



European gas market liberalisation:

Are regulatory regimes moving towards convergence?

Nadine Haase

May 2008

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ISBN
978-1-901795-73-8

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Abbreviations

Bcm	Billion cubic metres
CIEP	Clingendael International Energy Programme
CNE	Comisión Nacional de Energía
DTe	Directie Toezicht Energie
DSO	Distribution system operator
DG COMP	Directorate-General for Competition
DG TREN	Directorate-General for Energy and Transport
CEER	Council of European Energy Regulators
EC	European Commission
ERGEG	European Regulators Group for Electricity and Gas
EU	European Union
EP	European Parliament
EZ	Ministerie van Economische Zaken
Fcfs	First come first served
GGPSSO	Guidelines for Good Practice for Gas Storage System Operators
GP	Green Paper
GRI	Gas Regional Initiative
GTE	Gas Transmission Europe
HubCo	North West European Hub Service Company
IEA	International Energy Agency
LNG	Liquefied natural gas
Mtoe	Million tonnes of oil equivalent
MWh	Mega Watt hours
NBP	National Balancing Point
NRA	National Regulatory Authorities
nTPA	Negotiated Third Party Access
Ofgem	Office of Gas and Electricity Markets
OTC	Over-the-counter
OCM	On-the-day commodity market

PSV	Punto di Scambio Virtuale
REM	Regional Energy Markets
rTPA	regulated Third Party Access
SEER	Strategic European Energy Review
SOTEG	Société de Transport de Gaz
TOP	Take-or-pay contract
TPA	Third party access
TSO	Transmission system operator
TTF	Title Transfer Facilities
UIOLI	Use it or lose it
UK	United Kingdom

Preface

European gas market liberalisation has been a long-running story which, for most observers, has yielded disappointingly slow results. Most of the academic literature on this subject focuses on the EU Directives or the detail of one or two countries. Therefore when Nadine Haase asked whether she could spend time at the Oxford Institute to complete a part of her PhD work on comparing national regulatory regimes for gas across the “old” EU member states, my response was one of delight, but also caution due to the difficulty of gathering information and the complexity involved in constructing a framework which would allow a comparison of developments across countries through time.

I believe that Nadine has achieved this very difficult task with distinction and I am delighted that we are publishing what I believe is one of the first detailed academic assessments of the EU gas liberalisation process across the whole range of regulatory functions. Nadine spent six months with us carrying out part of this research and returned to the University of Twente to complete the work. I am very grateful to her for seeing it through to the end and producing an excellent work of reference for students of the EU energy liberalisation process.

Jonathan Stern

April 2008

Acknowledgement

First and foremost, I would like to express my gratitude to Prof. Jonathan Stern for accepting me as a visiting fellow at the Gas Programme of the Oxford Institute for Energy Studies. The research would not have been carried out without his support and has been substantially enriched by his insightful comments.

In addition, I would like to thank all staff members of the Oxford Institute for Energy Studies, who created such a supportive and inspiring environment. I would like to express my special appreciation to Christopher Allsopp CBE and Joan MacNaughton CB for their support. Moreover, I would like to thank Robert Mabro CBE for giving me the opportunity to attend the Oxford Energy Seminar and sharing some of his views on four decades of energy policy.

Gathering the data for this study and gaining the necessary background information was only possible with the help and support of numerous highly knowledgeable practitioners throughout Europe, who are either engaged in natural gas markets or its regulation. Without their contribution, my attempt to increase my understanding of the European Gas reform process in general and the evolution of regulatory regimes in natural gas markets in particular would have been a discouraging undertaking. The list of my interview partners is too long to be named here. Instead, I would like to thank my interview partners from the Directorate-General for Energy and Transport, the Directorate-General for Competition, and the Council of European Energy Regulators. In addition, I would like to thank the national regulatory authorities of the old Member states, who spared their limited time to provide me with complementary data. I also received helpful comments from the sponsors of the Gas Programme of the OIES and the participants of the European Doctoral Seminar of natural gas research. I would especially like to thank Prof. Dr. Helmut Schmitt-von-Sydow from the European Commission for his support throughout the project.

The research stay was jointly enabled by the Center for Clean Technology and Environmental Policy at University of Twente and the Netherlands Organisation for Scientific Research. The research process was supervised by Prof. Dr. Hans Bressers and Dr. Maarten Arentsen who contributed pertinent scientific guidance and support. The Netherlands Institute of Government generously supported the publication of this study by offering an editing grant. Last but not least, I would like to thank Mike Meier, Joan Conway and Kate Teasdale for improving the language and design of the manuscript.

Summary

This study has assessed the evolution of regulatory regimes in European gas markets on the basis of panel data from the old member states (EU15) for the period between 2000 and 2005. The methodology used enabled us to assess whether regulatory regimes are converging. In this context, an index has been developed to measure the extent to which member states are closing the gap between their regulatory regime and a best-practice model. Due to the discretion allowed within the framework regulations of the Gas Directives, member states can choose which regulatory instruments to apply. As a consequence, the reforms have resulted in diverging regulatory regimes within the framework for gas market organisation in the European Union. Our analysis suggests that the old member states have only achieved 54% of best practice in terms of European regulation for competition. During the final two years of our study period, member states became increasingly reluctant to apply best practice. In fact, no country followed the UK example and achieved what could be categorised as best practice. The majority of countries did, however, improve their regulatory regimes. At the end of 2005, Denmark, Spain, the Netherlands, Italy, Belgium, Austria, Ireland and France could be put in a group that were moving towards best practice. Germany, Luxembourg and Sweden appeared less enthusiastic, with minimal convergence throughout the entire period.

Although national regulatory agencies have been granted many more competencies during recent years, regulatory decision-making structures differ considerably across Europe. Economic governance of European gas market regulation is still characterised by multi-authority structures at the national level. On the European level, member states voted against the creation of a common energy regulator and, instead, tried to increase the regulatory impact through enhancing co-operation among national regulators.

The main drivers for a convergence of regulatory regimes are the European legal provisions. The detailed specifications in European law have had an effect on the application of best-practice approaches. Complementing this, the Madrid Forum contributed to building a consensus and greater uniformity in tariff structures, thereby promoting best practice. After reviewing the evolution of general and energy specific policy objectives, we conclude that they are important. In 2000, and again in 2005, the European Union's Lisbon Agenda stimulated further moves towards liberalisation. However, despite liberalisation now having been on the political agenda since the late 1980s, it runs the risk of being overtaken by more current policy objectives of security of energy supply and climate change. Since at least 2000, the European Energy Strategy has followed a holistic approach in striving to achieve a sustainable, competitive and secure energy supply. We would argue that once the security of supply enters the policy framework, regulations are less likely to follow competitive market models. Anticipating an increase in future geopolitical uncertainties together with a greater import dependency on fewer suppliers, energy supply security seems likely to move up on the political agenda and needs to balance its position vis-à-vis carbon reduction objectives.

