Structural and regulatory reform of the European natural gas market : does the current approach secure the public service obligations?

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In loving memory of my dear mother

Preface

During the six years spent preparing this study, the European gas market has changed radically, and so has the public attention for it. While in 2002 newspapers wrote relatively little on gas, currently I have to exercise restraint in following the news, because otherwise my entire day will be dedicated to sifting through all those interesting news clippings. Furthermore, the pitying look that used to appear on the faces of friends and relatives when I told them I was working on gas issues, has recently changed into genuine interest. The first question they ask me no longer is how I manage to spend so much time on such a boring subject, but rather if I can bring down the gasoline prices and restrain Putin.

This renewed attention, which is not expected to fade away any time soon, makes this subject extremely interesting, also in the years to come. I hope that this study is able to pass on to the reader at least a part of my enthusiasm for this market.

Finally, writing a thesis can be a lonely affair, especially when it is written on a subject that is largely foreign to the rest of the section or the Faculty. Nevertheless, I have never felt lonely during the time I spent in Leiden, which is a big compliment to my colleagues and supervisors in Leiden. I guess that the never-ending discussions on football are an important element in this.

Leiden, 10 September, 2008 Aldo Spanjer

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List of abbreviations

ACER	Agency for the Cooperation of Energy Regulators
ADL	Arthur D. Little
AH	Access holiday
BBL	Bacton-Balgzand pipeline
bcf	billion cubic feet
bcm	billion cubic meter
BERR	Department for Business Enterprise and Regulatory Reform
BG	British Gas
BBLOE	billion barrels oil equivalent
BOE	barrels oil equivalent
BP	British Petroleum
BTU	British thermal unit
CAC-pipeline	Central Asia Centre Pipeline
CCGT	Combined cycle gas turbine
CEC	Commission of the European Communities
CEER	Council of European Energy Regulators
CH_4	methane
CIEP	Clingendael International Energy Program
CO_2	carbon dioxide
CoJ	Court of Justice
COLS	Corrected Ordinary Least Squares
CPB	Netherlands Bureau for Economic Policy Analysis
CPI	consumer price index
DEA	Data Envelopment Analysis
DG COMP	Directorate-General for Competition
DG TREN	Directorate-General Energy and Transport
DSO	distribution system operator
DTe	Dienst Toezicht Energie (Office of Energy Regulation)
DTI	Department of Trade and Industry
EASEE	European Association for the Streamlining of Energy Exchange
EC	European Commission
EEC	European Economic Community
EFET	European Federation of Energy Traders
EIA	Energy Information Administration
ERGEG	European Regulators Group for Electricity and Gas
ETS	Emissions Trading Scheme
EU	European Union
FSU	former Soviet Union
GDP	gross domestic product

GECF	Gas Exporting Countries Forum
GIE	Gas Infrastructure Europe
GJ	giga-joule
GTS	Gastransport Services
GUTS	Gasunie Trade & Supply
H-gas	high-calorific gas
IEA	International Energy Agency
IIASA	International Institute for Applied Systems Analysis
IMF	International Monetary Fund
IOC	international oil company
L-gas	low-calorific gas
LNG	liquefied natural gas
MIDAL	Mitteldeutsche Anbindungsleitung
MMBTU	million British thermal units
MTOE	million tonnes of oil equivalent
N_2O	nitrous oxide
NAM	Nederlandse Aardolie Maatschappij
NG	natural gas
NGT	National Grid Transco
NIE	New Institutional Economics
NMa	Nederlandse Mededingingsautoriteit (The Netherlands Competition Authority)
NOC	national oil company
NO_x	nitrogen oxides
NTPA	negotiated third party access
OECD	Organization for Economic Cooperation and Development
OFGEM	Office of Gas and Electricity Markets
ppm	parts per million
PSO	public service obligation
RTPA	regulated third party access
R/P	reserve to production ratio
SERIS	Sheffield Energy and Resources Information Services
SFA	Stochastic Frontier Analysis
SNAM	Società Nazionale Metanodotti
SO_2	sulfur dioxide
SOS	security of supply
TCE	Transaction Cost Economics
TOP	take-or-pay
TPA	third party access
TPES	Total Primary Energy Supply
TSO	transmission system operator
UNFCCC	United Nations Framework Convention of Climate Change
WEC	World Energy Council
WETO	World Energy and Technology Outlook
WRR	Scientific Council for Government Policy (Wetenschappelijke Raad voor het Regeringsbeleid in Dutch)
ZEBRA (pipeline)	Zeeland Brabant (pipeline)

1 Introduction

1.1 INTRODUCTION

This study is concerned with the regulation of the European gas market. It investigates whether existing gas regulation can be expected to continue to reach its energy policy goals – supply security, competitiveness and sustainability – in the years to come. One important reason for this choice of subject is that European gas markets are currently in the midst of a process of liberalization, which creates anxiety concerning the policy goals. Another reason is the observation regularly put forward by the European Commission (CEC, 2005a, e; 2007c) that the liberalization of the European gas market is not working as anticipated. A third and related cause concerns the discussion on whether the competition-oriented approach currently adhered to by the Commission is applicable to the European gas market. This chapter elaborates on these reasons. Furthermore, it provides the necessary background information on the European gas market. To this end, section 1.2 discusses the early development of natural gas in Europe, following which section 1.3 presents the structure of the pre-liberalization European gas market. A major advantage of this monopolistic structure was that it facilitated the investments required to satisfy European energy demand and to develop the European gas grid. Section 1.4 then provides a few illustrations of the mounting pressure on the traditional organization. The upshot of this pressure has been a new, fashionable, alternative – liberalization. Section 1.5 discusses the energy policy goals and their relation with liberalization. While the idea was that liberalization would improve all policy goals, this has by no means been guaranteed. One important observation resulting from this section is that while liberalization may be necessary to reach the policy goals, it is not sufficient. Secondly, the real issue concerning each of the policy goals is how to secure investments. Liberalization must be viewed as a very powerful and useful measure that in conjunction with the appropriate regulatory provisions may create a more competitive gas market on which the policy goals can be reached. Thirdly, all three policy goals are considered as public service obligations in need of regulatory intervention because they all exhibit market failures. This is due to the fact that under regulation's current assumptions, market failure is a ground to argue for regulatory intervention. Section 1.6 argues that the liberalization process is inherently fraught with problems and conflicts. In order to assess liberalization fairly, a distinction must be made between transitory and

fundamental problems. Section 1.6 closes by putting to the fore a number of market shifts that in conjunction with each other are fundamentally changing European gas markets. The consequences of these changes for current gas regulation are a main theme in this study. Finally, section 1.7 provides the research questions, research methodology and outline of this study.

1.2 THE ORIGINS OF THE EUROPEAN GAS MARKET

Although gas was used as early as the nineteenth century to provide street and home lighting in northwestern Europe (Wybrew-Bond, 1999, p. 6), the European natural gas market is of relatively recent origin. Gas was originally manufactured, that is produced from coal and/or oil. Natural – as opposed to manufactured – gas discoveries in Italy and France in the 1940s made it possible to establish transmission systems in these countries. The modest scale of the discoveries restricted them to local use. This town gas with its limited distribution range dominated until the Second World War. Until 1955, natural gas consumption in Western Europe accounted for less than 1 percent of the total energy consumption (Estrada et al., 1998, p. 9). Natural gas took off due to large discoveries along the Continent. The most notable discovery occurred in 1959 when the very large Groningen field at Slochteren in the Netherlands was discovered. Its size opened up the possibility to trade gas internationally. To this end, in the mid 1960s, the Dutch developed international low-calorific pipelines to transport their Groningen gas to northwestern Europe. In conjunction with the first major pipeline from Russia, a European natural gas market was beginning to emerge on a substantial scale (Stern, 1998, p. 15, 16). Until the 1970s, the Netherlands were the largest gas producer in Europe – at the time of the 1973/74 oil price shock, Dutch gas accounted for over 75 percent of internationally traded gas supplies in western Europe. Under the influence of the two oil companies responsible for the discovery of the Groningen field, Shell and ExxonMobil, an ingenious construction was developed. Dutch gas sold outside the Netherlands would have to be competitive with other fuels, in order to generate maximum revenues for both the government and the holder of the Groningen concession, the Nederlandse Aardolie Maatschappij (NAM, a 50/50 joint venture of Shell and ExxonMobil) (Correljé and Odell, 2000, p. 20). Gas was priced in accordance with oil and contracts were concluded on a long-term basis with take-or-pay (TOP) and destination clauses (more on these clauses in the next section).

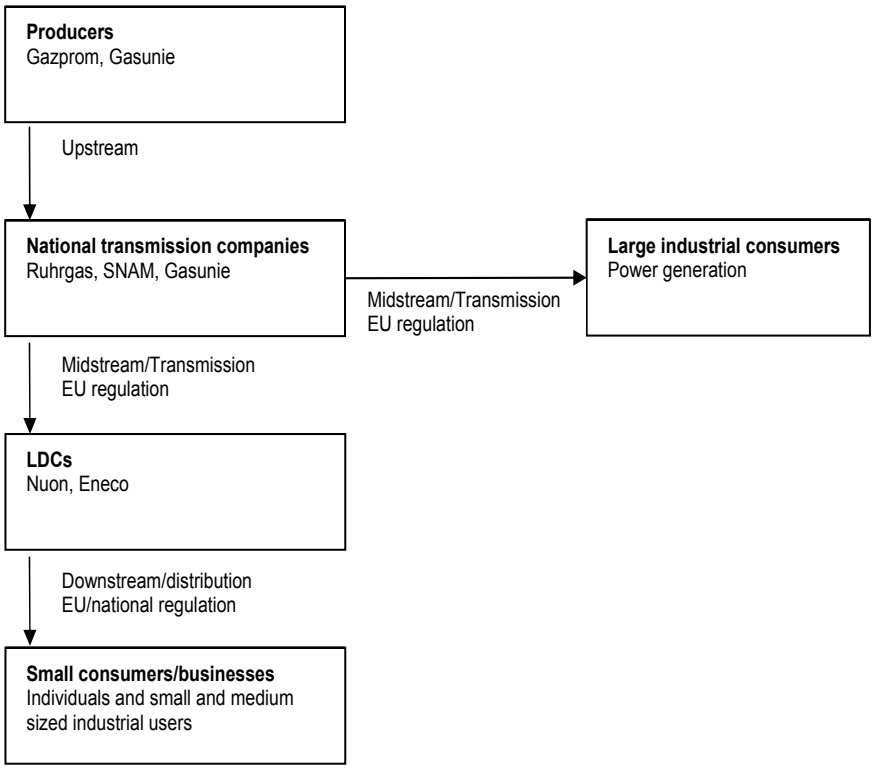
These arrangements facilitated the development of the infrastructure for trading Dutch gas across Europe, which offered a vital contribution to the development of a European gas market. The development of gas markets and infrastructure in Europe stimulated other producers, such as the UK, Germany, Denmark, Norway, Russia and Algeria, to also engage in the production of gas. This process was facilitated by the rising oil price of the 1970s. Selling

gas became profitable when gas prices rose on back of oil prices. Furthermore, the oil crises meant that gas, with its indigenous availability, was more reliable than Middle Eastern oil. Increasing supplies from these countries to European firms facilitated a further expansion of European gas infrastructure and effectively created a European gas market.

1.3 THE TRADITIONAL MARKET STRUCTURE

Six main types of players can be distinguished on the European gas market: 1) producers, 2) national transmission companies, 3) large industrial consumers, 4) local – often municipal – distribution companies (LDCs), 5) small consumers and businesses and 6) the government. Figure 1.1 depicts a stylized overview of the traditional market structure of the European gas market and illustrates the focus of this study.

Figure 1.1: Stylized structure of the European gas market



Own elaborations

The European gas market developed at both the national and the European level (see Estrada et al., 1998, Percebois, 1999, Correljé et al., 2003 and Finon, 2004). The national level – the downstream/distribution section in figure 1.1 exemplified by the lowest two rectangles – was characterized by national monopolies. These monopolies, which on the Continent were dominated by the government, developed 'their' own national market, taking into account market specifics such as resource endowment, energy mix, etcetera. This study focuses on the European level – the upstream and midstream/transmission sections in the upper three rectangles of figure 1.1.

The producers were responsible for exploration and production activities. They sold their gas to the national transmission companies via the upstream pipeline network under long-term contracts which usually ranged from fifteen to twenty years. We can distinguish exporter transmission companies and those of the importing countries. The exporting transmission companies – predominantly Russia's Gazprom, Algeria's Sonatrach, Norway's GFU and Holland's Gasunie[1] – held a national export monopoly and handled the volumes of domestically produced gas. On a European scale, they formed an oligopoly, which Finon (2004, p. 185) refers to as the oligopoly of sellers or producers. Finon also identifies an oligopoly of purchasers consisting of the Continental European national transmission companies which imported their gas and were in a monopoly (or quasi-monopoly) position for wholesale supply in their country. Examples are Germany's Ruhrgas,[2] Belgium's Distrigas, France's Gaz de France, Italy's SNAM, Austria's OMV, Spain's Gas Natural and Holland's Gasunie.[3] The European upstream gas market was consequently a two-sided oligopoly.[4]

The national transmission companies played a pivotal role in the traditional market structure. Virtually all Member States except Germany (Scheib et al., 2006) had one transmission company.[5] National governments owned or were involved in almost all transmission companies, providing them with an opportunity to use gas rents for social or wider economic purposes (more on this at the end of this section). The transmission companies shared the following additional similarities: they were monopoly wholesale sellers of gas, monopoly transmission system operators and monopsony buyers of gas from the pro-

1 As of September 2006, Gasunie is the name of the infrastructure company which has been unbundled from the trading company Gasterra.

2 E.ON/Ruhrgas since 2003.

3 Gasunie – now Gasterra – appears in both the oligopoly of purchasers and of sellers, since it held statutory monopolies as exporter, importer, and wholesale supplier on the Dutch natural gas market.

4 Finon excludes the British market because as a consequence of its isolation from the Continent until 1997, it 'has long since differed from the Continental market' (p. 185).

5 Germany had about 15 regional transmission companies (some of which had direct access to import and production) and over 700 local distributors, or 'stadtwerke'. However, despite the fact that the regional transmission companies were dominant in their own regions, Ruhrgas played a dominant role on the international scene (Stern, 1998).

ducers. Their vertical relations with gas producers took the form of long-term contracts which contained three specific clauses.

The first contractual clause was the take-or-pay clause which compelled the transmission companies to pay for the gas even if less than the contractually agreed quantity was taken from the system. Hence, volume risk was borne by the transmission companies. Due to the monopolist position of the national transmission companies on their home markets, competition came from substitutes the consumers could switch to rather than new entrants. In consequence, in the early 1960s, after the 1959 discovery of the Groningen field, gas prices were fixed at the level of competing fuels in order to obtain and retain a market share for gas. Since oil was the main substitute available, gas prices were linked to those of oil. This oil price linkage is the second main contractual clause. Residential gas prices were linked to those of heating oil and industrial prices to heavy fuel oil. The revenue to the producers was derived from the end-user prices by means of netbacking. This meant that the costs of transportation, storage and ancillary services were subtracted from the end-user price of the competing fuels to arrive at the commodity price of gas. This explains why the oil price linkage is often referred to as a netback market value approach. Maisonnier (2006, p. 26) provides the following example of a typical European gas pricing formula:

$$P = P_0 + A*(G-G_0) + B*(F-F_0),$$

where P is the monthly price paid for gas from a producer; G denotes the average heating oil price over 3, 6, or 9 months; and F indicates the average heavy fuel oil price over the same intervals. The index 0 indicates the values at the initial date of contract implementation. The margin to the transmission company has been predetermined and will not change if, for example, prices fall. In fact, the lower revenues resulting from lower prices are passed on to the producers, indicating that they are the ones bearing a price risk.[6,7] The third and final clause is the final destination clause. A final destination clause prohibits transmission companies from reselling purchased gas in order to guarantee that this gas could not be sold elsewhere in competition with a producer's other gas supplies. This effectively partitioned national markets, which obstructed inter-Member State trade and de facto created a patchwork of national energy markets.

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6 Dailami and Hauswald (2000) provide empirical evidence on risk sharing regarding relation-specific investments. They have studied the Ras Gas LNG (liquefied natural gas) Project in Qatar, which delivers LNG on a long-term take-or-pay basis to South Korean Kogas (who resells it to the Korean Electric Power Company). It is shown that risks are shared in that volume risk is borne by Kogas, while price risk remains with Ras Gas.

7 In addition to adjusting prices to changes in prices of competing fuels, prices were also typically revised at regular intervals (and based on defined criteria) in order to adapt them to changes in market circumstances (Energy Charter Secretariat, 2007, p. 152, 155).

These contracts shared price and volume risks between producers and transmission companies, which facilitated investments (see below). They also had an impact on the fulfillment by the transmission companies of their two main tasks: keeping supply and demand in balance and developing the required national and international infrastructure in order to develop the European market (Stern, 1998, p. 12-18).

First, the task of keeping supply and demand in balance was impacted by the take-or-pay clause. This clause meant that if the transmission company bought too much gas, it would have to pay for it without taking the gas, or it would need to sell into other, lower-value sectors (see below). If it bought too little gas, it would be unable to honor its own contracts. Governments played an important role in this regard, because they wanted a restricted use of gas. This was especially prevalent in the power generation sector. Before the gas discoveries, electricity was predominantly generated by coal or nuclear energy. If these industries would convert to gas, the governments feared politically undesirable consequences for employment and the balance of payments. For instance, British and German power-generation gas use was discouraged in order to protect the coal industry – in Britain through the licensing regime which allowed the government to control the type of generation capacity; in Germany predominantly through subsidization of coal. France had a similar stance to protect its nuclear industry (ibid., p. 62-63).

In addition, after the first oil shock in 1973, import dependency anxieties shifted the balance away from gas (Newbery, 1999, p. 150). Imported gas supplies were considered scarce, insecure and therefore in the long-run expensive, in contrast to indigenous coal or domestically produced nuclear power. Consequently, gas was considered too expensive for a low-value use such as power generation. Rather, this premium fuel should be restricted to high-value uses such as residential consumption or in commercial sectors (Stern, 1998, p. 30, 31). The national transmission companies were satisfied with this low-growth situation, because focusing on high-value markets enabled them to extract the maximum value from the gas they sold. This provides a second rationale for the netback market value approach indicated above: by pricing gas just below the price of competing fuels, the maximum value could be extracted without inducing demand substitution.

The second task of the national transmission companies, developing the national and international gas (transmission) infrastructure in cooperation with the producers, was greatly facilitated by the above contractual structure. The market's immaturity required many investments in pipelines into Europe, interconnectors between Member States, transmission systems within Member States and LNG trains. The long-term contracts with purchase obligations provided the producers with security of demand (and revenues), which stimulated them to invest in production and export infrastructures. Furthermore, the contractual structure allowed the transmission companies to obtain a diversified portfolio of long-term contracts and sole access to pipelines, which

furthermore facilitated investments. This policy proved very successful. According to Stern (1998, p. 16), gas pipeline[8] development in Europe grew from 61.4 thousand kilometers to 211.3 between 1965 and 1990. In addition, there was also a growth in LNG, predominantly in France and Spain. Of the 254 billion cubic meter (bcm) of gas that was internationally traded in 1996, 21 bcm concerned LNG (ibid., p. 18). In fact, these investments were so successful that by the end of the 1990s, most of the European gas grid could be considered mature – both from a physical and an economic perspective. Physical maturity means that future investments will not be made in new infrastructures with the purpose to meet demand, but rather will predominantly concern extensions of and interconnections between the main corridors. Economic maturity results from most of the infrastructure having been amortized (cf. Ellis et al., 2000, p. 3 and IEA, 2000, p. 24).

The national transmission companies sold their gas via the high-pressure midstream or transmission system to the LDCs and large industrial consumers. This was arranged through medium-term contracts which ranged from one to five years. LDCs were largely captive to the national transmission company.[9] They often cooperated with the transmission companies in order to develop an appropriate status quo. The LDCs used their low-pressure distribution system to deliver gas to small consumers and businesses on the basis of short-term supply agreements. The LDCs constitute the third level of oligopoly.

The above indicates that the traditional European gas market was being controlled by the national transmission companies and governments. The degree of horizontal integration was generally high. The national transmission companies acted as monopoly wholesale sellers on their national markets which ensured that LDCs were captive. In addition, their monopsony buying position ensured a strong bargaining position towards the producers. Some governments (notably the Dutch and Norwegian governments) placed limits on the volumes of gas allowed to be produced and determined were the gas was to be sold. Producers were often obliged to sell to the national transmission company. However, the vertical relations between the parties discussed above ensured that the profitability in this situation was sufficient to remove the incentive to break the status quo. Essentially, all parties had similar incentives to ensure that gas prices were relatively high.

In addition to this horizontal integration and the indicated vertical contractual clauses, another widespread phenomenon in the industry was vertical integration. Economies of scale and scope (see Annex) offered an important rationale for vertical integration. The international oil companies responsible for gas production on the Continent were also present further down the gas

8 Defined as national and international gas (transmission) infrastructure.

9 In a few European countries, such as France and the UK, distribution had been integrated with transmission (IEA, 2000, p. 24), as a result of which the transmission company controlled distribution too.

chain, in for example transmission and trade companies, in order to capture part of the downstream profits. Examples are Shell and ExxonMobil who were responsible for the production of gas in the Netherlands and the North Sea whilst also holding important downstream ownership positions in Gasunie and BEB, a German pipeline and storage operator. National transmission companies were partly owned by the producers. This integration in conjunction with the fact that these owners were relatively indifferent to the distinction between up- or downstream profits, provides one possible explanation for the observation that the national transmission companies did not, despite their strong position and contrary to expectations, bargain down the price for the gas they imported (Radetzki, 1999, p. 19).[10]

In sum, the monopolistic structure and the controlled manner in which the European gas market was being developed worked to the extent that they facilitated the necessary investments (IEA, 2008a, p. 38, 39). We highlight two additional advantages of the traditional structure. First, energy is considered vital from an economic (by contributing to GDP and employing thousands of people), political (as a redistributive vehicle) and strategic (controlling strategic infrastructures in case of a war or crisis) perspective, providing incentives to retain all control within the realm of the national government (Geradin, 2006, p. 6, 7). Second, it was relatively easy to secure the public service obligations (PSOs). It was customary to grant monopoly franchises to a utility delivering gas. In exchange for this monopoly franchise, the utility was either a regulated private player as in the United States, or under state ownership as for the greater part of Europe, with a mandate to operate in the public interest (Newbery, 1999, p. 86). These franchise monopolies could recoup investment costs by passing them on to consumers.

1.4 Pressures for change

Around the end of the 1970s, pressure began to mount on this managed market. With no intention of being exhaustive, we provide four important reasons for this development, in chronological order.

The changing perception of scarcity

It had become customary to use the size of proven reserves as an upper bound to production. Since the size of proven reserves could be adjusted upwards when needed through, for instance, an intensification of production and exploration efforts, a reevaluation of reserves or higher prices, energy reserves were fixed at a lower than realistic level. In addition, the 1973/74 and 1979/80

10 A second reason put forward by Radetzki is that several national transmission companies were publicly owned utilities, required to provide a 'normal' return on capital as opposed to maximizing profits.

oil shocks created fears of being too dependent on unreliable oil producers. This extended to gas with European governments also designating gas supply security as vital (Stern 1988, p. 24). Such security of supply anxieties offered a major justification for the emergence of the government-dominated market structure. The oil shocks increased the oil price and, due to the oil price linkage, also the gas price. This boosted production and exploration efforts as well as investments in transport facilities. In 1986, oil and gas prices declined again which mitigated the scarcity threat and removed an important *raison d'être* for state intervention. It also facilitated the idea that market forces were more efficient than state intervention. According to Radetzki (1999, p. 19, 20), the 1986 price decline undermined the traditional structure in three additional ways. First, until 1986, high oil and gas prices had led to a low market growth. Although the market had a clear potential for expanding, the producers were satisfied and accepted the stagnant market as long as prices and rents remained high. The price fall, however, lowered wholesale gas prices without significantly increasing the market share of gas. Accordingly, producers grew increasingly dissatisfied with the monopolistic structure. Second, the producers' discomfort with the old structure was increased by the reduced costs resulting from technological advancements. These lower costs increased the potential for a larger production and profit level, but the low market growth limited this potential. The third effect of the oil price collapse, according to Radetzki, was that it induced in the government a new attitude towards the energy sectors. This was most notable in the UK. The lower oil and gas prices sent a signal that supplies were sufficient and that there was consequently no reason for the government to intervene, for instance by creating or allowing national monopolies, from a supply security perspective. Accordingly, the support for the traditional monopolistic structure crumbled further.

Power generation

Recall from the previous section that in the traditional structure, gas was considered scarce, which restricted large-scale gas use for low-value applications such as power generation. In addition, in countries like the UK, Germany and France, gas use was prohibited in order to protect domestic coal and nuclear power. Until the end of the 1980s, the European Union did not stimulate gas use for power generation. In addition to the above premium fuel and protection of domestic industries arguments, another important argument for restricting gas use was to prevent dependence on Russian gas (Newbery, 1999, p. 150). Nevertheless, around the 1990s, gas finally became the fuel of choice for power generation, as a result of, for instance, gas' environmental advantages as compared to oil and coal. Technological breakthroughs, especially the development of combined cycle gas turbines, further stimulated the use of gas for power generation (see also section 2.8). This unlocked the potentially huge power generation gas demand, creating a new and important market for gas.

New pipelines create gas-to-gas competition

In addition, in the 1990s, commercial initiatives began to develop which undermined the status quo. The construction of additional pipelines built on a partly speculative basis allowed small, uncontracted volumes of gas to be traded outside the managed system. In the managed market, a secured market existed for gas transported through a pipeline. The availability of uncontracted gas flows changed this situation. The secured gas now had to compete with uncontracted gas (or alternative fuels), which created a situation in which the managed market became less and less tenable. Two notable examples are Wintershall's pipeline initiatives and the UK Interconnector.

The first is the pipeline competition that developed in Germany from November 1989 on (Stern, 1998, p. 139, 140 and Radetzki, 1999, p. 20, 21). In that month, Wintershall, a small West German gas producer and the oil subsidiary of chemical manufacturing company BASF, decided to construct a 560 km pipeline – Midal – from Emden to Ludwigshafen, the location of the main BASF plants. This was a response to a dispute between BASF and its supplier Ruhrgas concerning the price for gas (which was determined through the netback market value approach referred to in the previous section). Midal bypassed Ruhrgas, the dominant transmission company, and consequently BASF became directly involved in the German gas market. This created an independent supplier of gas that competed with the traditional supplier, which resulted in some gas-to-gas competition. Less than a year later, in October 1990, Wintershall moved into the East German gas market, which had become available after the reunification between East and West Germany (Stern, 1992, p. 88, 89). Wintershall signed a cooperation agreement with Gazprom which created a joint venture company – Wingas – to market Russian gas in Eastern Germany. To this end the Stegal pipeline was built. It ran through Slovakia and the Czech Republic and was connected to Midal in Germany. The competition between Ruhrgas and Wingas resulted in additional pipelines – with Ruhrgas emphasizing Norway supplies (the Netra pipeline), while Wingas remained focused on Russian gas supplies (the Jagal pipeline) – that were partly constructed in parallel with existing pipelines, providing direct gas-to-gas competition (Stern, 1998, p. 142). According to Radetzki (1999, p. 20), these developments indicate that producers are willing to break the status quo of the managed market if they see commercial opportunities. Furthermore, these competitive pressures are considered to have facilitated competition in neighboring countries, and possibly even the rest of Europe (ibid., p. 21 and Stern, 1998, p. 155).

A second major pipeline initiative was the construction in 1998 of the Interconnector between Bacton in the UK and Zeebrugge on the Continent. The Interconnector created a bi-directional link between both markets (Stern, 1998, p. 56). Due to the supply surplus that had emerged in Britain in the mid-1990s, British producers and marketers considered the Interconnector as a useful means of exporting surplus volumes to the Continent. Consequently,

the Interconnector was initially developed as an export line for gas from the UK Continental Shelf. The pipeline's maximum British export capacity to the Continent is 20 bcm per year. At a later stage, after the turn of the century, the UK was expected to become a net importer due to its dwindling reserves. In consequence, gas was expected to also flow in the opposite direction (at a maximum capacity of 8.5 bcm per year). According to Futyan (2006, p. 26), in October 1998 around 8 bcm of gas supplies to the Continent was contracted for through long-term agreements. Consequently, significant uncontracted volumes were available (around 12 bcm) for short-term and spot market sales, which increased both gas-to-gas competition and market liquidity. As above, these uncontracted volumes provided a source of competition to the secured gas on the Continent, lowering the tenability of the traditional status quo.

Market maturity

The monopolistic structure and the managed market development were no problem as long as substantial investments were required to develop the immature European gas market. As indicated in the previous section, around the end of the 1990s large parts of the European gas market had matured as a consequence of the investments that were made – as well as due to the pipeline initiatives discussed above. In a mature gas market, the initial investments have been amortized. The penetration of gas into most markets is well advanced. Accordingly, new investments are primarily required in expansion and interconnection rather than new infrastructures, as a result of which the rationale for a managed market becomes less obvious. Accordingly, the emphasis shifts from stimulating new investments towards more efficiently deploying existing investments.

The corollary of these and other factors was the arrival of a new alternative to govern European gas markets. On back of the successful liberalization operations in the US and the UK, a consensus arose concerning the need for liberalization of the European gas market, which culminated in a 1985 White Paper on the internal market (CEC, 1985). Liberalization is supposed to transform the rigid and constrained gas market into a European internal gas market governed by unfettered competition. The essence of liberalization is to introduce competition where possible.

However, the cost characteristics of the European gas market require a substantial level of monopolization even after liberalization. The costs of transmission and distribution networks are generally considered to be subadditive. Costs are subadditive when one firm is able to produce at a lower cost than two or more firms (see Annex). With subadditive costs over the relevant production range, the first operator obtains a natural monopoly position since he will be able to undercut the prices of potential entrants. The lowest cost solution in this case is to have one company supplying the entire market with gas. Consequently, the naturally monopolistic network – the pipelines – should remain a natural monopoly. Efficiency is supposed to be

improved by regulating the pipelines to drive down network costs towards marginal costs (referred to as 'asset sweating'). On the other hand, regarding the services over the network – transport and trade of gas[11] – efficiency-improving competition should be introduced. To this end, two EU Gas Directives have been introduced, the first one in 1998 (CEC, 1998), followed and replaced by a second one in 2003 (CEC, 2003). A third set of legislative measures has been proposed (CEC, 2007h). Chapter four discusses these and other European legislative initiatives.

1.5 Liberalization and the energy policy objectives

The legislative measures are intended to satisfy the three main policy objectives of energy policy: supply security, competitiveness and sustainability. Prior to liberalization, government franchises were responsible for reaching these objectives and they recouped the associated costs on consumers. Governments consequently had a strong hand in the managed market described above.

A major theme in this study is that the liberalization approach is founded on neoclassical guiding principles, aiming to achieve perfect competition through the internal gas market (see chapters three and four). Once liberalization has created perfect competition, the neoclassical argument goes, no detailed market intervention and/or regulation is required and consequently a government's (and regulator's) role is restricted to that of a market facilitator enabling competition. In such a world, regulators or governments should intervene if the market fails to reach perfect competition. Consequently, regulatory intervention in European gas markets is currently determined by market failure.[12] This section discusses the policy objectives and highlights some possible effects of liberalization. We point out that there is no intrinsic conflict between liberalization and the policy objectives, and that, given the proper regulatory environment, liberalization may improve these objectives. Furthermore, we identify investments as a key element in reaching any and all of the objectives. Finally, we show that each policy objective is currently treated as a public service obligation (PSO) that requires regulatory intervention, since for all of them we can identify a market failure. Since chapter three elaborates on the market failures that can be identified on the European gas market, we provide here a concise treatment of market failure.

11 Gas production is not mentioned here, since it has been a competitive activity prior to the inception of liberalization. Unless specified otherwise, the term transport includes transmission and distribution of gas. Gas trade refers to the resale of gas on the wholesale and retail markets.

12 Chapter three elaborates on the neoclassical perspective and why it considers market failure to be a ground for regulatory intervention.

1.5.1 Liberalization and security of supply

According to Frei (2004), security of supply is the most important energy policy objective. He argues that the energy policy objectives can be stratified into an energy policy needs pyramid similar to Maslow's pyramid of human needs, implying that we are dealing with a hierarchy of energy policy needs, rather than the generally assumed trade-off. Frei argues that as long as a lower-order need such as security of supply is not satisfied, higher-order needs such as efficiency or environmental concerns cannot be adequately dealt with.

Security of supply comes down to guaranteeing gas supplies now as well as in the future. It encompasses a range of short- and long-term issues, most importantly 1) the long-term availability of gas supplies, 2) the extent to which consumers can be assured, within foreseeable circumstances, of gas delivery and 3) the prevention of international crises and, in case of a crisis, control of the consequences.

Ever since the inception of liberalization, the possibly adverse effects of liberalization on (long-term) supply security have exercised many minds. As indicated, the traditional market structure allowed supply security to be guaranteed relatively easily, albeit at high costs. Liberalization shifts supply security responsibilities to market participants, which has created anxiety that increased incentives for lower prices, cost reduction and efficiency might impede supply security. Fears range from lagging investments and soaring production levels to low-quality networks and supply shortages.

The lasting presence of such fears notwithstanding, the emphasis lies increasingly on the conditions under which liberalization and supply security can be mutually reinforcing (or at least not preclude one another). The main issue in this regard is stimulating investments. The common view is that competitive markets and investments can co-exist, but that the specifics of energy markets may nevertheless pose problems. Joskow and Tirole (2005) illustrate this by considering the theory of merchant transmission investments. Although Joskow and Tirole apply this theory to electricity transmission, they note that similar issues are expected to arise when considering merchant investment in gas transmission pipelines. The theory goes that investment in electricity transmission lines can be secured without regulatory intervention provided that the investor is allowed to reap the congestion revenues. In this case, both generation and transmission can be completely deregulated without negative repercussions for investments. However, Joskow and Tirole also argue that the assumptions underlying this model are quite restrictive when considering the specifics of energy markets. Examples of complicating factors, which may create inefficiencies when completely relying on merchant investments, are market power in wholesale markets and the lumpiness of investments. Von Hirschhausen et al. (2004) endorse the view that there is no fundamental tension. They argue that the specification of the regulatory system is what matters for attracting investments, as opposed to the generic ownership form.

Europe's rising import dependence adds to supply security anxieties by increasing Europe's dependence on foreign suppliers. Although forecasts vary, there is a consensus that European gas import dependence will rise to approximately two thirds of the supply by 2020.[13] According to Stern (2002, p. 12-14), this exposes the EU to three kinds of dependence (and risk): 1) source dependence, 2) transit dependence and 3) facility dependence.[14] Source dependence follows from Europe's dependence on a limited number of gas suppliers. A good example is provided by Russian exports into Europe. Transit dependence arises because most European gas imports are delivered by pipelines which must cross several transit countries before reaching the European consumer markets. Examples of risks in this regard are the disputes between Russia and the countries through which their export pipelines pass (mainly Ukraine and Byelorussia). Chapter two more elaborately discusses the issues regarding source and transit dependence. Facility dependence creates the risk of a supply disruption due to the destruction of a major, not easily replaceable, facility. An example is the 1998 Longford incident in which an explosion in the only plant that supplied gas to Victoria, Australia led to a two-week cut in supplies to Victoria (CPB, 2006, p. 47). Britain's dependence on the Bacton and St. Fergus LNG receiving terminals makes it vulnerable to facility-induced supply disruptions (Stern, 2004, p. 1975, 1976). A similar situation arises concerning the Continent's gas supply which is concentrated on a relatively small number of large Russian pipelines such as Brotherhood, Yamal and possibly Nord Stream (under construction). Note the close similarity with transit dependence in the latter case.

While acknowledging that historical experiences provide no guarantees for future developments, Stern's (2002, p. 16, updated in Stern, 2006b, p. 17-19) empirical observations regarding gas security incidents in OECD Europe over the last 25 years provide interesting anecdotal insights. Stern points out that between 1980 and 2001 Europe was confronted with a few source and transit incidents related to the Russian gas transiting the Ukraine. No significant facility incidents occurred.[15] From 2001 on, three serious facility incidents were identified: a liquids contamination of the Interconnector in 2002, a fire a Algeria's Skikda liquefaction plant in 2004 and a 2006 fire at the Rough storage plant in the UK. Other incidents were Russia's 2004 dispute with Belarus, which resulted in a 24 hour interruption of supply to Belarus, and the 2006 crisis between Russia and the Ukraine, which resulted in short supply interruptions to Europe. Based on these observations, Stern concludes that

13 Table 2.2 provides an overview of different scenarios.

14 Weisser (2007, p. 2) supplements this categorization with structural risks. These are 1) the pipeline-bound character of gas supply and 2) the responsibility for security of supply that shifts from monopoly provision under the traditional structure to market players on liberalized markets.

15 One facility-related incident, an explosion on the Trans Mediterranean Pipeline which cut Algerian gas flows to Italy, could be labeled a terrorist attack according to Stern.

there have been very few security incidents over the past 25 years, and that there is no evidence of imported supplies being less secure than indigenous supplies. In fact, most gas supply disruptions appear to have domestic origins. Facility incidents seem to have increased in recent years. This offers some perspective on the sometimes not so tacit assumption that import dependence automatically aggravates security of supply hazards. Another conclusion from the above is that, as argued by Stern (2006b, p. 2), present-day supply security anxiety is not so much due to a discrepancy with liberalization, but rather has3 a geopolitical origin (see chapter two).

The above indicates that concerns arise on Europe's liberalizing gas markets regarding all three components of supply security – the long-term availability of gas supplies, the extent to which consumers can be assured, within foreseeable circumstances, of gas delivery and the prevention of international crises and control of the consequences. A common denominator is that all components require investments – in gas exploration and production to develop sufficient volumes, and in transmission, distribution, transit and LNG infrastructures to properly transport the gas to the consumers. The issue is whether these investments can be facilitated by the market alone – and the government or regulator can step back from the market – or if regulatory intervention is required. Due to its neoclassical guiding principles (see chapter three for an elaborate exposition), any market failure is a candidate for regulatory intervention.[16] Section 3.4 extensively discusses six important market failures on the European gas market – failure of competition, public goods, externalities, incomplete or missing markets, information failures and uninsurable risks. In consequence, we provide a concise treatment of the main market failures at this point.

The first market failure is failure of competition, both on the Continent as well as regarding the relationship with the producers. Competition is also undermined because contrary to early European expectations, producing countries appear less willing to allow the predominantly western oil companies a stake into their energy sectors (these issues are addressed in section 2.3). Furthermore, a closer look at Europe's gas suppliers reveals that the European gas market is quite segmented – Russian supply largely concentrates on central and eastern Europe, Norwegian supplies mostly arrive in northern and western Europe and Algeria focuses on southern Europe. Although this is perfectly understandable when considering transport costs, this division nevertheless hampers competition between suppliers. A second market failure consists of missing markets. Gas trading is developing, but mainly in the Northwestern part of Europe (see section 4.10.1). Import contracts between producers and

16 While a market failure is sufficient ground to think about regulatory intervention, actual intervention should only materialize in practice if the costs of the market failure outweigh the costs of the government or regulatory failure that accompanies the intervention (see section 4.4 and chapter 5).

European consumers are still predominantly bilateral and long-term – as is a large proportion of gas trade between Member States. There is no world gas market (as there is for oil). LNG will improve the situation, but it is uncertain if and to what extent this will lead to a sufficiently liquid world gas market, based on hub-to-hub trading. Therefore, missing markets will remain a problem for a considerable period of time to come. Thirdly, import dependence satisfies the non-rivalry and non-exclusivity conditions that define a public good, because 1) an extra person enjoying low import dependence does not obstruct others from enjoying it and 2) import dependence cannot be split up in parts and sold on a market. Import dependence is therefore a public bad. Fourth, externalities play a role here. Natural gas is an essential input in many industrial processes and consumer applications, and consequently is complementary to the rest of the economy. Therefore, according to Helm (2005a, p. 10):

> 'the costs of excess supply and excess demand are asymmetric. Therefore, optimal capacity is greater for the economy as a whole than would result from the sum of individual investment decisions. This usually requires some form of government intervention – except, of course, when the system is in general excess supply, as in the 1980s and 1990s'.

Facility and transit dependence predominantly boil down to the infrastructure which provides two additional market failures: information failures and uninsurable risks. Information is imperfect because it is impossible for European consumers to perfectly observe the quality of the facilities through which their gas is imported. As indicated, large scale gas infrastructure investments are extremely costly (up to 8-10 billion dollars), require long cost-recovery periods and must be implemented in their entirety at once. (The last condition invites the question of exactly what kinds of investment – storages, LNG facilities or pipelines – would qualify as potentially uninsurable. This discussion, however, falls outside the scope of the present study).

These market failures provide scope for government intervention to guarantee supply security. A range of European initiatives have been and are being developed to this end (cf. CEC, 2000, 2004b, 2005c, 2007b). Some initiatives – such as stimulating energy efficiency and promoting renewables – emanate from a predominantly environmental point of view but nevertheless positively influence gas supply security by lowering gas demand. Also, following oil, a solidarity mechanism – strategic gas stocks – between Member States has been proposed. These initiatives attempt to reduce gas consumption and soften the consequences of a supply disruption. Furthermore, diversification may also lower supply security risks. Gas supply diversification has several dimensions: 1) geographical diversification between suppliers, 2) diversification between pipelined and liquefied gas, 3) diversification between several facilities and 4) diversification between energy forms. Their merit is not difficult to comprehend: the first lowers import dependence on a single supplier, the

second is supposed to create arbitrage opportunities between gas markets, the third lowers facility risk and the fourth lowers dependence on hydrocarbon energy sources.

All in all, we emphasize three points. First, there is no inherent tension between liberalization and supply security. Second, investments are vital concerning all three elements of security of supply – the long-term availability of gas supplies, the delivery of supplies and the prevention of international crises and their consequences. Consequently, facilitating investments is a vital factor in securing supply security on a liberalizing European gas market. Thirdly and finally, the identified market failures may require regulatory intervention.

1.5.2 Liberalization and competitiveness

Liberalization is also supposed to improve the competitiveness of the European economy by improving efficiency. Improved efficiency should lead to lower prices of supplies, which enhances the competitiveness of energy-intensive users and lowers the energy expenditures of small consumers. We explore the subject in light of the three economic efficiency criteria.

The first form of efficiency is productive efficiency. Productive efficiency is defined as producing a good at the lowest possible unit cost. By subjecting operators to competitive forces, liberalization should induce them to behave more efficiently and lower production costs, consequently improving productive efficiency and lowering prices. Productive efficiency can also be enhanced by improvements in fuel efficiency, operational efficiency or utilization of production capacity. The restructuring of the US wholesale gas market is often considered a prime example for the benefits of competition and liberalization as well as a blueprint for restructuring efforts in other regulated industries and countries (Leitzinger and Collette, 2002, p. 79). The same applies to the UK restructuring experience (Bolle and Breitmoser, 2006, p. 18).

As indicated in section 1.4, separating transport and trade activities is an important measure for liberalizing gas markets. In the US this took the form of open-access transportation after the Federal Energy Regulatory Commission (FERC) issued Order 436 in 1985. Open access entails that gas users, LDCs and small consumers, buy their gas directly from gas producers, following which the interstate transporters transport this gas on non-discriminatory terms. This separates transmission and trading activities and is supposed to ensure non-discriminatory access to the transmission pipelines for consumers. Granderson (2000) has examined US open-access gas transportation. Based on a data set that comprises 20 US interstate natural gas pipeline companies from 1977 to 1989, he concludes that open access has slightly lowered transport costs and increased cost efficiency (meaning that firms are producing their output levels more efficiently compared to the most efficient firm). The positive influence

of competitive forces on productive, or operating, efficiency is not undisputed. Leitzinger and Collette (2002) argue that the US restructuring indeed resulted in billions of dollars of savings. However, they submit that these savings were not due to competition, but rather accrued because restructuring resulted in stranded costs (see section 1.6) which were absorbed by producers and transporters.

Regarding the UK market, an influential study on electricity restructuring has been undertaken by Newbery and Pollitt (1997). They conducted a cost-benefit analysis of the restructuring of the British Central Electricity Generating Board (CEGB) which generated and transmitted all Welsh and UK public electricity until 1990. Their conclusion is that the benefits outweighed the costs, the main gains coming from the operating efficiencies of the generating companies. Regarding the British gas market, SERIS (2006, p. 4) reaches a conclusion similar to Leitzinger and Collette's above: improvements regarding for instance capacity utilization were due more to regulatory intervention than to competition. However, the US and UK experiences also show that the restructuring process as a whole, comprising competition and regulatory intervention, has in all likelihood improved operating efficiency.

Allocative efficiency is achieved if the benefits of lower operating costs are transferred to consumers through lower prices. If competition works, operators will cut their costs and lower prices accordingly (to the level of marginal costs under perfect competition). The European Commission provides some figures on the expected allocative gains from its liberalization measures, notably its unbundling proposals (CEC, 2007d, p. 38, 39). The Commission compares the electricity prices of Member States with and without ownership unbundling.[17] These calculations indicate that separating ownership from trade weakens the market power of vertically integrated companies, which will decrease electricity prices. The Commission notes (ibid., p. 39) that similar calculations cannot yet be made for gas, because too few Member States have implemented ownership unbundling for gas transmission to make a comparison statistically significant.

According to Pollitt (2008, p. 709), there is a lack of definitive econometric evidence on the effects of restructuring initiatives in gas markets, which is why a large part of empirical research is devoted to electricity studies. One gas study by Ernst and Young (2006) for the British Department of Trade and Industry (DTI, disbanded when the Department for Business Enterprise and Regulatory Reform (BERR) was created on 28 June 2007), argues that gas prices fall under liberalization, as compared to a situation without liberalization. Specifically, they (ibid., p. 2) find 'a strong degree of correlation between

17 Ownership unbundling is one option to remove the natural monopoly problem discussed in section 1.4. Ownership unbundling separates the ownership of the natural monopoly (the pipelines) from the trading activities. It is the most far reaching measure to this end. See section 3.5.1 for other options.

border and consumer prices and the degree of liberalization, particularly unbundling and the creation of an independent TSO'. Steiner (2001) tests whether regulation and restructuring – emphasizing unbundling, ownership and third party access initiatives – have improved capacity utilization and reserve margins on the electricity market for a panel data set of 19 OECD countries from 1986-1996. She shows that capacity utilization is positively correlated to unbundling and private ownership, while the effect on reserve margins is ambiguous. Furthermore, she argues that liberalization and competition may in the long-run improve allocative efficiency by lowering electricity prices.

These studies confirm that liberalization may also improve allocative efficiency. However, CPB (2006) notes that the presence of market power complicates matters. It argues that, in the case of electricity, market power can be used to raise prices by for instance withholding supplies from the market or withdrawing generators with lower marginal costs, even if the price equals the marginal costs of the most expensive unit. CPB (ibid., p. 29) states that 'given the vulnerability of liberalized energy markets to market power (…), European energy markets are at risk of not performing well in terms of allocative efficiency'. This means that productive efficiency is necessary but not sufficient to lower consumer gas prices. For example, with a single, unregulated supplier, higher productive efficiency will likely not result in lower gas prices, but will instead increase producer profits. This illustrates the importance of regulatory and structural reform measures: only if market power is curbed, either through competitive forces or by a regulator, can we expect productive gains to be passed on to the consumers. Crew and Kleindorfer (2006, p. 74) point out the inadequacy of a policy that focuses solely on productive efficiency by arguing that the traditional assumption 'of economic efficiency maximizing the size of the pie irrespective of the distribution of the resulting benefits' is one of the fundamental shortcomings of traditional regulatory economics.

Another issue regarding allocative efficiency pertains to the distinction between large and small consumers. Gas prices for large users have fallen in most Member States, in contrast to those for small consumers and households.[18] Small users apparently do not reap all the perceived efficiency gains. Possible explanations for this include a larger bargaining power for larger consumers and a lack of real-time metering data for small users which precludes them from responding to short-term price changes (cf. Joskow and Tirole, 2006).

Finally, productive and allocative efficiency potentially create an efficient equilibrium at a particular point in time. However, for this static equilibrium to also be efficient in the longer term, dynamic efficiency (i.e., investments)

18 See the benchmarking reports by the European Commission, at http://ec.europa.eu/energy/gas/benchmarking/index_en.htm.

must be guaranteed too. Liberalization might, by increasing competition, provide agents with incentives to reduce operating costs and outperform others by making innovative investments. One potential drawback results from the competition's anticipated effect on reducing overinvestments. The citation of Helm (2005a) in the previous section implies that the social costs of underinvestments exceed those of overinvestments, hence that some degree of overinvestment – gold plating – may be the preferred strategy. From a different perspective, liberalization and its accompanying unbundling may decrease firm size and consequently hamper investments (cf. Jamasb and Pollitt, 2005), implying that market power may facilitate innovation by generating funds for investments.

MacAvoy (2007) studies the deregulation of the US gas and electricity markets, and makes a number of interesting observations regarding liberalization and investments. As we will see in this study, liberalizing gas and electricity markets requires regulatory reform. One measure to this end is deregulation, that is, removing or simplifying restrictions or regulations in order to facilitate competition. MacAvoy looks into the deregulation of prices, that is, whether prices should be determined by market forces. The goal of the US deregulation was to create open entry and access to the facilities of incumbent producers in order for markets for network services to be populated by independent sources of supply that would generate price reductions and service improvements (ibid., p. 36). However, at the transmission level, new entry was minimal. Furthermore, because the transmission grid could not be broken up into independent entities, competition did not develop sufficiently to eliminate price controls (ibid.). Because the markets for final services were released from price controls, a situation of partial deregulation arose. A main argument in MacAvoy's book is that this partial deregulation is not only unavoidable[19] but also unsustainable, because the capped prices for basic services were above marginal but below average costs, hampering investments.[20]

Focusing on investments in infrastructures, WRR (2008) provides a less negative assessment. It disagrees with the notion that competition should be rolled back (therewith implicitly acknowledging that there is no fundamental tension between liberalization and dynamic efficiency), but shares the concerns many people have whether the current institutional arrangements are able

19 According to page 13 of the preface, 'the prospect of completely deregulating market structures where there are large numbers of approximately uniform services has not been realized because these industry networks have been driven by technologies that limit the number of service provides'. In other words, competing transmission networks is impossible, as a consequence of which price controls remain necessary to prevent abuse of the (naturally) monopolistic position of the transmission network owner (see also Annex).

20 See especially chapter four of MacAvoy (2007) which provides a case study of the performance of Pacific Gas and Electric Company, which went bankrupt after deregulated wholesale market prices became higher than those capped at the retail level.

to guarantee the adequacy of existing infrastructures in the future. It argues that up to now, the emphasis has been on short-term (Type 1) issues, which has been pretty successful. However, nowadays long-term (Type 2) issues have become important, and the institutional arrangements must be able to accommodate these additional requirements. The vital issue concerning these Type 2 issues is investments. WRR furthermore argues that it appears to be the case that the institutional and legal arrangements have such a strong short-term emphasis that these long-term objections will likely not be adequately secured (ibid, p. 14).

Finally, Von Hirschhausen's (2008) view on liberalization and dynamic efficiency is more positive. He provides a case study of the US natural gas industry and concludes that liberalization – through restructuring and vertical unbundling – did not impede investments. He also notes that while these results are not easily extended to other gas markets, they nevertheless provide a reasonable working hypothesis for future studies on the subject.

A general observation deriving from the above is that determining the effect of liberalization on competitiveness becomes quite intricate once we look beyond productive efficiency and consider allocative and dynamic efficiency. However, there is once again no intrinsic conflict between competitiveness and liberalization. The issue boils down to creating the circumstances – such as the appropriate regulatory regime – under which liberalization improves competitiveness and efficiency. Most attention must be paid to dynamic efficiency, once again placing investments center stage.

The market also fails with respect to competitiveness. According to the above exposition on efficiency, the main issues in this respect are market power, which may harm productive and allocative efficiency, and a lack of investments, which may obstruct dynamic efficiency. Hence, failure of competition and uninsurable risk arguments also apply in this case. A specific failure of competition in this regard is provided by the link between oil and gas prices. To achieve competitive gas prices, pricing formulas must be adjusted to allow gas scarcity, rather than oil prices, to determine gas prices. In addition, long-term contracts should give way to shorter-term contract forms that allow gas prices to be more often adapted to market conditions (the latter argument was instrumental in the Distrigas case study in chapter seven). Furthermore, another important failure is due to the missing markets. As indicated, gas trading exchanges such as Endex and the Amsterdam Power Exchange are developing, but markets are still missing or incomplete since there is not as yet a complete set of spot, future, forward and risk markets. Finally, information problems also appear regularly. Russian gas prices, for instance, are non-transparent, since most Russian gas trade traditionally takes the form of package deals with an element of barter trade (IEA, 2002). Furthermore, according to a report by Transparency International (2008), the transparency of the leading gas and

oil companies concerning payments and operations leaves a lot to be desired.[21] This makes it difficult for consumers to ascertain how much they are paying for which services. These market failures provide a rationale for regulatory intervention.

Consequently, we emphasize the same three points as regarding security of supply above: 1) the absence of an inherent tension between liberalization and competitiveness, 2) the necessity to facilitate investments and 3) the presence of market failures which may require regulatory intervention.

1.5.3 Liberalization and sustainability

Sustainability comes down to guaranteeing a clean environment for everyone, now as well as in the future. The use of fossil fuels creates emissions of amongst others greenhouse gasses responsible for the problem of global warming. Global warming, and, in its slipstream, environmental policy, is quickly gaining (political) recognition as an energy policy spearhead. The urgency of measures is illustrated by the current trend in CO_2 emissions: atmospheric concentrations have risen from pre-industrial levels of 270 parts per million (ppm) to 350 ppm currently. Extrapolating the current trend puts CO_2 concentrations in the realm of 750 ppm at the end of this century while the safety threshold is estimated at around 450 ppm (Helm, 2005b). Mitigating these emissions provides the backdrop for EU and Member State environmental policy.

As above, most empirical studies analyze electricity liberalization and restructuring. Theoretical and empirical studies once again fail to provide an unambiguous answer regarding the impact of liberalization (Sevi, 2004). Burtraw et al. (2000) corroborate this view. They (ibid., p. 14-29) identify a number of channels through which electricity restructuring impacts the environment: 1) changes in electricity demand in reaction to prices of other goods, 2) substitution among fuels in electricity production, 3) efficiency improvements due to the introduction of competition and 4) the interaction of firm behavior and market structure with existing and new incentive-based approaches to environmental regulation. If we translate this to gas, the important determinants for gas liberalization's impact on the environment are the initial position of gas in the energy mix, power generation gas use, combined cycle gas turbine (CCGT) efficiency and the effectiveness of environmental regulations. Furthermore, the other factors impacting the overall outcome

21 The companies are classified into three groups based on an assessment of their transparency. Group 1 comprises highly transparent companies like Shell, StatoilHydro and Petrobras. Group 2 companies, like BP, Chevron, Gazprom and Sonatrach, are middle performers, while ExxonMobil, Saudi Aramco and Petroleos de Venezuela, for example, are very non-transparent.

include the initial market situation, the degree of market opening and the specific environmental measures in a Member State. These different channels result in different effects of liberalization on sustainability, making it difficult, if at all possible, to provide a definitive conclusion concerning the effect of liberalization on the environment. CPB (2006) provides an overview of empirical evidence on the relationship between liberalization and the environment from which it concludes that a definitive verdict is very hard to reach, because 'according to the theoretical literature the single effects can be either positive or negative' (ibid., p. 63).

A few examples are in order. European gas liberalization might lessen environmental concerns by for instance promoting power sector gas use at the expense of coal and lignite, both of which are more polluting (cf. Pearson, 2000; see also section 2.8). This would enable the least polluting fossil fuel – gas – to form the bridge towards a sustainable energy economy based on wind, hydro power, biomass, solar and eventually hydrogen. On the other hand, gas liberalization may also entail dangers to the environment. The initially anticipated (relatively) lower gas prices can have negative influences on the demand and supply side. On the demand side, lower gas prices obviously may raise total energy consumption and emissions. A danger on the supply side comes down to low gas prices making the less developed but cleaner renewable energy options less competitive. This threat subsides if the external costs of polluting emissions are fully internalized into energy prices through energy taxes or emissions trading. Kemfert et al. (2003), taking a game-theoretic approach, study the strategic behavior of energy suppliers and their impact on the economic and environmental situation in the liberalized European electricity market. They argue that in the absence of full internalization, liberalization may provide incentives to apply low-cost technologies which are more polluting than gas – especially if we consider that current gas prices are much higher than those of, for instance, coal.

In sum, similarly to both policy objectives above, the paramount issue regarding sustainability is not so much an intrinsic conflict with liberalization, but rather how liberalization should be complemented with regulatory provisions in order to take account of market specifics like the global nature of climate change or a Member State's energy mix. Ensuring sustainability requires investments in emissions reduction – for instance in measures that improve energy efficiency and low-carbon technologies. Consequently, the sustainability objective can also be considered as an investment problem. Sustainability also exhibits market failures which may justify regulatory intervention, as illustrated in the next section.

Governments frequently intervene regarding environmental issues – think of, most notably, the Kyoto Protocol and the European emissions trading scheme. One rationale is that environmental issues exhibit externalities that result in market failure. A private entrepreneur will not automatically consider social costs, but will have an incentive to focus on his private costs when

maximizing his profit, which renders his output inefficiently high or low. Due to the negative external effects of pollution, the latter applies. Second, the environment is a public good. The benefits of one country's domestic reduction of emissions are not confined to that particular country; neighboring countries benefit from the cleaner air too. This creates an incentive to free-ride on emission reduction investments, obstructing efficient investments. Missing markets are a third market failure. The European emissions trading scheme has been introduced to efficiently reduce emissions by introducing markets that were previously missing. A number of promising initiatives are developing on the Continent: Intercontinental Exchange (via the European Climate Exchange); the European Energy Exchange; Nord Pool; and the New Values exchange (via Climex) all offer carbon contracts.[22] Whether these market initiatives will eventually develop sufficiently and whether trading in the remaining greenhouse gasses – such as NO_x, CH_4 and N_2O – will be embraced is uncertain, but prospects are certainly promising. A final market failure is information failure because future developments are unclear. Examples include: 1) uncertainty on the Kyoto Protocol's second commitment period, 2) the political will and commitment to keep reducing emission levels even when the low-cost, easy to achieve, options are exhausted and 3) prospects on nuclear and sustainable energy.

The discussion of the energy policy objectives brings to the fore three important observations. First, the energy policy objectives are not principally at odds with liberalization. In fact, liberalization is likely to have positive effects. However, liberalization is necessary but not sufficient, which renders a complete reliance on market forces a utopia. Helm (2007a, p. 7) submits that 'This [AS: liberalization] agenda has much merit, but is at best necessary. It is very far from sufficient'. Liberalization must therefore not be viewed as a panacea that solves all problems, but rather as a very powerful and useful measure that in conjunction with the appropriate regulatory provisions may create a more competitive gas market on which the energy policy objectives are secured. A second observation is that due to its neoclassical guiding principles, current gas regulation considers that the energy policy objectives may require regulatory intervention because each exhibits market failures. In other words, current regulation treats the energy policy objectives as public service obligations (PSO), i.e., obligations that are not adequately secured when left to the market. Securing the PSOs is complicated because they may contradict each other. For instance, ensuring a sustainable energy supply requires renewable technologies which become viable at high gas prices that diminish competitiveness. Another example is that supply security may require the inclusion into the energy mix of more polluting energy sources like coal.

22 For more information on these trading initiatives, see their websites at respectively www.theice.com; www.europeanclimateexchange.com; www.eex.de; www.nordpool.com; www.newvalues.nl and www.climex.com.

Hence, the PSOs are characterized by multiple market failures (Helm, 2001, p. 301-305). Securing the PSOs requires an energy policy that simultaneously solves all market failures. Our third observation is that investments are vital to secure any and all of the policy objectives. Consequently, despite their multiple market failures, stimulating investments is a way to simultaneously improve all PSOs.

1.6 PROBLEMS WHEN MOVING TOWARDS COMPETITIVE GAS MARKETS

It has been indicated that liberalization radically changes the European gas market. It requires fundamental restructuring which impacts all players along the value chain as well as other stakeholders. This implies that the transition to a more competitive gas market will not be smooth, but rather a messy affair inherently fraught with problems and conflicts. Some of these are transitory, that is, due to the market adjusting to a new setting. Others are permanent. The former are no long-term issue because they should in principle eventually vanish. Permanent problems, on the other hand, are problematic as they indicate more fundamental problems and impact the envisaged equilibrium. In addition, implementing wrong solutions to transitory problems may make them permanent and consequently afflict the liberalized gas market's efficiency. Therefore, in order to adequately judge the liberalization movement, a distinction must be made between transitory and structural problems. This section discusses three common transitory problems of moving towards competitive gas markets. These are related to 1) contracting, 2) cross-subsidies and 3) technology (Helm and Jenkinson, 1998, p. 10-16).

First, competition is supposed to shorten contract duration. Depending on the way competition is introduced, rigid long-term contracts may possibly be eliminated and replaced with short-term, possibly spot contracts.[23] This increases uncertainty for the incumbent. Two main consequences of increased uncertainty are 1) that an investor will demand a higher rate of return on his investment to compensate for the higher risk (see section 2.9) and 2) that the incumbents may want to integrate vertically to lower uncertainty. Chapter five elaborates on the latter. At this point it suffices to note that both consequences impact the end state: a higher rate of return translates into higher consumer prices, and increased vertical integration may prevent competition from working satisfactorily.

Stranded assets are another important contractual problem. Assets are stranded when they become unprofitable after liberalization. The UK experience provides an example (Waddams Price, 1998, p. 113). Former UK gas monopolist

23 Complete removal of long-term contracts is possible only if perfect competition materializes. See chapter three for an elaborate discussion. In more realistic settings, long-term contracts are likely to be necessary also in the future (cf. Slot, 2000, p. 303).

British Gas (BG) had signed contracts with North Sea producers to procure gas and supply it to the UK market during the 1980s and early 1990s. The UK's privatization and liberalization policy at that time lowered BG's market share. As a consequence, contracted quantities, which were based on contracts concluded under BG's assumption that it would remain monopoly supplier to the market, became too large. The rigid nature of these contracts prevented BG to scale down the quantities. Matters were aggravated by the UK spot price falling below the long-term price for which BG had bought its gas supplies. The result was that BG was unable to sell its excess supplies at a reasonable price. The upshot of this example is that liberalization can inflict substantial costs on incumbents by stranding their assets. Stranded assets are a potential threat on the Continent too. This is illustrated by the Gas Directives explicitly reckoning with this problem (see chapter 4). Beard et al. (2003, p. 832, 833) make an interesting observation in this respect. They point out that the presence of stranded assets creates a fundamental dilemma for the regulator. On the one hand, stranded assets reflect costs made on the understanding of their eventual recoverability. On the other hand, remunerating these costs results in higher prices, which runs counter to one of the fundamental goals underlying energy policy. Hence, the regulator is caught between his obligations towards the investors and the desire to deliver the benefits of competition – lower prices – to consumers. Chapter four shows that this trade-off inherently arises when regulating a gas market.

A second transitional problem is cross-subsidization. Affordable energy for every citizen is an important objective of energy policy. In order to ensure this, substantial cross-subsidies developed. These cross-subsidies are most visible in electricity. For instance, universal service obligations oblige each supplier to within reasonable bounds supply electricity to everyone against a reasonable price. This implies that a consumer that can be supplied only at very high costs should also pay a reasonable price. If supply costs exceed the price the electricity supplier is allowed to ask, this consumer is effectively receiving a subsidy. To be able to provide this subsidy, the supplier will subsequently ask a price to the low-cost consumers that is above the costs of supplying them. Low-cost consumers therefore cross-subsidize high-cost consumers. Although universal service obligations do not apply to gas, gas does have cross-subsidies. An example pertains to an integrated company which undertakes both non-competitive infrastructure activities and potentially competitive trading activities. If the integrated company was to generate high profits from its infrastructure activities, these could be used to cross-subsidize its competitive activities.

