that were discovered since then. Often the blessings of so many small fields are overlooked in terms of their adding to the resource base and helping to conserve the many benefits of the Groningen field.

Not only has domestic gas production brought ample extra income for the Dutch government but it also created wealth for the country as a whole, employment for many thousands of workers and a relatively clean environment. The income from gas helped the government return to a healthy budget in the 1990s. In the coming decades, the *Aardgasbaten* will continue to contribute to the health of the public finances. Finances aside, Dutch gas production has made a substantial contribution to the security of energy supply, both nationally and for the EU. Moreover, while other European governments had to secure gas supplies from afar, the Dutch can continue to live with the comforting thought that with the prolongation of the present gas policy (actively stimulating small fields production and conserving Groningen) they can continue to enjoy their domestic gas for some time to come.

Chapter 7

New Policy, New Questions and the Future of Dutch Natural Gas





In January 1996 the drilling at Lauwersoog started. The most technologically advanced equipment in the world, the PT-2000, allowed exploration drilling underneath the Waddenzee, to be undertaken from an on-shore platform.

7.1 The Third White Paper on Energy

In December 1995, the Minister of Economic Affairs, Hans Wijers, presented the Third White Paper on Energy, outlining the steps the liberal, social-democrat coalition government “wished to take in order to achieve a more sustainable energy economy.” In addition, as was stated, “it dealt with the increasing liberalisation and internationalisation of energy markets” (MEZ 1995a). The policy objectives implied a clear break from the traditional Dutch organisation of the energy sector, which had relied on local monopolies and government-directed self-regulation of the energy utilities.

During the second half of the 1990s, a new policy framework was developed that referred to the market as the main coordinating entity for energy supply and demand and for the further development of the Dutch energy sector. Main elements of this framework included free choice of suppliers for consumers, nondiscriminatory (but by no means *free*) access to distribution and transport systems and plans for privatisation of the municipally and provincially owned utilities. The liberalisation of the Dutch energy sector was further developed into a new Electricity and Gas Law. In addition, the general objectives for the new energy/environmental policy, based on the Kyoto Accord and the National Environmental Policy Plan (VROM 1993), were developed in a Climate Policy Paper (VROM 1999). As can be observed in the Action Plan for Sustainable Energy (MEZ 1996a) and the White Paper on Energy Saving (MEZ 1998c), the energy/environmental policy was given a more market-based environmental orientation, including economic policy instruments, such as levies and subsidies. These instruments – unlike the traditional command-and-control instruments – are expected to not distort the efficient and effective operation of the market.

7.2 Towards a Gas Act

Since the mid-1980s, the Netherlands had been among the staunchest opponents of the EU Commission initiatives to liberalise the gas market (see Correljé 1997). The Dutch Ministry of Economic Affairs opposed liberalisation because it was thought to jeopardise the traditional Dutch gas policy objectives and to interfere with the main instruments, the coordination of markets and market-value pricing. The main objectives formulated under the banner of national interest involved se-

curity of supply, over the shorter and the longer-term, the small fields policy, State revenues, gas pricing as instrument of regional and sectoral policy, environmental issues, and so forth.

Nevertheless, the Dutch economy is an open economy with a relatively large share in international trade. The argument that energy costs weigh heavily on exporting energy intensive industries has always been an important issue, particularly because of the large contribution of those industries to the Dutch economy and export. Previously, electricity and gas had been sold at lower prices to these large consumers. A single European energy market would make this approach impossible. The energy intensive industry was continuously stressing this particular point with the Minister of Economic Affairs. In addition, the Netherlands – as a trading country – had always been a proponent of liberalisation and could not afford to lose face on the gas issue. Finally, as liberalisation would proceed anyway, it was deemed better to cash in on first mover advantages instead of becoming a laggard. At the end of 1995, the Dutch policy made a U-turn when the Minister of Economic Affairs, Hans Wijers, presented the Third White Paper on Energy 1995 (MEZ 1995a).

The path to the Third White Paper on Energy began in the 1980s, when important structural changes were undertaken in the gas and electricity sectors. Historically, the utility sector had developed in two separate vertically organised structures, in which the power and the gas sector had their own production and distribution companies, mostly owned by the municipalities that they supplied. From the mid-1980s onwards a process of concentration was stimulated to enhance their efficiency, in which many of the municipal firms were transformed into regional multi-utility companies. The number of municipal energy utilities quickly declined from around 168 in the mid-1980s to only 34 in 1996. Presently, around three-quarters of all customers are served by one of the four large integrated companies, providing gas, power, water and cable connections plus maintenance services: Nuon, Essent, Eneco and Delta (see Figure 7.1).

Instead of opposing liberalisation, the Third White Paper on Energy of 1995 argued that it would be more advantageous to reap the benefits a free energy market would provide (MEZ 1995a). The White Paper contemplated fundamental changes to the traditional organisation and operation of the Dutch electricity and gas industry (MEZ 1995a; Correljé & Odell 1996). In 1996, the Ministry of Economic Affairs published the draft of a new Electricity Law (MEZ 1996b). In early 1998, Parliament approved the Electricity Law. The development of a new Gas Law took more time, however.

Initially, the aim of the new gas regime was to maintain the basic structure of the industry, with a key role for Gasunie and *De Maatschap/NAM* – including the cross shareholdings – to secure scale and organisational advantages and to facilitate the continued coordination of gas sales and purchases from both Groningen and from the smaller fields (MEZ 1997, 1998a, 1999a). In anticipation of the EU

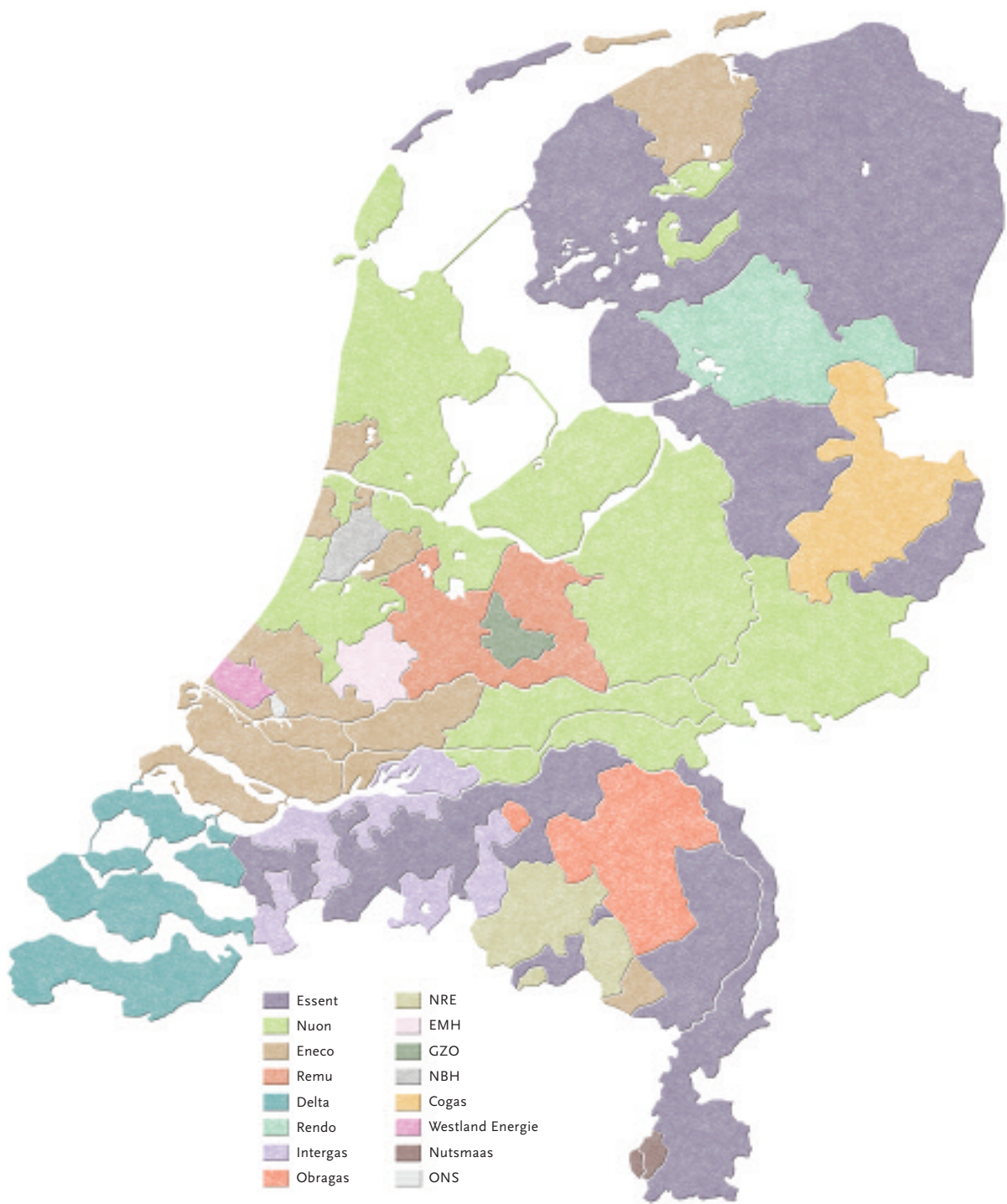


Figure 7.1 Distribution Companies' Service Areas, 2002

Source: Energiened 2002

Gas Policy, the paper proposed to liberalise the gas sector. The essence of the policy objectives for the gas as well as the power sector were stated as follows. First, in a phased process, the various categories of customers would be given the freedom to buy electricity and gas from their supplier of choice, beginning with the large-scale users, followed by the medium-sized firms, and finally, the small domestic consumers and businesses. These latter captive groups were to be protected from abuse by suppliers. Second, supply, production and domestic and international trade would be liberalised. The entry of new suppliers and other market parties, like traders, should be encouraged. Finally, third parties were to be given access to the national transmission systems and the local utilities' distribution networks, controlled by a regulatory agency.

The further development of these vague provisions would take time. During the second half of the 1990s, the Ministry of Economic Affairs, sometimes in consultation with representatives of the energy sector, drew the main lines for the re-regulation and the restructuring of the electricity and gas sectors, but until the European Directives for the electricity and the gas sector had been accorded, not much happened. After the acceptance of the EU Gas Directive, on 8 December 1997, a discussion paper *Gasstromen* (Gasflows) was published with more concrete proposals for a new Gas Law (MEZ 1997). It was acknowledged in this paper that the implementation of the above measures would constitute a fundamental transformation of the Dutch gas sector. Shortly thereafter, in early 1998, a draft proposal for a new Mining Law – replacing the 1810 Law – was published, with adjustments to the Dutch regime for exploration and production of subsurface natural resources (MEZ 1998b). Eventually, this culminated in the passing of the new Gas Act in April 2000 by Parliament. The new Mining Law, however, was seriously delayed by the discussion on the future organisation of the sector and was only approved in October 2002.

7.3 Implementing the Gas Act

The new Gas Act provided for a step-by-step liberalisation of categories of consumers, although it had never been determined by law that small – or any – consumers were tied to Gasunie. The fact of always being able to underbid other potential suppliers gave Gasunie the *de facto* supply monopoly. Large consumers using more than ten million cubic metres annually, with a market share of around 45% of total demand, enjoyed the freedom to negotiate gas supply contracts with suppliers other than Gasunie from the 1 January 1998 onwards. From the 1 January 2002, freedom of supply was given to medium-size consumers with a gas consumption of between 0.17 and 10 million cubic metres. In 2003, Parliament will decide whether small users, consuming less than 0.17 million cubic metres (around 20% of the market) will follow in early 2004, or if their liberalisation will

be delayed until a later stage. Traditional and new producers and traders in the Netherlands would then be allowed to sell their gas, without commercial involvement of Gasunie and/or the traditional utilities, to these categories of consumers. Initially, it was intended that Gasunie and the distribution companies would remain the owners of their transport systems to maintain the advantages of scale and scope and the possibility to coordinate gas supplies from Groningen and the small fields. To secure the non-discriminatory provision of transport and storage services and to facilitate regulatory oversight in these operations, Gasunie was required to administratively separate (to unbundle) the operation of its high pressure national transport system and its underground storage facilities from its trading activities, through the establishment of a 'Chinese wall'. The local distribution companies, in contrast, were to be split-up legally into network operators and gas suppliers/traders. This new structure is illustrated in Figure 7.2.

The Act required the establishing of a system of Negotiated Third Party Access, through which the traders, producers and consumers would be enabled to hire storage and transport capacity and ancillary services from Gasunie and the local network operators. Gasunie and the local network operators are required to enter into negotiations with potential shippers on the prices and conditions for those services. Publicised indicative tariffs and conditions would form the basis for these negotiations.

To meet its obligations, in 1998 Gasunie established its Commodity Services System (CCS), a tariff structure that distinguished separate elements for the volume of gas supplies, the maximum hourly supply capacity contracted and the location of supply. This system clearly contrasted with the former tariff structure, involving an all-in approach in which the price was only related to the volume of gas purchased and the sector of use.

In August 2000, the competition authority for the energy sector, DTe, published preliminary guidelines and general principles for determining indicative tariffs and conditions for third party access rights to transportation, storage and handling facilities. Quite logically, Gasunie's CSS and DTe's guidelines, as well as other elements of the new law provoked animated discussions amongst the parties involved about encroachments on each other's legitimate interests and/or whether they were facilitating the development of an effective system of supply in which workable competition coordinated behaviour. Subsequently, in August 2001 and 2002, DTe published more elaborate versions of the guidelines.