1. INTRODUCTION

In the 1980s and 1990s, privatisation and liberalisation of European gas markets emerged on the political agenda. Back then, “many of the established actors in European gas industry still regarded the introduction of liberalisation as the equivalent of the end of civilisation” (Stern, 1998: 91). Ever since, attempts to liberalise European gas markets were facing strong opposition and resistance from the industry and industry-oriented governments, aiming to maintain the status quo of market organisation. Initially ambitious regulatory targets from the European Commission boiled down to a very basic introduction of competition and liberalisation in form of the first gas directive. However, the European gas reform marks the starting point for restructuring the gas sector and its economic governance. European gas markets have gone through profound restructuring processes in the last 10 years. In 1998, the European gas market resembled a patchwork of national markets with highly heterogeneous regulatory regimes. Since then, a European gas market reform attempted to integrate and harmonise gas markets while asking for country-specific solutions to take into account different national characteristics. In early 2000, the European Commission (EC) expressed the over-optimistic expectation of reaching full liberalisation by 2004. Two years later, the European gas market reform was described as a “patchy process” (see EC Inform-Energy, 2002: 16). In 2007, the EC officially spoke out about what many observers were claiming for years: European gas markets lacked competition, cross-border integration, and harmonisation. Due to the discretion of the European framework regulation, member states could choose to a large extent which regulatory instruments to apply. As a consequence, the reform brought about a divergent convergence of regulatory regimes which now functions as a framework for natural gas market organisation in the European Union. This study aims to assess the degree and direction of policy convergence applied to regulatory regimes that came into existence in order to realise European gas market liberalisation.

We assess the regulatory regimes of national gas markets in Europe over time, covering the gas market regulation in the old member states. We concentrate on policies affecting the downstream part of the gas value chain that is subject to the reform. The period under study begins with the implementation of the first Gas Directive in 2000 and lasts until the end of 2005. Our leading question is ‘Are regulatory regimes moving towards convergence?’ Complementarily, we explore common patterns or paths that member states follow. To capture the dimension of rate and degree of convergence, the following sub-questions guide our analysis: ‘Are some countries moving towards a best-practice model faster than others?’ (rate of convergence) and ‘how much do the member states decrease the distance of their regulatory regime towards a best-practice model?’ (degree of convergence). The second question necessitates developing a methodology which allows the deduction of a so-called best-practice model from the European legislation and economic theory (chapters 2, 5, & 6) and then measures the distance of the regulatory regimes towards this best-practice model (chapter 7). The research design is guided by New Institutional Theory, combining insights from European Public Policy Studies and New Institutional Economics. With reference to Williamson’s four layer model (chapter 2), we identify institutional factors that shape regulation. The focus is on two factors: European law and European energy policy. By investigating the evolution of European legal provisions and energy

policy related to the gas market liberalisation (chapters 4 & 5) we try to explore whether these factors promote regulatory convergence.

The assessment of regulatory regimes in European gas markets faces two main limitations. First, the scope of our assessment may be criticised for being too formalistic, because our analysis takes into account only formal aspects of regulation. The study assesses the choice of regulatory instruments, but their practical application is not researched. Moreover, we do not show how cross-border harmonisation works in practice. Those are valid objections underlining the necessity to clarify the scope of the study and its results. At the same time, the objections indicate subjects for further research in European natural gas markets.

Second, the idea of market integration and harmonisation is often challenged by reform opponents who raise the fundamental question of why natural gas market regulation should be harmonised in the first place. This position is based on the argument that regulatory instruments induce different effects in different countries. Certainly, characteristics of national gas markets such as market size, existing networks, or import infrastructure and market structure do matter. One among several reasons why the EU voted for a framework regulation as the main legal instrument of the European gas market liberalisation was to ensure that national characteristics can be taken into account to set up an appropriate regulatory regime. In general, the European Commission did not take a dogmatic point of view in this regard, but at the same time advocated the idea of liberal market integration which necessitates a certain degree of harmonisation to allow interoperability of European gas markets. As a consequence, the EC did not directly prescribe a coherent best-practice model, but instead expressed preferences with regard to individual regulatory instruments. With the help of our methodology we try to make this implicit best-practice model explicit. At the end of the day, European gas market liberalisation has to balance out the harmonisation of European gas markets, and the optimal functioning of national gas markets. Nevertheless, our assessment takes the harmonisation goal as the main angle and starting point to increase the understanding of evolving gas market regulation in the process of European gas market liberalisation.

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2. THEORETICAL FRAMEWORK

2.1 Goals and neoclassical assumptions of the European gas reform

The following paragraph sketches the reform goals and references their theoretical underpinning. This is necessary because our methodology is grounded on these theoretical assumptions that ex ante structured the market reform by determining certain traditional principles.

The main reform objectives are twofold: completing the internal market and establishing a competitive natural gas market. The EU also aims to increase efficiency, reduce prices, raise standards of service, and increase competition (see European Commission, 1998: Recital 1-3; European Commission, 2003: Recital 2). In short: a new governance arrangement shall bring about long term benefits for consumers (see Joskow, 2006: 3). The means enhancing overall welfare by trying to influence the economic performance in the energy sector is deduced from the structure-conduct-performance paradigm (see Bain, 1968a; Graham, 2000; E. Mason, 1939; E. Mason, 1957). According to the prevailing model in industrial organisation studies, economic performance depends on the conduct of buyers and sellers. Business conduct incorporates not only pricing policies and practices but also spans most corporate activities such as marketing strategies or research and development plans. Conduct in turn is influenced by the market structure. Market structure is characterised by

the number and size of sellers and buyers, the degree of physical or subjective differentiation distinguishing competing sellers' products, the presence or absence of barriers to the entry of new firms, the shapes of cost curves, the degree to which firms are vertically integrated from raw material production to retail distribution, and the extent of firms' production line diversification (conglomeration). (Scherer & Ross, 1990: 4-5)

The model foresees market structure as determined by basic conditions grouped into supply and demand side indicators. The supply side for instance, is characterised by the gas supply situation, the nature of the relevant technology and business attitudes; price elasticity, availability of product substitutes, and rate of growth account for the demand side. The causal flow suggested in the context of the structure-conduct-performance paradigm does not follow one direction per se, but instead foresees feedback from each variable in the model.