In a perfectly competitive environment, prices should equal supply costs. Cross-subsidies impede this process by severing the tie between prices and supply costs. Consequently, cross-subsidies should vanish. Tariff rebalancing in order to obviate cross-subsidies will create winners and losers, the losers being those who previously profited from the cross-subsidies. These losers

have incentives to organize themselves and obstruct liberalization, even if the total benefits outweigh total costs. According to Waddams Price (1998), another problem is that the cross-subsidized consumers are often the most vulnerable ones. She (p. 125-127) argues that removing their subsidization may result in serious payment problems. Although the risk of rebalancing resulting in higher tariffs to the vulnerable consumers has been played down somewhat in her more recent research, Waddams Price (2005, p. 141, 142) nevertheless upholds that low-income consumers are more vulnerable to price increases due to the higher share of energy in their incomes. Furthermore, rebalancing may run counter to more general policy objectives such as a fair income distribution.

Technology is a third transitional problem. Introducing competition into gas markets is supposed to increase efficiency by allowing consumers a choice of supplier. This requires consumers who are able (and willing) to switch between suppliers. Technology is an important constraint. For example, inadequate metering facilities impede switching which lowers the benefits of competition. Efficient switching requires sophisticated information technology. For example, short-term metering must be possible, billing procedures must be adequate, and the large data stream that follows a switch must be handled. This requires substantial investments.

All these problems may be temporary: contractual problems are nonexistent if sufficiently liquid short-term spot markets have developed; distributional problems as a consequence of cross-subsidies may be overcome by a smart redistribution policy and technology will develop if the correct investment signals are provided by a fully competitive gas market. They may, however, become permanent. As will be shown in chapter five, the contractual problems will likely not be solved entirely. A regulator's information deficit poses problems for implementing a proper redistribution policy (see section 4.4.2). Finally, the development of technology depends on the investment climate (see chapters 2 and 5). Therefore, without the appropriate preconditions, these transition problems may well develop into permanent problems that afflict the efficiency and efficacy of the envisaged liberalized internal gas market.

1.7 Research questions, methodology and outline

This study argues that the problems indicated so far are relevant but only part of the story, because we are currently experiencing a multitude of shifts on the international gas market which put together fundamentally reshape European gas markets. The market shifts can be classified in the following four broad categories:

- A shift in international relations – the emergence of a seller's market rather than a buyer's market;

- A shift in energy policy objectives with security of supply having become the top priority, while climate change has also climbed up the ladder;
- An increasing need for investments along the entire value chain. Total EU-27 investment requirements amount to roughly 1800 billion Euro of which around 12 percent – 216 billion Euro – is required for gas (CEC, 2007a, p. 17);
- An increasing influence of politics on energy relations.

Chapter two elaborates on these shifts and illustrates that they create a new context for gas regulation. This study analyzes whether the current approach towards liberalization is appropriate for satisfying the energy policy objectives in this new context. As indicated in section 1.5, facilitating investments is vital in satisfying any and all of the policy objectives. Therefore, our main interest is with facilitating investments in the new context.

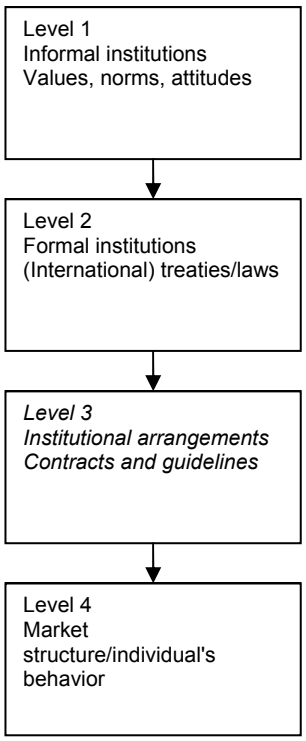
Given the problems indicated above, and the significant amount of restructuring required to transform the traditional market into a competitive one, it is not surprising that liberalization has met with considerable opposition and that problems inevitably arise. This is illustrated by the observation that liberalization is not working as expected (cf. CEC, 2004a, 2005a, 2007c) and that the current industrial and regulatory conditions appear to be struggling to deliver the necessary investments (IEA, 2008a, p. 8). As chapter four points out, the European Commission interprets this as a sign of insufficient competition. Consequently, the proposed prescription is to more vehemently pursue competition, that is, to move closer to the internal gas market by more vigorously pursuing the Commission's current liberalization proposals (IEA, 2008b, p. 57). In effect, it is assumed that all current problems are transitory and can be overcome once the internal gas market has developed. Therefore, the Commission's underlying assumption is that the current approach is also adequate in the new context for gas regulation.

However, the unsatisfactory state of liberalization may also be interpreted as an indication that the current neoclassically-inspired, competition-oriented approach is incompatible with the changed characteristics of the European gas market. This would imply that current regulation is no longer adequate in the new context. A weak point of existing gas regulation is that since it was founded on a theory that assumes competition to eventually become perfect, it by definition rules out the presence of a discrepancy between market characteristics and liberalization. That is, it is assumed that any arising discrepancy will eventually be removed by either competition or regulatory intervention which will restore the competitive equilibrium. This study fills this gap by considering whether such an assumption is correct, i.e., whether the current regulatory approach is the proper one for the European gas market in its new context.

This study approaches this issue by contrasting two economic perspectives: the neoclassical and the transaction cost perspective. The neoclassical perspect-

ive is used because it provides the guiding principles for the current regulation (see chapters 3 and 4). The transaction cost perspective is introduced as an alternative because it explicitly incorporates all the criteria that are identified as important in the new context (see chapters 2 and 5). The distinction between both perspectives is captured by Williamson's framework of analysis, depicted in figure 1.2.

Figure 1.2 The Williamson framework



Source: Williamson (1998), Groenewegen (2005) and CIEP (2006)

This framework identifies 4 layers of institutional analysis and forms the basis for the transaction cost perspective on economics. Chapter five discusses this framework extensively and applies it to the European gas market, which is why at this point a concise overview of the basic issues suffices. This overview serves two purposes. First, it illustrates some important differences between both economic perspectives. Second, it motivates this study's focus.

Level one comprises the informal institutions, such as the basic societal values, norms and traditions, that create the level of social embeddedness for individuals. These informal institutions are the underlying determinants of a society's basic view on market reform and energy policy. For gas, these informal institutions comprise issues such as the perceptions about sovereignty

over energy resources, beliefs about state versus markets and the energy policy objectives discussed in section 1.5 (CIEP, 2006, p. 22). Furthermore, the market reform principles – unbundling, access and competition – are determined at this level.

The informal institutions influence the formal institutions at level two where the polity, judiciary and bureaucracy are located. One could at this level think of (inter)national treaties and laws laying down the ground rules for the behavior of market actors. Market design takes place at this level, based on the energy policy objectives and reform principles. The Gas Directives and the national Gas Acts that emanate from the transposition of the Directives into national law as well as competition policy provisions belong to this level. Levels one and two comprise what Davis and North (1971) refer to as the institutional environment.

The institutional environment forms the basis for the institutional arrangements which are designed at the third level. The laws and treaties at the second level are at this level transposed by Member States into actual regulation, such as contracts, guidelines or tariffs. These institutional arrangements are the focus of transaction cost economics (TCE), which determines the most appropriate mode of governance given the prevailing property rights, rule of law and regulations. This study analyzes existing European gas regulation, and consequently emphasizes this third institutional level.

At the fourth and final level, the institutional arrangements drive the behavior of market actors who try to achieve their specific objectives. Their behavior determines prices, quantities and investments, which adapt more or less continuously in response to changing market conditions. This is what neoclassical economics is concerned with.

In sum, according to CIEP (2006, p. 22), the Williamson framework illustrates that 'the structure and operation of a market evolve as a consequence of market design processes, driven by the traditional principles of market reform (unbundling, access and competition) and modified by specific objectives of energy and other policies'.

Originally, this framework was developed to illustrate the position of New Institutional Economics (NIE) among different levels of social analysis. Broadly spoken, NIE, which is primarily based on TCE, concentrates on levels 2 and 3. TCE is concerned with the third level, while the neoclassical perspective can be found at level 4. As indicated, this study is interested in whether the neoclassical perspective still suffices in the changed circumstances or whether the TCE provides a superior perspective for the regulation of the European gas market. This study's main research question can be specified as follows:

Is existing gas regulation able to secure the PSOs given the new context it must operate in?

To answer this question, the following subquestions are specified.

1 How has the international gas market changed and what are the consequences for gas regulation?
2 What are the theoretical underpinnings of current regulation and what does it try to achieve?
3 What kind of doubts arise concerning the appropriateness of this regulatory scheme in light of the criteria that are pivotal in the new regulatory context – investment irreversibility, risks and uncertainty?
4 What does the TCE perspective look like, and is it better suited to the properties of the new context for gas regulation?
5 Which criteria for assessing existing regulation follow from this perspective?
6 Where does existing regulation go wrong under the new circumstances?
7 Which amendments are required to the provisions of the current Gas Directives?

The first piece of information required concerns the changes in the international gas scene. Therefore, in order to answer the first subquestion, chapter two provides an overview of seven market shifts that in conjunction are creating a new context for gas regulation. From these shifts, the following criteria are derived which are elementary in a regulatory regime that satisfies the policy objectives in this context: investment irreversibility, risks and uncertainty. These criteria imply that in the new context, the purpose of a regulatory regime is to create a governance structure that properly facilitates investments. This new context is compared to the context in which existing regulation has been instigated. This indicates that the context for gas regulation has fundamentally changed. For example, due to the market maturity as a consequence of the managed market (see sections 1.2 and 1.3), there was in the traditional structure much less need to stimulate new investments.

The theoretical underpinnings of gas regulation determine whether the existing regulation is able to adjust to the new context. This is the second subquestion, which is answered in chapters three and four. This study argues that existing gas regulation is based on neoclassical guiding principles. This is shown by firstly setting out the neoclassical perspective on economics and its implications for gas regulation. To this end, chapter three discusses the main assumptions of the neoclassical approach, its view on competition, its view on regulatory intervention and finally its policy prescriptions for restructuring the European gas market. Chapter four sets out the process and contents of current gas legislation, emphasizing the Gas Directives. It provides an overview of the legislative measures that have so far been proposed to induce the structural and regulatory reforms necessary to liberalize the Euro-

pean gas market, and compares these to the neoclassical recommendations. It shows that current gas regulation is firmly embedded in the neoclassical perspective. Chapter four furthermore provides an overview of practical initiatives that emanate from gas regulation. These initiatives are also shown to follow the neoclassical perspective.

Chapter four's conclusion that current gas regulation is firmly embedded in the neoclassical perspective towards economics and regulation answers the second subquestion. Once this conclusion is combined with the neoclassical prescriptions in chapter three and the market shifts in chapter two, doubts arise concerning the applicability of the neoclassical view to the issues that arise in the new context. None of the criteria identified in chapter two – investment irreversibility, risks and uncertainty – are explicitly recognized or analyzed by neoclassical economics. This answers the third subquestion. The next step is to look for a theoretical perspective that is better aligned with the new context. An obvious candidate is transaction cost economics (TCE), because it has been developed specifically to deal with issues such as irreversible investments and uncertainty. Chapter five answers the fourth and fifth subquestions by discussing TCE's analytical framework and specifying the set of criteria for a proper regulatory regime according to the TCE perspective.

Having set out the two contrasting economic perspectives, both perspectives are then combined into an encompassing theoretical framework. The goal is to specify when to use which perspective. The final step in the theoretical critique is to apply this framework to the European gas market in order to determine whether the conditions of the European gas market in its new context justify the TCE perspective. To that end, the transactional characteristics of the European gas market in its new context are identified. Subsequently, we consider whether these transactional characteristics satisfy all TCE criteria. The upshot is that these criteria are satisfied by the European gas market in its new context and that the TCE perspective will therefore result in more desirable market behavior than the neoclassical perspective.

In order to answer subquestions six and seven, the theoretical critique must be substantiated by empirical observations on the actual behavior of market players. The effect of regulation on market behavior, and by extension on investments and securing the PSOs, is an empirical issue. The TCE perspective is superior in actual practice to the neoclassical perspective only if it can be shown to better explain and predict actual regulatory behavior. In this light it is important to observe that several amendments have been made to European gas regulation that appear to follow the TCE line of reasoning. Two notable examples are the possibility to exempt certain investments from the obligation to provide third party access, and the enlarged scope for concluding downstream long-term gas supply contracts. This study conducts two case studies to analyze both amendments. Consequently, the remaining two subquestions are answered by the two case studies in chapters six and seven. Chapter six analyzes the exemptions from the third party access provisions;

chapter seven examines downstream long-term supply contracts. The goal of both case studies is to assess whether the theoretical critique holds in practice. This is done by describing the regulatory process in order to trace the kind of changes to regulation that have been implemented, why these changes were made and which arguments were voiced by the relevant stakeholders. Based on this description, it can be determined to what extent current regulation has implemented provisions that deviate from the neoclassical perspective, and whether this perspective is able to explain the amendments. An important observation in both case studies is that the implemented amendments can only be explained from the TCE perspective. Consequently, the TCE perspective indeed explains actual regulatory behavior better. The final issue is to infer whether the implemented changes sufficiently incorporate the TCE perspective. This is assessed by tracing whether these changes incorporate all TCE criteria. It turns out that the implemented changes offer significant adaptations to the neoclassical paradigm but nevertheless insufficiently incorporate the TCE perspective. Current regulation appears to be stuck between both perspectives. Chapter eight summarizes and concludes this study.

Finally, this study analyzes the identified issues from an economic perspective. Consequently, current European gas regulation and legislation is being assessed on economic criteria. Some chapters, especially chapters four and seven, have a strong legal component. However, the emphasis in these chapters is not on the legal aspects, but instead on the economic issues at stake. One consequence of this approach is that in discussing the legislation, no attempt is made to provide a comprehensive overview of all legal provisions. Rather, a selected number of provisions are concisely discussed in order to set the scene for this study's economic analysis.

2 Market shifts

2.1 Introduction

An important element in this study is the changed landscape on the international gas market which has developed recently. This chapter sets out the environment the European gas market and its regulation have to operate in. This new environment results from a number of market shifts (cf. Helm, 2007a). This chapter discusses these shifts and traces their consequences for gas regulation.

The shifts in question create a gas market that is fundamentally different from the one from which existing gas regulation originates. This begs the question whether gas regulation can adapt in order to also secure the energy policy goals in the new context in which gas regulation operates. Sections 2 to 8 below discuss the shifts which are impacting both the supply side and the demand side, starting with the supply side. Section 2.9 traces the implications of these shifts for regulation. It is argued that the context for regulation has changed from one that emphasizes asset sweating and where supply security is not a main issue, into one in which the focus lies on investments, risks, uncertainties and governance. These are the criteria that regulation must take into account order to adequately reach the energy policy objectives in the changed world. Section 2.10 concludes.

2.2 External dependence and long-term vulnerability

An important development in the European gas market is the rapid growth of European gas demand during the last decade, combined with decreasing gas production (cf. CIEP, 2006, p. 6). The resulting growing dependence of Europe on foreign gas imports is increasingly creating anxieties. Table 2.1 provides statistics that depict Europe's external dependence in 2006.

Table 2.1: Europe and its gas suppliers, 2006

	Russia	Iran	Qatar	Nigeria	Algeria	Norway	EU-25	Rest world
Proven reserves								
- percent world[a]	26.3	15.5	14.0	2.9	2.5	1.6	1.3	35.9
- bcm	47650	28130	25360	5210	4500	2890	2430	
Production								
- percent world[a]	21.3	3.7	1.7	1.0	2.9	3.0	6.6	59.2
- bcm	612.1	105.0	49.5	28.2	84.5	87.6	190.0	
R/P	77.8	>100	>100	>100	53.3	33.0	12.8	
Consumption								
- percent world[a]	15.1	3.7	0.7	Na	0.8	0.2	16.3	63.2
- bcm	432.1	105.1	19.5	Na	23.7	4.4	467.4	

Source: Own calculations from BP (2007).
a) percent world: percentage of world total.

The table shows that EU-25 consumption outweighs production and proven reserves – reserves which are shown by geological and engineering data to be recoverable with reasonable certainty in future years from known reservoirs under existing economic and operating (BP, 2007, p. 22) – are low. Europe is quite import-dependent, with some eastern Member States completely dependent on Russian supplies. Long-term projections aggravate the anxieties. According to CEC (2007i, p. 13), without policy changes, EU gas import dependence will rise from 51 percent in 2000 to 81 percent in 2030. Projections of the International Energy Agency (IEA, 2007, p. 85-88) confirm the picture of rising import dependence. According to IEA's reference scenario, between 2000 and 2030 OECD Europe's[1] gas demand will rise from 477 to 771 bcm. Maturing European gas fields cause gas production to level off and then decline. IEA projects OECD Europe's gas production to fall from 304 bcm in 2000 to 251 bcm in 2030. The gap between consumption and production, which is expected

1 OECD Europe comprises all European Member States of the OECD, i.e. Austria, Albania, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, The Former Yugoslav Republic of Macedonia, Moldova, Netherlands, Norway, Poland, Portugal, Romania, Serbia and Montenegro, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine and United Kingdom.

to rise from 173 bcm in 2000 to 520 bcm in 2030, must be filled by imports (consequently, imports will make up 67 percent of gas demand in 2030).

The reserves to production (R/P) ratio shows how many years current proven reserves will last with current production levels. If current production remains unchanged, all currently proven EU reserves will be depleted in 12.8 years. Some producers have abundant reserves, as indicated by the R/P ratios in the table. Globally, the reserve picture is quite positive (BP, 2007, p. 26): existing world proven reserves are sufficient to satisfy global gas demand for approximately another 65 years. Hence, the global amount of reserves does not yet pose a real threat. This is even more so because of the consensus that the undiscovered, potential reserves are very large.[2] The location of reserves may create some anxieties, however. Most of the proven – and also undiscovered – reserves are located outside Europe (BP, 2007, p. 26). For instance, the Middle East possess by far the largest R/P ratio of over 200 years, quadrupling that of Europe and Eurasia combined, which is just over 50 years. Therefore, Europe will increasingly have to rely on imported gas supplies, the geographical spread of which may put Europe in a vulnerable position. Moreover, these anxieties are exacerbated by political risk and ownership concerns. Regarding the former, Röller et al. (2007, p. 7) argue that around 70 percent of global reserves are located in medium and high risk areas. They also argue that Russian gas should be considered as a (much) higher political risk than indigenous volumes. Hence, Europe's increasing import dependence will increase (political) security of supply risks.

Constantini et al. (2007) provide an overview of a number of long-term scenarios regarding Europe's vulnerability – the EU World Energy and Technology Outlook (WETO); the IEA World Energy Outlook 2002; the US Department of Energy's (EIA-DOE) outlook and the International Institute for Applied Systems Analysis (IIASA) with the World Energy Council (WEC) outlook. Table 2.2 reproduces these projections.

2 This is confirmed by Adelman and Lynch (2002), who argue that in the very long-term supply fears due to geological constraints are overstated.

Table 2.2: European gas dependence and vulnerability

	2000 (basis)	2030 WETO	2030 IEA	2025 EIA	2030 IIASA A1
PHYSICAL DIMENSION					
Dependence					
- Net import percent of TPES	34.0	67.0	70.0	60.0	50.0
- Share of EU imports on world Imports	33.0	35.0	60.0		67.0
Vulnerability supply side					
- Supply concentration (trade)	0.12	0.32	0.40	Na	Na
- Supply concentration (production)	0.12	0.23	0.20	Na	0.19
- Shannon-Wiener index	0.99	0.67	1.02		
Vulnerability demand side					
- Share of electricity produced With gas	16.0	24.0	39.0	-	-
- Gas use per capita (toe/ab)	0.64	1.15	1.37	1.73	1.25
ECONOMIC DIMENSION					
Dependence: value of gas imports (billion $)	23.3	-	85.5 ($2000)	-	-
Vulnerability supply side: gas consumption per $ of GDP (toe/mil 1995$PPP)	0.03	0.03	0.04	0.04	0.04

Source: Constantini et al. (2007, p. 219).

Although the outcomes diverge widely, the general picture is quite clear. European net imports will increase – both as a share of total primary energy supply (TPES) and as a share of global imports. If the share of European imports in global imports was to rise to around two-thirds as suggested by the IIASA scenario, a possibly powerful position as the main global gas importer could counteract some of the import dependence anxieties (provided Europe will be able to speak with one voice). Regarding supply side vulnerability, all scenarios confirm that supply concentration, measured by the Hirschmann-Herfindahl Index,[3] will increase strongly in both trade and production. The Shannon-Weiner diversity index provides an indicator of supply diversity:[4]

3 A value of 0 indicates low concentration; 1 indicates a monopoly.

4 See Von Hirschhausen (2005). The formulaic expression is: [- Σxi ln xi bi](1+ gi), whereby ln xi is the natural logarithm of the market share of supplying country i; bi is an index of political stability in producing country i; and gi represents the share of indigenous energy production. As opposed to HHI, this diversity measure places weight on smaller participants and its value ranges from 0 (low diversity) to 2 (high diversity).

the higher this index, the higher the level of diversification and consequently the lower is vulnerability. The WETO is quite negative concerning the scope for diversification. IEA, on the other hand, envisages some – albeit very little – room for supply diversification (through for instance new import routes). The demand side vulnerability indicators affirm a higher vulnerability. According to the table, gas use in electricity generation will increase sharply (see section 2.8), while per capita gas use will rise too. These figures indicate a higher future gas intensity. This translates directly into the economic dependence figures which show that the value of gas imports will rise. This is caused by higher import volumes, but higher gas prices play an important part too. In money terms, as opposed to per capita terms, gas consumption is projected to remain stable during the coming decades. To sum up, table 2.2 illustrates a consensus that Europe's gas supply vulnerability will increase.

2.3 PRODUCER BEHAVIOR

Given the forecasts above, producer behavior becomes a vital parameter for European energy policy. The original expectation in Europe was that the producing countries would gradually embrace Europe's liberalization approach. That is, producers were expected to welcome foreign direct investments into their energy sectors, grant access to their reserves and to privatize their energy incumbents.

2.3.1 Access to reserves and state ownership

Current developments indicate a changing balance between the international oil majors (IOCs) and the national oil companies (NOCs) of the producing countries. These changing dynamics have urged the Financial Times (2007a) to speak of the 'new seven sisters'. The traditional seven sisters – the seven biggest IOCs, reduced to ExxonMobil, Shell, Chevron and BP after consolidation – currently produce around 10 percent of global oil and gas and hold about 3 percent of global reserves (Worldbank, 2008, p. 3). The new seven sisters comprises seven NOCs – Saudi Aramco, Gazprom, China National Petroleum Corporation, National Iranian Oil Company, Petróleos de Venezuela, Brazil's Petrobras and Malaysia's Petronas – who collectively control about one-third of global oil and gas production and over one-third of global oil and gas reserves. Each of these new seven sisters is to a large extent owned or controlled by its respective government, creating apprehensions of energy being deployed as a strategic asset or even weapon to further political, non-energy goals to the detriment of European consumers.

Zanoyan (2004, p. 3) narrows the scope to gas. He argues that IOCs have full equity access – which allows them to book reserves to replace their de-

pleting reserve stocks in order to uphold or increase their market value – to around 10 percent of global gas reserves. These are reserves in countries where the governments themselves are not involved in the exploitation. The remaining 90 percent of the global gas reserves are found in countries where governments are actively involved through an NOC. A small part of these reserves, 8 percent of global reserves, are open to IOCs. Both Russia's 31 percent share of the global reserve base and the remaining 51 percent in other countries are accessible, in a limited manner, through service contracts rather than equity contracts.

Production sharing agreements provide an example of such service contracts (Bindemann, 1999). Under a production sharing agreement, the state, through the NOC, allows an IOC as a contracter to provide technical, financial and management services, in exchange for a share of the receipts.[5] However, the reserves remain the property of the state. In economic terminology, this is a principal-agent problem with the resource rent at stake. The principal – the producer government, represented by the NOC – needs to design an incentive contract that induces the agent – the IOCs – to behave in a manner that maximizes the principle's welfare (Pongsiri, 2004).

Views on the prospect for cooperation between IOCs and NOCs differ. On the one hand, Al-Moneef (2006) downsizes the concerns by arguing that energy security is a shared concern of both producer and consumer nations and that there is scope for fruitful cooperation between both. This is corroborated by Zanoyan (2004, p. 11) who argues that cooperation between IOCs and governments/NOCs is not a zero sum game. There is ample room for mutually beneficial cooperation because their activities are generally complementary rather than competitive: producing nations have the subsoil resources the IOCs are looking for, while the IOCs have the skills producers generally lack to optimally exploit the resources. From this perspective, partnerships between NOCs and IOCs should result in adequate and timely investments which mitigate concerns on both sides.

This positive view is not universally shared, however. Marcel (2006) provides some insights.[6] As indicated, the needs of IOCs and NOCs differ. IOCs generally want 1) access to reserves to increase their market value, 2) acceptable rates of return, 3) mechanisms for enhanced recovery and 4) opportunities for additional future investments. NOCs, on the other hand, are in need of 1) capital, 2) management skills and 3) technology to develop their resources. In addition, NOCs are often bound by their governments to pursue additional considerations such as maintaining sovereign control over their resources, optimize resource development and improve domestic prosperity. These

5 This is the basic mechanism. In practice, bilaterally negotiated production sharing agreements will differ from one another.

6 Marcel considers the case of oil. Nevertheless, the basics of the IOC/NOC relationship are also applicable to gas.

differences create tensions between the players which hamper cooperation.[7] For example, optimizing resource development is a long-term planning decision which may in the short-run require below-capacity production. Furthermore, a government's responsibility for its citizens may urge it to subsidize domestic gas prices, as happens in Russia.[8] This increases domestic gas demand at the expense of export volumes. These goals contrast with those of IOCs, who typically have incentives to develop an existing resource base as fast as possible – for economic reasons, but also to expose themselves to political risks for as short a period as possible. According to Marcel (2006, p. 6), another problem, in addition to differing objectives, relates to the blurring distinction between NOCs and IOCs. She provides two examples. First, the strategy of many NOCs has changed. The internationalization strategies pursued by for instance Algeria's Sonatrach and Malaysia's Petronas imply that these NOCs are increasingly engaging on IOC territory. Second, public ownership of NOCs becomes less clear following for example the partial privatizations of Norway's Statoil (merged into StatoilHydro in December 2006) and Brazil's Petrobras.

The outcome of the relationship between an IOC and an NOC, and the corresponding distribution of rents, depends on both players' relative negotiating positions. This is a function of, amongst others, the principal's possession of the resources and the agent's technical expertise for developing these resources. If one expects a high need of NOCs for capital or technical expertise, then the producers are expected to be relatively favorable to IOCs entering their markets, large investments can be made and consequently large amounts of reserves can be developed and traded. At the time of the inception of liberalization, the low oil and gas prices, added to the fact that NOCs had little technical expertise, an uneducated workforce and in some cases (Saudi Arabia and Abu Dhabi) management support from the IOCs (cf. Marcel, 2006, p. 4) created a favorable bargaining position for the IOCs. In such a situation we can expect access to reserves being provided relatively easily and on relatively favorable terms. On the other hand, if this need is limited because NOCs have developed their own expertise and management skills or have the funds available to hire these elsewhere, the balance shifts to the NOCs as a result of which IOC access to reserves is hampered. Consequently, as Marcel argues, this maturation of the NOCs results in the conclusion of new production sharing agreements without equity access provisions and renegotiation of existing agreements. In addition, the typically more conservative exploitation

7 Matters are furthermore complicated by differing objectives between a producer government and its own NOC (Zanoyan, 2004, p. 8). Where NOCs are conservative and try to maximize the resource base and retain control over resources, national governments may have stronger preferences towards short-term revenue generation (Marcel, 2006, p. 4). Hence, an NOC will typically implement a more conservative depletion policy than an IOC or producer government. We do not explicitly consider this complication in the remainder of this study.

8 See Stern (2005) and Spanjer (2007a).

strategy of an NOC will result in lower availability of gas supplies on the market which may increase importer fears of a supply disruption.

As indicated above, most NOCs are controlled by their governments. We close this section by narrowing the scope to the European gas market in particular. Table 2.3 shows that in 2004, European gas production accounted for a mere 37 percent of demand, the rest being provided by government-dominated exporters.

Table 2.3: State ownership of main gas exporters to Europe, 2004

	% of demand	Main exporting company (NOC)	Status	State ownership %
Norway	17	Statoil	Monopoly	70
Russia	29	Gazprom	Monopoly	51
Algeria	13	Sonatrach	Monopoly	100
Nigeria	1	BBOC	Monopoly	100
Qatar	1	Qatargas	Monopoly	65
EU production	37			

Source: Röller et al. (2007, p. 7).

Gazprom stands out it this regard: it supplies 29 percent of European gas demand. As indicated, Russia holds 31 percent of global gas reserves. Gazprom is controlled by the Russian government, as indicated by its 51 percent share. In addition, according to Helm (2007b, p. 24-26), Russia is currently renationalizing its gas reserves as well as renegotiating existing PSAs, with the Sakhalin-2 project as a notable example (p. 25).[9]

This situation, in combination with producers' growing assertiveness on back of their rising energy incomes, creates concerns in Europe.[10] In sum, the combination of lower access to reserves and increasing state ownership which is changing the balance of power between NOCs and IOCs, signifies a fundamental shift – a shift which European gas regulation has to reckon with.

2.3.2 Producer cooperation

The above fears are exacerbated by anxieties concerning producer collusion. This explains why the Gas Exporting Countries Forum (GECF), established in 2001, causes some concern for the importing countries. GECF is an informally

9 See Stern (2005, p. 145-152) for background information regarding the Sakhalin projects.
10 See, for instance, De Kort and Spanjer (forthcoming) for an analysis of these concerns in light of the relationship between Europe and Russia.

structured group of the world's leading gas producers which is aimed at representing and promoting their mutual interests.[11] Collectively, GECF currently controls around 74 percent of global proven reserves, contributes to 45 percent of production and takes care of 91 percent of LNG trade.[12] Due to this collective strength, some importers fear that GECF may evolve into a gas-OPEC or Gaspec. GECF denies this and has posited, in September 2001, that its intention is merely to enhance 'the role of stable and transparent energy markets for the health of the world economy, security of supply and demand, and expansion of the global trade in energy sources' (Global Gas Reporting, 2003). Anxieties have flared up again following a recent GECF meeting (April 2007) where a number of members – predominantly Venezuela and Iran – explicitly expressed interest in creating a Gaspec. Producers' views on a Gaspec are more diverse this time: Russia, Egypt and Qatar, as opposed to Venezuela and Iran, expressly denied intentions of creating a Gaspec, stressing that the GECF's main impetus is and will be to cooperate with consumers in a transparent manner.

With the promoting of mutual interests as one of its explicit goals, GECF to a certain extent brings suspicion upon itself, because preventing oversupply and low gas prices clearly is a mutual interest of gas producers. Microeconomic theory tells us that the socially optimal gas supply will always be considered to be oversupply by a profit maximizing producer with market power. However, two main impediments to the creation of a gas cartel similar to OPEC are the regional nature of gas and the higher price elasticity of power generator gas demand as compared to oil. First, gas is traded chiefly through bilateral long-term contracts and is transported through regional pipelines, which makes it virtually impossible for Gaspec to influence the price level in the way OPEC can. Second, the effect of gas price increases will probably be smaller, because unlike in the case of oil, where the transport sector's oil demand is very inelastic due to a lack of substitution possibilities, there are substitution possibilities for dual-fired electricity generators.[13]

Academic views on the likelihood of a Gaspec differ. According to Odell (2003), the emphasis of EU liberalization on creating a competitive gas supply system exposes producers to uncertainty concerning their upstream investments, which provides them with an incentive to collude in response to EU

11 Membership has fluctuated, but members include Algeria, Bolivia, Brunei, Egypt, Equatorial Guinea, Indonesia, Iran, Libya, Malaysia, Nigeria, Oman, Qatar, Russia, Trinidad & Tobago, the United Arab Emirates and Venezuela. Turkmenistan has been involved in the past, and Norway participates as an observer.

12 Calculated from BP (2007).

13 There is, however, some uncertainty on the viability of these substitution possibilities. This is because switching to oil becomes increasingly unattractive due to climate change considerations, nuclear energy is still suffering from a lack of political acceptability and sustainable alternatives are still too expensive. Hence, most new power generation facilities are built for gas firing.

liberalization. Wagbara (2007) conducts a comparative study of the prospects and constraints regarding the development of Gaspec in light of OPEC's experience. He argues that the potential for cooperation among the gas-rich countries is great. Nevertheless, he identifies a number a significant constraints (ibid., p. 1229-1231) of which we mention three. One important constraint is the lack of spare capacity required to control the market in the way OPEC does. Second, he observes that the gas markets of the GECF members are at different stages of development, with consequently differing gas policies. Different gas policies in turn impede fruitful cooperation. Third, a general lack of information and transparency makes it difficult to coordinate actions and to detect cheating, which lowers the effectiveness of a cartel. Hallouche (2006, p. 52) submits that the buyers' market motivated producers to cooperate and set up Gaspec. In the current sellers' market with high prices and tight supplies, however, the need for collusion among producers is not very great. If market conditions were to change again, GECF may however become more proactive in regulating long-term oversupply (ibid., p. 54).

Regarding the scope for producers to prevent oversupply, the following is instructive. If producers were to succeed at this task, an oversupplied European gas market would be a relic of the past and consequently the currently developing seller's market will be here to stay. This rather grim outlook is not universally shared. Kjärstad and Johnsson (2007) argue that the combined 2010 export projections of the three main suppliers to Europe – Russia, Algeria and Norway – sum up to around 315 bcm, which comes close to the projected EU import needs of approximately 340 bcm. Contracts with alternative suppliers are expected to deliver around 81 bcm and hence more than make up for the difference, possibly creating another gas bubble. The likelihood of these planned projects materializing depends on at least two vital conditions: the incentives for and scope of cooperation among gas producers (as indicated above), and the investments needed for supplying Europe actually materializing (see section 2.9). A main theme in this study is that neither is guaranteed beforehand.

These studies on Gaspec imply that the incentives for collusion among gas-rich countries do exist. However, for the time being, the practical constraints to such collusion developing into a cartel are substantial, which renders the fears of a Gaspec exaggerated. However, a certain degree of production coordination should not be ruled out. In conclusion, the changing position and behavior of gas-producing countries constitutes a structural break with the past in several respects – a break European gas regulation will have to reckon with.

2.4 MORE LONG-DISTANCE SUPPLY

As indicated, due to Europe's dwindling domestic production, future gas supplies will increasingly come from countries outside Europe, hereby traveling long distances. Transport costs and in turn supply costs will rise. Also, gas transport is very capital-intensive which results in a large share of fixed costs within total costs. The larger the transport distance, the longer and bigger pipelines need to be. This increases the share of fixed costs, which urges producers to reduce spare capacity and utilize a pipeline to its maximum in order to spread their fixed costs over as large a volume of gas as possible. The result is a low level of over-capacity and a limited ability to offer flexible off-takes. Flexibility is important to the receivers of the gas, the EU transmission companies, who supply their gas to the local distribution companies (LDCs) and large industrial consumers. In addition, flexibility is vital to LDCs because their small consumers are much less able to adapt their gas consumption than the large users to whom the transmission companies deliver their gas. Without flexibility it will be very hard, if at all possible, to satisfy the capricious gas demand. In addition to unsatisfied consumers, this situation could also result in high imbalance fines. Since the producers cannot be expected to provide such flexibility, the transmission companies and/or LDCs need to create flexibility themselves, which will increase the demand for flexibility in Europe. This may result in the building of seasonal gas storages. Up to 2025, a projected 45 to 60 bcm of seasonal storage working volume will be needed, requiring substantial additional investments (CIEP, 2005).

Another important effect of gas traveling larger distances is that it stimulates the development of liquefied natural gas (LNG).[14] As gas delivered by pipeline becomes more expensive, the attractiveness of LNG as an alternative to pipelined gas increases. Jensen (2004, p. 7) provides estimates of the costs of LNG versus pipelines. He shows that LNG becomes more competitive with distance, and after about 3000 miles, an LNG train is the cheapest option available. LNG's attractiveness is furthermore increasing because of 1) its lower transit risks compared to pipeline gas supply, which usually transits several countries before reaching its final destination, 2) the emphasis on diversifying gas supplies and 3) the large reduction in LNG costs. LNG may partly offset the above dependency concerns by increasing flexibility and enabling consumers to diversify suppliers. LNG is much more flexible than pipelined gas, which is mostly dedicated. On the other hand, LNG's flexibility also benefits producers as it facilitates diversification of consumers.

In theory, LNG can be delivered by ship to any receiving terminal with sufficient capacity. In future, price developments could determine where an

14 See Jensen (2003, 2004) and CIEP (2003).

LNG ship delivers its cargo.[15] For this reason LNG is regarded as an important vehicle to increase competition and integration between consumer centers such as Europe, the United States and Asia. However, LNG's flexibility is determined in part by the degree of long-term contracts in the LNG chain. As with pipelines, long-term contracts have been the main vehicle to share risks along the value chain. The large up-front investments involved in an LNG project render a degree of long-term contracting necessary. Therefore, it is likely that long-term contracts will remain the mainstay of the LNG business (Jensen, 2004, p. 1 and Energy Charter Secretariat, 2007, p. 205). Nevertheless, despite these limitations, one effect of LNG has been to make gas trade less regionally oriented.

2.5 Increasing transit flows

LNG trade will grow, but is not expected to surpass pipeline trade. Pipelines will remain the mainstay of the European gas industry, which means that increasing imports will increase transit. Russia is the most prominent example: more Russian pipelines will, given Russia's existing pipeline system, result in more transit through Ukraine and Byelorussia. Transit could and does lead to disputes between Russia and these transit countries, which threatens Europe's gas deliveries.[16] Transit problems are not only harmful to Europe; Russia also wants to avoid transit problems as much as possible. An interruption in Russian gas supply could have detrimental consequences for Russia's reputation as a secure gas supplier and would result in lower Russian gas profits since Europe is a premium[17] market for Russian gas. In the long-run, transit problems might urge Europe to increasingly undertake measures to move away from Russian gas (through for instance supply diversification or energy efficiency measures). The significance of transit to Russia is illustrated by the Blue Stream, Nord Stream and South Stream pipelines, which are to a large extent built to avoid transit.

2.6 Delinking and relinking

Structural shifts have also occurred on the demand side. We discuss three important demand shifts below. The two oil crises of the 1970s have facilitated

15 Obviously, there can and will be bottlenecks at sea too, such as the Suez Canal or the Strait of Malacca. Therefore, arbitrage opportunities will not only be influenced by transport costs, but also by the ability to reach a certain port with favorable conditions.

16 There have been a few transit incidents, for example between Russia and Byelorussia (Bruce, 2005) and Russia and the Ukraine (Stern, 2006a).

17 Russian gas is currently sold to Europe at much higher prices than to Russian or FSU (former Soviet Union) consumers, cf. Stern (2005) and Spanjer (2007a).

a delinking of economic growth from energy use (CEC, 2005c, p. 47). Prior to the crises, energy demand growth was linked to GDP growth, meaning that GDP growth determined the projections for investments in new infrastructure. The crises prompted European economies to rethink their energy policies. One spearhead became to lower energy intensity. As an illustration, German energy intensity has declined by 30 percent since the 1970s, while the French managed a 40 percent reduction (ibid., p. 12). For Europe as a whole, energy intensity has decreased by an average of 1.6 percent per year until 2002 (ibid., p. 47). The economic downturn which followed the crises facilitated economic restructuring. As a result, economic activity shifted away from the relatively unattractive energy-intensive industries towards less energy-intensive service sectors like finance (as well as to Asia and Japan). Furthermore, rising energy prices lowered energy demand which enhanced energy efficiency. Due to these factors, energy demand grows around 1 percent per year which is much lower than GDP growth of approximately 2.4 percent per year (ibid., p. 47). Hence, these shifts have lowered, but not obviated, European energy demand growth. This is confirmed by IEA demand projections which over the last few years show a decline in the still rising trend (Honoré and Stern, 2007, p. 226).

Global gas demand growth, on the other hand, has not been delinked from GDP growth. Rather, several countries see their economic growth, and their energy use on back of it, rise to unprecedented heights. Prime examples are found in Asia – especially China, India and Indonesia – and Africa, but also Latin America and the Middle-East. These countries are reaching an industrialization phase in which mobility is taking off, resulting in a sharply rising energy demand. Hence, global energy demand growth has become relinked to GDP growth, i.e., the global ratio of energy growth to GDP growth is increasing (Shell, 2005, p. 28).

The global picture is one of growing energy demand – predominantly in Asia and Africa, but also in Europe. For Europe, the upshot of this is a shift towards increased competition for imports since Middle-Eastern, Caspian and Russian gas supplies are within economic reach of all importing regions. The expected rise of LNG makes gas trade more flexible and expands the range of gas deliveries also to the US, further increasing competition among consumers. The overall increase in demand, as well as the competition that might develop between regions, may increase the commodity price of gas and aggravate supply security fears.

2.7 Growing awareness of climate change

The awareness of climate change is growing primarily because global economic growth exhibits increasing carbon intensity. Whereas up to 1997 carbon intensity in GDP was clearly declining, as a consequence of for example the declining importance of the coal industry and improvement in energy effi-

ciency, this trend has since reversed (Helm, 2007a, p. 14). The industrializing countries above are expected to achieve the highest growth rates. Their industrialization not only creates an explosive growth in energy demand, but also in carbon emissions, which reinforces the awareness of emissions that has developed due to the greenhouse effect. As indicated in section 1.5.3, atmospheric CO_2 concentrations have risen from pre-industrial levels of 270 parts per million to a current 350 ppm, while extrapolating the current trend puts CO_2 concentrations in the realm of 750 ppm at the end of this century compared to the safety threshold which is estimated at around 450 ppm (Helm, 2005b).

These developments have rendered the mitigation of such hazards a vital parameter for energy policy. In the words of Sioshansi (2005), climate change has evolved from an academic issue into a public policy challenge and has become a significant risk factor for the business community, especially the energy-intensive industries. Accordingly, the growing importance of sustainability is a structural shift which induces energy policy to be concerned not only with the volume of supplies but to an increasing extent also with their content.

2.8 A SHIFT IN DEMAND TOWARDS POWER GENERATION

Power generation gas demand has occupied Europe for over thirty years (Söderholm, 1998). As indicated in section 1.3, the managed market resulted in a restrictive use of gas for power generation. During the 1990s, however, natural gas became the fuel of choice for power generation, predominantly at the expense of coal. Since then power generation gas demand has increased substantially, and this trend is expected to continue in the coming years. Table 2.2 shows the increasing share of electricity produced with gas. Power generation accounts for an increasing share of gas demand, changing the composition of gas demand. Honoré and Stern (2007, p. 227) argue that approximately 70 percent of the total demand increase until 2030 is currently expected to be attributable to power generation. They identify three reasons for this dash for gas: 1) the economics and efficiency – due to lower capital costs, lower construction lead times and higher economies of scale – of new combined cycle gas turbine (CCGT) power plants, 2) the low emissions of gas and 3) the adaptability, flexibility and availability of gas in an open power sector. Opinions differ, however. For instance, De Jong (2004, p. 94, 96) mentions that these growth figures tend to overlook 1) the opaqueness of the gas market which makes the use of more transparent options, for example oil, more attractive and 2) the complexity inherent in developing a gas supply chain which could divert choice away from gas.

In addition, the soaring oil and gas prices are creating substantial uncertainties concerning the future of gas demand from power generators. High

gas prices slow down gas demand. Coal and nuclear power may become more attractive fuels of choice for power generators. Consequently, the development of new CCGT plants may be delayed or existing ones may run at low load factors (Honoré, 2006, p. 14).[18] Honoré illustrates possible effects on gas demand. She assumes the load factor of power plants that run baseload at 75 percent (ibid., p. 25, 26).[19] If, in contrast, power plants run at peak load, with an assumed load factor of 20 percent, EU 25 power generation gas demand would be slashed by 60 bcm by 2015 (ibid., p. 14).[20] According to Stern and Honoré (2007, p. 229), gas-fired power plants will not run baseload in either Northwest or East Europe – only the UK, Spain and Italy have the possibility for baseload gas-fired power generation at current prices. Both studies conclude that while EU-25 power generation gas demand will definitely increase, the current projections will only materialize at substantially lower prices than the current ones. The growth will furthermore be confined predominantly to the UK, Spain and Italy. Gas supply security anxieties create additional uncertainties. As long as gas import dependence and supply security remain political threats (whether justified or not), incentives will be strong to base power generation on domestically available supplies like coal, nuclear power, lignite or hydro.

Therefore, in sum, we can say that an increasing share of gas-fired power generation will change the composition of gas demand. However, current projections appear to be overly optimistic and the precise effect of this market shift on gas demand is still quite uncertain and unclear.

2.9 A NEW CONTEXT FOR GAS REGULATION

As set out in the introduction, the shifts on the international gas market can be divided into four main categories:

- A shift in international relations between producers and consumers – the emergence of a seller's market as opposed to a buyer's market;
- An increasing influence of politics on energy relations;
- A shift in energy policy objectives with security of supply having become the top priority, while climate change has also climbed up the ladder;
- An increasing need for investments along the entire value chain. Total EU-27 investment requirements amount to roughly 1,800 billion Euro of which

18 A load factor is the ratio of actual production to maximum production capacity.

19 A power plant runs baseload if it serves the minimum amount of power that a utility or distribution company must make available to its consumers, or the amount of power required to meet minimum demands based on reasonable expectations of consumer requirements.

20 A peak load power plant only runs in case of very high (peak) demand. It serves the maximum power requirement of a system at a given time, or the amount of power required to supply consumers at times when need is greatest.

around 12 percent – 216 billion Euro – is required for gas (CEC, 2007a, p. 17). In addition, the energy policy objectives are essentially also an investment problem (see section 1.5).

These shifts create a new context for European gas regulation. The issue boils down to stimulating investments on a seller's market where political considerations are gaining importance. The two sections below elaborate on the consequences of these market shifts compared to the context from which current regulation emanates. This discussion allows us to specify the criteria which a regulatory policy must satisfy in this new context.

2.9.1 Investment characteristics

Investments in gas markets are required along the entire value chain, comprising exploration and production, transmission, distribution and ancillary services. Investments in exploration, production and transmission including LNG are predominantly irreversible (sunk). Examples are costs for project identification, investment planning and construction, which imply that the economic viability of a project is not guaranteed beforehand (Hubert, 2007, p. 63). In addition, transmission and distribution are considered a natural monopoly due to economies of scale and scope. Other segments exhibit scale and scope economies too. In descending order we have gas storage and blending (i.e., quality conversion); exploration and production; and gas trading.

Many future investments will relate to the production and transport of gas. The irreversibility creates the largest risks. For instance, once laid, a gas pipeline has very limited, if any, alternative use. This creates a quasi-rent, which is the difference between an investment's pay-off in its current use and its highest alternative use. Furthermore, the decision to build a pipeline is usually based on negotiations between a specific consumer and a specific producer. This locks both parties into a bilateral dependency which changes through time and which affects the appropriation of the quasi-rent. Prior to the investment, the producer/investor has a relatively strong bargaining position, as the consumer or its regulator depends on him for undertaking the investment.[21] Ex-post, however, the limited alternative use of its sunk investment ties the investor to the market for the foreseeable future, which shifts the bargaining power to the regulator. This provides the regulator with an incentive to adapt his policy in order to increase his own or society's rents at the expense of the investor's through arrogating the quasi-rent.[22] This can

21 We refer to investor and regulator throughout this study.

22 Society's rents increase because most regulatory models specify a social welfare function that attaches a higher weight to consumer benefits than to producer benefits. See Baron and Myerson (1982) and Laffont and Tirole (1986).

be achieved through renegotiation or expropriation. The former entails a regulator using information obtained during the regulatory process to increase welfare in the subsequent period(s) at the expense of the investor. Expropriation means that a regulator creams-off the investor's profits via for instance determining low prices or by cheaply or freely permitting entry. Both adaptations may obstruct or hold-up investments. The key element in this regard is regulatory risk.

The bilateral dependency and lock-in discussed above are primarily due to asset specificity (which will be elaborated upon in chapter 5).[23] Gas markets exhibit several forms of asset specificity. The first is locational specificity, which is due to the spread of gas reserves. Because potential gas producers are limited, importers often largely depend on a specific producer. Second, the network-bound character of gas creates physical asset specificity. This most clearly manifests itself in the distribution segment where consumers are commonly connected to appliances that support a specific range of gas specifications. Third, dedicated assets are created by investments which are specific to a particular consumer-producer relationship. As indicated, pipelines that connect a producer with a consumer are good examples.

In the old context these considerations were relatively unimportant. For instance, stimulating investments was not necessary because of the maturity of large parts of Europe, while an oversupply of gas rendered dependency issues relatively unimportant. The market shifts change this picture. Many new investments are necessary, to a large extent in new pipelines, LNG terminals and storage facilities, all of which are irreversible. As indicated, this increases regulatory risk and consequently makes regulatory credibility a vital component for future energy regulation (cf. Guthrie, 2006, p. 31-42). LNG may reduce asset specificity, especially locational specificity, because LNG creates the possibility to diversify between suppliers. Also, an LNG terminal does not need to be constructed for a specific producer or consumer, which makes the investment less dedicated. However, while these advantages are real, they must not be overstated because 1) LNG has high storage costs, to an extent impeding arbitrage and 2) most LNG capacity is committed to a specific project (in contrast to for instance oil), which means that uncommitted LNG volumes are quite small (Energy Charter Secretariat, 2007, p. 205).

Furthermore, pipelines remain the mainstay of the gas business. The increasing import dependence calls for new pipelines from the producers to Europe, which increases asset specificity. Furthermore, the longer traveling distances allow a level of flexibility which necessitates additional investments in European storage. As indicated, storage facilities may aggravate the natural monopoly problem.

23 See Williamson (1996, p. 59, 60) and Creti and Villeneuve (2003, p. 4).

2.9.2 Uncertainty

Uncertainty is another vital parameter in regulation aimed at facilitating investments. Investment under uncertainty is what Dixit and Pindyck (1994) are concerned with in their real options theory. More recently, Guthrie (2006) surveys the literature on the implications of different regulatory schemes for infrastructure industries. Agreeing with Dixit and Pindyck, Guthrie emphasizes the relevance of modern investment theory to the study of regulation of infrastructure industries. Intertemporal issues such as investment timing and irreversibility are stressed.

Under uncertainty, it may be beneficial to delay an investment in order to wait for more certainty. Uncertainty impacts the investment through the option value: the higher the uncertainty, the larger the option value, and the higher the hurdle rate (i.e., the price against which an investor is willing to immediately invest). Most empirical studies of the impact of uncertainty on investments take a short-run perspective and find a negative impact (Servén, 1997 and Altug et al., 2000).

In the long-run, uncertainty may increase the capital stock. For example, Hartman (1972) and Abel (1983) argue that the long-run capital stock increases under uncertainty because uncertainty increases the future marginal revenue product of capital. Abel and Eberly (1999) take a more nuanced stance by arguing that the ultimate result of uncertainty of the long-run capital stock depends on the relative magnitude of the following two effects. They show that the long-run capital stock might increase due to a hangover effect: irreversibility makes it impossible for a firm to sell its capital in a low demand state, resulting in a higher capital stock than without reversibility. On the other hand, they also argue that uncertainty and irreversibility increase the user cost of capital, which lowers the long-run capital stock. Neither effect dominates globally. These authors also show that the presence of uncertainty increases ambiguity. This ambiguity invites additional empirical research. A recent survey of the empirical literature on investment under uncertainty concludes that despite some fundamental difficulties in empirically testing the above effects, uncertainty generally lowers investment, also in the long-run (Carruth et al., 2000).

Dixit and Pindyck (1994, p. 18) distinguish two types of uncertainty: aggregate uncertainty, which affects all firms in an industry, and idiosyncratic or firm-specific uncertainty, which affects a particular firm. Regarding the former, if industry-wide demand increases, investing becomes attractive for every firm in the industry. Depending on the competitive status of the industry, the associated output expansion – through entry of new firms or capacity expansion of existing firms – lowers prices somewhat and therefore also lowers the profit a particular firm can reap. When, on the other hand, industry demand falls, this again affects all firms. Without irreversible investments, some firms leave the industry, which somewhat lowers the effect of

the decreased demand on the remaining firms. However, the lack of exit possibilities due to the irreversibility of investment precludes this exit and its resulting cushioning effect. Hence, the response is asymmetric: positive shocks to industry profitability are scaled down, whereas negative shocks are not. Profits are therefore truncated, which makes a firm cautious to invest.

Idiosyncratic uncertainty, on the other hand, changes the effect of a positive shock. A positive shock now affects just one firm and increased profitability need not be shared with others. There is therefore no risk of profits being eroded by entry or capacity expansion, mitigating the above asymmetry and improving investment incentives. However, the investment timing decision is still influenced because higher risk increases the option value which may induce the investor to postpone his investment.

One particularly important form of uncertainty is regulatory or political uncertainty (Altug et al., 2000 and Buckland and Fraser, 2001). An example is the urge of some governments, prompted by record high gas prices on back of those of oil, to impose a tax on energy company profits in order to redistribute some of these profits back to consumers. This increases regulatory risk, which energy companies will incorporate into their calculations. Ultimately, these higher risk levels will feed through into higher consumer prices, at least partly counteracting the goal of changing the rent distribution.

The option value of waiting also increases if investors doubt the sustainability of a policy which is beneficial to them (Sérven, 1997, p. 14). The value of waiting increases and investments are postponed until the return on capital rises sufficiently to compensate the losses to the investor should a policy reversal take place (of course, if the necessary hurdle rate is never reached, this investment pause is perpetual and no investment is undertaken at all). An example pertains to renewable energy. Nowadays, climate change is a main concern of energy policy, which makes a reform towards a policy more conducive to renewables likely. If an investor was to doubt this reform's sustainability, for instance if the emphasis on climate change was to weaken again, the investment response to the policy reform will be relatively muted.

Hence, uncertainty hampers investments. The source of uncertainty is important, because the effect on investments of aggregate shocks is larger than that of an idiosyncratic shock. Regulatory credibility is once again an important parameter. Rodrik (1990) shows that the option value is quite high even with high credibility, implying that the hurdle rates to investment are anyway high.

Compared to the old context, the market shifts create additional uncertainties of which we provide four examples. First, increasing external dependence creates uncertainty regarding producer behavior and collusion. This is possible due to the leading role of many producer governments in their NOCs as well as their growing dominance on the international gas market. Matters are aggravated because none of the Member States are self-sufficient in satisfying their domestic gas demand while most – especially those in Eastern Europe – are heavily import-dependent. For example, CEC (2005b, p. 33)

indicates that Belgium, Luxembourg, Sweden, Estonia, Latvia and Lithuania all are completely dependent on gas imports. The Czech Republic, Slovakia, Slovenia, Bulgaria and candidate country Turkey all have import dependencies exceeding 95 percent of domestic demand. As indicated, increasing import dependence creates uncertainties concerning security of supply that did not exist in the old context, whether this is justified or not. Second, uncertainty is increased by the growing share of gas in power generation, because its effect on gas demand is still very unclear. Third, climate change increases uncertainty because its future developments are unclear. The unresolved issues are 1) the precise form that 'the' second commitment period of the Kyoto Protocol will take, 2) whether there will still be enough political will and commitment to keep reducing emission levels once the low-cost, easy-to-achieve options are exhausted and 3) the prospects on nuclear and sustainable energy. Fourth, gas transit creates uncertainty because it adds a third party to the equation. If transit countries cannot commit to agreements, the resulting potential for disputes creates an additional risk to Europe's gas supplies. Examples are 1) the postponement of the start of Algerian supply because of internal political and safety problems as well as difficult relationships with Tunisia and Morocco, 2) the cut-off of Russian gas via Byelorussia (to Poland and Germany) after a conflict between the Byelorussian government and Russian Gazprom in early 2004 and 3) the recent gas dispute between Russia and Ukraine in early 2006. Hence, as gas transit increases, so does the risk of transit-induced supply interruptions. This in turn may hamper investments. Box 2.1 below illustrates some consequences of the risk of transit disputes for investments in gas pipelines.

Box 2.1: Investment consequences of Russian transit disputes

So far we have assumed that transit disputes may result in hold-up problems which may result in underinvestments. Notwithstanding this, hold-up caused by transit states may also result in overinvestments, as argued by Hubert and Ikonnikova (2004) and Hubert and Suleymanova (2006). Russian gas pipelines heading into Europe are prominent examples. Transit risks have always been an important consideration when building a Russian pipeline to supply Europe. In the 1990s, Russia constructed the Yamal pipeline, which runs through Byelorussia and Poland, even though it was clear that refurbishing and upgrading the existing Ukrainian pipeline system was a much cheaper option. This choice is attributed to a lack of commitment powers of the Ukrainian government, which rendered the more expensive option the most attractive one, because it circumvented the Ukraine. Hence, the hold-up problem manifests itself in overinvestments in this setting.

Another example of overinvestments as a consequence of a lack of commitment powers is provided by the construction of Nord Stream (formerly known as North Trans Gas, Baltic Pipeline and North European Gas Pipeline). The story is analogous to the Yamal story: instead of choosing the cheaper options of upgrading the existing Ukrainian pipeline system which had around twenty billion cubic meter (bcm) of spare

capacity, building a new Yamal pipeline or building the Amber Pipeline through Poland, Ukraine and the Baltic States, Russia has opted for the very expensive, partly underwater, Nord Stream pipeline which circumvents all transit states above by directly linking Russia and Germany. Building this pipeline creates countervailing power through the credible threat of diverting supplies through Nord Stream which is supposed to discipline the transit states.

The likelihood of overinvestments is dependent on a number of variables, most importantly the prospect for a collusive equilibrium between Russia and the transit states. In fact, Hubert (2007, p. 77, 78) argues that if a collusive equilibrium develops in which the players are able to make credible long-term commitments, Nord Stream will not be built at all. Hence, the fact that Nord Stream is under construction, signals a lack of commitment. The cost of holding excess capacity is another important variable. If excess capacity is prohibitively expensive, which for example may occur if the relative value of gas is low compared to transport costs, an investor will not invest in a more expensive pipeline and will consequently not be able to create countervailing power. Without alternative means to counteract opportunistic behavior, the investor will then end up in the classical underinvestment situation. In both cases, uncertainty created by the transit risks increases the hurdle rate for investments. However, the difference with the underinvestment case is that the higher hurdle rate now manifests itself through a new, more expensive pipeline.

In sum, the market shifts have created a new context for gas regulation which fundamentally differs from the context in which existing gas regulation was developed. For instance, as set out in section 1.3, in the traditional structure, investment risks were shared between the dominant players, which facilitated the early development of the European gas market. Liberalization and the accompanying regulation could consequently focus on more efficiently deploying (sweating) existing assets. Furthermore, gas supplies were ample and therefore supply security not as vital an issue as today. However, in the new context created by the market shifts, the main issue is how to facilitate new investments rather than sweat them (cf. WRR, 2008, p. 15).[24] Furthermore, this has to be done in a gas market which is dominated by sellers, where political considerations are becoming more important and where supply security and sustainability have become the top priorities of energy policy. This changes the context for regulation into one where the interplay of regulation with investments, irreversibility, risks and uncertainty determines whether a regulatory regime creates a governance structure that properly facilitates investments.

CIEP (2006, p. 18, 19) mentions four additional issues that arise in this context. First, regulatory credibility is greatly enhanced by regulatory stability in terms of objectives and instruments. However, ex-post adaptations to regulation are required due to the inherent uncertainties specified above and

24 See section 1.5.2.

the learning curve of a regulator. This creates a trade-off between regulatory credibility and flexibility (see chapter four). Second, the roles of the relevant parties may change along the way. A prominent example pertains to the producer's NOCs. If they integrate downwards into the European distribution sector, their role will change compared to their current role of supplier. Unbundling integrated incumbents is another example. The role of trading companies without a network is very different from that of an integrated incumbent, for example in terms of negotiating power *vis-à-vis* the producers (see also section 4.10.3). Third, the demand side deserves more attention. Consumers can lower import dependence and lessen price spikes by actively participating in gas markets. Finally, regulation must acknowledge that the value chain is fragmented over different jurisdictions, each with its own policies and approaches and consequently that a one-size-fits-all regulatory approach may not be the optimal solution.

2.10 Conclusions

This chapter provides an overview of the market shifts that are fundamentally changing international gas markets. These shifts stem from 1) external dependence and long-term vulnerability, 2) producer behavior, 3) an increase in long-distance gas supply, 4) an increase in gas transit, 5) a loosening link between energy demand and GDP growth in Europe but a tightening link at the global scale, 6) a growing awareness of climate change and 7) increasing gas demand from power generation. These seven shifts can be classified in the following four main categories: 1) a shift in international relations with the emergence of a seller's market, 2) a shift in energy policy objectives where supply security has become the top priority while sustainability is growing in importance, 3) an increasing influence of politics on energy relations and 4) a need for new investments along the entire gas value chain. In conjunction, these shifts create a new context for European gas regulation.

In the old context, in which current gas regulation was developed, the emphasis lay on asset sweating and, due to the presence of ample gas supplies, supply security was not considered to be a large threat. In contrast, in the new context, a regulatory regime must govern the market in such a way that it properly facilitates investments in a seller's market where political considerations and anxieties are becoming more important and where supply security and sustainability have become top priorities for energy policy.

The interplay of regulation with irreversible investments, risks and uncertainty determines whether a proper governance structure can be devised. Consequently, the criteria for an adequate regulatory regime in the new context are investment irreversibility, risks and uncertainties. European gas regulation needs to adapt to this new context in order to reach the energy policy object-

ives. This study analyzes whether existing regulation will allow it to do so. The emphasis is on the theoretical underpinnings of current regulation. The next two chapters discuss the neoclassical underpinnings of current regulation.

3 The neoclassical perspective towards reform of the European gas market

3.1 Introduction

As indicated in the introductory chapter, this study contrasts two economic perspectives on regulation in order to examine whether existing regulation can adequately reach the energy policy objectives in the new context for regulation. This chapter discusses the neoclassical perspective on regulation and traces its implications for the structure of a liberalized gas market. It sets the scene for chapter 4, which argues that the existing regulation is firmly embedded in the neoclassical paradigm.

The neoclassical methodology is based on three basic axioms, which are discussed in section 3.2. Section 3.3 discusses the neoclassical emphasis on perfect competition that emanates from these axioms. By assuming that the market can work perfectly, the implication is that any deviation from perfect competition – that is, any market failure – is a candidate for regulatory intervention (see section 1.5.1). Possible market failures on the European gas market are identified in section 3.4. Section 3.5 provides the neoclassical policy prescriptions for reforming the European gas market. Section 3.6 concludes.

3.2 The neoclassical methodology

Arnsperger and Varoufakis (2006) state that in the last three decades neoclassical economics has incorporated models that allow economic actors to be imperfectly informed and irrational. This invalidates the traditional criticism on the neoclassical assumption of perfectly informed and perfectly rational individuals. The authors contend that the hardcore of the neoclassical perspective towards economics consists of three main axioms: methodological individualism, methodological instrumentalism and methodological equilibration.

3.2.1 Methodological individualism

Methodological individualism states that all actions are performed by individuals. Consequently methodological individualism implies that all social phenomena can only be explained in individual terms, which implies that all analyses must ultimately be couched in terms of the behavior of individuals.

Arnsperger and Varoufakis (2006) argue that the analytical method employed to this end consists of three steps: 1) the socio-economic phenomenon is to be analyzed by focusing on the goals, plans and actions of the individuals who have brought about this phenomenon, 2) understanding fully their working at the individual level and 3) synthesizing the individual-level knowledge to explain the phenomenon at hand.

Hodgson (1988, p. 55-62, 2007, p. 211) points out that methodological individualism requires purposeful individual action which is a sufficient cause for all social action. By considering individual action as the only determinant of social phenomena, other, possibly complementary, explanations for human behavior such as norms, habits or social institutions, are not accepted as an explanatory variable. Recent advances in neoclassical economics allow a link between individual behavior and these complementary explanations. However, according to Arnsperger and Varoufakis, these complementary explanations are explained rather than being explanatory variables for individual behavior.