In essence, the intention of DTe was to split-up the gas supply system into its separate components, each with a specific tariff attached. This would enable the potential users of the system, the shippers, to transparently contract tailor-made bundles of transport, treatment and storage services from Gasunie and, thus, to economise on the aggregate cost of their supplying customers. Only the services used had to be paid for and nothing more. This transparency, it was argued, had two important advantages. First, it would stimulate Gasunie to invest in those

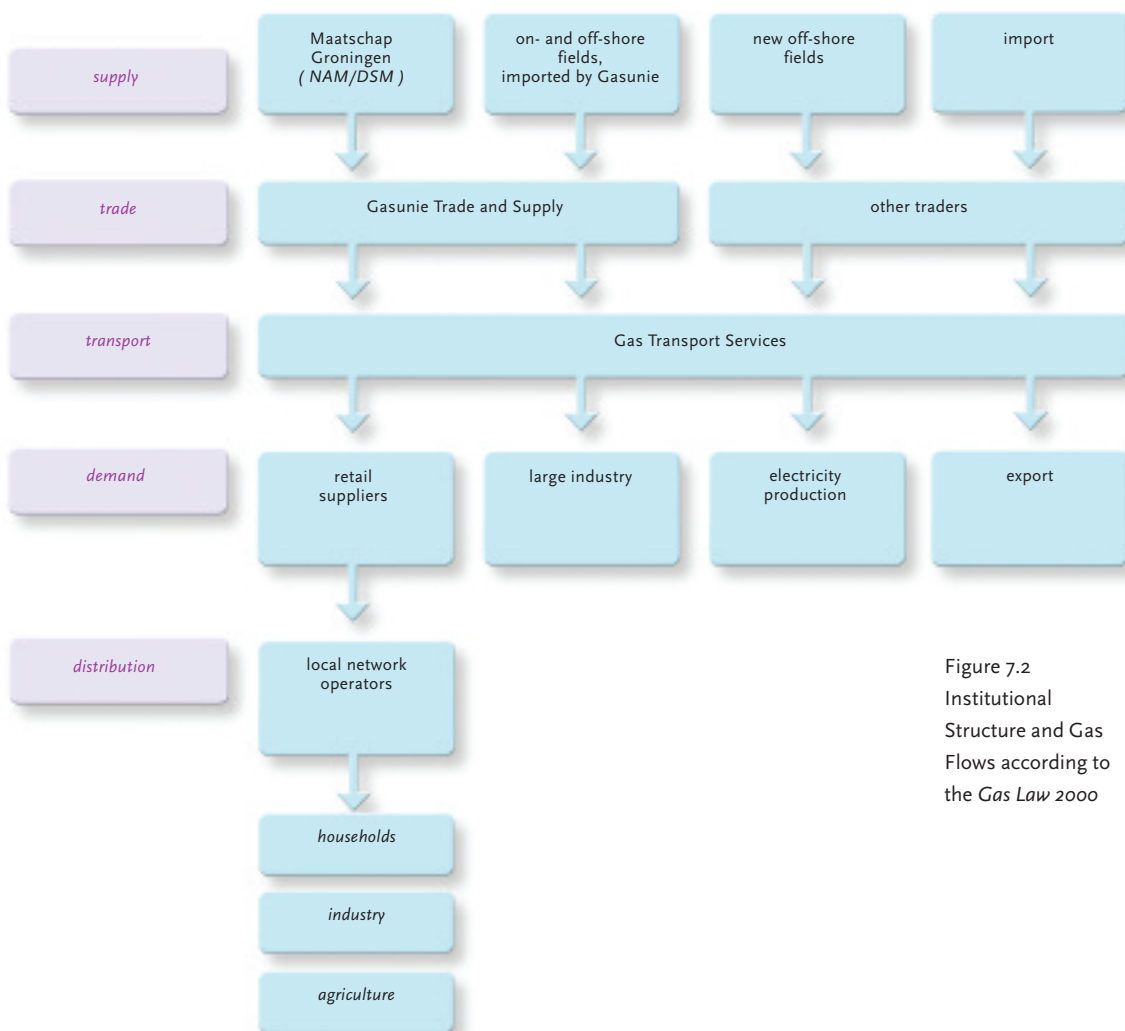


Figure 7.2
Institutional
Structure and Gas
Flows according to
the Gas Law 2000

components of its system in which capacity was lacking, while reducing excess facilities. In theory, an iterative process of adjustment was to stimulate the gradual development of a least-cost system for transmission and distribution. Second, it would provide the parties competing in the market, like producers, traders, retail operators, etc., with maximum flexibility of access to transport and storage services. Indeed, effective access to such services is considered a *sine qua non* for the development of an efficient market in which providers and traders can compete effectively.

Whereas such flexibility and transparency was welcomed enthusiastically by the new traders and large consumers, who were already free to contract their gas supplies, Gasunie was radically opposed to such a disintegration of its system. It nevertheless quickly concluded that a functional and effective separation between

its *Gasunie* supply business and *Gas Transport Services* (GTS) would be unavoidable if it wanted to avoid continuous allegations of abuse of market power. Indeed, even the slightest sign of discrimination of other parties by GTS would immediately backfire on Gasunie.

Gasunie had understandable reasons for fighting DTE's proposal for a radical split-up of its various services and the detailed regulation thereof. The first of these was the argument that such a disintegration would jeopardise the over-all integrity of the gas system. In essence, in order to provide an acceptable security of delivery at every time of the day and year, it had to maintain sufficient capacity in all constituent components of its system. Yet, the facilities – and the cost thereof – providing overall security of delivery in the system cannot be attributed specifically to particular components in the system. Since it is not known in advance where precisely supply problems might arise, the whole of the system has to be constructed slightly over-sized and over-interconnected, taking into account growth in demand. While the advantages of providing security of delivery benefit all users, the cost falls on GTS. If users only pay for the services they actually use, the extra cost for security remains an unpaid externality.

This was the essence of the discussion regarding DTE's choice for negotiated, regulated or hybrid Third Party Access (TPA). The former approach, which was the point of departure in the Gas Act, in principle, gives the operator the opportunity to allocate these costs in the most economic manner, to the most 'in-elastic' users. Yet, how and why this happens remains essentially unclear. The objective of regulated TPA is to achieve maximum transparency and clarity in advance about costs and tariffs.

Security is specifically provided by the timely coordination of gas flows in the several components and facilities of the system, so that its input and output always remain in balance. Traditionally, this was the task of Gasunie, or GTS, and was carried out without much involvement of the consumers and suppliers. By splitting up the system into services and facilities to be contracted separately the responsibility for stability in the system is shifted towards the separate users. GTS is provided the right to penalise shippers for failing to supply enough gas or for taking too much gas at the wrong time. Therefore, in theory, these users would avoid such situations, thus reducing the fines incurred. Yet, as individual contractors for facilities – by and large unaware of each other's respective intentions – will never be able to take measures that are most efficient from the point of view of the system as a whole. The operator of the system, in contrast, would have the oversight and the ability to achieve such coordination, as the choices and options in the system would not be specifically attributed to contracted services.

Gasunie and GTS argued that such a situation would reduce the safety and security of delivery of the system and would probably lead to under-investment in components of the system. Consequently, it continued to fight DTE's guidelines. A much more strategic reason was that – although separated – Gasunie would al-

ways be able to provide a range of services more cheaply. This would provide Gasunie with a competitive advantage as long as others did not have access to, for example, storage and conversion services. The other parties, shippers, large users, some oil companies, complained about this and about the fact that they had to balance their input and off-take on an hourly basis, with high penalties upon failure. They also complained that they had to pay for the whole of the transport trajectory, from where they actually put the gas in the system, to where it was delivered, while Gasunie calculated transport costs to its own customers as being supplied from the most nearby entry point. Indeed, it put gas into the system in a number of places. Yet, the most important impediment for the independent operators, allegedly, is that the required flexibility in gas supply – to meet daily, weekly or whatever, variation in demand – was initially not at all made available by Gasunie, and later at a rather high price. While Gasunie is able to provide flexibility through its access to the Groningen field and the underground gas storage installations, the independents are less well-placed, as they rely on rigid, fixed-volume supply contracts to meet the variable demand of their clients.

Clearly the outcome of the discussion on these issues could never have satisfied all parties involved. In part, this is because the debate is on real and fundamental issues and regulatory problems, like the attribution of the component cost, the optimal degree of unbundling of the system, admissible levels of overheads, and the level of transaction costs *versus* efficiency related gains, etc. All of the negotiation parties had strategic objectives and interests and, based on contributions to the various hearings that were organised by the DTe and Gasunie, these largely guided the positions taken in the discussion. To some extent, the choice to develop such fundamental regulatory concepts during, instead of before, the implementation of the system made a well-informed, rational process of decision-making impossible. In this respect, the mood was set when DTe published the first guidelines without further consultation in 2000.

The hearings on the guidelines in 2001 and 2002, simply illustrated the conflict between DTe and the newcomers and the incumbents. The procedure that was followed did not allow, either politically or technically, for an open discussion of how aspects of general or public interest, such as security of supply and resource management, should be dealt with in the emerging system of regulation. DTe was given the task of implementing the Gas Act, but was not appointed any role in constructing a gas market and management of the gas transport system through detailed guidelines. To be sure, Gasunie had – and still has – the publicly established responsibility to manage its transport system so that it is able to secure gas delivery under strict conditions. DTe's interventions in the management of the system in order to facilitate competition seems difficult to reconcile with this responsibility, because it evidently reduces GTS' power to act and to manage on behalf of the longer-term stability of the system. And, to be sure, DTe has not been accorded this responsibility either.



View of NAM's new underground gas storage at Grijpskerk, opened in June 1997.

Building a Broad Consensus on Gas Production is Essential

“We will not rest until we have an adequate solution to achieve the continuity of present conditions which are a result of fitting in gas production from small fields in the total of Dutch production. We understand fully the importance of maintaining the flexible system that Gasunie has always applied on the purchasing side.”

The Director-general of Competition and Energy at the Ministry of Economic Affairs in The Hague, Dr. Noë van Hulst, a young (46) and eager official, is well informed on the complicated gas dossier. Economist van Hulst has worked in several jobs at the Ministry of Economic Affairs in The Hague. From 1999 he served as Director-general of Energy and since 2001 van Hulst is the Director-general of Competition and Energy.

The evolution of the single European market and the liberalisation of the EU energy markets brought about the 2001 government proposals for re-structuring the Dutch gas sector. After opening up the markets for electricity and natural gas – more quickly than required by the first Directive – Gasunie’s trading and transport operations were unbundled. But more transparency in the *gasgebouw* was needed, especially concerning the role of the State, as any direct government influence in the commercial aspects must be eliminated. According to the latest proposals by the Minister of Economic Affairs, the State entity *Energie Beheer Nederland* (EBN) will in the future represent the State in the *Maatschap Groningen*, with a stake of 40%, and with 50% of the voting rights. In the new system the State will facilitate gas transport in the Netherlands, through a 100% ownership of the high-pressure pipeline system.

The government maintains that the successful small fields policy must be continued, and State revenues must be safeguarded. The minister of Economic Affairs will determine the maximum production of Dutch gas per year, in order to keep the depletion of the large Groningen field under control, thereby providing demand capacity in the market for production from small fields.

Asked whether future developments of the free market could also include privatisation of the State entity EBN, van Hulst commented, “That is not at all an issue at this moment, because we need EBN very much to guarantee a number of public interests. One of them, the continuation of the small fields policy, is a crucial element in our endeavour to modernise the *gasgebouw*. Early in this process, we made our objectives clear. I cannot speculate on the exact outcome now, because we are in the middle of negotiations with Exxon/Mobil and Shell, but I assure you that all parties involved wish to fully facilitate the production offered by the small fields.”

Noë van Hulst stresses that “not only the government, but all parties involved”,

are “very seriously” taking into account the worries amongst small field producers about the future position of their contracts. “New, future sales contracts will be brought under the *Maatschap Groningen*. I think the third producers have no problem with that. But the split-up of existing contracts between the merchants Exxon/Mobil and Shell is the cause of their concern. We will look into that seriously and we have to come up with a satisfying solution.”

“Very useful and promising” are, according to van Hulst, the conclusions of a recent study by the *Overleggroep Olie en Gas* (OOG) consisting of all parties involved with gas and oil production, including several ministries, environmental groups and oil companies. The most important focus of this group is that consensus on the basis of win-win solutions should be possible where exploration and production of hydrocarbons in sensitive areas is concerned.

“The work is not done, it has just started. On the basis of the OOG report, we should continue to work towards a common understanding that it is indeed possible to produce gas, for instance from under the Waddenzee and the Biesbosch, without doing any harm to nature, wildlife or the environment, if it is done under a special regime. I think such a breakthrough is not only necessary, but also possible. To define this special regime, we have to agree on a formula that covers the technological and ecological aspects, and also the possibility that the government spend a certain part of its gas revenues (*Aardgasbaten*) on visible improvement and conservation of the environment and the nature in that particular area. Part of the special regime, are a set of preconditions. For example, drilling and production of gas under the Waddenzee will only be carried out from outside the area (deviated drilling), so no rigs will be placed in the sea. Furthermore a strict system of monitoring by independent experts could be introduced. One of the preconditions is that no subsidence in the Waddenzee may remain as a result of gas production. The producer will have to work ‘with a hand on the taps’, meaning that production could be stopped temporarily, if preconditions are not met.”

Van Hulst thinks that reaching this consensus would be “the litmus test for a successful continuation of the small fields policy.” [...] “I agree with those who say that if you keep the oil and gas people away from important gas fields in all sensitive nature reserves, we can very soon write the requiem for the small fields. The government has a certain role in promoting the idea of reaching a consensus. But it should not be a traditional top-down procedure. The importance of producing gas should not be at the forefront, but rather a search for what is wrong in this nature reserve and what could be improved.”

For the Ministry of Economic Affairs, van Hulst sees no leading role here, “because we would be regarded as suspects in the dock. What the government needs is active support from NGOs, from provinces and local governments. If that consensus becomes broad enough, the political translation will follow suit.”

He emphasises that the Dutch policy to produce as much natural gas as possible is in the interest of security of supply – not only for the Netherlands, but also

for the European Union, which as a whole is becoming more and more dependent on energy imports.

The government declared in 2002 that it is striving for a second moratorium on exploration and production of gas from under the Waddenzee. The first moratorium ended in 1994. Would a second one not bring the requiem of the small fields policy even closer?

“The Waddenzee is believed to hold a substantial part of the present futures in gas reserves. If a moratorium meant that this part of the reserves could not be touched for ten to fifteen years, a serious problem results. The risk is that the gas will stay in the underground forever because over time production may no longer be viable, as the pressure in the Groningen field becomes so low that it cannot perform its balance role for the production from small fields. But let me underline that a moratorium cannot just be declared, it is not a one-sided decision. An agreement of all the concerned parties is necessary.”

Van Hulst agrees that the decisions of the Dutch government (summer 2002) and Parliament (November 2002) to abolish depreciation at will on investments in buildings and installations off-shore could have painful consequences for companies, partners and investors. This fiscal feature was introduced only two years ago, to stimulate exploration and production of small gas fields. “But as you know, the government was confronted with enormous financial and economic problems. In such a case, politicians have to make decisions in order to balance the State budget. This time decisions had to be made very quickly. A lot of measures of this programme to reduce spending and reduce fiscal incentives will be painful for groups of civilians and for companies. But in this case we are not talking about companies that are dependent on poor-relief. Moreover, one should compare the investment conditions internationally. We know for instance that the British government has also changed the fiscal regime for off-shore investments. We will monitor the relative effects. If they are dramatic, leading to a sharp decline of the investments in the Netherlands, we will consider this very well. But do not forget the influence of oil prices. They are quite high now (November 2002). This usually encourages investments.”

“Yes”, van Hulst knows that in the Netherlands, apart from Shell, the gas producers are not the Seven Sisters themselves, but only relatively small affiliates of international oil companies. And “yes”, he realises that investment projects in small Dutch fields, that would yield higher earnings in more promising regions in the world, could easily be disposed of and the funds directed elsewhere. And, last but not least, “yes”, in his comments he has taken into account that high oil prices in one month are not decisive for investments in the oil and gas industry, but rather an estimated average over a long period of exploration and production. Still the Director-general remains firm in his judgement: “We will in due time review the relative effects of this measure.”

7.4 A Liberalising Market

The introduction of a liberalised gas market in the Netherlands fundamentally changes the operation of the gas sector and the way in which gas is produced, transported and sold. Due to this new institutional and financial framework, the fundamentals of traditional Dutch gas policy, i.e. the small fields policy, the balancing function of the Groningen field and the national depletion policy, the pricing of gas according to the principle of opportunity costs (or the market-value principle), and the collection of State and private revenues (the *Aardgasbaten*), are all profoundly challenged.

The essence of the deregulation process was to facilitate indiscriminate access of suppliers, other than Gasunie, to the Dutch gas market. Since large consumers were given the explicit right to shop around in 1998, Gasunie lost a considerable share of the industrial market, initially mainly in the Rijnmond area and in the south of the country. The distribution companies ENECO, PNEM, MEGA Limburg and Delta began selling gas supplied through the UK Interconnector and Dutch gas that was not delivered to Gasunie. Despite the growth in industrial demand from 14.5 bcm in 1998 to 16 bcm in 1999, Gasunie's sales fell from 14.5 bcm to 13.2 bcm. Gasunie's reported share in the supply of 'free' industrial users thus fell from 90% to 75% in 1999 and to 63% in 2000. During the course of 2001, however, Gasunie's deliveries to this market segment recovered somewhat, to 71%. The remainder of the market was supplied by RWE Gas Nederland, Nuon, Essent and Duke Energy from North Sea and inland fields. In 2003, it will be determined when small consumers will also be given the freedom to select their suppliers.