Public policy in general and the European gas market reform in particular bring leverage to bear indirectly on economic performance by influencing market structure and conduct (see Bain, 1968b; Scherer & Ross, 1990: 5). This is in line with two broad conceptions of competition, one of which emphasises market structure while the other stresses the conduct of sellers and buyers (see Scherer & Ross, 1990: 15-18). Liberalising European gas markets self-evidently necessitates introducing competition, but what are the sufficient conditions to call a market competitive? Scherer & Ross (1990) offer the following general definition:

In modern economic theory, a market is said to be competitive (or more precisely, purely competitive) when the number of firms selling homogenous commodity is so large, and each individual firm's share of the market is so small, that no individual firm finds itself able to influence appreciably the commodity's price by varying the quantity of output it sells. (Scherer & Ross, 1990: 16)

The European Union applied several principles of market reform such as access, competition, unbundling, and independent regulators to reach this degree of competition. To minimise the barriers for the market entry of new firms, the European legal provisions regulate network access conditions for the transmission and distribution levels. Trading activities are not in the regulatory scope, although Joskow identifies the existence of mature trading facilities as a key component for the development of competitive markets. Despite the fact that trading might not be regulated, Joskow (2006) stresses the important role spot markets and trading hubs play in allocating scarce network transmission capacity and ensuring an effective balancing of demand and supply in electricity markets (see Joskow, 2006: 4-5). Some member states chose to influence conduct by employing incentive regulation in form of a price-cap regulation which restricts the pricing behaviour of the companies when setting tariffs for their networks. Most of the employed regulatory instruments such as legal market opening and third party access, target changing market structure. Additionally, vertical separation of trade and transport (so called unbundling) promises to break up prevailing market structures. Here, the underlying assumption is that transport and trade companies have different profit interests, and therefore follow other incentive structures. Under perfect market conditions, it is anticipated that a transport company in its own right strives to diversify its customer portfolio by offering transparent tariffs and access conditions. On the contrary, the transport arm of an integrated incumbent is to have an incentive to prevent competitors from competing with its own trading schemes. A separation of trade and transport companies has not become a reality in most of the European gas markets. Due to the lack of perfect market conditions, a considerable amount of competition introducing measures try to enhance transparency and decrease the information asymmetry between incumbents and new market entrants on the one hand and vis-à-vis the regulator on the other hand. As a result, transparency has crystallised as a keyword for lessening the information asymmetry.

With the liberalisation of markets, independent regulatory agencies evolved on the national and European levels. The restructuring of various industry sectors was accompanied by the transferral of regulatory power to those agencies. Although the superiority of independent agencies such as regulators towards governmental administrations is contested, a number of considerations convinced governments to establish regulators and endow them with the necessary competencies. During the 1980s and early 1990s, experiences in the UK demonstrated that “in many cases, privatisation would only mean the replacement of public by private monopolies unless the newly privatised companies were subjected to public regulation of profits, prices, and entry and service conditions” (Majone, 1998: 199). In the process of redefining the functions of the state, several justifications are put forward regarding why independent agencies seem to be more appropriate than governmental departments to exert regulatory power in Europe. The most central one points to the enormous information asymmetry between industry and regulatory authorities. Sector regulation often necessitates expertise in highly complex or technical matters to design appropriate rules and fulfil its judicative role. Although the information asymmetry can be significantly decreased by strengthening the regulators competencies and staff, the disparity cannot be fully abrogated. Moreover, due to separation of power, governmental bodies tend to be inappropriate to exert judicative functions. Courts in turn are not supposed to take over legislative or regulatory action. Establishing separate entities from government, promised to decrease the influence of partisan politics and party political influence on regulatory decisions. As opposed to cabinets, the institutional structure of regulators is independent from legislative periods; the hope is therefore to enhance stability and credibility of

regulation. Furthermore, proponents of independent agencies claim that public participation is easier to facilitate, “[...] while the opportunity for consultations by means of public hearings is often denied to government departments because of the conventions under which they are operate” (ibid). Last but not least, agencies are able to focus public attention on controversial issues because they are more distant from political or governmental agendas. Our list is certainly neither exhaustive nor reflecting a balanced discussion. Instead, the main justifications why regulators are considered better suited to promote regulation for competition than other state entities are summarized. Considering whether an independent regulator or governmental body is the designated regulatory authority, the crucial the question remains if the authority takes on an enacting or enforcing role in liberalising the natural gas market.

2.2 Institutional change in the light of New Institutional Theory

The next section fulfils two functions. First, we define the variables of this analysis and show how they are theoretically embedded. Second, we deduce two contrary expectations on the basis of the theoretical explanations that the New Institutional Theory offers. Drawing on New Institutional Economics and European Comparative Studies of New Institutional provenience enables us to account for divergence and convergence of regulatory patterns.

2.3 Williamson’s conceptual framework of institutional change

In general, New Institutional Economics perceives institutional change as a gradual and incremental process evolving over a long time. Williamson’s four-layer model falls in this evolutionary tradition which helps to understand how the regulatory framework and the market are related to each other. Williamson’s conceptual framework initially intended to illustrate the position of New Institutional Economics within different levels of social analysis. Recently, scholars have discovered the framework helps explain differences in economic governance from an evolutionary perspective (see Correljé & de Vries, 2007; de Vries & Correljé, 2006; Groenewegen & Künneke, 2005; International Gas Union, 2006). More precisely, the framework contributes to understanding “why economic institutions have emerged that way they did and not otherwise” (Oliver E. Williamson, 1998: 25) by offering a set of categorical variables. Williamson distinguishes between four endogenous variables representing different levels of analysis. In short, those variables are informal institutions (level 1), formal institutional environment (level 2), institutional arrangements (level 3), and (market) behaviour (level 4). Exogenous variables are not explicitly linked to the framework, but are usually included with or without reference to the structure-conduct-performance paradigm which foresees basic conditions or market characteristics as part of the research equation (see Correljé & de Vries, 2007).

Williamson assumed the main direction of influence starting from the first level where the beliefs and norms are located and feeding through down to the fourth level, describing economic performance. The implicit assumption is that other causal relationships may possibly arise, but are less strong (see Oliver E. Williamson, 1998: 26). “The basic causality in this model flows from the top towards the behavioural layer. But it should be clear that via processes of learning, lobbying, technical development and societal change in the broader sense, there is also an upwards influence on the form and content of the basic values and beliefs” (International Gas