3.2.2 Methodological instrumentalism

Methodological instrumentalism assumes that all behavior is preference-driven. The individual is seen as a bundle of preferences who, given these preferences, undertakes actions that maximize his expected utility. This requires a number of assumptions, in particular: perfect and costless information, complete and transitive preferences and the individual being able to act as a lightning calculator in order to make all required calculations. The preferences themselves are not explained. Preferences are exogenous to the analysis, i.e., separate from the structure of interaction in which the individual is involved, either because they are psychological phenomena that should be explained by psychologists as opposed to economists, or because individual purposefulness is entirely indeterminate (Hodgson, 1988, p. 60, 66). It is therefore assumed that people behave as if they possess consistent preferences which guide their behavior. Hence, the ends are given and the individual chooses the means to reach his objectives. According to Arnsperger and Varoufakis (2006), the fundamental point with respect to methodological instrumentalism is that the preferences fully determine an individual's actions. Therefore, even the current emphasis of some neoclassicists towards endogenizing preferences does not refute methodological instrumentalism as the preferences remain fully determining.

3.2.3 Methodological equilibration

Methodological equilibration posits that human interactions always tend towards an equilibrium, which in economic theory refers to a situation where

price adjustments in the process of competition equalize supply and demand of a good or service. Arnsperger and Varoufakis (2006) refer to Cournot (1838), who according to them was the first scholar to use methodological equilibration. They define the concept by specifying the three steps Cournot took in his analysis: 1) discover the equilibrium, 2) assume that agents will find themselves at that equilibrium and 3) show that at the equilibrium small changes will not move self-interested behavior away from the equilibrium. In effect, the presence of the equilibrium is assumed rather than explained.

3.3 PERFECT COMPETITION

The above axioms imply that individuals will transact on a market when they consider it to be in their best interest. Therefore, as long as individuals expect a transaction to generate additional utility or, for a firm, profit, the transaction will be undertaken. The axioms also imply that these transactions will be conducted without any problems. In equilibrium, the highest possible welfare will be attained, because competition ensures that products are produced at the lowest possible unit cost (productive efficiency) and correspond with consumer preferences (allocative efficiency). Hence, competition is perfect.

The axioms explain why competition is perfect (Hunt, 2000, p. 7-9). Perfect competition theory focuses on the interaction between consumers and producers. Consumer's tastes and preferences concerning the producer's goods are assumed to be identical and stable. Hence, consumer demand is homogeneous. Furthermore, they know all there is to know about the products due to the perfect and costless information and they buy products in order to maximize their utility. The firms act in a similar manner. They maximize their profits, or more accurately, the net present value of future profits. They produce products using capital, labor and land as factors of production. These resources are assumed to be homogeneous and perfectly mobile: a unit of one resource is identical to another and can be transferred unrestrictedly between firms. Furthermore, innovation is exogenous. The latter implies that the firm's only role is to respond to changes in the environment by determining the quantity of goods to produce. In other words, the firm is conceptualized as a production function in which resources are transformed into outputs. Its boundaries are determined by technological conditions such as scale economies.

In these settings, competition means that in the short run, firms change the quantity of products produced in response to for example changes in prices or resource costs, while in the longer run, they may adjust production capacities. Hence, the firm's environment determines its conduct. Profit maximization implies that in the short run, all firms produce output up to the point where the marginal revenue of a product equals its marginal cost. This may result in profits or losses depending on whether the market price exceeds average production costs. However, any profit is eventually competed away. Long-run

equilibrium is attained if the firm produces the quantity for which price equals long-run marginal costs. This corresponds to the point where long-run average costs are minimal. At this point, price equals average costs, hence equilibrium profits are zero. Therefore, the environment also determines the firm's performance (i.e., its profits).

If all firms act according to this perfect competition logic, then the equilibrium is characterized by all firms producing at minimum cost, creating productive efficiency. Every resource receives the value of its marginal product, which is optimal. Furthermore, the price of each good equals the marginal benefit (which indicates what a consumer is willing to pay). This in turn equals marginal cost, which is an indication of the cost of producing an extra unit. Hence, allocative efficiency is attained too.

3.4 Regulatory intervention in the neoclassical world

In the neoclassical world, utility and profit maximizing actions of individuals and firms create the optimal equilibrium, rendering regulatory intervention unnecessary. This provides straightforward guidance for regulatory intervention: any market situation that deviates from the characteristics of perfect competition is a candidate for regulatory intervention. Hence, in the neoclassical world, regulators intervene in order to correct a market failure and restore the perfect competition equilibrium: regulation is consequently employed from a public, rather than private, interest perspective. Without the intention of being exhaustive, we discuss below six prime reasons for market failure on the European gas market, each providing a rationale for regulatory intervention on European gas markets.

3.4.1 Failure of competition

Without sufficient competition, market players are able to influence the market price. The most extreme situation in this regard is a monopoly in which one firm dominates the entire market. Another possibility is an oligopoly, in which a few firms control the market. Competition fails on the European gas market in several respects. We provide four different arguments that indicate a failure of competition in the European gas market.

First, as indicated in chapter 2, the international gas market is increasingly becoming dominated by a few producers. Russia is Europe's main supplier. North African, Caspian and Middle-Eastern supplies are also within economic reach and expected to increase in importance. An oligopolistic market structure is likely to develop. This will inevitably create anxieties of depressed supply

and soaring prices.[1] Regulatory intervention might take the form of initiatives that strengthen Europe's negotiation position by allowing Europe to speak with one voice (more on this below).

Second, economies of scale and scope are important since these are often assumed to create natural monopoly positions on the gas market, especially with respect to infrastructure. As indicated, pipelines are not the only segment of the gas market characterized by economies of scale. In descending order we have gas storage, blending (i.e., quality conversion) and gas import infrastructure; gas exploration and production; and gas trading and supply to end users. The Annex shows that, in the single product case, scale economies are sufficient but not necessary to create a natural monopoly. In the multi-product case, however, economies of scope enter the picture, which renders scale economies neither sufficient nor necessary. Therefore, the traditional argument of scale economies being responsible for the natural monopoly character of the gas market is incorrect. This is illustrated by a few private initiatives to construct pipelines in addition to the existing infrastructure, despite the presence of scale economies. Wingas in Germany (see section 1.4) and the ZEBRA pipeline in the Netherlands are notable examples. Rather, natural monopolies arise when costs are sub-additive, i.e., when one firm is able to produce all products cheaper than two or more can. Assuming cost sub-additivity, productive efficiency is achieved by having a single operator managing the pipeline. This creates a (local) monopoly position. Because pipelines are essential facilities, entrants need access to the natural monopoly to supply consumers. This creates a possibility for the natural monopolist to abuse his dominant position and obstruct competition by charging excessively high access charges or denying access altogether. This failure invites regulatory intervention in order to achieve allocative and dynamic efficiency, which explains why the infrastructure usually remains a monopoly either owned by the government and/or placed under strict regulatory control.

Third, it has been and still is common for governments to create legal monopolies or oligopolies on their gas markets. For instance, at the upstream production level, a legal monopoly is created when a producer obtains a production and exploration license for a particular gas field. The license gives the operator an exclusive right to undertake exploration and production activities, which creates a monopoly position. Also, further downstream the value chain, national incumbent energy companies, such as Gaz de France, RWE and E.ON, are in a legal monopoly or at best oligopoly position on their home markets.

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1 Upon closer inspection, fears of monopoly abuse by producers are possible but commonly overstated. For example, in the case of Russia, the dependence is bilateral. Russia depends in large measure on Europe for revenues. Furthermore, its existing pipeline system is strongly focused on supplying the European market with few possibilities to diversify towards for example Asia.

Fourth and final, long-term contracts have dominated the natural gas industry and will continue to do so for a considerable time to come (see section 1.3).[2] Long-term contracts guarantee capacity to a particular user for the contractually agreed period. This limits the capacity available for trade among other players which impedes the creation of a competitive European gas market. The gas prices in these contracts are often determined by a linkage to oil prices. Hence, oil fundamentals determine gas prices rather than the gas supply and demand balance. The final destination clauses furthermore impede competition by preventing consumers from reselling gas outside their own markets. Removing legal monopolies and long-term contracts may require regulatory intervention (see the Distrigas case study in chapter seven regarding the latter).

Each of these four failures of competition implies that the perfect competition equilibrium is not attained, and consequently that regulatory intervention is warranted to restore it.

3.4.2 Public goods

Public goods have two main properties. First, public goods are non-rivalrous, meaning that consumption of the good by one person does not obstruct another person from enjoying the benefits of using the good. Second, public goods are non-exclusive, which means that nobody can be excluded from enjoying the good. Ferroni (2002, p. 1, 2) uses less stringent conditions. He identifies three characteristics of public goods: 1) they generate significant externalities, 2) they are *to a considerable degree* non-rivalrous and non-excludable (emphasis added) and 3) they create opportunities for the enhancement of welfare through collective action.

If the market is to function perfectly, those persons who are not willing or able to pay for the good must be excluded from its use and benefits. Non-exclusivity by definition negates or, under the less stringent conditions, diminishes the possibility of exclusion and by extension the possibility to ask a price. As a result, a private producer will not have adequate incentive to produce the good because others can free-ride on his expenses. This leads to the conclusion that private markets will not produce public goods. Hence, the government may intervene, for instance by producing the public good and spreading the associated costs over all users via obligatory levies or taxes. This is in accordance with the strict conditions of non-rivalry and non-exclusivity.

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2 See Neumann and Von Hirschhausen (2004, 2006) and Neuhoff and Von Hirschhausen (2006) for empirical studies that analyze the relationship between liberalization and contract length. These papers conclude that liberalization initially decreases contract length but that asset specificity may increase contract length again. We return to these studies in section 5.4.2.

Security of supply of an energy system and the environment are two common examples (see also the next section). With respect to security of supply, if one extra EU-citizen benefits from an enhanced security of supply, the benefit of other citizens does not deteriorate. Security of supply, moreover, cannot be split up in parts and sold on a market, so a private entrepreneur will not be able to ask a price for this good. Supply security is thus both non-rivalrous and non-excludable. The environment is a textbook example of a pure public good (see also the next section). No one can be excluded from clean air, and an extra person enjoying it will not make a difference for the rest. Therefore, both supply security and environmental issues exhibit market failures. These may justify regulatory intervention, even government provision, in the neoclassical perspective. Regarding security of supply one might think of strategic gas stocks which can be used in case of a supply disruption. Emissions caps or energy taxes provide examples with respect to the environment.

3.4.3 Externalities

Externalities arise when the actions of one person or firm affect other persons or firms, either negatively or positively, without adequate compensation. That is, externalities arise when certain costs or benefits are not incorporated in the price of the good in question, i.e., when private and social costs and benefits diverge. In case of negative externalities (e.g., polluting emissions) the negative consequences of producing a good are not incorporated in its price. Social costs outweigh private costs, and as a result, the price is too low and the output too high from a social point of view. On the other hand, positive externalities (e.g., security of supply) arise when production generates benefits that are not incorporated in the price. Social benefits outweigh private benefits, which renders the output too low and the price too high from a social perspective. All in all, externalities, positive and negative, distort the market allocation away from the optimum.

Externalities regularly appear in discussions on environmental issues and impact all aspects of the energy markets. The discussion on nuclear energy is essentially about externalities: positive externalities, such as the zero carbon emission of nuclear energy use,[3] are weighed against the negative externalities, such as nuclear waste. Furthermore, gas is the least-polluting fossil fuel and thus constitutes a positive externality compared to more polluting alternatives like oil and coal. On the other hand, gas' carbon emission is considered a negative externality compared to renewable alternatives like wind or solar energy. Therefore, gas is considered a bridge towards a non-carbon future

3 Note that the use of nuclear energy results in zero carbon emissions. The upstream extraction of uranium, however, entails substantial emissions.

(cf. Nakicenovic et al., 2000). Regulatory intervention should aim at internalizing the externalities. Internalizing the external effects of energy use (by putting a price on carbon) is the *raison d'être* of the Kyoto Protocol and the resulting Emissions Trading Scheme in Europe. Emissions trading is a market-based solution. Non market-based approaches, like taxes and subsidies, can also be used. Energy use is discouraged by taxing its use. The use of green gas[4] is stimulated via fiscal subsidies.

In addition to emission-related concerns, both producer and consumer behavior on the gas market exhibit externalities (Mulder and Zwart, 2006, p. 19-24). Regarding gas production, the tragedy of the commons comes to the fore. A gas field can be operated by multiple developers, each of whom wants to increase its own production. Part of the costs associated with this behavior will be external, i.e., borne by the other producers. This results in an inefficiently high production level that too rapidly depletes the gas field. Depending on the number of developers and transaction costs, negotiations might in principle be possible. If these are unfeasible, regulators may intervene by for instance licensing gas production. Moreover, gas exploration and production harms ecologically sensitive areas like the Waddenzee in the Netherlands, Alaska in Canada or Sakhalin in Russia. It is doubtful whether these environmental externalities are sufficiently internalized. Possible solutions include prohibition of exploration or issuing licenses which specify a controlled depletion path.

Consumer behavior also creates externalities because consumers usually do not take all the external effects of their gas use into account. For example, a lower gas use lowers gas import dependence and may decrease environmental concerns unless it is being replaced by a more polluting alternative. Consumers generally do not determine their gas use based on a combination of all these aspects, which creates higher than optimal gas consumption. This may call for regulatory intervention in order to discourage gas use somewhat.

Finally, network externalities can be a problem in the gas market. Network externalities are externalities that arise from the total size of consumption or production. An example pertains to gas networks. As a gas network becomes more developed and integrated, the distances to be covered when developing an extension shorten. This makes it cheaper to connect a new consumer and to transport gas to his or her home, which reduces the producers' costs of bringing gas to the market. Network externalities can be negative too. An example is system imbalance in case of peak demand. A larger number of consumers raises aggregate demand and system load. Peaking gas demand (usually during harsh winter conditions) might then create a system imbalance

4 Note the close similarity with green power. There is, however, a big difference between the two. Green power is generated by for instance wind mills and biomass which lowers emissions. Green gas, on the other hand, is ordinary gas for which it is guaranteed that somewhere else emissions have been lowered by generating gas in a durable fashion.

and result in a black-out. Furthermore, if wellhead gas supply is separated from transportation, a network externality may arise because the producers may not have a proper incentives to maintain the system-wide pressure essential for reliable downstream supply (Lyon, 2000, p. 59).

3.4.4 Incomplete or missing markets

We speak of missing markets if a private market fails to provide a good or service, even though supply cost is lower than what individuals are willing to pay. With a complete set of markets, prices are perfectly predictable and firms are able to insure against every possible contingency. With one or all of these markets missing, resource owners have to guess future prices. If their guess turns out to be correct, no problems will arise. However, without perfect foresight due to a lack of markets, it is highly doubtful that these guesses will indeed be correct.[5] The market fails because incorrect guesses create a distorted allocation of resources.

With respect to natural gas, spot-, future-, forward- and risk-markets are often missing or not sufficiently present (cf. Perman et al., 1999, p. 128, 129 and Stiglitz, 1988, p. 688-690), which creates uncertainty regarding current and future gas prices. Northwest Europe provides a number of initiatives that attempt to create such markets. For instance, the Amsterdam Power Exchange operates gas and power exchanges in the UK, the Netherlands and Belgium.[6] All three exchanges offer within-day and day-ahead gas at the UK's National Balancing Point, the Dutch Title Transfer Facility and Belgium's Zeebrugge. Moreover, since the second quarter of 2006, Endex has started gas trading at the Title Transfer Facility and Zeebrugge.[7] Endex enables market participants to manage price and settlement risk up to three years ahead (Section 4.10.1 provides a more elaborate overview of Continental European hub initiatives). These trading exchanges allow for some spot, within-day, and day-ahead trading, but markets are still incomplete.

3.4.5 Information failures

Insufficient or flawed consumer information about a product impedes market operations. If consumers are unable to correctly ascertain the quality of the goods or services they are receiving, the supplier could cut back the quality of these goods in order to cut costs. Furthermore, the consumers might not

5 Of course, this effectively creates an information problem and therefore could also have been discussed in the section in information failures below.
6 See the homepage for more information, at: www.apx.nl/index.php?id=13.
7 See the homepage for more information, at: www.endex.nl/index.php?a=44.

be able to determine whether the price they are paying is fair. In other words, information failures may create inefficiencies in product quality and prices that lead to market failure.

Information failures abound on the opaque gas markets. In the traditional monopolistic market structure, a consumer paid an all-in gas price, which made it impossible to determine how much was being paid for what service. Liberalization is supposed to improve this by for example unbundling trade activities from network activities. This makes it easier to determine how much is being paid for the commodity, how much for transport and which part is being taxed. Unfortunately, liberalization also creates information problems. Network quality in the Netherlands is a conspicuous example of regulatory intervention in this regard. Dutch network operators are regulated by Office of Energy Regulation (DTe, a chamber of the Dutch competition authority, NMa). They were originally regulated by a price cap system in which network tariffs were allowed to increase with the consumer price index minus an efficiency parameter (CPI-x). This system provided network operators with an incentive to delay or renounce infrastructure investments in order to lower costs and artificially increase efficiency. Consumers were unable to observe this before actual failure. This lack of consumer information has been one of the reasons for adapting traditional price-cap regulation to also provide adequate incentives for infrastructure investments. This has resulted in the current CPI-x+q regulation system in which the q parameter allows tariffs to rise if infrastructure quality is above-average.

Incomplete consumer information may also impede consumer switching. If consumers cannot properly ascertain the quality of competing suppliers, they may be disinclined to switch, which creates a barrier to entry and obstructs the market from working satisfactorily. Transparency initiatives are usually introduced to mitigate this problem.

Upstream, information failures affect the depletion rate chosen by a producer in a fairly obvious manner. According to Perman et al. (1999, p. 162), optimal depletion requires that 'each asset or resource earns the same rate of return, and that this rate of return is the same at all points in time, being equal to the social rate of discount'.[8] To be able to optimally deplete a gas field, an operator thus needs to possess extensive – perfect – knowledge on future developments such as prices, reserves and government policy. If this is not the case, the market will fail to provide optimal depletion levels.

8 Environmental economists will realize that this is Hotelling's (1931) rule for the extraction of non-renewable resources.

3.4.6 Uninsurable risks

The uninsurable risk argument is often applied to insurance markets, but it has some relevance for gas markets too. In fact, uninsurability has been one of the predominant arguments for implementing long-term take-or-pay contracts to finance infrastructure investments. The scale of investments has been, and sometimes still is, a reason for national governments to promote or create national champions. The argument proceeds as follows: gas infrastructure projects are extremely expensive, require long cost recovery periods, cannot be implemented in stages and require rapid capacity buildup in order to become financially viable (Stern, 2002, p. 10). Combined with insecurity of demand due to the liberalizing gas market, this has prompted the producers to argue that the risk of such projects is too high to be insured privately without some guarantees. Proposed remedies are the long-term take-or-pay commitments and/or exemptions from the third party access regime discussed in the case studies in chapters 6 and 7.

In sum, the neoclassical perspective towards regulation proposes that a regulator intervenes in the market in order to correct a market failure. The previous sections have set out the most common market failures that prevail on the European gas market. We have also indicated some proposed remedies to these market failures, which in this neoclassical world may result in a substantial regulatory intervention.

3.5 Reforming the European gas market according to the neoclassical perspective

The above sections have set out the implications of the neoclassical perspective for regulatory intervention. This section completes the picture by tracing the implications for the structure of a liberalized gas market. It draws from Joskow (1996) who applies the recommendations of the standard neoclassical prescription to electricity.

The basic elements are quite straightforward. The gas value chain comprises exploration and production, transmission, distribution and (wholesale and retail) trade activities. Exploration and production and trade are potentially competitive, while the infrastructure links, transmission and distribution, are natural monopolies. For these latter links, monopoly provision is the best, i.e., lowest-cost, solution. This market failure should be corrected by permanent regulation of the infrastructure operator. In the traditional market structure, vertical integration extended into the potentially competitive links as well. Horizontal integration within a link resulted in a typically low number of competitors. Hence, in order for real competition to develop, both the vertical and horizontal structure of the market requires reform.

3.5.1 Structural reform

Structural reform can occur between different links of the value chain or within one specific link. The former is referred to as vertical restructuring, the latter horizontal. We start with vertical restructuring; horizontal restructuring predominantly applies to the trading and production segments and is discussed in the final part of this section.

Competitors need to have access to the infrastructure on fair and non-discriminatory terms to be able to effectively compete with the incumbent supplier. Vertical integration creates competitive distortions in this regard. The fear is that an incumbent infrastructure operator who is also involved competitive activities, may obstruct competition in the competitive activities through cross-subsidization and discriminatory access. The neoclassical presumption regarding vertical integration is that firms integrate vertically in response to a market failure of some kind, especially market power. Because in the neoclassical world the costs associated with vertical integration are not recognized, any market failure is a candidate for vertical integration (Joskow, 2005a, p. 325). Furthermore, as indicated above, the boundaries of a firm are assumed to be determined by technological considerations. In other words, there is no technical or physical reason for expanding these boundaries, which means that vertical integration has no efficiency rationale. This explains the inhospitable view towards vertical integration in the neoclassical perspective: vertical integration is seen as a response to existing market power or as an effort to create market power (Williamson, 1985, p. 26). As an illustration, we provide three traditional market power explanations for vertical integration.

First, vertical integration can arise as a response to double marginalization. Consider the situation of a bilateral monopoly in which a monopolistic supplier/manufacturer supplies a monopolistic intermediary. When acting independently, both will attempt to maximize their own private profits. Each firm takes its input price as given and charges a monopoly mark up to it. This double mark up (marginalization) disappears when the manufacturer and the intermediary are integrated. Tirole (1988, p. 174, 175) shows that in this setting, vertical integration yields higher industry profits and lower consumer prices.

A second market power explanation for vertical integration is that it facilitates price discrimination (Perry, 1978). The simplest example is one in which a monopolist sells intermediate goods to two firms, one in a high-price industry, the other in a low-price industry. Tirole (1988, p. 141) shows that the optimal solution entails different prices for the intermediate firms, because these prices are determined by their respective demand elasticities which will likely differ. This optimal solution requires the ability to price-discriminate, since without it the firm paying the lowest price could resell its product to the higher priced firm. If this arbitrage cannot be prevented directly, vertical integration may be a solution. The monopolist would then buy a firm in the low-price industry, set this firm's final price at the low price level, and con-

tinue to charge the higher price to the other industry. The expensive good will only be bought in the high-price industry, which effectively precludes arbitrage. Vertical integration can thus be used as a substitute for price discrimination.[9]

Thirdly, vertical integration could hand the integrated firm the power to raise the costs of its rivals. The key is that the firm interferes with the input market in order to raise the costs of competitors. The predatory firm must have the ability to enter into exclusive contracts with lower-cost suppliers that prohibit rivals from acquiring the input (or a substitute) at a price as low as that paid by the predator. Vertically integrating into the input market by taking over the input supplier is a possibility. In the short run, higher costs to rivals lessen competitive pressure on the predatory firm. In the long-run, it could raise entry costs and deter entry by potential rivals (cf. Salop and Scheffman, 1983 and Aghion and Bolton, 1987).

Because the indicated competitive disadvantages cannot (by definition) be offset by efficiency advantages, the policy prescription is to prevent vertical integration as much as possible. If vertical integration is already present, public policy should try to remove it. Mitigating the competitive hazards if vertical integration is already present requires separation of the competitive from the non-competitive parts. There are five main options for achieving this goal (OECD, 2001 and CPB, 2005).[10]

Structural separation

The transmission and distribution assets are vertically divested from the competitive activities and organized into different companies. The network operator is not allowed to have any financial ties to production or trading. This is supposed to severe any link with production and trading activities and accordingly, no incentive or possibility to distort competition in these segments is possible.

Operational separation

Operational separation separates network ownership from control. Control is transferred to an independent entity (an Independent System Operator, or

9 Perry (1978) provides a number of alternative ways in which vertical integration can facilitate price discrimination.

10 The OECD study also discusses club ownership and separation of the non-competitive part into reciprocal parts as potential solutions. These options are unlikely for a market like gas. Club ownership allows firms to jointly own the network assets. This is unlikely for gas, because governments are in practice very reluctant to give up their control over energy networks – due to for instance the economic, political and strategic importance of gas to an economy (see section 1.3). The overall efficiency of separation of the non-competitive component into reciprocal parts hinges on network efficiencies offsetting the incentive to deny interconnection. Because gas possesses some positive but very small network effects (see section 3.4.3), this option is probably inefficient.

ISO) while ownership remains with the integrated company. The prime advantage is that the integrated company will no longer have an incentive to abuse the non-competitive segment to obstruct competition. The outcome depends on the composition of the independent entity. For example, if the ISO consists of representatives of the competitive firms, the situation corresponds to club ownership; if the regulator takes on the task of the ISO, the situation resembles regulated access. Another important consideration is whether the ISO receives a part of the profits of the non-competitive activity. If not, the ISO might have little incentive to stimulate efficient operation of the non-competitive segment. The following three approaches have less impact (Hardt, 1995).

Accounting separation
The weakest form of separation is accounting separation which obliges a firm to keep separate accounts of regulated and non-regulated activities. The integrated firm has to charge itself the same internal prices for use of the non-regulated activities as it does other parties. The activities are conducted within the same company, which is one reason why accounting separation often fails to remove fears of anti-competitive conduct on the part of the integrated firm.

Functional separation
Functional separation goes a step further by requiring that different activities be grouped into different divisions of the firm. In addition to charging identical prices, the integrated firm should rely on the same information as other firms do. In addition, the employees of both activities must be physically separated from each other. Once more, all activities are conducted within the same integrated company.

Corporate separation
Corporate separation, finally, goes yet another step further and requires that different activities be grouped into different corporate entities, as opposed to different divisions. As with operational separation, ownership and control are separated from each other. The difference is that with corporate separation, everything remains within the integrated company.

In a neoclassical world the choice between these options is straightforward. Recall that the neoclassical perspective assumes the absence of efficiencies related to vertical integration. In that case, the most efficient option is structural separation because it provides the best assurance of the removal of competitive distortions.

The neoclassical perspective towards horizontal structural reform measures is essentially similar. Perfect competition hinges on the presence of a large number of competitors that vehemently compete with each other. This is not only contingent on the presence of competition between links as above, but

also on competition within a link. Introducing competition within the infrastructure link is unwise due to its natural monopoly status (see Annex). Production and trading activities, on the other hand, may become more efficient if more competitors appear. This may require horizontal restructuring. For example, divesting production or trading assets may increase the number of competitors and by extension competition. As in the vertical case, the neoclassical assumption is that firms integrate horizontally in response to or anticipation of market power. Without efficiency rationale, the straightforward prescription is to combat horizontal integration as much as possible. If removal appears unfeasible, regulation may be required.

3.5.2 Access

In addition to structural reform which prepares the sector for competition, another main requirement is the actual introduction of competition into the sector. Network access is no issue if competition develops between infrastructures, where each entrant possesses its own gas network and is able to compete against the incumbent. However, the natural monopoly character of gas infrastructure renders this option inefficient and likely nonviable. Hence, rather than between infrastructures, competition should take place on the infrastructure. This requires entrants to be granted fair and non-discriminatory access to a single network. There are two basic ways to grant access: negotiated and regulated third party access (NTPA and RTPA, respectively). NTPA relies on negotiations between the parties involved, the entrant seeking access and the network operator, concerning the conditions on which access should be granted. If no agreement is reached, the regulator should intervene and settle the dispute. Without structural separation, the criticism concerning NTPA usually concentrates on the entrant's dependence on the incumbent, as there is a threat of the incumbent abusing its advantageous position. Also, it is difficult for an entrant to adequately determine whether the incumbent's tariffs are fair, i.e., based only on cost considerations. Moreover, the regulator's information deficit hampers an appropriate dispute resolution, for instance because the regulator depends on information provided by the incumbent. The advantage of NTPA is that if all goes well, no government interference is required and that the access conditions may be relatively easily adapted to changing conditions.

TPA can also be provided on a regulated basis. RTPA requires a regulator to initially set the tariffs or the way the tariffs should be calculated in order to prevent the incumbent from abusing its advantageous position. The entrant's position is important when choosing between these options. If entrants are in a relatively favorable negotiating position, the market power objection to NTPA becomes less significant. Then NTPA, with its lower government interference, may be preferred. In the opposite case, RTPA is preferable. Under

structural separation, the market power threat dissipates because the network operator has no incentive to obstruct entrants from accessing its network. Hence, the neoclassical prescription is this regard is negotiated TPA (on a structurally separated gas network).

3.6 CONCLUSIONS

This chapter provides an overview of the neoclassical perspective towards regulation. After having set out its hardcore assumptions – methodological individualism, methodological instrumentalism and methodological equilibration – the neoclassical view towards competition is discussed. The neoclassical assumption that competition is eventually always perfect implies that long-term equilibrium profits to producers are zero, that products are priced at long-term marginal costs and, consequently, that welfare is maximal. This view has far-reaching consequences for regulatory intervention as well as the preferred structure of a liberalized European gas market.

Starting with the former, in the perfect competition outcome, the market itself has attained maximum welfare, and consequently no regulation is necessary at all. Only if the market is in a situation that deviates from perfect competition is there a rationale for regulatory intervention. In other words, any market failure provides a reason to argue for regulatory intervention (whether actual intervention should take place is of course dependent on whether the costs of market failure outweigh the costs of government or regulatory failure). Regulators may intervene in case of a market failure in order to restore the perfect competition equilibrium. The market failures on the European gas market – failure of competition, public goods, externalities, incomplete markets, information failures and uninsurable risks – and the solutions that are commonly proposed on the gas market to correct these imply, in this neoclassical world, a substantial regulatory intervention.

The neoclassical perspective also provides prescriptions regarding the structure of the liberalized European gas market. One important observation in this respect is that in the neoclassical world, any efficiency advantage related to vertical and horizontal integration is ignored. Rather, integration is always assumed to be a response to, or anticipation of, market power. Consequently, the main task when reforming the gas market towards competition is to prevent any integration. If integration has already taken place, potentially competitive and non-competitive activities must be separated completely trough structural separation (ownership unbundling in the next chapter). With a structurally separated network, negotiated TPA is probably the best solution as it implies lesser regulatory interference and allows for more flexibility. The next chapter discusses current European gas regulation and shows that it is firmly embedded in the neoclassical perspective set out in this chapter.

4 The regulatory framework for European gas

4.1 INTRODUCTION

In order to show the link between neoclassical economics and current gas regulation, this chapter discusses the process and contents of European gas legislation. Section 4.2 discusses the process by setting out the European institutions and other stakeholders. It shows that European gas regulation emanates from a process in which a range of stakeholders define, influence and mould European gas regulation according to their objectives. Section 4.3 illustrates the link between energy and European integration, indicating that European energy markets are important not only from an economic perspective. This section also illustrates the sometimes substantial influence on regulation of different stakeholders. Section 4.4 provides general insights from agency theory for regulatory intervention and shows why regulation is inherently bound to fail. Sections 4.5 to 4.9 discuss the legislative measures that have been taken so far, with an emphasis on the Gas Directives which largely prescribe structural and regulatory reform measures, and the problems that have arisen in the process. Section 4.10 steps away from the discussion of the legal provisions. This section defines the Commission's overarching policy goal – the internal gas market – and the way in which the Commission and the regulators want to achieve this goal. Most importantly, this section shows that the internal market view is consistent with the neoclassical assumptions and the perfect competition equilibrium in chapter three. Section 4.11 concludes and provides the link with chapter five.

It is important to note that this study analyzes the issues from an economic, as opposed to legal, perspective. Because this chapter's discussion of European gas legislation is part of an economic study, the emphasis is on the economic impact of the legal provisions. One consequence is that this chapter does not intend to provide a comprehensive overview of the legal provisions, but rather uses the main legal provisions to illustrate the economic argument that current gas legislation is built on neoclassical guiding principles. In addition, the emphasis is on the economic literature where possible.

4.2 EUROPEAN INSTITUTIONS AND STAKEHOLDERS

Understanding how the European Union is moving from a regionally-oriented gas market towards an internal one, starts with the recognition that there is not a single European policymaker with a single objective, but rather that there are a host of different stakeholders, each acting according to their own objectives. This section discusses some of these stakeholders. It sets out the European institutions which together are responsible for the legislative measures and a number of stakeholders that exert influence on the design of European gas regulation and its implementation into national law.

We start with the European institutions. The main decision-making institutions of the European Union are: The European Commission; The Council of Ministers; The European Parliament; The European Court of Justice; The Economic and Social Committee; The Committee of Regions; and The Court of Auditors (Dinan, 1994, p. 205-329 and Senior Nello, 2005, p. 34-66). The latter three are often regarded as ancillary institutions. We concisely discuss the main features of the first four institutions.

The European Commission

The European Commission, or the Commission of the European Communities, comprises 27 Commissioners, one from each Member State. They are supposed to act to the Union's, rather than a Member State's, best interest. The Commission is divided in main policy areas which are represented by Directorate-Generals (DGs). From an energy perspective, Competition, Energy and Transport, Environment, and Internal Market and Services are the most important DGs.

Senior Nello (2005, p. 40, 41) provides an overview of the Commission's most important functions, of which we discuss six.

1 The Commission is the guardian of the Treaties of Rome. She must ensure application of the provisions from the Treaties and the measures applied to that end. If a firm, institution or Member State is found to act against the Treaties, she may issue a reasoned opinion, impose a fine or refer the issue to the Court of Justice.[1]
2 The Commission manages the implementation of rules laid down by the Council;
3 The Commission has certain autonomy in areas like competition policy, and negotiates for the Community in areas like foreign trade. She represents the EU in international organizations such as OECD, UN and the WTO;

1 For instance, if the Commission is not satisfied by a Member State's reply to its threat of legal proceedings, it issues a 'reasoned opinion' in which it sets out in full the grounds for the legal action and requiring the matter to be sorted out by a specific date. If not resolved at this stage, and as a last resort, the Commission can then bring an action in the European Court of Justice.

4 She prepares the annual preliminary draft budget for the Community and is responsible for implementing the budget;
5 She may publish formal representations (i.e., White and Green Papers) on specific policy areas in order to disclose her view and invite reactions;
6 She makes recommendations or opinions on matters related to the Treaties.

A number of these functions are interesting from an energy perspective. For instance, the function of managing the implementation of rules laid down by the Council comes to the fore when we discuss the third legislative package below. The final two functions are also interesting. As will be indicated below, Green Papers in particular exert quite some influence. According to Senior Nello (ibid., p. 41), the Commission's right to issue recommendations and opinions are two EU legislative instruments which have no binding force; others are Directives, Regulations and Decisions.

A Directive fixes a binding objective but leaves the method of achieving this objective up to the Member States. Hence, a Directive allows more scope for national sovereignty, which is an important reason for issuing Directives with respect to energy as will be pointed out below. Because a Directive must be transposed into Member State legislation, the Directive approach provides limited scope for national stakeholders to influence regulation. A Directive is often the result of a lengthy consultation process involving interest groups, politicians and other stakeholders, enlarging the scope for stakeholder influence. Second, the Commission may issue a Regulation which is directly binding in all Member States of the European Communities. Decisions are a third legislative measure. They concern specific issues and are binding on those to whom they are addressed. This may include Member States but also companies or individuals.

The Council of Ministers

The Council of Ministers is the main decision-making body of the EU. It comprises the ministers of the Member States (plus one representative of the Commission). It directly represents the Member States. The European Council, comprising heads of state and government, also represents the Member States, but is strictly speaking no EU institution (Dinan, 1994, p. 237). Therefore, the Council of Ministers can be seen as the only EU institution that directly represents the Member States (Senior Nello, 2005, p. 41). The Council is a single body, but meets in different configurations depending on the issue at stake. It has the power to accept or reject Commission proposals. Decisions are taken by a vote of Ministers from the Member States, which can take three forms: majority (for procedural decisions); qualified majority (for many decisions concerning the internal market, economic affairs and trade); and unanimity (for foreign policy, defence, judicial and police cooperation, and taxation).

The European Parliament

The European Parliament is the only European body which is elected directly (Senior Nello, 2005, p. 47). The Parliament shares legislative power equally with the Council, implying that it is empowered to agree, reject or amend European legislation. In addition, the Parliament may request that the Commission issues legislative proposals for laws to the Parliament (Dinan, 1994, p. 281). Another relevant right is that the Parliament may dismiss a single Commissioner or even the whole Commission.

The European Court of Justice

The European Court of Justice is composed of one judge from each Member State and eight Advocates-General. Its task is to interpret Community law and to settle disputes arising from the interpretation of Treaties or related legislation. EU law takes precedence over national law, hence the Court of Justice can overrule national courts and governments. It has the power to impose fines on countries that do not fulfil the obligations imposed on them by Community law. In order to speed up procedures, a Court of First Instance was created in 1989, also comprised of one judge from each Member State. This court has the power to hear direct actions (Senior Nello, 2005, p. 53).

Other stakeholders

These European-level institutions help us understand how the Gas Directives and accompanying legislation come about. European legislation is also influenced by other stakeholders. As indicated, Commission proposals are usually the result of lengthy consultations with different stakeholders like industry representatives and interest groups, allowing these stakeholders to influence the contents of regulation before adoption. Players from all links of the gas value chain have created associations to influence the European regulatory process – national regulators (CEER, ERGEG), producers (OGP), the gas industry (Eurogas, Marcogaz), infrastructure (i.e., transmission, storage, and LNG) operators (GIE), independent distribution companies (GEODE), industrial energy users (IFIEC) and energy traders (EFET).

As indicated above, a Directive must be transposed into national law: a Directive's provisions must be reflected in national law, inconsistencies of existing national laws must be eliminated and structures for application and enforcement must be created (Ministry of Justice, 2002). This process involves winners and losers. Consequently, various national stakeholders and institutions may want to influence European regulation ex-post through impacting the implementation of a Gas Directive into national legislation. National institutions include the relevant ministry, national regulatory authorities, national competition authorities and the national parliament. The ministry is responsible for translating a Gas Directive into sector-specific and competition legislation; the regulatory and competition authorities are responsible for enforcement. If necessary, these national institutions may adapt some

provisions to a Member State's market specifics. Other stakeholders are the national counterparts of the above European associations. They may try to influence the national institutions or the Parliament into moulding the provisions into a form more favourable to them.

In sum, the objectives specified in the Gas Directives must be implemented by everyone, which ensures a significant level of consistency between Member States. Nevertheless, the impact of the Gas Directives likely differs between Member States according to their interests, endowments and stakeholders. This implies that the Gas Directives will substantially influence, but not completely determine the outcome in a particular Member State. This study is concerned with the liberalization of European gas markets, and consequently emphasizes the Gas Directives which are the predominant legislative measures to this end.

4.3 European integration and the internal energy market

Energy has always been an important economic factor in Europe. Energy was a subject in the European Coal and Steel Community (ECSC) and the Euratom Treaties. One goal underlying the development of the ECSC was to build peace by linking together the Benelux countries, France, Italy and Germany into a common program of postwar production and consumption of steel and coal. The same six countries also looked to nuclear energy as a means to achieve energy independence. They joined together to form Euratom with the objective to contribute to the development of Europe's nuclear industry by pooling European atomic resources.[2]

Oil security had become a political issue at that time, due to the 1956 Suez Crisis. However, the negotiations on the European Economic Community (EEC) and Euratom Treaties were so far advanced that incorporation of oil issues or the development of an integrated energy policy were unfeasible (De Jong, 2008, p. 96). Nonetheless, an integrated European energy policy did not feature in the 1957 Treaty that established the EEC. According to De Jong (ibid.), in 1962 an integrated European energy policy was proposed. However, due to diverging national interests of the six Member States, the results were meager. For example, while Belgium and Germany depended in large measure on coal, oil was predominant in the Netherlands and France. The oil crises, by shifting the emphasis towards reducing energy dependence, changed the picture somewhat. In 1974, the Member States implemented a crisis mechanism which after the second oil crisis was extended and accompanied by a number of energy saving proposals. However, this was still a far cry from an integrated European energy policy.

2 See http://europa.eu/scadplus/treaties/euratom_en.htm.

Around a decade later, a real breakthrough was provided by the Commission Working Document 'The Internal Energy Market' (CEC, 1988) which instigated the extension of the internal market to energy, especially so for the gas and electricity industries.[3] The aim was to adjust the existing structures in such a way that energy would be traded on competitive market conditions (Correljé et al., 2003, p. 135). This approach implied far-reaching repercussions for the European energy sectors, because it necessitated the restructuring of sectors which were characterized by exclusive rights or a monopoly – of which the gas and electricity industries were notable examples.

Extending the internal market into the gas and electricity industries – i.e., liberalizing them – proved to be a difficult task.[4] Stern (1998, p. 90-92) offers a number of possible explanations. The industry view was that no liberalization at all was necessary. More influence from Brussels was unwelcome. Protection of profits was an important argument in industry opposition. Member States were largely opposed to liberalization because they feared that a large number of industry and trade union groups would be antagonized. They also doubted whether liberalization's benefits would be worth the effort. Their concerns were often expressed in terms of security of supply and public service obligations.

Despite the opposition, two early successes were the Price Transparency Directive[5] and the Electricity[6] and Gas Transit Directives[7] which entered into force within three years of the Working Document. Moving on towards real liberalization would prove much more difficult. Consultative committees set up to find common ground were inconclusive and only registered the substantial amount of disagreement between the Commission and the industry (Stern, 1998, p. 90). The electricity industry proved to be more willing to accept that liberalization may have advantages for them, allowing electricity liberalization to move faster than gas. The consequence was that gas and electricity could no longer be liberalized in tandem; each required its own approach (ibid., p. 92).

As indicated, there was considerable opposition to liberalizing national energy markets – from Member States, but also from powerful incumbent energy suppliers and other stakeholders. Incumbents – the gas utilities and gas producing companies – were opposed to the liberalization as this would create substantial pressure on their profitable national monopolies (Correljé et al., 2003, p. 137). Another impediment to liberalization was that many Member States viewed the energy sector as more than just an economic sector

3 COM(88) 238 final.

4 See Matlary (1997) for a discussion on the development of European energy policy between 1985 and 1995, and for an analysis of the important roles played in European energy policy by large Member States and interest groups.

5 90/377/EC, OJ L185 17/07/1990.

6 90/547/EEC, OJ L 313, 13/11/1990.

7 91/296/EEC, OJ L 147, 12/06/1991.

(see section 1.3). Member States feared they would lose an instrument enabling them to influence their economy if they ceded control over their energy markets. For example, according to Correljé et al. (ibid.), Germany subsidized its coal mines to maintain jobs while in the Netherlands, energy levies were introduced to facilitate energy saving as well as generate government revenues. Finally, an important reason is that each Member State had developed its own market structure which reflected specific national circumstances such as resource endowment, spatial distribution of activities and production, access to technology, political preferences, institutions and the stage of market development. The result was a divergence of energy policies among Member States (this situation was one of the reasons for using a Directive-based approach for energy). Table 4.1 highlights some landmarks of European energy liberalization policy. It does not intend to provide a comprehensive overview

Table 4.1: An overview of European liberalization policy initiatives

1987	Single European Act (OJ L 169/1) enters into force and largely excludes energy
May 1988	Publication Commission's paper 'The Internal Energy Market' (COM(88) 238)
July 1990	Price Transparency Directive (90/377/EEC) enters into force
December 1990	Electricity Transit Directive (90/547/EEC) enters into force
May 1991	Gas Transit Directive (91/296/EEC) enters into force
May 1994	Hydrocarbons Directive (94/22/EC) enters into force
February 1997	First Electricity Directive (96/92/EC) enters into force
August 1998	First Gas Directive (98/30/EC) enters into force
September 1999	First meeting Madrid Forum
August 2000	Gas market opening begins
July 2003	Second (Acceleration) Electricity (2003/54/EC) and Gas (2003/55/EC) Directives.
November 2003	European Regulators Group for Electricity and Gas (ERGEG) established.
July 2004	Market opening following the second Directives begins
June 2005	DG COMP Energy Sector Inquiry launched
November 2005	Regulation (1775/2005) on conditions for the access to natural gas transmission networks enters into force
January 2007	Publication of Energy Package and final report on the energy Sector Inquiry (SEC(2006 1724)
July 2007	Full gas and electricity market opening
September 2007	Proposal for a third legislative package (COM (2007) 529 final)

Source: adapted from Honoré and Stern (2007, p. 244).

of all legislative measures taken – that would have required a discussion of competition policy and merger legislation too.

The table illustrates that a large number of legislative, regulatory and policy initiatives have been proposed to liberalize Europe's gas and electricity market, providing an indication of the severe opposition. Another indication is that the gas and electricity markets are fully opened nearly twenty years after the first Commission paper on gas and electricity liberalization.

Nonetheless, the adoption of the Electricity and Gas Directives does signal the dismantling of the managed and integrated market structure into one that ultimately should develop into a genuine internal energy market. So far, we have emphasized the influence of Member State and stakeholder opposition as an obstructing factor to energy regulation. In addition, however, we also need to appreciate that regulatory intervention itself is a very difficult task for a regulator to undertake, inherently prone to failure. To elaborate on this, and to determine the circumstances under which regulation will typically fail, the next section discusses the economic literature on this regulatory failure.

4.4 Regulatory failure

The neoclassical perspective towards regulatory intervention set out in the previous chapter prescribes regulation in response to a market failure. In case of gas, an important market failure pertains to the natural monopoly characteristics of the infrastructure. As indicated in chapter three, the regulatory task is to remove this market failure in order to restore the perfect competition equilibrium. In consequence, network operators are commonly regulated, usually regarding their prices or revenues, in order to prevent them from abusing their dominant position *vis-à-vis* entrants.

The perfect competition equilibrium is attained only if regulation does not fail as well. Agency theory, however, illustrates that such failure of regulation is likely. It poses regulation as an implicit contract between a regulator/government and a firm. It focuses on ex-ante incentive alignment. Regulation can be posed as a game in which a principal – a regulator – tries to design a regulatory contract in order to provide the proper incentive to an agent – a regulated firm.[8] This section discusses the insights for regulatory intervention that emanate from agency theory.[9] Regulatory intervention is determined by the objectives of a regulator. These are discussed in section 4.4.1. Regulatory

8 Posing regulation as a principal-agent problem follows the 'new regulatory economics' approach that was developed in the early 1990s. Cf. Laffont and Tirole (1993) and Laffont (1994).

9 This section builds on Joskow (2006, p. 3-15) and Armstrong and Sappington (2006, 2007).

intervention will fail predominantly due to information problems and dynamic interaction with the regulatees, issues which are discussed in sections 4.4.2 and 4.4.3. This section finishes by delineating this study's scope of regulatory intervention.

4.4.1 Objectives

A regulator's objectives determine which kind of regulation will eventually be imposed. Typically, a regulator is assumed to act in society's interest and to maximize social welfare, which is the sum of the rents accruing to consumers and firms. In its simplest form, this amounts to the following formula:

$$SW = f(S; \alpha R)$$

Where SW stand for expected social welfare; S is an indication of consumer surplus; R indicates producer surplus; and α is a parameter denoting the relative weight attached to producer surplus by the regulator or society. If producer and consumer rents are weighed equally, α is 1. Most regulatory models assume a regulator to favor consumer rents over producer rents. There are two general approaches to this end. First, one might assume an α smaller than 1 (Baron and Myerson, 1982). This may be due to regulators being more concerned with the utility of local consumers, instead of that of company owners, who are not all local residents (Baron, 1989, p. 1362). A second approach emphasizes the social cost of transfer payments to the firm (Laffont and Tirole, 1986). In this case, a regulator is able to directly compensate a firm, in order to reimburse its costs and/or to provide a net transfer, through payments that draw from the government budget. These transfer payments carry with them a social cost due to distortions caused by the taxes that are used to generate these funds. Therefore, one dollar of transfer payment requires more than one dollar of taxes to raise it. To illustrate this, Laffont and Tirole (1986) introduce the parameter $\lambda = 0$. That is, one dollar of transfer payment results in one + λ dollar of social costs. Laffont (2005, p. 1, 2) estimates λ to be around 0.3 for developing countries.

Both approaches are similar in that welfare is increased by transferring producer rents to consumers. The optimal outcomes differ, however. In the former case, the optimal, perfect information outcome is marginal cost pricing with transfer payments compensating for the firm's fixed costs. However, in the latter case, transfer payments to the firm are costly.[10] This means that

10 This may be due to distortions created by subsidies or by an insufficient amount of public funds.

the optimal outcome is achieved by Ramsey-Boiteux pricing, as opposed to direct compensation (Ramsey, 1927 and Boiteux, 1956).[11]

Neven and Röller (2005, p. 830, 831) identify a number of factors that influence the appraisal of a consumer standard versus a welfare standard including producer profits, of which the influence of stakeholders is an important one. Based on a political economy model of merger control, Neven and Röller argue that without regulatory failure a regulator's objective must encompass both consumer and producer benefits. However, regulation may fail if lobbying is effective, i.e., if a regulator is likely to be captured by the merging firms or another stakeholder (see the next section). This may imply that a consumer-oriented standard is preferable as it mitigates the incentive to capture the regulator (we return to the issue of capture in the next section).

4.4.2 Information

The information at a regulator's disposal determines its ability to regulate. Regulation is straightforward under the neoclassical assumption of perfect information, for if a regulator can simply dictate the optimal regulatory scheme to the monopolist, no complications arise and all monopolists will act efficiently according to a regulator's (and society's) objectives. This would create the perfect competition behavior outlined above. However, a regulator is generally unable to perfectly observe neither a firm's costs nor its managerial efforts (Agrell and Bogetoft, 2004, p. 6 and Joskow, 2006, p. 4, 5). A firm will intrinsically have better information on these issues. This asymmetric information creates a classical principal-agent problem in regulation (given a divergence of the interests between the regulator and the regulatee). Unless the regulator manages to completely dissipate its informational disadvantage, this induces strategic behavior which complicates regulation.[12]

Unobservability of costs provides a firm with an incentive to portray itself as a higher cost firm than it actually is, because this will generally induce a regulator to set or allow higher prices. This decreases welfare. It also shifts rents from consumers to the firm, which as indicated above, further decreases welfare. A regulator thus faces an adverse selection problem in trying to distinguish high cost firms from low cost firms (Baron and Myerson, 1982).

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11 Ramsey-Boiteux pricing proposes a pricing rule based on the inverse elasticity rule. The price of the relatively inelastic good must be higher than that of its more elastic counterpart. Intuitively, it is optimal to increase prices to consumers who are unlikely to switch because this increases profits. In contrast, consumers prone to switching must be charged lower prices to prevent them from changing to another supplier.

12 The regulator may lessen his information deficit by for instance obtaining information on the regulated firm's costs from third parties. He may also implement a proper cost accounting system, commission industry studies or use competitive benchmarks or yardstick regulation (Joskow, 2006, p. 14-16).

Observing a firm's realized costs and then adjusting the prices accordingly after a certain period may mitigate the adverse selection problem.

However, this creates a second information problem. Auditing a firm's costs lowers the prospect of a firm earning a rent as prices will be adjusted to costs (with a delay). This might give the managers an incentive to decrease their efforts because the imperfect observability of managerial effort implies that high managerial effort will not be rewarded adequately and low effort not punished sufficiently. Accordingly, by solving the adverse selection problem, the regulator will have exposed itself to a moral hazard problem (Laffont and Tirole, 1993, p. 35, 36). Moral hazard results in managers exerting as low an amount of effort as possible. This managerial slack and accompanying x-inefficiencies (Leibenstein, 1966) pushes costs up higher than necessary, which increases consumer prices to above-optimal levels.

These information problems illustrate the fundamental problem pertaining to a regulator. If a regulator wants to transfer rents from the firms to the consumers by auditing a firm's costs, he induces the firms to engage in strategic behavior which increases their costs. Consequently, the regulator faces a trade-off between rent extraction and cost reduction, which constitutes the basis for the wide variety of approaches and instruments for regulating network industries that can be observed in practice.

Asymmetric information creates problems in other respects too. We highlight three examples. First, information asymmetries create scope for regulatees or interest groups to influence a regulator to undertake actions preferential to them but not necessarily to society as a whole (Stigler, 1971). Such regulatory capture significantly afflicts regulatory policies. In consequence, regulatory design focuses to a large extent on how to overcome capture (Helm, 2006, p. 174).[13] Secondly, asymmetric information rules out the optimal equilibrium. Crew and Kleindorfer (2006) submit that theories which conclude that regulatory policy might result in optimal prices, always assume some sort of common knowledge.[14] Hence, asymmetric information renders it unlikely that a regulatory policy will result in optimal prices. Finally, a firm's informational advantage implies that a firm cannot be motivated to disclose its privileged information unless it receives a (substantial) rent from doing so. In particular, Armstrong and Sappington (2006, p. 330, 331) argue that the regulated firm needs to receive the full surplus of its activities in order to behave efficiently, that is, to operate at minimum costs and to satisfy consumer demand and

13 See Dal Bó (2006) for a review of empirical and theoretical literature on regulatory capture.

14 In addition, Eggertsson (2005, p. 138) argues that 'the concept of the optimal regime or optimal economic system (…) is too elusive to be of practical use'. We get back to Eggertsson's views in chapter five.

needs.[15] Granting the full surplus to the producer means transferring the entire consumer surplus to him. If this situation is considered undesirable, and accordingly some surplus is transferred to consumers, the producers will not act efficiently in consequence. Some efficiency therefore may be sacrificed for distributional purposes.

4.4.3 Dynamic interaction

A regulator and a regulated firm will often interact with each other repeatedly. The above considerations apply to a static, one-period setting. At least two issues arise when dynamic interactions are taken into account.

First, a regulator might learn about the regulated firm(s) when interacting more than once. As indicated, this might reduce the regulator's informational deficit as it could use newly obtained information in the next regulatory period. It creates a risk to the regulatee if we consider a regulator's objectives. Because a regulator typically attaches a higher value to consumer rents than to firm profits, he has incentive to increase welfare by transferring rents from firms to the consumers. In regulatory terminology: a regulator has limited commitment powers not to renegotiate the regulatory contract. If the firms realize this, they will change their behavior accordingly. The regulated firm faces a trade-off between better performance in a particular period and resulting higher performance standards in future periods. This could induce the firm to underproduce, at least at the end of the regulatory period, in order to avoid more demanding future regulatory schemes – the so-called ratchet effect (Weitzman, 1980, Freixas et al., 1985 and Dalen, 1997). A related consideration is expropriation. Expropriation arises in the presence of sunk (or irreversible) investments which are particularly relevant to network industries (Williamson, 1975). Section 2.9.1 indicates that such investments tie the investor to the market he has invested in, creating scope for ex-post regulatory opportunism. With limited commitment powers, a regulator will behave opportunistically. He might choose not to compensate the firm for its investment, but rather to deliver all benefits to the consumers via for instance imposing low prices or encouraging entry via free or cheap access to the sunk investment. This changes an investor's ex-ante behavior. The investor might, in the extreme

15 This is the Loeb-Magat (1979) mechanism, which has been refined by Finsinger and Vogelsang (1982) and Sappington and Sibley (1988). The former allow for imperfect information of a regulator concerning consumer demand for the regulated product. A regulator will provide a regulated firm a subsidy equal to its approximation of the increment in surplus by its activities. In the latter's incremental surplus subsidy scheme, asymmetric information need not be a problem if the regulator knows the firm's demand curve and discount rate. They propose a dynamic modification of the Loeb-Magat mechanism which achieves the optimal regulation by granting the regulated firm a subsidy equal to the one-period gain in consumer surplus resulting from its pricing decision.

case, choose not to make any upfront investments at all. The negative impact on investments of limited regulatory credibility is referred to as the hold-up problem. The key issue for any regulatory policy aiming to stimulate investments in this respect is to remove the threat of opportunistic behavior by installing a commitment device (Van Dijk, 2008, p. 52). Hold-up of investments is a key parameter in TCE and therefore features prominently in chapter 5.

A second issue that arises in the context of dynamic interactions between a regulator and regulatee is that the composition of investments may change. Investors will choose a less capital-intensive production technique to mitigate the risk of being expropriated (Baumol and Klevorick, 1970, p. 179, 180 and Gilbert and Newbery, 1994, p. 551). If cost-reducing technologies require sunk investments, this effect moves the market equilibrium away from the optimum. However, dynamic interactions do not necessarily reduce investment incentives. According to Salant and Woroch's (1992) model, in which investments last forever, therefore with a very large danger of expropriation, the desired level of investment is reached when a firm gradually builds up its asset base. In this setting, if the regulator displays ex-post opportunism, the firm can credibly threaten to abandon its investment plan.

In sum, regulation will fail predominantly due to a regulator's information deficit which results in moral hazard and adverse selection problems as well as regulatory capture. Another source of problems is ex-post regulatory opportunism. Two important implications arise. First, limiting regulatory discretion has advantages because it lowers both a regulator's opportunity to behave opportunistically and the consequences if a regulator is captured. On the other hand, limited regulatory flexibility also lowers the scope for welfare-enhancing adaptations to regulation which may arise due to changing market circumstances, new forecasts or the learning curve of the parties involved. Hence, unless opportunistic regulatory behavior can be separated from efficient adaptations to regulation, there is a fundamental trade-off between discretion and commitment. Second, a regulator will generally be unable to implement the optimal regulatory regime. Even if an optimal regulatory scheme would be possible, the information deficit of a regulator obliges him to allow the firm some rents to induce it to reveal its superior information. To limit these rents and increase consumer benefits, some inefficiency must consequently be allowed.

In consequence, any regulatory policy will be inefficient to a degree. These inherent inefficiencies will always provide scope for arguing that competition improves matters. Accordingly, regulatory failure must be weighed against the market failure it is supposed to correct in order to determine whether regulatory intervention is the right course of action.[16] This has led Martimort (2006, p. 7) to argue that an important lesson from optimal regulation literature

16 This is one of the main arguments of the institutional perspective towards regulation which is discussed in chapter five.

is that efficiency should not be the sole criterion on which to assess regulation. Rather, the relevant concept here is interim inefficiency, i.e., reaching an optimal balance between efficiency and limiting a monopolist's rents from its privileged information.

In sum, the contents of regulation are determined by a regulator's objectives, its informational deficit and its interaction with regulatees. We finish this section by delineating our scope of regulatory intervention. Liberalizing European gas markets requires structural reform, regulatory reform and privatization (Joskow, 1996). The first comprises the vertical and horizontal structure of the industry as well as related access issues. Regulatory reform refers to creating new regulations and removing or reforming existing regulations, while privatization addresses the ownership structure.[17] The following sections discuss existing gas regulation, with an emphasis on the Gas Directives.[18] These largely prescribe reform measures.[19] Privatization measures are not included in the Directives and are consequently not considered explicitly in this study.

The next five sections provide a selected overview of important provisions emanating from the two Gas Directives issued so far, the Gas Regulation and the proposed third Gas Directive. Instead of providing an encompassing overview of all legal provisions, the main provisions are discussed concisely in order to illustrate how the thinking of European legislators on liberalization of the European gas market has developed and changed during the course of time.

4.5 The first Gas Directive

In 1998, the movement towards a liberalized internal European gas market resulted in the first attempt to lay down a sector-specific regime of common legal rules.[20] As indicated, creating a European internal gas market requires fundamental restructuring of the traditional market structure. This becomes clear when we consider that for the internal gas market to develop, at least

17 Regarding the regulation of network industries, Laffont and Tirole (1993) provide a standard reference work. Armstrong et al. (1994) analyze what economic theory has to say about reforming utilities (network industries). Aalbers et al. (2002) provide an overview of what 'one can say based on the economic literature about reform and privatization in network industries'. A recent and extensive overview of normative regulation theories on utilities (electricity, gas, telecommunications and water) is provided by Jamison et al. (2005).

18 These sections draw in part from Barents and Slot (2003) and Calster et al. (2007).

19 Note that certain aspects of regulatory reform are not explicitly addressed. For example, in order to guarantee fair and non-discriminatory access to networks, Member States have implemented incentive regulation measures such as price or revenue caps. Such measures, however, are not spelled out in the legislation we discuss, and will therefore not be explicitly considered in this study.

20 98/30/EC, OJ L 204, 21/7/1998.

the following three conditions must all be met: 1) free and non-discriminatory access to the essential facility, 2) free competition among suppliers and 3) the ability for consumers to choose freely between suppliers. Note the similarity with the perfect competition equilibrium set out in the previous chapter (see also section 4.9.1). None of these conditions were fulfilled in the old structure.

The first Directive can be thought of as the first attempt to transform the old structure into one that satisfies all three conditions. Its main provisions to this end are a phased market opening, introduction of third party access (TPA) to the system[21] and unbundling of potentially competitive activities and non-competitive activities. Below we provide the provisions of the first Gas Directive towards these three criteria.

Market opening

Liberalization requires that Member States open their gas markets to competition and allow new suppliers to compete with incumbents. According to Article 18, the gas market should be opened up gradually to enable national markets to adjust to the new environment in a flexible and ordered manner and to take account of the different market structures in the Member States. Consequently, markets were to be opened up in progressive stages. According to Recital 9, the principle of subsidiarity left implementation, where possible, to the Member States. Each stage defined a minimum requirement; Member States were free to increase their speed of market opening.

Access and unbundling

Market opening is necessary but insufficient to create an internal gas market. One reason is that the incumbents are typically vertically integrated with vested interests in downstream trade activities (see section 1.3). A problem in this regard is that the gas infrastructure is an essential facility: the use of pipelines is essential for delivering gas to consumers and duplication is, as a consequence of both the natural monopoly status of the network as well as the high investment sums, generally unfeasible or prohibitively expensive (see Annex). This renders potential entrants dependent on the monopolistic network owner, who can distort competition by discouraging or denying access to its network. Moreover, vertical integration enables the incumbent to extend its dominant position into trade activities. Because trade activities are potentially competitive, this situation needs to be averted. The unfeasibility of network

21 According to the definition of system in CEC (2000, p. 9, 10), TPA must be extended to upstream pipelines from production facilities to landing or processing terminals including ancillary services; processing and landing terminals; terminals for importing and exporting liquefied natural gas (LNG); high-pressure transmission pipelines; natural gas storage facilities; blending, load balancing and other ancillary services; and regional and local distribution pipelines.

duplication renders telecom-like competition between infrastructures impossible (or at best very expensive).

The second-best option is competition on the infrastructure. Consequently, chapter six of the Directive, comprising Articles 14-23, focuses on introducing competition on the existing infrastructure through imposing third party access (TPA) to the system. This is supposed to grant entrants access to the essential facility. Member States are allowed to grant access based on negotiations between the relevant parties (NTPA, Article 15) or on regulated terms (RTPA, Article 16). In addition, in order to take away the possibility and incentive for an incumbent to treat his own trade company preferentially, unbundling requirements and independent regulatory oversight must be introduced. The unbundling requirements (Articles 12 and 13) force integrated undertakings to unbundle accounts of their gas transmission, distribution and storage activities, and where appropriate to also keep consolidated accounts for non-gas activities. Consequently, transport and trade activities of the incumbents have to be separated from each other. According to Article 21, the transport activities must be regulated by an independent regulator to ensure non-discriminatory access to the networks of the transmission and distribution system operators, while the trade segment should engage in competition with other gas supply companies. This is supposed to grant to consumers a choice of supplier, keep prices and network charges low and service levels high.

4.6 Some unresolved issues

Notwithstanding the significance and positive influence of the first Gas Directive, additional measures were required. This was largely attributable to three unresolved issues: 1) uneven implementation among Member States, 2) different access regimes and 3) high levels of market power (Cameron, 2005, p. 9, 10).

First, the subsidiarity principle had allowed Member States considerable discretion in implementing the Directive (ibid.). The first Directive introduced a phased market opening with minimum opening requirements which allowed Member States to open their market beyond the minimum. A large number of Member States did so and a few did not, resulting in a patchwork of national markets with different degrees of market opening. One consequence was that energy companies that were shielded by a relatively closed market competed at the European level with energy companies from more open markets. This created unfair competition because an incumbent from a closed market was able to enter a liberalized market, while the reverse was impossible.