The decline in Gasunie's home market sales has had an important effect on its supply. As pointed out above, Gasunie's supply is composed of gas from the small fields purchased at relatively constant volumes, plus additional requirements supplied from the flexible Groningen field. In addition, moderate volumes of gas are imported from the UK and Norway. This approach implies that a fall in Gasunie's overall volume of sales will have an immediate impact on the off-take from Groningen. Figure 4.4 illustrates: a) the post 1990 fall in Gasunie's national and export sales; b) a more or less constant production from the on-land fields; c) the growth in small fields production, as a delayed result of the successful stimulation policy; and d) the fall in Groningen production, from around 40 bcm in the mid-90s to below 20 bcm in 1999. Only recently, did an increase in Gasunie's export justify a small increase in the production at Groningen, to 24 bcm.

In 2001, Gasunie purchased gas from 11 consortia. Clearly NAM has a dominant position, supplying around 75% of the overall Dutch production, including 43% from Groningen and the remainder from other fields. TotalFinaElf produced 11.6%, BP 3.8%, Gaz de France 3.7%, Wintershall 3.1%, Conoco/Phillips 1.9% and ENI, Unocal, Petro-Canada and Chevron/Texaco less than 1%. The share of NAM

is relatively high for the non-Groningen on-shore production, while the other operators have a large share of off-shore activities.

It is important to emphasise that the recent shifts in the structure of supply have serious consequences. To begin with, when demand falls the relative increase in the contribution of relatively rigid sources of supply reduces the ability to effectively employ the flexibility of Groningen in providing the daily and weather-determined patterns of supply. During the summer period, Groningen production is zero, while the output of a number of other larger inland fields is also greatly reduced. The underground gas storage (UGS) facilities with a total capacity of 35.1 bcm, created by Gasunie/NAM in depleted gas and oil reservoirs in the Netherlands, at Alkmaar (jointly with BP), Langelo and Grijpskerk, of course help to achieve supply flexibility.

The relative decline in the contribution of Groningen has serious consequences for State revenues. Indeed, Groningen is a very low cost field – even when the investments in the recently installed facilities to maintain pressure are taken into account. At given prices for the gas sold by Gasunie, the net revenues generated on selling Groningen gas will always be a multiple of the revenues on selling gas from other fields. Gasunie's purchasing costs for gas from the other on- and off-shore fields – and thus the gross revenues of their operators – are a function of the volume of gas purchased and the price of several oil products in the relevant markets. After deducting these purchasing costs, the operating expenses and the annual statutory profits of 80 million Dutch guilders (€36.3 million), from Gasunie's gross revenues on sales, the remaining amount is transferred to the *Maatschap Groningen*, owned by the State and Exxon/Mobil and Shell, to pay for Groningen gas. As a consequence of the low cost, the pre-tax per cubic metre profit to the *Maatschap* is enormous. Yet, unlike the small fields system, the Groningen regime involves a progressive State profit share arrangement in addition to the standard corporate tax, amounting on average to 70% to 80% of the net revenues. From the smaller fields, the State receives a stable profit share of 40% or 50%. The decision to produce gas from Groningen or from the other fields was relatively insignificant for the earnings of the share-holding oil companies, particularly because NAM also had a large stake in the on- and off-shore small fields production. For the Dutch State the difference in income is huge, because it foregoes the much higher State profits share on Groningen production.

7.5 New Strategies

Any credible commitment by the government to opening the Dutch national gas market would inevitably imply a reduction of Gasunie's market share. Indeed, as the monopolist incumbent in the Dutch market, with a fundamental importance for the gas supply in north-west Europe, Gasunie would otherwise be certain to be-



One of the hooks of the Saipem 7000 semi-submersible crane vessel.

come a major target of the EC Directorate for competition. Thus, other gas sellers would have to assume a significant market share in the Netherlands. However, the Dutch national market for gas is, by and large, saturated and not much absolute growth is expected. Hence, the necessary creation of market share for newcomers would by definition imply an absolute fall in Gasunie's national sales and thus in Gasunie's gas requirements.

This situation could become extremely problematic, with Gasunie as still the near-monopsonist buyer of most of the Dutch gas production. The existing contractual arrangements with the producing gas companies were all concluded with Gasunie. The operators of newly found gas fields were not obliged to sell to Gasunie by law, or by the right of first refusal as in the past. But, most of the new gas fields will be small fields, with a marginal economic profitability and without Gasunie's purchasing arrangements for small fields they would probably not be taken into production. Most companies taking part in the on- and off-shore production prefer to continue to sell most of their output to Gasunie under the relatively stable and profitable arrangements of the small fields policy – which is accepted by the EU-Commission under the label of resource policy. Caught between the need to give away absolute sales volume, the need to maintain a reasonable level of production in Groningen and some other larger on-shore fields, and the political pledge to maintain the small fields policy, the only solution for Gasunie is to expand its sales elsewhere in Europe. Consequently, as a compensation for falling sales and revenues in the Dutch market, the government expected Gasunie to increase exports.

Dutch gas exports, however, had been statutorily restricted by the requirement to maintain sufficient proven gas reserves in Dutch fields to satisfy the country's anticipated consumption over a rolling 25-year period (see MEZ 1995a, 1997; Algemene Rekenkamer 1999). However, the new Gas Act stated that Gasunie could no longer be held responsible for the long-term security of supply for importing consumers, "Dutch gas cannot be reserved primarily for Dutch consumption." The traditionally required ministerial approval for export volumes, prices and destinations had been withdrawn in the new Gas Act (MEZ 1999b). The only remaining – politically determined – limit to Gasunie's foreign commercial activities emerged from the overall Dutch gas production objective set at 80 bcm annually, while Groningen production aimed for 25-30 bcm (MEZ 1999a).

A simple expansion of exports, however, was constrained by Gasunie's prevailing commercial strategy and the structure of the European gas market. This strategy, to-date, precludes the use of price-competition in Gasunie's traditional export markets, Germany, Belgium, France, Italy and Switzerland. In these markets, Gasunie would enter into direct competition with other production and marketing subsidiaries of its own shareholders, Shell and Exxon (Gelder 2000; Correljé 1997). A considerable part of northern Germany is supplied by BEB, a Shell/Exxon subsidiary with an interest in Ruhrgas. Norwegian supplies come from fields in

which Shell (Troll) and Exxon (Sleipner) participate. On the British sector of the Continental Shelf, Shell Expro (50:50 Shell/Exxon) is a main gas producer. In Denmark, Shell accounts for nearly half of the gas produced.

Therefore, as Gasunie stated, new export markets had to be found in the free market of the UK and in central Europe. In the latter market, gas demand was expected to recover to pre-transition levels, while simultaneous attempts are made to diversify away from the Gazprom-oriented supply structure. Gasunie also made an effort to provide new clients with “what it knows best, balancing the flat supply curves temporarily storing gas in abandoned gas fields and using the output flexibility of the Groningen field” (Gelder 2000). So far, Gasunie has succeeded in concluding new supply contracts in France and the UK.

It has often been argued that the gradual liberalisation of the European gas market, the likely appearance of producers with lower overhead costs and lower requirements regarding profit margins and tax revenues, plus the falling costs associated with technological development will end the current market organisation. The prevailing system of market-value-pricing and market demarcation through long-term supply contracts, will give way to gas-to-gas competition causing a decline of prices on the continent. Indeed, Norway, the UK and at a later stage Russia and Algeria will be able to supply considerable volumes of gas at current prices, unless serious political problems arise in the latter countries (See CEC 2001; IEA 1995, 2001; Odell 1995, 1997; Heren 1999; Radetzki 1999).

It remains to be seen whether and when this scenario of gas-to-gas competition will unfold. It is by no means guaranteed. Existing long-term supply contracts still govern the lion's share of European gas supply. These contracts will give way only very gradually – under commercial and/or internal and external political pressure in the producing countries. Indeed, recently, the EU Commission accepted the continuation of these contracts as a means to secure further investments in transport and production capacity for long distance gas. Moreover, producers like Shell, BP, Exxon/Mobil and TotalFinaElf and downstream operators like Ruhrgas, Eon, etc., are repositioning themselves in such a way as to retain control over the industry. Other examples of horizontal integration are the joint ventures with Gazprom, the Exxon/Mobil and TotalFinaElf mergers and the allocation of capacity in the Interconnector. With regards to the latter point, alternative supplies of gas to Europe have been swept up by incumbents that wish to protect their market.

In the short run, the way in which Norway decides to restructure its gas industry and the role it will bestow upon the familiar European gas producers in the future exploitation of its gas resources will be an important determinant of the gas market structure in Europe. Of equal importance in the medium-term, will be the involvement of the same set of firms in joint-production ventures in the Mediterranean and Caspian Sea area.

For the foreseeable future, the lion's share of the gas supplied to Europe will be made available by two non-EU countries, Russia and Algeria; by European Eco-

conomic Space (EES) Member State, Norway; and EU Member State, the Netherlands. Moreover, the EC Gas Directive applies to the trade and distribution activities only. It does not interfere with the structure and the organisation of the production segment, and recognises the national States' sovereignty in their natural resources management. Thus far, the few public/private joint ventures in the five main EU market supplier countries have avoided large-scale gas-to-gas competition and have maintained oil-parity pricing, instead of 'spoiling' the market with low priced gas (Heren 2000). As long as gas production policies in these countries remain rigid, and as long as the market structure underpins these policies, it is unlikely that large volumes of competitively priced gas will reach the liberalised downstream EU supply channels. Indeed, most of the potential alternative supplies from the UK have been contracted by incumbents and, thus, no longer threaten to destabilise the EU markets.

The near future will reveal whether future liberalisation in the Netherlands and elsewhere in Europe will induce the predicted competitive behaviour further upstream. Abandoning the self-imposed Dutch long-term security of supply objectives was a prerequisite for Gasunie's role as an unconstrained active and long-term strategic player. Flexible supplies of additional Dutch gas could indeed stimulate the creation of additional markets in Europe for long distance, high load-factor gas from Norway, Russia and elsewhere – including supplies by the foreign affiliates of Gasunie's own shareholders, Shell and Exxon, in northern Germany, Norway and the UK. This would require a fundamental change in the strategies of the (private and State-directed) upstream strategies in the main producing countries. Crucial in this respect is the current political debate around the restructuring of the Norwegian gas industry, and thus, on the utilisation of its expanding production and transport capacity in the near future.

7.6 The Dismantling of the Dutch System

In the context outlined above, the announcement, in April 2002, of the dismantling of Gasunie as the wholesale trader for most of Dutch gas came as a surprise to many. According to the announcement by the Minister of Economic Affairs, Gasunie was to be split into three parts. The trading branch, Gasunie Trade and Supplies, would be split in two, and transferred to the trading departments of the two share-holding oil companies, Shell Gas and Power and Exxon/Mobil. The transmission branch, already administratively unbundled as Gas Transport Services, would become the fully State-owned network operator, providing non-discriminatory access to all gas producers, traders and consumers. This structure is illustrated in Figure 7.3.

Following the April 2002 announcement, the two oil companies and the Dutch State embarked on a complex process of negotiation. Amongst the many issues to

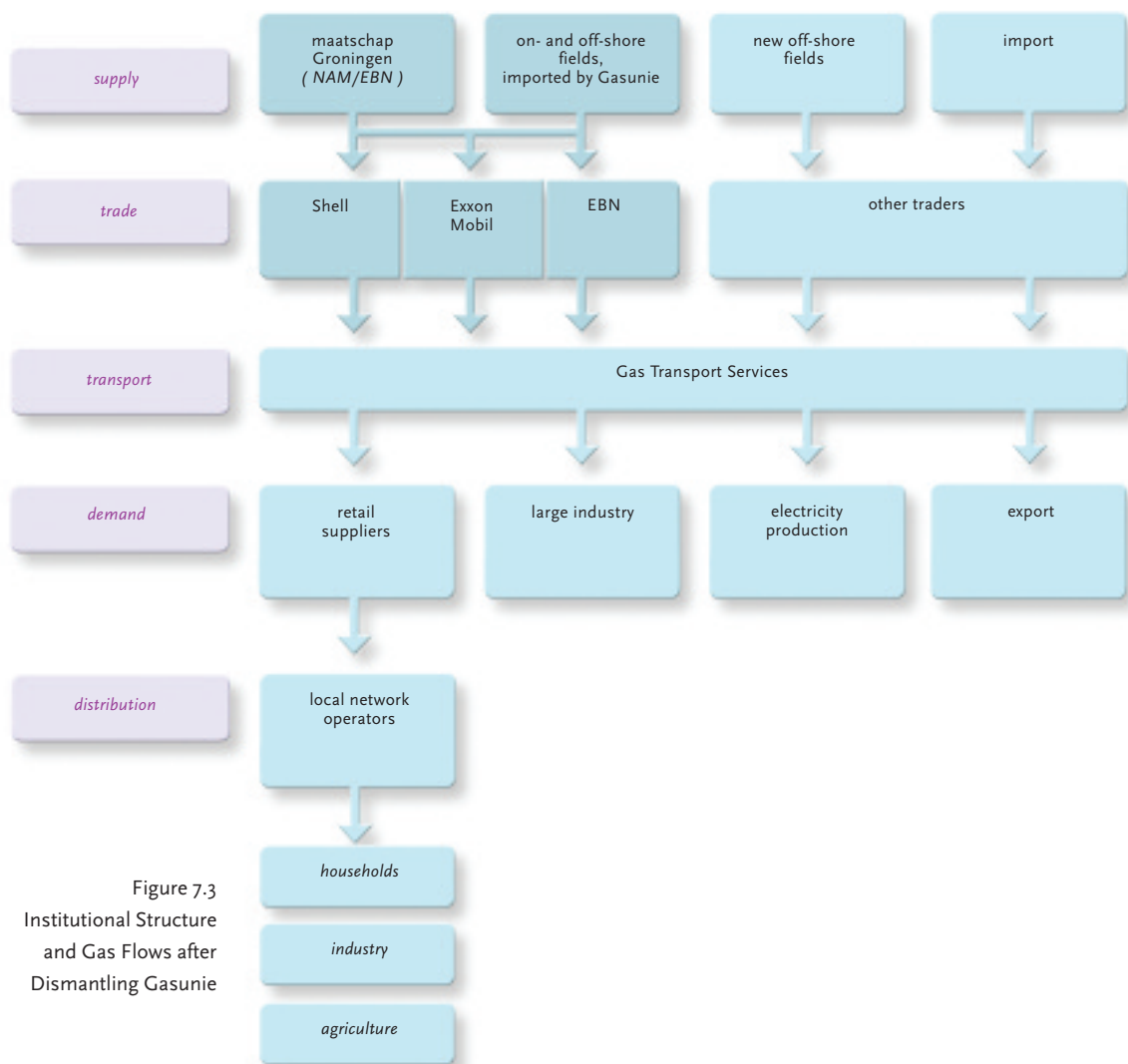


Figure 7.3
Institutional Structure
and Gas Flows after
Dismantling Gasunie

be resolved was the way in which the small fields policy and the long-term depletion policy could be maintained, given that Gasunie, the traditional ‘keeper’ of the policy, would disappear. This issue was not only of public interest, of course. It also affected the (future) position of several oil companies, among which TotalFinaElf, BP, Wintershall, Gaz de France and Oranje-Nassau, as private shareholders in consortia operating the smaller fields. Not surprisingly, these parties were categorically unconvinced that Shell and Exxon/Mobil would carry out the tasks inherited from Gasunie in the same impartial manner as Gasunie had done. Indeed, Gasunie had aggregated and managed the gas flows from Groningen and the other fields in such a way that the smaller fields could also be developed as profitable ventures. This was possible because, on the one hand, it constrained the produc-

tion of Groningen, while on the other, it facilitated the supply of the other fields, in terms of a timely load and quality management with a certain degree of discretionary leeway.