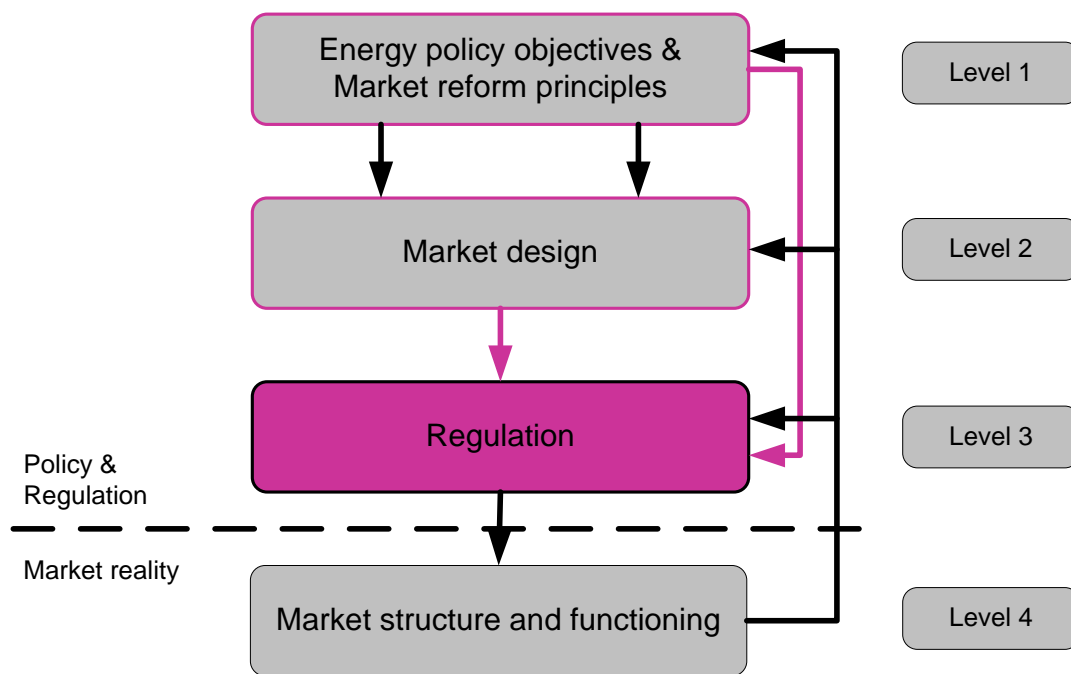
Union, 2006: 23). So far, interaction between the levels, or feedback processes have hardly been subject of empirical research (see de Vries & Correljé, 2006; Oliver E. Williamson, 1998). Consequently, the explanatory power of Williamson's conceptual framework has still to be tested to clarify its benefits and limitations. One may describe the state of research with reference to an allegory stemming from chemistry: the main substances are determined, but the composition of the substances and the chemical processes are not fully understood. The strength of the framework is to show which institutional variables are at stake. At the same time, the model does not account for variables describing actor's behaviour in a more systematic way (Oliver E. Williamson, 1975, p.: xiii). New institutional theory grounds on the micro foundation of economics. Actor's preferences are characterised by bounded rationality and opportunism (Oliver E. Williamson, 1996, p.6). It is assumed that actors are striving for maximising their profit and thereby preferences are supposed to be defined. New institutional theory has therefore been criticised for not identifying key actors and fully accounting for the nature of agency. "As a result, institutional theory has struggled to explain how change comes about when existing structures embedded in the broader environment are so constraining upon human actions." (Frumkin & Kaplan, 2000)

2.4 Conceptual applications to the European gas market reform

In the next section, we will discuss Williamson's framework and its possible application to the European gas market reform in more detail. The next section shows that the initial model from Williamson and its recent application deviates in the process of application and interpretation from the original model.

We do so, by contrasting our application to those put forward by Dutch scholars researching the economics of energy infrastructure. The aim of this section is to embed our analysis theoretically. The figure visualises an applied version of Williamsons conceptual framework to the gas market, which we will elaborate on (see Groenewegen, 2005).

Figure 1: The regulatory framework and the market



Source: (IGU/CIEP 2006: 23) – Adaption of Williamson (1998) and Groenewegen (2005)

The **first level** represents informal institutions such as broad beliefs, values and norms (see Oliver E. Williamson, 1998: 27). North subsumes under informal constraints also sanctions, taboos, customs, traditions, and codes of conduct (1991). Those informal institutions are supposed to be stable and change only occurs within a long time period. According to Williamson's proposition, they change every 100 years or even after longer time periods. When applying Williamson's four-layer model to the gas sector, the author group from the Clingendael International Energy Programme (hereafter CIEP) identifies potential drivers for beliefs, values, or norms related to the gas market. Accordingly, those are triggered by "perceptions about sovereignty over national energy resources, equity, scarcity and resource independence, the environment, in/exclusion of social and ethnical groups, beliefs about states versus markets" (International Gas Union, 2006: 22). Variation of the attitude regarding these principles or issues often stems from the

presence or lack of energy resources, the role of natural gas in the energy portfolio, the openness of the economy, political culture, norms of 'good governance' and the involvement of the interest group in society via 'deep' political principles and beliefs (ibid).

CIEP specified the first level by labelling it 'energy policy objectives and market reform principles'. On this level, principles of liberal market reform such as unbundling, access, and competition on the one hand and energy policy objectives on the other are considered pivotal in

shaping market design processes. We distinguish between general policy, energy, and even sector specific policy objectives. Such general policy objectives may be overarching socio-economic development goals such as employment and economic growth. Energy specific objectives often refer to guaranteeing security of energy supply, or competitive energy prices. Additionally, the general attitude towards liberalisation of markets or overarching economic objectives may influence the establishment or reformulation of regulatory regimes in the gas sector (see *ibid*). Moreover, beliefs about state versus market are ultimately expressed by member states attitude towards liberalisation.

In the **Second level**, Williamson placed the rules of the game. Those formal institutions comprise the polity, judiciary, and bureaucracy of government. Here, “the laws regarding property rights – their definition and enforcement – are prominently featured.” (Oliver E. Williamson, 1998: 27). In addition to international treaties, national laws, and constitutions, more elements of market design are determined within this layer. CIEP also suggests that the position of the regulator vis-à-vis the administration and court is determined here (see International Gas Union, 2006: 22). The distinction between the second and third level and its labelling is not fully convincing or at least poses some demarcation problems. In a more general understanding, market design includes regulatory instruments applied and regulation incorporates legal provisions. In this way, the adapted version of Williamson’s model in figure 1 does not necessarily enhance the clarity of the framework. In some instances, the distinction between the second and the third levels is not as clear-cut as the framework appears to be at first glance. This is explained further in the next section.

When applying the framework to the European electricity sector, de Vries and Correljé introduced the distinction between generic and sector specific institutions. The generic formal institutions are congruent with Williamson’s understanding of the rules of the game, whereas the sector specific institutions are determined by the scope of the European Directives and regulations (See de Vries & Correljé, 2006).

The **Third level** is central for assessing the institutional arrangements, labelled ‘regulation’ in the figure. The play of the game is located in this layer. According to Williamson (1998), every one to 10 years one can observe the process of aligning governance structures with transactions (see Oliver E. Williamson, 1998: 26). Under institutional arrangements we understand actual regulatory instruments and decisions (hands-on regulation), firms’ tariff structure and trading practices, forms of private public co operations, and contracts.