Second, the choice of access regime had created differences between Member States which impeded inter-Member State trade. In addition, the national regulatory agencies which had been established in those Member States favor-

ing RTPA differed in power and competence. For example, the German market displayed negotiated access and had not created an energy regulator (issues were supposed to be resolved through ex-post action of the competition authorities), which contrasted with the situations in most other Member States (ibid.). Such circumstances impede unfettered competition between Member States, because it is more difficult to access another, differently regulated, market. In addition, differing regulatory and access regimes make it difficult to build an interconnector pipeline that facilitates inter-Member State trade (in fact, that has been an important issue in the regulatory process concerning the construction of the BBL interconnector between Bacton in the UK and Balgzand in the Netherlands, see chapter six for an elaborate discussion).

A third problem was created by the consolidation among incumbents that had taken place in anticipation of the Gas Directive. This increased incumbent market power as well as national concentration levels. This posed challenges that extended beyond the scope of the Directive, as Community legislation did not include measures that directly address the concentration inherited from the traditional market structure (CEC, 2007c, p. 30).

4.7 THE SECOND GAS DIRECTIVE

These problems indicate that further measures are necessary to create a fully operational internal gas market. The second Gas Directive sets out to overcome these problems as well as to increase the pace of liberalization.[22] The second Directive is supposed to make it practically impossible for Member States to allow their own, shielded markets to exist. It tries to create the necessary regulatory framework to tackle the remaining barriers to the completion of the internal gas market. The second Directive proposes changes regarding the market opening, TPA and unbundling provisions.

Market opening

To quickly solve the problem of uneven market opening among Member States, Article 23 of the second Directive stipulates that the gas market must be opened up to competition at an accelerated speed: for non-residential consumers 1 July 2004 at the latest and full market opening for all consumers on 1 July 2007. This is a substantial improvement considering the absence of a definitive date for full market opening in the first Directive (Albers, 2005, p. 49).

Another measure to create a more level European playing field is the reciprocity clause in Article 23(2). This is a temporary clause which allows a Member State that has opened its market more than required by the Directives to refuse access to the network of an eligible consumer to a supplier from

22 2003/55/EC, OJ L 176, 15/7/2003.

a Member State in which the targeted consumer is not yet eligible. This clause allows Member States to liberalize more quickly than required without exposing them to unfair competition from less liberalized Member States. The Commission is also allowed to impose measures to ensure external reciprocity to guarantee an equal opening of downstream and upstream markets.

Access

Another important change in the second Directive concerns the access regime. The NTPA regime was considered unsatisfactory. Therefore, the choice between NTPA and RTPA in the first Directive is replaced by RTPA in Article 18 of the second one. That is, TPA to transmission and distribution must be granted on published and regulated tariffs. Gas storage is recognized as a special case in that on the one hand storage can be seen as an ancillary service providing flexibility to new entrants, which implies that access should be provided for when requested. On the other hand, gas storage can be seen as a system-related service because of its importance for matching supply and demand, optimizing the system and creating a level playing field. This would call for a more restrictive access regime. Therefore, Article 19(1) allows access to storage facilities, including line pack,[23] to be granted based on RTPA, NTPA or both. The access criteria must at the very minimum be objective, transparent and non-discriminatory.

One exception to this storage rule is that ancillary services and temporary storage related to LNG facilities, and which are necessary for re-gasification and subsequent delivery of gas to the transmission system, fall under the RTPA regime (Article 19(2)). Furthermore, some storage facilities may be exempted from the TPA provisions. This stems from the Commission's interpretation laid down in a non-legally binding Interpretation Note (DG TREN, 2004a): storage facilities that are exclusively reserved to transmission system operators (TSOs) for carrying out their functions and storage facilities that are used for production operations may also be exempted from the TPA provisions.

Regarding access to upstream pipeline networks,[24] Article 20 stipulates that the access provisions apply to the extent that these pipelines are not used for local production. This grants Member States considerable discretion. According to Article 21(1), access may be refused if this results in serious economic and financial difficulties with take-or-pay contracts (see also Article 27 regarding derogations based on take-or-pay contracts). Article 21(2)

23 Linepack refers to the ability of a natural gas pipeline to effectively 'store' small quantities of gas on a short-term basis by increasing the operating pressure of the pipe (ECORYS, 2007, p. 18). Line pack is often used as a resource to help manage the load fluctuations on their systems, building up line pack during periods of decreased demand and drawing it down during periods of increased demand.

24 Defined by Article 2(2) as 'pipelines or a network of pipelines operated and/or constructed as part of an oil/gas project, or used to convey natural gas from one or more projects to a processing plant or terminal or final coastal landing terminal'.

allows access to be refused due to a lack of capacity. The same Article states that Member States may take measures to ensure necessary improvements to the pipeline network insofar as it is economic to do so or when a consumer is willing to pay for them. Finally, Article 22 permits granting exemptions from TPA to major new infrastructure investments like interconnectors, LNG and storage facilities (see chapter six).

Unbundling

The third main requirement for developing the internal market is unbundling. The second Directive goes substantially further than the first: rather than unbundling accounts, the emphasis in Articles 9 and 13 of the second Directive is on legal unbundling. This means that TSOs and DSOs (distribution system operators) that are part of a vertically integrated undertaking must be independent at least in terms of their legal form, organization and decision-making from other activities not related to transmission and distribution.[25] No change of assets is required. Legal unbundling is limited to the natural monopoly (the network business); all other activities, like supply and production, may still be operated within a single company. According to Article 13 and Recital 11, Member States may be exempted from legally unbundling DSOs if a disproportionate financial and administrative burden on small distribution companies would result. Articles 13 and 33(2) state that for small DSOs serving less than 100,000 consumers the exemption is not time-limited, as opposed to bigger DSOs for whom unbundling could be postponed until 1 July 2007. In addition to the above three conditions for creating an internal market, other important factors include the public service obligations and the status of national regulatory agencies. We start with the former.

Public service obligations

A glance at Annex A and Article 3 of the Directive reveals that the provisions concerning the public service obligations (PSOs) and consumer protection have been strengthened. The measures to this end can be classified in three groups (Cameron, 2005, p. 24). First, there are obligations imposed upon the Member States. These are a) ensure that gas companies respect the Directives' requirements and do not discriminate, b) protect consumers, especially vulnerable ones, c) notify measures taken to achieve the PSOs, d) publish the PSOs and e) ensure easy consumer switching between suppliers. The second group of measures identified by Cameron (ibid.) are objectives to be pursued by the Member States, like the PSOs. The Directive allows Member States to define these objectives and impose them on natural gas undertakings, provided these are clearly defined, transparent, non-discriminatory and verifiable. Article 3(2) defines the PSOs as 'security, including security of supply, regularity, quality

25 See DG TREN (2004b) for the Commission's interpretation.

and price of supplies and environmental protection, including energy efficiency and climate protection'. Following Articles 5 and 26, other objectives to be pursued are protection of final consumers and social and economic cohesion. Member States are allowed to monitor and intervene based on security of supply considerations.[26] The third group of provisions allows Member States to establish a supplier of last resort and to protect remote consumers.

Regulatory authorities

Regarding regulatory authorities, two improvements have been implemented. First, Article 25(1) obliges Member States to set up one or more competent regulatory authorities which are wholly independent from the industry (but not from the government). This improves clarity and transparency compared to the first Directive which only prescribed that appropriate and efficient mechanisms for regulation, control and transparency must be created in order to avoid any abuse of a dominant position. According to Cameron (2005, p. 19, 20), a second improvement is that in order to ensure a level playing field as much as possible, Recital 13 formulates a number of regulatory competences in terms of harmonization (subsidiarity notwithstanding). This applies in particular to network access and setting and approving network tariffs or the methodology underlying their calculation. Important in this respect is Recital 14's emphasis on regulatory cooperation and coordination in Europe, which is considered vital to prevent the patchwork of regulatory strategies (Eberlein, 2005, p. 65). To this end, a number of informal institutions have been set up with the goal to bring together regulators and stakeholders and allow them to informally discuss regulatory issues. For gas, the Madrid Forum has been set up. It was established in 1999 and provides an informal EU-level framework for discussing issues concerning, and exchange experience of, the establishment of a competitive internal gas market. Madrid is also the platform to discuss (mostly technical) issues relating to the creation of an internal gas market which are not addressed in the Directive.[27] In addition, its informal and co-operative nature provided an alternative to vertically delegating regulatory powers to the Community (ibid., p. 81). This is why the Madrid Forum was also regarded as a way around the problem of Member State reluctance to cede control over their respective energy sectors (ibid., p. 63).

The Madrid Forum has reached an agreement on a few elementary principles concerning for example cross-border transactions, cost-reflective tariffs and non-discrimination procedures. However, as a consequence of the diverging interests of Member States, incumbents and new entrants as well as its informal status, the Forum has proved unable to convert these agreements

26 See DG TREN (2004c).

27 The Madrid Forum comprises officials from the Commission, national regulatory authorities and EU Energy Ministries, international organizations and associations representing the gas industry as well as gas and electricity consumers.

into formal legal, economic and technical rules. As a consequence, and in order to harmonize the work of different national regulators, the European Regulators Group for Electricity and Gas (ERGEG) was set up in November 2003 to ensure a consistent application across all Member States of the adopted Directive.[28] While ERGEG diminishes the influence of the Madrid Forum, Madrid will nevertheless remain an important discussion platform between regulators and stakeholders. The Gas regulation below highlights the importance of the Madrid Forum for regulation, its informal status notwithstanding.

Long-term contracts
Finally, the second Gas Directive considers long-term gas contracts. Given the potential usefulness of long-term contracts for facilitating sunk investments, Article 18(3) explicitly mentions that these contracts should not be precluded, insofar as they are compatible with the Directive and the competition rules of the Community (see chapter seven for a more elaborate discussion).

4.8 The Gas Regulation

As indicated, the second Directive provides a legal framework that is supposed to facilitate the development of an internal European gas market. However, it does not provide specific guidelines for transmission systems.[29] Therefore, following the Electricity Regulation, the Madrid Forum concluded that a similar set of rules was required for gas (Calster et al., 2007, p. 108). This has culminated in the Guidelines for Good Third Party Access Practice which set out to 1) clarify the role and responsibilities of the main parties in gas transportation, 2) ensure non-discrimination, 3) facilitate cross-border trade and consumer choice through competition in the internal market and 4) avoid distortions to trade (Madrid Forum, 2002b).

In September 2002, at the sixth meeting of the Madrid Forum, the Commission issued a compliance report on these guidelines, which concluded that there was a significant lack of compliance (DG TREN, 2002).[30] Accordingly, the first set of Guidelines were followed by a second set (Madrid Forum, 2003), adopted at the seventh meeting of the Madrid Forum in September 2003. However, according to a second compliance report (DG TREN, 2003), the Madrid

28 Lavrijssen (2004) provides a discussion on ERGEG. She (ibid., p. 7) argues that one of the reasons for the creation of ERGEG was the lack of Member State support for a European Energy Regulator (see also Geradin and Petit, 2004, p. 13).

29 Transmission is defined in Article 2(1) as 'the transport of natural gas through a network, which mainly contains high pressure pipelines, other than an upstream pipeline network and other than the part of high pressure pipelines primarily used in the context of local distribution of natural gas, with a view to its delivery to customers, but not including supply'.

30 At http://ec.europa.eu/energy/gas/madrid/6_en.htm.

Forum's informal status rendered compliance with the second Guidelines unsatisfactory too. To better ensure harmonization, the Commission decided that the principles laid out in the revised Guidelines must form the basis for a Regulation (1775/2005) on conditions for access to the transmission grid (Calster et al., 2007, p. 109).[31] The Regulation (CEC, 2005e) was adopted on 28 September 2005 and entered into force in November 2005.

The distinction between the Gas Directives and the Regulation can be illustrated in figure 1.1. The Directive impacts the downstream part of the European gas market – the LDCs and the small consumers – while the Gas Regulation focuses on the midstream part that incorporates the transmission companies and the large industrial consumers. The Regulation's main provisions are 1) to set harmonized principles for tariffs, or the methodology underlying their calculation, for access to the transmission network, 2) the establishment of TPA services, 3) harmonized principles for capacity allocation and congestion management, 4) the determination of transparency requirements, 5) balancing rules and imbalance charges and 6) facilitating capacity trading.

Compliance with the Regulation as well as the development of market forces in general have been, and are being, monitored by the relevant authorities. Regarding the Gas Regulation, ERGEG launched a public consultation process in 2007 to monitor the compliance with the Regulation's transparency requirements. ERGEG (2007a, p. 9) indicated a heterogeneous and sometimes low degree of implementation among Member States, creating a need for a more comprehensive and complete implementation of the Regulation. ERGEG also doubted whether national regulators had effective powers and enforcement mechanisms in place to ensure proper compliance and implementation of all regulatory requirements (ibid.). According to the Commission's most recent progress report on the development of the internal gas and electricity market (CEC, 2008, p. 9), these concerns have been an important reason for the Commission to propose a new legislative package (see below). The compliance monitoring process included five intermediate documents[32] and was concluded in July 2008 with the publication of a conclusions paper (ERGEG, 2008). In this paper, ERGEG's view was that the existing requirements in the Gas Regulation were insufficient to facilitate the development of an efficient and effective gas market. It proposes three measures that should be included in the current discussion on the third legislative package (see below): 1) ensuring complete implementation on the Gas Regulation, 2) strengthening the existing transparency requirements of the Regulation where necessary and 3) define and adopt additional transparency requirements where necessary (ibid., p. 3).

After the entry into force of the Gas Regulation, the Commission also closely monitored the implementation and effects of the above legislative

31 OJ L 289, 3/11/2005.

32 All documents are publicly available at http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS.

measures from a broader perspective, the results of which have been published in benchmark reports (cf. CEC, 2004a, 2005a). She has also kept in close contact with stakeholders through the meetings of the Madrid Forum. The Commission sees the results as generally disappointing because real competition is not developing as expected and hoped for. This has urged the Hampton Court European Council in 2005 to call for a true European Energy Policy. The Commission's response was a March 2006 Green Paper on the topic of such a coherent energy policy. These approaches are aimed at improving compliance with the Directive. To this end, competition law is also used. Following complaints of consumers and new entrants regarding the development of wholesale markets in Europe and the limited real choice for consumers, the Competition Directorate launched a sector inquiry into competition in the gas and electricity markets on 13 June, 2005.[33] The final report was presented on 10 January 2007 (CEC, 2007c). The report not only concluded that the second Gas Directive was implemented incompletely, but also that it failed to address all the structural problems.

In sum, market development and implementation of legislation were considered insufficient after the second Gas Directive and the Gas Regulation had been introduced. Accordingly, a January 2007 Commission Communication to the Council and Parliament entitled 'Energy for a Changing World' has been proposed to develop a general framework for overcoming the problems. In March 2007, the European Council accepted the 'new Energy Policy for Europe' proposals, which contain measures regarding all three energy policy goals.[34] An important element in a new European energy policy is the development of the internal market. Completing the internal market is the main thrust of the proposals for a third legislative package, adopted by the Commission in September 2007, which amends both the second Gas Directive as well as the Gas Regulation. We discuss the proposals of this third legislative package (which is currently debated in and possibly amended by both the Council and Parliament) below.

4.9 THE PROPOSED THIRD LEGISLATIVE PACKAGE

The third package is intended to complete the internal energy market and is therefore supposed to remove all structural failings.[35] In addition, according to IEA (2008a, p. 27), 'the rationale of this third package is the integration of the energy and the environmental objectives of the EU through the use of market based environmental and other measures'. The package proposes amendments in six main areas: 1) unbundling, 2) cooperation among national

33 See http://ec.europa.eu/comm/competition/sectors/energy/inquiry/index.html.
34 See http://ec.europa.eu/energy/energy_policy/index_en.htm.
35 COM(2007) 529 final.

regulators, 3) powers and independence of national regulators, 4) cooperation between TSOs, 5) improving the functioning of markets and 6) security of supply. Of these, the main new feature for market liberalization consists in the structural changes to the industry through ownership unbundling; the other measures are accelerations of already existing measures (ibid.).

Unbundling

Regarding unbundling, the view is that the existing provisions are insufficient to facilitate a well-functioning market (CEC, 2007h, p. 4-7). Legal and functional separation of network operations from supply and production 1) allow a system operator to treat its own affiliates more favorably than others, 2) does not guarantee non-discriminatory access to information and 3) retains an integrated company's distorted investment incentives. The Commission's preferred solution is ownership unbundling (structural separation in section 3.5.1). Note that the unbundling requirements only apply to the transmission grids; for distribution system operators, legal and functional unbundling is considered sufficient. Member States must ensure that a person who exercises control over a supply undertaking cannot at the same time hold any interest in or exercise any control over a transmission system. While this is the preferred option, an alternative is provided for those Member States that do not wish to go down the ownership unbundling path (ibid., p. 5). The requirement for this alternative is that network independence and investment incentives are similar to ownership unbundling. The Independent System Operator option (operational separation in section 3.5.1) allows a vertically integrated undertaking to retain the ownership of its network assets, but requires that it is managed by an independent system operator which is completely separate from the vertically integrated undertaking.

The package also considers undertakings from non-European countries. These companies must demonstrably and unequivocally comply with the unbundling requirements. The Commission proposes that third country undertakings can acquire control over a Community transmission system or TSO only if this is permitted by an agreement between the EU and the third country (ibid., p. 7).

Cooperation among national regulators

A second legislative change follows from cross-border issues. Cross-border issues have been one reason for setting up the Madrid Forum and ERGEG. While both forums have been useful, there has always been a regulatory gap – differences in regulation between Member States. In order to create true supranational gas markets, the technical rules need to be harmonized. This is out of the Commission's reach as well as the reach of ERGEG or Madrid. Accordingly, a new entity, independent of the Commission, must be devised that bundles the expertise of all 27 national regulators. An Agency for the Cooperation of Energy Regulators (ACER) is consequently proposed (ibid., p. 9-13). ACER

complements the actions of national regulators. Its main tasks are: allowing national regulators to cooperate, providing regulatory oversight of the cooperation between transmission system operators (see below), handling specific cross-border issues like exemption requests for interconnectors and providing advise to the Commission.

Powers and independence of national regulators
Following the first two Directives, Member States must establish national regulators that oversee and ensure the proper functioning of the market. Some national regulators are well-established, have strong powers and are independent. In some Member States such regulators have been established just recently, are not independent and/or lack the required powers. It is therefore proposed to strengthen the powers of national regulators by giving them a clear mandate to cooperate at the European level, in close cooperation with ACER and the Commission (ibid., p. 7-9).

In addition, their market regulation powers are strengthened by for instance granting regulators the possibility to review investment plans, monitor compliance with TPA rules and impose sanctions (ibid., p. 8). Furthermore, regulators must have access to information on the operational decisions of the firms. The requirements for regulatory independence are also strengthened. Rather than being independent from industry interests, a regulator must now be independent from any other public or private entity.

Cooperation between TSOs
Market integration requires that national TSOs cooperate effectively. For instance, network access and operational rules must be compatible for supranational markets to develop. The Commission considers voluntary cooperation initiatives in this regard, like Gas Transmission Europe, to be insufficient. Cooperation must therefore be strengthened (ibid., p. 13-15). Highlighted areas of cooperation are the development of market and technical codes, research and innovation initiatives of common interest, coordination of grid operation and investment planning (ibid., p. 14).

Improving market functioning
Market functioning needs to be improved according to the Commission. This relates to TPA, transparency, access rules for storage and LNG, and retail markets (ibid., p. 15-19).

Regarding TPA, the third package sets out to streamline the procedure for applying and granting exemptions from the TPA regime, as well as to clarify some of the conditions. An example is providing general minimum conditions for capacity allocation and congestion management of an exempted infrastructure, rather than determining these on a case-by-case basis (ibid., p. 15, 16). The transparency requirements imposed on incumbents must be increased in order to create a level playing field for new entrants. In particular, in

addition to publishing network capacities, it is proposed that transparency requirements also cover gas stocks, demand and supply projections and balancing and trading costs (ibid., p. 16). The strengthened national regulators must ensure and oversee this process. The Commission still sees access to storage and LNG facilities as insufficient, because the second Directive leaves too much discretion to Member States to define their storage regime. As a solution, the Commission proposes a better implementation of the voluntary Guidelines for Good Practice for Storage System Operators (agreed upon by stakeholders in the Madrid Forum). These Guidelines should become legally binding, storage system operators must be legally and functionally unbundled, national regulators must have more powers to oversee access to storages and there must be clarity on which regulatory regime applies to storage facilities (as opposed to the choice of access regime in the second Directive) (ibid., p. 17). LNG access also needs to become clearer. The second Directive's requirement that access must be regulated is considered too vague. It is also thought to create room for diverging Member State interpretations. Therefore, legally binding guidelines which spell out more clearly defined LNG access rules must be defined (ibid., p. 18). A final initiative to improve market functioning is aimed at retail markets. The Commission considers setting up a retail forum (analogous to Madrid and Florence) which would allow all stakeholders concerned to discuss specific retail problems (ibid., p. 18).

Security of supply

Ensuring security of supply requires sufficient storage and import capacity to be in place in order to satisfy a peak demand. It is proposed that the indicated network of European TSOs monitors supply security and makes system adequacy forecasts for summers, winters and the long-term. A European outlook needs to be construed which takes account of the possibilities to export and import gas in case of peak demand. Finally, cooperation among Member States is seen as an important element of supply security (ibid., p. 19). The current coordination platform is supplemented with additional transparency requirements on the level of commercial stocks (i.e., a storage operator must disclose on a daily basis the volume of working gas in its storages) and a solidarity mechanism between Member States is proposed (ibid., p. 20).

All in all, the third legislative package tries to improve matters by a strict separation of supply and production from transmission. Furthermore, the abilities of regulators need to be strengthened, both nationally and at the European level. Cooperation and coordination must be improved – between national regulators, TSOs and Member States. Operations along the entire value chain must be more transparent. Finally, greater solidarity benefits Member States by improving security of gas supply.

The regulatory framework specified above has been developed in order to create an internal gas market. At each stage, problems regarding the competitiveness or the development of the internal market have occurred. New

proposals were suggested that were supposed to remove the impediments. In consequence, the changes to regulation have been substantial. As set out in chapter three, there is a trade-off between regulatory flexibility and credibility.[36] To be credible, regulation must be as stable and predictable as possible while leaving room to implement necessary changes. Therefore, the third package is supposed to be the final one.

Some recent developments

Recent developments, however, are creating uncertainties. For example, as indicated, the Commission's proposal for a third legislative package could be amended by the Council and Parliament. Both did so, especially regarding unbundling, the key part of the proposals. On 6 June 2008, the Council agreed on a general approach to opening gas and electricity networks that prevents integrated energy incumbents from selling off their networks (European Council, 2008). This agreement was based on a third option – the third way proposed by France, Germany and six other Member states – for unbundling energy incumbents which allows former state monopolies to retain ownership of their gas and electricity grids. However, they would have to transfer their management to an independent transmission operator (ITO) with effective decision making rights over day-to-day operations like network operation and maintenance.

On 9 July, the Parliament's vote on two reports[37] provided general support for the liberalization of Europe's gas markets, but nevertheless called for some changes. The Parliament rejected the ISO option put forward by the Commission and adopted the third way ITO option. The MEPs (Members of the European Parliament) did install additional safeguards such as an independent trustee who would closely oversee the internal discussions of the gas transmission operator, as well as consumer protection measures like the right to withdraw from contracts without charge (European Parliament, 2008).

On 18 June, the Parliament voted on a report relating to electricity markets,[38] in which it rejected the ISO and ITO options, leaving ownership unbundling as the only option. The gas vote implies that agreement on gas liberalization is more likely than regarding electricity liberalization, where there is still considerable disagreement. A separate treatment for gas is not new; in 1994, the gas and electricity industries were also separated in terms of liberalization proposals (Stern, 1990, p. 92). At the time of writing (September, 2008), the effect of this split is not clear. For instance, the exceptions to full unbundling for gas may spill over to electricity. On the other hand, if successful in electricity, ownership unbundling could eventually also spill over

36 Or, in the terminology of chapter three, between discretion and commitment.

37 One was drafted by Romano La Russa, A6-0275/2008, the other by Atlanas Paparizov, A6-0253/2008.

38 Drafted by Eluned Morgan, A6-0191/2008.

to gas. In order to take away the uncertainty as soon as possible, this important issue needs to be resolved quickly. This is why the Madrid Forum invited the Council and the Parliament to come to an agreement on the Commission's proposals as soon as possible (Madrid Forum, 2008, p. 2).

In addition, the Commission has published a progress report on the development of the internal gas and electricity market (CEC, 2008) which reiterates the need for its third package proposals. The report notes that cross-border coordination at the regional level has improved (see also section 4.10.1 below). However, the main conclusion is that the problems identified in amongst others the Energy Sector Inquiry have not been solved and that major barriers to efficient functioning of both electricity and gas markets still exist (ibid, p. 2). Insufficient implementation of European legislation by Member States is another important problem in this regard (as also observed with respect to the Gas Regulation).[39] Four main areas of improvement are proposed (ibid. p. 9): 1) national regulators must be empowered with a view to ensuring proper implementation of legislation by stakeholders, 2) regulators must have their own responsibility to encourage implementation (for instance through harmonization of regulatory best practice models), 3) the industry must observe the legal requirements without compromise and 4) regulated energy prices remain a concern. In addition, according to the Commission, these problems cannot all be solved within the existing legislative framework, which explains its proposal for a third package.

4.10 THE INTERNAL GAS MARKET

As indicated, the overriding goal of the legislative measures discussed above is to create an internal gas market. In order to be able to assess whether the above legislative measures will be able to attain their goal, that goal must first be properly defined. To this end, the next section steps away from, and complements, the legal perspective by examining the Commission's and the regulator's definitions of the internal gas market and the way this market is supposed to be achieved. The final section points out the relation to the neoclassical perspective set out in the previous chapter.

4.10.1 The long-term vision

This section discusses the long-term vision of a single European gas market shared by the European Commission and the European regulators (ERGEG).

39 In addition to implementation of legislation, other areas of concern include market integration, concentration and consolidation, price trends, independence of network operators, effective regulation by regulators, the consumer dimension and security of supply.

The Madrid Forum (see section 4.7) has published a road map towards the internal European gas market (Madrid Forum, 2002a). It issues a step-by-step plan to achieve the long-term vision. It contains the following high-level objectives:

- real supply-side competition;
- contractual flows becoming decoupled from physical flows in many locations;
- entry-exit tariff arrangements for access to transmission networks;
- liquid hub-based trading;
- a robust and comprehensive regulatory framework; and
- effective mechanisms for investments in cross-border infrastructure.

A second road map builds on the first and identifies the following goals (ERGEG, 2005, p. 6):

> 'effective competition delivering real benefits for gas consumers throughout the EU; a stable regulatory framework facilitating efficient levels of investment; secure supplies; choice; and gas suppliers able to market their services to all consumers across the EU. This vision also now includes the availability of new sources of gas supply to Europe, notably LNG.'

The ultimate objective is a fully integrated single (internal) energy market, as also stressed by the Lisbon Council in 2000. The specific characteristics of Member State gas markets and consequent differing starting-points have been acknowledged. These have led to an intermediate step of creating effective regional gas markets based on liquid hub-to-hub trading. The Commission's view on the future European gas market hinges to a large extent on hub-based trading. A hub can be seen as an intersection of pipelines creating a central place where gas can be traded. Hubs are an important precondition for the development of an internal gas market, because a hub facilitates gas trade via bilateral contracts and exchanges.[40] Hubs also facilitate spot gas markets, like the UK National Balancing Point and the Dutch Title Transfer Facility discussed below, both of which are markets where gas can be traded and delivered instantly or at short, intra-day, notice. Spot markets allow the market to clear by enabling producers of surplus energy to locate available buyers for this energy, negotiate prices and deliver gas to the consumer. This greatly facilitates a competitive market.[41]

The regional markets should eventually be integrated to create a single European gas market. The Gas Regional Initiatives focus on creating a North-

40 Note that a gas hub is not an exchange. It is merely a convenient location for trade and provides some additional trade facilitating services, see Egenhofer et al. (2004, p. 18).

41 Other elements conducive to market competition include facilitation of price discovery, organization of trading in a transparent way and prevention of systemic risk.

west, South and South South East (SSE) regional gas market. Table 4.2 provides the definition of the regions.

Table 4.2: The Gas Regional Initiatives

Region	*Countries*	*Lead regulator*
Northwest	Netherlands, Belgium, France, Ireland, UK, Germany, Denmark, Sweden, Northern Ireland and Norway (as an observer)	The Netherlands
SSE	Italy, Austria, Greece, Slovakia, Hungary, Slovenia, Poland, Czech Republic, Bulgaria and Romania	Italy and Austria
South	Spain, Portugal and France	Spain

Source: ERGEG website[42]

Hub development is a priority in each of these regions: each region is more or less classified according to the existence of hubs or alternative trading mechanisms.

The Northwest region is best endowed both with hub trading and prospects for further development. We emphasize Continental trading initiatives and consequently largely exclude UK and Irish initiatives. The most liquid[43] Continental hub is the Zeebrugge hub, located on the Fluxys part of the Interconnector, with a churn rate of around four. Churn rates provide a measure of liquidity.[44] To put the churn rates below into perspective, consider the UK National Balancing Point which possesses a churn rate of around 10 or the US Henry hub which averages around 30. Zeebrugge is a physical, rather than a virtual, hub.[45] A second important hub is Eurohub, a physical hub in the Emden, Oude Statenzijl and Bunde region close to the Dutch-German border. This hub has good prospects since a great deal of European gas from either

42 At http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_INITIATIVES/GRI.

43 Liquidity is difficult to define. In fact, according to IEA (2008a, p. 46), 'Liquidity can be a somewhat elusive concept, since it is incorporates four distinct characteristics of a market namely: depth, breadth, immediacy, and resilience. Deep markets are ones in which large volumes can be bought or sold without moving the price excessively, and wide markets are ones in which a large number of different bids and offers are present in the market. Immediacy on the other hand relates to the ability to trade large volumes in a short period of time, and resilience to the ability of the market to recover towards its actual supply/demand equilibrium'.

44 Stern (2007, p. 18), defines a churn rate as the ratio of total trades to total demand in the region served by the hub. The churn rates quoted below are all from Stern (2007, p. 19, 20). The churn rates must be treated with care, however, because the figures relate to a single month: in other months other, possibly higher, churn rates may apply. They nevertheless show that in general liquidity is quite low. See Hernandez and Bahillo (2005) and IEA (2008a, p. 46-60) for a status reports on Europe's gas trading hubs.

45 At a physical hub gas is traded at a physical delivery point.

Norway and/or Russia can pass through this region.[46] Northern Germany also has the BEB virtual hub, offering both transport and storage services and accommodating approximately 25 bcm yearly. This hub is still in its infancy and is mainly used for physical balancing. Consequently, no significant churn rate can be expected. Fourth is the Dutch Title Transfer Facility, a virtual trading platform operated by Dutch network operator Gastransportservices (a subsidiary of network operator Gasunie), which is of recent origin and whose maturity and liquidity are increasing: whereas in 2003, 30 parties traded 1.3 bcm in total, numbers have increased to 40 parties trading 2.5 bcm in 2004. The churn rate has increased from three in October 2006 to sometimes seven in early 2007. Scandinavian hub development is starting with the virtual Gas Transfer Facility in Denmark. Gastra, the Danish gas system operator, considers developing a virtual gas trading hub in cooperation with the Nordic electricity exchange Nord Pool, which could stimulate the development of a Northwest gas market.

Italy is important in the SSE region. It has a developing trading point, punto de scambio virtual, which is conceptually located between the entry and exit points of the national (transmission) network. It is a virtual trading place which consents bilateral transactions between traders on a daily basis. Currently it accounts for a little over 2 percent of total supplies, but it has good prospects of functioning as a regional hub because large volumes of gas from different sources are expected to flow into Italy (see below). Given its state of infancy, the low churn rate is unsurprising. This hub appears to be used predominantly for physical balancing. The Austrian Baumgarten hub near the Slovak border is an important trading initiative both for the SSE and, due to the Nabucco pipeline discussed in the next section, also for the European gas market as a whole. It is a physical hub which already distributes Russian gas to Austria, Germany, France, Italy, Slovenia, Croatia and Hungary. To stimulate a regional market, Baumgarten has been upgraded to the Central European Gas Hub. Baumgarten is too young and too exclusively used for physical balancing to possess a significant churn rate.

In the Southern region, France's Points d'Exchange de Gaz are virtual hubs where gas can be traded bilaterally.[47] Their churn rate is generally below 2 and peaks at 3. In Spain, gas swaps are often conducted at LNG terminals.

The development of these regional initiatives, and market integration in general, is being monitored by ERGEG. The regional initiatives feature prominently in the Madrid Forums as well as an the 2008 progress report (CEC, 2008).

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46 The Emden region is already vital in Europe's gas supply from Norway since Europipe 1 and 2 and Norpipe all arrive in Emden.

47 A virtual hub operates in a wide geographical area and allows gas trade at any point within that area. Buyers and sellers are not tied to a specific delivery point – the system operator balances out all trades – which should facilitate gas trading.

The conclusions of the two latest Madrid Forum gatherings indicate progress being made regarding the Regional Initiatives (Madrid Forum, 2007, 2008). Nevertheless, according to the progress report, market integration has not yet developed sufficiently. This is indicated by, for example, the existence of price differences, regional monopolies, legal differences between Member States, and persistent cross-border congestion between Member States (CEC, 2008, p. 3).

4.10.2 The Commission's investment priorities

In addition to full implementation of the above legislative measures, the necessary infrastructure must also be developed in order to ensure the free movement of gas volumes between Member States (cf. IEA, 2008b, p. 31). Gas networks are therefore at the heart of a well-functioning European internal gas market. As a result, in order to materialize its internal market vision, the Commission's trans-European energy networks program identifies the missing links in Europe's energy networks and formulates priority investment projects which are considered essential to develop the European energy market. With respect to natural gas, six priority projects have been identified. We discuss the most important projects below (see DG TREN, 2007, for a comprehensive evaluation of the priority projects).

The first priority project is the Nord Stream pipeline, which is supposed to cross Germany and the Netherlands to arrive at Bacton in the UK (through the BBL which is extensively discussed in chapter six). Its intended yearly capacity is 55 bcm, equally divided over two parallel pipelines, and construction should commence in 2010. The first pipeline is planned to come on stream in 2011, the second in 2012.[48] An alternative route would involve constructing a pipeline parallel to the existing Yamal-Europe pipeline – Yamal 2 – running through Byelorussia and Poland to reach Germany and from there possibly on to the Netherlands and the UK. Both projects illustrate the relevance of a Northwest European gas market as envisaged in the roadmap. As a consequence of, for example, problems with Byelorussian and Ukrainian transit, Gazprom's emphasis too has shifted towards Nord Stream.

The second priority project focuses on the South region. Two major pipelines delivering Algerian gas to Europe are planned: the Medgaz and Galsi pipelines. Starting at the second half of 2009, the former is supposed to deliver 8 bcm per year to Spain and from there on to France. The latter should commence operations in 2009/2010 and is supposed to deliver a yearly volume

48 According to Goldman (2008, p. 159, 160), construction of Nord Stream has been postponed by at least a year due to, amongst others, concerns regarding the pipeline's effect on the ecology of the Baltic Sea, a rejection by Estonia to cross its offshore economic zone and Swedish concerns that the pipeline may be used by the Russians to install underwater eavesdropping equipment.

of 8 to 10 bcm of Algerian and Tunisian gas to Italy. Due to the inclusion of Italy, this priority project also facilitates the SSE region. Furthermore, Algeria might develop into an important energy corridor if the planned Trans-Saharan Gas pipeline, which is supposed to deliver up to 25 bcm of Nigerian gas per year to Europe, materializes as envisaged in 2015.

The South region is furthermore facilitated by the third priority project that focuses on bringing gas from Egypt and Libya to Europe. An 8-10 bcm per year connection between Libya and Italy (Gela) has been in operation since 2004. In addition, Egyptian gas could in the future be channeled to Spain via Libya. Thirdly, the Arab Gas pipeline, linking Egypt with Turkey via Jordan and Syria, is planned. From Turkey, the gas could be delivered to Europe via the Nabucco or Orient Express pipelines (see below).

The fourth priority project predominantly focuses on the SSE region. This region is growing in importance due to its proximity to the Caspian region. The goal is to deliver Caspian and Middle-Eastern gas via Turkey into Europe. It emphasizes Baumgarten. There are at least three important pipeline projects: the interconnection between Turkey, Greece and Italy, Nabucco and the Orient Express pipeline. The first project consists of interconnections between Turkey and Greece (ITG) and between Greece and Italy (IGI). ITG is currently under construction with a maximum capacity of 12 bcm per year (of which 8 bcm is anticipated to flow into Italy by 2012). IGI will transport up to 8-10 bcm per year and is foreseen to be completed in 2011 (the offshore section of IGI is the Poseidon pipeline discussed in chapter 6). The second main pipeline in this region is the Nabucco pipeline. Nabucco is planned to run from the Turkish border all the way to Baumgarten. Its anticipated maximum capacity is 31 bcm per year. Construction is envisaged to commence in 2010. Around 2010/ 2011, 8 bcm per year of Caspian gas is expected to reach Baumgarten. Its maximum transport capacity should be reached by 2020, with 16 of the 31 bcm reaching Baumgarten. As discussed below, however, Nabucco's prospects are quite uncertain. Thirdly, Caspian gas may also reach Austria via the 10 bcm per year Orient Express pipeline which runs from Turkey to northern Greece, the western Balkans, Slovenia and Austria. Connection of this pipeline to Italy is also envisaged. This project is still under consideration.

The final two priority projects focus on developing or upgrading LNG terminals and underground gas storage facilities. LNG initiatives focus mainly on the south region (predominantly Spain); Wilhelmshaven and Zeebrugge are the two Northwest candidates. DG TREN (2007, p. 32, 33) lists all proposed and planned projects, some of which are already operational. The capacities of many projects are not yet available. As an illustration, the Zeebrugge upgrade will add 4.5 bcm, Wilhelmshaven's planned capacity is 10 bcm and Spain plans to have a total LNG capacity of 65 bcm by 2011. Underground storage initiatives are more evenly spread across the Continent, with the

Northwest region possessing the largest volumes: 37.2 bcm in 2005.[49] According to DG TREN (ibid, p. 78), the region will need to double this volume by 2030. New initiatives are planned in France, the Netherlands, Belgium and Germany. Italy also has a substantial amount of storage: 12.8 bcm which is mainly developed as a strategic reserve.

In sum, gas trading initiatives are developing in Europe, but aside from the UK National Balancing Point, none possesses sufficient liquidity (Hernandez and Bahillo, 2005). The Sector Inquiry (CEC, 2007c, p. 34) confirms this: the 2003-2004 churn rate for Europe as a whole is about 1. The intermediate step of developing regional markets will require the right steps being taken to unlock sufficient liquidity at European hubs and a number of outstanding issues being addressed.[50] After liquid and well-functioning regional gas markets have developed, these should be linked together to create a single European gas market. However, this is still a far cry because according to ERGEG none of its vision's high-level objectives have been reached yet.

The interaction with producers causes additional problems. For one, European policies may contradict those of producers and vice versa. The Gas Directive does not apply to non-European countries. Therefore, simply demanding that producers act according to European standards is unhelpful. For instance, demanding the break-up of Gazprom is useless because the Russian government does not need to act according to European legislation. Once importing pipelines are built, however, European legislation will apply to the parts crossing European territory.

The planned Nabucco project provides an example of the tensions that arise. Nabucco, by unlocking resources from Azerbaijan and perhaps Iran, Iraq, Kazakhstan and Turkmenistan, is an important initiative towards lowering Europe's dependence on Russian imports, because it circumvents Russia.

However, two recent Russian pipeline deals may represent countermeasures. The first is a December 2007 agreement between the presidents of Russia, Kazakhstan and Turkmenistan to build a pipeline carrying 20 bcm per year of Kazakh and Turkmen gas to Russia (Financial Times, 2007b). The project consists of the reconstruction and expansion of one branch of the Central Asia Centre (CAC) pipeline system, comprising five separate pipelines constructed in the Soviet era, which chiefly carries Turkmen gas to Russia

49 Northwest Europe is defined as the Benelux, Germany, France, UK and Denmark as opposed to the broader definition used in the Gas Regional Initiatives.

50 According to page three of the roadmap a number of issues are: 1) experience of the development of existing successful hubs, 2) access to capacity into and out of hubs (including capacity trading), 3) incentives for investment in transportation capacity between hubs and in storage, 4) transparency, 5) availability of gas sources, 6) communication and transaction arrangements, 7) cross-border compatibility (i.e., of balancing and flexibility regimes), 8) cross-border capacity, 9) the arrangements for regulatory oversight and 10) existence of regulatory gaps relating to cross-border activity.

(Fredholm, 2005, p. 31).[51] This should carry an additional 10 bcm per year. In addition, a new parallel pipeline will be built to boost overall capacity to 20 bcm per year by 2012. On the European side, there are fears that this deal will decrease Turkmen and Kazakh gas available to Nabucco. The second pipeline deal is a proposal of Gazprom and Italian ENI to develop South Stream, a pipeline crossing the seabed of the Black Sea, which avoids Turkish transit by directly linking Russia and Bulgaria. Two routes are currently under consideration for the onshore section into Europe: one running north to Austria and Slovenia via Serbia and Hungary; the other to southern Italy via Greece. The pipeline's throughput capacity will be 30 bcm per year. It is expected to come on stream in 2012. In early 2008 several agreements have been concluded that indicate South Stream's progression. In January 2008, Russia and Bulgaria signed a deal that created a joint venture to build South Stream on Bulgarian territory (RIA Novosti, 2008a). That same month, the Serbian government approved the sale of a controlling majority in NIS, a Serbian state-controlled oil-refining monopoly, to Gazprom. The parties also agreed on the construction of the Serbian section of South Stream (RIA Novosti, 2008b). The third January 2008 deal comprised an agreement between Gazprom and Austrian OMV – an important partner in Europe's Nabucco project – granting the former a 50 percent stake in the Central European Gas Hub at Baumgarten in Austria (RIA Novosti, 2008c and OMV, 2008). With Hungary joining the project in February (RIA Novosti, 2008d), the northern branch appears to be advancing well. Regarding the southern branch, Gazprom is in discussion with Slovenia (RIA Novosti, 2008e). The line-up of participants in the project is growing fast. Once the line-up is complete, construction can commence.

Both projects fuel European supply security anxieties. By locking in potential suppliers through long-term contracts, both projects may render Nabucco obsolete and consequently increase Russia's grip on Europe. On the bright side, Turkey's recent agreement with Iran to develop its part of the South-Pars gas field in the Persian Gulf and to ship the supplies via Turkey to Europe, improves Nabucco's outlook. Nabucco's outlook has deteriorated recently as a consequence of the August 2008 Georgia crisis. Nabucco is supposed to deliver Caspian and Iranian gas to Europe. It is supposed to connect to the South Caucasus pipeline[52] (which in turn is supposed to connect to the Trans-Caspian gas pipeline[53]) which runs through Georgia (Goldman, 2008, p. 154-156). Because of the crisis, doubts have been cast as to the reliability of Georgia

51 The five CAC pipelines can be divided into two branches. The main branch consists of four pipelines (CAC-1, -2, -4 and-5) and runs from Turkmenistan through Uzbekistan to Russia. The second branch comprises the CAC-3 pipeline and reaches Russia via Kazakhstan (Fredholm, 2005, p. 32). The pipeline project focuses on this branch.

52 Built by a consortium led by BP in order to transport gas from the Shah Deniz field in Azerbaijan to Turkey.

53 A planned, submarine pipeline crossing the Caspian Sea between Turkmenbasy in Turkmenistan and Baku in Azerbaijan.

as a transit state, and by extension, the reliability of the South Caucasus pipeline supposed to feed Nabucco (ibid., p. 149). Therefore, in addition to uncertainty regarding gas supplies, the safety of the proposed route is also being doubted.

Of course, these anxieties may well be a European overreaction – just as the one following the January 2006 Russia-Ukraine gas row (Stern 2006a). This is because South Stream links Russia to its main consumer for the foreseeable future. The consequent interdependence could improve supply security. Furthermore, as indicated, for the European onshore sections which will fall under European jurisdiction, Gazprom will have to act according to European ownership, access and competition provisions. This should lessen concerns. This being said, large parts of these projects fall outside the scope of European regulation. These projects illustrate that the viability of many European infrastructure projects critically depends on the producer's reaction.

4.10.3 The link with the neoclassical perspective

The internal market logic is that eventually an atomized gas market with a large number of suppliers is created. The suppliers vehemently compete with each other on an equal footing and a short-term basis, creating unfettered supply competition. This supply competition lowers consumer prices, increases service levels and facilitates efficient investments. Efficient demand and efficient investments help alleviate supply security anxieties. Furthermore, in this perfect setting, gas prices internalize the costs of emissions, which mitigates sustainability issues. This is nothing short of a direct translation of perfect competition above. Therefore, the neoclassical perspective towards regulation is the guiding principle of existing gas regulation. This perspective implies that any impediment to the liberalization process or the development of the internal gas market is a sign of insufficient competition. This explains why the Commission's solution to the currently unsatisfactory development of competition is to more strongly pursue competition on Member States' gas markets (CEC, 2005e, 2007c). This builds on another important assumption, namely that by changing the structure of the market it is possible to change market participants' conduct in the desired direction. This assumption follows from the neoclassical structure-conduct-performance paradigm (Bain, 1956), which states that the market structure (the number and relative sizes of firms in an industry) determines firm conduct (output decisions and pricing behavior), which yields an industry's overall performance (for example, its efficiency and profitability). For example, the lack of competition at the transmission level can, according to the third legislative package, be overcome if we change the market structure through ownership unbundling. Following ownership unbundling, firm conduct will be more competitive. The main argument in this regard is that the behavior of a separated transport company

is more competitive than when the company is integrated (see section 4.9). An integrated transport company may have incentive to impede or deny access to the benefit of the incumbent's trading company. In contrast, separation severs the link between the transport and trading companies. The transport company now will focus only on its own core-business, the argument goes, which is to grant access. Accordingly, it will have incentive to offer third parties access to its grid on fair and non-discriminatory terms. This in turn will yield a more efficient performance. The next chapter provides a critique on this rather simplistic assumption.

Furthermore, one consequence of the perfect competition assumption is that by the time the internal market has developed, the invisible hand will have dissipated all problems. In other words, it is assumed that the market forces themselves will solve the current problems. The only thing to do for a regulator in this situation is to create an environment in which these market forces can flourish as much as possible. This argument is tautological: by assuming that the internal market will eventually work perfectly, all problems that may occur are considered temporary by definition and are therefore effectively assumed away. That is, all current problems on the European gas market will eventually dissipate once the internal gas market develops. However, if the current problems are due to a structural discrepancy between full competition and the specifics of the European gas market, then the current problems may well become permanent if not addressed explicitly. Consequently, by not recognizing the possibility of permanent problems, the perfect competition assumption by definition rules out this option.

4.11 Conclusions

This chapter provides an overview of the process and contents of European gas legislation. The development of European gas regulation involves the European decision-making institutions and stakeholders that exert influence both at the development stage as well as concerning the transposition of European legislation into national law. Stakeholders may capture regulators which generally induces regulatory failure. Regulation may furthermore fail due to a regulator's information deficit or its opportunistic behavior. As a consequence of these problems, any regulatory policy is inefficient to a certain degree. These inherent inefficiencies, in turn, always create scope to argue that competition improves matters by lessening the need for regulation.

This study emphasizes structural and regulatory reform on the European gas market (and ignores privatization). The emphasis is therefore on the two Gas Directives issued so far as well as the proposals for a third one. Due to the importance of gas transmission, the Gas Regulation is discussed too. These measures are developed to reach the Commission's long-term vision which is to create an internal European gas market. The priorities to this end are to

create regional gas markets as a stepping stone to the internal gas market, and to stimulate investment to develop a European gas network of sufficient size and flexibility.

These legislative measures indicate that the existing regulatory framework for gas is firmly embedded in the neoclassical perspective set out in chapter three. The internal gas market is a direct translation to the gas market of the assumptions underlying perfect competition. However, the new context for gas regulation is a far cry from the anticipated internal gas market. The substantial need for investments along the value chain and the observations that the international gas market is being dominated by sellers, that political considerations are growing in importance and that supply security and sustainability have become the priorities for energy policy, illustrate a departure from the perfect competition world. The criteria relevant in the new context are beyond the scope of current regulation which is built on neoclassical foundations, implying that we should consider thinking from a broader perspective than neoclassical economics.

5 The transaction cost perspective towards reform of the European gas market

5.1 INTRODUCTION

The transaction cost economics approach has been developed specifically to deal with the criteria in the new context for regulation. Consequently, this chapter examines whether the transaction cost economics (TCE) perspective provides better guiding principles for a regulatory scheme that stimulates investments, and reaches the energy policy objectives, in the structurally changed European gas market.

This chapter sets out the TCE perspective towards gas regulation. Section 5.2 starts with a number of general criticisms on the neoclassical perspective that have resulted in the development of alternative economic perspectives of which TCE is one. Section 5.3 firstly discusses the broader new institutional economics (NIE) approach. It discusses two waves of early contributions of the NIE approach towards network industries and their restructuring that illustrate some fundamental critiques on the neoclassical approach. Thereafter NIE's analytical framework is presented in an overview of Williamson's four institutional levels which, in conjunction, determine actual market behavior. This discussion sketches a number of consequences for structural and regulatory reform and illustrates the level at which TCE operates. Section 5.4 provides the analytical framework of TCE. From this discussion a number of criteria are derived that determine whether regulation will be appropriate from the TCE perspective. These criteria are used to develop an encompassing framework that combines the neoclassical and TCE perspectives. With this framework in hand, section 5.5 assesses whether TCE provides the proper theoretical underpinnings for European gas regulation in the new context. Section 5.5 shows that European gas regulation is vulnerable to ex-post hazards. Therefore, TCE indeed provides better guiding principles for gas regulation than neoclassical economics. Section 5.6 traces a number of important implications of the TCE perspective for regulatory intervention. Section 5.7 revisits the neoclassical prescriptions for reforming the European gas market discussed in chapter three. It shows that a liberalized gas market designed with the TCE perspective in mind differs substantially from one that emanates from the neoclassical prescriptions. Section 5.8 concludes and sets the scene for the case studies in chapters 6 and 7.

5.2 A CRITIQUE ON AND ALTERNATIVES TO THE NEOCLASSICAL PERSPECTIVE

As indicated in chapter three, the neoclassical axioms result in a perfectly competitive market in which competition is sufficient to steer firm and consumer behavior in the optimal direction. No government guidance is required. The firm is considered as a black box or production function that transforms resources into products, which are subsequently sold on a spot market. In consequence, firms and markets are seen as complementary, while in fact they are substitute governance structures (Coase, 1937). In consequence, neoclassical economics provide no explanation for the demarcation between markets and firms. It also fails to provide insight into the boundaries of the firm. That is, it does not explain the governance structures that lie between the extreme solutions of organization through markets or firms that can be observed in practice, for example long-term contracts. Furthermore, due to the black box nature of the firm, no consideration is given to its internal organization. In fact, internal organization of activities within a firm is considered costless. However, such considerations are vital in the new context set out in chapter two where devising an appropriate governance structure becomes the main consideration for regulatory policy. Neoclassical approaches are also criticized for their neglect of the influence of institutions on economic behavior. By analyzing matters through a perfect competition lens, neoclassical economics does not explicitly consider the presence of or need for institutions. However, even when assuming perfect competition, one also simultaneously assumes the presence of a set of institutional constraints guiding market exchange. Hence, institutions matter and must be considered explicitly.

These considerations have spurred a substantial body of research that amends the neoclassical approach. All approaches essentially argue that institutions must be incorporated into the analysis in order to adequately explain economic performance, and that institutions shape and define the actions of different players (Nelson and Sampat, 2001, p. 39). However, the proposed amendments to neoclassical theory to this end differ between three main approaches. Therefore, in order to delineate our own approach, we set out the main premises of these approaches below.

Closest to the neoclassical fundament is the research program sometimes labeled Neoinstitutional economics (cf. Alchian and Demsetz, 1972, De Alessi, 1983 and Eggertsson, 1990).[1] It upholds the neoclassical core of methodological individualism, methodological instrumentalism and methodological equilibration, but generalizes neoclassical economics by adding a few extra ingredients – information, the structure of property rights and transaction costs –

1 Several classifications have been made. We use the one found in Eggertsson (1990), which contrasts Neoinstitutional economics with New Institutional Economics, or NIE. An alternative classification is to identify old institutional economics – along the lines of Veblen and Hodgson below – with NIE, as in Hodgson (1989), Langlois (1989) and Rutherford (1989).

to the mix. Given these additional constraints and with given preferences, an individual optimizes his welfare. This eventually creates an equilibrium outcome, possibly characterized by an alternative organizational form.

This approach contrasts with the New Institutional Economics (NIE) approach which rejects parts of the neoclassical core, notably the rational-choice model which follows from the methodological instrumentalism postulate. Important in this regard is Simon's (1957) work, which has challenged the rationality assumption. He argues that the human mind has a limited ability to formulate and solve all the complex problems required for rationality. In effect, therefore, rationality is bounded. As a consequence, individuals will display satisficing rather than maximizing behavior: individuals try to attain acceptable minima rather than optima. Building on this and pulling together all the theoretical threads into a coherent framework, Williamson´s (1975) work is widely regarded as a landmark in NIE. NIE is primarily based on Transaction Cost Economics (TCE). Our discussion below emphasizes the TCE line of reasoning. By rejecting the rational choice postulate and replacing it with bounded rationality, NIE and TCE deviate somewhat from neoclassicism. They nevertheless retain large parts of it – for instance through upholding optimizing behavior by way of cost minimization and by following strict methodological individualism.

Bounded rationality has also given rise to a more forceful rejection of neoclassical economics. For instance, Hodgson (1988), building on Simon (1957) but also incorporating contributions by scholars like Veblen (1909), who questions the conception of economic man central to neoclassical economics, goes further than Williamson. In fact, in chapter 9 of his work, Hodgson provides a number of points of criticism on the Williamson approach, of which we highlight three. Hodgson (ibid., p. 203) argues that Williamson incorrectly treats information in a positivist sense, i.e., he ignores the fact that information on (transaction) costs has to be interpreted by the economic actors whose interpretations will differ due to differing cognitive frameworks. Furthermore, Hodgson's treatment of the market differs from Williamson's: rather than viewing the market as a state of nature, as does Williamson, for Hodgson the market consists of mechanisms which structure, organize and legitimate exchange (ibid., p. 174). This means that the market is itself a social institution (ibid., p. 206). In consequence, rather than solely focusing on explaining the presence of the firm, there is just as much need to explain the presence of markets. A third departure from the Williamson approach is that according to Hodgson, the existence of the firm must be explained not merely from the perspective of cost-minimization and efficiency, but also from the point of view of the firm as an institution of power (ibid., p. 214).

5.3 New Institutional Economics

In order to comprehend NIE's analytical framework, its early developments are instructive. Therefore, section 5.3.1 sets out some early contributions, following which section 5.3.2 provides the analytical framework.

5.3.1 Early contributions

According to Glachant (2002), the initial contributions of NIE to network industries and their reform came in two waves: one instigated by Coase and Demsetz, the other attributable to Williamson and Goldberg. Below we discuss the main insights for regulatory intervention that arise from both waves; this section reproduces the eloquent discussion in Glachant (2002).

Coase's contributions start with his milestone 1937 paper on the nature of the firm, in which he questions the neoclassical assertion that prices are delivered freely to economic agents. In practice, producing and disseminating market prices result in transaction costs. According to Coase, the market is not the only institution for coordinating economic activity; rather, both firms and the market are substitute governance structures. The most efficient mode of economic organization is determined by comparing the relative efficiency of market organization and organization within firms. This explains Coase's (1946) objections to the wave of nationalizing monopolies that were conducted under the assumption that marginal cost pricing would mitigate all problems. As indicated in chapter three, this requires the public authority to possess complete (and costless) information, which is unlikely. In a related point Coase (1959) argues that a government is unlikely to be more able than private negotiations to efficiently distribute scarce resources. He proposes competitive bidding (for radio frequencies) as an allocation mechanism. His landmark 1960 paper focuses on the neoclassical recommendation for intervention in case of market failure. While certain private transactions undoubtedly give rise to transaction costs, so does the alternative of government intervention. Accordingly, the choice between these two options hinges on a comparison of their transaction costs. An illustration is provided by Coase (1974). He argues that lighthouses, a classic example of public goods which according to the neoclassical perspective should be provided by the government, are actually privately owned and operated. He argues that regulatory intervention is not necessarily more successful than private ownership in correcting the market failure due to public goods.

Inspired by Coase's research, Demsetz (1968) asks why network industries need to be regulated. His answer is that there is no need for regulatory intervention if a competitive solution is available: a natural monopoly can be regulated by auctioning the right to operate the natural monopoly to the bidder that offers to supply at the lowest cost (also referred to as franchise bidding).

In other words, if competition on the market is not feasible, then competition for the market is the next best alternative. Building on these insights, Demsetz (1969) introduces his famous Nirvana fallacy which implies that an existing governance structure is considered efficient not when it corresponds with the theoretical perfect competition optimum but rather when none of the feasible alternatives is superior.

The second wave builds on and refines these insights. Goldberg (1976) argues that the merits of franchise bidding are contingent on whether the duties and services of the franchisee can be specified ex-ante in a contract. If the only concern is to obtain an adequate price, then ex-ante specification is straightforward and consequently franchise bidding indeed offers the best solution. However, for most network industries, other aspects are also important, some of which cannot so easily be specified beforehand, like service quality. Under these circumstances, the superiority of franchise bidding is questionable, because ex-post contracting issues arise. This extends to the analysis of Williamson (1985, p. 34, 35) who argues that the relative position of the bidders and the incumbent may change over time. That is, while there may be large-numbers competitive bidding for an initial contract, at the contract renewal stage competition may be hampered due to a small-numbers bargaining. This is because the incumbent is proceeding in a learning-by-doing manner, which grants him a non-trivial information advantage over competitors, putting them at a disadvantage. Williamson (1976) provides a practical empirical illustration of this effect.[2]

5.3.2 Analytical framework

As indicated, a fundamental criticism on neoclassical economics is that it ignores important institutional determinants that explain alternative forms of economic organization. To solve this problem, the neoclassical perspective must be enriched both to enable it to account for the costs of internal organization, as well as to recognize that there is a wide array of governance structures in real life through which transactions can be mediated (see Estache and Martimort, 1999, Berg, 2001, CIEP, 2006 and Dassler, 2006 for recent contributions). To this end, research has focused on theories of organization, also referred to as the economics of institutions, consisting of property rights theory, agency theory and Transaction Cost Economics (TCE) (Menard, 2005, p. 281). New Institutional Economics (NIE) has developed primarily out of TCE and is based on three pillars: transaction costs, contracts and property rights (see Klein, 2000, for a survey of the very broad NIE literature). These pillars have created two distinct lines alongside which NIE has developed, both of which

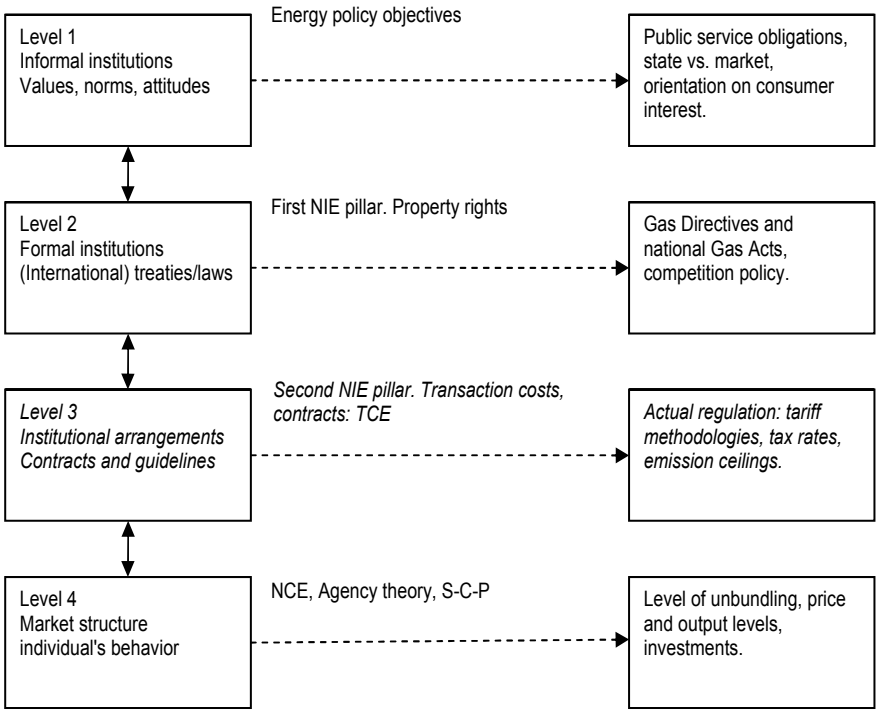
2 More on the Williamson framework below when we discuss Transaction Cost Economics.

originate from Coase's research referred to above. Williamson (1998, p. 24) puts it in the following way:

> 'The New Institutional Economics comes in two parts. Part one deals with the institutional environment – the rules of the game – and traces its origins to Ronald Coase's 1960 paper on "The Problem of Social Cost". Part two deals with the institutions of governance – the play of the game – and originates from Coase's 1937 paper on "The Nature of the Firm".'

The first part was further developed by North (1981, 1990), the second part by Williamson (1971, 1975, 1985, 1996). Figure 5.1 provides an overview of the different levels of institutional analysis.

Figure 5.1: New Institutional Economics, Transaction Cost Economics and European gas policy



Source: adapted from Williamson (1998), Groenewegen (2005) and CIEP (2006)

This figure was originally developed to illustrate the position of NIE among different levels of social analysis. The dotted arrows illustrate the relationship between NIE, TCE and the traditional neoclassical theories of economics. Recently, this framework has been deployed to explain differences in governance structures in infrastructure industries (cf. Groenewegen, 2005, Groenewegen and Künneke, 2005, and Midttun, 2005) and gas markets specifically (cf. Correljé, 2005 and CIEP, 2006). The right-hand side of the figure illustrates the impact of the different institutional levels on the European gas market. This framework has been discussed concisely in section 1.7 in order to motivate this study's focus. The following description is more comprehensive.

Level one comprises the informal institutions where the basic societal values and beliefs are located. One might, in this context, think of values, norms and traditions that create a level of social embeddedness for individuals. These informal institutions are the underlying determinants of a society's basic view on market reform and energy policy. For gas, the relevant issues include the energy policy objectives, perceptions about sovereignty over energy resources, beliefs about state versus markets and the emphasis on consumer interests (CIEP, 2006, p. 22). Changing the institutions at this level may take centuries or even millennia, giving them a pervasive influence on the long-run behavior of economies (North, 1991, p. 111).

The informal institutions determine the formal institutions at level two, where the polity, judiciary and bureaucracy are located. This is the property rights part of NIE which determines the rules of the game. One might at this level think of (inter)national treaties and laws laying down the ground rules for the behavior of market actors. This is the level at which market design takes place. It is also the level at which we find the Gas Directive and the national Gas Acts, which arise from the transposition of the Directives into national law as well as competition policy provisions. According to Williamson (1998, p. 27), first-order economizing – getting the institutional environment right – takes place at this level. Formal institutions also change very sluggishly: changes in the institutional environmental can take up to decades or centuries to materialize. Levels one and two comprise what Davis and North (1971) refer to as the institutional environment.

Getting the institutional environment right is not an easy task, because the traditional structure of the European gas market was not conducive to market competition. The vertical and horizontal integration as well as the shielded national gas markets prevented competitive forces from spreading across Europe. Consequently, liberalization requires significant restructuring of the European gas market as a consequence of which there will be winners (presumably the consumers) and losers (the incumbents). Chapter four points out the important role of interest groups and stakeholders in shaping and moulding gas regulation. Regulation with the aim of implementing liberalization can only be properly devised and implemented if there is sufficient support for it among stakeholders. Glachant and Perez (2007) provide interest-

ing insights into the consequences for network industry regulation. They argue that if the pro-reform coalition is not sufficiently strong, the practical effects of the restructuring efforts may be much less than anticipated. For instance, vested interests may be exempted from the provisions in order to launch the reforms. This implies that it is difficult in practice to promptly restructure the European gas market into one governed by competitive forces. The result is that initially, liberalization initiatives are scaled down in order to limit opposition. Examples in this regard pertain to the TPA and unbundling provisions, both of which have become more strict after the first Directive. Accordingly, the liberalization process is spread out over many years and implemented in different successive stages. This approach is reflected in gas regulation with both Gas Directives proposing to open the market in progressive stages and leaving implementation to the Member States. Glachant and Perez raise the point that splitting up of the process may impact the course of liberalization: if a certain stage of liberalization has been reached, it may be hard to progress from there on because of the opposition of (new) stakeholders. Eggertsson (2005, p. 138) points out another drawback: this modulation of institutional reforms is risky because it may create interim periods of severely malfunctioning economic systems.