In the new structure, Exxon/Mobil and Shell would have to purchase their gas requirements from the *Maatschap*, with EBN in an executive role. Understandably, the impartial Gasunie attitude in purchasing gas could not be expected from Exxon/Mobil and Shell, with their own significant interests in the Dutch gas sector and abroad. Indeed, the very same argument used to split-up Gasunie (or e.g., British Gas), into a trading and a transport branch pertains also in respect to this situation. The public interest, the provision of transport services, the management of the small fields policy – can never be credibly served by the two large oil companies that are driven primarily by shareholder value. In such a situation, belief and trust are more important than facts that can never be fully ascertained anyway – as evidenced in particular by the Enron debacle. Hence, every arrangement between the Dutch government and the oil companies, with or without EBN, to deal with these issues in a convenient way may fall victim to allegations of abuse of market power.

A second fundamental factor in the negotiations between the State and the oil companies is the valuation of both Gasunie's Trade and Supply activities and Gas Transport Services, and the way in which the shareholders will be compensated when the company is split-up. A main difficulty in this regard is the fact that the value of the assets involved is very much a function of the expected profits that can be made through exploitation. These profits are dependent on a range of decisions the Dutch State itself may take, for example on regulation of Gas Transport Services, issues of taxation, and on factors fully external to the system, such as the price of oil and the evolution of the future European gas market. These issues require long-term agreements on all kinds of principles and aspects and, thus, are extremely complicated and politically sensitive. In the midst of these complex negotiations, the new government resigned after 87 days in office, in October 2002. The expected discussion in Parliament on the results of the negotiations were delayed and Gasunie would continue to function at least until 1 January 2004, half a year later than initially intended. In December 2002, under-secretary Joop Wijn of the Ministry of Economic Affairs wrote a letter to Parliament in which he explained the progress or lack thereof of the negotiations and promised Parliament ample opportunity for comment on the proposed outcome of the negotiations. This is a further indication that Parliament will be given the opportunity to weigh the proposed market structure and the privatisation of gas trading against the public interests and in particular, the manner in which these interests will be secured in a new situation.

GEORGE VERBERG

President of Gasunie

It Would be a Great Pity if we are Played Off of the European Gas Map

George Verberg (60), since may 1992 president of Gasunie, the national Dutch gas supply, trade and transportation company, is located high in the proud, futurist building that has housed the office of Gasunie since 1993. No one approaching the city of Groningen could miss this seventeen storey high fortress, which in 1993 was called, "The Dutch gas building, symbol of a reliable gas-supply."

Nowadays a hefty discussion is going on about the future of the Dutch gas building (*gasgebouw*) with a different connotation. *Gasgebouw* refers to the system of cooperation between the government and private partners in steering the production, supply, sales and export of natural gas. The close partnership in Gasunie, between the government, Shell and Exxon/Mobil, was regarded as monopolistic, and thus contrary to the liberalisation of the European energy markets that had taken effect at the end of the 1990s. Gasunie was encouraged to split the company in two different entities: one for trade and supply, and the other responsible for gas transport services. After this split had taken place, negotiations between the government and the two private shareholders, on 8 April 2002, led to the decision to make a three way split in Gasunie: existing trade contracts were to be divided between Shell and Exxon/Mobil; each of these companies will run a separate trade and supply entity. The Gastransport services and its large infrastructure were to be taken over by the government wanting to ensure a strictly independent entity for this line of activity.

Although Verberg has accepted the split, and Gasunie will – as he says – work hard on implementing the decision, one gets the impression he tries to hide a certain disappointment about the result. This interview confirms that he is not at all happy with the situation.

At the end of 2003 Verberg will leave Gasunie and Groningen, to become president of the International Gas Union in Copenhagen, an organisation of sixty countries with a national gas industry.

Is it a painful process, splitting-up your company?

"Certainly. Wasn't it a fine company? Look what we have achieved. We played a decisive role in the start-up and the development of the European gas market. Gasunie planned and stimulated export streams for natural gas, we co-initiated the building of the first export pipeline, from the Netherlands to Italy. For forty years we were, and still are, a very efficient and successful company, working with ingenuity and commercial creativity."

The negotiations on privatisation were lengthy. Did the decision still come as a surprise?

"First, we were still counting on acceptance of our two-way split of Gasunie into separate entities for trade and for transport. We were working on formal comple-

tion of this change with a legal structure. The organisation was already unbundled and firewalls were being built. I was convinced that both entities could work successfully in the market. After months of negotiations it was more or less a public secret that the negotiations between the State and our shareholders – Exxon/Mobil and Shell – were proceeding with great difficulty, so the decision of 8 April struck us as a moment of great emotional pain. It meant the end of a period of almost forty years during which Gasunie and its personnel had played an essential role in the energy supply of the Netherlands and Europe.”

“After the unbundling into two separate companies, which was logical and in line with the liberalisation, a second factor appeared: the government did not want to be involved – within the free energy market – in the trade and sale of natural gas, but wished to leave this activity completely to private parties. In itself this was understandable and intellectually explainable.”

Gasunie will be loyal in implementing these changes, but what will the result be?

“It means a radical, far-reaching change of the Dutch *gasgebouw* that has brought our society and our government so many advantages. But a strikingly negative result could be that the Netherlands in a very short time will be played off the European energy map. I would regard this as a great pity. Gasunie was always very emphatically present in the market. After this split-up it is not even sure we will retain a head office for our gas business in the Netherlands. Look at the contrast with neighbouring countries Germany and France, where in the same European free market environment large energy companies are maintained and even expanded!” “In the eighties, when I was the Director-general for Energy at the Ministry of Economic Affairs in The Hague, I represented our country at the so-called pre-Sherpa meetings that prepared the Group of 8 summits, because the Netherlands played an important role in the energy policy of Western Europe. And I am not so sure this will be the case in the future.”

“We at Gasunie have in the course of the years strengthened our position by importing gas from Norway and Russia. It is well known in the market that our supply portfolio is extra strong, due to the swing and strategic buffer functions of our large Groningen field, in combination with gas imports, the role of our small gas fields and our underground storage facilities.”

“Energy has always been part of geo-political elements and policies, look again to Germany and France. And, read the most recent report of the British Royal Commission that advises the government to undertake special action in order to secure energy supply, because of diminishing national gas reserves.”

Could the security of supply be endangered when integrated gas companies are unbundled?

“The least one can say is that we as gas companies have always supported provisions for more security of supply and taken measures to improve it, such as large investments. A recent report of the International Energy Agency in Paris especially cautions the European countries to focus more attention on security of supply. What is astonishing is that the European Commission, at the same time that

'Brussels' is dumping the baby out with the bath-water by demanding complete unbundling of the activities of gas companies, is now calling for action by its own bureaucracy to improve security of supply!"

"Governments, whether national or at the European level, should not take the seat of the industry. They should strive for a good division of tasks between themselves and the industry, but leave the responsibilities of companies to the industry and confine themselves to good surveillance: closely checking that energy supply works well and that companies work according to the rules. But I see developments in the European rules and in European law-making that give the wrong structure to the division of these tasks. If this continues and the Dutch government accepts it, I predict that in, say seven years (a well known biblical period) the whole policy concerning the Dutch gas reserves will move to Brussels. That would mean that the national governments lose control and sovereignty over their own energy reserves. It would also mean that we will have a central planning system, organised by 'Brussels', of the gas and electricity sector in the European Union. Fortunately I hear a lot of criticism about this trend and I hope many Dutch experts will loudly raise their voices about it."

Gas producers in the Netherlands are worried that the privatisation of Gasunie will endanger the exploitation of small gas fields, because gas from the Groningen field and from imports is cheaper.

"Until now Gasunie has purchased gas from small fields at an attractive price and with priority. The Dutch small field policy has been very successful. Over the years about 800 bcm has been produced from small fields and brought to the market. That is more than the total of the British reserves to date. I think when the role of Gasunie with respect to the small fields is changed, we will need a new policy, or a change of system to guarantee continuation of the production. One advantage, in this respect, is that security of supply is now emphatically on the agenda of the European Union. Any strengthening of the indigenous reserves and production is of course welcome."

"Yes, although the NAM has been very active and successful in this line of work, one can see a trend that big oil companies are becoming less interested in the exploration and production of small gas fields, because these investments are of course less effective and less lucrative than exploiting large fields with large reserves. But at the same time there is, apart from NAM, a number of niche players, still interested in small fields, like the American newcomer in the Netherlands, ATP."

"It is now clear that in government plans the *Maatschap Groningen* remains in tact at the centre of the Dutch *gasgebouw*. Accordingly, the Groningen field will remain the mother of the small field policy. I can imagine, in the event of Gasunie no longer functioning as the operator of the system for small fields exploitation, this task being adequately taken over by EBN, and with respect to technical issues by the new entity Gastransport."



Platform for the Exploitation
of the Troll Field on the
Norwegian Continental Shelf

7.7 Conclusions

Market liberalisation and protection of the public interest will define the boundaries of negotiations on the Dutch gas sector. The outcome is by far undetermined. Bos, Roggenkamp and Visser (2000: pp. 100-102) rightly conclude that there are *Two Faces of Dutch Gas Policy*. On the one hand, there is the liberal face of the new gas law in the spirit of the integration of the EU energy market. On the other hand, there is the oligopolistic face of the Netherlands as an important gas producer within the wider European gas market. These faces represent the two different sets of interests and objectives, different institutional frameworks and different geo-political spheres.

Since the mid-1990s, a move towards liberalisation has guided developments in the downstream segments of the national EU gas sectors; *viz.* the connected national high-pressure transport systems, the local distribution, and retail trade. As a result of spill-over from competition emerging in other EU industrial sectors and under pressure of (large commercial) energy consumers and potential new entrants to the gas and electricity industry, the EU Commission was able to develop its general guidelines for liberalisation. The actual way in which these requirements have been implemented in the several Member States, have resulted in variations in the degree of openness and in the business strategies that can be observed in the several EU Member States. Dutch policy in this respect has been ambitious, with a progressive schedule for market opening and – since recently – a vigorous (near regulated) TPA regime, as proposed by the regulator DTe.

This logic of liberalisation, however, has not been established in the wider European gas market, where most gas is supplied by the Netherlands and Norway and by two non-EU countries, where the EU Gas Directive does not apply. The *Two Faces of Dutch Gas Policy* are inherent to the place of Dutch up and downstream gas industry within the context of the wider European gas market. It is relatively open and in line with the EC Gas Directive in the downstream segments, and in line with the incumbent industry's long-term pricing and volume strategies in the production segment.

Given current rethinking on the roles of government and the market, awareness that the gas market in Europe is still very much in flux in terms of structure, and the general long-term task of both the Dutch and the European governments to secure a sustainable energy system, it is difficult to assess how quickly the Dutch should restructure their own industry. Debates on the new structure of the *gasgebouw* are, as yet, unclear as to whether there should be preference for strengthening the upstream or downstream sector. In April 2002 proposals indicated that the downstream priority would prevail, but with the negotiations on hold in late 2002 and early 2003, as a result of the rapidly changing political landscape, it could very well end up being the Dutch producing sector that reigns.

A photograph of a modern building with a curved glass facade. The building has a prominent vertical section with horizontal metallic panels. In the foreground, a flagpole displays several flags, including the European Union flag, the Belgian flag, the Danish flag, and the German flag. A few people and cars are visible at the base of the building.

Chapter 8
Conclusions
Natural Gas in the Netherlands



The European Parliament
in Brussels, Belgium

From Cooperation to Competition?

The development of the Dutch natural gas industry spans more than 40 years. During this period the national and international economies, the national and international energy markets, and the ideas regarding the relationship between the government and the market underwent great changes. The way in which the Netherlands decided to manage its gas resources are a clear reflection of these changes. When gas was first discovered in commercial quantities, the Netherlands was still in the middle of a process of reconstruction. The vision of the vigorous policymakers on how to rebuild the Dutch post-war economy can be easily recognised in the way the Dutch *gasgebouw* was created.

The choice for a mixed public-private organisation of the sector typifies the Dutch society's ability at that time to pragmatically combine the interests and positions of the various stakeholders – such as the State, the international oil companies, the councils, the town gas companies, and the coal industry. The evolution of the Dutch gas system was influenced by complex economic, institutional and technological factors. These included policy paradigms and ideas regarding scarcity, security of supply, social issues, the environment, and the impact of other realms of policy-making. The pragmatic approach to fundamental issues like ownership, market development, and public goods created a gas sector that was able to rapidly change the make-up of the Dutch energy system.

For each of the significant periods (1959-1973; 1974-1987 and 1987-2002) it is shown that public policy was often a compromise between conflicting political objectives, such as the level of gas prices, the size of State revenues, the rate of depletion and the development of new reserves. Many of the debates around these issues can be described in terms of the classical tension between a private industry, owned by shareholders looking for dividend and growth; and the State, with a number of pressing arguments for regulation, intervention and taxation. We have attempted to illustrate that the relationship between the industry and the State is by no means stable, but the consensus model of Dutch society made this less evident.

Economic, political and technical developments are constantly influencing and changing perceptions, interests, objectives, boundaries, coalitions and incentives to bring about changes in the governance structure. Examples of such drivers of change are the perceptions of availability of gas and other sources of energy, that have given rise to national and international marketing strategies, energy-saving

campaigns and approaches to secure the long term supply of gas, through stimulation of the indigenous production and even imports of gas into the Netherlands. Another important driver is the price of oil. This is an important determinant of companies' and State revenues and also has an impact on investments and the taxation regime. The environmental perspective not only drives preferences for specific fuels and energy-saving, but also affects the choice for production locations.

During the various periods that we distinguished, pragmatism prevailed as a guiding principle for the management of the gas resources. Yet, the particular structure of the *gasgebouw*, that is very much like a *poldermodel* for the gas sector, also had its disadvantages. Due to the commercial interests of the parties, transparency was not always optimal and allowed a veil of mysticism to develop around the *gasgebouw* with regards to prices, profits and the reserves in the Groningen field. The pragmatic organisation model hampered both corporate governance by the market and public governance in Parliament and created to some extent an insider model of governance. This insider model of governance encouraged technical and organisational synergies that created the well-run gas industry for which the Dutch system is known. Simultaneously, it also stimulated a certain degree of distrust among outsiders. This included factions of Parliament, where other stakeholders found a willing ear to hear their arguments.

The insider-outsider controversy gained prominence in times when difficult policy change decisions had to be made. This controversy has become a permanent feature during the last 10-15 years and has hampered a rational approach and proper political debate on difficult issues such as development of the Waddenzee. Over time, the outsiders grew to be political insiders and became stakeholders. Thus they were able to influence the political agenda and decision-making on fundamental issues like future production, environmental concerns and security of supply. In addition, the EU initiatives to liberalise the European gas markets increased the pressures on the *gasgebouw* model of organisation. As a result, the incumbents were forced into defensive strategies, a rather difficult change of roles.

In the 1980s a discussion emerged on the role of the government and the market in the energy sector, also in the Netherlands. Initially the position of the *gasgebouw* was not at stake in this debate. However, under pressure of the European energy market liberalisation in the 1990s, the organisation of the gas sector in the Netherlands also came under review. The demands of the internal gas market are narrowing down the possibilities to formulate a pragmatic solution to adapt the existing *gasgebouw* to the new European structure, although it is not impossible. Yet, new insights on the role of government in society and in the economy obviously prepared Dutch society for a more radical break with the past than initially anticipated. So, a new period in the development of the Dutch gas sector has started in which the mixed public-private organisation that characterised the Dutch gas sector for so long is about to be radically transformed.