The **Fourth level**, ‘market structure and functioning’, comprises classical economic performance and business conduct. Level 4 is characterised by interaction between actors with different objectives. Here prices, quantities, and investments are continuously determined by the business conduct of the engaged actors. Market strategies are chosen and deployed, lobbying comes into play, and buyer and seller exchange goods. Actual behaviour is circumscribed by the room the market design and regulation offers.

2.5 Adjustments to the model

Recent literature puts forward several criticisms to enhance the model. One concerns the direction of causal flows, another regards the assumption made with respect to the frequency of

institutional change. A third criticism emphasises the role exogenous factors may play in changing the endogenous. We suggest an additional fourth criticism, regarding the distinction between the second and third layers of the model. The fifth criticism addresses possible intra-variable effects.

First, De Vries and Correljé make a critique of Williamson's idea about the duration of those institutions. They argue that a range from 100 years to a millennium for informal institutions or in general time constants based on a factor of 10 might be too long and static. Instead, most likely the proposed time spans are possibly inspired by aesthetic considerations rather than empirical observations. Second, the two authors emphasise the impact of exogenous factors on all levels. Consequently, exogenous factors should be taken into account, be they more general in nature or energy sector related. Third, De Vries and Correljé challenge the constitutive character of the four-layer model. Originally, the direction of causality is anticipated to feed through from the first to the second layer, from the second to the third and so forth. Although a backwards flow is mentioned, its impact is considered less effective or profound. Other intra-layer interactions, such as economic performance or other aspects of market behaviour feeding back to informal institutions or formal institutions, are not considered. De Vries and Correljé (2006) show that "feedback from the governance level to the level of informal institutions can have significant influence and can cause cultural changes at a much higher speed than Williamson suggests". Consequently, a conservative interpretation of Williamson's preferred direction of feedback is inappropriate and limits its explanatory power, especially when applying the model to explore causal relations.

Fourth, when applying the four-layer model to the European gas market reform, the distinction between formal institutions and institutional arrangement was not as clear cut as the model assumed in the first place. In fact, de Vries and Correljé faced the same difficulty to stringently separate sector-specific formal institutions and institutional arrangements when applying the model. In their (2006) analysis of the European electricity reform, they refer to rules that a regulator releases in both levels. Moreover, they concede that the distinction between generic and sector-specific formal institutions is ambiguous. This leaves us asking what causes the lack of conceptual clarity in order to overcome this obstacle.

What proved to be problematic can be summarised as follows: the same indicators occur in the sector-specific institutions set by the European Union on one variable side and institutional arrangements on the other. This conceptual ambiguity is illustrated by two examples. First, European provisions determine legal unbundling as minimum, but the national regulatory authority decides which degree of unbundling is in effect applied. Another example is the distribution of regulatory oversight. If the European law does not determine the position of the regulator vis-à-vis the government by prescribing the regulatory competencies, then their distribution has to be decided on the national level. On the one hand, the decision might be undertaken by the regulator which would qualify it as regulators actual decision (level 3). On the other, it could be perceived as national law that transferred the regulatory oversight of certain aspects of regulation to regulator, government, or/and transmission system operator. Depending on the case, the actual regulation might be a decision prescribed through national law, the decision of the regulatory authority, or through a two step progressing decision within both levels. To conclude, in the case of the European gas market reform the actual regulatory

functioning is finally determined on the level of institutional arrangements. First and foremost, the cause for conceptual ambiguity stems from the nature of regulation – process that involves several factors and levels. Second, the model in its raw version does not fully account for multi-level governance. Striving for a general solution, it comes down to whether the classification of subjects to levels is primarily subject-related or primarily dependent on who decides those subjects. We do not offer a concluding clarification of which indicator is subsumed under formal institution or institutional arrangement that would allow a generalisation. The purpose of our analysis is explorative. We apply a research interest based solution by distinguishing between the European legal provisions of the Gas reform on the one hand and institutional arrangements determined by national authorities - be it in the form of law or regulation - on the other hand. This enables the identification of the convergence effect European law has on gas market regulation across Europe.

Fifth, energy policy and member states' beliefs expressed through attitudes towards liberalisation might change within an examination period and directly or simultaneously affect the institutional arrangements on the third level. In other words, while European energy policy or member states' attitudes in moment 't1' might be solely or predominantly focused on liberalisation, priorities and views might change in 't2'. If our first criticism holds that time factors might be considerably shorter or accidentally fall within an examination period, then intra-variable flows between the first and the third layers are theoretically possible. An impulse stemming from the first layer might affect both originally subordinated layers (second and third) simultaneously, or with little time delay after another. This might be caused by an extraordinary event (see Sine & David, 2003) or triggered by an accumulation of structural changes of basic market conditions (see Helm, 2005). Helm postulated the occurrence of an energy paradigm shift around 2000. Thereafter the objectives of energy policy shifted towards security of supply and climate change, whereas in the 1980s and 1990s, energy policy concentrated on privatisation, liberalisation, and competition (ibid.). In other words, there are indications for energy policy objectives and member states' attitudes to change within the studies' examination time.

2.6 European harmonisation versus path dependency

Two bodies of literature inform us about different expectations regarding the convergence of regulatory patterns. Whereas the logic of transaction cost economics suggests convergence through the process of European harmonisation, historical institutionalism counters with the concept of path dependency stressing the likelihood of divergence.

The Single European Act (1986) functioned as a precondition for the creation of a common European internal market, to be accomplished by the energy market reforms. Perennially, market integration and harmonisation have been central ideas and its interpretation has been contested. European integration studies identify two distinctive understandings of economic integration, reflecting different degrees of depth and rate of the process. "In the dynamic understanding, it is the process whereby economic frontiers between member states are gradually eliminated [...], with the formerly separate national economic entities gradually merging into a larger whole" (Molle, 2006: 4). The dynamic process results in a supranationalisation of competencies and convergence of policies and regulations. "In a static sense, it is the situation in which national components of a larger economic zone function together as one entity" (ibid). Unlike the first,

the static understanding of the European integration process is characterised by more or less coordinated markets. The latter view stresses persisting intergovernmental approaches and prevailing national market coordination. Although both views ultimately strive for full market integration, the static understanding takes into account experiences of European market integration processes where after the outcome of sectoral market integration often resembles a static integration approach.