In addition, restructuring alone is insufficient. For instance, vertical separation may improve matters by removing anti-competitive incentives. However, its effect will be severely limited if it is copied onto the traditional market structure without additional measures. Hence, removing vertical integration may be necessary but is not sufficient. Rather, the institutional environment should be changed by rearranging existing property rights in order to create an institutional structure that better aligns with the separated entities.

However, changing institutions create their own problems. This can be seen by considering North's (1990) analysis of the process of institutional change. According to North, institutional changes always become necessary in the course of time, because no one really knows what will happen in the longer term. Since some outcomes or events are unobservable, they cannot be specified in a contract, inviting ex-post changes. He argues that existing institutions do not change overnight, and will accordingly impact the present structure as well as the possibilities for structural change. Therefore, institutional changes will not consist of radical adaptations to the existing structure, but rather incremental ones at the margin (ibid., p. 101). In other words, changes are marginal and build on the existing institutional structure. Hence, when the formal institutions are changed, for instance through issuing a new Gas Directive, a disequilibrium may be created because the more tenacious informal institutions do not change accordingly. Without adequate adjustment to the new situation, this disequilibrium can create problems and tensions which may, for instance, increase opposition to, and lower the feasibility of, the reforms. In North's (1994, p. 367) own words: 'It is adaptive rather than allocative efficiency which is the key to long-run growth'.

From a slightly different perspective, Aoki (2001) points out that new or changed institutions need to be implemented in a world where numerous other institutions already exist. These existing institutions (like long-term take-or-pay contracts) partly lock-in the current situation.[3] This will impact, either positively or negatively, the development and prospects of new institutions. As above, the consequence is that a discrepancy may arise between the inert existing institutional environment and the institutional changes implemented in order to realize the competitive reforms. In consequence, the new, adjusted institutional structure may well be less far-reaching than originally intended by the new Directive.

The rules of the game determine the way the game is played, which is located at the third level. This is the level at which the institutional arrangements are designed. Here the laws, treaties and property rights developed at the second level are transposed by Member States into actual regulation such as contracts, guidelines or tariff methodologies. This is where the governance structure (cf. Williamson, 1985, 1996) – addressing issues like spot market trading, the level of unbundling or state ownership – is determined.[4] Getting the governance structure right is referred to as second-order economizing. Changes in governance can take up to a decade to materialize. These institutional arrangements are the focus of transaction cost economics (TCE). TCE takes the institutional environment as given. That is, TCE determines the most appropriate mode of governance given the prevailing property rights, rule of law and regulations. This study analyzes existing European gas regulation, and consequently emphasizes this third institutional level. The next section more elaborately discusses the TCE framework which is central to this study's analysis.

At the fourth and final level, the institutional arrangements drive the behavior of market actors who try to achieve their specific objectives. This is what neoclassical economics is concerned with. The issue here is to get the marginal conditions right, which is third-order economizing. Changes at this

3 Different reasons have been put forward. Couwenberg and Woerdman (2006) analyze lock-in on the Dutch natural gas market and argue that the old transactions create a lock-in that makes implementation of full competition impossible. Without explicitly analyzing path dependence, Polo and Scarpa (2007) corroborate this by arguing that the presence of take-or-pay commitments might negate the pro-competitive effects of stimulating entry. They claim that take-or-pay commitments might create a segmented market, i.e., a market in which each supplier targets a different segment of the market. The resulting entry without competition would harm liberalization's efficacy. From a different perspective, Mañé Estrada (2006, p. 3784) 'can think only of two possible answers' to the observation that the EU appears to be locked-in to its current competition approach: 1) the current policies are the only viable ones in today's EU or 2) statesman of the EU have ceased to observe the actual world around them. The first answer corresponds with lock-in being caused by the ongoing integration movement (see section 4.3), while the second one implies that the market shifts from chapter two may not be adequately recognized by European policy makers.

4 See Groenewegen (2005, p. 10) for a number of options.

level concern prices and quantities, and these changes occur more or less continuously in response to changing market conditions. As indicated in chapter three, the neoclassical emphasis on regulation is neatly illustrated by the structure-conduct-performance (S-C-P) paradigm (Bain, 1956). In this paradigm, the market structure (the number and relative sizes of firms in an industry) determines a firm's conduct (output decisions and pricing behavior), which yields an industry's overall performance (for example, its efficiency and profitability). From this perspective, a firm's only function is to transform inputs into outputs. In contrast, NIE and TCE regard the firm as an organization which must itself be subjected to economic analysis (Klein, 2000, p. 463, 464).

Hence, the value of the neoclassical approach notwithstanding, figure 5.1 indicates that this viewpoint towards regulation is no longer appropriate. Accordingly, a main message of this study is that the neoclassical approach must be complemented with the NIE framework in order to explicitly recognize the important role of transaction costs, contracts and property rights in European gas regulation. Note that while the above description of the four levels implies a one-way, top-down, causality, the arrows indicate otherwise. Williamson's (1998, p. 26) assumption is that while causality also runs from the bottom up, this causality is less strong than the top-down causality. Therefore, the main causality is top-down. However, recent research seems to indicate that the bottom-up causality may be stronger than Williamson assumes, as illustrated in the next section.

5.3.3 Criticism on and adaptations of the Williamson framework

Causality also runs from bottom to top due to the presence of several bottom-up feedback loops. For example, as indicated in chapter four, the actions of market players and stakeholders influence the design of European regulation that is being imposed on a market. They may lobby the regulatory institutions to induce institutional changes at a higher level. Firms and investors may also influence the higher-level institutions by changing the market structure through mergers, take-overs and joint-ventures (Correljé and De Vries, 2008, p. 76). In addition, all players learn during the process, for instance as a result of new insights into the developing institutions. This learning curve may change their behavior and may in turn also change the institutions. Other examples that induce bottom-up pressure include technological change and broad societal change (CIEP, 2006, p. 23). In addition, undesirable market outcomes at the fourth level may indicate that the institutional environment and/or arrangements are working unsatisfactorily, which may prompt institutional changes. For example, insufficient investments may signal the need for amendments to regulation in order to better facilitate investments. This may explain some of the amendments to regulation we have discussed in the previous chapter, for instance the enlarged scope for exemptions from the TPA provisions and

the acceptance of some degree of long-term contracting. These feedback loops indicate 1) that the bottom-up causality may be stronger than assumed by Williamson and 2) that regulation is a dynamic process.

However, using insights from North (1990), Correljé and De Vries (2008, p. 76, 77) highlight two informational reasons that may weaken the feedback loops. First, information may be insufficient to determine whether a specific choice is superior to the current one. They provide the example that the experience with liberalized markets is too limited to provide clear evidence that a market design without a capacity mechanism provides sufficient investment incentives. Without a superior option, or consensus on it, the easiest solution is to stick with the existing option. This is one of the causes for the lock-in (or path dependence) indicated above (ibid., p. 12). Second, the models – both formal and mental – with which information is processed may be inadequate. Any model is inherently a simplification of the real world and will therefore always highlight only part of the real world. Different national policy and political traditions to some extent result in different reference models of policymakers, and these in turn result in different policy guidelines. If feedback is sufficient and adequate, these models can improve over time and converge towards an optimal model. However, in complex systems like electricity and gas, feedback is likely to be inadequate. In their conclusion, Correljé and De Vries (2008, p. 89) identify time lags (due to investment lead times) and the fact that much of the feedback represents the perspective of lobbyists as additional impediments to the feedback loop.

In addition to the more prominent presence of feedback loops indicated above, several other amendments to the Williamson framework have been proposed recently (cf. Haase, 2008). First, De Vries and Correljé (2006) disagree with Williamson's indications regarding the time periods of institutional changes. Specifically, they argue that the time periods might be too long and static. The periods also appear to be based more on aesthetic considerations than on empirical observations. Second, Correljé and De Vries (2008, p. 68) argue that the governance structure is also determined by a set of exogenous factors, comprising macroeconomic characteristics (e.g., level of development and economic growth), the institutional and socio-political constitution of a country (e.g., rule of law and institutional centralization) and the physical situation (e.g., resource endowment and physical size of the market). A third amendment follows from De Vries and Correljé (2006), who argue that the distinction between the formal institutions at level 2 and the institutional arrangements at level 3 are not as clear-cut as implied in figure 5.1. They distinguish between general formal institutions which correspond to the rules of the game in the Williamson model on the one hand, and sector-specific formal institutions which are determined by the scope of the Gas Directives and Regulations on the other. They argue that the difference between the two is ambiguous. Recall from chapter four that the basic legislative principles are determined at the European level (in consultation with stakeholders), following

which Member States must transpose the legislation into their national law. According to Haase (2008, p. 11) this multi-level and multi-actor regulatory process explains the ambiguity. She provides the following example which illustrates that unbundling can be classified both as a formal institution and an institutional arrangement. European gas legislation determines that legal unbundling must be implemented. This qualifies as a formal institution at level 2. On the other hand, national regulators determine which form of unbundling is actually introduced in a Member State, which constitutes an institutional arrangement at level 3. Fourth and final, she (ibid., p. 12) contends that energy policy objectives may change at relatively short notice (see the first amendment above), which would imply changes at the lower institutional levels. As an example, she mentions the energy paradigm shift put forward by Helm (2005a, 2007a). According to Haase, this new paradigm implies a shift from the competition, liberalization and privatization emphasis prevailing during the 1980s and 1990s to one governed by supply security and climate change. This changed paradigm will impact the lower institutional levels, and consequently probably require a different governance structure. Note that this relates to our discussion of the market shifts in chapter two (although we argue there is more to this issue than just a shift in policy objectives). We argue that these market shifts create a gas market that is fundamentally different from the one from which existing gas regulation emanates. This begs the question whether gas regulation is able to adapt in order to secure the energy policy goals in this new context in which gas regulation operates.

5.4 Transaction Cost Economics

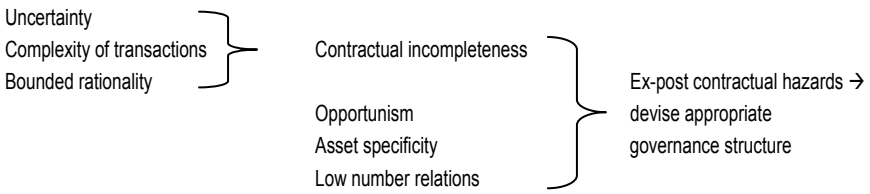
TCE is concerned with institutional arrangements such as contracts and guidelines. The transaction is the basic unit of analysis. In short, TCE argues that many transactions create contractual hazards which must be mitigated through an appropriate governance structure. It studies comparative contractual arrangements and examines which of the feasible alternatives is best suited given the transactions at hand. As pointed out below, this makes TCE the ideal basis for designing regulation in the new context set out in section 2.9.

5.4.1 Analytical framework

The ease of contracting is an important difference between neoclassical economics (NCE) and TCE. NCE, with its perfect competition postulate, assumes that contracts are complete, i.e., that every possible contingency can be foreseen, specified and agreed upon in a contract. This does not imply the absence of uncertainty. The future is not known but the probability distributions of all possible future events are (Klein, 2000, p. 466). In Knight's (1921) terminol-

ogy, NCE assumes the presence of risks rather than uncertainties, which allows for contracts that foresee and anticipate all possible contingencies. Under these assumptions, there is no efficiency argument for coordinating transactions outside the market. Hence, market exchange is the best option. TCE takes a different perspective. Figure 5.2 illustrates TCE's analytical framework.

Figure 5.2: The analytical framework of TCE



Own elaborations

TCE allows for the presence of uncertainties. That is, the available contracting options are limited because nobody knows exactly what will happen in the future. This translates into contractual incompleteness, because a contract cannot take account of ex-post adaptations that cannot be foreseen ex-ante. Even if we assume the possibility of contractual completeness, writing, monitoring, verifying and enforcing a complete contract will likely be prohibitively expensive. If we consider a very simple transaction like buying an off-the-shelf component, the uncertainty is very small and spot transactions are likely to be the preferred solution. However, more complicated, specialized transactions which are common on gas markets, require more sophisticated modes of governance. According to Williamson (1975, p. 4), an important cause for contractual incompleteness, in addition to uncertainty and complexity of transaction, is bounded rationality. That is, an agent intends to behave in a rational manner but will do so only to a limited degree, for instance because human beings are limited in knowledge, foresight, skill and time. This explains the left-hand column of figure 5.2: the inherent presence of uncertainty, combined with the complexity of transactions and the bounded rationality of individuals, renders most contracts unavoidably incomplete.

Contractual incompleteness invites opportunism, also known as moral hazard, which is defined by Williamson (1996, p. 6) as 'self-interest seeking with guile'. The gaps present in any contract can be used by an agent to

achieve his own personal goals which do not necessarily coincide with those of society as a whole – think of sub-goal pursuit, shirking, etc.[5]

In addition to contractual incompleteness, asset specificity is an important cornerstone of TCE. It can take one of several forms.[6] For European gas, common forms are locational and physical asset specificity and especially dedicated assets, as indicated in section 2.9.1. Locational specificity relates to the spread of gas reserves; physical specificity relates to the network-bound character of gas; and dedicated assets refer to investments in assets that are specific to a particular consumer or relationship. Arguably the most important form of specificity in the case of gas is dedicated assets. Dedicated assets sink investments into a market and create a bilateral relationship between the parties involved. These then have an incentive to bargain about the rents that arise from the sunk investment. This can have negative effects both on ex-ante investment and ex-post efficiency, as well as increase transaction costs. In fact, transaction costs are determined to a large extent by the degree of asset specificity (Williamson, 1985, chapter 4). Asset specificity is closely related to low numbers relations, the final element in the second column of figure 5.2. This is due to the fact that asset specificity creates a condition of bilateral dependency, which implies that what may have been a large number supply situation at the outset is transformed into a small number exchange relation thereafter.

In the third column, the interplay of the transactional characteristics – contractual incompleteness, opportunism, asset specificity and low numbers bargaining – induce ex-post contractual hazards which increase the costs of transacting. Therefore, the cost of handling a particular transaction does not only consist of the direct contracting costs of writing, monitoring, verifying and enforcing contracts, but also of the costs of ex-post contractual hazards. These hazards render market exchange costly too, which opens the door for a comparative analysis of alternative governance forms in order to assess their respective advantages in terms of transaction costs.

The ex-post contractual hazards warrant further attention. According to Klein (2000, p. 467), the investment hold-up problem is the best-known example of an ex-post contractual hazard. Section 2.9.1 discusses this problem and defines it as the negative impact on investments of limited credibility. If an investor undertakes a specific investment, he is tied to the trading relation he has invested in. Hazards arise if circumstances change. Without any safeguards, the opportunism of the trading partners may result in their changing their behavior in order to capture the quasi-rent associated with the specific

5 Hodgson (1998, p. 205) objects to the central role that Williamson apportions to opportunism. According to Hodgson, the fundamental issue regarding contract compliance is not opportunism or self-interest, but rather uncertainty (which may or may not be due to opportunism).

6 These include 1) site or location specificity, 2) physical asset specificity, 3) human-capital specificity, 4) dedicated assets, 5) brand name capital and 6) temporal specificity. See Williamson (1996, p. 59, 60) and Creti and Villeneuve (2003, p. 4).

investment. This lowers the investor's ex-post profits which changes his ex-ante behavior. As long as the trading partner fails to credibly promise ex-ante not to behave opportunistically ex-post, the investor might in the extreme case choose not to make any investments at all. Accordingly, a governance structure must be created which can eliminate this investment hold-up problem given the particulars of the relationship. The essence in this regard is to install safeguards that improve the ex-post credibility of the trading relationship. In other words, the key of any regulatory policy aiming to facilitate investments is for the regulator to find some sort of commitment device; TCE allows us to analyze which commitment device best suits the transaction at hand.

5.4.2 Empirical evidence and outstanding issues

TCE's predictions have been quite extensively tested. This section discusses some landmarks and highlights a few remaining issues. We emphasize vertical integration and long-term contracts (Klein, 2000, p. 470-478 provides an overview).

A number of difficulties arise when empirically testing the TCE predictions. According to Klein (ibid., p. 477, 478), two of these are related to measurement and confusion about the definitions of key variables, especially uncertainty. In addition, Hubbard and Weiner (1991) and Joskow (1991) argue that alternative hypotheses that might also fit the data – in their papers, these consist of (neoclassical) market power explanations – are rarely mentioned or compared. A final problem is that most empirical studies do not establish causal relations, but instead focus on observing correlations.

TCE is usually tested by analyzing to what extent asset specificity facilitates integration. The common denominator is that there is a positive relationship between asset specificity and vertical integration (see the survey articles of Joskow, 1988a, 2005a, Shelanski and Klein, 1995, Crocker and Masten, 1996 and Lyons, 1996). This corroborates the general view that TCE performs well empirically. According to Williamson (1996, p. 55), 'TCE is an empirical success story'.

Nevertheless, the role of asset specificity has created – and still creates – considerable controversy within TCE. Klein et al. (1978) have argued that asset specificity creates hold-up problems which in turn provide a rationale for vertical integration. This has been challenged by Coase. Coase agrees that high levels of asset specificity may indeed create hold-up problems, but he objects to the assertion that this is likely to result in vertical integration rather than the intermediate solution of concluding long-term contracts. Menard (2005, p. 310) argues that this controversy – which, as illustrated by Coase (2006) and Klein (2007), is far from resolved – indicates the need for additional empirical research. Menard argues that uncertainty and the role of human

assets must be studied more thoroughly and that tests must be conducted at the firm or the inter-firm, rather than sector, level.

Regarding the solution of long-term contracts to which Coase refers, Joskow (1985, 1987, 1988b, 1990) argues that in coal markets, contract duration tends to increase when relation-specific investments are at stake. Considering gas markets, Crocker and Masten (1988) corroborate this result and add the observation that adaptation to changes in economic conditions is vital when concluding long-term contracts. They furthermore argue that agents are sensitive to relatively small adaptations in contract terms. Crocker and Masten (1991) provide insights into the actual process of long-term contracting. They argue that the relational view towards long-term contracts may be a better perspective than the mechanistic contracts often assumed in economic literature.[7] According to the relational view, contracts should not attempt to specify all possible contingencies; instead, due for instance to their unavoidable incompleteness, contracts should try to establish procedures for adapting change and resolving disputes. Crocker and Masten apply this relational perspective to the price adjustment process in long-term contracts between gas producers and pipelines in the US. Their main conclusion is that relational contracts become more likely with longer contract durations. Note that the mechanistic contracts are similar to the complete contracts that arise from the neoclassical perspective, while the relational contracts follow from the TCE perspective.

Liberalization has induced several recent studies on the relationship between liberalization and contract length which have a TCE flavor. As referred to in section 3.4.1, Neumann and Von Hirschhausen (2004, 2006) and Neuhoff and Von Hirschhausen (2006) all submit that liberalization initially decreases contract length but that asset specificity may increase contract length again. In conclusion, the majority of empirical research is consistent with the insights from TCE.

5.4.3 An encompassing framework

Chapter two points out that the market shifts that are currently taking place on the international gas market have created a new context for regulation in which the predominant issue has become how to stimulate investments in a gas market which is dominated by producers, where political considerations are gaining importance and where supply security and sustainability have moved to the top of the energy policy agenda. According to section 2.9, in such an environment, regulatory policy must focus on irreversible investments, risk and uncertainty in order to devise an appropriate governance structure. The traditional neoclassical perspective incorporates risk, but ignores all other

7 Often referred to as contingent claims contracts.

criteria. Accordingly, one of the main messages of this study is that due to its neoclassical guiding principles, current European gas regulation cannot lead to the market behavior that is required in the new context. In order to better steer the market, therefore, we need to combine the neoclassical perspective with the transaction cost view because the latter explicitly considers the criteria for regulation in the new context spelled out in chapter two.

However, this study does not refute the neoclassical perspective but rather argues that its applicability is limited. A theoretical framework that covers both the neoclassical and transaction costs perspectives must specify when to use which theory. The main criteria in this regard are contractual incompleteness, opportunism and asset specificity, whose interplay determines how a transaction should be governed in practice (Newbery, 1999, p. 54). These criteria allow us to determine whether the neoclassical perspective provides a proper perspective.

If the contracts are incomplete and players behave opportunistically but the assets are not specific, the market is contestable and the solution is market exchange (see Annex). The neoclassical perspective is applicable in this setting. If we have specific assets and opportunism without incomplete contracts, all contingencies can be foreseen and specified in a complete contract. Hence, in this situation, we have risks but no uncertainties, which renders the neoclassical perspective appropriate (see section 5.4.1). Without opportunism, promises are always kept and simple (incomplete) contracts suffice to govern transactions without the need for monitoring, verification or enforcement expenses.

In all three situations, the solutions are straightforward and unproblematic since either market exchange or ex-ante contracting is sufficient. Consequently, the neoclassical perspective is appropriate in each of these situations. No institution is required (Williamson, 1996, p. 56). Only if all three characteristics are simultaneously present, will there be ex-post contractual hazards which require costly safeguards. In this setting, institutions become important and the TCE perspective is the proper theoretical perspective.

5.5 Is the European gas market vulnerable to ex-post hazards?

One of TCE's main messages is that the required governance structure depends on the transactions on a market, which in turn are determined by the market's structural characteristics. This section examines the structural and transactional characteristics of the European gas market in order to determine to what extent ex-post contractual hazards can be expected.

Figure 5.2 above spells out the relevant criteria. The presence of most of these on the European gas market is already discussed elsewhere. Section 2.9.1 indicates the sunk and specific nature of gas market investments, while section 2.9.2 points towards the increasing uncertainty on European gas markets.

In conjunction with the assumption of bounded rationality, we have contractual incompleteness on European gas markets. Furthermore, according to section 5.4, the specific assets create a low-number bargaining situation. Hence, the only criterion that requires further elaboration if we are to determine the likelihood of ex-post contractual hazards is opportunism, which is determined by regulatory credibility or commitment (see section 2.9.2). To this end, section 5.5.1 provides a non-exhaustive overview of the criteria that determine regulatory commitment that arise from the literature. These criteria allow us to determine under what circumstances regulatory policy can be considered to be credible. Section 5.5.2 then examines the credibility of European gas regulation.

5.5.1 Criteria of regulatory commitment

Newbery (1999, chapter 2) models the problem of regulatory commitment. He provides a simple infinite horizon model that illustrates under which circumstances regulation may be credible without additional institutional arrangements. A two-player dynamic regulation game between a regulator and a regulatee is defined. The following sequence of actions is undertaken. First, the rules of the game are set by a government or the community at large. This determines the applicable regulatory rules. Based on these rules and on its predictions of the level of revenue that the regulator will allow over the lifetime of an investment as well as its predictions of future demand, the regulated firm chooses the level of capacity it will install. Uncertainty is introduced by not being sure in advance whether future demand will be high or low. High demand is 1 with known probability 1-P; low demand is $1-\sigma$ with known probability P. After the firm's investment, both players observe the actual level of demand, following which the regulator determines the amount of revenue allowed to the regulated firm. At this point, renegotiation or expropriation may occur. This forms the basis on which the regulated firm sets its price and output and pay-offs are generated. Playing this game provides the following solution for (rate of return) regulation to be credible (see Newbery, 1999, p. 73-77 for the derivation):

$$(1-\sigma P)*(c-b) > r*[1+(1-\theta)*i],$$

where $(1-\sigma P)$ is next period's expected output; (c-b) is the extra variable cost of not having the regulated firm's investment; r is the fixed or capital cost of investing in capacity; $\theta < 1$ is the weight placed on investor profits; and i is the rate of return used by the regulator to discount future benefits. This model allows the regulator and regulatee to create a cooperative, or reputational, equilibrium in which the investment is undertaken and the regulator allows

for a price that recovers the sunk investments. In this equilibrium, a lack of regulatory commitment poses no problem and no contractual hazard arises.

Levine et al. (2005, p. 461, 462) cast some doubts on the prospect of such reputational equilibria. They argue that a cooperative equilibrium without hazards, as Newbery's, depends in large measure on the presence of complete information.[8] They (ibid. p. 456) introduce incomplete information by assuming uncertainty regarding the type of regulator. A regulator may be a strong type who likes to commit and accordingly has high costs of reneging, or in contrast, a regulator may be weak and prone to opportunism and short-term optimization. Their analysis indicates that a cooperative equilibrium is only one of a range of possible equilibria, among which the no-investment/no-cooperation outcome. Another contrast with Newbery is that they explicitly recognize both the increasing consumer demand and the capital depreciation rate.

These models provide six main criteria that determine the likelihood of a regulator reneging on his promises. We discuss these criteria below, following which section 5.5.2 applies them to the European gas market.

Gas demand and technological development

First, (1-σP) indicates that an increasing expected output in the next period improves regulatory credibility, since the larger the output of the regulated firm that is foregone by behaving opportunistically, the less likely a regulator is to renege. Levine at al. (2005) explicitly consider growing demand: rapid demand growth increases the benefits in subsequent periods which makes reneging less likely. Technological development has a similar effect in that it also increases future pay-offs from complying with the regulatory contract.

Private/public ownership

Second, (c-b) indicates that increasing costs of alternative supply eases compliance with the regulatory contract. This implies that a large comparative advantage of private over alternative (possibly public) supply improves regulatory credibility. This adds ownership of a regulated firm to the criteria. Schmidt (2000) shows that the incentive for regulatory opportunism in case of sunk investments can be mitigated via a privatization policy that distributes a large part of the shares to the general population (in contrast to insider privatization, where the shares are allocated to the workers of the company). According to Vickers (1993) and Biais and Perotti (2002), this widespread distribution can be achieved by allocating shares cheaply or freely, by restricting the number of shares an individual can own or by discouraging people to sell their shares for cash. The intuition is straightforward. With widespread distribution of shares, breaking the regulatory contract harms a large part of the population, which increases its political costs. Two additional issues

8 Note that this argument is similar to the one brought forward by Crew and Kleindorfer (2006), discussed in section 4.4.2.

warrant attention. First, the scope for lowering the number of shares allowed per individual is restricted, since investors need to receive a sufficient number of shares to be able to exert some control. That is, the more shares are transferred away from the investors to the public, the less incentive they will have to invest in the first place. Second, giving away shares for free or at a discount lowers the government revenues associated with privatization. Nevertheless, the Schmidt (ibid, p. 412) model shows that despite these objections, 'giving away a substantial part of the shares to the general population may not only reduce expropriation but also increase the restructuring efforts *and revenues* from privatization' (emphasis added).

Capital depreciation

The fixed or capital cost of investing in capacity, r, will at low levels increase credibility. To see why this is the case, note that r depends on the capital intensity of production and the rate of capital depreciation. The former directs us towards sunk investments, which have already been extensively discussed. Levine et al. (2005) provide an explicit treatment of capital depreciation, as opposed to the implicit treatment above, and they show that higher capital depreciation shortens the period over which capital needs to be replaced. The benefits of reneging are then short-lived, which makes it relatively expensive.

Investor/consumer benefits

The higher the weight on investor profits – that is, the higher θ is – the less likely it is that reneging will occur. In the same vein, Teulings and Bovenberg (2006) show that the potential hold-up problem in investments (in R&D) depends on the share of profits in the consumer surplus. That is, the less surplus a potential investor is able to extract, the lower is his incentive to invest. If a regulator places relatively high emphasis on consumer rents, he will have an incentive to expropriate investor rents and distribute these to consumers as doing so will increase welfare (see section 4.4.1). This incentive becomes lower as θ increases, which lowers expropriation hazards for the investor.

Discount factor

A regulator's discount factor, i, signals his view of the future. If the discount factor is low, a regulator values future pay-offs highly and will consequently be less inclined to renege. A related concept is the short-sightedness of a regulator (a regulator that values future benefits highly can by definition not be short-sighted or myopic). A myopic regulator is more likely to act opportunistically and maximize welfare over a relatively short-term horizon, a situation which may occur if a regulator is in office for a short period of time (Lewis and Sappington, 1990).

5.5.2 Regulatory commitment on the European gas market

These criteria allow us to determine whether regulation is credible. We determine whether the European gas market is susceptible to opportunistic regulatory behavior (and consequently hold-up) by tracing how the criteria identified impact a regulator's ability and incentive to ex-post commit to its ex-ante regulatory promises.

Gas demand
Substantial effort is currently being exerted to reduce gas demand – for instance as a consequence of import dependency anxieties and the emphasis on both energy efficiency and lowering gas demand. Nevertheless, gas demand will grow, for instance due to increasing gas demand from power generation (see section 2.8). This increases the benefits in future periods which improves commitment by lowering the incentive to renege on a regulatory contract.

Technological development
The rate of technological development has the potential to significantly influence a market and its regulation (as has happened in the telecommunications market when mobile telephony was introduced). However, gas markets are generally characterized by a relatively low level of technological development, which results in the benefits from reneging lasting relatively long, which in turn lowers commitment.

Ownership
Gas does not (yet) score too well on the issue of ownership. A recent European Court of Justice ruling that golden shares are incompatible with the free movement of capital[9] indicates a desire to decrease government involvement in this sector. However, the current trend is one of increasing rather than decreasing government control. Most European energy companies have been and still are controlled or influenced by their governments through majority stakes (like the Norwegian government's 62.5 percent stake in StatoilHydro) or golden shares (in the case of Belgium's Distrigas and GDFSUEZ, the French company that was created by the merger between Gaz de France (GdF) and SUEZ).[10] The GDF/SUEZ merger is furthermore a bad omen, because it may indicate a movement towards creating national energy champions. Commitment would be higher in case of privatized companies not controlled or influenced by their government and with their shares spread over a large part of the general population. However, this seems unlikely for the foreseeable future.

9 CoJ EC September 28 2006 C-282/04.
10 See sections 6.3.2 and 7.3.1 for more elaborate discussions of this merger.

Capital depreciation
Capital depreciates which means that at some point in time, investments will be worn out and should be replaced by new investments. Gas capital stock has a low level of depreciation, as it generally lasts up to decades. This lengthens the period after which capital needs to be replaced, which makes the benefits of reneging last for a relatively long period of time and consequently lowers commitment.

Consumer/Investor rents
The picture on investor's profits is not very positive, because the emphasis of existing gas regulation is on consumer interests. Existing gas regulation has been instigated and developed during the 1980s and 1990s and it is therefore firmly embedded in the competition, liberalization and privatization emphasis that prevailed during that period. From this a regulatory structure has evolved that aims to reduce costs to the benefit of consumers. The current emphasis on consumer interests is also clear from the observation that most of the regulation theories which have led to the existing gas regulation assume a regulator who attaches a higher weight to consumer interests than to producer interests (see section 4.4.1). A typical European gas regulator will have incentive to redistribute investor rents to consumers. This once more lowers regulatory commitment.

Discount factor
The discount factor of a typical gas regulator is generally quite high. One reason for this is electoral pressure to obtain short-term gains. Gas is a highly politicized subject due to for instance the importance of energy to a national economy and the soaring energy prices. One consequence is that regulatory bodies generally have a low degree of political autonomy. For instance, Arentsen (2004, p. 88) observes that

> 'Only Italy, The Netherlands (to some extent) and the United Kingdom have legally independent and autonomous gas market regulators with autonomous ex-ante regulatory mandates. All other countries in one way or another share regulatory mandates with governmental bodies, in almost all cases the ministry of economic affairs or energy.'

Hence, the threat of regulation being exposed to political considerations, and in turn a low discount factor and myopic behavior, is conceivable for gas. Again, commitment is low.

Table 5.1: Gas market specifics and regulatory commitment

Variable	Gas market	Regulatory commitment
Demand	Increasing	+
Technological development	Low	-/-
Private ownership	Predominantly public	-/-
Capital depreciation	Low	-/-
Investor's profits	Emphasis on consumer interests	-/-
Discount factor	High	-/-

Table 5.1 summarizes the analysis and illustrates that regulatory commitment is typically low. Of the six main factors identified, five definitely indicate low regulatory commitment. Only the projected increase in gas demand increases policy credibility. However, import dependency anxieties render it unlikely that European gas demand will be stimulated to increase regulatory commitment. Note that this section does not explicitly consider the nature of the investments. Their impact on regulatory commitment has already been discussed in the section on asset specificity. Their sunk nature creates the possibility for ex-post opportunism. On the other hand, the need for substantial new investments increases the future pay-offs of a cooperative solution. Hence, regarding investments, the picture is inconclusive.

The predominant picture that can be distilled from this section is that the specifics of the European gas market make it relatively easy (that is, cheap) for a regulator to renege on his regulatory promises. In conjunction with asset specificity and contractual incompleteness, this lack of regulatory commitment creates ex-post contractual hazards and investment hold-up problems. The TCE perspective is therefore applicable to the European gas market. The next two sections trace the implications of the TCE perspective for regulatory intervention and the structure of a liberalized European gas market, as compared to the neoclassical recommendations in sections 3.4 and 3.5.

5.6 Regulatory intervention in the transaction cost world

TCE provides a different perspective on regulatory intervention than the neoclassical approach. Without the intention of being exhaustive, this section provides some important implications of viewing regulation through a TCE rather than neoclassical lens.

Recall that the neoclassical perspective argues that a market failure is sufficient ground to think about regulatory intervention, but that actual intervention should only materialize in practice if the costs of the market failure outweigh the costs of the government or regulatory failure that accompanies the intervention (see section 1.5.1). The TCE perspective corresponds to the neoclassical perspective by arguing that regulatory intervention is required

only if it is more efficient than private ordering (if not, then the best solution is to refrain from regulatory intervention, market failure notwithstanding).

However, compared to the neoclassical perspective, TCE throws the rational choice axiom overboard but retains optimizing behavior. The fundamental difference with neoclassical economics is that that due to, amongst others, bounded rationality and uncertainty, the choice does not necessarily fall on the first-best optimum. Rather, TCE advocates a comparative institutional analysis in which the governance structure which entails the lowest transaction costs – comprising the direct contracting costs and the costs related to ex-post contractual hazards – is chosen from a set of feasible alternatives. This observation has consequences for the scope for regulatory intervention.

The difference resides in the costs of regulatory intervention. In economic jargon, regulatory intervention may be warranted only in case of complex externalities, i.e., if the transaction costs of private internalization become prohibitively expensive because, for instance, many actors are involved, the sources of externalities are diffuse, information is asymmetric or players behave opportunistically. A first main implication is therefore that the neoclassical perspective provides too much scope for regulatory intervention (cf. Robinson, 2000), for instance by not recognizing the costs of opportunism. Another implication is that from a TCE perspective, no governance structure should be ruled out beforehand (see the next section).

Second, a regulator's behavior is different in the TCE framework. TCE deviates from the neoclassical perspective 1) by assuming a regulator to be non-benevolent and generally unable to implement an optimal regulatory scheme, while 2) allowing him to behave opportunistically. The latter explains TCE's emphasis on ex-post governance issues (Williamson, 2005, p. 44).[11]

Third, TCE rejects the neoclassical notion that state ownership and state regulation are substitutes. According to Menard and Shirley (2005, p. 13), they are different, polar modes of governance, each with its own characteristics, efficiency properties and transaction costs. Their feasibility depends on the characteristics of the transaction at hand.

5.7 Reforming the European gas market according to the transaction cost perspective

This section revisits the neoclassical prescriptions for designing a liberalized gas market in section 3.5 in order to illustrate the differences between the

11 TCE also detracts from the capture and agency theories which we used to discuss regulatory failure section 4.4. According to the capture theories, regulation is supplied in response to private interests, which assumes a passive regulator. In contrast, TCE sees regulators as active, for instance by behaving opportunistically. Regarding the agency theories, TCE's emphasis on ex-post governance detracts from the emphasis in agency theories on principal-agent contracting schemes that are required to provide the proper ex-ante incentives.

neoclassical and the transaction cost perspective for restructuring and liberalizing the European gas market.

Structural reform

Regarding vertical restructuring, the neoclassical recommendation is clear: integrated firms must be structurally separated because vertical integration has no efficiency rationale while being likely to stifle competition. The TCE framework is less inhospitable to vertical integration. We follow Joskow (2005) who applies the TCE framework to vertical integration. TCE criticizes the neoclassical perspective for 1) ignoring both the costs of internal organization and the availability of more complicated hybrid governance forms and 2) assuming that vertical integration is without efficiency rationale. In case of ex-post hazards, market transactions cannot remove the investment hold-up problem which implies that the costs of market exchange are high. This means that it is beneficent to devise alternative governance structures that mitigate hold-up. Vertical integration can be regarded as the most far-reaching alternative to market exchange.

As indicated, ex-post contractual hazards are likely to occur on the European gas market due to its transactional characteristics, which implies that vertical integration entails benefits because it lowers these hazards and the resulting investment hold-up. This efficiency rationale is countered by the costs of internal organization. An additional cost results from the fact that vertical integration may distort competition in competitive segments like wholesale trading. In choosing the appropriate governance structure, therefore, the net benefits of market exchange need to be compared to those of vertical integration as well as other feasible alternatives like long-term contracts or one of the alternative separation options set out in section 3.5.

These recommendations for restructuring a liberalized European gas market are in stark contrast to those that emanate from the neoclassical perspective. First, note that we dispute neither the costs of vertical integration nor the benefits of structural separation. However, since TCE recognizes the efficiency advantages of vertical integration, pointing out its costs is insufficient to rule it out as an option. Only if the transaction costs of market exchange are lower than those of vertical integration as well as those of the alternative separation options should structural separation be pursued. If, on the other hand, vertical integration entails the lowest transaction costs of all feasible options, then vertical integration with accompanying behavioral regulation is the way to go.

We can be concise regarding horizontal restructuring, since once again the issues are similar to those involved in vertical restructuring. TCE departs from the neoclassical perspective by 1) recognizing that horizontal integration may have an efficiency rationale through economizing on transaction costs and 2) explicitly acknowledging the costs of internal organization and hybrid governance forms. Accordingly, a decision to horizontally break up production

or trading firms must be based on a comparative assessment between the benefits of enhanced competition and the costs of, for example, diminished coordination.

Access
This has repercussions for the access regime. With a structurally separated network, the competitive anxieties are relatively minor and negotiated access is preferred. However, if a less far-reaching separation option proves to have the lowest inefficiencies (i.e., transaction costs), then the increased fears of competitive abuse may be best mitigated through a regulated access regime.

In sum, the specific characteristics of a market and its transactions critically determine the preferred type of structural arrangements. This illustrates the departure of TCE from the neoclassical emphasis: rather than simply being a response to market power or an effort to create market power, vertical and horizontal integration can also occur because they mitigate contractual and transaction-specific hazards which might lower transaction costs compared to market exchange or an intermediate contracting solution.

5.8 CONCLUSIONS

This chapter sets out the TCE perspective, which has been proposed as an alternative to the neoclassical guiding principles of existing gas regulation. One important advantage of the TCE perspective is that it incorporates into the analysis the institutional determinants that explain alternative modes of economic organization. It puts the transaction center stage and determines the most appropriate governance form given the prevailing property rights, rule of law and regulations. It proposes a comparative institutional analysis of viable governance forms in order to find the governance form that entails the lowest transaction costs which consist of the direct contracting costs and the cost due to ex-post contractual hazards. TCE builds on three main criteria: contractual incompleteness, opportunism and asset specificity. In conjunction, these three characteristics create ex-post contractual hazards, and in turn the investment hold-up problem, which requires costly safeguards. Consequently, a governance structure must be devised that eliminates the ex-post hazards at the lowest possible transaction costs.

The transactional characteristics on a particular market determine whether the TCE criteria are present and in turn whether the TCE perspective is appropriate. This chapter develops an encompassing framework comprising the neoclassical and TCE perspective, based on which it argues that the TCE perspective is appropriate only if all three criteria are simultaneously present. If not, then either market exchange or ex-ante contracts will remove ex-post contractual hazards and the neoclassical perspective suffices.

The new context for gas regulation discussed in chapter two creates contractual incompleteness and asset specificity on the European gas market. The applicability to the European gas market of the TCE perspective is determined by examining whether opportunism is a threat in the new context. To this end, we must determine the level of regulatory commitment on European gas markets. The lower the regulatory commitment, the more vulnerable an investor is to regulatory opportunism. Six criteria, derived from the academic literature on regulation, determine the level of regulatory commitment: 1) the growth in gas demand, 2) the rate of technological development, 3) the ownership of a regulated firm, 4) the rate of capital depreciation, 5) the emphasis of a typical regulator on either consumer or investor rents and 6) the discount rate. It is shown that the transactional characteristics of the European gas market imply a low level of regulatory commitment. Accordingly, the European gas market is vulnerable to regulatory opportunism.

Because the European gas market exhibits all three TCE criteria, TCE is the proper lens through which to analyze European gas regulation. Hence, this study predicts that the TCE perspective would result in a better outcome in terms of market behavior in the new context for regulation, as compared to the current, neoclassically-oriented regulation.

According to this perspective, there is less scope for regulatory intervention on the European gas market, because the costs of opportunism are recognized as transaction costs of regulatory intervention. These higher costs of intervention compared to the neoclassical perspective, imply a lower need for intervention. On the other hand, a regulator does not possess all information and is prone to opportunistic behavior.

The policy prescriptions for reform also differ from the neoclassical ones. TCE argues that the competition distorting effects of vertical integration are insufficient to argue for ownership unbundling. It does not dispute the drawbacks of vertical integration. It acknowledges that integration may arise because it mitigates ex-post contractual hazards. Hence, in contrast to the neoclassical perspective, vertical integration may have efficiency benefits. In addition, the presence of ex-post hazards also makes market exchange costly. Therefore, in contrast to the neoclassical perspective, gas regulation must consider 1) that vertical integration may well have efficiency properties by mitigating ex-post hazards and 2) that there is an array of intermediate governance forms, like long-term contracts, which must also be considered. The net benefits in terms of transaction costs of market exchange must be compared to those of vertical integration as well as feasible intermediate contracting solutions; no governance structure should be ruled out beforehand.

This chapter completes the theoretical critique on current gas regulation. However, the effect of regulation on market behavior, and by extension on securing the PSOs, is an empirical issue. Therefore, the following two chapters empirically examine this theoretical critique. The discussion of the Gas Directives in chapter four illustrates that existing gas regulation has implemented

some changes that implicitly follow the TCE perspective. The two most prominent examples are the enlarged scope in the second Gas Directive for exempting certain investments from the third party access provisions, and the acceptance of long-term supply contracts. The case studies in the next two chapters examine these amendments.

6 TPA exemptions – The BBL case

6.1 INTRODUCTION

This chapter and the next empirically examine the previous chapter's theoretical critique by analyzing the actual behavior of market players. The goal is to assess whether the theoretical conclusion that TCE is superior to the neoclassical perspective also holds in practice. This would only be the case if the TCE perspective better predicts and explains regulatory behavior. Chapters six and seven provide case studies that examine this issue by describing the regulatory process in order to trace the arguments that were voiced by the different stakeholders, and to infer which specific changes to regulation have been implemented and why these changes were made. This in turn leads to an indication of whether current regulation has already implemented provisions that deviate from the neoclassical perspective in actual practice, and if so, whether the neoclassical perspective is able to explain these amendments.

If the amendments can be explained using the neoclassical perspective, then current regulation is appropriate in the new context, and possible adaptations to gas regulation would be marginal (i.e., building on the neoclassical guiding principles). If not, however, gas regulation's guiding principles should be changed, with consequently more fundamental adaptations. The issue then becomes whether the TCE perspective better explains the amendments. If so, this study's theoretical critique is corroborated. The final step would then be to infer whether the current amendments sufficiently incorporate the TCE perspective into European gas regulation.

This chapter analyzes one prominent adaptation to gas regulation: the enlarged scope for TPA exemptions. It conducts a case study of the first pipeline investment project to receive an exemption: the interconnector between Balgzand in the Netherlands and Bacton in the UK (the BBL pipeline). Section 6.2 provides the background to the case study. It sets out the TPA exemptions regime as specified in the second Gas Directive and explains our choice of the BBL pipeline. Section 6.3 then discusses the BBL project. It provides the main technical and economic features of the project and a discussion on the holding companies. Section 6.4 sets out a short timeline of BBL's exemptions process, from which we deduce three phases. Section 6.5 discusses phase 1 which comprises the informal guidance process which has been developed because the second Gas Directive was not yet implemented at the time BBL was planned. After having received informal comfort, the final investment decision

was made, and a formal application for an exemption could be made. This is phase 2, which is discussed in section 6.6. In phase 3, which is the subject of section 6.7, the European Commission assesses the views of both regulators towards the BBL exemption. Based on this overview of the regulatory process, section 6.8 draws some lessons. It examines whether the granting of exemptions can be considered an adaptation of the neoclassical underpinnings of gas regulation, whether the neoclassical perspective is able to explain the presence of exemptions, and if not, whether the TCE perspective can provide a satisfactory explanation. It is argued that the TCE perspective is indeed a better perspective. In addition, some of the problems encountered in practice are identified and recommendations are provided for solving them. Section 6.9 concludes that the Commission is currently stuck between the neoclassical and TCE perspectives.

6.2 BACKGROUND

This section provides the background to our case study. It sets out the TPA exemptions regime that emanates from the second Gas Directive and explains our choice for BBL.

6.2.1 The TPA exemptions regime

Before considering the specific application of the TPA exemptions regime, this section first sets out the reasons why the exemptions regime is considered necessary and the conditions under which an infrastructure investment may be exempted.

We start by restating that due to the structural market shifts discussed in chapter two, facilitating new investments has become vital. At the early stages of liberalization, costs could quite easily be decreased by more efficiently deploying the existing infrastructure (sweating the assets). The presence of a well-developed infrastructure disguised the inherent tension between stimulating investments and promoting competitive forces (Newbery, 2001). Reduced spare capacity following liberalization more visibly brings this tension to the fore. Nowadays, asset sweating is likely to result in underinvestment and consequent disruptions, which shifts the emphasis of European gas policy from sweating existing assets to stimulating investments in new assets. In the old days, investments were guaranteed through measures including 1) long-term take-or-pay contracts, 2) vertical integration, 3) regulating the pipeline as a monopoly or 4) have the government build and operate pipelines (Makholm, 2007, p. 4). Liberalization, especially through the unbundling and third party access (TPA) provisions, puts pressure on the viability of each of these measures and impedes investments.

This tension between liberalization and investments has been recognized in European legislation. TPA to the infrastructure is and will remain one of the core elements of the European reform initiatives. It determines that every infrastructure owner must grant third parties access to the infrastructure on fair and non-discriminatory terms (which are determined by tariff regulation by Member States). This corresponds to the neoclassical perspective set out in chapter three. However, in order to facilitate sufficient investments, Article 22 of the second Gas Directive deviates from this perspective by allowing certain investments to be exempted from the TPA provisions. TPA exemptions allow an investor freedom from this regime for a specified period if certain conditions are met. With an exemption, an investor may conclude long-term (capacity) contracts based on negotiated TPA, rather than regulated TPA without an exemption, in order to obtain the required financing for a project.

More specifically, according to the Commission's interpretation laid down in a non-binding Interpretation Note (DG TREN, 2004d), investments in new infrastructures as well as in significant increases in capacity of existing infrastructures and investments in modifications to such infrastructures which enable the development of new sources of gas supply can be dispensed from TPA requirements if the following six conditions are met:

1 The investment must concern a major new infrastructure – interconnectors, LNG and storage facilities;
2 The new infrastructure must enhance competition in gas supply and security of supply;
3 The level of risk attached to the investment must be such that the investment would not commence without an exemption;
4 The infrastructure must be legally separate from the system operator;
5 Charges must be levied on users; and
6 The exemption must not be detrimental to the efficient functioning of the internal gas market.

Regarding the first condition, a major, or high-cost, infrastructure is defined as a project with costs so high that they substantially increase the final consumers' bills if remunerated through regulated tariffs. The second condition is supposed to ensure that a new infrastructure will not establish or reinforce the market power of a specific supplier. However, as indicated in Spanjer (2007b), it is difficult to envisage an investment bringing additional gas to Europe from failing the above criterion, even if this gas is coming from an existing supplier, since additional gas volumes by definition improve security of supply compared to the situation without the additional gas. Third, a low-risk project will not receive an exemption. Project risk is based on the following five criteria (DG TREN, 2004d, p. 2): 1) the extent to which an investment is sunk, 2) the presence of uncertainty due to events that might occur after the investment has occurred, for instance concerning consumption projections, 3) other competing investments, 4) changes in world market conditions or 5) an above

average amortization period. We get back to these criteria in section 6.8.1. The fourth condition requires a legal separation between the network activities (of transmission system operators) and infrastructure activities in order to ensure that the interests of the transmission system operator in whose system the infrastructure is built do not conflict with the interests of the infrastructure operator. Fifth, only infrastructure users should be charged in order to prevent a cross-subsidization of merchant activities with regulated revenues. Finally, the sixth condition aims to defend a competitive market, rather than enhance it, as does the first condition. This condition implies that the operator of an exempted infrastructure must act in a transparent manner, notably through publishing relevant data concerning the operation of the concerned infrastructure. Furthermore, additional requirements may be implemented for example regarding capacity hoarding or use-it-or-lose-it mechanisms.

Three additional considerations are relevant. First, exemptions must be regarded as an exception to the general rule of TPA. Therefore, TPA exemptions should be granted only exceptionally. Second, Member States already have some scope to stimulate investments without using exemptions, for instance by allowing higher than normal rates of return to specific investments. Third, when granted, an exemption does not have to be granted to the full extent. The proportionality principle stipulates that the size and duration are determined by the riskiness of the investment in question. Under a full exemption, there is no need for any TPA. Under a partial exemption, TPA must be allowed, but need not be based on published tariffs. Examples are open seasons in which potential users of the infrastructure commit themselves to a certain part of the capacity prior to construction. Capacity may also be allocated after construction through individual negotiations (which corresponds to NTPA) or auctions.

As indicated, by granting certain investment projects derogations from the TPA provisions, the exemptions regime indicates a move away from the neoclassical perspective in chapter three. The extent to which an exemption is granted – and the extent to which regulation deviates from its neoclassical guiding principles in actual practice – is determined by the specifics of a particular investment project. Hence, to assess whether the exemptions regime can be considered an appropriate amendment in line with TCE, we need to study specific investment projects. By looking closely at the regulatory process leading up to the granting of an exemption, we can trace the arguments that have been voiced by the relevant stakeholders and determine which of these have fed through into actual regulation. This provides a picture of the amendments to the neoclassical paradigm which are implemented in practice. With this picture in mind, we can determine whether these amendments can be explained by the neoclassical perspective. If not, we can determine whether the TCE perspective provides a better explanation of regulatory behavior, i.e., whether the TCE perspective is also superior to the neoclassical perspective

concerning actual regulatory behavior. The next section explains our choice of investment project.

6.2.2 Exempted infrastructure investments

Section 4.10.2 indicates that the Commission's investment priorities focus to a large extent on investments in pipelines with four out of six priority projects concerning pipeline projects. These projects emphasize new pipelines that provide additional gas volumes and interconnector pipelines that connect the national transmission systems of Member States in order to facilitate regional gas trading. This emphasis on pipeline projects has urged us to choose a pipeline project for our case study. Three pipeline projects have been exempted so far.[1]

The most recent exemption has been granted to the Austrian part of the Nabucco pipeline, discussed in section 4.10.2, which is supposed to unlock Caspian and Middle Eastern gas resources for the European market, which should lower Europe's dependence on Russian imports. Construction has not yet commenced. Nabucco is planned to be fully operational by 2020. However, for reasons specified in section 4.10.2, the prospects for Nabucco actually materializing are somewhat doubtful due to Russian counter measures. A second exemption applies to the pipeline project between Greece and Italy, IGI in section 4.10.2, which is supposed to bring Caspian and Iranian gas to Western Europe. The exemption has been granted for the Poseidon pipeline, which is the offshore section of IGI. It is planned to become operational in 2011. The third exempted pipeline project is the pipeline between Bacton in the UK and Balgzand in the Netherlands (henceforth the BBL pipeline). It links the British to the Dutch gas market, and has started supplying gas to the UK on 1 December 2006.

As long as a pipeline is not actually completed, considerable uncertainty exists regarding the specifics of the project, because important project parameters may well change between now and 2011 or even 2020. This uncertainty hampers our analysis of the exemption process. Therefore, we choose the BBL project for our case study because it is the only exempted pipeline that has actually been constructed.

1 See http://ec.europa.eu/energy/gas/infrastructure/exemptions_en.htm for an overview of the granted exemptions.

6.3 THE BBL PROJECT[2]

The UK gas supply deficit following declining production rates at the UK Continental Shelf (UKCS) has been a main justification for building BBL. Due to this deficit, a long-term gas supply contract has been concluded in 2002 in which Dutch Gasunie Trade & Supply (GUTS) agreed to supply 80 bcm of gas to British gas supplier Centrica over a 10-year period (Gasunie, 2002). Gas had to be flowing in 2006. To honor this contract, additional transport capacity had to be made available. Gas Transport Services (the Dutch Transmission System Operator, a division of NV Nederlandse Gasunie) was asked to build BBL. BBL is a risky project. One reason for this is that it competes with a number of other projects, such as the existing Interconnector between Bacton and Zeebrugge, LNG regasification terminals (Zeebrugge on the Continent, and Isle of Grain and Milford Haven in the UK) and Norwegian supply routes. Accordingly, the economic viability of BBL depends on the developments regarding these competing projects. This section sets out the rationale for building BBL and its technical and organizational features, and it specifies the relevant stakeholders.

6.3.1 Project description

The BBL project comprises six elements:

- Compression facilities in Noord-Holland;
- A 5-kilometer onshore pipeline section to the designated pipeline dune crossing location near Julianadorp;
- A dune crossing/landfall from behind the dunes to a location offshore from the coast, preferably constructed using the horizontal directional drilling technique;
- A 230 kilometer offshore pipeline crossing the North Sea from The Netherlands to the UK;
- A pipeline section crossing the beach at Bacton;
- An onshore pipeline section to the gas terminal in Bacton.

The total connection length is 235 kilometers with a 36 inch pipeline diameter. The project's investment costs amount to around 500 million euros. Gas started flowing on 1 December, 2006, with a capacity of around 15 bcm per year. In order to remunerate the investment costs, a 2003 open season[3] allowed potential users to conclude 15-year contracts with an indicative tariff of 65

2 This section draws on De Joode (2006).

3 Open seasons are procedures in which potential users of the infrastructure commit themselves to a certain part of the capacity prior to construction. Open seasons provide demand security to the investor before committing himself to the investment.

euros per normal m^3 per year (this tariff was based on the assumption that the pipeline would have a 30 inch diameter; the 36 inch diameter results in other indicative tariffs).[4] All current capacity has been contracted to the initial shippers, Gasterra, E.ON Ruhrgas AG and Wingas AG, for periods of 10 and 15 years. Following the terms of Gasterra's supply contract with Centrica (see next section), gas flows unidirectionally into the UK. Technical modifications can make the flow bidirectional. However, due to a lack of shipper interest for transporting gas from the UK to the Netherlands emanating from the 2003 open season procedure, such reverse flow is not yet included.

There have been considerable competitive improvements along the way. BBL Company (see next section) has recently started another open season procedure to investigate market interest for an expansion of transmission capacity. In case of sufficient interest, expansion possibilities will be investigated, and provided there is a positive business case based on commitments from shippers, BBL capacity could be increased (BBL Company, 2007a). In addition, BBL also started to offer short-term services to shippers through daily transmission contracts (BBL Company, 2007b). Furthermore, as of 1 December, 2007, BBL Company offers forward capacity (i.e., gas flowing into the UK) on an interruptible basis (BBL Company, 2007c).[5]

BBL will after construction interact with other, existing or planned, projects and pipelines. Two of these deserve special attention: the Interconnector and Nord Stream. BBL is the second pipeline that connects the UK to the Continent: the Interconnector between Zeebrugge in Belgium and Bacton has been in operation since 1998. It is currently capable of transporting 25.5 bcm of gas per year from Zeebrugge to Bacton and 20.0 bcm per year in the opposite direction.[6] The Interconnector is a competitor to BBL because both are able to carry gas from the Continent to the UK. Second is Nord Stream, see section 4.10.2. Rather than competitors, these pipelines will most likely be complementary, because BBL can be regarded as an extension of Nord Stream which opens up the UK market to Russian gas.

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4 The indicative tariff required for the project go-ahead was based among others on analyses of several scenarios regarding competing projects, among which an upgrade of the Interconnector, expansion of the Norwegian Langeled pipeline into the UK and LNG terminals for the Netherlands.

5 Interruptible capacity must be distinguished from firm capacity. Firm capacity is capacity that is expected to be available at all times other than exceptional circumstances (like maintenance). Interruptible capacity, on the other hand, is additional capacity in excess of firm capacity. This extra capacity may be interrupted at times and is therefore described as 'interruptible capacity'. Interruptible capacity is usually allocated to shippers in proportion to their firm capacity rights. See http://www.interconnector.com/Commercial/FirmIntreruptibleandUIOLICapacity2.htm.

6 See http://www.interconnector.com/index.html.

6.3.2 Holding companies

BBL was undertaken on a partnership basis which necessitated the setting up of a separate company, BBL Company BV, in July 2004. BBL Company constructs the pipeline with its own capital and at its own risk. GTS is the main operator and currently holds a 60 percent majority of the shares through its subsidiary Gasunie BBL BV (GTS' share will reduce to 51 percent if it transfers 9 percent to Gazprom, see below). Two other parties, Fluxys BBL BV and E.ON Ruhrgas BBL BV, have been present since the setting up of the joint venture, each possessing a 20 percent share. These three subsidiaries provided the capital required for construction and remunerated these costs through the above-mentioned long-term contracts with shippers. Gazprom became involved in the project recently, after the construction of BBL, with an option to buy 9 percent of the shares. We discuss the subsidiaries below.

As indicated, a gas supply contract between GUTS and Centrica has led GUTS to request the Dutch transmission system operator to build BBL. In anticipation of the legal unbundling requirements of the second Gas Directive, the integrated national champion Gasunie[7] was unbundled in GTS and GUTS in January 2002. GUTS retains Gasunie's shareholders. The Dutch government became a forerunner by deciding to push through towards ownership unbundling. This penultimate step in the restructuring of the Dutch Gasbuilding created an infrastructure company (NV Nederlandse Gasunie) and a trading company (GUTS, renamed into Gasterra) from 1 September, 2006 on. Gasterra's ownership structure is similar to GUTS's. The final restructuring step was to privatize Gasterra and split it between ExxonMobil and Shell, but this has been postponed until further notice. The NV Nederlandse Gasunie is completely owned by the Dutch State and comprises three main divisions: GTS, Gasunie Construction and Maintenance and Gasunie Participations & Business Development. The Dutch Gas Act precludes GTS from directly participating in a merchant project like BBL. Therefore, the BBL shareholding is a part of the Participations and Business Development division. BBL Company stresses the legal separation between GTS and Gasunie BBL which is supposed to ensure BBL's independence from the system operator.

On 6 November, 2007, NV Nederlandse Gasunie and Gazprom signed an Umbrella Agreement on the joint participation of both companies in the Nord Stream and BBL gas pipeline projects (Gazprom, 2007). The agreement stipulates that Gasunie receives a 9 percent share in Nord Stream, coming from Wintershall and E.ON Ruhrgas, which will each cede 4.5 percent of the shares, in exchange for which Gazprom receives an option to acquire 9 percent in BBL Company. Accordingly, GTS' share would decrease to a 51 percent majority. This reciprocal shareholding may open up the UK gas market to Gazprom (for

7 The Dutch State held 50 percent of its shares; the remaining 50 percent were equally divided between Shell and ExxonMobil.

instance by linking Nord Stream to BBL in the future). If Gazprom exercises its option, a state-owned – the Russian state holds a controlling portion of Gazprom's shares[8] – and integrated gas supplier satisfying around one third of European gas imports[9] will become involved in BBL.

Fluxys BBL is a subsidiary of the Belgian TSO Fluxys. Fluxys originated in the November 2001 legal unbundling of the integrated Distrigas into an independent transport company and a trading company (Distrigas). As of September 2006, SUEZ (through its subsidiary SUEZ-Tractebel) owns 51 percent of the Fluxys shares; Publigas (a group of public Belgian communalities) owns 37.5 percent (SUEZ, 2006). Private shareholders own 11.5 percent and the Belgian State holds one golden share.

The merger between the French companies Gaz de France (GDF) and SUEZ, creating GDF SUEZ, has repercussions for both the Belgian gas market and Fluxys. Following an in-depth investigation, the Commission concluded that GDF SUEZ would have anticompetitive effects for the Belgian and French gas markets (CEC, 2006b, c). Regarding the Belgian gas market, the Commission was concerned with the high market share of GDF SUEZ. Furthermore, the merger would remove GDF as a direct competitor to Distrigas (of which there are very few, see section 7.3.1), following which GDF SUEZ would dominate the Belgian market. GDF SUEZ would also have access to most of the gas imported into Belgium and would hold almost all long-term import contracts. Competition would furthermore be impeded by GDF SUEZ controlling Fluxys, the Belgian TSO, which would grant them privileged access to supply infrastructure and storage. GDF and SUEZ proposed structural remedies to remove these concerns. The merger was officially concluded on 22 July, 2008.

Some of the structural remedies, which should become applicable as a consequence of the merger, affect Fluxys (section 7.3.1 discusses the effects on Distrigas). The restructuring of the Fluxys activities entails the creation of two entities: Fluxys and Fluxys International. Fluxys owns the entire Belgian gas transmission/transit system as well as the complete Belgian gas storage infrastructure and operates all the infrastructures regulated under Belgian law (the transmission and transit system, storages and LNG terminals). GDF and SUEZ have promised not to control Fluxys through their shareholdings. Specifically, they have agreed not to hold more than 45 percent of Fluxys' capital (SUEZ currently holds over 57 percent of the shares, while Publigas holds around 33 percent of the shares). At 3 September, 2008, GDF SUEZ and Publigas reached an agreement following which GDF SUEZ commits to sell, on 31 December 2009, a number of its Fluxys shares to Publigas, allowing Publigas to become Fluxys' majority shareholder (GDF SUEZ and Publigaz, 2008).

The other entity, Fluxys International, will own the Zeebrugge LNG terminal and the non-regulated Belgian and international assets (among which BBL and

8 See http://www.gazprom.com/eng/articles/article21713.shtml.
9 See http://www.gazprom.com/eng/articles/article20160.shtml.

Huberator, the Fluxys subsidiary that operates the Zeebrugge gas hub). Fluxys BBL therefore becomes a subsidiary of Fluxys International. The 3 September agreement also includes Fluxys International. In exchange for ceding control over Fluxys to Publigas, GDF SUEZ is allowed to hold 60 percent of Fluxys International's capital (with the remaining 40 percent being shared equally between Fluxys and Publigas). To prevent GDF SUEZ from controlling the Zeebrugge LNG terminal, which is of strategic importance to the Belgian as well as the European gas market, Fluxys will, in addition to its 20 percent share, also take care of the management of Fluxys International and have the right to appoint the Board of Directors.

E.ON Ruhrgas is one of the main European gas companies. Its upstream activities are undertaken by E.ON Ruhrgas Exploration and Production. The downstream activities, the selling of gas to distribution companies, industrial consumers and electricity producers, are conducted by E.ON Ruhrgas International and Thüga, a German communality. E.ON Ruhrgas Gastransport has leased E.ON Ruhrgas' transmission grid and is responsible for its operation, maintenance and expansion. It also markets storage capacities on behalf and account of E.ON Ruhrgas. From 1 January 2004 on, E.ON Ruhrgas Transport has been legally separated from the trading activities (this was one of the conditions for ministerial approval of E.ON's takeover of Ruhrgas). Regarding this separation, a recent statement by E.ON in which it proposes to sell off – that is, structurally (ownership) unbundle – its electricity transmission network to an operator with no interests in electricity generation or supply (E.ON, 2008) may be a prelude to significant changes. The voluntary[10] decision to unbundle of E.ON, one of the most vehement opponents of the Commission's unbundling proposals, may signal the crumbling of the opposition. If so, then in due time the gas networks may be unbundled too, and Gastransport will become completely independent from E.ON Ruhrgas.