It is clear that the discovery of the large Groningen gas field was of crucial im-

portance for the role of gas in Dutch society. The gas network in the Netherlands did expand in the 1950s, but the then public utility type institutional regime was a major barrier for further expansion and for integration of the existing networks into a national network. In addition, there was the strong potential competition from oil products supplied by private oil companies. The discovery of the Groningen gas field provided a solution to this urgent impediment. The exploitation of the enormous gas field and the large-scale introduction of gas required a new institutional framework, with a much more pronounced role of the private industry and a new form of coordination of the energy market.

When political consensus was reached on a new regime, the expansion of the gas network by Gasunie could be undertaken. Gasunie took charge of the well-planned and executed transition to natural gas in the Netherlands. From then onwards the institutional regime and the gas supply system co-evolved and mutually reinforced each other. Inconsistencies were solved within the boundaries of the regime and this produced a very stable socio-technical configuration. In terms of institutional and economic factors, the shaping and structuring of the market was remarkable: it provided a new public role in hydrocarbon production (with a 70% State revenue share and a considerable influence in resource depletion and marketing), that previously had been the exclusive domain of private enterprises. At the same time, it also provided a new private role in the formerly public system of gas supply.

The pragmatic solution achieved for the organisation of the gas sector took place at a time (the late 1950s) when Dutch society appeared stable. However, in the 1960s the social stability of the country was challenged by the emergence of a range of new social movements. These movements themselves were a sign of changing social relations and institutions in the Netherlands and were the first steps towards a social and cultural modernisation process. The unravelling of society, vertically segregated along socio-religious lines, crucially weakened the central role of the elite of the respective groups and their organisations in embedding technological and social-economic innovations in Dutch society. From about 1970 onwards, innovations and especially large-scale technical projects became much more contested than before. The timing of the discovery of Groningen was in hindsight an important factor.

The rise in oil prices in 1973-74 provoked substantial changes in the Dutch economy and also in policy-making on natural gas. The political and social relations became much more complex, particularly because the Dutch economy experienced a sharp downturn during the 1970s. Natural gas became of even greater importance to the Dutch economy. The political context, conflicts of interest and divergent views on resource management resulted in sharp discussions about energy and gas policy. The discovery of other gas fields in the 1960s and 1970s, the perception of scarcity, high oil prices, and the general political and social developments during this period had a large impact on the gas sector and brought about

changes in the institutional set up. The role of the State was to some extent strengthened. This, nevertheless, hardly affected the core elements of the institutional regime and the operation of the sector. Hence, the objectives of the post-1974 Dutch governments, in terms of State revenues, enlargement of the indigenous resource base with the small field policy, and energy-saving policy could be aligned with those of the gas industry through adjustments in the contractual arrangements and the executive role of Gasunie.

In 1995, the externally driven liberalisation of the European gas market was beginning to show its impact on the organisation of the Dutch gas sector when, under the Minister of Economic Affairs, Wijers, the Third White Paper on Energy Policy was published (MEZ 1995a). This was a turning point, as until then the Netherlands had been amongst the staunchest opponents of the EU Commission's proposals. The subsequent far-reaching change in gas policy became even more evident when, in 2002, the Minister of Economic Affairs, Jorritsma, announced a radical separation of Gasunie's transport and trading activities and proposed the unbundling of ownership of the trading activities. This will considerably reduce the influence of the State in the exploitation of the gas fields, despite a continuing State ownership of the transmission system. The more or less symbiotic relationship between the State and the relevant parties will come to an end, unless a new government decides to put the negotiations on hold. Indeed, the enthusiasm for privatisation of public utility sectors has begun to wane after bad experiences in other sectors of the economy, such as the railways. According to the plans, the old *gasgebouw* governance system will be replaced by a multi-layered governance system with a different co-ordination mechanism for the market and for the State. The integration of these systems of governance becomes the critical task of the regulator. Some fear that these synergies, now easily organised in the *gasgebouw*, will be lost in the new governance system.

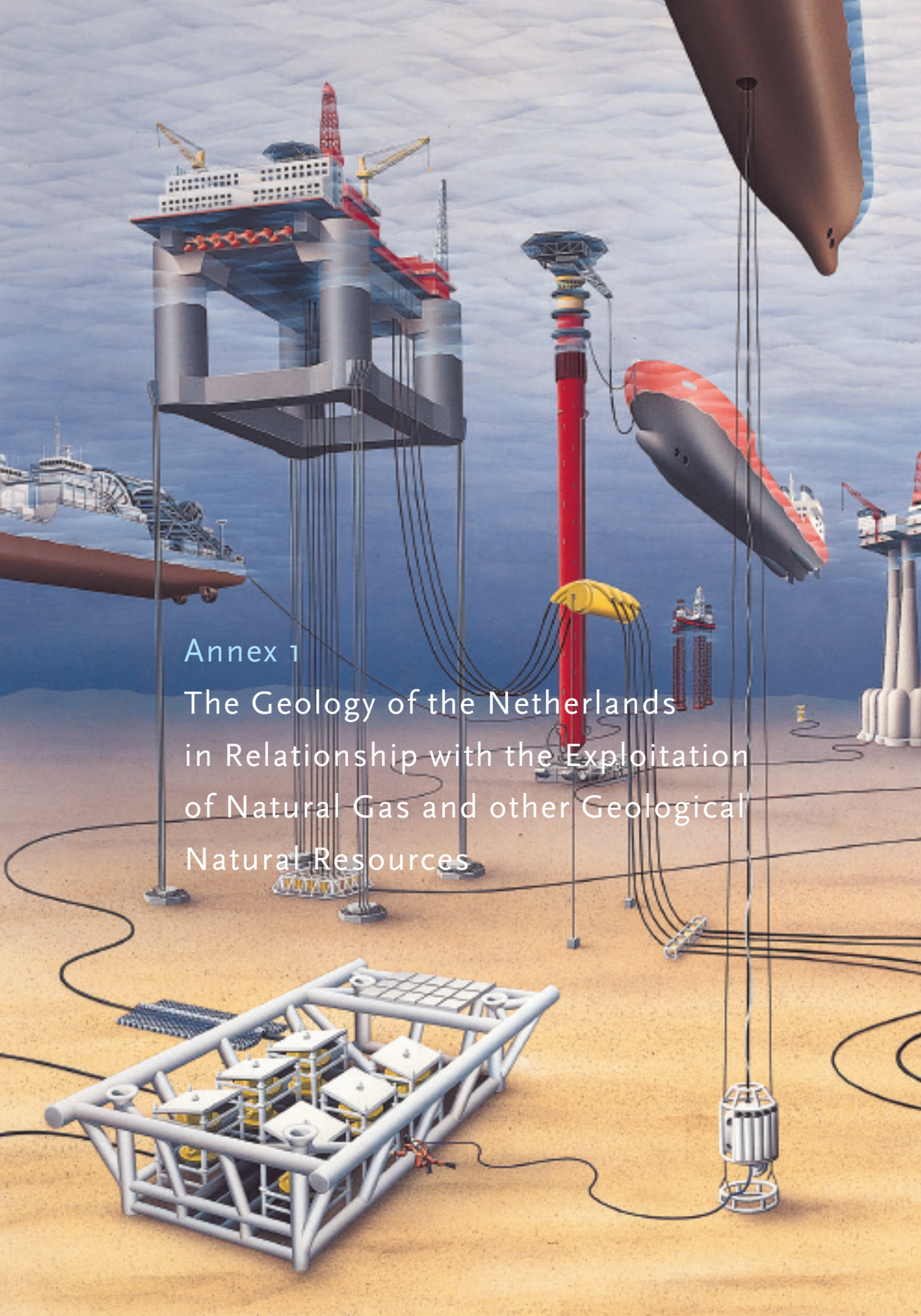
The place of the small field policy remains unclear. The low-cost Groningen field and production flexibility that the field and the governance system offer at the moment generate the positive investment conditions for the smaller fields. The more gas that is produced from other fields the longer the Groningen field can fulfil its role as swing supplier. Groningen is important for maintaining the competitive edge over other nearby suppliers, stability and flexibility. Competition amongst the Dutch gas fields, however, is impossible because of the wide variety of production costs between Groningen and the rest of the fields. Separating Groningen from the production of other fields will bring the production of the small fields to a quick end. Competition in Europe amongst various suppliers has already been realised to a certain extent. Rather than being blinded by the market ideology, pragmatism is needed more than ever to position the Dutch gas industry in the European market. Security of supply worries in Brussels will no doubt lend a willing ear to a Dutch position that wishes to promote indigenous gas production.

The new experience with the market model and regulatory control is still very

much a-learning-by-doing experience. This model will have to compete with the established model of the *gasgebouw*, which, on the one hand, has internalised commercial risks and public policy goals but, on the other hand, has created insufficient political transparency to be re-embraced as a model for the future. Discussion on adapting the *gasgebouw* in such a way as to overcome some of its disadvantages while maintaining the advantages did not arouse much interest. After initial hesitation, the Kok II government (1998-2002) attempted to fully embrace the logic of liberalisation as the leading paradigm.

Today, a critical review of the various options would do justice to the importance of gas sector for the Dutch economy. Perhaps, given such an effort combined with a greater sense of realism that is beginning to sink in, it is not too late to at least compare the pros and cons of the various governance models and come up with a well-argued rather than an ideologically grounded choice. The Dutch owe such a reflection to their pragmatic predecessors and to the public that has been locked out of such debates in the past. While other countries move ahead with liberalisation and privatisation of their energy sectors, albeit with mixed feelings on the short-term outcome, they are committed to that model. To generate such a commitment amongst Dutch citizens for a new governance model, a more open debate would be beneficial to gain acceptance. Furthermore, such a debate could prevent an ambiguous outcome in which the government opts for governance by the market, but cannot accept the outcomes and responds with over-regulation.

The development of the Dutch gas sector was an important impetus for the development of a cross-European gas network in the 1960s and 1970s. This network was – to a high degree – shaped by the Dutch example and Gasunie became a major international player. The dynamics of the European and international gas markets are dictated by resource availability, geopolitics and the demands of the technical system on the one hand, and the markets for gas and invested interests on the other. The lucrative Dutch exports of gas stimulated the activities of other potential suppliers of natural gas, from the North Sea, the Soviet Union, and Algeria. After 1972, the Netherlands lost its international expansionist outlook on gas policy. The new challenges of the current European gas market, in which suppliers from far-away producing countries hope to enter the market, should be appreciated by the Dutch gas sector and by Dutch policy-makers as a welcome opportunity to sell important services such as proximity, stability, flexibility, peak shaving and storage capacity.



Annex 1

The Geology of the Netherlands
in Relationship with the Exploitation
of Natural Gas and other Geological
Natural Resources



Production systems of the 1990s often combine subsea wellheads and manifold centres with several types of floating platforms. The role of fixed platforms, however, is not over.

A.1 Geological Natural Resources

The geological natural resources of the Netherlands have long been exploited at or near the earth's surface. Flint was dug in shallow mines in South Limburg during the Stone Age, and exported as far away as Frankfurt, Germany. The Romans dug for coal in the same area. Gradually the mining of coal went deeper and mines were opened during the last decade of the 19th century into the 1960s. The last coal mine, Oranje-Nassau's, closed in 1974. Peat has been dug for as long as can be remembered in the extensive low swamps behind the coastal barriers and in the high swamps in the eastern part of the country. Sand, clay and gravel are dug everywhere, chalk is quarried in South Limburg, and a few abandoned limestone quarries lie in the eastern part of the Gelderland province. Kitchen salt is exploited with wells to Röt and Zechstein salt in the same area. Zechstein magnesium salt is exploited in the same manner in the northern part of the country.

Methane gas, generated in some of the peat swamps, is known as swamp gas. It has been exploited by local farmers, particularly in the Noord-Holland province, by placing metal containers over locations with gas bubbles in the water and by connecting these by hoses or pipes to their homes.

Natural gas in a stricter sense has been produced as a by-product of the coal-mining operations in South Limburg for household and industrial purposes. Almost 350 fields with natural gas have been found, and there are almost 40 oil fields in the country. Western Europe's originally largest and second largest gas fields (Groningen and Annerveen) and the largest oil field (Schoonebeek) are located in the Netherlands.

A.2 Natural Gas

Origin

Beds from which natural gas and/or oil (hydrocarbons) have been or can be generated are called source rocks. Most of the natural gas found in the Netherlands has been generated from thick layers of coal present at varying depths in the subsurface in most of the country. These are the extension of the coal beds that have been exploited in the mines in South Limburg. These coal beds were previously immensely thick layers of plant material that originated in extensive swamps during the Carboniferous epoch. As the name suggests, this refers to the coal period of

about 360 to 290 million years ago, with most plant growth in this area occurring during the late part of the Namurian and the early and middle parts of the Westfalian periods, between 320 and 305 million years ago. The climate then was very moist and warm and plant life proliferated to levels never seen since or before.

Most natural gas is formed from plant material that has become buried, compacted, and with increasing burial reaches higher temperatures. At a very shallow burial depth, peat develops, in which swamp gas is formed. In sinking parts of the earth's crust, organic matter can become more deeply buried. When buried deeper, peat gradually turns into brown coal or lignite and eventually into coal. The Carboniferous coal beds in the Netherlands go to a depth of about six thousand metres. At the temperature, pressure and degree of compacting at which coal is formed, gases are formed in the coal by complex chemical processes. The result is known as mine gas in coal-mines and as natural gas in gas fields. Most gas generation takes place at temperatures of about 150-200°C. In the Netherlands these temperatures occur between depths of about 4,000 and 5,250 metres. At these depths and temperatures the source rock is called 'mature'.

Coal that is or has been buried deeper than this interval are 'overcooked' and no longer capable of generating gas. Coal that has remained at more shallow depths, releases relatively small amounts of gas and is called 'immature'. If a mature source rock is uplifted it will stop generating gas, unless the area in which it occurs again sinks to the original or to a greater depth. Analysis of the burial history is, however, only one of the many challenges a petroleum geologist has to tackle before an exploration well can be proposed, as we shall briefly describe in the following paragraphs.

Composition

Not all natural gas originates from the burial, compaction and cooking of plant material. When oil is buried deep and at a very high temperature, it will gradually become lighter and eventually transformed into gas. Oil is predominantly generated by the deep burial of fine-grained sediments deposited in marine environments that are rich in plankton remains. It can also be formed from pollen and seeds-rich coal types (boghead and cannel coals) and from chemical transformation into sapropel of plant material deposited in coastal areas. As a result, specific types of coal in certain parts of the Netherlands also generated some oil, and the gas itself may vary from dry (low-calorific – mainly methane) to wet (high calorific – rich in ethane, propane, butane, etc.).

Ideally, natural gas is entirely composed of hydrocarbon gases, but due to the presence of, amongst others, certain plant materials and a mixture of gases generated from other rocks at increased temperatures and depths, nitrogen, carbon dioxide, hydrogen sulphide and other gases may also be present in natural gas. For example, gas in the Netherlands becomes gradually richer in nitrogen toward the

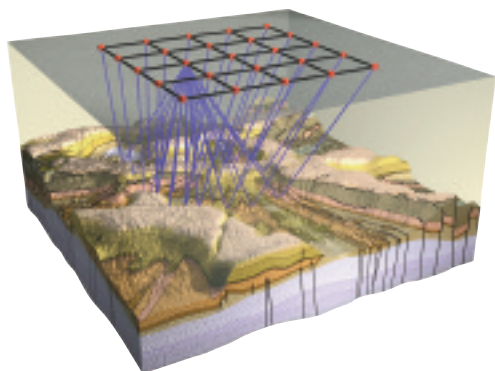
north-east; the Groningen gas field contains about 14% of this gas and the German gas fields even more.