The main argument for creating common markets governed by common rules is borrowed from the transaction cost economics. Thereafter, the creation of general contracts and universal rules resulted in the lowering of transaction costs (see Molle, 2006: 19). According to Majone (1996), the general growth of community regulation is partly induced by “the interest of multi-national, export-oriented industries in avoiding inconsistent and progressively more stringent regulations in various EC and non-EC countries” (Majone, 1996: 1611). The incentive to vote for supranationalisation depends on the character of the public good. Once the Single European Act was in place and the decision for starting a gas market reform had been made, the causal mechanism of European harmonisation could unfold its effect. Accordingly, the stimulus of policy convergence is legal obligation by European law (see Holzinger & Knill, 2005: 778-782). The existence of legal provisions does not per se result in a convergence of policies or institutional arrangements. The success of harmonisation depends on the degree of legal specification. The more concretely European law sets targets or prescribes regulatory instruments the more likely convergence will happen. Holzinger and Knill (2005) point out, “convergence effects are less pronounced, by contrast, if legal rules are defined in a less rigid way, leaving member states broad leeway for selecting appropriate instruments to comply with international policy objectives” (Holzinger & Knill, 2005: 787). They distinguish between those formal institutions in form of European legislation that are objectively based or determine minimum standards opposed to those setting maximum standards. This insight derives from empirical results generated by comparative European studies and allows the formulation of a general hypothesis which will later be supplemented by more detailed expectations. Hypothesis 1: We expect those subjects (indicators) of the gas market reform more specified by European provisions (level 2), to converge towards best practice.

The concept of path dependency was initially developed to allow a better understanding of technological innovation within industrial economics (Arthur, 1994; David, 1985). Later it was extended to explain institutional change in the economic and social sphere (see North, 1990) and applied within the discipline of political science (see Pierson, 2000). The idea of path dependency goes back to the explanation of why some superior technologies do not reach a dominant market position while suboptimal products do. Assuming that competition supporting regulation is by (reform) definition the superior market design, one may question why not all member states employ the most favourable regulation-for-competition.

Opposed to European harmonisation, the concept of path dependency basically suggests that member states follow individual paths by taking into account national characteristics which in turn result in diverging regulatory patterns.

In general, “path dependence is characterised as a self-reinforcing sequence of events with its own logic (see North, 1990). A path has a distinct pattern of institutionally rooted constraints and incentives that create typically strategies,

routine approaches to problem and shared decisions and rules that produce predictable patterns of behaviour. A path constructs mental maps of actors, determines the problem actor perceive and solutions available” (Groenewegen & Künneke, 2005: 16).

The prospect of increasing returns stemming from returns to scale (including high sunk costs - unrecoverable past expenditures), network externalities, learning, and coordination effects function as a lock-in to continue a path. If conditions conducive to path dependence are fulfilled, actors are less inclined to make (radical) change but instead desire the status quo as an equilibrium situation.

We exemplify the argument of increasing returns from scale for the natural gas sector. Network based natural gas transport implies high sunk costs with increasing returns in the course of the investment cycle. By establishing transport capacity the company ensured the possible trade volume which in the end determined the market share. As a result, vertical integration of trade and transport was traditionally the dominant mode of organisation for natural gas undertakings. In the process of liberalising European gas markets, incumbents tend to be reluctant to share network access with competitors or towards regulation which decreases its rate of return. At the same time, governments and regulators have to ensure sufficient incentives for operating the natural gas network and for investments to fulfil their security of natural gas supply mandate. Investment incentives are strongly related to the rate of return. From this narrow point of view, there is little reason on either side to change the market structure by regulation in the first place. A further application of the concept to the European gas market reform would reveal that several characteristics or mechanism enforce the likelihood of path dependent regulatory inertia.

On the basis of the first and fifth criticism of Williamson’s model (see previous section), the ‘Northian’ inertia assumption can be specified for our purposes. Hypothesis 2: “If there are ambiguous or rivalling energy policy objectives on the European level throughout the gas market reform, the likelihood that member states adopt best practice decreases.”

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3. RESEARCH OUTLINE

This chapter begins by formulating the guiding questions of the analysis. Thereafter, we explain the two central concepts of our analysis. First, we clarify the concept of policy convergence and its application to the gas sector regulation. Second, we define regulatory regime and the concept of a comprehensive regulatory regime. Both clarifications are necessary because the operation is based on these two concepts.

3.1 Research questions

The main objective of this study is to assess the regulatory performance of national gas markets in Europe over time. We concentrate on policies affecting the downstream part of the gas value chain. Our lead question is ‘Are regulatory regimes moving towards convergence?’ (Q1). This is divided into two sub questions that aim to explore patterns of institutional change. The dimension of speed is addressed by asking whether some countries are moving towards a best-practice model faster than others (Q2). Qualitative change in the sense of directional change is the subject of the third question which explores how much member states decrease the distance of their regulatory regime towards a best practice model (Q3).

With reference to Williamson’s four layer model (see chapter 2), we identified institutional factors that are supposed to influence regulation. In our analysis we focus on two of those factors: the European law and European energy policy, and try to explore whether these induce convergence by investigating the development of the European provisions and energy policy related to the gas sector. On the basis of this inductive examination in chapter 3 and 4, we formulate expectations regarding the effect these variables may have on the convergence of regulation. The second set of research questions therefore states: do the European legal provisions for the gas market reform induce convergence of the national regulatory regime in the natural gas sector? (Q4). And does energy policy affecting the gas sector reform have converging effects on regulatory regimes? (Q5). Answering the second sets of questions will not let us claim a causal relationship, but will indicate some of the dynamics evolving from the first and second layer of Williamson’s model.

3.2 Policy convergence

The next section starts defines the meaning of policy convergence and then introduces approaches for assessing policy convergence According to Knill

policy convergence can be defined as any increase in the similarity between one or more characteristics of a certain policy (e.g. policy objectives, policy instruments, policy settings) across a given set of political jurisdiction (supranational institutions, states, regions, local authorities) over a given period of time. Policy convergence thus describes the end result of a process of policy change over time towards some common point, regardless of causal process. (Knill, 2005: 29-30)

This remains close to the widely cited definition formulated by Bennett, but enriches it in two ways. In the first part, Knill renders it more precise by distinguishing between different types and levels of policies. This contributes to research stringency by drawing a clear line between policy

process and policy outcome on the one hand, while taking into account multi-level governance on the other. In the second part, the definition emphasises the dynamic nature of the concept. In this context, Jordan rightly puts forward, "...because policies are the same at a given point of time, does not necessarily confirm that policy convergence has occurred: they could have emerged independently but in similar forms" (Jordan, 2005: 946). To identify coincidental versus causal relations of policy convergence, it is therefore necessary to emphasise the temporal dimension of the convergence concept. Bennett: "There must be a movement over time towards a common point" (Jordan, 2005: 946).

Our analysis concentrates on the policy outcome when analysing policy convergence with regard to regulatory regimes of European gas markets. In doing so, we analyse the policy and policy dimensions, and include those regulatory instruments or measures that are chosen and implemented in order to fulfil the obligations imposed by the Gas Directives. The analysis aims to assess the similarities of regulatory instruments member states chose over time.