6.4 THE EXEMPTION PROCESS

A particular problem for GTS was that in order to guarantee supplies to the UK in 2006, the project was being planned while the second Gas Directive was drafted but not yet implemented in UK and Dutch legislation. The relevant national authorities have the power to formally grant an exemption only after the Directive has been implemented in national law. In consequence, it was not yet possible for GTS to submit a formal exemption request. Accordingly,

10 The press release notes that E.ON unbundled as part of a deal with the Commission to settle ongoing antitrust inquiries, which places doubts on the voluntary nature of the unbundling. It provides an illustration of the process in which the Commission uses competition policy to ensure compliance with the Directives (see section 4.8). The case study in chapter seven provides a more elaborate treatment of such a combined approach.

before undertaking any commitments, GTS sought clarity on the applicable regulatory regime. Since BBL is an interconnector pipeline, GTS requested advise of the applicable regulatory regime from the British Department of Trade and Industry (DTI)[11] and the Office of Gas and Electricity Markets (OFGEM), as well as the Dutch Ministry of Economic Affairs and the Dutch Office of Energy Regulation (DTe).

DTI and OFGEM set out their views regarding the implementation of the second Directive concerning LNG terminals and interconnectors in a June 2003 joint consultation document (DTI/OFGEM, 2003a) which confirmed that the RTPA requirements with the possibility for exemption will apply, subject to a European Commission veto. The consultation and corresponding stakeholder responses resulted in a final views paper in November (DTI/OFGEM, 2003b) that confirmed the initial views. Because at the time several projects were coming to financial close before transposition of the second Gas Directive into UK legislation, OFGEM indicated its willingness to provide early guidance. This had to be provided on a case-by-case basis, through a consultation on the basis of draft exemption applications for specific projects. GTS was the first to issue a draft application (GTS, 2003).[12] The UK consultation was carried out in parallel with a consultation by DTe.

The preliminary guidance phase in the UK concerned four stages. It started with GTS' draft application for an exemption in which GTS set out why it thought BBL satisfied all criteria for awarding an exemption. On the basis of this draft application, OFGEM issued its initial views (OFGEM, 2003a). In the third stage, other stakeholders were also allowed to offer their thoughts. Finally, based on its initial views, stakeholder responses and possibly additional information by GTS, OFGEM provided its final views (OFGEM, 2003b) on which its informal comfort letter is based. The Dutch preliminary guidance differed from the UK process because DTe did not issue a separate initial views document prior to stakeholder consultation (but rather referred to DTI/OFGEM, 2003a above). Hence, the Dutch approach consisted of three stages, in which the stakeholder views and DTe's final views were integrated into DTe's informal comfort letter to the Minister of Economic Affairs in November 2003 (DTe, 2003). This is what we refer to as phase one of the exemption process.

The second phase commenced when, after having obtained informal security, the investment decision was made in May 2004 and BBL Company was set up in July of the same year. BBL Company formally requested an exemption in December, 2004 (BBL Company, 2004), following which an official

11 DTI was disbanded when the Department for Business Enterprise and Regulatory Reform (BERR) was created on 28 June 2007.

12 The two other draft applications concerned Qatar Petroleum and ExxonMobil's South Hook LNG import terminal (which we will refer to below) and Dragon's LNG import terminal, both at Milford Haven in Wales.

consultation process was initiated. Approval documents were published in March (DTe, 2005) and April (OFGEM, 2005).

All regulatory decisions were sent to the European Commission, who also provided initial and final views. However, this case study focuses on the interaction between the UK and the Dutch sides in shaping the exemption for BBL. We therefore do not explicitly consider the Commission's guidance process. We will only consider the Commission's final views towards the UK and Dutch exemption decisions in order to trace which arguments eventually found their way into regulatory practice. We refer to the Commission's assessment as phase three of the exemptions process.

6.5 PHASE 1: GTS' DRAFT EXEMPTION APPLICATION AND STAKEHOLDER RESPONSES

6.5.1 GTS' draft exemption application

In its draft exemption application, GTS' main rationale for requesting an exemption is that building BBL requires a significant investment sum with corresponding risks. According to GTS, BBL can be constructed only if there is long-term clarity on the applicable regulatory regime and contracted capacities. The former is uncertain because by connecting the Netherlands to the UK, BBL will operate in two different jurisdictions. Regarding the latter, GTS plans to grant access to BBL on the basis of long-term capacity contracts through an open season procedure which allows interested parties to commit themselves to a part of the capacity prior to construction. These initial contracts determine BBL's capacity. GTS' exemption request applies to this contractual structure which it considers necessary for the project to commence. Furthermore, GTS requests that the conditions of the initial contracts are not subject to regulatory or governmental approval. The draft application provides GTS' views regarding the conditions for an exemption. Section 6.2 mentions these conditions:

1 The investment must concern a major new infrastructure – interconnectors, LNG and storage facilities;
2 The new infrastructure must enhance competition in gas supply and security of supply;
3 The level of risk attached to the investment must be such that the investment would not commence without an exemption;
4 The infrastructure must be legally separate from the system operator;
5 Charges must be levied on users;
6 The exemption must not be detrimental to the efficient functioning of the internal gas market.

BBL is an interconnector, hence the first condition is fulfilled. We specify GTS' view regarding the latter five conditions below.

The new infrastructure must enhance competition in gas supply and security of supply
Regarding competition in the UK gas market, GTS argues that it cannot be responsible for a competition analysis of BBL. Since BBL operates separately from the parties concluding the contracts, GTS has no information on the source or destination of the gas that is transported through BBL. GTS has nevertheless commissioned an independent study by Arthur D. Little (ADL, 2003), which shows that upstream concentration of the UK gas market would decrease if BBL was connected to the UK grid. The report also provides a view to the future. It identifies three possible scenarios. The first assumes that BBL will not be built and that the 8 bcm per year in the GUTS contract with Centrica will be supplied by an alternative route, for instance reverse flow capacity in the Interconnector. The second scenario assumes BBL to be operational by 2006 with a capacity of 8 bcm per year; the third assumes an initial capacity of 8 bcm per year in 2006, rising to 17 bcm per year in 2008. In each case, the report calculates the Hirschmann-Herfindahl index (HHI, see table 2.2) for 2006 and 2008 to measure concentration. The results are that cases 1 and 2 have slightly higher and similar HHI values in 2008 compared to 2006. Hence, concentration increases slightly regardless of BBL. The increase in HHI in case 3 is lower that in the other two cases. All 2008 HHI values still indicate a competitive market. The report consequently argues that market concentration may increase a bit from 2008 on, but not to levels that give rise to regulatory concern. It concludes that the UK upstream gas supply market will remain very competitive after BBL. The report's overall conclusion is that in the worst case BBL will have no impact on concentration, but that under realistic assumptions competition will increase as compared to the situation without BBL.

Regarding security of supply, ADL concludes that BBL will add to security of supply both in the UK and the Netherlands. UK security of supply will improve because BBL can supplement UKCS gas supply and Norwegian imports with suppliers linked to the Continental gas market. UK security of supply will furthermore improve because BBL allows UK consumers to access Dutch and other storage facilities. Finally, ADL argues that if in the future, reverse flow capacity will be included, BBL will allow Continental or Dutch gas supplies to be supplemented with UKCS or Norwegian gas.

GTS envisages a few additional advantages related to competition. First, access of Continental suppliers to the most liquid market in Europe will improve the working of the internal European gas market, and increase the scope for arbitrage between the two markets. Second, BBL will also increase competition in gas transport (as opposed to competition at the commodity level), because it is a direct competitor to the existing Interconnector. Third, GTS argues that if BBL is connected to Nord Stream, the UK market will have

at its disposal the vast Russian reserves. In addition, BBL may even facilitate the inclusion of the Netherlands in the Nord Stream project.

The level of risk attached to the investment must be such that the investment would not commence without an exemption
The riskiness of the project has already been mentioned in the introduction to this section. GTS adds that any insecurity concerning its initial long-term contracts – if for example tariffs were to be revised, extra conditions imposed or the contract length shortened – might increase investment risk to such an extent that the investment will not materialize. Another additional argument is that the initial long-term contracts with shippers which range from 10 to 15 years are necessary but not sufficient. There will still be risks with respect to the sale of transport capacity after the initial contracts have expired. Finally, GTS illustrates the size of the investment, which ranges, depending on the chosen pipeline diameter, between 375 and 500 million Euro, by comparing this sum with the average GTS investments of 70 million Euro per year prior to BBL. BBL therefore increases average investments to 150-250 million Euro per year. Hence, BBL doubles and maybe even quadruples average yearly GTS investments up to the year 2006.

The infrastructure must be legally separate from the system operator
BBL Company is owned by GTS. GTS indicates that it is considering including one or two other transmission companies into a joint venture.[13] GTS explains that BBL Company will be legally separate from GTS. It will also be financially independent. BBL Company will subcontract exploitation and operation to NV Nederlandse Gasunie (see section 6.3.2) on the basis of a service contract. All transport contracts relating to BBL facilities and ancillary services will be conducted between BBL Company and its customers. In addition, GTS points out that it is already internally separated from GUTS (as it was still called then). Legal separation should be completed by July 2004.

Charges must be levied on users
Since BBL is an independent transmission company, GTS argues, it has an incentive to pass through its costs to users. Costs are remunerated by the long-term capacity contracts on the basis of the 2003 open season. GTS will publish the open season's indicative tariffs and the conditions for interruptible contracts.

Regarding capacity allocation, GTS promises to implement a use-it-or-lose-it system, in which unused capacity will be made available on a short-term basis to prevent capacity hoarding. If a user chooses not to use its contractually agreed capacity or a part thereof, there will be a possibility to trade this

13 These are, as indicated in section 6.4, Fluxys, the Belgian TSO, and E.ON Ruhrgas.

capacity on the secondary market. A third measure to prevent capacity hoarding proposed by GTS relates to interruptible capacity: BBL is allowed to take back capacity which has not been used by the contracted party for a long period but for which there is demand. GTS furthermore points out that it is considering setting up a bulletin board which facilitates secondary capacity trading by bringing (potential) shippers in contact with each other. Finally, information will be provided on historical capacity use, prices and real time flows, insofar as confidentiality requirements are not violated.

The exemption must not be detrimental to the efficient functioning of the internal gas market
According to GTS, the contractual and technical specifications of transmission through BBL are in accordance with both the Dutch and UK network requirements. At the time of submitting its draft application, GTS was discussing network issues with National Grid Transco, the UK TSO. On the Dutch side, GTS expects that additional transport capacity will be required on the GTS network. Especially the missing link between Oude Statenzijl and Balgzand needs to be expanded to accommodate the increased gas volumes due to BBL. GTS explicitly notes that these investments are a necessary condition for a number of potential shippers to reserve transmission capacity in BBL. The GTS view is therefore that these additional investments are a vital element in the BBL investment decision (in fact, the investment decision on this missing link will be taken at the same as BBL's investment decision).

In sum, GTS argues that BBL lives up to all the requirements above and is hence eligible for an exemption. GTS requests an exemption for the entire length of the initial long-term contracts. Furthermore, the date at which gas starts flowing does not run parallel with the starting dates of the initial contracts. Accordingly, when gas starts flowing, some extra capacity may be available because not all initial contracts will have started yet. Since GTS plans to make these capacities available to the market in order to remain in accordance with the terms and conditions of the initial contracts, GTS requests the exemption to also apply to this overcapacity.

6.5.2 British responses

The stakeholders we consider are the regulators and those parties that have submitted an official response to GTS' draft application. We start with the British side, where we discuss OFGEM's initial views, the relevant stakeholder responses and OFGEM's final views which consider the stakeholder responses and additional information provided by GTS.

OFGEM's initial views

In September 2003, OFGEM set out its initial views on GTS' draft exemption application (OFGEM, 2003a). Regarding the first criterion, that the investment must enhance competition in gas supply and supply security, OFGEM indicates that it will be undertaking its own competition analysis. Regarding information provision, it indicates that details need to be filled in. This particularly concerns the issue whether BBL's information provision to the market is, and will remain, consistent with UK information disclosure requirements. Finally, OFGEM attaches high value to the views of other interested stakeholders (discussed below). Second, OFGEM agrees with GTS that the level of risk is such that it merits an exemption. Because OFGEM assumes that in due time BBL will be separate from GTS and that GTS will be effectively unbundled from the trading activities (see also section 6.4.2), it also considers the third criterion to be met. The fourth criterion, which states that charges must be levied on users, is not considered a problem. The connection of BBL to the UK system is also not considered an issue, because entry capacity to the National Grid Transco (NGT) system will be booked in a similar fashion to other entry capacity. Furthermore, OFGEM trusts that any technical complication will be resolved by GTS and NGT. Finally, while considering the circumstances in which the exemption may be withdrawn, OFGEM sees no reason not to grant GTS an exemption for the capacity and duration of the initial long-term contracts. All in all, OFGEM's initial view is that BBL can expect to receive an exemption.

Respondent's views

Five parties responded to the draft application: BP Gas, Power & Renewables, Total Gas & Power, Centrica, Interconnector (UK) and NGT. The first three are gas suppliers in the UK, Interconnector is a competing infrastructure to BBL and NGT is the British transmission system operator.

BP (2003) supports BBL in principle. It offers five additional suggestions in order to guarantee that BBL is operated on appropriate terms. First, BP envisages the possibility that there will be commercial drivers for UK exports to the Continent. Accordingly, in order to also allow exports from the UK, BBL should be bi-directional. Second, BP argues that physical flow information should be made available to the UK and Dutch authorities in order to prevent capacity hoarding. Pipeline operators must ensure that contractual arrangements permit capacity to be traded efficiently (for instance through offering capacity on an interruptible basis) on the secondary market. Furthermore, a bulletin board would be welcome. Third, BP is concerned that TSOs may exercise too much discretion in accepting or rejecting gas qualities that are marginally out of the specification range. In order to prevent discriminatory behavior of shippers by the BBL operators, gas quality requirements should be made explicit. Fourth, BP argues that the advantages of BBL, especially if it becomes a bi-directional link, hinge on the capacity of related pipelines to and from Bacton and Balgzand (note that GTS already mentioned the missing

link between Oude Statenzijl and Balgzand in its draft application). These additional TSO investments should not result in problems. Finally, BP argues that BBL may enhance overall efficiency of the entire North Sea infrastructure. BP recommends that the operators have a 'good faith obligation' to negotiate with third parties wishing to connect to BBL.

The second respondent is Total Gas, Power & Renewables. Total (2003) puts forward one main concern. While not opposing GTS' exemption application, Total emphasizes that the decision should not lead to any differences in regulatory requirements between BBL and existing infrastructures (in particular interconnectors) built before the second Gas Directive came into force.

Centrica (2003) welcomes BBL. It considers the information provision requirements imposed on Interconnector UK to also be appropriate for BBL. Centrica wants the option to withdraw the exemption after it has been granted to be based on clear criteria. Furthermore, withdrawal should be conducted only after consultation with Centrica and other market parties.

Interconnector (2003), the operator of Interconnector between Zeebrugge and Bacton, has no specific comments because some key elements, such as the use-it-or-lose-it (UIOLI) provisions, are treated confidentially. Interconnector does provide some generic concerns predominantly regarding competitive distortions resulting from the exemption. Interconnector's first concern corresponds to Total's concern that there should be no competitive differences between new and existing investments. In addition, Interconnector wants to know how the relevant regulators intend to ensure commercial neutrality when exemptions are granted. Interconnector furthermore argues that as an exemption seeks to make an uneconomic investment project economic, it is similar to a direct financial subsidy. This hampers the principle of a level playing field. Furthermore, Interconnector notes that since third party access rules are always a hindrance to an investment, all parties should be granted an exemption.

Finally, NGT has no principled objections either. NGT (2003) judges the application according to each of the five criteria for granting an exemption. Regarding the first criterion, NGT agrees with GTS' assessment of BBL's competitive effects on the UK upstream market. NGT furthermore considers BBL an important contribution to UK supply security. Similar to Interconnector above, NGT refrains from taking a firm view on the capacity allocation mechanisms due to a lack of information on for instance UIOLI. NGT confirms OFGEM's initial view regarding the remaining exemption criteria. In addition, NGT explicitly sets out its relation with BBL and its shippers and explains that the regulated system will not be affected by BBL. In particular, BBL needs to be connected to NGT's system, which requires an agreement between both parties on a network entry agreement. Furthermore, if gas is to flow from BBL into NGT's system, shippers must purchase entry capacity to the NGT grid. NGT uses this information to assess future network enhancements. This approach is consistent with all other NGT entry points. Hence, BBL will not hamper the efficient functioning of the regulated system.

OFGEM's final views

After having conducted its own competition analysis in addition to GTS', OFGEM (2003b) upholds its view that BBL should in principle enhance competition on UK gas supply. Nevertheless, OFGEM considers ExxonMobil's role as a shareholder of the trading part of Gasunie (which is only legally separated from GTS, as opposed to the originally anticipated ownership unbundling) as a potential problem because of ExxonMobil's proposal to build an LNG terminal with Qatar Petroleum, which is seen as a competitor to BBL (see section 6.3). OFGEM fears that ExxonMobil's reciprocal shareholding may distort competition between both projects. If this was to result in competitive problems, however, these problems would be addressed when ExxonMobil and Qatar Petroleum apply for an exemption for their South Hook LNG terminal. OFGEM takes over some the respondent's comments. OFGEM agrees with BP, Centrica, Interconnector and NGT that further detail is required on the level of transparency and the UIOLI provisions. Because of the preliminary status of the guidance process, OFGEM is satisfied with GTS' current provisions for the moment. However, OFGEM reserves the option to amend the exemption should the UIOLI provisions prove inadequate. OFGEM rejects BP's argument for reverse flow capacity, because the GTS open season does not signal a need for it.

Regarding the second condition, the risk being sufficiently high to make an exemption necessary, GTS has provided additional, largely confidential, financial information on the economics of the project. Specifically, GTS argues that return on equity is not expected for 20 years. Furthermore, GTS demonstrates that if it had to reserve 25 percent of BBL's capacity for short-term access, access tariffs would rise to uncompetitive levels. GTS' financial advisors, KPMG, argue that without an exemption, the project's long-term finance is unsustainable due to the risks associated with regulated TPA. OFGEM concludes that the level of risk merits an exemption.

Regarding the separation of GTS from BBL Company, the third condition for granting an exemption, OFGEM notes that its initial view is based on the assumption of an ownership separation between GTS and the rest of Gasunie (Gasterra). OFGEM now includes the decision to implement a less far-reaching legal unbundling and the inclusion of Fluxys into the BBL joint-venture. OFGEM's concern regarding the latter is that competition between BBL (connected to the Dutch system) and Interconnector UK (connected to the Belgian system) could diminish. Accordingly, OFGEM requests clarity regarding the relationship between ExxonMobil, Shell and Fluxys if a formal application is to be submitted.

The fourth criterion, that charges should be levied on users, poses no problem. Moreover, none of the respondents raised any issue in this regard. Hence, this criterion is met. The fifth condition concerns the effective functioning of the internal gas market. NGT has voiced concerns to OFGEM regarding the quality of the Dutch gas imported into the UK. While acknowledging the issue of gas quality, OFGEM expects that these concerns will be mitigated.

Finally, regarding exemption length, GTS has confirmed to OFGEM that possible overcapacity will be made available to the market. In consequence, OFGEM upholds its initial views and therefore allows an exemption for the entire capacity including possible overcapacity. Due to the differing starting dates of the contracts, a 15 year exemption is considered appropriate. OFGEM rejects Centrica's suggestion to specify the conditions for withdrawal of an exemption, because conditions for withdrawal are not specific to BBL.

In conclusion, based on GTS' draft application, the additional confidential information provided by GTS and the views of respondents, OFGEM envisages that BBL will be applicable for an exemption. Its comfort letter was sent to GTS on 24 November, 2003.

However, OFGEM also indicates a number of caveats to its positive assessment. First, OFGEM notes five unknown factors in GTS' draft application. These concern the size of the pipe, the capacity of the owners, the duration of the initial contracts, the ownership of BBL and the separation agreements between GTS and the rest of the former Gasunie. In consequence, in considering GTS' application, OFGEM has assumed that:

- BBL will have the capacity required to deliver GUTS's (Gasterra's) gas sold to Centrica. That is, the pipeline capacity is assumed to be 8 bcm per year;
- GUTS will be the capacity owner;
- The initial contracts will last 10 years;
- BBL will be legally separated from GTS; and
- GTS will be separated from the rest of the former Gasunie according to the provisions of the second Gas Directive.

Any deviation from these assumptions may require a revised vision to the one above. Second, GTS' formal application will be subject to a formal consultation process. The responses from that consultation may be reason for OFGEM to deviate from the above views. Furthermore, if market conditions change by the time of the formal application, so may OFGEM's formal view.

The UK preliminary guidance process is rounded up by two recommendations offered by OFGEM in order to improve GTS' prospect of receiving a formal exemption. First, as indicated in ADL (2003), further capacity sales in addition to the GUTS contract would improve BBL's effect on UK competition. Second, structural unbundling of GTS from the rest of former Gasunie would also enhance the effect on UK competition.

OFGEM's preliminary exemption decision was sent to the European Commission. In two confidential letters (dated 30 January and 12 May 2004) the Commission stated that the exemption would likely be accepted if 1) exemption length would not exceed the period of the initial contracts, 2) reverse flow nominations were not covered and 3) the UK retail market was kept under close review.

6.5.3 Dutch responses

This section considers the Dutch side. As indicated in section 6.4, one difference between the UK and the Dutch preliminary consultation processes was that the Dutch regulator, DTe, did not issue a separate initial views document, but rather referred to DTI/OFGEM's (2003b) joint consultation paper. DTe did consult the relevant stakeholders concerning GTS' draft application to arrive at its comfort letter to the Minister of Economic Affairs. We follow the structure of DTe's advice on GTS' draft application, which means that we set out the respondent's views regarding the exemption criteria, immediately followed by DTe's (2003) assessment.

Respondent's views and DTe's assessment
DTe received responses from ten stakeholders: Gasunie Trade & Supply (GUTS); Centrica; Nederlandse Aardolie Maatschappij (NAM); RWE Gas Netherlands; DSM Agro; Nuon; Amsterdam Power Exchange (APX); the Association for Energy, Environment and Water (VEMW according to its Dutch acronym); the Vrijhandels Organisatie voor Electriciteit en Gas (the Free Trade Organization for Electricity and Gas, or VOEG according to its Dutch acronym) and the European Federation of Energy Traders (EFET).

Some of these may need some clarification. NAM is the biggest oil and gas producer in the Netherlands. DSM Agro is a Dutch producer of fertilizer and industrial products, and consequently a large consumer of gas. Nuon is a Dutch gas and electricity supplier. The APX Group provides gas and power exchanges for the UK, Dutch and Belgian markets (see section 3.4.4). The latter three respondents are examples of the stakeholder associations we referred to in section 4.2. VEMW is a Dutch organization established to further the interests of industrial gas users. VOEG is a Dutch platform designed to stimulate energy trade and includes producers, transporters and traders. Finally, EFET is a European stakeholder group comprising over 80 energy-trading companies.

The new infrastructure must enhance competition in gas supply and security of supply
The respondents' views are somewhat mixed regarding BBL's effects on competition and supply security. GUTS and NAM emphasize BBL's positive effects on 1) UK supply security, 2) Dutch security if BBL is connected to Nord Stream and 3) competition in Europe because BBL is an alternative pipeline that competes with the Interconnector. However, DSM, NUON, VEMW, VOEG and EFET are concerned that increased gas flows on GTS' grid due to BBL will result in insufficient transport capacity to supply Dutch consumers. Additional GTS investments to upgrade the grid should not be remunerated on Dutch users (which would be the case if GTS undertakes the investments and spreads the costs over Dutch users).

APX and NUON want BBL to provide reverse flow capacity. VOEG even proposes that the exemption be contingent on reserve flow capacity being installed. Attention is also given to UIOLI and capacity allocation. NUON argues that 20 percent of the capacity should be available for short-term contracts. Regarding UIOLI, APX argues, as does OFGEM above, that the UIOLI rules are not yet clear enough. VOEG opposes that an exemption also applies to UIOLI provisions.

DTe's assessment follows some of these arguments. DTe argues that an exemption may be granted only if sufficient measures are taken to prevent negative effects on Dutch supply security. DTe is predominantly concerned with the effects of gas flows that transit through the Dutch system to BBL (i.e., Balgzand). In this regard, DTe highlights three points. First, GTS should prevent that these transit flows result in insufficient transport capacity to supply Dutch consumers. Second, Dutch competition must not be impeded by the transit flows creating scarcity on Dutch entry points.[14] The concern in this regard follows particularly from congestion at the entry point at Oude Statenzijl. Scarcity at this point would impede third party entry into, and in turn competition in, the Dutch gas market. Additional investments required to prevent such scarcity should be undertaken by GTS in a timely manner. Third, the costs of these investments in the GTS grid should be remunerated on BBL users, for instance by including these in the exit tariffs at Balgzand. Only if GTS proves that Dutch consumers benefit from these investments may a part be remunerated at other entry- and exit tariffs. Furthermore, DTe wants to make the exemption contingent on timely information provision to DTe and/or the Minister of Economic Affairs.

DTe deviates from some respondents (APX, Nuon, VOEG) in not obliging BBL to install reverse flow, because the open season indicated a lack of interest. This is similar to OFGEM's view. However, DTe adds that GTS may be obliged to provide backhaul, i.e., non-physical transport, to the Netherlands. For example, backhaul imports into the Netherlands may take the form of reduced exports from the UK. To this end, GTS should recognize Balgzand as a non-physical entry point in its system as well as ensure that BBL contracts provide adequate and timely information on expected forward flows (into the UK) in order to facilitate backhaul. Finally, regarding UIOLI, DTe follows OFGEM in mentioning that there are no principle problems at the moment, but that additional clarity on the specifics is required. In sum, DTe's conclusion is similar to OFGEM's: she provides comfort concerning the first exemption criterion under the condition that the Minister of Economic Affairs, after delibera-

14 According to DTe (2006), an entry point is a point where gas enters GTS' national transport grid. Gas can enter a national grid from for example a production site, another national grid or a storage facility. An exit point refers to a point where the gas leaves the national grid, for instance into a regional transport grid, a large industrial consumer or an export point like Balgzand in the case of BBL.

tion with BBL and UK authorities, maintains the right to change the UIOLI provisions if they prove unsatisfactory.

The level of risk attached to the investment must be such that the investment would not commence without an exemption

NAM and GUTS argue that BBL's risk is high enough to make the project nonviable without exemption. GUTS indicates that the exemption is a crucial condition for concluding the transport contract with BBL Company. VOEG and NUON argue that the investment risk should be compensated for by long-term contracts. According to VEMW, on the other hand, BBL fits into the core activities of GUTS and Centrica, and its risk should therefore be considered a normal business risk which does not justify an exemption.

DTe has received additional information from GTS that identifies risks related to financing, permits, technical operation, maintenance, planning delays, price and volumes. DTe's view is that financing risks are the prime considerations for determining whether investment risk justifies an exemption. DTe considers that an exemption may impact GTS' expected tariffs because without an exemption, tariffs will be determined by regulation, while with an exemption BBL can set these tariffs itself. There is also an impact on expected transported volumes, because if regulation induces tariffs and conditions which are unattractive compared to alternative routes, BBL volumes will decrease. Hence, DTe considers that its risk assessment should also take into account price and volume risk. Its risk assessment analyzes the effects on the three risks it considers relevant of the following three alternatives: no exemption, a partial exemption and a full exemption. We discuss here a number of elements that were considered important in this regard.

The first main element has been discussed above: since BBL will at first have few competitive advantages for the Dutch market, its costs should not be remunerated on Dutch consumers. A second element is the extent to which BBL Company is able to force BBL users into concluding long-term contracts with high tariffs and unreasonable conditions. This possibility hinges on the presence of viable alternatives to BBL. DTe identifies the Interconnector, and its increase in capacity, as such an alternative. DTe has received GTS calculations which, based on BBL's indicative tariffs and those of the Interconnector's reverse flow expansion, compare the prices of both projects for transport from the Dutch Title Transfer Facility (a virtual trading platform operated by GTS, see section 4.10.1) or Gersheim to the UK. These calculations show a very small price differential, based on which DTe concludes that BBL is experiencing competition from the Interconnector (more on this in section 6.6.1). Competitive pressure may be increased further if plans to construct a pipeline from Denmark to the UK or additional LNG terminals in the UK were to materialize. These competitive forces imply that an RTPA regime should be careful not to impose too low tariffs, as this might make the project nonviable. Too high tariffs would result in shippers choosing an alternative option.

Concerning the possibility of a partial exemption, DTe reckons it has insufficient information regarding the GTS assumptions that underlie its argument that the project is nonviable without a 15 year exemption (the duration of the longest initial contracts) rather than 10 year (the duration of the shortest initial contracts). It is not clear that the initial contracts will not be concluded if after 10 years a part of their capacity was to fall under an RTPA regime.[15]

DTe nevertheless acknowledges that regulating the tariffs of a pipeline that operates in the presence of alternative competing routes may entail high risks to the investor. However, these risks may also be mitigated by implementing RTPA with tariffs that are based on existing alternatives on the market. In this situation, RTPA would prescribe a tariff which is in accordance with the market. Interestingly, DTe notes that such a market-oriented tariff would also arise with an exemption if there is real competition between alternatives and if an open season procedure has been installed to allocate capacity in a competitive fashion. Under these circumstances, granting an exemption would have no impact at all on tariffs.

In sum, DTe considers that there is sufficient evidence that the investment risks are high enough for an exemption. An important additional consideration is that tariff regulation is less necessary due to the competitive pressure from alternative projects. This statement may imply that DTe is less restrictive if there is competitive pressure, for instance through allowing longer exemptions. If so, then we must note that this is in direct contrast to the Commission's goal of granting exemptions restrictively. That is, taking the presence of competition as an argument to introduce competition less vehemently (through a longer exemption) runs counter to the Commission's main goals to introduce competition as much as possible.

As for GTS' calculations which indicate that its access tariffs would rise to uncompetitive levels if BBL had to reserve 25 percent for short-term access, DTe again emphasizes that it has insufficient information to properly assess the realism of the GTS projections, especially its scenarios regarding short-term contracts. With this explicit reservation, DTe differs from OFGEM. DTe also differs from the OFGEM view regarding the duration of the exemption, because it is not convinced that a 15-year exemption is proportional. Based on the information received, DTe concludes that a 10-year exemption, equal to the minimum length of the initial contracts, would not prevent the investment from being undertaken. In sum, DTe provides comfort to GTS regarding the risk criterion under explicit reference to the above reservations.

The infrastructure must be legally separate from the system operator

The original expectation was that BBL would be separate from GTS and that GTS would be structurally separated from GUTS after the Dutch Gasbuilding

15 Recall GTS' argument that without an exemption, the project's long-term finance is unsustainable due to the risks associated with regulated TPA.

had been fully restructured. However, at the time of its draft application, GTS was internally separated from GUTS, while the envisaged legal separation was postponed. Without structural unbundling, however, NUON, DSM and VEMW have expressed their concerns regarding the independence of GTS from GUTS.

DTe points out that ownership unbundling is not mandated by European legislation. It notes that when GTS formally applies for exemption, its unbundling should be carefully assessed in light of the Gas Directive's provisions. For the moment, however, DTe expects that BBL will satisfy this criterion.

Tariffs are levied on users

No reactions from respondents were received. GTS has indicated that BBL users will pay for booked capacities based on the indicative tariff specified in the open season procedure, which is sufficient for DTe to provide comfort.

The exemption must not be detrimental to the efficient functioning of the internal gas market

The responses regarding this criterion have already been discussed in the context of the first criterion. DTe adds the criterion that BBL must not be detrimental to the efficient operation of the system it is connected to. In this regard, DTe mentions that no problems are expected because no gas will be flowing into the Netherlands. If reverse flow capacity is installed, DTe considers consultation with BBL and OFGEM to be necessary. Hence, DTe also provides comfort regarding this criterion.

In conclusion, following OFGEM, DTe provides informal comfort regarding all criteria for awarding an exemption. Based on its current information, DTe advises the Minister of Economic Affairs to provide comfort for a full exemption over a period of 10 years. One additional advice to the Minister is to look into the initial contracts if GTS formally applies, in order to ensure that the information on which comfort has been granted has not changed.

We close this section with the observation that while both regulators were positive towards BBL, some differences in opinion came to the fore. An important reason for these is the fact that BBL entails clear advantages for the UK by supplying it with additional gas volumes, as opposed to the Netherlands. Due to these additional volumes, OFGEM is understandably focused on increasing BBL's competitive advantages as much as possible, hence its emphasis on gas quality and the role of ExxonMobil as a shareholder of GUTS. The Dutch perspective is different because without reverse flow capacity, BBL's effects on Dutch supply security will be minimal. There is a lack of consensus among respondents regarding BBL's effect on Dutch competition, because this depends on uncertain future developments like the installment of reverse flow capacity and connection to Nord Stream. The Dutch competition assessment is therefore more strongly focused on preventing obstructions to competition, as evidenced in DTe's concern with additional transit flows created by BBL on GTS' grid.

DTe is somewhat less forthcoming towards BBL than OFGEM. DTe is less lenient regarding GTS' information provision because it has some explicit reservations regarding the information it has received on GTS' risk projections. This contrasts with OFGEM, who explicitly states that it agrees with GTS' risk assessment. DTe is also stricter regarding the exemption period: whereas OFGEM considers the proposed 15-year exemption appropriate, DTe advises a 10-year exemption.

We can only speculate regarding the reasons for this difference. As indicated, one possible explanation may be that the lack of direct competitive advantages to the Dutch market has resulted in DTe taking a less positive stance towards the project. Without many direct competitive benefits, it is understandable that DTe's emphasis should lie on preventing anti-competitive effects on the Dutch market. In contrast, OFGEM would then have a stronger incentive for promoting BBL's development due to the competitive benefits for the UK market, which might explain its more lenient stance.

6.6 Phase 2: BBL Company's formal exemption application and stakeholder responses

Phase one of GTS' exemption process resulted in comfort letters from both sides of the North Sea. These, together with the Commission's reaction on OFGEM's preliminary exemption decision, created the security to take the final investment decision on BBL in May 2004 and to create the joint venture BBL Company in July. BBL Company officially requested an exemption in December 2004 (BBL Company, 2004), after which a formal consultation process was initiated.

6.6.1 BBL Company's formal exemption application

BBL Company submitted its formal exemption application to OFGEM and DTe on 10 December 2004. The application is based on Article 22 of the second Gas Directive as implemented in the Dutch and UK legislation. This implies for the Netherlands that the application is made under Article 18h of the Dutch Gas Act. BBL Company applies for an exemption from paragraphs 2.2 (Articles 12, 13), 2.3 (Articles 14, 15, 16, 17, 17a, 17b) and 2.5 (Articles 19, 20). In the UK, the application is based on sections 149 and 150 of the Energy Act 2004. Specifically, BBL Company applies for an exemption from Conditions 10 and 11 of the Interconnector License.

Section 6.5.1 provides a detailed account of GTS' draft application. The early guidance procedure provided comfort from both regulators. Consequently, the basic arguments remained unchanged. BBL Company's formal application can therefore be considered to be an updated version of the draft application.

This section discusses the arguments that differ from those in the draft application.

The new infrastructure must enhance competition in gas supply and security of supply
A few additional arguments are voiced in this regard. First, BBL Company refers to the European Commission's Trans-European Energy Networks (TEN-E) Programme which identifies missing links in Europe's infrastructure. TEN-E prioritizes specific investment projects which according to the Commission facilitate the operation of the internal gas market. An interconnector between the Netherlands and the UK is such a priority project. Hence, BBL Company's referral to the TEN-E Programme is supposed to emphasize BBL's positive effects on the development of a European internal gas market. Second, the ADL study, which was an important part of the draft exemption, has been updated. The study confirms its 2003 conclusions. Finally, it is indicated that as BBL will not be able to completely fill the UK's supply deficit, it will not obstruct other projects from being developed.[16]

Mitigating this supply deficit extends to supply security. One additional argument is that BBL increases the possibilities for third parties to enter the UK gas market. In addition, BBL Company includes a discussion of a May 2004 energy security monitoring report by OFGEM and DTI through their Joint Energy Security of Supply Working Group (JESS, 2004) to illustrate BBL's positive addition to UK supply security. The report identifies a UK supply gap which will increase UK import dependence in the coming 20 years. The report identifies five potential solutions: 1) additional imports from Norway, 2) LNG terminals to import gas from around the globe, 3) more interconnection, 4) pipeline upgrades and 5) gas storage. BBL corresponds to the third solution and improves supply security by mitigating the supply gap. BBL Company adds that BBL furthermore improves supply security because its transmission contracts neither specify a minimum load factor nor impose other limiting conditions regarding the use of transmission capacity (besides of course the UIOLI provisions). In consequence, according to BBL Company, BBL increases the availability of capacity and flexibility in UK and Continental gas markets. Finally, the transmission contracts explicitly include reverse flow possibilities (not physically, but either through swaps or interruptible contracts) which facilitates arbitrage.

The level of risk attached to the investment must be such that the investment would not commence without an exemption
Regarding investment size, no new arguments are voiced. Another component of investment risk is an investment's competitive position. BBL Company elaborates quite extensively on BBL's competitive position in comparison to

16 The report states that BBL will provide an additional 16 bcm of import capacity to the UK which equals around 18 percent of UK gas consumption.

competing projects, most notably the Interconnector. The Interconnector's reverse flow capacity enables it to supply gas to the UK, and consequently compete directly with BBL. BBL Company provides the tariff comparison with Interconnector we have referred to in section 6.5.3. Based on its indicated tariff of 65 euros per normal m^3 per year, BBL requires 87 euros per m^3 per hour per year to transport gas from TTF to the National Balancing Point in the UK. The corresponding figure for transport through the Interconnector is 84 euros. Hence, according to BBL Company, there is no room for tariff increases. A related point emerges from the ADL study referred to above. Based on ADL's conclusions that that the UK market can be considered competitive, BBL Company argues that this competitive pressure precludes it from setting high access tariffs.

BBL Company adds regulatory opportunism to the specific risks indicated in its draft application (which predominantly emphasized the risk due to the applicability of two different legal regimes). This has been discussed extensively in chapter five and needs no additional clarification at this point. BBL Company stresses that the exemption must be legally binding in order to make ex-post reneging as difficult as possible. BBL Company has provided additional information in support of its claim that the exemption should cover the entire length of the initial contracts. Specifically, it has provided a calculation indicating that the project's break-even point extends beyond the initial contract length.

The infrastructure must be legally separate from the system operator

In providing informal comfort, both OFGEM and DTe had voiced concerns regarding the separation of BBL from GTS. OFGEM based its informal comfort on the assumption of a legal separation between BBL and GTS as well as between GTS and the rest of Gasunie. DTe noted that BBL's unbundling should be assessed in light of the Gas Directive's provisions.

BBL Company reacts to these concerns by emphasizing the establishment of GTS in July 2004. According to BBL Company, this takes away the concerns, because GTS is legally separate from Gasunie. In addition, BBL Company explains, in a December 2004 update of its application, that there is agreement to go a step further and to implement structural (ownership) separation, which according to BBL Company further enhances BBL's independence from GTS.[17]

BBL Company elaborates on the role of GTS after separation. According to BBL Company, one result of the separation is that GTS is responsible for the national transmission activities (in other words, GTS will be the transmission

17 At the time of BBL Company's application, this ownership unbundling was being planned; it has been implemented on 1 July 2005. GTS, Gasunie Technology & Assets and the BBL shareholding are structurally separated from the trading activities, GUTS (now Gasterra), and brought into the hands of the government. Gasterra has retained the same shareholders: Shell, ExxonMobil and the Dutch State.

system operator). Because the Dutch Gas Act permits GTS to be involved only in regulated national transmission activities, and therefore not in BBL, the BBL shareholding is the responsibility of Gasunie Technology & Assets. Consequently, BBL Company stresses the legal separation between Gasunie Technology & Assets and Gasunie BBL which is supposed to ensure BBL's independence from the system operator.

BBL Company furthermore indicates that the other holding companies, Fluxys and E.ON Ruhrgas, also live up to the unbundling requirements, see section 6.3.2. Finally, BBL Company reacts to OFGEM's concern in its final views that the incorporation of Fluxys into the joint venture may decrease competition between BBL and the Interconnector. OFGEM's informal comfort requested clarity on this point, which BBL Company provides by stating that Fluxys does not participate in the Interconnector.

Charges must be levied on users

No additional arguments are voiced in this regard. BBL Company proposes the same capacity allocation mechanisms as in its draft application. BBL Company updates its information by providing the following overview of the open season process. Initial shipper interest was substantial, with 18 interested parties. Following a number of exploratory meetings, six were left. Finally, after further discussions regarding the parties' commitments to capacity, E.ON Ruhrgas, Wingas and GUTS signed the initial contracts. As indicated, these contracts determined BBL's initial capacity which justified a 36 inch pipeline.

The exemption must not be detrimental to the efficient functioning of the internal gas market

The only additional remark in this regard is that BBL Company sent a letter to DTe on 30 August 2004 pointing out that Gasunie Technology & Assets will carry out a substantial investment program in the GTS grid in order to prevent a scarcity of transport capacity due to the transit flows on behalf of BBL. This alleviates one of DTe's concerns in its final views. BBL Company indicated that the investment costs will be recouped on BBL users through long-term capacity contracts.

Because its initial contracts must start before December 2007, with a duration of 10 to 15 years, BBL Company applies for a 15-year exemption up to December 2022. They argue that this would guarantee a level playing field between shippers. The request concerns a full exemption, including the capacity of the initial contracts, reverse flow services and any spare capacity over and above the initial contracts. BBL Company adds that if the exemption would not cover the initial contract period, non-exempted capacity sold on an RTPA basis would impact the initial contracts. Specifically, BBL Company argues that regulated tariffs could also change the tariffs in the initial contracts. Finally, BBL Company explicitly considers the possibility of reverse flows in case of sufficient interest. BBL Company argues that these future contracts must be

consistent with the initial contracts, hence that an exemption should also apply to future reverse flow contracts.

BBL Company considers that its formal application is acceptable to the European Commission. BBL Company responds to many of the concerns of the regulators. The additional information provided to this end is often an update of the information in the draft application. The only significant change is the restructuring of Gasunie. For our purpose, a very interesting point raised by BBL Company is that of regulatory opportunism. We get back to this at the end of this chapter.

6.6.2 British responses

The formal procedure is similar to the one following GTS' draft application: OFGEM provided its initial views in December 2004 (OFGEM, 2004), inviting stakeholders to express their opinions and synthesizing both into its final views document, published in May 2005 (OFGEM, 2005). We discuss this process below. We only consider changes to OFGEM's final views concerning the previous consultation.

OFGEM's initial views

OFGEM's initial views arose from its final views on the draft application and the updated information provided by BBL Company (most of which is discussed in the previous section).

OFGEM upholds its view that BBL will improve competition in UK gas supply as well as its security. Its own competition analysis concludes that 1) there is no evidence that current market participants and new entrants will not be able to compete within the retail market due to a lack of future gas supplies, 2) the GB (Great-Britain) market is dynamic enough to respond to changes in supply and demand and 3) OFGEM has sufficient power to prevent future abuse within the GB market. By removing any connection between ExxonMobil and BBL Company, the intended restructuring of Gasunie alleviates OFGEM's concerns regarding ExxonMobil's role in both BBL and the South Hook LNG terminal. Finally, OFGEM welcomes BBL Company's intention to provide contractual (i.e., firm) reverse flow on the secondary market as well as an interruptible reverse flow (i.e., backhaul) service in the primary market.[18]

OFGEM considers that the first exemption condition is likely to be met. BBL Company's updated information on its contractual provisions is considered sufficient by OFGEM to honor its request for clarification on the UIOLI provisions.

18 See section 6.3.1 for the differences between firm and interruptible flows and between forward and reverse flows. The primary market refers to capacities that are acquired directly from BBL Company, while secondary capacity may be acquired from shippers that do not make use of their contracted capacity.

Regarding project risk, OFGEM sees no reason to change its position that the level of risk is sufficient for an exemption. Interestingly, OFGEM makes no reference to BBL Company's concern regarding regulatory opportunism. A new situation had arisen with respect to the third criterion, because BBL Company had been set up.[19] OFGEM considers BBL Company to be sufficiently separated from the British and Dutch system operators. The restructuring of the Dutch Gasbuilding indicated above facilitates OFGEM's positive view. The fourth criterion concerns chargers to users. OFGEM's positive final view on the draft application has remained unchanged. Regarding the fifth criterion, that the infrastructure should not have detrimental effects on competition or the internal market, OFGEM provides formal comfort on the condition that any gas quality issue is removed by GTS and National Grid Transco (NGT). OFGEM considers this condition to be met by referring to Condition 3 of the draft Interconnector License which is required to access the UK system. Condition 3 specifies that BBL Company must have a transmission operator to transmission operator agreement. Based on this agreement, GTS and NGT are expected to be able to cooperate to remove gas quality issues.

OFGEM's initial view regarding the duration of the exemption is that an exemption for the initial capacity and any contractual reverse flow is warranted until December 2022 (i.e., based on the duration of the longest underlying contract). OFGEM retains the option to amend or revoke the exemption for the capacity of the contract that expires in 2016, for instance if this capacity is sold after 2016 in a way that is detrimental to competition. However, OFGEM refuses to comply with BBL Company's request to also exempt future reverse flow capacity. OFGEM considers that this issue must be addressed when it arises. Condition 12 of the Interconnector License (which applies to BBL) allows BBL to apply for an exemption of any investment in additional future capacity. OFGEM has the ability to assess whether such an investment meets the risk criterion. Since it is impossible at this point to determine whether this criterion will also be met by future capacities, OFGEM considers that its view cannot be extended to future capacities. This applies to both forward capacity to the UK and reverse capacity from the UK.

Finally, OFGEM's approval of BBL Company's exemption is contingent on three factors. First, BBL must comply with the Competition Act 1998 and the Enterprise Act 2002, implying that the exemption may be revoked if BBL Company breaches competition law. Second, the approval applies to a specific situation, which if changed, may result in a review of the decision. Finally, the European Commission may veto or amend OFGEM's decision.

19 At the time of the draft application, the BBL project was owned by GTS and GTS considered including one or two other transmission companies into a joint venture. At this point, legally separate subsidiaries of E.ON Ruhrgas and Fluxys have been included in the partnership, each with a 20 percent share.

Respondent's views

OFGEM received responses from two parties: Centrica, who also responded to the draft application, and GUTS, the party who requested GTS to build BBL.

Centrica (2005) welcomes BBL and supports OFGEM's initial views. It offers three specific comments. First, Centrica notes that since Great-Britain's licensing regime has not yet been finalized by DTI, OFGEM's decision should be subject to further review, based on another consultation with the market parties, once the licensing regime has been finalized. Second, Centrica requests more clarification regarding BBL Company's proposals on UIOLI. Third, Centrica would like to receive additional information as to any additional investments in GTS' grid as a consequence of BBL.

GUTS (2005) obviously supports BBL, but nevertheless expresses two concerns. First, GUTS voices the same argument as BBL Company concerning the fact that discrimination should be prevented between possible future regulated tariffs (if not exempted) and non-regulated tariffs of the initial contracts. GUTS notes that the proposed Interconnector License includes elements to this end. Second, GUTS notes that NGT's quality requirements should be in line with the recommended EASEE-gas[20] values for high calorific gas at cross border points, because this would allow maximum utilization of the BBL and connected infrastructure.

OFGEM's final views

OFGEM' s final views include no material changes with respect to its initial views. Concerning BBL's effect on competition and supply security, OFGEM aims to closely monitor the retail gas market to detect any anti-competitive behavior. Since it received no responses on the risk criterion and ownership structure, OFGEM's final views on both are similar to its initial views. Regarding charges, OFGEM acknowledges GUTS' view that discrimination between regulated and non-regulated activities should be prevented. OFGEM considers that the requirement that charges and the methodologies underlying these charges should be objective, transparent and non-discriminatory suffices. Hence, also on the charges criterion, OFGEM's final view corresponds to its initial view. The respondents also issued some comments in light of the criterion that BBL should not harm competition or the internal market. OFGEM responds to Centrica's information request by indicating that the only investment in NGT's system is the connection of BBL to the grid. As to GUTS' gas quality concerns, OFGEM refers to its initial views in which it argued that gas quality issues must be resolved bilaterally by GTS and NGT. Once more, OFGEM's view remains unchanged.

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20 This acronym stands for the European Association for the Streamlining of Energy Exchange. EASEE-gas was set up in 2002 to develop and promote the simplification and streamlining of both the physical transfer and the trading of gas across Europe. It comprises members from every link of the gas value chain.

No responses were received regarding the length of the exemption. Nevertheless, OFGEM's final view is more lenient than its initial view: the exemption not only applies to contractual reverse flow, but also includes any non-physical reverse flow. This new and expanded provision comprises both contractual reverse flow capacity offered by shippers on the secondary market as well as interruptible reverse flow capacity offered by BBL Company on the primary market. Finally, since no responses or additional information were received on the grounds for amending or revoking the exemption, OFGEM's final views in this regard mirror its initials views.

6.6.3 Dutch responses

On the Dutch side, DTe did not organize a consultation process based on its informal comfort advice, but chose instead to base its formal advice (DTe, 2005) on the additional information it received after having sent its comfort letter. This additional information arose from BBL Company's formal application or the reactions from GTS and Gasunie Technology and Assets to questions from the director of DTe.

DTe's formal advice to the Minister of Economic Affairs

DTe splits the issue of competition and supply security into three parts: 1) competition and supply security in the Netherlands, 2) the direction of gas flows and 3) UIOLI provisions. Regarding the first part, in order to alleviate DTe's concerns regarding a potential scarcity of transport and entry capacity, GTS indicated that its investment plan will add 500.000 m^3 of entry capacity in the Northeastern part of the Netherlands. Based on confidential capacity figures, DTe concludes that the additional entry capacity is sufficient to cover expected transit flows. Furthermore, the costs of these investments will be remunerated on BBL users through long-term capacity contracts, which removes another of DTe's concerns voiced in response to GTS' draft application. DTe notes an additional competitive advantage of BBL: it creates the possibility to export high calorific gas from the Dutch small fields to the UK. This export frees up scarce conversion capacity in the Netherlands, because the exported gas need not be converted into gas of Groningen quality suitable for the Dutch market. The additional conversion capacity in turn increases the possibilities for suppliers to supply Dutch consumers, which improves the prospects for competition. A final advice of DTe regarding competition and supply security is that the Minister should force GTS/BBL Company to provide information not only in its compulsory two-yearly capacity plan (according to Article 8 of the Dutch Gas Act) but also at interim intervals in case of a substantial deviation from its investment plan.

DTe proposes no changes to its comfort advice concerning the direction of gas flows. The same applies to the UIOLI proposals, with the additional

advice to evaluate BBL Company's UIOLI mechanism and if necessary to adapt it after consultation with DTe.

Regarding investment risk, DTe received additional information from ABN AMRO and KPMG as well as a copy of the initial contracts, which acknowledges the need for an exemption. DTe makes the interesting observation that if one takes BBL Company's actual behavior as a guiding principle, it can be argued that the exemption need not cover the entire duration of the longest initial contracts (i.e., 15 years). This is because the investment was given the go-ahead despite the Commission's reaction to OFGEM's informal comfort letter, in which the Commission provides comfort for a 10-year exemption.[21] Apparently, this 10-year exemption was sufficient for the project to commence. DTe nevertheless grants the full-length exemption for the entire capacity of the initial contracts because 1) it considers it too difficult to determine the exemption length at which the investment would cease to be attractive, 2) there is no real need to shorten the exemption because the competition from alternative projects takes away the risk of BBL Company abusing a dominant position and 3) the open season, which is a form of TPA, justifies leniency.

These three reasons are also used by DTe to argue against the Commission's advice not to exempt reverse flows. An additional reason for doing so is that contractual counter flows are derived from physical forward flows. Treating the two differently, DTe argues, would result in regulatory problems, for instance in determining the appropriate cost basis, as well as impede a level playing field between shippers. Regarding the final three exemption criteria, the ownership structure, the tariffs for BBL use and BBL's effect on competition and the internal market, DTe's formal advice is similar to the advice in its comfort letter.

In sum, DTe considers BBL eligible for a full exemption with the option to amend or revoke the exemption for the capacity of the contract that expires in 2016 if this capacity is sold after 2016 in a way that impedes competition. Hence, DTe's assessment appears to have moved closer to OFGEM's. Whereas DTe's final views on GTS' draft application provided comfort for a 10-year exemption, its final views on BBL Company's formal application in principle allow an exemption for the entire length of the initial contracts (up to 15 years), which is similar to OFGEM's stance. Both regulators include reverse flow capacity in the exemption. The additional conditions are that 1) GTS/BBL Company provides interim information if it deviates from its investment plan, 2) BBL Company's UIOLI system is evaluated and 3) BBL Company owns the complete infrastructure when building commences. Following DTe's advice, the Dutch Ministry of Economic Affairs formally approved BBL's exemption.

21 As indicated in section 6.5.2, the Commission accepted the exemption if 1) its length would not exceed the period of the initial contracts (i.e., 10 years), 2) reverse flow nominations were not covered and 3) the UK retail market was kept under close review.

6.7 Phase 3: The European Commission's assessment

The European Commission was required to assess the regulator's decisions on BBL's exemption. It has the power to veto the exemption or demand amendments. The Commission received the UK and Dutch decisions on 12 April 2005. It published its formal notification of receipt on its website and invited third parties to respond.[22] However, no responses were received. The Commission then requested further information from the UK and Dutch authorities, which extended the deadline for the Commission's response to 12 July 2005. Its evaluation (CEC, 2005d) proposes a number of amendments to the exemption decisions which are in line with the letters sent earlier in response to OFGEM's informal comfort.

A first amendment relates to competition in the Dutch market. The Commission argues that Dutch competition will only be enhanced in case of fair and non-discriminatory access to reverse flow from the UK. Hence, reverse flow must not be exempted from third party access provisions. Another concern regarding reverse flow is that the Commission is not convinced that BBL Company would provide reverse flow capacity on reasonable terms without regulation. It underpins this opinion by arguing that the transmission contracts between BBL Company and shippers specify that 85 percent of the payments for reverse flow services would flow back to the main shippers. Consequently, the Commission considers the incentive of BBL Company for developing reverse flow capacity to be rather low. Second, the Commission considers that exemption length should not extend beyond what is needed for the project to go ahead. As indicated above, the project commenced after having received comfort from the Commission for an exemption covering the initial contracts (10 years). Furthermore, in contrast to both regulators above, the Commission considers the presence of competing pipelines or the open season procedure insufficient to justify a longer exemption. Adopting a more lenient stance towards the project – that is, allowing longer exemptions than strictly necessary for the project to commence – based on such arguments runs counter to the essence of the Gas Directive, the Commission argues. Third, the Commission also refutes the argument that having RTPA in the years 2016-2022 would impact the initial contracts, because regulators are supposed to take this into account in approving their tariff methodologies for this period. Fourth, the option to amend or revoke the exemption during the period 2016-2022 for the capacity of the contract that expires in 2016 if this capacity is sold after 2016 in an uncompetitive fashion is considered insufficient. The reason is that this approach grants the exemption unless uncompetitive behavior is identified, which directly contrasts with the condition that exemptions must be granted exceptionally.

22 See http://ec.europa.eu/energy/gas/infrastructure/exemptions_en.htm.

In sum, the Commission is considerably more strict with respect to BBL's eligibility for an exemption than the Dutch and UK regulators. It considers that BBL will meet the Article 22 criteria only if the exemption decision by the UK and Dutch regulators is amended so that its length is 10 years (2006-2016) for the initial contracts and 15 years (2007-2022) for the remaining capacity. Furthermore, reverse flow should not be exempted.

6.8 Lessons from the BBL exemption process

6.8.1 Actual regulation and the TCE perspective

As a result of assuming that vertical integration brings no increase in efficiency, neoclassical regulatory intervention is forced as much as possible to remove vertical integration, which it can do relatively easily through simple access rules or tariffs. Following the neoclassical perspective, European gas regulation emphasizes fair and non-discriminatory TPA as the basis for a competitive internal gas market.

If one strictly follows the neoclassical perspective, then introducing TPA creates the perfect competition equilibrium where investments are being undertaken efficiently. Accordingly, in the neoclassical world, the tension between liberalization and investment which is the foundation for the exemptions regime (see section 6.2.1) is non-existent. Hence, no exemptions should be granted at all. Consequently, the neoclassical perspective fails to explain the granting of an exemption to BBL.

Chapter 5 argues that the TCE perspective provides better guiding principles for gas regulation. Recall that the implication of the TCE perspective is that if an investment project faces ex-post hazards, applying the current TPA regime may not be the optimal (i.e., lowest transaction cost) solution. The discussion of investment hold-up in sections 2.9.1 and 5.4.1 illustrates the argument. It is argued that if an investor undertakes a specific investment, he is tied to the trading relation he has invested in. Ex-post hazards arise if circumstances change. Without any safeguards, the opportunism of the trading partners may change their behavior in order to capture the quasi-rent associated with the specific investment. This lowers the investor's ex-post profits which in turn changes his ex-ante behavior. As long as the trading partner cannot guarantee ex-ante not to behave opportunistically ex-post, the investor might in the extreme case choose not to undertake the investment. The essence in this regard is to install safeguards that improve the ex-post credibility of the trading relationship.

The BBL project fits this description. As indicated, the Commission sees BBL as a vital infrastructure that improves security of supply. A main argument of BBL Company is that the risk of the project is such that it would not commence without an exemption from TPA. BBL's TPA exemption can be considered

as a safeguard which is supposed to remove ex-post hazards concerning the BBL investment. It does so by allowing BBL Company to provide access not on regulatory terms, but rather through open seasons for capacity rights with consequent long-term transmission capacity contracts with shippers based on negotiated tariffs. During BBL's exemption process, the UK and Dutch regulators have allowed quite substantial adaptations to the TPA regime. The Commission for its part amended the regulator's exemption decisions, but it has granted an exemption to the project in order to ensure its development. BBL Company has indicated that this exemption was material in the project's go-ahead, implying that the exemption sufficiently mitigated ex-post hazards. This decision can only be explained using the TCE perspective, corroborating our theoretical critique in the previous chapters. Accordingly, the decision that BBL qualifies for an exemption is a step back in gas regulation from its neo-classical guiding principles towards the TCE perspective.

However, nowhere in the exemption process has this influence been recognized explicitly. Therefore, the BBL exemption may well coincidentally fit the TCE framework or only certain parts of it. The remainder of this section analyzes whether the step back from the strict application of TPA as a result of the exemptions regime can be considered sufficient to guarantee a credible European gas regulation which removes the ex-post contractual hazards. In other words, we consider whether it corresponds to the TCE perspective. For this assessment, we use the TCE criteria: contractual incompleteness, opportunism and asset specificity. Their interplay determines how a transaction should be governed in practice. Ex-post contractual hazards and required costly safeguards only play a role if these criteria appear in conjunction.

Ex-post contractual hazards are an element of investment risk. To assess the appropriateness of the BBL exemption regime in light of the TCE perspective, we must consider both the arguments that were voiced in the BBL process as well as the general risk criterion for awarding an exemption that has been applied to BBL. As indicated in section 6.2.1, DG TREN (2004d, p. 2) provides the following general criteria that determine an investment's riskiness:

- the extent to which an investment is sunk;
- the presence of uncertainty due to events that might occur after the investment has occurred, for instance concerning consumption projections; other competing investments; changes in world market conditions for primary fuels; or an above-average amortization period.

BBL's exemption process has brought to the fore numerous arguments, some of which have been acknowledged by the Commission. In order to determine whether the current exemptions regime has properly incorporated the TCE criteria, and consequently will be able to mitigate ex-post contractual hazards, we must look at actual regulation. Therefore, we trace below the extent to which the TCE criteria have found their way into BBL's exemption decision.

Asset specificity
Nowhere in the BBL exemption process is explicit reference made to BBL's specificity or sunk nature. This does not point towards ignorance of asset specificity, however, because asset specificity is explicitly mentioned in the exemption criteria. A more likely explanation is that BBL's specificity is undisputed, for instance because it has been built to honor GUTS's supply contract with Centrica and is therefore specific to that trading relationship. The open season procedure and capacity allocation mechanisms referred to above lower BBL's specificity by allowing other parties besides GUTS, Centrica or the initial shippers to use the pipeline. Nevertheless, specificity remains considerable, because BBL's only function is to provide transmission of gas from the Netherlands to the UK. Reverse flows or backhaul services further lower but do not remove BBL's specificity. In terms of the previous chapter, BBL creates a quasi-rent, which may be lowered but not removed. Section 5.4.1 also indicates that asset specificity is closely related to low numbers relations, because asset specificity creates a condition of bilateral dependency, implying that what may have been a large number supply situation at the outset is transformed into a small number exchange relation thereafter.

Contractual incompleteness
There is no explicit reference to contractual incompleteness in the exemption process. However, the fact that ex-post uncertainty is an explicit criterion of investment risk implies that contractual incompleteness is a parameter in the exemption process. Nobody knows exactly what will happen in the future. Consequently, since a contract cannot take account of ex-post adaptations that cannot be foreseen ex-ante, contracts are inherently incomplete. Ex-post uncertainty has been an important consideration at several stages of the exemption process. We provide a few notable examples that arise from the regulatory process.

GTS notes in its draft application that there will still be risks regarding the sale of transport capacity after the initial contracts have expired. Competing infrastructure projects have played an important role since the start of the BBL project. As indicated, the competitive position of BBL compared to the Interconnector has been an important parameter in the investment decision. DTe followed BBL Company's calculations concerning its indicative tariff and thereby acknowledged that the presence of competing infrastructures creates a substantial risk to BBL. In its formal exemption decision, DTe noted that the presence of competing infrastructures is sufficient to warrant a longer than minimum exemption. OFGEM adhered to this. In addition, financing uncertainty is also considered relevant by the national regulators. This is illustrated by DTe's final views regarding GTS' draft application. By granting longer than minimal exemptions (i.e., extending beyond 10 years), both regulators appear to acknowledge GTS' statement that return on equity is not expected after the initial contracts have expired. The Commission's final assessment, however,

amends this view by arguing that the presence of competing projects and/or open seasons does not provide sufficient ground for longer exemptions than required for the investment to commence. Nevertheless, the ex-ante risks are considered sufficient for a minimum-length exemption.

Regulatory opportunism/risk

As indicated, although the risk criteria do not explicitly refer to regulatory opportunism, there is nevertheless clearly room to incorporate opportunism. It has surfaced at a few points during the exemption process. According to GTS' draft application, regulatory uncertainty is the main justification for an exemption. The uncertainty in this regard emanates from the fact that BBL will operate in two different jurisdictions and hence will have to deal with two different regulators, creating uncertainty regarding the applicable regulatory regime. Regulators, respondents and the Commission acknowledge this risk. Another regulatory risk pertains to the observation that the second Gas Directive will not yet have been transposed into UK and Dutch legislation at the time of BBL's financial close. The latter risk has been the reason for the early guidance process.

Furthermore, the draft application argued that any insecurity concerning the initial long-term contracts might increase investment risk to such an extent that the investment will not materialize. Examples of such uncertainty given by GTS were that tariffs could be revised, extra conditions imposed or contract length shortened. These examples point towards regulatory opportunism. BBL Company makes this point explicitly in its formal application. It specifically argues that 'even if a favourable regulatory regime were offered at the outset (…) there is no certainty that this would last'. GTS argues that regulatory policy may be influenced by political pressure. This has urged BBL Company to stress that a positive aspect of including exemptions in the second Gas Directive is that it makes ex-post reneging of a regulator more difficult than a regulation which can more easily be amended ex-post. None of the actors make any reference to the possibility of regulatory opportunism, however. The Commission considered in its final assessment (CEC, 2005d, p. 4) that 'since exemptions from third party access are an exception from the general rules in the Directive, these should not go beyond what is necessary for the project to proceed, which in this case, was related to the time periods of the underlying contracts'. No reference is made to costs due to regulatory opportunism. Hence, regulatory opportunism is ignored in the BBL exemption process.