Migration

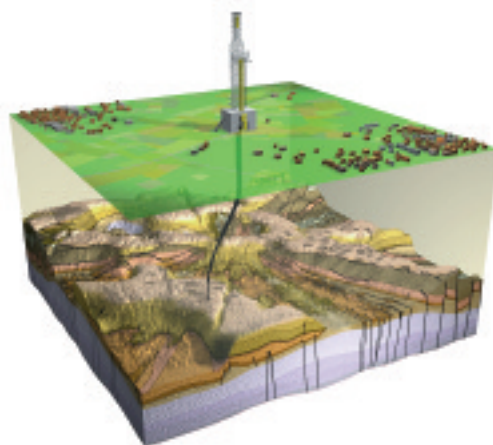
Sedimentary rocks contain numerous small pores. Big holes are extremely rare and occur only in limestone that has undergone karst formation. Due to geological movements, rocks can become fractured or faulted. The pores, fractures and faults, are generally full of water. Under influence of the pressure of overlying rocks, the hydrocarbons generated in the source rocks will be pressed out. Because they are lighter than the water in the pores, fractures and faults, they will migrate in an upward direction.

Seals and traps

Hydrocarbons will keep moving upwards until they meet a sealing layer (seal or cap). Seals can occur from, in order of descending quality, rock salt, gypsum/anhydrite, shale or fault planes. These layers do not possess connected pores and can trap the migrating hydrocarbons, provided they have been structured into the right shape during deformational movements of the earth. These sometimes compressional and at other times tensional tectonic forces compressed, faulted and tilted the originally more or less flat-lying sediments into anticlines, synclines and rotated fault blocks. Uplifts may result in the erosion of thousands of metres of rock. Traps can be formed by anticlines, by faults that provide a seal across them, against salt walls or pillars, by erosion surfaces (unconformities) or by pinch-out of reservoirs between sealing formations.



Artificial vibrations (seismic signals) are partly reverberated back to the surface by bedding planes of the different rock layers and by faults.



For wells on land a concrete drilling location is constructed around a surface pipe with a diameter of about 90 centimetres.

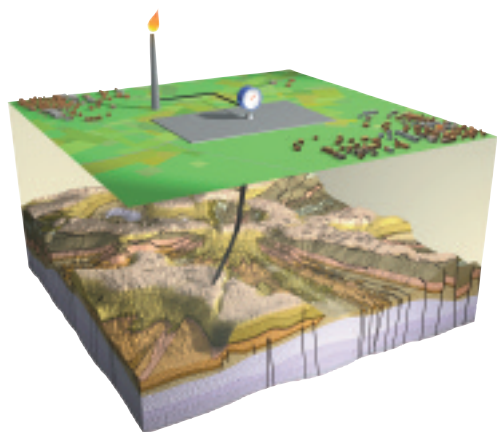
A range of complex combinations of these main trap types may also occur. All 'easy' traps in areas where gas is expected to exist have now been drilled and exploration is presently concentrated on the more complex trap types. A trap with oil or gas in it is called an oil or gas field.

Reservoir

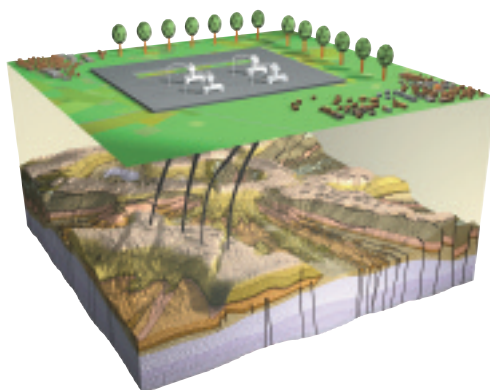
The rock in which the hydrocarbons are trapped should have a minimum porosity and permeability (connectivity) to allow for the production of hydrocarbons and to qualify as a reservoir. Reservoir rocks are usually sedimentary rocks (sandstone, limestone or dolomite), but also buried limestone reefs and occasionally fractured and/or weathered igneous rocks (lava, granite, etc.) can act as reservoirs. Primary porosity is determined by the pores. Some reservoirs possess primary porosity of up to 35% of the total volume. Primary permeability is determined by pores that are connected. Primary porosity and permeability can be enhanced by fracturing of the rock or by chemical processes involving volume loss of the rock (for example the transition from limestone to dolomite) or by solution processes (for example karst processes in limestone).

Gas and oil fields

The relatively light gas and oil deposits are almost always underlain by water. When oil and gas occur in the same reservoir, the gas (that is lightest) is always present in the upper part of the field. Relatively high pressure occurs in the hydrocarbons trapped in the pores. The higher the pressure, the easier the hydrocarbons are produced. Extra care must be taken when drilling through very high-pressure



In the event of finding hydrocarbons, production tests are required to further establish whether the discovery is of an economically viable size or not.



To develop an on-shore gas field, a production location is prepared and the necessary number of production wells is drilled.

reservoirs. The shallowest gas fields in the Netherlands occur in the northern part of the Continental Shelf at a depth of about 700 metres; the deepest gas fields are found in the L Quadrant of the Continental Shelf at depths of more than 4,500 metres. The maximum depth for commercial production is usually determined by the degree of reduction of porosity and permeability by compression and/or cementation, and consequently by the resulting gas flow rate from them.

Gas fields in the Netherlands vary from very small to gigantic. So far, more than 350 gas fields have been found in the Dutch subsurface, of which more than 150 have been developed. The minimum economic size of a gas field depends on its depth, distance to a pipeline or other infrastructure and on the efficiency of the operator. Gas fields at the right location with reserves of only about 0.5 billion cubic metres (bcm) can still be commercially attractive in the Netherlands.

A.3 Exploration

Exploration for hydrocarbons can be compared with trying to complete a jigsaw puzzle with a certain number of pieces missing. In much-explored areas, relatively few pieces are missing, but trying to complete the puzzle in areas with little previous exploration feels sometimes like an uphill battle. Working as a team, the petroleum geologists and geophysicists have the challenging task of completing the picture by using their experience, intelligence, imagination, a lot of hard work and serendipity.

Geology

Petroleum geologists, with the help of geophysicists (see below) are specialised in assembling and mapping all available well and outcrop data regarding the presence, distribution and type of source rocks and their maturity, the presence, distribution and composition of hydrocarbons, the possible migration paths, the presence, distribution and quality of sealing formations, the integrity of the traps, the presence and distribution of reservoir rocks and their porosity and permeability, the depths of the different rock types, their geological age and a lot more. Although all necessary ingredients for the presence of hydrocarbons may seem to be present, only the drill bit will tell whether they are present in the right combination.

Geophysics

A most important tool for mapping the traps and the rest of the subsurface structure and for estimating the depth and thickness of the different formations, is the interpretation of seismic sections by geophysicists. It may also help to solve other geological problems. Therefore, team-work is essential.

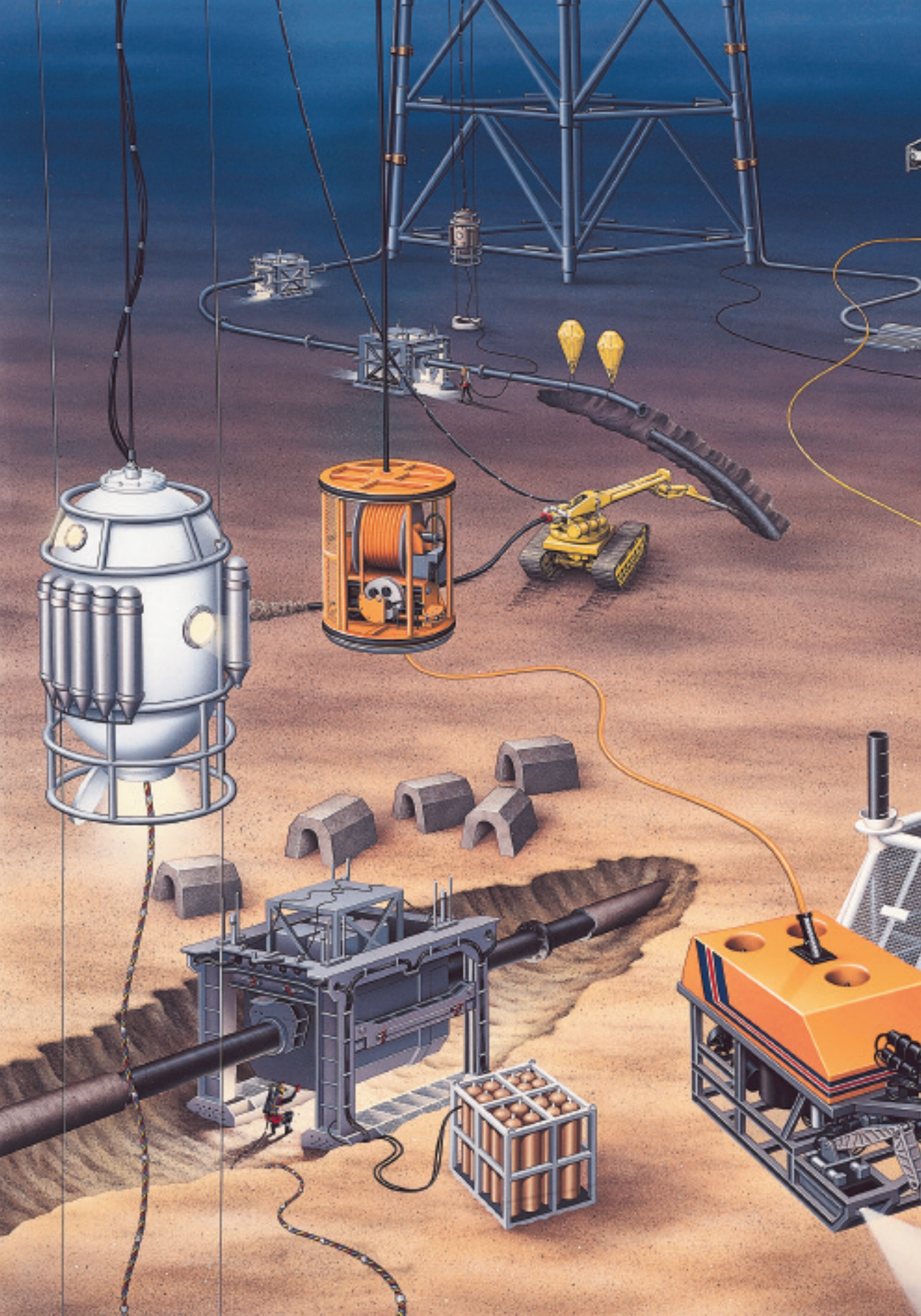
Seismic records are obtained by generating artificial vibrations (seismic signals) at the earth's surface, that are partly reverberated back to the surface by bedding planes of the different rock layers and by faults. In lightly inhabited or uninhabited areas seismic signals are still generated by small dynamite explosions in shot holes. In more built-up areas these signals are usually generated by fibroses methods, by which a metal plate under a lorry is pushed against the earth, creating a vibration. For off-shore areas dynamite has been replaced by air guns that generate shock-waves using compressed air. On land, the reverberated parts of the signal are recorded at the surface by geophones positioned in an optimal pattern. Off-shore, hydrophones combined into a number of streamers are pulled behind the same ship that pulls the airguns. The longer it takes for a signal to come back to the surface, the deeper the reflecting surface is located. The non-reverberated part of the signal (the refracted part) continues downward until it meets the next bedding plane, and the process repeats itself. This process can be compared with the reflection and refraction of light rays by a prism.

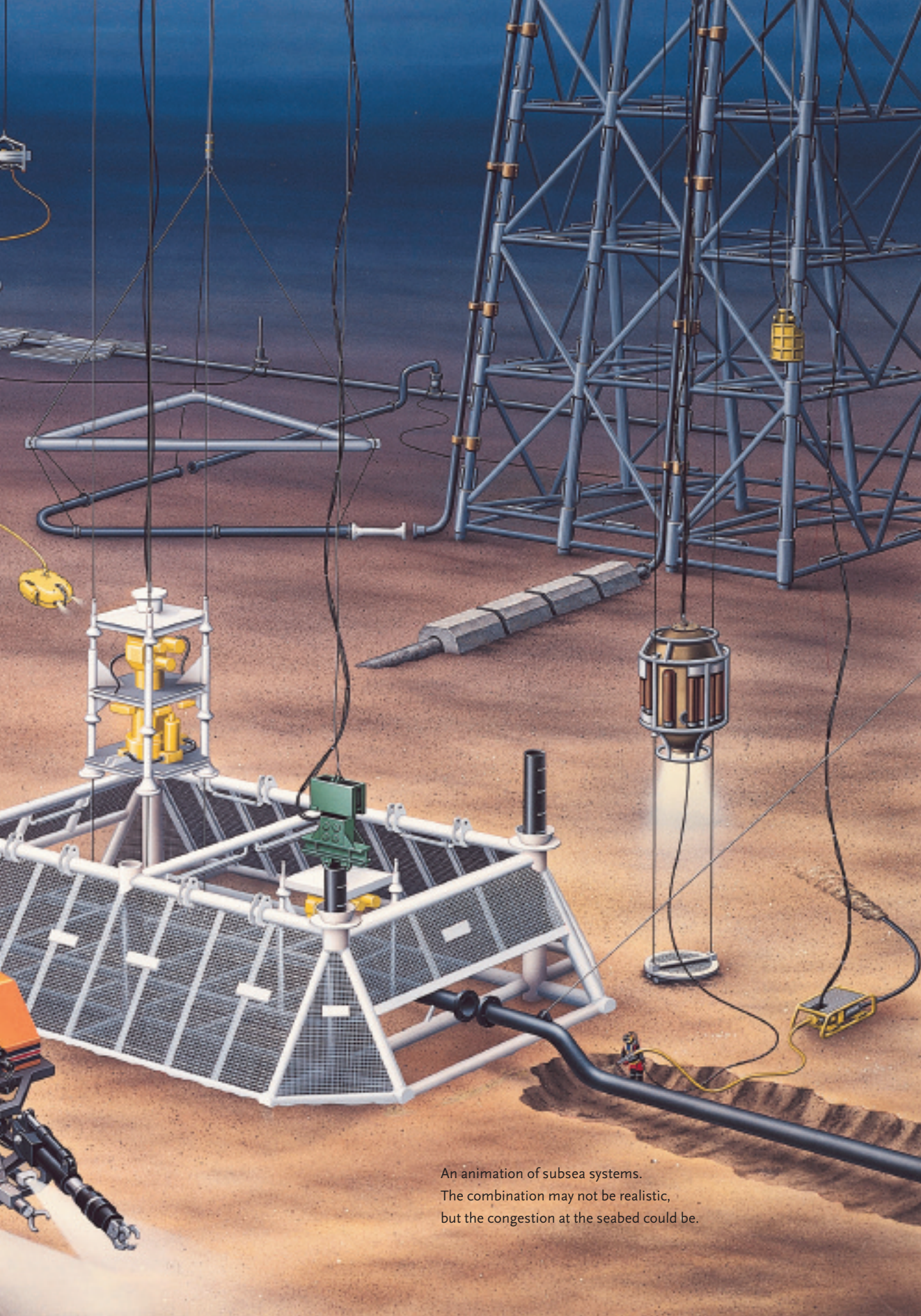
The deeper the bedding plane, the weaker the signal and, consequently, the more diffuse the seismic records. The signals recorded by the numerous geophones and hydrophones are recorded on tapes or discs. These are then processed using sophisticated computer programmes. The final record is called a seismic section. The more data obtained, the more complete the picture of the subsurface will be. Previously, wells were drilled on grids of seismic lines that were located four kilometres apart. It later became apparent, after more seismic data had been acquired, that certain wells had been drilled at the edge or even outside the interpreted traps. Nowadays, most operators shoot a so-called 3D seismic, in which seismic lines are shot as close as every 20 metres in two directions, local circumstances permitting. With this data, detailed three-dimensional pictures of the subsurface can be obtained.