The comparative policy literature suggests several approaches to assess convergence. Basically there are four main approaches which with reference to the Greek alphabet are signified as sigma-, beta-, gamma-, and delta-convergence (Heichel et. al., 2005: 831-834). For our purposes we are concerned with three: sigma, gamma, and delta convergence. These three types use indicators that reflect the degree, direction, scope and speed of change (see Holzinger & Knill, 2005). However, given the restricted number of European member states and the chosen case selection of the old member states, the indicator scope is not relevant for this analysis.

Sigma-convergence describes in its classical form "decreasing coefficient of variance" and follows the logic of "growing together" (Heichel et. al., 2005: 831). The assessment of sigma-convergence is often applied in studies on economic globalisation, but also to measure similarities of policies and regulatory instruments. Sigma-convergence occurs if there is a decrease in variation of policies among the countries under consideration (see Knill, 2005: 769). Most convergence studies of this kind adopt a quantitative design, but can be used for qualitative analyses or smaller number of cases as well. Sigma convergence occurs when there is a decrease of range and standard variation indicated by an increase in the number of countries that implement the same instrument.

Whereas sigma-convergence does not cover the direction of change, beta-, gamma- and delta-convergence describe three different aspects of qualitative change. Beta convergence is quite prominent in economic convergence literature to analyse for instance the economic progress of developing countries. Beta-convergence occurs when poor economies grow faster than rich ones for example, and is named after the growth coefficient. As such beta-convergence is applicable if the phenomenon of 'catching up' is to be detected. The mobility dimension here is covered by gamma-convergence, which is formulated in response to beta-convergence. As Heichel et al. point out, beta-convergence is criticised for not capturing sufficient aspects of cross-country dynamics. For instance, convergence trends generated by rich countries that are falling back, were not covered by applying beta-convergence but by gamma convergence. (See Heichel et. al., 2005: 832). Gamma-convergence reflects mobility of countries with regard to the speed of implementing certain regulatory instruments.

For the analysis of gamma-convergence, country rankings for different points of time are compared to assess the mobility of countries. If countries in the first ranks fall behind or catch up over time, convergence occurs. (Heichel et. al., 2005: 832)

The analysis of gamma-convergence enriches the interpretation of sigma- and delta-convergence because it allows assessing changes of country rankings over time. Gamma-convergence is particularly helpful for the analysis of path dependency. The concept of path dependency suggests regulatory inertia of those countries that entered the European gas market reform with a highly monopolistic market structure. Accordingly, countries such as Germany are expected to make slow progress in liberalising their market by applying certain regulatory instruments.

In general, gamma convergence occurs when a country catches-up or falls back. In this context, we introduce the distinction of positive and negative gamma convergence.. Hereafter, we speak of positive gamma convergence if one or more countries start with least favourite instruments or measures and implement the favourite instrument. Strong positive gamma convergence is given if this happens in the early stages of the reform. We speak of negative gamma convergence if one or more countries start with a favourable or even favourite instrument and then replace it with a less favourite instrument. From the indicator level this scheme can be levelled up to the regime level. If a country begins with a relatively low score of its regulatory regime and catches up by gaining relatively high scores, positive gamma convergence occurs. In turn, the absence of positive and negative gamma convergence may indicate path dependency, although it is not a sufficient condition to identify a path dependent outcome.

The most sophisticated, but seldom applied variant is delta-convergence (see Heichel et. al., 2005: 834). This type of analysis implies the direction of change. Ultimately, a decrease in variation of national policies is accompanied by an upward or downward shift. Holzinger and Knill observe, “the direction of convergence is usually related to the extent of state intervention or to the strictness of a regulation” (Holzinger & Knill, 2005: 777). Delta-convergence assesses not only the direction of change, but describes the ordinary ranking of countries. According to Knill’s definition, “we speak of delta-convergence when similarity change is operationalised by comparing countries distance changes to an exemplary model” (Knill, 2005: 769). In this study, the exemplary model serves as a best-practice model put into operation by the creation of an index in the methodology chapter (see chapter 6). Delta convergence occurs when a decrease of distance to the best-practice model can be identified. Observing trends from an indicator perspective, delta convergence occurs when an increasing number of countries (most) apply the instrument considered to be best practice and receive high scores. Translating this to the regime level, delta convergence is exhibited when an increasing number, the majority of countries, realises high scores.

For all types of assessment discussed, convergence holds that they might occur simultaneously. In their portrayal of convergence literature, Heichel et al. (2005) stress “empirically, sigma- and delta-convergence often occur simultaneously. If countries reach total similarity relative to a policy model, variance between them is obviously reduced” (Heichel et. al., 2005: 833). Nevertheless, the different types of convergence can also occur in their own right.

3.3 Regulatory regimes in the context of European gas market reform

The next section fulfils three purposes. First and foremost, we provide the working definition for regulatory regime. Second, we outline the concept comprehensiveness of regulatory regimes and third, provide a classification for regulatory models.

Regulatory regime is defined as the bundle of institutional arrangements triggered by the liberalisation process in the context of the European gas reform. These institutional arrangements are mainly implemented on a national level in anticipation of meeting obligations imposed by the European Gas Directives. With reference to Williamson, we distinguish between formal institutions such as laws on one side and institutional arrangements on the other (see Oliver E. Williamson, 1998: 25-29). In general, institutional arrangements span actual regulatory instruments and decisions as well as contracts, forms of public and private cooperation, firms' tariff structure, and trading practices (see International Gas Union, 2006: 22-23). Our analysis concentrates on the formal dimension, the actual regulatory instruments or so-called hands-on regulation (*ibid*). Regulatory practices are not included in the assessment of regulatory regimes. For the operation of regulatory regime we refer to the concept of regulatory comprehensiveness initially put forward by Genoud, coined jointly by Finger and Genoud, and then modified by Arentsen (Maarten Arentsen, 2004; Genoud, 2001; Genoud & Finger, 2004). Genoud conceptualised regulation in the context of electricity liberalisation reform to analyse the impact of privatisation on the regulatory performance in terms of coherence, efficiency, and effectiveness. Genoud takes a broader public policy perspective in response to the economically biased understanding of regulation as perceived in various theories of regulation. In his dominantly descriptive analytical framework, he suggests that existing regulation and privatisation shape the outcomes of regulatory games. In this context, it is necessary to assess and conceptualise coherence of regulation as independent and dependent variable. For the latter, he focuses on the coherence and efficiency aspects (see Genoud, 2001: 26-27).