The omission of regulatory opportunism is also evident from a broader perspective if we consider the Commission's interpretation note on exemptions (DG TREN, 2004d, p. 5) which assumes the following cost elements to be relevant for a risk assessment: the revenues over time, the expected return on investment, the foreseen amortization period and the cost of capital assumptions. Accordingly, the current regime emphasizes the costs related to economic risks and does not consider regulatory opportunism as a risk element. This ob-

servation is confirmed by the interim results of a survey on regulator's experience with Article 22 exemptions which notes that 'The only relevant risks with respect to Art. 22 are economic risks (for example risk of investment with sunk costs or large investments in combination with low market demand)' (ERGEG, 2007b, p. 13). Remunerating these economic costs is obviously a good thing, but it excludes regulatory opportunism and therefore fails to properly remove ex-post hazards.

In sum, the Commission considers that exemptions must be used to make previously unprofitable but desirable investment projects profitable – both in the BBL case as well as concerning exemptions in general. This is perfectly understandable. However, the Commission does not take into consideration the presence, and costs, of regulatory opportunism. This contrasts with the TCE perspective which states that in order to remove the ex-post hazards which arise after the construction of BBL, the Commission should explicitly allow remuneration of the costs of regulatory opportunism, which it currently fails to do. The next section identifies the problems that arise from this omission and proposes a number of policy recommendations in order for the exemptions regime to become more credible.

6.8.2 Problems and policy options

This section discusses two problems of the current exemptions regime. The first is a direct consequence of the omission of regulatory opportunism. The Commission acknowledges that the exemptions regime is currently not working satisfactorily. For instance, in its impact assessment accompanying the proposals for the third legislative package (CEC, 2007d, p. 57, 78), the Commission notes that the current approach towards exemptions

> 'would lead to increasing national differences in the application of the exemption requests for new infrastructure projects. (…) Specifying and clarifying the legislative framework for these exemptions through specific guidelines would reduce the risk and would be favourable for the treatment of cross-border exemption requests'.

This section argues that providing more clarity on the conditions that determine an investment's eligibility for exemption is necessary but not sufficient.

Following our encompassing framework in section 5.4.2, with asset specificity and incomplete contracts, the presence of opportunism determines whether simple contracts suffice without the need for exemptions or whether there will be ex-post contractual hazards. In the latter case, costly safeguards (e.g., exemptions) are required. In this situation, in order to compensate for the costs to the investor of regulatory opportunism, hurdle rates and required pay-offs to the investor should increase beyond economic cost remuneration.

The omission of regulatory opportunism in the Commission's risk assessment highlights an interesting contradiction in existing regulatory policy. If the Commission really was to adhere to its neoclassical assumption of the absence of regulatory opportunism, she should grant no exemption at all. By allowing exemptions based just on economic risks, the Commission's current policy lies somewhere between the neoclassical and TCE perspective.

One solution for adequately incorporating the TCE perspective, and in consequence improving regulatory credibility, which facilitates investments, is to allow BBL Company to earn higher profits during the exemption period, which would include the costs of regulatory opportunism. This is unlikely because any company will be subject to EC competition rules regardless of the kind of exemption that has been granted (the inclusion of competition policy follows from the criterion that an exemption may not be detrimental to competition or the effective functioning of the internal market). In particular, Article 81 EC ensures that the competition rules concerning agreements, decisions of associations of undertakings and restrictive practices are applied, while Article 82 EC prevents abuses of a dominant position. Allowing for higher profits during the exemption, profits which would be higher than necessary for economic cost remuneration, particularly runs counter to Article 82, because it appears to benefit the investor with his dominant position at the expense of the infrastructure users. Hence, awarding higher profits during an exemption will likely run into competition policy objections.

An interesting option in this regard is to grant a US-style exemption. According to Larouche (2007, p. 25, 26), in the US, competition law is no longer required if a sector-specific regulation has been implemented which deters and remedies anticompetitive harm. As the case study indicates, potential anticompetitive issues are extensively analyzed in the current exemptions regime. If in this case an investor receives an exemption, and the costs of regulatory opportunism are included in the regulator's risk assessment, then ex-post hazards are substantially mitigated. However, this option is unlikely due to the place of competition law in primary EC law.

Another solution to this problem is to leave profits intact per period, but instead to increase overall profitability by extending the length of the exemption beyond the length required for economic cost remuneration. The Commission is unresponsive to this, as indicated by its final assessment regarding BBL. According to the Commission, the scope and duration of an exemption should be proportional to the objective being pursued, which is to allow an investor to make up for his economic costs (see above). Hence, there is also no incentive for increasing the exemption length beyond the minimum.

In sum, the existing Article 22 criteria live up to the TCE perspective regarding asset specificity and uncertainty, but fail to include regulatory opportunism. The consequence is that allowed profits during an exemption will be too low. If we assume that competition policy will prevent the Commission from allowing higher profits during an exemption, the implication is that DTe and

OFGEM were right to allow longer than minimum exemption lengths. However, none of them explicitly referred to regulatory opportunism as the basis for their leniency. DTe, for instance, explained its leniency by noting that it is hard to determine the required exemption length, that competition from alternative projects mitigates abuse of dominance, that BBL's open season justifies leniency and that reverse and physical flows should not be treated differently.

A second problem regarding the existing exemptions regime, in addition to the omission of regulatory opportunism, relates to the number of approved exemptions. Note that this problem is not caused by an ignorance of the TCE criteria, but rather is a general problem of the current regime. It nevertheless deserves attention because it enables us to provide a balanced assessment of the current exemptions regime. In its response to GTS' draft application, Interconnector (2003) argued that because the application of the TPA rules to an investment project is always a hindrance to an investment, all investments should be eligible for exemption. This corresponds to the view that exemptions are difficult to deny in practice. For example, Stern and Honoré (2004, p. 3) argue that virtually all new import projects – at their time of writing the LNG projects at Isle of Grain and Milford Haven and BBL – have received exemptions. According to Hernandez and Gandolfi (2005, p. 3), the exemption of major new infrastructures has been the rule since the inception of the second Directive. They argue that all six applications for an exemption have been approved by the Commission *without any objection* (emphasis added). BBL is one of these; the other 5 concern the North Adriatic and Brindisi LNG terminals in Italy, and the Isle of Grain, South Hook and Dragon terminals in the UK. However, our case study shows that the Commission actually has implemented quite substantial amendments to OFGEM's and DTe's exemption decisions, implying that the actual picture is more nuanced than Hernandez and Gandolfi's. Nevertheless, all requested exemptions have been granted so far. Of these, only two – BBL and the Poseidon pipeline – were amended by the Commission.[23] Therefore, Hernandez and Gandolfi do have a point by implying that the current exemptions regime is very lenient towards granting exemptions (in contrast to the conditions for exemptions which we have discussed above). This observation urged ERGEG in its presentation to the Madrid Forum Joint Working Group on 17 July, 2007 to state that exemptions are the rule rather than the exception. This contrasts with DG TREN's (2004d) explicit goal to restrictively grant exemptions.

According to this study, this situation is due to a misunderstanding concerning the impact of RTPA on investment behavior. The risks related to an RTPA regime are an important reason for applying for an exemption. This is understandable, because access regulation will always lower a project's profitability compared to a situation without RTPA requirements. The emphasis on

23 See http://ec.europa.eu/energy/gas/infrastructure/exemptions_en.htm for an overview of all approved exemptions.

the risks associated with RTPA is also clear from the BBL case, as GTS' draft application (based on confidential financial information provided by its financial advisor) explicitly argues that without an exemption the project's long-term finance is unsustainable due to the risks associated with RTPA. This statement is accepted by OFGEM, DTe and the Commission in the remainder of the exemption process. Spanjer (2008) argues that the effect of TPA investment incentives is not as negative as is often assumed. The argument runs as follows. The existing exemptions regime is an application to the gas market of the access holiday (AH) theory which builds on the assumption that access regulation truncates profits. According to AH theory, a lack of credibility to leave access regulation unaltered ex-post negatively impacts sunk investments (note the close similarity with the TCE reasoning). In such a situation, an exemption is very useful because it removes the hazard of ex-post regulation for a period of time which improves project profitability. Spanjer argues that this argument has limited practical applicability. Only in case of excessive access regulation – i.e., access regulation that makes the investment project unprofitable overall – will investment behavior be impacted. In contrast, if access regulation lowers profits but retains a project's overall profitability, it will not impede the investment and no exemption is necessary. Overestimating the effect of RTPA on investments creates a situation in which any investment project can show that its profitability will deteriorate when regulated, and hence that it is eligible for an exemption. Consequently, denying an exemption becomes impossible. According to this study, this is an important reason for the observation that all exemptions are approved despite clear intentions of granting them exceptionally.

If we combine both our arguments, the omission of regulatory opportunism in an investment's risk assessment and the overestimation of RTPA's impact on investment behavior, we need an exemptions regime that grants exemptions more restrictively than does the current regime, but when doing so is more lenient to the investor. The Commission does not follow these recommendations regarding BBL. First, the exemption is granted and the GTS/BBL Company arguments that the RTPA regime is an important impediment to investment are acknowledged without explicitly considering the relation between investment behavior and RTPA. Hence, the approval of BBL's exemption is not based on a proper analysis of the interaction between the access regime and investment incentives.[24] Second, if the Commission considers an exemption to be necessary, as is the case with BBL, the costs resulting from regulatory opportunism justify leniency regarding the conditions of the exemption. As indicated above, extending the exemption length may be an appropriate solution (as opposed to scaling down the exemption to a minimum).

24 Note that we have not had insights into KPMG's and ABN AMRO's calculations regarding their conclusion that the risks related to the RTPA regime justify an exemption.

6.9 CONCLUSIONS

This chapter empirically examines the conclusion of chapter five that the TCE perspective provides a better basis for European gas regulation than the neoclassical perspective. It analyzes the actual behavior of market players regarding one prominent adaptation to gas regulation that signals a move away form the neoclassical perspective: the enlarged scope for TPA exemptions in the second Gas Directive. This is conducted through a case study of the first pipeline investment project that has received an exemption: the interconnector between Balgzand in the Netherlands and Bacton in the UK (the BBL pipeline). The analysis of the regulatory process in this case results in the following conclusions.

First, granting an exemption cannot be explained using the neoclassical perspective, because in the neoclassical world the tension between liberalization and investments, which is the foundation for the exemptions regime, is non-existent. The TCE perspective provides a proper explanation for the presence of exemptions by considering BBL's TPA exemption as a safeguard that mitigates ex-post hazards concerning the BBL investment project. Accordingly, by granting exemptions, European gas regulation has moved away from its neoclassical guiding principles towards the TCE perspective.

Second, the assessment of BBL's exemption incorporates the TCE criteria of asset specificity and the presence of incomplete contracts, but ignores regulatory opportunism. A similar picture arises with respect to the general risk criteria of the exemptions regime. Even though BBL Company explicitly refers to it in its formal application, neither the national regulators nor the Commission have incorporated it into their assessments. The encompassing framework in chapter five points out that when regulatory opportunism is omitted, all promises are kept and ex-ante contracting removes all ex-post hazards, as a consequence of which the neoclassical perspective still suffices. This illustrates that European gas regulation appears to be moving towards the TCE perspective but nevertheless retains its neoclassical perspective. The conclusion is that European gas regulation is currently stuck between the neoclassical and TCE perspectives. This is undesirable, because chapter five illustrates that the structural and transactional characteristics of the European gas market call for a full incorporation of the TCE perspective.

Third, a consequence of the omission of regulatory opportunism is that the inherent costs resulting from regulatory opportunism are not recognized in an investment's risk assessment. Accordingly, the allowed profits during an exemption are too low. One solution is to allow higher profits to reflect the higher hurdle rates, but this is not likely due to the applicability of competition policy. An alternative solution might be to grant US-style exemptions, whereby competition law does not apply if competitive harm has been mitigated by sector-specific regulation. However, the place of competition policy in primary EC law makes this option unlikely. Another solution may be to

grant exemptions which are longer than minimum (i.e., longer than required for the remuneration of economic costs).

Fourth, a more general problem regarding TPA exemptions is that it appears very hard in practice to deny an exemption (despite the clear intention to grant them exceptionally). According to this chapter, one reason for this is an overestimation of the impact of RTPA on investment profitability. The traditional argument is that RTPA truncates profits because a regulator cannot credibly promise ex-ante to leave access regulation unaltered ex-post. A TPA exemption is then very useful since it removes the ex-post hazard of regulation for a specified period of time, which increases profitability. This chapter submits that this argument has limited applicability in practice. Any project can show that RTPA diminishes profitability compared to a situation without RTPA, which makes is impossible to deny an exemption. The issue regarding investments is not so much whether project profitability diminishes as a result of access regulation, but rather whether it diminishes to the extent that the project becomes unprofitable. As long as profitability remains positive, the investment will commence and no exemption is required. In conjunction, the third and fourth conclusion argue that a TPA exemptions regime which is based on TCE guiding principles should grant fewer exemptions than is currently the case, but display more leniency towards granted exemptions.

7 Long-term supply contracts – The Distrigas antitrust case

7.1 INTRODUCTION

This chapter examines the second amendment in gas regulation: the treatment of long-term downstream gas supply contracts. To this end, a case study is carried out on the Commission's antitrust case against Distrigas' downstream long-term gas supply contracts in Belgium. The goal is similar to that of the previous chapter, namely examining whether the theoretical critique is valid in practice. The choice fell on this antitrust case because it provides the Commission's view towards future long-term contracts.

Section 7.2 provides the background to the case study. It sets out the Commission's view towards long-term supply contracts. It is indicated that the Commission's view arises from an antitrust case against Distrigas, a Belgian trading company. Section 7.2 also provides the required background information on Distrigas. Section 7.3 studies the Commission's antitrust case against Distrigas' long-term supply contracts in Belgium. This section describes the regulatory process in order to trace the arguments that were voiced by the different stakeholders in order to infer which specific changes to regulation have been implemented and the reason for these changes. Section 7.4 explores the broader implications of the case study. It argues that the acceptance of long-term contracts by the Commission cannot be explained within the neoclassical perspective. It can be explained, however, within the TCE perspective. Section 7.5 examines whether the Commission's view properly incorporates the TCE criteria. We show that it does not and that the Commission is once again stuck between the neoclassical and TCE perspectives. Section 7.6 concludes. Chapter four's disclaimer also applies here. Because this study analyzes the issues from an economic perspective, the emphasis is on economic arguments and literature where possible.

7.2 BACKGROUND: LONG-TERM CONTRACTS AND COMPETITION

7.2.1 Stakeholder views

This section sets out the views of different stakeholders in the European arena regarding long-term contracts and competition. Section 4.10.1 has discussed two ERGEG papers that set out a road map towards a competitive single gas market in Europe. ERGEG (2005) is a discussion paper for public consultation. It poses several questions on which it invites stakeholder responses. One cluster of questions relates directly to long-term contracts and competition (ERGEG, 2005, p. 34):

> 'Long contracts give security to investors, but may frustrate the development of effective competition. Under the regulated approach, what steps are needed to provide the necessary degree of security to investors (for example, the existence of a regulated asset base)? If the two approaches co-exist (for example, where non-regulated infrastructure outside the EU meets regulated infrastructure inside the EU at the border), what issues are raised by the interaction? Finally, how do legacy contracts fit into this picture?'

The answers to these questions should provide the stakeholder's views on the existence of long-term contracts while moving towards competitive gas markets. Twenty-two responses to the consultation were received, of which five directly addressed the questions posed above.[1] This section provides an overview of these responses in order to provide a general view of the opinions on long-term contracts and competition. Two of these stakeholders – EFET and GIE – have been mentioned in section 4.2. The remaining three stakeholders comprise the already referred to energy companies E.ON and Centrica as well as Eurelectric, the sector association representing the common interests of the European electricity industry and its worldwide affiliates and associates. These responses, in combination with those of Shell (which do not directly address the above question), provide a complete range of views on long-term contracts and competition.

GIE (2006), Gas Infrastructure Europe, representing the European infrastructure operators, posits that while short-term trading will increase, long-term contracting will remain the cornerstone for the European gas market. These contracts need to be balanced against the drive to develop competitive markets. According to GIE, one key aspect of this is for the regulatory framework to not prescribe a particular form of remuneration, but to allow flexibility to how investments are funded. Regarding legacy contracts, contracts that existed prior

1 Seehttp://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_CONSULT/ARCHIVE/ GAS/ Roadmap%20to%20competitive%20markets/RR for the overview of all responses.

to the liberalization coming into force, GIE points out that these will not impede competition provided that adequate congestion management principles and secondary trading markets are present.

EFET (2006), the European Federation of Energy Traders, recognizes the important role of long-term contracts in facilitating infrastructure investments. However, these contracts must be consistent with competitive markets, implying that new users of an infrastructure should not be disadvantaged compared to existing users. In this regard, EFET mentions that long-term contracts, as well as the legacy contracts, are of no concern if a TSO has been fully (i.e., ownership) unbundled, if non-discriminatory TPA services to all parties is provided and if unused capacity is made available on the secondary market or through use-it-or-lose-it principles.

Centrica (2006), a UK-based supplier of gas and electricity on both sides of the Atlantic Ocean, argues that the two approaches identified by ERGEG – a fully regulated approach where investors remunerate their costs based on tariffs set by the regulator, and a commercial approach where investments are secured on the back of long-term contracts – have facilitated investments in the UK. Regarding the long-term contracts approach, Centrica argues that the traded gas market itself provides a significant element of investor security in a competitive environment. In contrast to the two approaches identified by ERGEG, Centrica identifies four different investment approaches: the regulated approach, a liberalized commercial model within parts of the EU, the legacy, pre-liberalization model in parts of the EU and the commercial model that applies to non-EU infrastructure projects such as Nord Stream. The co-existence of these fundamentally different approaches is the main impediment to competitive trading markets in Europe. As above, the issue is to integrate these contracts as much as possible into the liberalizing gas market without impeding investment incentives.

Eurelectric (2006) puts forward a similar argument by identifying two pressing problems: 1) most EU cross-border capacity is booked for incumbents' existing (legacy) long-term contracts and 2) investment in new cross-border capacity is inadequate. Regarding the first issue, no suggestions for a solution are proposed. Regarding the second issue, Eurelectric fears that TSOs may not have sufficient incentive to invest in cross-border capacity, creating a need for Member States and regulators to step in to ensure that investments are undertaken.

E.ON (2006) emphasizes the investment security properties of long-term contracts. In fact, in order for companies like E.ON to efficiently deliver adequate investment in an appropriately diverse portfolio of assets requires among others that 'regulators/governments support long-term contractual supply and transportation agreements as well as protect investments'.

Finally, Shell (2006) also emphasizes that long-term contracts are a risk management tool. Shell goes a step further by warning for too much emphasis on short-term considerations due to liberalization. Shell is concerned by the

renewed debate about the viability and desirability of long-term contracts. While she acknowledges that there is clearly a role on the European gas market for short-term business, according to Shell, ERGEG's discussion paper puts too much emphasis on 'short-term-ism', with possibly detrimental consequences to investments.

These responses illustrate the different perspectives and views of different stakeholders regarding long-term contracts and competition. The common denominator appears to be that there is a tension between the short-term focus that follows liberalization and the long-term contracts required to facilitate investments. This is in accordance with one of the main messages from the transaction cost perspective, namely that there is a fundamental tension between competition and coordination. The upshot is that devising a regulatory regime that introduces competition in the European gas market whilst ensuring sufficient investments, will need to carefully balance both conflicting objectives. The next section sets out the balance currently chosen by the Commission.

7.2.2 The Commission's view

The Commission's assessment of long-term contracts and competition is based predominantly on the extent to which consumers are able to switch between suppliers. This can be explained as follows. As indicated in chapter one, the European gas market is mature, which means that a relatively low number of new connections to the grid is required. This in turn means that new consumers must be recruited from existing suppliers by for instance offering more attractive contract terms. Consequently, the ability of consumers to switch is vital to facilitate competition among suppliers.

The Commission's current view on long-term contracts on a liberalized European gas market has come to the fore in two recent publications. Firstly, the final report of the Energy Sector Inquiry (CEC, 2007c, p. 7-10) identifies at least two main impediments to competition of long-term contracts. An important precondition for competition to develop is the possibility for new entrants and existing competitors to procure additional gas in order to gain a foothold on the market or increase their market share. Such entry is foreclosed if the majority of available gas volumes are tied up in long-term supply contracts. A second, and related, competition-distorting effect is that long-term downstream supply contracts prevent consumers from switching to another supplier. This implies that dispensing with long-term contracts would improve the level of competition, which would in turn improve operational and allocative efficiency.

A second publication that reflects the Commission's assessment is its proposal for a third legislative package (see section 4.9). The accompanying impact assessment builds on the Sector Inquiry and argues that a higher level of competition, and by extension a lower level of long-term contracting, implies

a shift of welfare from current gas suppliers and transporters to consumers (CEC, 2007d, p. 55). This 'will mean an increase in efficient use of the transport system. The cost of regulation and the cost of compliance are expected to be less than economic benefits' (ibid.). Hence, the emphasis is on competition rather than coordination. In the explanatory memorandum to the third package proposals, the Commission notes that 'downstream bilateral supply agreements provide an opportunity to energy intensive industries to obtain more predictable prices. However, such agreements risk foreclosing the downstream market (…)' (CEC, 2007e, p. 18). Hence, long-term contracts entail benefits by reducing uncertainty to users. This may indicate a step back from the neoclassical perspective, which does not consider such efficiency rationales, towards a more explicit recognition of the TCE perspective in gas regulation. On the same page, the Commission furthermore notes that 'To reduce uncertainty on the market, the Commission will, in the coming months, provide guidance in an appropriate form on the compliance of downstream bilateral long-term supply agreements with EC competition law'.

The Commission has recently closed its antitrust case against Distrigas, a Belgian trading company (see also section 6.3.2), which focused on the long-term contracts that Distrigas had concluded with its consumers. These downstream supply contracts contrast with upstream supply contracts which are usually concluded with gas producing companies like Gazprom to import gas supplies. This chapter focuses on the downstream contracts, because these are fully within the Commission's jurisdiction (upstream supply contracts are, with the notable exception of Norway, predominantly concluded with parties that are not subjected to European gas legislation). The outcome of the Distrigas case is exemplary of the Commission's treatment of other companies that have concluded or wish to conclude such contracts with consumers, because the Commission has indicated that it will take account of the reasoning developed in the Distrigas competition case when assessing future cases (CEC, 2007g). Hence, the Distrigas case provides the Commission's current and future view on long-term downstream supply contracts on European gas markets.

7.3 The Distrigas antitrust case

7.3.1 Distrigas

Founded in 1929, Distrigas has been the integrated gas incumbent on the Belgian gas market until 2001. In 1998 Distrigas went public but remained integrated. This ended in November 2001 when Distrigas was legally unbundled into Fluxys (the transport part, see section 6.3.2) and Distrigas which was from then on responsible for the trading activities. Table 7.1 provides Distrigas' shareholder structure.

Table 7.1: Distrigas shareholders

Shareholder	Percentage
SUEZ (through SUEZ-Tractebel)	57.25
Publigas (Belgian communalities)	31.25
Private shareholders	11.50
Belgian State	1 golden share

Source: Distrigas website, at: www.distrigas.be

Distrigas is the largest gas supplier and importer in Belgium. Distrigas is active in six countries in the Northwest region – Belgium, Luxemburg, France, Germany, the Netherlands and the UK – and Spain. Table 7.2 indicates that around 80 percent of its gas sales are on the Belgian market.

Table 7.2: Distrigas gas sales

Gas sales in TWh[a] to:	2006	2007
Resellers/distribution	67.9	62.5
Direct industrial consumers	49.1	49.5
Electricity generators	44.8	28.5
Sales in Belgium	*161.8*	*140.5*
Sales outside Belgium	31.7	31.6
Arbitrage	8.2	4.6
Total sales	*201.7*	*176.7*
Total sales in bcm[b]	*17.3*	*15.2*

a) TWh stands for Terawatt hour which amounts to 10^{12} watt*hour.
b) bcm stands for billion cubic meter. 1 bcm equals 11,630 MWh or 11.63 TWh.
Source: Distrigas website, at: www.distrigas.be.

Distrigas facilitates both east-west and north-south gas flows. For example, Distrigas holds a 16.41 percent share in the UK Interconnector and has facilitated Interconnector's investment in reverse flow capacities to Belgium. Distrigas is also active in the LNG market. It has been importing LNG from Algeria since 1982 and from Qatar since 2007.

Section 6.3.2 indicates that the merger between SUEZ and Gaz de France (GDF) has far-reaching consequences for the Belgian gas market and Fluxys. This merger, and the related structural remedies, also have an effect on Distrigas.

We highlight the most notable remedies that affect Distrigas. The most important remedy is the divestiture of SUEZ's holding in Distrigas. Until the merger was finalized, Distrigas was managed independently from SUEZ under the supervision of a trustee. After the merger, Distrigas will be sold in its entirety (including its French activities) to a third party that must have relevant expertise in the energy sector, particularly in the downstream supply to final

consumers. In order to cover Electrabel's (Belgian's biggest electricity company, solely owned by SUEZ) needs for its gas-fired power plants as well as to serve its consumers (mainly residential), GDF SUEZ will conclude a supply contract with Distrigas prior to divesting its stake. This supply contract amounts to maximally 70 TWh,[2] and must after five years have decreased to 20 TWh. Furthermore, to facilitate market entry and competition, the operation of the Zeebrugge hub is transferred from SUEZ to Fluxys, the network operator. In addition, several investment projects will be carried out which increase infrastructure capacities. The most prominent example pertains to improvements in the functioning of the Zeebrugge gas hub through the creation of a single entry point which links all networks together.

As indicated in section 6.3.2, the Commission accepted the remedies and approved the merger on 14 November 2006 (CEC, 2006b). The deal with the Commission includes the obligation to make public a shortlist of potential candidates for the take-over of Distrigas before the end of March 2008. On March 26, SUEZ published its shortlist which announced that negotiations would start with Electricité de France, Italy's ENI and Germany's E.ON (SUEZ, 2008). On May 29, ENI announced that it had signed an agreement to buy SUEZ's share in Distrigas (ENI, 2008).[3]

7.3.2 The regulatory process

We start out by noting that the regulatory process differs from that of BBL's exemption process. First, this case does not involve national regulators. Second, there is less publicly available information in the present case. The Commission's antitrust website contains the Commission's assessments and decisions, but not the stakeholder responses in the consultation process and Distrigas' submitted documents.[4] Nevertheless, the information at our disposal is sufficient for the task at hand which is to trace and assess the Commission's view towards Distrigas' long-term contracts (see CEC, 2007j for an overview of the process).

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2 Terawatt hour (TWh) is a unit of energy used for expressing the amount of produced energy, electricity and heat. 1 TWh = 1,000 Gigawatt hour (GWh) = 1 million Megawatt hour (MWh) = 1 billion kilowatt hour (kWh).

3 At the time the shortlist was published, the merger had not yet materialized. Consequently, the agreement was conditional on the merger between GdF and SUEZ actually materializing, approval by the Commission of the agreement and the right of first refusal of Publigas not being exercised. Due to this uncertainty, three possible scenarios were being considered: 1) the situation in which Distrigas is managed as a separate company, 2) the reintegration of Distrigas in the SUEZ group if the merger should fail and 3) the divestment of Distrigas to ENI if the merger actually materialized. These scenarios influenced the Commission's assessment in the Distrigas case, as we discuss below.

4 See http://ec.europa.eu/comm/competition/antitrust/cases/index/by_nr_75.html#i37_966.

The regulatory process commenced on 26 February 2004 when the Commission opened proceedings by adopting a Statement of Objections[5] concerning long-term supply contracts between Distrigas and an unspecified industrial consumer. On 30 June 2005, the Commission adopted a preliminary assessment. This concerned supply contracts with a number of different consumers – industrial users, electricity producers and resellers. The preliminary assessments were concluded by a supplementary Statement of Objections on 8 May 2006 concerning Distrigas' long-term contracts with industrial users in Belgium (CEC, 2006a). The Commission's objections predominantly focused on market foreclosure issues as we show below.

On 1 March 2007 Distrigas submitted a proposal which specified a number of amendments aimed at allaying these objections. These proposals were followed on 5 April 2007 by a market test notice in which the Commission invited interested third parties to respond (CEC, 2007f).[6] Based on the responses received, Distrigas submitted an amended proposal on 12 June 2007. The Advisory Committee on Restrictive Practices and Dominant Positions[7] was consulted on 17 September 2007, following which the Hearing Officer[8] issued her final report on 25 September.[9] The regulatory process was completed on 11 October 2007 through a formal Commission decision that made Distrigas' amendments legally binding (see CEC, 2007k).

5 A Statement of Objections is a written communication which the Commission addresses to persons or undertakings before adopting a decision that affects their rights negatively. This ensures the addressee's rights of defense by giving them the opportunity to make their point of view known on any objection the Commission may wish to make in a decision. The Statement of Objections must contain all objections which the Commission intends to rely upon in its final decision. It is an important procedural step foreseen in all competition procedures in which the Commission has the right to adopt negative decisions. See http://ec.europa.eu/comm/competition/general_info/s_en.html.

6 OJ C 77, 05/04/2007.

7 An Advisory Committee comprises representatives of the Member States and is consulted by the Commission in antitrust and merger cases where such a consultation is foreseen. A preliminary draft decision by the Commission is submitted to and discussed with the Committee. The Advisory Committee issues an opinion which is taken into account in the final Commission decision.

8 The Hearing Officer is an independent senior official charged with organizing hearings and with ensuring that they are properly conducted. Its tasks include resolving disputes between the Commission services and the parties concerned about the confidentiality of documents and access to the file which one or more of the parties claim in order to prepare their defense. The Hearing Officer reports to the Commissioner with special responsibility for competition. Its final report on a competition case is attached to the decision and published in the Official Journal. The terms of reference of the Hearing Officer are laid down in a Commission decision.

9 OJ C 9, 15/1/2008.

7.3.3 The Commission's preliminary assessment

An important element in the Commission's objections concerned Distrigas' dominant market position. Hence, its preliminary assessment started with determining the relevant product and geographic markets for Distrigas. The market for supplying high-calorific gas to consumers with an annual gas consumption that exceeds 1 million m^3 was seen as the relevant product market. Due to the specific legal and regulatory regime in Belgium as well as price differences between Belgium and its neighbors, the Belgian market was considered to be the relevant geographic market. Three elements were especially relevant in the Commission's conclusion of market dominance (see the Commission's commitments decision (CEC, 2007l) for an overview).

The first element was the high market share enjoyed by Distrigas five years after liberalization. The Commission provided confidential information specifying that Distrigas' market share on the relevant market for industrial consumers was 55 to 65 percent. When taking account of Electrabel's share on the same market, the total market share of SUEZ-related undertakings rose to 70-80 percent, compared to 5-15 percent for the next largest supplier. Second, the Commission identified barriers to entry due to 1) the balancing regime of the transport network, 2) the difficulty in using gas in transit to supply Belgian consumers, 3) congestion on entry points into the Belgian transport network, 4) a lack of liquidity on the Zeebrugge hub and 5) a lack of effective competition on the low-calorific gas market. The problem regarding the latter point was that the lack of competition could spill over to the high-calorific market. This was due to the fact that some consumers with multiple sites wanted a single supplier for all their Belgian sites. The spill-over occurred because some of these sites were connected to the high-calorific network and others to the low-calorific grid. Thirdly, being a member of the SUEZ group strengthened Distrigas' position on the relevant markets. The SUEZ group comprises consumers like Electrabel and many local distribution companies. Accordingly, Distrigas was assured of supply to large consumers from within the group, providing an advantage to competitors who lack such access and guaranteed supply. This preferential position will disappear once Distrigas is divested as a consequence of the GDF/SUEZ merger. According to the Commission, however, Distrigas will remain dominant in the divested situation. Based on these considerations, the Commission concluded that Distrigas has a dominant position on the relevant markets. Of course, simply indicating a dominant position is insufficient; there has to be abuse of dominance.

In its original Statement of Objections, the Commission expressed concerns regarding market foreclosure and the use and resale restrictions in a Distrigas contract with a large energy consumer. Since Distrigas decided to remove the sales restrictions from its contracts before the Statement was sent, the Commission's latter concern was no longer relevant. Accordingly, the Commission

emphasized market foreclosure issues, which in this case were due to the volumes tied by the contracts and the duration of the contracts.

The contracted volumes were considered problematic because most Distrigas contracts specified mandatory minimum off-takes with the possibility for consumers to procure their entire demand from Distrigas even though their exact annual consumption was unknown beforehand. In addition, some consumers had signed contracts that explicitly obliged them to buy all their gas from Distrigas. Furthermore, most consumers only had one supplier – only very large consumers with an annual consumption exceeding 500 GWh were able to obtain gas from multiple suppliers. Below this threshold, consumers were considered to be tied to their supplier, and therefore able to switch only at the contract renewal stage.

Regarding contract duration, the first step was to determine the normal length of a supply contract. To this end, the Commission considered the average duration of the transport contracts which are required in conjunction with supply contracts. The normal duration of a gas transport contract in Belgium was one year. Consequently, a normal supply contract was considered to be of the same duration. The Commission noted that some contracts contained tacit renewal clauses that automatically renew a contract unless one of the parties explicitly terminates it, and observed that some contracts had no explicit termination date. The Commission did not consider this harmful, however, because it assumed that the professional buyers on the relevant product market were able to terminate their contracts if they considered this to be in their best interest. Accordingly, consumers were considered tied by a contract until the first possibility to terminate the contract. With this definition in hand, the Commission calculated which part of the relevant market would be tied by Distrigas' contracts. These calculations showed that Distrigas' supply contracts on 1 January 2005 tied 50-60 percent of the relevant market on 1 July 2005, 30-40 percent a year later and 20-30 percent three years later.

These calculations confirmed the Commission's foreclosure suspicions and in conjunction with Distrigas' market dominance led the Commission to conclude in its preliminary assessment that Distrigas' long-term gas supply contracts foreclosed the relevant markets in a way that might constitute an abuse of its dominant position.[10]

7.3.4 Amendments proposed by Distrigas

The Commission has published in the Official Journal a notice to market test the commitments proposed to meet its concerns raised in its Statement of Objections of May 2006 for prohibition on abuse of dominant position under

10 In addition, CEC (2007k, p. 7) seems to suggest that this situation could impede inter-Member State gas trade.

Article 82 EC.[11] The notice mentions that despite both oral and written objections to the Commission's concerns, Distrigas nevertheless proposed the following amendments:[12]

- Distrigas promised to return to the market a portion of the gas it or its related undertakings supply to the consumers on the relevant market (industrial users, electricity generators and resellers). Specifically, each calendar year a minimum of 65 percent, and on average for all calendar years a minimum of 70 percent, of supplied volumes will be available to alternative suppliers, providing a choice of supplier to the related consumers. These volumes will be calculated based on Distrigas' annual contract volumes with Distrigas retaining some flexibility to account for fluctuations over the years.
- One reservation was made. In order to protect Distrigas from having to reopen its long-term contracts if its sales decrease from their 2007 level, Distrigas was allowed to tie a fixed volume of gas sales under long-term contracts which may not exceed 20 percent of the market concerned. The fixed volume depends on whether or not the GDF/SUEZ merger goes through. These first two amendments allowed Distrigas to conclude long-term contracts that tie at most 30 percent of its existing supply volumes or 20 percent of the market, whichever is highest.
- The duration of new contracts with industrial users and electricity generators will not exceed five years. Existing consumers with contract durations extending beyond the five year threshold will be allowed to unilaterally terminate these with prior notice and without indemnity. Furthermore, Distrigas' supply contracts with resellers may not exceed two years.
- Distrigas will not include any use, resale or destination clauses in new contracts. Nor will these contain tacit renewal clauses. These restrictions will be removed from or not enforced regarding existing supply contracts.
- Distrigas excluded the following five classes of sales from its amendments: 1) gas supplies to industrial consumers whose consumption is less than 12 GWh, 2) gas supplies to electricity generators with installations below 10 MW, 3) intra-group sales and the sales to Electrabel to cover its needs

11 CEC (2007f) provides additional information on this market test notice and the following steps to be taken. By publishing the market test, the Commission invites interested parties to present their comments on the commitments offered by Distrigas within one month of the publication in the Official Journal. If the market test indicates that interested parties consider the proposed commitments to remove the Commission's concerns about the foreclosure of the Belgian gas market, the Commission will adopt a so-called commitments decision (CEC, 2007l) under Article 9 of Regulation 1/2003. Such an Article 9 decision finds that there are no longer grounds for action by the Commission, without concluding whether or not there has been or still is an infringement. However, if commitments given in the context of such a decision are broken, the Commission may impose on the party in question a fine amounting to ten percent of total worldwide turnover without having to prove that there has been an infringement of the antitrust rules.

12 OJ C 77, 5/4/2007.

for its gas-fired power plants and to serve its mainly residential consumers (see section 7.2), 4) Distrigas' trading activities and 5) sales outside the relevant geographic market, i.e., outside Belgium.

- The amendments were proposed for a period of four years, taking effect from 2007. They apply to Distrigas as long as its market share exceeds 40 percent and surpasses that of its nearest competitor by at least 20 percent.
- If Distrigas is divested, the sales of the buyer on the relevant market will be included. After a transitional period of one year the buyer's existing contracts will be included unless its existing contracts are less than five percent of Distrigas' sales in 2007.

7.3.5 Stakeholder responses

This section provides an overview of the stakeholder responses that were received. The Commission received eight confidential responses. Consequently, we only have access to the Commission's synthesis of these comments. The Commission notes that Distrigas' amendments were generally welcomed. The respondents believe that the Commission's concerns would be covered. A few additional proposals were made. Some were outside the scope of the investigation, such as the proposals relating to ownership unbundling or improved access to storage and gas volumes.

Three main concerns were put forward. First, one respondent feared that consumers who prefer long-term contracts, for instance to invest in new production capacity or to obtain certainty if gas takes up a large chunk of production costs, might get into trouble once the proposed amendments, which substantially shorten contract duration, are implemented. A second concern relates to contracts with resellers. The duration of contracts between Distrigas and the resellers is restricted to a maximum of two years. Some respondents worry that this in turn prevents gas resellers from concluding contracts that exceed two years. Finally, some respondents were concerned with the exclusion of Distrigas' sales contracts to Electrabel if the GDF/SUEZ merger went ahead. According to the Commission, such fears are not relevant because the contracts with Electrabel are specific to the merger, rendering it natural to exclude them from the Distrigas case.

In response, Distrigas adapted its amendments by clarifying issues concerning resale restrictions and sales outside Belgium. Distrigas furthermore stated that it will not remove clauses from the contracts that only designate a point of delivery. In conjunction with the proposed amendments indicated in section 7.3.3, these additional considerations provide Distrigas' final amendments. The final stage in the regulatory process is the Commission's evaluation of these amendments.

7.3.6 The Commission's final assessment

The Commission classified the amendments using the following five categories: 1) adequate volumes being returned to the market every year, 2) the maximum contract duration for industrial consumers and power generators (new installations excluded) being five years, 3) the maximum contract duration with resellers being two years, 4) no supply contract containing resale or use restrictions and 5) the commitments being binding until the end of 2010. In its commitment decision, the Commission assessed each of these on their proportionality (CEC, 2007l, p. 9-13).

The obligation on Distrigas to make available each year to the market 30 percent of its own portfolio or 20 percent of the total market is supposed to lower market foreclosure and accordingly enable alternative suppliers to build up their own portfolio to compete with Distrigas. This obligation was considered proportional, because it merely enhances the contestability of the market. Distrigas still has flexibility in contracting with consumers. In addition, Distrigas is not in any way precluded from competing with new entrants for consumers after contacts have expired. Finally, there would still be some flexibility if Distrigas was unable to meet the threshold in a particular year.

The second category concerned contract duration. The goal here was to alleviate the foreclosure problems by precluding Distrigas from tying consumers for long periods of time. The main impetus for this obligation was the observation that most Belgian consumers procured their entire gas demand from Distrigas. Shortening the duration of long-term contracts ensured that these consumers would be returned to the market at shorter notice, which would enable new parties to compete for them (as above). Distrigas appeared to live up to this amendment quite well, because the Commission noted that at the start of 2005, the amendments would only affect one Distrigas contract. Hence, the effect of this amendment was to ensure that Distrigas keeps up this behavior. Therefore, this measure was considered proportionate. The Commission reserved the right to reopen proceedings if it received signals from industrial users of misbehavior by Distrigas.

An important point was that the limitation in contract duration did not apply to gas supply for new investment in gas-fired power generation capacity exceeding 10 MW. The argument bears some resemblance to the exemptions case in the previous chapter: the investment might not go ahead without predictability of prices and security of gas supplies. In addition, Distrigas was also allowed to sell gas without time limitations to power plants owned by affiliated companies. These secured supplies may give affiliated power generators a competitive advantage over non-affiliated generators. Allowing non-affiliated power generators to also conclude such unrestricted contracts would guarantee a level playing field between affiliated and unaffiliated power generators. However, this measure was not considered to be necessary, because the Commission did not expect that industrial users would be building new

production capacity before 2010. Therefore, industrial users were not allowed to conclude supply contracts that extended beyond the amendments. The Commission may reopen the proceedings if its expectations turn out to be wrong.

Regarding the third category, limiting the maximum contract duration with resellers to two years, the Commission restated that the most important effect of the amendment is precluding Distrigas from cherry picking – tying the most attractive consumers through long-term contracts and leaving the less attractive ones to the competitors – while not significantly altering Distrigas' existing contracts. This ensured the proportionality of this amendment in the same fashion as with the contracts for power generators and industrial consumers.

The proportionality of the removal of all use, resale or destination clauses from contracts is explained by noting that these amendments are consistent with EC competition law.

Regarding the length of the amendments, the fifth category, the Commission noted that competition is gradually developing in Belgium. To facilitate and speed-up this process, barriers to entry have to be removed as soon as possible. The period up to 2010 is crucial for the development of further competition in Belgium. If the amendments would bind for a shorter period of time, the Commission argued, alternative suppliers would not have sufficient time to build up a proper consumer base to compete with Distrigas. Therefore, the period up to 2010 was considered proportional.

Finally, it was noted that the remaining amendments by Distrigas are conditional on the GDF/SUEZ merger. Consequently, the above five categories of amendments were applicable to Distrigas in any case, whether the merger materializes or not, and therefore apply today. The Commission noted that in the situation in 2007, with Distrigas being managed as a separate undertaking, the amendments only apply to Distrigas. If the merger is called off and Distrigas is subsequently reintegrated into the SUEZ group, the amendments will still need to be respected. If Distrigas is divested and sold off, then the purchaser – ENI – will have to comply with the amendments provided that it has significant activities on the relevant market (CEC, 2007k). The Commission's overall assessment was that all amendments are proportional. There was no longer ground for action and consequently all proceedings were brought to an end.

7.4 Wider implications of the Distrigas case

Two implications of this case study stand out. First, the Commission uses the Distrigas case as a benchmark case to provide guidance to other dominant suppliers concerning their concluded or proposed downstream long-term supply contracts. This is illustrated by the proceedings that were recently opened against Electrabel and Electricité de France (EdF) for suspected fore-

closure of the Belgian and French markets (CEC, 2007g). The Commission declared that it will take account of the reasoning developed in the Distrigas case (ibid.).

The second implication is that the case study indicates reluctance on the part of the Commission to allow dominant companies to conclude long-term gas supply contracts due to their foreclosing properties. The Commission appears willing and able to force adaptations to existing long-term contracts through antitrust proceedings in order to facilitate competition. If we consider the January 2007 conclusions of the Energy Sector Inquiry (CEC, 2007c), the July 2007 proceedings against Electrabel and EdF and a 2006 case of the German competition authority against E.ON Ruhrgas in conjunction, a rather inhospitable view on long-term contracts comes to the fore. The sector inquiry identifies foreclosure by long-term downstream contracts as a key impediment to the development of competition in European gas markets. Second, as indicated, the suspected objections that underlie the Commission's proceedings against Electrabel and EdF are similar to those used in the Distrigas case, and consequently need no further elaboration. The E.ON Ruhrgas case is concisely discussed in Bellantuono (2008), see also box 7.1.

Box 7.1: E.ON Ruhrgas vs. the Bundeskartellamt

Early in 2006, the Bundeskartellamt, the German competition authority, decided that certain long-term contracts concluded by E.ON Ruhrgas with resellers should be prohibited (Bundeskartellamt, 2006a). The argument was that tying resellers (i.e., regional and local gas distributors) through long-term contracts had a foreclosure and therefore price-raising effect by impeding the competition from potential newcomers. This was a breach of German and European competition law. The decision, which was immediately enforceable, obliged E.ON Ruhrgas to limit the duration of new and existing contracts covering over 80 percent of resellers' requirements to a maximum of 2 years. Contracts tying between 50 and 80 percent of requirements were allowed to run up to 4 years. Furthermore, supplying additional volumes under short-term contracts to make up for the remainder of consumer demand was prohibited. These provisions concerned downstream contracts; long-term import contracts between E.ON Ruhrgas and gas producers were excluded.

E.ON appealed the immediate enforceability before the Düsseldorf Higher Regional Court (Bundeskartellamt, 2006b). The appeal was rejected. This decision is very similar to the Commission's objections and decisions in the Distrigas case, which is why this German case is often considered a forerunner of the Commission's current behavior towards long-term contracts.

According to Bellantuono (2008, p. 2), the Commission's view emphasizes fostering competition. Bellantuono (ibid.) also argues that the argument that any interference with long-term contracts could decrease investments and dampen security of supply is dismissed. The Commission's view above violates most of the TCE arguments that were put forward in chapter five. Adapting

existing long-term contracts is an example of ex-post regulatory opportunism that lessens regulatory credibility which in turn hampers investments. Furthermore, recall that chapter five has pointed out that a long-term contract may mitigate ex-post contractual hazards, which provides an efficiency rationale that must be weighed against its foreclosure effects.

However, the Commission's actual stance is more nuanced than implied above, because she explicitly mentions that long-term downstream supply contracts are not incompatible with the EU competition rules per se (CEC, 2007j, p. 4, 5). In fact, she appears to argue along TCE lines by noting that the likely positive and negative effects of long-term contracts on competition must be assessed in the overall context in which they occur. The Commission uses the Distrigas case to provide the following five criteria for assessing long-term contracts: 1) the market position of the supplier, 2) the share of consumer demand tied under the contracts, 3) the duration of the contracts, 4) the overall share of the market covered by the contracts and 5) efficiencies. Especially the fifth criterion implies a TCE perspective.

This fifth criterion cannot be explained using the neoclassical perspective, due to its disregard for the presence of an efficiency rationale for long-term contracts. Since any long-term contract will by definition foreclose a part of the market, the neoclassical perspective prescribes a complete removal of all these contracts. Therefore, as in the exemptions case study, the TCE perspective once more provides a better explanation of actual regulatory behavior than the neoclassical perspective. In conclusion, the Distrigas case also empirically confirms our theoretical critique on the neoclassical perspective.

The final issue is to determine whether the Commission's criteria take proper account of the TCE criteria or whether existing regulation is stuck somewhere between the neoclassical and the TCE perspective – as in the exemptions case. To this end, the next section discusses these criteria and assesses whether they indeed signify a proper incorporation of the TCE perspective.

7.5 Do the Commission's criteria follow the TCE perspective?

As indicated, the Commission's view towards long-term contracts in a competitive environment can be derived from the Energy Sector Inquiry (CEC, 2007c). The Sector Inquiry sets out to provide a preliminary indication on whether or not existing downstream long-term contracts impede competition by creating barriers to entry. To this end, it provides insights on three of the above criteria (ibid., p. 236-241). The data provided in the Sector Inquiry, a part of which will be referred to below, provides information on downstream supply contracts in Europe and illustrates some indicators that are being used to evaluate these contracts in light of the goal to facilitate competition. A supplier's market position is not elaborated upon. Also, because efficiencies arising from the

contracts must be considered on a case-by-case basis, these are also left out of the general analysis.

A supplier's market position is the starting point of the analysis, see section 7.3.2. If a single supplier dominates the market, this supplier's portfolio of contracts will be the subject of an examination (as was the case with Distrigas). Long-term contracts concluded by fringe suppliers, however, will generally not give rise to foreclosure concerns. The Commission notes that in some cases, especially those involving no single dominant supplier, it may be necessary to consider the cumulative effect of the long-term contracts of several suppliers.

The second criterion, the share of consumer demand tied by the long-term contracts, is important because if a contract ties most or all of a particular consumer's demand, this consumer is effectively removed from the market. The Sector Inquiry refers to this as exclusivity (ibid., p. 236). Exclusivity forecloses the market and may assist a dominant supplier in retaining or extending its dominance. The Sector Inquiry provides interesting insights by specifying three indicators of the level of exclusivity. The first is the number of contracts that contain rebate clauses. A rebate clause is a clause that provides lower prices when certain targets, like procured volumes as a share of overall requirements, have been met. The Inquiry provides a table that illustrates that the percentage of contracts containing these rebate clauses ranges from 13 percent in Germany to 28 percent in Italy. The second indicator, take-or-pay clauses (see section 1.3), increases overall exclusivity according to the Commission. If a take-or-pay clause is close to a consumer's overall demand, then we can effectively speak of a predominantly exclusive supply situation. A third and final indicator put forward in the Inquiry is the presence of technical obstacles or obstacles in the network codes that prevent dual-supplier agreements. The requirement of two metering stations that may be required for a dual-supplier agreement is put forward as an example. At page 236, the Sector Inquiry states that:

> 'Taking the data from customers and suppliers together, the Sector Inquiry has found that dual supplier relationships at the final customer level are certainly not the norm and very rare in some Member States [AS: it is noted that this is with the exception of multi-site customers who can choose different suppliers for each of their sites]. Even most local distribution and supply companies, which consume very large volumes of gas, generally appear to have a single wholesale supplier.'

In addition, contract duration, the third criterion, may aggravate the foreclosure effects. Contracts that tie consumers for a long period of time impede competition by preventing the consumers concerned to switch and become available to the market. Shorter contracts allow a consumer to become available to the market sooner, in which case alternative suppliers can compete with the incumbent supplier. Contract length is an obvious indicator. The Sector Inquiry provides evidence on contract duration for a selection of Member States – France, Germany, Italy, the Netherlands and Poland. Especially Germany and

Poland appear to have very high shares of such contracts (over 80 percent in both countries). It is also indicated that in these five countries very few contracts last less than one year while many exceed five years. Finally, the Sector Inquiry provides data that indicates that the volume weighted average contract duration in these five countries has declined since the start of liberalization, but that the duration still exceeds 3.5 years (with the exception of Italy). Another indicator of contract duration is the presence of tacit renewal clauses. These clauses automatically renew a supply agreement for a specified duration at the contract termination date unless one of the parties gives prior notice of termination to the other. According to the Sector Inquiry, these clauses have a similar effect to indefinite contract periods and consequently impede switching. The Sector Inquiry indicates that these clauses are used quite extensively (ibid., p. 239). Once again, Germany and Poland have the largest shares of contracts with these clauses (60 and almost 75 percent respectively, when measured by the number of contracts). Italy follows with 30 percent. A second contractual clause, notice periods, provides the final indicator. One consequence of a notice period is that it takes some time before a switch of supplier becomes effective, delaying the benefits to the consumer of the switch. This postponement of the benefits of switching makes switching less attractive to the consumer. The Sector Inquiry consequently interprets notice periods as an indicator of the ability of consumers to switch supplier. It provides data that indicates that notice periods are not a significant obstacle to switching in France, Italy and the Netherlands. They are, however, in Germany and Poland, where 72 and 95 percent of contracts have notice periods that exceed three months.

The fourth criterion concerns the ratio of the long-term contracts to the total market. Long-term contracts concluded by a dominant supplier need not result in foreclosure problems if the contracted volumes are small relative to the total market volumes. In the Distrigas case, the amendments accepted by the Commission imply that there would be no competition concerns if Distrigas' long-term contracts lasting more than one year would cover less than 20 percent of the relevant market. The Sector Inquiry (ibid., p. 241) argues in this regard that the combination of high exclusivity of suppliers, long contract duration, tacit renewal clauses and long termination periods implies that there are significant barriers to consumer switching.

The final criterion relates to efficiencies. These have to be assessed on a case-by-case basis and therefore are not explicitly elaborated upon in the Sector Inquiry (though it mentions the recuperation of sunk investments as a possible example). The Commission notes in this regard that even if a long-term contract results in foreclosure, the Commission will assess whether the contract generates efficiencies that outweigh its negative effects. Accordingly, long-term contracts are undesirable only if their costs outweigh their efficiency benefits. As an illustration, the Commission mentions its exclusion of gas-fired power

plants from the scope of the amendments imposed on Distrigas. Facilitating new gas-fired power generation is considered beneficial to the Belgian electricity market by adding electricity production capacity. These investments may require the certainty of a gas supply contract that lasts longer than five years to become economically viable and are therefore excluded. Another example emanates from the Sector Inquiry when it notes that long-term contracts may allow consumers to better manage the risks associated with adverse price movements. However, these 'may not outweigh the negative foreclosure effects of long-term retail (i.e., downstream) contracts on competition and overall consumer welfare' (ibid., p. 237).

There are a number of similarities with the Commission's treatment of exemptions in the previous chapter. The first similarity is that the Commission's assessment implies a step back from the neoclassical perspective. One illustration is the fourth criterion which specifies that long-term contracts may not be considered harmful if they foreclose only a small part of the total market. A second and more fundamental illustration is the fifth criterion which explicitly allows for the efficiencies of long-term contracts. This efficiency criterion brings us to the second similarity. As with the exemptions regime, there is a clear scope to incorporate the TCE perspective into existing regulation, because all TCE criteria can potentially be included in the assessment of long-term supply contracts.

However, the guidance provided so far is insufficient. A promise to consider the efficiency properties of long-term supply contracts is clearly positive, but it is far from an assurance that the relevant TCE criteria will be explicitly incorporated in the assessment. The argument runs along lines similar to the BBL case. Ensuring certainty of gas supplies is the justification put forward by the Commission for excluding new power plants from the amendments to Distrigas' long-term supply contracts. In its explanation regarding the efficiencies of downstream long-term supply contracts in general, the Commission notes that (CEC, 2007j, p. 5):

> 'It follows that long-term contracts are only incompatible with EC competition rules when they are likely to have negative effects on competition due to their significant foreclosure effects and these negative effects are not outweighed by efficiency benefits'.

Note the omission of the costs of the Commission's intervention (which is consistent with the neoclassical perspective towards regulatory intervention). One effect of the Commission's antitrust case is that Distrigas' ability to conclude long-term contracts is being amended. This renegotiation is an act of regulatory opportunism which decreases regulatory credibility. From a TCE perspective, this is an additional cost of reducing market foreclosure. Furthermore, chapter five has pointed out that long-term contracts serve a purpose on European gas markets by mitigating ex-post hazards. Shorter contract durations may well increase ex-post hazards, and consequently impede invest-

ment or increase hurdle rates. Therefore, the problem is once again the disregard of the effects of regulatory opportunism. By not taking into account all the costs of its interventions, the Commission will amend downstream long-term gas supply contracts more often than is efficient. This indicates the third similarity with the exemptions case: in both cases, the Commission is stuck between the neoclassical and TCE perspectives.

7.6 CONCLUSIONS

This chapter analyzes the second notable amendment to gas regulation's neoclassical guiding principles, namely accepting long-term downstream gas supply contracts. We study the Commission's antitrust case against Distrigas, because the Commission has explicitly stated that the outcome of this case is exemplary of its treatment of other companies that have concluded or wish to conclude long-term supply contracts with consumers. Hence, the Distrigas case provides the Commission's current view towards long-term downstream supply contracts on European gas markets. This chapter examines whether this view can be considered to be an adaptation to gas regulation's neoclassical underpinnings, and if so, whether it is appropriate in light of the TCE perspective.

Regarding Distrigas' supply contracts on the Belgian gas market, the Commission was notably concerned with their duration and the volumes of gas tied to Distrigas. In order to prevent these contracts from impeding competition by foreclosing a substantial part of the market, the Commission started an antitrust case against Distrigas. The result was that Distrigas proposed to limit the duration of new contracts with gas resellers to two years at most. New contracts with other large consumers (industrial consumers and power generators) would last up to five years, excluding new gas-fired power plants. In addition, Distrigas promised to return to the market an average of 70 percent of the gas it contracts each year.

To some, these amendments may reflect a general hostility of the Commission towards long-term downstream gas supply contracts. However, the Commission takes a nuanced stance towards long-term supply contracts by noting that their likely positive and negative effects on competition must be assessed in the overall context in which they occur. Based on the Distrigas case, the Commission formulated the following five criteria for assessing long-term contracts: 1) the market position of the supplier, 2) the share of consumer demand tied under the contracts, 3) the duration of the contracts, 4) the overall share of the market covered by the contracts and 5) efficiencies. Especially the fifth criterion implies a TCE perspective. This leads to two main conclusions regarding the Commission's stance towards long-term downstream gas supply contracts.

The first conclusion mirrors the first conclusion in the exemptions case: the neoclassical perspective cannot explain why long-term supply contracts are accepted. The reason is that by not ascribing an efficiency rationale to long-term contracts, the assessment of any long-term contract will always be negative due to its inherent foreclosure effects. Therefore, the neoclassical perspective prescribes a complete ban on all contracts of this type. In the TCE perspective, long-term contracts have an efficiency rationale through mitigating ex-post hazards. Therefore, as in the exemptions case study, the TCE perspective once again provides a better explanation of actual regulatory behavior than the neoclassical perspective, which confirms the theoretical critique on the neoclassical guiding principles of current gas regulation. Accepting long-term supply contracts and their related efficiencies therefore signals a step back in European gas regulation from its neoclassical guiding principles towards a TCE perspective.

Second, the Commission's view is once again stuck between the neoclassical and TCE perspectives. The foreclosure effects of long-term supply contracts are not disputed. Instead, we argue that the Commission's assessment fails to take into account the costs of regulatory opportunism, which is consistent with the neoclassical view towards regulatory intervention. The guidance provided so far is insufficient due to the omission of regulatory opportunism. By understating the costs of its own interventions, the Commission is likely to amend downstream long-term gas supply contracts more often than would be the case if all costs would be taken into account. By extension, ex-post hazards will be higher and regulatory credibility will be lower than necessary as a consequence of which investment will be impeded.

8 Summary and conclusions

8.1 Research motivation and problem definition

The European gas market is currently undergoing substantial structural and regulatory reform. These reform initiatives are supposed to liberalize the European gas market in order to reach the energy policy objectives: supply security, competitiveness and sustainability. The introductory chapter discusses these objectives. The study leads to three main conclusions regarding the energy policy objectives and liberalization of the European gas market. First, liberalization is not principally at odds with reaching the policy objectives. In fact, liberalization may result in all policy objectives being reached, provided it is accompanied by a proper regulatory regime. The challenge is to create the circumstances – i.e., the appropriate regulatory regime – under which liberalization improves availability, efficiency and sustainability. Second, all policy objectives display market failures. Since current regulation is guided by neoclassical economics, any market failure becomes a candidate for regulatory intervention. Therefore, according to the current regulatory settings, all energy policy objectives are candidates for regulatory intervention.[1] Consequently, the energy policy objectives are considered public service obligations. Third and final, the discussion on the policy objectives also indicates that facilitating investments takes center stage in securing each of the policy objectives.

This study is motivated by the currently unsatisfactorily state of European gas liberalization, as reflected in the benchmarking reports published by the European Commission. An additional reason for this study is that the international gas market is experiencing a number of shifts which are together fundamentally reshaping the European gas market.

Chapter two elaborates on these shifts, which stem from 1) external dependence and long-term vulnerability, 2) producer behavior, 3) an increase in long-distance gas supply, 4) an increase in gas transit, 5) a loosening link between energy demand and GDP growth in Europe but a tightening link at the global scale, 6) a growing awareness of climate change and 7) increasing

1 While a market failure is sufficient ground to think about regulatory intervention, actual intervention should only materialize in practice if the costs of the market failure outweigh the costs of the government or regulatory failure that accompanies the intervention, see section 1.5.1.

gas demand from power generation. These can be classified in the following four broad categories:

- A shift in international relations – the emergence of a seller's market rather than a buyer's market;
- A shift in energy policy objectives with security of supply having become the top priority, while climate change has also increased in importance;
- An increasing need for investments along the entire value chain. Total EU-27 investment requirements amount to roughly 1800 billion Euro of which around 12 percent – 216 billion Euro – is required for gas (CEC, 2007a, p. 17);
- An increasing influence of politics on energy relations.

These shifts create an environment that differs from the environment at the end of the 1980s, when European gas liberalization was instigated. For instance, the context in which current gas regulation has been developed emphasized asset sweating due to the presence of a mature infrastructure. In addition, the availability of ample gas supplies resulted in a relatively low emphasis on supply security. In contrast, in the new context, new investments are required and supply security is a big issue. Nowadays, a regulatory regime must govern the market in such a way that it properly facilitates investments in a seller's market where political considerations and anxieties are becoming more important and where supply security and sustainability have become the top priorities for energy policy. The interplay of regulation with irreversible investments, risks and uncertainty determines whether a proper governance structure is devised. Consequently, the criteria for an adequate regulatory regime in the new context are irreversibility of investments, risks and uncertainties.

This study's main concern is whether the current approach towards structural and regulatory reform of the European gas market will be able to secure the public service obligations. This is tantamount to examining whether current regulation is still adequate in the changed context set out above. We therefore examine whether current regulation has incorporated the above criteria, and if not, whether it will be able to do so under its current guiding principles.

8.2 THEORETICAL ANALYSIS

We use two economic perspectives to analyze the above issues: the neoclassical and the transaction cost perspective. We use the neoclassical perspective because it provides the guiding principles for the existing gas regulation.

8.2.1 The neoclassical perspective

Chapter three discusses the neoclassical perspective, notably its main assumptions, its implications for regulation and its prescriptions for structural reform to liberalize the European gas market. It builds on three hardcore assumptions: methodological individualism, methodological instrumentalism and methodological equilibration. The goal is to reach the perfect competition outcome where long-run equilibrium producer profits are zero, products are priced at long-run marginal costs and consequently welfare is maximal. This view has far-reaching consequences for regulatory intervention. In a perfect competition world, the market will have attained maximum welfare on its own, which implies that no regulation is necessary at all. There is consequently only a rationale for regulatory intervention if the market is in a situation that deviates from perfect competition. In that case, regulators must intervene in case of a market failure in order to restore the perfect competition equilibrium. As indicated above, in the neoclassical perspective, any market failure is a candidate for regulatory intervention. This study identifies several market failures on the European gas market: failure of competition, public goods, externalities, incomplete markets, information failures and uninsurable risks. These imply that the neoclassical perspective results in a substantial level of regulatory intervention in the European gas market.

The neoclassical perspective also provides guidelines regarding the structure of the liberalized European gas market. The neoclassical line of reasoning argues that the widespread vertical and horizontal integration in the traditional market structure has no efficiency advantage. This is due to the fact that integration is always assumed to occur in response to or anticipation of market power. Consequently, the main task when reforming the gas market towards competition is to prevent any integration. If integration is already present, then competitive and non-competitive activities must be separated completely trough structural separation (or ownership unbundling). On a structurally separated network, negotiated TPA is probably the best solution as it implies lesser regulatory interference and allows for more flexibility.

8.2.2 Current European gas regulation

European gas regulation is developed on the basis of European gas legislation, which is formulated by the European decision-making institutions in interplay with the relevant stakeholders. Chapter four provides an overview of the process and contents of European gas legislation. The stakeholders exert influence both at the development stage as well as concerning the transposition of the European legislative measures into national law.

Stakeholders may induce regulatory failure by capturing regulators, in which case the regulator undertakes actions in the best interest of the stake-

holders but not necessarily in society's interest. A regulator's information deficit and its opportunism provide additional grounds for regulatory failure. Due to these problems, any regulatory policy will be inefficient to some extent, which implies that regulatory intervention will not lead to the perfect competition equilibrium. There will consequently always be scope to argue that competition will improve matters by reducing the inherently inefficient regulation.