A.4 Drilling

After management has approved the prospect proposed for drilling by the petroleum geologists and geophysicists, an exploration well is drilled. This may cost between €5 and €30 million. The chance of finding commercial oil or gas accumulations world-wide is now approximately 10-15%. In the Netherlands, where relatively much previous exploration has taken place and much 3D seismic has been acquired, the success ratio has been about 30% during recent years. This does not mean, however, that every third well results in a discovery, it is more often the case that a company drills ten dry holes in succession, followed by four discoveries. One needs patience, endurance and courage in this industry – and a lot of money to risk.

First the necessary permits have to be obtained, this may take a very long time especially for sensitive areas.





An animation of subsea systems.
The combination may not be realistic,
but the congestion at the seabed could be.

For wells on land a concrete drilling location is constructed around a surface pipe with a diameter of about 90 centimetres. The surface pipe not only prevents the loose surface sediments from caving in, it also prevents drilling fluids entering the ground water. Rubber mats or asphalt prevent drilling fluids or other pollutants from entering into the soil from above. The drilling location will accommodate the drilling rig, the mud pumps, the mud pit, containers with materials and equipment, the blow-out preventers, etc.

For off-shore drilling a surface pipe is set, with the drilling rig and all the equipment on a mobile drilling platform, usually a jack-up rig in the shallow Dutch off-shore waters.

No drilling permits are granted for built-up or sensitive nature areas and a location has to be chosen at some distance from the prospect to be drilled. Consequently, this requires deviated or even horizontal drilling over lengths of thousands of metres. Operators outside the Netherlands have drilled at a horizontal distance of more than eleven kilometres from the drilling location!

The drill bit is connected to stabilisers and drill pipes, which are rotated by a driving tool in the drilling rig. When a certain depth is reached and the last drill pipe almost disappears into the ground, a new pipe is attached.

While drilling, a heavy viscous drilling fluid (drilling mud) is circulated. This mud is composed of water (or oil), clay and some chemicals. It is used to smear off the wall of the borehole to prevent liquid losses to the formation or formation fluids from entering the borehole. It also prevents the drill bit from overheating and transports the drilled rock chips (“drill cuttings”) to the surface. These cuttings are separated from the mud and the cleaned mud is pumped down again.

A well-site geologist investigates the cuttings to monitor the progress of the well and to fine tune drilling operations.

Drill speed may vary from about 100 metres per hour in the soft shallow section, to only a few decimetres per hour in very hard rocks such as anhydrite. Drilling an exploration well may take one to six months, depending on the depth and the kind of rocks and pressures encountered.

In order to prevent the borehole wall from collapsing, steel casings are cemented at regular intervals. The deeper the well becomes, the smaller the diameter of the casing and consequently of the drill bit that has to go through it. This system resembles old-fashioned extendable binoculars.

A.5 Evaluation

In addition to the investigation of the very small drill cuttings, big cores of the rocks can be taken for examination by using a hollow drill bit; smaller rock samples can be obtained by shooting hollow bullets into the wall of the borehole. To further guide interpretation of the subsurface, the following measurements can be

carried out: the dip and the strength of the rocks, the reservoir pressure, several kinds of electrical resistance and conductivity, direct and induced radio-activity, sonic speed and density. Direct borehole images can be acquired as well.

In the event of finding hydrocarbons, production tests are required to further establish whether the discovery is of an economically viable size or not. The variations in the amount of hydrocarbons produced and the recorded pressures can give an indication of the size and quality of the field. For example, low gas production rates may indicate low permeability; a rapid drop in flow rate and pressure may indicate a very small accumulation or a nearby barrier.

After analysis of all data acquired in a discovery well and, if necessary, adjusting the geological and seismic maps, the reserves and production rates over time are estimated (production profile). Different kinds of reserves are estimated: the amount of gas present in the ground (gas originally in place), the part of this gas that could be produced with current technology (recoverable gas or reserves) and the part of the technically producible gas that could be produced economically (economic reserves). The latter depends, amongst others, on the operational costs and the expected, but difficult to predict, future gas prices. Given these calculations a decision is made whether to develop the field or not, or whether a second well (an appraisal well) will be required before making the final decision.

A.5 Production

After the decision to develop an on-shore gas field has been made, permits are applied for, a production location is prepared and the necessary number of production wells is drilled. The wells are connected with flow lines to a gas treatment installation. Here water, solids and other impurities are removed, condensate is separated from the gas, pressure is brought to the required level and the temperature is lowered. A pipeline is installed from the production location to one of Gasunie's measuring stations and their pipeline infrastructure.

For the development of an off-shore gas field, a fixed production platform is positioned over the field. For small fields, small re-useable production platforms are sometimes deployed. The platform has room for production wells, gas treatment installations and living quarters. Most installations are fully automatic and many are operated from shore.

The gas is transported to shore via one of the pipeline systems, the longest of which (NOGAT) is 260 km long, with a 120 km extension to the German Continental Shelf. On land, the gas is further treated and brought to Gasunie's specifications. The condensate is usually shipped to shore by boat.

A.6 The Groningen Gas Field

The Groningen gas field is situated in the northern province of Groningen. Originally it was called the Slochteren gas field, after the village where the discovery well was drilled in 1959. The field occupies an area of about 900 square kilometres, with a tiny piece of the field extending into Germany.

The gas column in the reservoir is about 180 metres high. Gas reserves have been estimated at about 2,600 bcm. First production took place in 1963. The field produces from 29 fully automatic locations each with eight to twelve wells. The gas in the Groningen field contains about 82% methane, 3% heavier and wetter hydrocarbon gases, 14% nitrogen and 1% carbon dioxide and is therefore of low calorific value. Gas with a higher calorific value from other fields often has to be diluted artificially to the Groningen standard in order to be used by the numerous installations adjusted to this standard.

The field is a faulted anticline, situated at a depth of about 3,000 metres. The sandstone reservoir, called the Slochteren Formation, lies on top of the mature, coal rich Carboniferous source rock. The seal is provided by the thick Zechstein salt. The sediments composing the reservoir were deposited in a desert environment during the Permian epoch. The reservoir is between 100 and 300 metres thick, is very homogeneous and has excellent porosity and permeability.

Thus the field is very suitable for use as a swing producer. It can be closed during periods of low demand (during summer, when smaller fields completely take over gas production) and can be fully opened on very cold winter days, producing up to 470 million cubic metres of gas. In the early 1990s, however, this level could no longer be guaranteed due to the pressure decrease in the reservoir as the result of ongoing production. Therefore, gas storage projects have been completed in three other gas fields in the Netherlands as a safeguard. In order to maintain this swing role of the Groningen field for as long as possible the Dutch authorities therefore have given priority to the exploration, development and production of smaller gas fields elsewhere in the country.

Wim van den Bosch

Acronyms & Glossary

AmvB	<i>Algemene Maatregel van Bestuur</i> : Decree as executive part of a Dutch law
<i>Aardgasbaten</i>	State income from gas production and sales
ARP	<i>Anti Revolutionaire Partij</i> , Dutch political party of protestant nature
bcm	billion cubic metres, unit of gas volume
BP	British Petroleum
BPM	<i>Bataafse Petroleum Maatschappij</i> , subsidiary of Shell
CCGT	Combined Cycle Gas Turbine
CDA	<i>Christen Democratisch Appél</i> , Dutch political party of Christian Democratic nature
CEO	Chief Executive Officer
CHP	Combined Heat and Power production technology
CHU	<i>Christen Historische Unie</i> , Dutch political party of protestant nature
CSS	Commodity Services System, Gasunie tariff system for gas transport and trade
Dfl	Dutch guilder (see below)
DSM	Dutch State Mines, formerly <i>Staatsmijnen</i>
DSM-Aardgas	Dutch State Mines, formerly <i>Staatsmijnen</i> , later EBN
DTe	<i>Dienst Toezich Energie</i> , Dutch energy market regulator
Dutch guilder	The Netherlands adopted the European euro (€) currency in 2002, with a guilder conversion rate of € 0.45
E&P	Exploration and Production sector
EBN	<i>Energie Beheer Nederland</i> , Dutch public shareholder in joint-ventures for gas production
ECB	European Central Bank
ECSC	European Coal and Steel Community
EEC	European Economic Community
EES	European Economic Space
EMU	Economic and Monetary Union
ENI	<i>Ente Nazionale Idrocarburi</i> , Italian State oil company
EU	European Union
Euratom	European Atomic Energy Community
FES	<i>Fonds Economische Structuurversterking</i> , Fund for strengthening the Economic Structure
FNV	<i>Federatie Nederlandse Vakverenigingen</i> , Dutch social democrat labour union
Futures (gas) <i>gasgebouw</i>	Gas futures refers to estimated but not yet proven reserves of gas A Dutch term referring to the specific institutional structure that governs the exploitation of the Dutch natural gas reserves
Gasunie	The marketing and distributing company for Dutch gas
GDP	Gross Domestic Product, unit for the size of a national economy

GFU	<i>Gassforhandlingsutvalget</i> , Norwegian gas sales negotiating committee
GME	Gazoduc Maghreb-Europe pipeline
GTS	Gas Transport Services, Gasunie's transport network operator
H-gas	High calorific gas
IEM	Internal Energy Market, EU plan for integration of Member States' energy markets
<i>kleine velden-beleid</i>	Small Fields Policy – A Dutch policy directed at encouraging the exploration and production of smaller gas fields.
KVP	<i>Katholieke Volks Partij</i> , Dutch catholic political party
L-gas	Low calorific gas
LNG	Liquefied Natural Gas
LPF	<i>Lijst Pim Fortuijn</i> , Dutch populist political party
LPG	Liquid Petroleum Gas
MEZ	<i>Ministerie van Economische Zaken</i> , Ministry of Economic Affairs
<i>Mijnwet Continentaal Plat</i>	Dutch Continental Shelf Mining Law
mmBtu	Millions of British thermal unit
NAM	<i>Nederlandse Aardolie Maatschappij</i> , Shell/Exxon joint venture for oil and gas exploration and production in the Netherlands
NGO	Non-Governmental Organisation
NMP	<i>Nationaal Milieu Plan</i> , Dutch National Environmental Policy Plan
OAPEC	Organisation of Arab Petroleum Exporting Countries
OOG	<i>Overleggroep Olie en Gas</i> , Dutch commission for the exchange of information and views on environmental, physical and social aspect of oil and gas production
OPEC	Organization of Oil Exporting Countries
<i>poldermodel</i>	A Dutch model of political decision-making based on achieving consensus
PRC	Policy Research Corporation (Netherlands)
PvdA	<i>Partij van de Arbeid</i> , Dutch labour party
RWE Gas Nederland	<i>Rheinisch-Westfälisches Elektrizitätswerk</i> , Dutch subsidiary of German utility
Sep	<i>Samenwerkende Electriciteits Producenten</i> , Cooperating electricity producers (Netherlands)
SGB	<i>Staats Gas Bedrijf</i> , Dutch State Gas Company
SROG	<i>Samenwerking Regionale Organen Gasvoorziening</i> , Commission for cooperation between regional authorities in gas supply
TPA	Third Party Access
UGS	Underground Gas Storage
UK	United Kingdom
UMTS	Universal Mobile Telecommunications System
VEGIN	<i>Vereniging van Gasdistributiebedrijven in Nederland</i> , Association of gas distribution companies in the Netherlands
VROM	Ministry of Housing, Spatial Planning and Environment (<i>Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieu</i>)
VVD	<i>Volkspartij voor Vrijheid en Democratie</i> , Dutch neo-liberal political party
<i>Wet Opsporing Delfstoffen</i>	Dutch law for exploration in the mining sector
WIR	<i>Wet Investeringsrekening</i> , State subsidy on productive investments, to stimulate economic development

References

- Aardenne, van, G.M.V. (1987) De Industrie-politieke slingerbeweging. In A. Knoester (ed.) *Lessen uit het Verleden: 125 jaar Vereniging van Staatshuishoudkunde*, Leiden: Stenfert Kroese BV, pp. 319-331.
- Adelman, M.A. (1962) The Supply and Price of Natural Gas. Supplement to the *Journal of Industrial Economics*. Oxford: Basil Blackwell.
- Adelman, M.A. (1980) The Clumsy Cartel. *The Energy Journal* 1 (no. 1 1980): 43-53.
- Algemene Energieraad (AER) (1983) *De prijs van het aardgas: Advies uitgebracht aan de Minister van Economische zaken op 28 juni 1983*. 's-Gravenhage: Staatsuitgeverij.
- Algemene Rekenkamer (1999) *Gasbaten*, Den Haag: Algemene Rekenkamer.
- Andersen, S.S. (1993) *The Struggle over North Sea Oil and Gas: Government Strategies in Denmark, Britain and Norway*. Oslo: Scandinavian University Press.
- Ausems, A.W.M. (1996) Nota de Pous 1962 en het aardgasgebouw. In: *Handboek Energie en Milieu*. Alphen aan den Rijn: Samsom (Hoofdstuk 2020, losbl.).
- Bakker, V., Salverda, F. (1983a) De jacht op ons aardgas. *Vrij Nederland* (Suppl. 2, 15 januari) pp. 3-36.
- Bakker, V., Salverda, F. (1983b) De prijs van ons aardgas. *Vrij Nederland* (Suppl. 6, 12 februari) pp. 3-52.
- Bohi, D.R., Toman, M.A. (1996) *The economics of energy security*. Boston: Kluwer Academic Publishers.
- Borghuis, G.J. (1988) *Veertig Jaar NAM: De geschiedenis van de Nederlandse Aardolie Maatschappij*. Assen: Nederlandse Aardolie Maatschappij BV.
- Bos, J.A.M., Roggenkamp, M.M., Visser, R.D. (2000) The two faces of Dutch gas policy. *International Oil and Gas Financial Review*, pp. 100-102.
- Brouwer, G.C., Coenen, M.J. (1968) *Nederland = Aardgasland*. Ratio Reeks. Amersfoort: A. Roelofs van Goor.
- Bruntland, G. (ed) (1987) *Our Common Future: The World Commission on Environment and Development*. Oxford: Oxford University Press.
- Callon, M. (1998) Introduction: The Embeddedness of economic markets in economics. In M. Callon (ed.) *The Laws of the Markets, The Sociological Review*. Oxford: Blackwell Publishers.
- Centraal Bureau voor de Statistiek (CBS) (2002) *Consumption of Primary Energy*. CBS Statline (online database <www.cbs.nl>).
- Clark, J.G. (1990) *The Political Economy of World Energy: A Twentieth-Century Perspective*. New York: Harvester Wheatsheaf.
- Commission of the European Communities (CEC) (1988) *The Internal Energy Market*. 2 May, COM (88) 238 final.
- Commission of the European Communities (CEC) (2001) *Green Paper: Towards an European Strategy for the Security of Energy Supply*. 29 November, COM (2000) 769 final plus Technical Document.
- Correljé, A.F. (1997) Naar nieuwe verhoudingen in het energiebeleid. In W. Hout, M. Sie Dhian Ho (eds.) *Aanpassing onder druk: Nederland en de gevolgen van de internationalisering*, Assen: van Gorcum, pp. 165-178.
- Correljé, A.F. (1998) *Hollands Welvaren: De geschiedenis van een Nederlandse bodemschat*. Hilversum: Teleac/Not.

- Correljé, A.F. (2001) Dutch Natural Gas in Europe: Towards a competitive market? In M. M. Roggenkamp, J.A.M. Bos (eds.) *Energie liberalisatie in Nederland: Op Koers?* Intersentia Rechtswetenschappen, Antwerpen/Groningen, pp. 1-14.
- Correljé, A.F., Odell, P.R. (2000) Four Decades of Groningen Production and Pricing Policies and a View to the Future. *Energy Policy* 28 (1) pp. 19-27.
- Correljé, A.F., Odell, P.R. (1996) The politics of European Gas: Dutch play for a return to Centre-Stage. *Geopolitics of Energy* 18, Number 9, September, Calgary: The Canadian Energy Research Institute, pp. 7-10.
- Dankers, Norbert (2003) Transcript from Radio 1. January 6.
- Davis, J.D. (1984) *Blue Gold: The Political Economy of Natural Gas*. World Industries Studies 3. London: George Allen & Unwin.
- Dosi, G. (1988) Sources, Procedures and Microeconomic Effects of Innovation. *Journal of Economic Literature* 26, pp. 1120-1171.
- Energiened (2002) Strenge regels voor een natuurlijk monopolie. *Energie Nederland*. nr. 14, p. 9.
- Estrada, J., Moe, A., Martinsen, K.D. (1995) *The Development of European Gas Markets: Environmental, Economic and Political Perspectives*. Chichester: John Wiley & Sons.
- Gasunie (various years), *Annual Reports*. Gasunie: Groningen.
- Gelder, J.W. van (2000) Adapting to new realities. *Petroleum Economist Supplement Gas and Power*, pp. 28-32.
- Hellema, D., Wiebes, C., Witte, T. (1998) *Doelwit Rotterdam: Nederland en de oliecrisis 1973-1974*. Den Haag: Sdu Uitgevers.
- Heren, P. (1999) Removing the government from European gas. *Energy Policy* 27, pp. 3-8.
- Heren, P. (2000) Structural Changes in the European Gas Industry: Causes and Consequences. Paper presented at the IAEE energy conference at Bergen, 31st August 2000.
- International Energy Agency (IEA) (1995) *The IEA natural gas security study*. Paris: OECD.
- International Energy Agency (IEA) (2000), *Energy Policies of IEA Countries: The Netherlands 2000 Review*, Paris: OECD/IEA.
- International Energy Agency (IEA) (2001) *Regulatory reform of European gas*. Paris: OECD/IEA.
- International Energy Agency (IEA) (2002a) *Flexibility in natural gas supply and demand*. Paris: OECD.
- International Energy Agency (IEA) (2002b) *Energy Balances of OECD Countries 1960-2000*. IEA Energy Statistics Division (CD-Rom). Paris: IEA/OECD.
- International Energy Agency (IEA) (2002c) *Oil Information 1960-2000*. IEA Energy Statistics Division (CD-Rom). Paris: IEA/OECD.
- International Energy Agency (IEA) (2002d) *Electricity Information 1960-2000*. IEA Energy Statistics Division (CD-Rom). Paris: IEA/OECD.
- International Energy Agency (IEA) (2002e) *Gas Information 1960-2000*. IEA Energy Statistics Division (CD-Rom). Paris: IEA/OECD.
- Kam, F. de (1997) De verkwisting van een bodemschat. In *NRC Handelsblad* profile 30/01/1997.
- Kielich, W. (1988) *Ondergronds Rijk*. Amsterdam: Uniepers/Gasunie.
- Linde, J.C. van der, Lefeber, R. (1988) International Energy Agency Captures the Development of European Community Energy Law. *JWT* 22, October, no.5: pp. 5-25.
- Mabro, R., Wybrew-Bond, I. (eds.) (1999) *Gas to Europe: The strategies of the Four Major Suppliers*. Oxford: Oxford University Press.
- Mackay, D.I. & Mackay, G.A., (1975) *The Political Economy of North Sea Oil*. London: Martin Robertson.
- Meadows, D. (1972) *Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind*. New York: Universe Books
- Ministerie van Economische Zaken (MEZ) (1962) *Nota inzake het aardgas* (Kamerstukken II, 1961-1962, nr. 6767): *Nota de Pous*.

- Ministerie van Economische Zaken (MEZ) (1965) *Mijnwet Continentaal Plat*. 23 september, Stb. 428.
- Ministerie van Economische Zaken (MEZ) (1967a) *Koninklijk Besluit*. 7 februari, Stb 73.
- Ministerie van Economische Zaken (MEZ) (1967b) *Wet Opsporing Delfstoffen*. 3 mei 1967, Stb. 258.
- Ministerie van Economische Zaken (MEZ) (1974a) *Energiebeleid*, Tweede Kamer, zitting 1974-1975, 13 122 nrs. 1-6.
- Ministerie van Economische Zaken (MEZ) (1974b) *Verdeling van de netto-opbrengsten van het aardgas uit de concessie Groningen*. Zitting 1974-1975, 13 109, nr 1.
- Ministerie van Economische Zaken (MEZ) (1974c) *Regelen met betrekking tot de prijzen en de tarieven voor het leveren van aardgas (Wet Aardgasprijzen)*. Zitting 1974-1975, 13146, nr 1-16.
- Ministerie van Economische Zaken (MEZ) (1979) *Nota Energiebeleid*, Tweede Kamer Zitting 1979-1980, 15 802.
- Ministerie van Economische Zaken (MEZ) (1984a) *Het energiebeleid nader bezien*. Tweede Kamer Zitting 1988-1989, 21061, nr 1-2.
- Ministerie van Economische Zaken (MEZ) (1984b) *Memorie van Toelichting bij de Rijksbegroting voor MEZ*.
- Ministerie van Economische Zaken (MEZ) (1990) *Nota Energiebesparing*. Den Haag: Sdu Uitgeverij.
- Ministerie van Economische Zaken (MEZ) (1995a) *Derde Energienota 1996*, Kamerstukken II 1995-1996, 24 525, nrs. 1-2.
- Ministerie van Economische Zaken (MEZ) (1995b) *Energie Charter*. Tweede Kamer Zitting 1995-1996, 24545 (R 1560) nr 3.
- Ministerie van Economische Zaken (MEZ) (1996a) *Actieprogramma Duurzame energie in opmars*.
- Ministerie van Economische Zaken (MEZ) (1996b) *Stroomlijnen naar een markt voor elektriciteit*.
- Ministerie van Economische Zaken (MEZ) (1997) *Gasstromen: discussienota*, Ministerie van Economische Zaken, Directoraat-Generaal voor Energie, Den Haag.
- Ministerie van Economische Zaken (MEZ) (1998a) *Regels omtrent het transport en de levering van gas (Gaswet): Memorie van toelichting en voorstel van wet*. Mimeo.
- Ministerie van Economische Zaken (MEZ) (1998b) *Regels met betrekking tot het onderzoek naar en het winnen van delfstoffen en met betrekking tot met de mijnbouw verwante activiteiten (Mijnbouwwet): Memorie van toelichting en voorstel van wet*. Mimeo.
- Ministerie van Economische Zaken (MEZ) (1998c) *Energiebesparingsnota*, MEZ 1998
- Ministerie van Economische Zaken (MEZ) (1999a) *Energierapport*. Den Haag: Ministerie van Economische Zaken.
- Ministerie van Economische Zaken (MEZ) (1999b) *Regels omtrent het transport en de levering van gas (Gaswet)* Tweede Kamer Zitting 1999-2000, 26 463, nr. 7, 8.
- Ministerie van Economische Zaken (MEZ) (2002) *Energierapport 2002*. Den Haag: Ministerie van Economische Zaken.
- Ministerie van Economische Zaken (MEZ) (various years), *Olie en Gas in Nederland*. Den Haag: Ministerie van Economische Zaken.
- Ministerie van Financiën (MF) (2002a) *Begroting van de uitgaven en de ontvangsten van het FES voor het jaar 2002*. Stukken Tweede Kamer 28000 D, nummer 1 en 2. Den Haag: Sdu Uitgeverij.
- Ministerie van Financiën (MF) (2002b) *Voorjaarsnota*. 4 april. Den Haag: Sdu Uitgeverij.
- Ministerie van Financiën (MF) (2002c) *Miljoenennota*. Den Haag: Sdu Uitgeverij.
- Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieu (VROM) (1989) *Nationaal Milieubeleidsplan*. 's-Gravenhage: Sdu Uitgeverij.
- Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieu (VROM) (1993) *Tweede Nationaal Milieubeleidsplan*. 's-Gravenhage: Sdu Uitgeverij.
- Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieu (VROM) (1999) *Uitvoe-*

- ringsnota Klimaatbeleid, Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieu. 's-Gravenhage: Sdu Uitgeverij.
- Nederlandse Aardolie Maatschappij (NAM) (1999) Eindrapport Integrale Bodemdalingstudie Waddenzee van de NAM.
- Nelson, R.R. (1995) Recent Evolutionary Theorizing About Economic Change. *Journal of Economic Literature* 33: pp. 48-90.
- Nelson, R.R., Sampat, B.N. (2001) Making sense of institutions as a factor shaping economic performance. *Journal of Economic Behaviour & Organization* 44: pp. 31-54.
- Newbery, D.M. (2001) *Privatization, Restructuring and regulation of Network Utilities*. Cambridge MA: The MIT Press.
- North, D.C. (1990) *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press.
- Notenboom, H. (2002) *De strijd om de begroting*. Nijmegen: Valkhof Pers.
- Odell, P.R. (1969) *Natural Gas in Western Europe: a Case Study in the Economic Geography of Resources*. Haarlem: De Erven F. Bohn.
- Odell, P.R. (1973a): Het Nederlandse aardgastekort: Onbeantwoorde vragen en een alternatieve hypothese. *Economisch Statistische Berichten* (16 Mei) 422-425.
- Odell, P.R. (1973b): Indigenous oil and gas developments and Western Europe's energy policy options. *Energy Policy* (June) 47-64.
- Odell, P.R. (1979): Een kritische beschouwing van de uitgangspunten van het Nederlandse energiebeleid. *Economisch Statistische Berichten* (23 Mei).
- Odell, P.R. (1987) Aardgas in de Nederlandse samenleving. *De Gids*, nr. 2/3.
- Odell, P.R. (1988): De Westeuropese gasmarkt. *Economisch Statistische Berichten* (7 September) 822-828.
- Odell, P.R. (1995) The Cost of Longer-Run Gas Supply to Europe. *Energy Studies Review* 7, No.2, pp. 94-108.
- Odell, P.R. (1997) Europe's Gas Consumption and Imports to Increase with Adequate Low Cost Supplies. *Energy Exploration and Exploitation* 15, No.1, pp. 35-54.
- Odell, P.R. (2001) *Oil and Gas: Crises and Controversies 1961-2000. Vol. 1 Global Issues*, Brentwood England: Multi Science Publishing Company Ltd.
- Odell, P.R. (2002) *Oil and Gas: Crises and Controversies 1961-2000. Vol. 2 Europe's Entanglement*. Brentwood England: Multi Science Publishing Company Ltd.
- Parker, M.J. (2000) *Thatcherism and the Fall of Coal*. Oxford Institute for Energy Studies, Oxford: Oxford University Press.
- Peebles, M.W.H. (1980) *Evolution of the Gas Industry*. London: The MacMillan Press Ltd.
- Peebles, M.W.H. (1999) Dutch Gas: Its role in the Western European Gas Markets, Gas to Europe. In Robert Mabro, Ian Wybrew-Bond (eds.) The Oxford Institute for Energy Studies, Oxford: Oxford University Press.
- Peeters, C., Webers, H., Thijssens, Meyer, de, B. (2002) *Visie op aardgasproductie in Nederland in de 21ste eeuw*, Den Haag: Sdu Uitgevers.
- Portegies, M.J. (1969) Marktstrategie van het Nederlandse aardgas, *Economisch Statistische Berichten*, 25 June, pp. 650-655.
- Radetzki, M. (1999) European natural gas: market forces will bring about competition in any case, *Energy Policy* 27, pp. 17-24.
- Rijks Instituut voor Volksgezondheid en Milieuhygiëne (RIVM) (1988) *Zorgen voor Morgen*, Bilthoven: RIVM.
- Roggenkamp, M.M., Bos, J.A.M. (eds.) (2001) *Energieliberatisatie in Nederland: Op Koers*. Intersectia Rechtswetenschappen, Antwerpen/Groningen.
- Schot, J.W. (2000) *Techniek in Nederland in de twintigste eeuw II: Delfstoffen, Energie, Chemie*. Stichting Historie der Techniek. Zutphen: Walburg Pers.
- Seumeren, H. van (1989) *Gerrit A, Wagner, Een loopbaan bij de Koninklijke*, Utrecht/Antwerpen: Veen Uitgevers.
- Shell (1968a) *Development of Groningen Gas*, Shell Briefing Service, Royal Dutch Shell Group, October.

- Shell (1968b) *Typical Development of a Market for Natural Gas*, Shell Briefing Service, Royal Dutch Shell Group, October.
- Sociaal Economische Raad (SER) (1983) *Advies aardgasbeleid*: Advies inzake het aardgasbeleid uitgebracht aan de Minister van Economische Zaken (Publicatie nr. 24-21 oktober) Den Haag: SER.
- Stern, J.P. (1984) *International Gas Trade in Europe*. British Institutes' Joint Energy Policy Programme, Policy Studies Institute, Royal Institute of International Affairs, Energy Papers, 8. London: Heinemann Educational Books.
- Stern, J.P. (1998) *Competition and Liberalization in European Gas Markets: A diversity of models*. The Royal Institute of International Affairs, Energy and Environmental Programme, London.
- Stern, J.P. (2001) *Traditionalists versus the New Economy: Competing agendas for European gas markets to 2020*, Briefing Paper No. 26, November, Royal Institute of International Affairs, Energy and Environmental Programme, London.
- Stern, J.P. (2002) *Security of European Natural Gas Supplies: The impact of import dependence and liberalization*, July 2002, Royal Institute of International Affairs, Sustainable Development Programme, London.
- Storms, Joep E.A. (2002) *Controls on shallow-marine stratigraphy*. Delft: Delft University Press.
- Stuurgroep Maatschappelijke Discussie Energiebeleid (SMBE) (1984) *Het Eindrapport van de Brede Maatschappelijke Discussie*. Leiden: Stenfort Kroese BV.
- Weenink, A., Correljé, A.F. (1999) The state and the energy sector in Russia's transformation. In Kees van Kersbergen, Robert H. Lieshout and Grahame Lock (eds) *Expansion and Fragmentation: Internationalisation, Political Change and the Transformation of the Nation-State*, Amsterdam: Amsterdam University Press, pp. 145-160.
- Westerwoudt, T. (2002) *Een verwijderd ideaal: Analysis of the election programmes of the Dutch political parties on energy en environment*, Clingendael International Energy Programme (CIEP).
- Wieleman, F.G.M. (1982) *De economische betekenis van het Nederlands aardgas*. Institute for economic research discussion paper series 8218/G, Rotterdam: Erasmus University.

Credits

Not all the photographers of the photographs printed in this report are known. Those who can be accounted for are mentioned below:

- Aldel: p. 65 (John Vos Fotografie, Delfzijl)
 ANP: p. 85 and 31
 Bob Fleumer Aerial Photography: p. 103
 ENECO: p. 29 and 32
 Gasunie: p. 19, 81, 111, 134 (Aerocamera, Michel Hofmeesters), and 155
 HBG Steel Structures: p. 127 (R. Nagelkerke, Fotostudio Rijnmond)
 Husmo Foto: p. 200
 Image Store/Hollandse Hoogte: p. 119, 145, 162, and 212-213
 NAM: cover and p. 12-13, 24-25, 44, 50-51, 76-77, 90, 96, 107, 114-115, 139, 148-149, 166, 167, 178-179, 184-185, 194, and 224-225
 Oilfield Publications Limited, Ledbury: p. 220-221, and 228-229
 Shell: p. 209