Since this study emphasizes structural and regulatory reform of the European gas market (and leaves out privatization), it emphasizes both Gas Directives issued so far and the proposal for a third one. Due to the importance of the regulation of gas transmission networks, the Gas Regulation is also discussed. Taken together, these legislative measures indicate that the existing regulatory framework for European gas is firmly embedded in the neoclassical perspective towards economics and regulation set out in chapter three.

Liberalization and the restructuring of the European gas market should eventually create an internal European gas market. On this internal gas market, all policy goals are supposed to be satisfied as efficiently as possible. This anticipated internal European gas market is similar to the neoclassical perfect competition equilibrium. The underlying assumption is that an atomized gas market should materialize eventually in which a large number of suppliers vehemently compete with each other on an equal footing and a short-term basis. This would induce unfettered supply competition which would lower consumer prices, increase service levels and facilitate efficient investments. Efficient demand and efficient investments would alleviate supply security anxieties. Furthermore, in this perfect setting, gas prices would internalize the costs of emissions, which would mitigate sustainability issues. This is nothing short of a direct translation to the gas market of the perfect competition equilibrium, which is why the neoclassical perspective towards regulation is the guiding principle of existing gas regulation.

These neoclassical guiding principles imply that any impediment to the liberalization process or the development of the internal gas market is a sign of insufficient competition. This explains why the Commission's solution to the currently unsatisfactory development of competition is a stronger push towards competition on Member State gas markets. One consequence of the perfect competition assumption is that once the internal market has developed, the invisible hand will have dissipated all problems. This argument is tautological: by assuming that the internal market will eventually work perfectly, all problems that may occur are considered temporary by definition and are effectively assumed away in the equilibrium. This in turn by definition rules out the option that the current state of affairs may be due to a discrepancy between full competition and gas market specifics (because this would point towards a fundamental problem). In other words, the neoclassical arguments underpinning the current gas regulation by definition rule out one of the main

arguments from TCE, namely that the current institutional structure of the European gas market may not be conducive to competition.

This vision contrasts with the new context for gas regulation. As indicated, in this new context the issue is to facilitate substantial new investments along the value chain of a gas market dominated by sellers, in a world where political considerations are growing in importance and where supply security and sustainability have become the priorities for energy policy. This is a far cry from the anticipated internal gas market. The relevant criteria in the new context are not acknowledged by the neoclassical perspective and are consequently beyond the scope of current regulation which is built on neoclassical foundations. The transaction cost economics (TCE) approach has been developed specifically to deal with the criteria that come to the fore in the new context. Consequently, TCE is the alternative economic perspective we consider.

8.2.3 The transaction cost perspective

Chapter five discusses the TCE perspective towards regulatory intervention and restructuring. TCE places the transaction center stage and determines the most appropriate governance form given the prevailing policy objectives, property rights, rule of law and regulations. TCE incorporates into the analysis the institutional determinants that explain alternative modes of economic organization and proposes a comparative institutional analysis of viable governance forms in order to find the governance form that entails the lowest transaction costs which consist of the direct contracting costs and the cost due to ex-post contractual hazards.

Its analytical framework builds on three main criteria – contractual incompleteness, opportunism and asset specificity – which in conjunction induce ex-post contractual hazards. Regarding opportunism, we note that an important contrast with the neoclassical perspective is that TCE explicitly recognizes regulatory opportunism. Costly safeguards are required to mitigate the ex-post hazards and the investment hold-up problem they may create. Consequently, a governance structure must be devised that eliminates these hazards at the lowest possible transaction costs. The transactional characteristics of a particular market determine whether these criteria are present and in turn whether the TCE perspective is appropriate. This study uses the TCE criteria to develop an encompassing framework, comprising the neoclassical and TCE perspectives, which determines when to use which perspective. This framework specifies that the TCE perspective is appropriate only if all three criteria are simultaneously met. If not, then either market exchange or ex-ante contracts remove ex-post contractual hazards. In both these settings, the neoclassical perspective is appropriate. Therefore, the issue is to determine whether contractual in-

completeness, asset specificity and opportunism are simultaneously present on the European gas market in its new context.

The increasing need for new, irreversible investments increases asset specificity. The new context also leads to substantial uncertainty, which induces contractual incompleteness. Hence, the new context for gas regulation creates contractual incompleteness and asset specificity on the European gas market. In order to determine whether the TCE perspective is the proper lens through which to view the European gas market, it must be determined whether regulatory opportunism is a threat in the new context. This is done by determining the level of regulatory commitment on European gas markets. The lower the level of regulatory commitment, the more vulnerable an investor will be to regulatory opportunism. Six criteria are derived from the academic literature on regulation to determine the level of regulatory commitment. These are: 1) the growth in gas demand, 2) the rate of technological development, 3) the ownership of a regulated firm, 4) the rate of capital depreciation, 5) the emphasis of a typical regulator on either consumer or investor rents and 6) the discount rate. The level of commitment is determined by the costs of reneging (i.e., breaking the regulatory contract). If future benefits of adhering to the regulatory contract are high, the costs of reneging, and therefore also the level of commitment, will be high because of the benefits foregone by discontinuing the relationship. Only the increasing gas demand will increase future benefits and therefore have a positive effect on commitment. Of course, due to for instance supply security issues in the new context, gas demand will not be explicitly stimulated to improve commitment. All of the remaining five criteria lower regulatory credibility. The nature of investments is not explicitly mentioned, because investments have been treated when considering asset specificity. We nevertheless note that the effect of investments on commitment is mixed. The sunk nature of many investments in the gas market creates the ex-post hazards. However, the fact these investments will increase in future improves commitment. Therefore, the transactional characteristics of the European gas market imply a low level of regulatory commitment. By extension, the European gas market is vulnerable to regulatory opportunism.

In sum, the European gas market exhibits all three TCE criteria. Consequently, the TCE perspective provides the proper lens through which to view European gas regulation. This leads to the conclusion that the TCE perspective results in better outcomes in terms of market behavior in the new context for regulation compared to the current, neoclassically-oriented regulation. TCE implies significant differences in regulatory intervention compared to current regulation. For example, with a TCE view, there is less scope for regulatory intervention in European gas, because the TCE perspective takes into account more costs of intervention, especially the costs related to opportunistic behavior. An additional difference is the TCE assumption that a regulator does not possess all information.

Concerning the policy prescriptions for reform, TCE submits that the competition distorting effects of vertical integration are insufficient to justify ownership unbundling. Note that the drawbacks of vertical integration are not disputed. However, TCE allows integration to arise in order to mitigate ex-post contractual hazards, rather than only in response to, or as an effort to create, market power. Hence, vertical integration may have efficiency benefits, while the presence of ex-post hazards makes market exchange also costly on European gas markets. Therefore, in contrast to the neoclassical perspective, gas reform initiatives must recognize that 1) vertical integration may well have efficiency advantages by mitigating ex-post hazards and 2) intermediate governance forms, such as long-term contracts, may also be appropriate. In sum, the net benefits in terms of transaction costs of market exchange must be compared to those of vertical integration as well as to feasible intermediate contracting solutions. Consequently, no governance structure should be ruled out beforehand based on its anti-competitive properties.

This completes the theoretical critique on current gas regulation. However, the effect of regulation on market behavior, and by extension on the securing of the PSOs, is an empirical issue. The TCE perspective is superior to the neoclassical perspective only if it is shown to better explain and predict actual regulatory behavior. In this light it is important to observe that several amendments have been made to European gas regulation that appear to follow the TCE line of reasoning. Two notable examples are the possibility to exempt certain investments from the obligation to provide third party access, and the enlarged scope for concluding downstream long-term gas supply contracts.

8.3 Case study analysis

This study conducts case studies on both amendments. The goal is to assess whether the theoretical critique is also valid in actual practice. This is done by describing the regulatory process in order to trace the arguments that were voiced by the different stakeholders, the specific changes to regulation that have been implemented and the reasons why these changes were made. This indicates whether current regulation has already implemented provisions that deviate from the neoclassical perspective in actual practice, and if so, whether the neoclassical perspective is able to explain these amendments.

If the amendments can be explained by the neoclassical perspective, then current regulation is appropriate in the new context, and possible adaptations would be marginal (i.e., building on the neoclassical guiding principles). If not, however, regulation's guiding principles should be changed, which implies more fundamental adaptations. The issue then becomes whether the TCE perspective provides a better explanation. If so, this study's theoretical critique would be corroborated. The final step would then be to infer whether the

current amendments sufficiently incorporate the TCE perspective into European gas regulation.

8.3.1 TPA exemptions – The Balgzand-Bacton pipeline

Chapter six analyzes the first amendment: the enlarged scope for TPA exemptions in the second Gas Directive. The TPA exemptions regime allows certain investments that are considered important to the European gas market to be exempted from the obligations to provide access to third parties. A case study is undertaken of the interconnector between Balgzand in the Netherlands and Bacton in the UK (the BBL pipeline), which is the first pipeline investment project that has received an exemption. From the analysis of the regulatory process in this case, the following four conclusions are drawn.

First, the fact that BBL received an exemption cannot be explained by the neoclassical perspective. This is due to the fact that in the neoclassical world the tension between liberalization and investments, which is the foundation for the exemptions regime, is non-existent. The TCE perspective, on the other hand, provides a proper explanation by considering BBL's exemption as a safeguard that mitigates ex-post hazards regarding the BBL investment project. Accordingly, by granting exemptions, European gas regulation has moved away from its neoclassical guiding principles towards the TCE perspective.

Second, the assessment of BBL's exemption application incorporates the TCE criteria of asset specificity and the presence of incomplete contracts, but ignores regulatory opportunism. A similar picture arises with respect to the general risk criteria of the exemptions regime. Even though BBL Company explicitly refers to regulatory opportunism in its formal application, neither the national regulators – the British Office of Gas and Electricity Markets (OFGEM) and the Dutch Office of Energy Regulation (DTe) – nor the Commission have incorporated it into their assessments. The encompassing framework in chapter five points out that when opportunism is omitted, all promises are kept and consequently that the neoclassical perspective suffices because simple ex-ante contracts remove all ex-post hazards. This illustrates that European gas regulation is moving towards the TCE perspective but nevertheless retains its neoclassical perspective. The conclusion is therefore that European gas regulation is currently stuck between the neoclassical and TCE perspectives. This is undesirable, because chapter five illustrates that the structural and transactional characteristics of the European gas market call for a full incorporation of the TCE perspective.

Third, the omission of regulatory opportunism implies that its costs in terms of ex-post hazards are also not explicitly considered in an investment's risk assessment. The consequence is that the profits allowed to an investor during an exemption will be too low, which may impede investments. Allowing higher profits to reflect the higher hurdle rates may be a solution, but is

not likely due to the applicability of competition policy. This problem could be solved by granting US-style exemptions, whereby competition law does not apply if competitive harm has been mitigated by sector-specific regulation. However, the place of competition policy in primary EC law makes this option unlikely. Another solution may be to grant exemptions that exceed the minimum length (i.e., which are longer than required for the remuneration of economic costs). The willingness to grant longer exemptions was visible in DTe's and OFGEM's BBL exemption decisions (subsequently undone by the Commission), but none of them based their decision on the presence of regulatory opportunism.

The fourth and final conclusion addresses a general problem regarding TPA exemptions which does not directly arise from the BBL case. The problem is that it appears to be very hard in practice to deny an exemption for a given project, despite the clear intention to only grant them exceptionally. According to this study, one reason for this observation is that the impact of RTPA on investment profitability is overestimated.

The traditional argument is that RTPA truncates profits because a regulator cannot credibly promise ex-ante to leave access regulation unaltered ex-post. This renders a TPA exemption very useful because it increases profitability by removing the ex-post hazard of regulation for a specified period of time. This study argues that this argument has limited applicability in practice. Any project can show that RTPA diminishes its profitability compared to a situation without RTPA, which makes it impossible to deny an exemption. In fact, the issue regarding investments is not so much whether project profitability will diminish due to access regulation, but rather whether it will diminish to the extent that the project becomes unprofitable. After all, as long as a project's profitability remains positive under RTPA, the investment will commence and there is no need for an exemption. Due to this overestimation of the negative effect of RTPA on project profitability, exemptions are granted more often than necessary.

In conjunction, the third and fourth conclusions argue that a TPA exemptions regime which is based on TCE guiding principles should grant fewer exemptions than currently, but display more leniency once an exemption has been granted.

8.3.2 Long-term contracts – The Distrigas antitrust case

The second amendment to the neoclassical perspective is the acceptance of long-term downstream gas supply contracts in Europe (consequently excluding long-term import contracts). The case study in chapter seven examines the Commission's antitrust case against Distrigas, because the Commission has explicitly stated that the outcome of this case is exemplary of its treatment of other companies that have concluded or want to conclude long-term supply

contracts with consumers. The Distrigas case therefore provides the Commission's current view towards long-term downstream supply contracts on European gas markets.

Chapter seven examines whether this view can be considered an adaptation to the neoclassical guiding principles of gas regulation and whether the neoclassical perspective is able to explain the implemented changes. If not, the question is whether the TCE perspective can provide a proper explanation. If it does, the final step is to assess whether the amendments are appropriate in light of the TCE perspective.

The antitrust case was occasioned by Commission concerns regarding Distrigas' contracts on the Belgian gas market, notably their duration and the gas volumes tied to Distrigas. The antitrust case resulted in Distrigas proposing to limit the duration of new contracts with gas resellers to two years at most. New contracts with other large consumers (industrial consumers and power generators) will last up to five years, excluding new gas-fired power plants. In addition, Distrigas promised to return to the market an average of 70 percent of the gas it contracts each year.

The effect is therefore that the Commission has forced Distrigas to shorten its contracts and tie lower volumes. While some may argue that this reflects a general hostility of the Commission towards long-term downstream gas supply contracts, the Commission actually adopts a rather nuanced stance towards these contracts. It notes that their likely positive and negative effects must be assessed in the overall context in which they occur. Based on the Distrigas case, the Commission comes up with five criteria for assessing long-term contracts: 1) the market position of the supplier, 2) the share of consumer demand tied under the contracts, 3) the duration of the contracts, 4) the overall share of the market covered by the contracts and 5) efficiencies. The fifth criterion especially implies a TCE perspective. This leads to two main conclusions regarding the Commission's stance towards long-term downstream gas supply contracts.

The first is similar to the first conclusion in the exemptions case, namely that the neoclassical perspective cannot explain allowing for long-term downstream supply contracts. The reason is that since the neoclassical perspective fails to ascribe an efficiency rationale to long-term contracts, the foreclosure effects inherent in any long-term supply contract render a neoclassical assessment of long-term contracts always negative. Therefore, the neoclassical perspective prescribes a complete ban on all long-term contracts. In the TCE perspective, on the other hand, long-term contracts have an efficiency rationale because they mitigate ex-post contractual hazards. Therefore, as in the exemptions case study, the TCE perspective provides a better explanation of actual regulatory behavior than the neoclassical perspective, which confirms the theoretical critique on the neoclassical guiding principles of current gas regulation. The acceptance of long-term supply contracts, and the recognition of their

efficiencies, therefore signals a step back in European gas regulation from its neoclassical guiding principles towards the TCE perspective.

Second, the Commission's view is once again stuck between the neoclassical and TCE perspectives. The incorporation of efficiencies in its assessment is positive, but it does not consider regulatory opportunism. The foreclosure effects of long-term supply contracts are not disputed. Rather, it is argued that the Commission's assessment fails to incorporate the costs of regulatory opportunism, which is consistent with the neoclassical view towards regulatory intervention. The guidance provided so far is insufficient due to the omission of regulatory opportunism. By understating the costs of its own interventions, the Commission is likely to amend downstream long-term gas supply contracts more often than would be the case if all costs are taken into account. By extension, this more extensive intervention implies that ex-post hazards may be higher, and regulatory credibility lower, than necessary, as a consequence of which impediments to investments are higher than necessary.

Finally, the answer to this study's main research question – *Is existing gas regulation able to secure the PSOs given the new context it must operate in?* – is no. This is not to say that this study opposes liberalization per se. It provides insights into how to adapt the current approach towards liberalization in order to reach the energy policy objectives as completely as possible. It opposes the neoclassical guiding principles underlying the current liberalization regime, most notably its perfect competition postulate which is visible in the internal gas market vision. This study argues that the new context for gas regulation requires a change in its guiding principles with consequent fundamental adaptations, rather than a continuation of the neoclassical emphasis which implies adaptations at the margin.

8.4 Lessons for policymakers – How to create sustainable competition on European gas markets

This study's analysis inherently invites speculation about lessons that can be learned. It is therefore worthwhile to explore some broader implications of this study's conclusions. Although general policy recommendations cannot be drawn because, as will be argued below, any regulatory policy is context-specific, the conclusions do allow us to derive some lessons policymakers could draw from the analysis when pondering the future of European gas regulation – especially how to create sustainable competition, i.e., competition without impeding investments, on European gas markets. We provide five lessons for policymakers.

1) This study shows that regulation is not a one-size-fits-all exercise – even when considering one particular market. Chapter two indicates that different market environments require different regulatory regimes. Consequently,

structural and regulatory reform measures that work adequately in a particular country may not work to the same extent (or at all) in another country, because the preconditions for reform, such as the institutional setting, the market environment or the development stage of the market, may differ between countries. For example, the preconditions at the time of the US and UK gas liberalizations differ greatly from those in the rest of Europe. While both the US and UK were largely self-sufficient at the time liberalization was instigated, the European continent currently increasingly depends on an oligopoly of external suppliers for its gas supplies. The same argument also applies to the experiences of different Member States. A successful reform in a particular Member State, or region, may not work similarly in another Member State or region with different preconditions. Consequently, policymakers, at the European as well as the Member State level, must recognize these differences and consequently must be careful when prescribing structural and regulatory reform measures based on experiences of forerunners.

2) Another conclusion of this study is that a broader perspective towards gas regulation is required than the neoclassical perspective in order to take proper account of the changing market fundamentals. One implication of adhering to the broader TCE perspective is that uncompromisingly pursuing competition – through for example ownership unbundled networks and liquid, hub-based spot trading – may impede long-term market performance by not sending the appropriate investment signals to potential investors. Following the case studies, in order to properly facilitate investments, short-term, competitive gas markets need to be complemented with alternative coordination mechanisms such as TPA exemptions and long-term supply contracts.

Both case studies indicate that this second lesson appears to be recognized in current regulation. Nevertheless, this study argues that the adaptations implemented so far are still too firmly embedded in the neoclassical perspective. In order to properly implement the alternative coordination measures, policymakers must take account of the following two lessons.

3) The third lesson emanates from the observation that it is inappropriate to base a regulatory scheme on the market failure paradigm only. Regulatory intervention should try to set the preconditions for the competitive process as good as possible instead of trying to correct a failed market in order to create the perfect competition outcome. Consequently, a regulatory regime should aim to remove the institutional impediments to competition through for example measures that increase market and price transparency, improve coordination between regulatory regimes along the value chain or lower the possibility for regulatory capture.

4) Removing the institutional impediments to competition entails transaction costs. When thinking about facilitating investments while liberalizing European gas markets in order to create a sustainable regulatory regime, therefore, policymakers should not anymore think in terms of more or less competition but rather should base their views on an assessment of the transaction costs of government failure versus the transaction costs of the market failure they try to correct. The transaction costs of both failures are determined by criteria such as asymmetric information, uncertainty, interest group behavior and the institutional setting. These are the real criteria on which regulatory decisions should be based, and not, as is currently the case, the prospects for the development of full competition. Such an assessment may result in less intervention, or even non-intervention, being less expensive in terms of transaction costs than removing the market failure as much as possible. This would create a situation of less than perfect competition.

5) Finally, this study argues that regulatory opportunism is not adequately recognized in current regulation. One consequence of not recognizing the costs of regulatory opportunism is that a regulator underestimates the costs of its interventions. Consequently, a regulator is likely to intervene more often than would be the case if all costs are taken into account. Consequently, policymakers should display more restraint in prescribing interventionist measures in European gas markets than they do currently.

All in all, the most important advantage of the TCE perspective over the neoclassical perspective is that by analyzing how institutions govern economic behavior, it proposes a less rigid way of thinking about regulation. This results in a regulatory framework that better deals with the fundamental problem on European gas markets, the trade-off between competition and coordination, which in turn enhances the prospect of a sustainable regulatory regime for the European gas market.

Samenvatting (summary in Dutch)

HERVORMINGEN IN DE STRUCTUUR EN REGULERING VAN DE EUROPESE GASMARKT – STELT DE HUIDIGE BENADERING DE PUBLIEKE BELANGEN VEILIG?

Aanleiding

Deze studie is geïnspireerd door het feit dat de liberalisering van de Europese gasmarkt moeilijker lijkt te verlopen dan voorzien was. Een tweede aanleiding is dat er op dit moment een aantal verschuivingen optreedt op de internationale gasmarkt, welke gezamenlijk de Europese gasmarkt fundamenteel veranderen. Deze zijn: de ontwikke-ling van een verkopersmarkt, een verschuiving in de beleidsdoelen, een groeiende behoefte aan nieuwe investeringen en een toenemende politisering van de energie-relaties.

Door deze verschuivingen ontstaat er een nieuwe context voor de gasregulering, waarin een beheersstructuur moet worden gecreëerd die ervoor zorgt dat er voldoende geïnvesteerd wordt in een verkopersmarkt waarop de politiek een grotere rol speelt en waar voorzieningszekerheid en milieu de speerpunten van het energiebeleid zijn.

Om de Europese gasmarkt te liberaliseren, dient zowel de structuur als de regulering te worden hervormd. De huidige hervormingsmaatregelen worden verondersteld te leiden tot een zekere, competitieve en schone gasmarkt. Dit onderzoek laat zien dat het erom gaat de voorwaarden te creëren (zoals het juiste reguleringssysteem) waarbinnen liberalisering bijdraagt aan het veiligstellen van de genoemde publieke belangen.

Probleemstelling en onderzoeksvragen

De centrale vraag in deze studie is of de huidige gasregulering in staat is de publieke belangen veilig te stellen in de nieuwe reguleringscontext. Het stimuleren van voldoende investeringen is hierbij essentieel. Hierdoor leidt deze studie een aantal criteria af waaraan een reguleringssysteem moet voldoen dat tot voldoende investeringen leidt in deze nieuwe context. Deze zijn onomkeerbare investeringen, risico's en onzekerheden.

Ter beantwoording van de onderzoeksvraag wordt tevens een tweetal economische perspectieven onderscheiden: het neoklassieke en het transactie-

kostenperspectief. Het neoklassieke perspectief wordt gebruikt omdat de huidige gasregulering gestoeld is op neoklassieke beginselen. Er wordt getoetst of dit perspectief voldoet aan de bovenstaande criteria, hetgeen niet het geval blijkt te zijn. Het transactiekosten-perspectief wordt als alternatief geïntroduceerd, omdat deze wel voldoet aan alle bovenstaande criteria. De analyse wordt uitgevoerd in een aantal stappen, welke zijn onderverdeeld in de volgende zes subvragen.

1 Wat is de theoretische onderbouwing van de huidige gasregulering en welk doel tracht deze te bereiken?
2 Welke twijfels ontstaan er ten aanzien van het huidige reguleringssysteem gegeven de criteria in de nieuwe reguleringscontext?
3 Hoe ziet het transactiekostenperspectief eruit, en is dit perspectief superieur aan het neoklassieke perspectief in het licht van de nieuwe context?
4 Welke criteria ter beoordeling van de huidige regulering volgen uit dit transactie-kostenperspectief?
5 Waar schiet de huidige regulering tekort in haar nieuwe context?
6 Welke aanpassingen aan de provisies uit de tweede Gasrichtlijn zijn vereist?

De studie is opgebouwd aan de hand van deze subvragen. Bij de onderstaande bespreking van de resterende hoofdstukken wordt aangegeven hoe deze subvragen beantwoord worden. Deze studie bevat een theoretisch deel en een empirisch deel waarin de theoretische kritiek aan de hand van twee case studies onderbouwd wordt.

Er dient te worden opgemerkt dat het hier een economische studie betreft. De huidige gasregulering wordt beoordeeld op haar economische merites. De studie bespreekt een aantal juridische provisies, welke voornamelijk gebruikt worden om inzicht te verschaffen in de economische problemen.

Theoretische analyse

Neoklassiek perspectief

Het neoklassieke perspectief wordt gebruikt, omdat het de leidraad voor de huidige gasregulering vormt. Hoofdstuk drie behandelt dit perspectief. Het bespreekt de belangrijkste aannames, de implicaties voor regulering en de voorgeschreven structuur van de geliberaliseerde Europese gasmarkt. In de neoklassieke wereld wordt uiteindelijk het evenwicht bereikt waarin de competitie perfect is. Als perfecte competitie zich heeft ontwikkeld, zorgt de markt op eigen kracht voor de maximale welvaart, en is er geen regulering meer nodig. Alleen wanneer het evenwicht afwijkt van perfecte competitie, is er reden voor het instellen van regulering teneinde de perfecte competitie te herstellen. Met andere woorden, regulering is louter vereist ingeval van marktfalen. Deze studie stelt vast dat er op de Europese gasmarkt verscheidene

vormen van marktfalen optreden welke een aanzienlijke regulering op de Europese gasmarkt zouden rechtvaardigen.

Het neoklassieke perspectief verschaft heldere richtlijnen betreffende de structuur van de geliberaliseerde gasmarkt. Vanuit neoklassiek oogpunt wordt aangenomen dat bedrijven integreren, omdat ze reageren op marktmacht of omdat ze marktmacht willen creëren. Als gevolg hiervan moet elke vorm van integratie vermeden worden als men een competitieve markt tot stand wil brengen. In het geval dat al integratie aanwezig is, moeten de competitieve en non-competitieve activiteiten zoveel mogelijk van elkaar gescheiden worden door middel van eigendomssplitsing. Als het netwerk volledig gesplitst is van de handelsactiviteiten, kan toegang verleend worden op basis van onderhandelingen tussen de netwerkeigenaar en de toetreder, aangezien dit in minder regulering en meer flexibiliteit resulteert dan gereguleerde toegang.

Europese gasregulering

Het vierde hoofdstuk behandelt de totstandkoming en inhoud van de huidige Europese gaswetgeving. Belanghebbenden spelen een belangrijke rol in het proces, omdat zij zowel de totstandkoming van de wetgeving op het Europese niveau alsook de transpositie in nationale wetgeving beïnvloeden. Belanghebbenden kunnen een reguleerder zondanig beïnvloeden dat deze regulering zal implementeren in het belang van de belanghebbenden, maar niet noodzakelijkerwijs in het maatschappelijk belang. Andere oorzaken voor reguleringsfalen zijn gebrekkige informatie en opportunistisch gedrag. Regulering zal hierdoor altijd deels falen, hetgeen grond is om te argumenteren dat (verdere) introductie van competitie de welvaart verhoogt door de noodzaak voor inefficiënte regulering te verminderen. Het huidige reguleringsraamwerk blijkt stevig verankerd te zijn in het neoklassieke perspectief. Het streven naar een interne Europese gasmarkt kan bijvoorbeeld gezien worden als een toepassing van het neoklassieke perspectief op de gasmarkt.

Een implicatie van de gekozen neoklassieke uitgangspunten is dat in het huidige reguleringssysteem het optreden van marktfalen een teken is van nog niet voldoende ontwikkelde competitie. Dit verklaart waarom de Commissie de huidige onbevre-digende staat van het liberaliseringsproces wil oplossen door middel van een sterkere nadruk op het faciliteren van competitie in de lidstaten. Een tweede implicatie volgt uit de aanname van perfecte competitie. Door aan te nemen dat de markt zich uiteindelijk perfect ontwikkelt, wordt tegelijkertijd ook aangenomen dat alle tussenliggende problemen uiteindelijk zullen zijn opgelost. Deze aanname heeft dus tot gevolg dat de huidige tegenvallende voortgang van de liberalisering per definitie niet kan zijn veroorzaakt door een fundamenteel probleem. Dit komt doordat fundamentele problemen, zoals een discrepantie tussen het Europese streven naar perfecte competitie en de karakteristieken van de Europese gasmarkt, niet altijd zullen worden opgelost en dus het uiteindelijke evenwicht kunnen beïnvloeden. Hiermee wordt een hoofd-boodschap uit de institutionele economie, namelijk dat de

institutionele vormgeving van de Europese gasmarkt zich misschien niet leent voor perfecte competitie, over het hoofd gezien.

De bovenstaande visie is tevens niet in overeenstemming met de nieuwe context voor gasregulering, welke ver verwijderd is van een interne gasmarkt. De in hoofdstuk twee geïdentificeerde criteria die van belang zijn in deze context, worden niet meegenomen in het neoklassieke perspectief, waardoor deze buiten de reikwijdte van de huidige regulering dreigen te vallen. De transactiekostenbenadering houdt specifiek rekening met deze criteria. Hierdoor vormt deze het alternatieve economische perspectief.

Het transactiekostenperspectief

Hoofdstuk vijf bespreekt het perspectief dat voortvloeit uit de transactiekosteneconomie (TCE). Dit TCE-perspectief stelt de transactie centraal en bepaalt de optimale beheersstructuur gegeven de geldende eigendomsrechten, wetgeving en regulering. TCE stelt een comparatieve institutionele analyse voor, waarin uit verschillende haalbare beheersvormen die met de laagste transactiekosten gekozen wordt. De transactiekosten bestaan uit de directe kosten van een transactie, en uit de kosten die voortvloeien uit de ex-post risico's die kunnen ontstaan nadat een transactie is overeengekomen.

Deze ex-post risico's ontstaan als een markt gekarakteriseerd wordt door de drie TCE-criteria: incomplete contracten, opportunistisch gedrag en specifieke investeringen. Ex-post risico's kunnen tot gevolg hebben dat investeringen alleen worden ondernomen tegen relatief hoge rendementen of zelfs helemaal niet worden ondernomen. Ter voorkoming hiervan dienen kostbare (in termen van transactiekosten) waarborgen gecreëerd te worden. Uiteindelijk dient er een beheersstructuur gevonden te worden, waarin deze waarborgen tegen de laagst mogelijke transactiekosten ingevoerd worden.

De karakteristieken van de transacties op een markt bepalen of er ex-post risico's zullen optreden en daarmee of het TCE-perspectief de juiste is. Deze studie ontwikkelt een theoretisch raamwerk waarin kan worden bepaald wanneer het neoklassieke dan wel het TCE-perspectief toepasbaar is. Dit raamwerk geeft aan dat als een van de bovenstaande criteria afwezig is, de problemen kunnen worden opgelost door marktwerking of door het vooraf afsluiten van contracten. In beide gevallen is het neoklassieke perspectief afdoende. Om de toepasbaarheid van het TCE-perspectief op de Europese gasmarkt te beoordelen, moet dus bepaald worden in hoeverre alle drie de criteria gelijktijdig aanwezig zijn in de nieuwe reguleringscontext.

De aanwezigheid van specifieke investeringen en incomplete contracten volgt rechtstreeks uit de karakteristieken van de nieuwe reguleringscontext. De toepasbaar-heid van het TCE-perspectief op de Europese gasmarkt wordt hierdoor bepaald door de aanwezigheid van (reguleerders)opportunisme.

Deze studie onderzoekt of reguleerdersopportunisme een gevaar is op de Europese gasmarkt, door te kijken naar de mogelijkheden en prikkels voor een reguleerder om zich te committeren aan een ingesteld reguleringssysteem.

Er zijn zes criteria afgeleid uit de reguleringsliteratuur die het niveau van committering bepalen: de groei in de gasvraag, technologische vooruitgang, de eigendomsstructuur van gereguleerde bedrijven, de afschrijvingen op kapitaal, de nadruk van een reguleerder op het consumenten- of het producentenbelang en de discontovoet. Het totaalbeeld is dat de karakteristieken van de transacties op de Europese gasmarkt leiden tot een laag niveau van committering, als gevolg waarvan deze markt kwetsbaar is voor reguleerdersopportunisme.

Doordat alle drie TCE-criteria gelijktijdig voorkomen op de Europese gasmarkt in haar nieuwe context, is de conclusie dat het TCE-perspectief zal leiden tot betere uitkomsten in termen van marktgedrag in de nieuwe context. Dit heeft gevolgen voor de regulering. Er is vanuit het TCE-perspectief bijvoorbeeld een verminderde noodzaak voor regulering, omdat het TCE-perspectief meer kosten van ingrijpen meeweegt dan het neoklassieke perspectief (met name de kosten van opportunistisch gedrag).

Hervormingen van de Europese gasmarkt moeten rekening houden met tenminste de volgende twee overwegingen. Ten eerste, verticale integratie heeft ook efficiëntie-voordelen, omdat het de ex-post risico's van een transactie kan verlagen. TCE stelt tevens dat een volledig competitief evenwicht op de Europese gasmarkt, zoals voorgestaan in het neoklassieke perspectief, tot ex-post risico's zal leiden met de bijbehorende transactiekosten. Hierdoor moeten de nettovoordelen in termen van transactiekosten van het organiseren van transacties op markten vergeleken worden met die van andere haalbare opties, zoals bijvoorbeeld verticale integratie of langetermijncontracten. Geen enkele optie zou op voorhand, alleen op basis van negatieve effecten op competitie, moeten worden uitgesloten (zoals het geval lijkt te zijn in de huidige splitsingsdiscussie).

Case study analyse

Het eerste deel van deze studie levert een theoretische kritiek op de huidige gasregulering. Het effect van regulering op marktgedrag en -uitkomsten, en daardoor op het behalen van de beleidsdoelen, is echter een empirische vraag. Het TCE-perspectief is superieur aan het neoklassieke perspectief wanneer het een betere verklaring en voorspelling geeft voor regulering in de praktijk. In dit licht is het belangrijk te beseffen dat de huidige gasregulering niet in beton gegoten is. Verschillende aanpassingen die een beweging richting het TCE-perspectief impliceren, hebben reeds plaatsgevonden. Twee in het oog springende voorbeelden zijn de toegenomen ruimte voor het uitzonderen van bepaalde investeringen tot het verlenen van toegang aan derden (*third party access* ofwel TPA exempties), en het toestaan van langetermijncontracten voor *downstream* gaslevering. Het tweede, empirische deel van deze studie analyseert

beide aanpassingen in twee case studies, met als doel om na te gaan of de theoretische kritiek ook geldig is met betrekking tot regulering in de praktijk.

TPA exempties – De Balgzand-Bacton pijpleiding

Hoofdstuk zes bevat een case study van de eerste aanpassing aan het neoklassieke kader. De case study behandelt het eerste pijpleidingproject dat een exemptie heeft ontvangen, namelijk de interconnector tussen Balgzand in Nederland en Bacton in het Verenigd Koninkrijk, ofwel BBL. De analyse van het reguleringproces in deze case leidt tot vier conclusies.

Ten eerste, het neoklassieke perspectief kan niet verklaren waarom BBL een exemptie heeft ontvangen, omdat in de neoklassieke wereld de spanning tussen liberalisering en investeringen, welke de reden vormt voor het toestaan van exempties, niet aanwezig is. Het TCE-perspectief biedt wel een bevredigende verklaring, namelijk dat BBL's exemptie gezien moet worden als een waarborg tegen de ex-post risico's die optreden in het BBL investeringsproject. De conclusie is dat het toekennen van exempties een beweging impliceert van het neoklassieke perspectief naar het TCE-perspectief.

Een tweede conclusie is dat reguleerdersopportunisme niet wordt meegenomen in de behandeling van de BBL-exemptie. Dit beeld komt ook naar voren uit de generieke criteria voor het beoordelen van investeringsrisico's in het huidige exemptieregime. Dit geeft aan dat de huidige gasregulering een beweging heeft gemaakt in de richting van het TCE-perspectief, maar dat desondanks de neoklassieke uitgangspunten behouden blijven. De conclusie is dat de Europese gasregulering zich op dit moment bevindt tussen beide economische perspectieven. Dit is onwenselijk gegeven de conclusie uit hoofdstuk vijf dat de karakteristieken van de transacties op de Europese gasmarkt pleiten voor een invoering van het TCE-perspectief.

Een derde en verwante conclusie is dat door het negeren van reguleerdersopportunisme, de kosten van ex-post problemen onvoldoende worden meegenomen in de beoordeling van het risicoprofiel van een investering. Het gevolg is dat de toegestane winsten tijdens een exemptie te laag zullen zijn, hetgeen een investering belemmert. Een oplossing is om langere exempties toe te kennen dan vereist voor het terugverdienen van economische kosten. Dit hebben de Britse en Nederlandse reguleerders ook gedaan (waarna ze werden teruggefloten door de Commissie). Hun beslissingen waren echter niet gebaseerd op de aanwezigheid van reguleerdersopportunisme.

De vierde en laatste conclusie is van algemene aard. Exempties blijken in de praktijk zeer moeilijk te weigeren, ondanks het expliciete doel om ze alleen in exceptionele gevallen toe te kennen. Volgens deze studie is een reden hiervoor dat het negatieve effect van het verlenen van gereguleerde derdentoegang (RTPA) op de winstgevendheid van een investering overschat wordt. Momenteel kan een project een exemptie krijgen door aan te tonen dat RTPA

de winstgevendheid verlaagt ten opzichte van een situatie zonder RTPA. Aangezien dit altijd het geval is, wordt het zeer moeilijk om een exemptie te weigeren. Een beter criterium voor het toekennen van een exemptie zou zijn om na te gaan of RTPA de winstgevendheid zodanig verlaagt dat deze negatief wordt, waardoor de investering niet ondernomen zal worden. Zolang dit niet gebeurt, worden er in de huidige praktijk meer exempties toegekend dan strikt noodzakelijk.

Gezamenlijk schrijven de derde en vierde conclusie voor dat een regime voor het toekennen van TPA exempties gebaseerd op TCE uitgangspunten, minder exempties zou moeten toekennen dan het huidige regime, maar ook minder strikt zou moeten zijn als een exemptie wordt toegekend.

Langetermijncontracten – De antitrust zaak tegen Distrigas

De tweede aanpassing aan het neoklassieke kader die behandeld wordt in deze studie is het toestaan van langetermijncontracten voor *downstream* gaslevering aan industriële verbruikers en elektriciteitsopwekkers. Hoofdstuk zeven bevat een case study van de antitrust zaak die is aangespannen door de Commissie tegen de Belgische gasleverancier Distrigas, omdat deze zaak expliciet door de Commissie wordt aangehaald als exemplarisch voor de toekomstige behandeling van soortgelijke langetermijncontracten.

De bezwaren van de Commissie tegen Distrigas betroffen voornamelijk de contractduur en het feit dat de contracten grote delen van de gasvraag aan Distrigas bonden. Als gevolg hiervan voerde Distrigas een aantal aanpassingen door, met een verkorting van de contractduur en minder gebonden gasvolumes tot gevolg. Deze aanpassingen kunnen worden uitgelegd als tekenen van een algemene afkerigheid van de Commissie jegens langetermijncontracten voor gaslevering. De Commissie lijkt echter een vrij genuanceerd standpunt te hebben ingenomen. Op basis van de Distrigas zaak specificeert de Commissie namelijk vijf criteria ter beoordeling van deze contracten: de marktpositie van de desbetreffende aanbieder, het aandeel van de vraag dat gebonden wordt door de contracten, de contractduur, het aandeel van de totale markt dat gebonden wordt door de contracten en de efficiëntie-effecten van de contracten. Dit laatste criterium impliceert een TCE-perspectief. Deze visie van de Commissie ten aanzien van langetermijncontracten voor *downstream* gaslevering leidt tot twee conclusies.

De eerste conclusie is dat de geïmplementeerde aanpassingen wederom niet verklaard kunnen worden door het neoklassieke perspectief. De reden is dat het neoklassieke perspectief geen efficiëntievoordelen toelaat voor langetermijncontracten. Hierdoor schrijft het neoklassieke perspectief een complete verwijdering voor van alle langetermijncontracten. Volgens het TCE-perspectief hebben langetermijncontracten een efficiëntievoordeel als ze de ex-post risico's van een transactie verkleinen. Als gevolg hiervan verschaft

het TCE-perspectief wederom een betere verklaring voor de regulering in de praktijk dan het neoklassieke perspectief. Ook de Distrigas case study bevestigt hierdoor de theoretische kritiek op de neoklassieke leidraad van de huidige gasregulering.

De tweede conclusie is dat de Europese regulering ten aanzien van de bovenstaande langetermijncontracten zich op dit moment bevindt tussen beide economische perspectieven. Het erkennen van efficiënties is zonder meer positief, maar neemt wederom het bestaan van reguleerdersopportunisme niet mee, waardoor de richt-snoeren van de Commissie onvoldoende zijn. Door het onderschatten van de kosten van haar eigen interventies, zal de Commissie te vaak interveniëren met betrekking tot het afsluiten langetermijncontracten voor gaslevering in Europa (waardoor ook de ex-post risico's die samenhangen met dit ingrijpen hoger worden dan nodig).

Deze studie geeft een negatief antwoord op de centrale onderzoeksvraag:

> *Is de huidige gasregulering in staat om de publieke belangen te borgen gegeven de nieuwe context waarin zij moet opereren?*

Dit betekent echter niet dat deze studie de liberalisering van de Europese gasmarkt in twijfel trekt. Het doel is om inzicht te verschaffen in hoe het huidige liberaliseringsproces moet worden aangepast aan de nieuwe context teneinde de beleidsdoelen op een zo goed mogelijke manier veilig te stellen. De nieuwe context waarin gasregulering moet opereren, vereist een aanpassing in de fundamentele onderbouwing van het bestaande reguleringsregime, in plaats van een voortzetting van de neoklassieke uitgangspunten met eventuele marginale aanpassingen.

Lessen voor beleidsmakers: houdbare competitie op Europese gasmarkten

De analyse in deze studie leidt onherroepelijk tot de vraag hoe het nu verder moet. Deze sectie geeft vijf beleidsaanbevelingen voor beleidsmakers die zich bezighouden met de vraag hoe houdbare competitie – dat wil zeggen, competitie zonder negatieve effecten op investeringen – gecreëerd kan worden op de Europese gasmarkt.

1) De regulering van een markt wordt mede bepaald door de omgeving waarin de markt opereert. Een gevolg van deze constatering is dat als hervormingen in de marktstructuur en regulering positief werken in een bepaalde markt, dit niet automatisch geldt voor een andere markt, omdat de randvoorwaarden, zoals de institutionele vormgeving, de marktomgeving of het ontwikkelingsstadium van de markt, kunnen verschillen tussen landen. Bijvoorbeeld, waar de Amerikaanse en Britse gasmarkten zelfvoorzienend waren toen ze werden geliberaliseerd, daar zijn de continentale Europese gasmarkten afhanke-

lijk van een oligopolie van niet-Europese gasproducenten. Dit argument doet ook opgeld als er wordt gekeken naar lidstaten onderling. Als gevolg hiervan moeten beleidsmakers, op zowel Europees als op lidstaat niveau, rekening houden met deze verschillen en voorzichtig zijn wanneer men bepaalde hervormingsmaatregelen wil voorschrijven die gebaseerd zijn op de ervaringen van voorlopers.

2) De gasregulering zou gebouwd moeten worden op het TCE-perspectief als men adequaat wil inspelen op de veranderende marktomstandigheden. Een manier om de aanbevelingen van het bredere TCE-perspectief te incorporeren in de huidige gasregulering is om, zoals beide case studies laten zien, korte-termijnmarkten te comple-menteren met alternatieve coördinatiemechanismen zoals TPA exempties en langetermijncontracten.

De case studies geven aan dat deze laatste les ter harte is genomen in de huidige regulering. De case studies geven echter ook aan dat de aanpassingen die tot dusver zijn ingevoerd, nog te sterk bepaald zijn door het neoklassieke perspectief. Teneinde de alternatieve coördinatiemechanismen op een goede manier in te voeren, zouden beleidsmakers de volgende drie lessen ter harte moeten nemen.

3) Een derde aanbeveling vloeit voort uit de conclusie dat het onverstandig is om een reguleringssysteem te baseren op alleen het paradigma dat uitgaat van marktfalen. Regulering zou zich tot doel moeten stellen om de randvoorwaarden te creëren voor het ontwikkelen van competitie in plaats van de onhaalbare perfecte competitie na te streven. Met andere woorden, regulering moet zich richten op het verwijderen van de institutionele belemmeringen voor het ontwikkelen van competitie, bijvoorbeeld door zich te richten op maatregelen die de transparantie vergroten, de coördinatie tussen verschillende reguleringsregimes bevorderen of die de kans op beïnvloeding van de reguleerder verkleinen.

4) Het verwijderen van bovenstaande institutionele belemmeringen leidt tot transactie-kosten. Beleidsmakers zouden hun zienswijze moeten baseren op een beoordeling van de transactiekosten van het overheids- of reguleringsfalen tegenover de kosten van het marktfalen dat zij trachten te corrigeren. Deze transactiekosten worden bepaald door criteria als asymmetrische informatie, onzekerheid, het gedrag van belangen-groeperingen en de institutionele omgeving. Reguleringsbeslissingen zouden moeten worden gebaseerd op deze criteria en niet, zoals nu het geval lijkt te zijn, op de vooruitzichten voor competitie. Een afweging in termen van transactiekosten kan tot gevolg hebben dat een situatie met minder interventie, of zelfs helemaal geen interventie, de laagste transactiekosten met zich meebrengt. Dit zou een situatie tot gevolg hebben met minder dan volledige competitie.

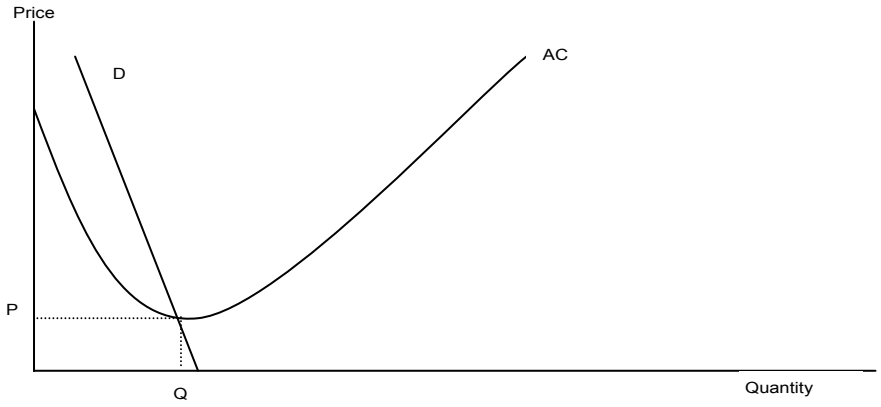
5) Beide case studies geven aan dat reguleerdersopportunisme niet adequaat wordt meegenomen in de huidige gasregulering, met als gevolg dat een reguleerder de kosten van zijn interventies onderschat. Hierdoor zal een reguleerder vaker ingrijpen dan wenselijk zou zijn geweest indien hij alle kosten had meegewogen. Beleidsmakers doen er dus goed aan om terughoudender te zijn dan nu in het voorschrijven van ingrijpende maatregelen.

Het grootste voordeel van het transactiekostenperspectief ten opzichte van het neoklassieke perspectief is dat het een minder rigide manier van denken over regulering voorschrijft door te analyseren hoe instituties het economisch gedrag beïnvloeden en vormgeven. Dit resulteert in een reguleringsregime dat beter omgaat met het fundamentele probleem op de Europese gasmarkt, namelijk de afruil tussen competitie en coördinatie. Dit vergroot de kans op houdbare competitie op de Europese gasmarkt.

Annex
The economics of natural monopoly

Chapter 2 indicates that the concept of natural monopoly is important with respect to network industries because most network industries can at least partly be considered a natural monopoly due to, e.g., the gas network or the electricity grid. Section 5.2.1 shows that a natural monopoly can result in market failure. Natural monopolies are one of the main arguments for regulating a network industry. This Annex discusses the basics of natural monopoly theory and illustrates why regulation is generally deemed necessary.[1] A natural monopoly arises because in some industries a single firm supplying the entire market demand may entail lower costs than two or more competing firms. This makes competition through entry undesirable and regulation necessary. Figure A.1 illustrates the properties of a natural monopoly, where D stands for market demand and AC for the average costs of a single firm.

Figure A.1: Natural monopoly



At the intersection of AC and D, at production level Q and price P, average costs are at their minimum. Upon entry of new suppliers, each will produce less than Q which raises average costs. Hence, one company producing Q and supplying the entire market produces at the lowest possible average costs. Therefore, this monopoly is the lowest-cost solution. The AC curve is drawn in such a way that average costs decrease all the way up to Q. This illustrates the traditional emphasis in natural monopoly theory on

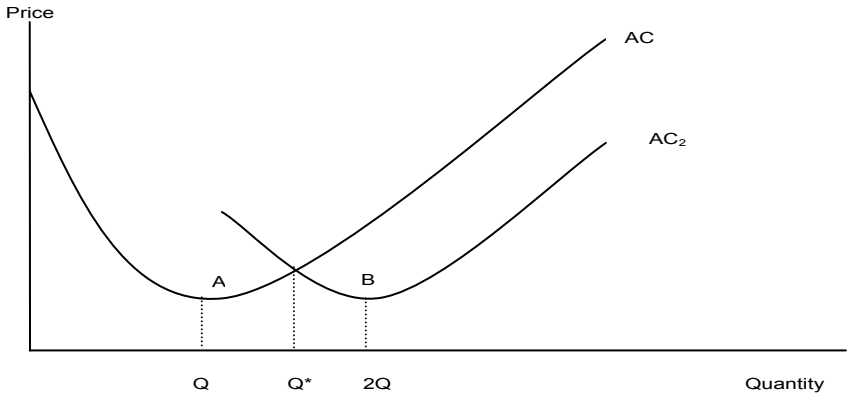
1 This section is based on Tirole (1998), Depoorter (1999) and Viscusi et al. (2000). See Joskow (2007) for a recent overview.

economies of scale (since economies of scale result in the AC curve sloping downward).[2] Baumol (1977, p. 809) changed this emphasis by arguing that:

> 'Perhaps the most unexpected finding of this paper is that *scale economies are neither necessary nor sufficient for monopoly to be the least costly form of productive organization*. Rather, the critical concept is (by definition) strict subadditivity of the cost function, meaning that the cost of the sum of any *m* output vectors is less than the sum of the costs of producing them separately.'

Costs are subadditive when one firm is able to produce at lower cost than two or more are. Note that this is basically the same conclusion as regards scale economies above. Figure A.2 illustrates the difference between the two concepts.

Figure A.2: Scale economies and subadditivity



We have added to figure A.1 a second AC curve, AC_2, indicating average costs when two firms are present. Note that still only one product is being produced. Production will be at Q (as in figure A.1) if one firm operates. When two firms are present, production doubles to 2Q. There are, as above, economies of scale up to Q and diseconomies of scale afterwards. The two-firm case illustrates the difference with subadditivity. At a production level between Q and Q*, production by a single company is still the lowest-cost option available since AC is lower than AC_2. Nevertheless, AC slopes upward, which indicates diseconomies of scale. Whereas economies of scale prevail only up to Q, subadditivity prevails up to Q*. This illustrates the first part of Baumol's claim that economies of scale are not a necessary condition for natural monopoly and that the right definition of a natural monopoly is rather subadditivity of the cost function. The numerical example below shows that economies of scale do not even have to be a sufficient condition for cost subadditivity (we apply Baumol's first claim above and define a natural monopoly as a situation in which costs are subadditive).

2 See Viner (1932) for a seminal paper.

To this end, the analysis is extended to a multi-product setting. Consider the following cost function:[3]

$$C\ (Q_1, Q_2) = Q_1 + Q_2 + (Q_1Q_2)^{\alpha} \quad \text{(A.1)}$$

Total cost after increasing each output by β percent becomes

$$C\ ((1+\beta)Q_1, (1+\beta)Q_2) = (1+\beta)Q_1 + (1+\beta)Q_2 + (1+\beta)^{(1-\alpha)}(Q_1Q_2)^{\alpha} \quad \text{(A.2)}$$

Compare this to the situation where total cost is increased by β percent

$$(1+\beta)C\ (Q_1, Q_2) = (1+\beta)Q_1 + (1+\beta)Q_2 + (1+\beta)(Q_1Q_2)^{\alpha} \quad \text{(A.3)}$$

Where $\beta>1$. For $\alpha>0$, A.2 is smaller than A.3, indicating economies of scale. Cost is nowhere subadditive, however. Expression A.1 shows the costs of a single firm which produces both outputs. Compare this to the costs of two firms who each produce one of the outputs. Costs would then be Q_1 for producing output 1 and Q_2 for producing output 2. Total cost would thus be $Q_1 + Q_2$. Hence, production by two specialized firms is cheaper than production in a single firm, which means that costs are not subadditive. This holds for any level of α.

This example illustrates Baumol's second claim: economies of scale are not even a sufficient condition for natural monopoly. Economies of scope (Panzar and Willig, 1981) explain this. Figure A.1 shows that economies of scale are represented by decreasing average costs at rising production levels. Economies of scope arise when it is cheaper to produce a number of products in one firm than within different firms. The numerical example thus provides for diseconomies of scope, since producing in a single company is more expensive. The distinction between the two concepts is important, because in our example diseconomies of scope are the reason that costs are not subadditive despite the presence of scale economies. The reason is simply that diseconomies of scope outweigh economies of scale.

In sum, in the single-product case, economies of scale are sufficient (but not necessary), while in the multi-product case, economies of scale are neither sufficient nor necessary. Furthermore, economies of scope are essential in defining a natural monopoly, i.e., in identifying subadditivity of the cost function.

Two additional insights from the literature must be noted. First, even economies of scale and scope combined are not necessarily sufficient for cost subadditivity (Panzar, 1989, p. 26).[4] Second, with multilateral rivalry – i.e., rivalry from diverse firms, which in the energy case amounts to energy utilities facing rivalry from non-energy companies – even the concept of cost subadditivity is not sufficient anymore (Jamison, 1997).

This study considers both 'normal' and natural monopolies. Both are similar in that they will generally result in risks of anti-competitive behavior and fears of excessively high prices. This is explained in figure A.3, where MC stands for marginal cost; D for demand; and MR for marginal revenue.

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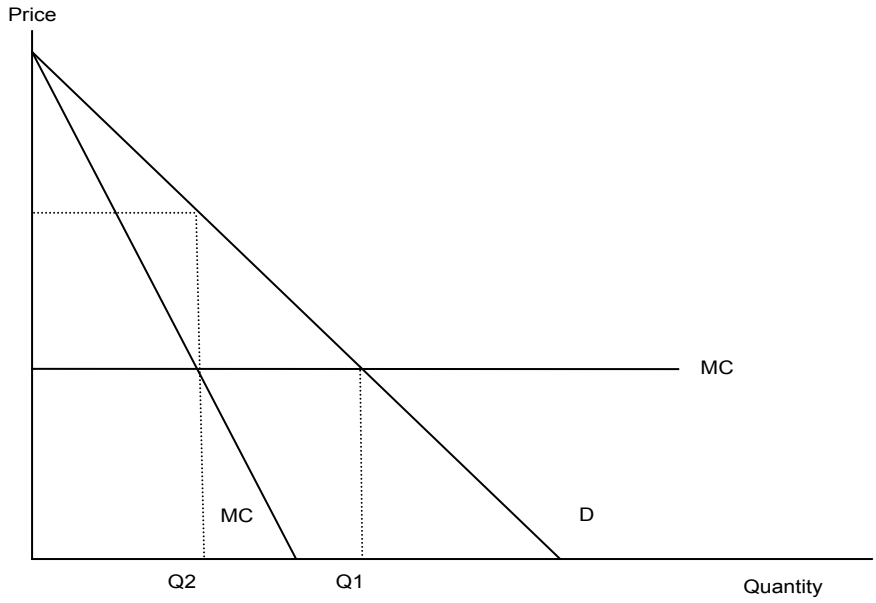
3 Adapted from Viscusi et al. (2000, p. 342), who have derived this example from Sharkey (1982).

4 See Proposition 10 of Panzar's paper and the accompanying mathematical proof.

Figure A.3: Monopoly and welfare



Any introductory micro-economics textbook shows the workings of a (natural) monopoly and its welfare-reducing properties (e.g., Eijgelshoven et al., 2004, chapter 6). With a large number of suppliers, consumers and unfettered competition, market equilibrium eventually ends up at the point where the marginal costs of production equal the market price. This is the intersection of the D curve and the MC curve in figure A.3, where output is Q_1. Total welfare, defined as the sum of consumer and producer surplus, is maximized. When, instead, a monopolist is present, things change radically. A monopolist maximizes his own profits, regardless of the interests of other parties in the economy. A monopolist's profit is maximized at the point where his marginal revenue equals his marginal costs, which occurs when an extra unit's benefits equals that unit's costs. Hence, we move to the point where the MR and MC curves intersect and where output has diminishes to Q_2. Output is much lower and price much higher than with unfettered competition. Welfare has been decreased. Therefore, a monopolist's incentive results in a price and output level which are not welfare maximizing. If left unregulated, he will also have the ability to impose this scheme.[5]

This brings us to regulating a natural monopoly. As the welfare optimum ultimately entails prices equal to marginal costs, a simple solution to any pricing problem associated with a (natural) monopolist is for the regulator to oblige the monopolist to charge prices equal to its marginal costs. However, for a natural monopolist, this option is problematic. Figure A.1 illustrates this point. The optimal production level is Q and this should best be produced by a monopolist. Introducing marginal cost pricing to

5 This ability vanishes with perfect contestability. We argue below that contestability is of limited practical relevance.

prevent monopolistic price setting will result in losses to the monopolist. Declining average costs imply that marginal costs are below average costs, because an extra unit costs less (i.e., the marginal costs) than all the previous units on average (i.e., the average costs), which lowers total average costs. Equating price to marginal costs will therefore result in losses to the monopolist.

As indicated, the fear of excessive prices pertains to natural as well as 'normal' monopolies. It is interesting to see exactly what the difference between the two is. The concept of subadditivity helps to explain the difference. For a natural monopoly, total costs are minimal when output is produced by a single company, which implies that welfare is increased compared to multiple firms producing the output. A normal monopoly is different, however, in that it has a societal cost – there is no subadditivity. Therefore, welfare is lower under a normal monopoly than in an alternative market with more producers. This explains why in gas trading markets, normal monopolies are heavily contested by regulators and/or antitrust authorities, whereas with respect to a natural monopoly like gas pipelines, entry is usually forbidden and regulation and/or government ownership is the preferred solution.

The distinction between subadditivity and scale economies leads us to another observation related to the welfare implications of a natural monopoly. A firm operating under decreasing average costs possesses a strong natural monopoly, as opposed to a weak natural monopoly for which average costs are increasing even though the cost function is subadditive. In figure A.2, this weak natural monopolist produces between Q and Q* (Gegax and Nowotny, 1993, p. 67). A weak natural monopolist might face entry without being able to prevent it, which makes its monopoly unsustainable (ibid., 1993, p. 76).[6] Its costs are, however, subadditive, which implies that for society as a whole it is preferable to have one firm producing the relevant output. This renders any entry inefficient. There are counterarguments too. The increasing costs associated with entry into a weak natural monopoly can be offset by improved efficiency due to the competitive forces associated with entry. For instance, competition might lead to a larger emphasis on cost reduction. If this incentive outweighs the rising costs associated with entry, overall costs might decline (Aalbers et al., 2002, p. 132). A second argument is that if a regulator possesses incomplete information about cost or demand characteristics, he might want to trade off returns to scale to the extraction of the relevant information through competition among firms (Tirole, 1988, p. 20). With a weak natural monopoly, nevertheless, one should be careful when considering entry (MacAvoy et al., 1989, p. 247).

A strong natural monopoly, on the other hand, will not face problems of entry, as its costs are lower than those of any possible entrant. Hence, the scope for entry is very limited at best. The rationale for regulation in this case is to prevent the monopolist from abusing his market power.

A weak natural monopoly calls for ownership regulation – privatization or nationalization – when entry is prohibited. If entry is allowed, it is more prudent to implement regulation which is focused on efficiency improvements and information disclosure to overcome the higher costs due to entry, and possibly some protection of the mono-

6 This happens if a potential entrant is able to enter and generate some profits by focusing on the most profitable activities. This 'cream-skimming' would leave only the less profitable activities for the natural monopolist, which might make the natural monopoly unsustainable.

polist. Regulation of a strong natural monopoly, on the other hand, could take one of the forms discussed in section 4.4 and requires stringent regulatory overview to prevent monopolistic abuse.

An exception to the rule that a natural monopoly will inevitably require regulation is the presence of a contestable market, as contestability makes regulation superfluous. Contestability has been introduced in seminal studies by Baumol, Panzar and Willig (1982) and Baumol (1982) who extended Demsetz's (1968) work on regulating utilities. They show that in an industry without sunk costs, potential competition can be sufficient to discipline a monopolist. When a monopolist charges a price above average cost in a contestable market, a potential entrant enters the market at the same production scale, charges a price slightly lower than the monopolist's, and captures the entire market for as long as it is profitable. When the market becomes unprofitable, the entrant can just leave the market. This is often referred to as 'hit-and-run' entry. In a contestable market, regulation is pure waste because the contestability induces a monopolist to price its products at average costs. Criticism often focuses on the assumptions underlying contestability theory. Contentious assumptions are 1) that prices adjust more slowly than decisions about entry (the incumbent cannot adjust prices immediately after being faced with an entry threat) and 2) that entry and exit are costless (no costs are incurred when entering the market that are not also incurred by the incumbent, and all costs can be recouped when exiting the market). First, Tirole (1988, p. 310, 311) shows that prices do not necessarily adjust more slowly than entry decisions. In fact, the opposite is quite plausible. This would result in a price which is considerably higher than average costs (Schwartz and Reynolds, 1983, p. 488-489). The assumption that entrants can leave the market at no cost appears to be unrealistic in practice (ibid., p. 490). Moreover, it has been demonstrated that the presence of sunk costs might deter entry (Dixit, 1980, p. 106 and Braeutigam, 1989, p. 1305).[7] This makes contestability highly unlikely in gas markets.

Though completely contestable markets are hardly ever seen in practice (Spence, 1983 and Shepherd, 1984), the approach nevertheless has some merit. Most importantly, it has resulted in antitrust analyses taking more account of potential competition than had been the case prior to contestability, when emphasis was being placed on concentration (Viscusi et al., 2000, p. 161). However, contestability theory does not change our conclusions above, namely, that a natural monopoly, weak and strong, requires regulation to allow the market to operate smoothly.

7 Sunk costs are also a barrier to exit, since exiting the market and recovering all costs is by definition impossible. See Gilbert (1989, p. 491).

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Conversion factors

This study's prime subject is natural gas – liquid and gaseous. While the main unit of measurement is billion cubic meters (bcm), several other units are available, some of which also appear in this study. We therefore provide a table with approximate conversion factors below.

Approximate conversion factors – natural gas (NG) and LNG

To (multiply by)	Bcm NG	Bcf NG	MTOE	MT LNG	Trillion BTU	Million BOE
From						
1 billion cubic meters NG	1.0	35.3	0.90	0.73	36.0	6.29
1 billion cubic feet NG	0.028	1.0	0.026	0.021	1.03	0.18
1 million tonnes oil equivalent	1.111	39.2	1.0	0.805	40.4	7.33
1 million tonnes LNG	1.38	48.7	1.23	1.0	52.0	8.68
1 trillion British thermal units	0.028	0.98	0.025	0.02	1.0	0.17
1 million barrels oil equivalent	0.16	5.61	0.14	0.12	5.8	1.0

Source: BP (2007)

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Curriculum vitae

Aldo Spanjer, born 30 June, 1979 in Harlingen, the Netherlands, received secondary schooling at the Simon Vestdijk high school from 1991 to 1998 (HAVO and VWO). In September 1998 he started a degree program in Economics at the University of Groningen. After graduating in August 2002, he became a PhD-Fellow at the Economics section of the Department of Tax Law and Economics of the Faculty of Law at Leiden University from October 2002 until October 2008. Aldo Spanjer pursues his career as a Regulatory Affairs and Communication Advisor at Shell Energy Europe.

His thesis has been written under auspices of the research program 'Securing the rule of law in a world of multilevel jurisdiction' of the E.M. Meijers Institute of Legal Studies at the Law Faculty of Leiden University. His publications focus on energy policy and the economics of gas markets and include topics like Dutch gas banking, the relationship between the EU and Russia in energy matters and specific topics in gas regulation such as unbundling and the third party access exemptions regime.

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