Within the process of conceptionalisation, Genoud made two important steps relevant for our analysis. Firstly, by taking a public policy perspective, Genoud was enabled to distinguish between the policy and polity dimension of the regulatory regime (see Genoud, 2001: 13). Arentsen labelled these two dimensions regulatory function and regulatory competencies (see Maarten Arentsen, 2004: 85). Second, Genoud introduces the idea of coherence of regulation and proposes criteria to assess this coherence. Later, Finger and Genoud coined and operated the concept of comprehensive regulation for the electricity reform (see Genoud & Finger, 2004). Arentsen (2004) applies it then to the European gas reform. The concept of regulatory comprehensiveness is embedded in the structure-conduct-performance paradigm when perceiving regulatory comprehensiveness as variable for regulation linked with the structure, business conduct, and performance triangle. According to Finger, Genoud, and Arentsen, regulatory comprehensiveness determines the degree of openness of gas markets. This is perceived as a basic condition for the degree of competition. In addition to regulation, market structure and business strategies also influence the degree of competitiveness of gas markets. The comprehensiveness of a regulation realizes itself in this two-dimensional concept: "One dimension referring to necessary regulatory functions and one dimension referring to regulatory competencies" (Maarten Arentsen, 2004: 85). Ultimately, the concept makes it possible "to assess whether or not the Member State's legal reforms meet formal standards of a competition-based gas market" (*ibid*). Applying the concept, Arentsen conducted a preliminary assessment of

the regulatory comprehensiveness induced by the European gas reform. On the basis of his empirical findings, he suggests a three-fold classification of regulatory models:

- 1 The Comprehensive regulatory model, holding all (...) legal regulatory conditions for competition.
- 2 The emerging regulatory model, still developing the (...) legal regulatory conditions for competition.
- 3 The minimal regulatory model, holding only minimal (...) legal regulatory conditions. (Maarten Arentsen, 2004: 90)

Our analysis adopts the concept of regulatory comprehensiveness as developed by Finger, Genoud, and Arentsen. Using Arentsen's first attempt to assess the regulatory performance as a starting point, the next chapter formulates a research methodology that allows us to analyse the convergence towards competition based regulatory regimes in the European gas markets.

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4. EUROPEAN GAS MARKET REFORM, 1998 - 2007: A ROAD MAP

4.1 Introduction

This chapter outlines the main developments of gas market reform, focusing on the European level. This broad outline certainly does not fill the gap or the need for an exhaustive analysis or history of gas sector reform in the European Union. It would be worth a book of its own, not to mention a book on European Energy policy incorporating the different energy policy fields. For the pre-liberalisation phase, there are only a few in-depth analyses on energy policies in general and gas sector reform in particular. Hanne Matlary, Peter Cameron, and Jonathan Stern proved to be the pioneers and distinguished connoisseurs of the European energy sector. Matlary (1997) offered a theory-guided analysis of the evolution of European Policy between 1985-1995, stressing the relative power distribution of EU actors on the one hand and actors such as state and market actors on the other. She explains why a common energy policy stranded before the single market act initiated in 1986 finally reached the gas and electricity sector by end of the 1990s. Peter Cameron (2002) gives a comprehensive expose of how the legal framework of the gas and electricity framework evolved between 1988-1998. Jonathan Stern (1998) not only covers market developments in the 1990s and the evolution of the first Gas Directive, but analysed ex ante “how competition and liberalisation may emerge in Continental European countries, and to investigate how these models may differ from those of Britain and North America” (Stern, 1998: 201). Before assessing ex post the development of regulatory regimes as part of the market model, we first expose the road map of the European gas market reform, emphasising the policy dimension. The aim of this chapter is to identify impulses stemming from energy policy that stimulate convergence of regulatory regimes. For this reason, we explore whether major changes of general or energy policy objectives occurred. On the basis of this inductive approach, we then formulate expectations with regard to convergence of regulatory regimes.

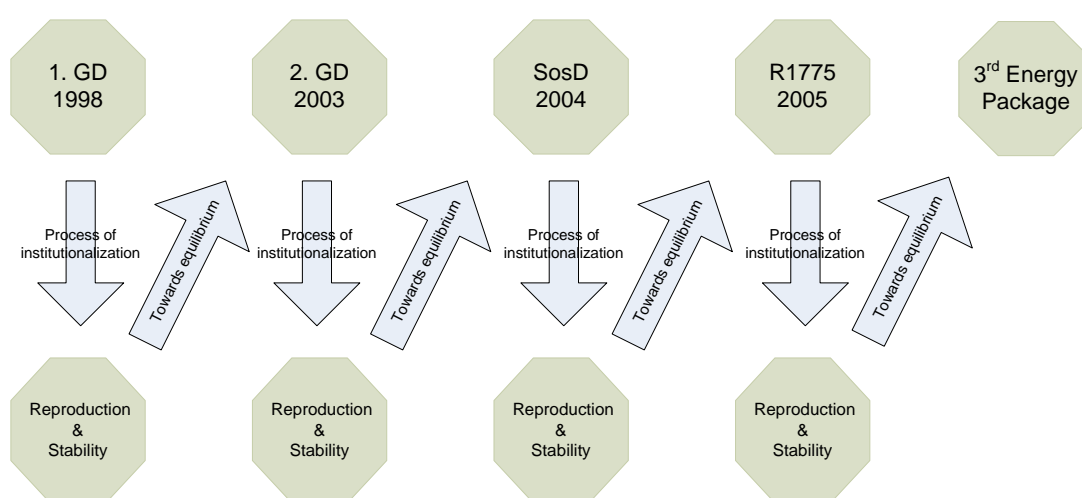
4.2 Evolution of the reform

For the analyses of institutional change, Groenewegen and Künneke propose an evolutionary perspective to understand institutional reforms in infrastructure industry. The idea of evolutionary change of economic governance is based on institutional economics formulated by Williamson who suggests that internal institutional and external factors shape the emergence and revision of economic governance. In this more dynamic interpretation of institutional change, institutions are not only given constraints, “...but under certain conditions institutions can erode and discontinue.” (Groenewegen & Künneke, 2005: 12) Instead, “In processes of institutional change equilibrium and stability are considered to be the exception and contradiction and change are the rules” (ibid: 12). In this interpretation of institutional change, actors can influence and change institutions – a process which is constantly observable when analysing the European gas market reform.

Applying this evolutionary perspective, we argue that the adoption of each relevant Directive and Regulation constituting the gas reform represents a moment of stability which might be

perceived as a kind of equilibrium situation. Hence, we can identify four moments of equilibria. Figure 2 shows these moments in time and indicates that the fifth moment has not yet been reached in summer 2007. The proposed allegory describing the reform process has its limitation. It suggests that there is a linear sequence of events or processes. On the contrary, we see that some discussions and processes either overlap or even take place in parallel. Although identifying equilibria may be a simplified way to describe the reform process, it allows us to define a path through what some people perceive as regulatory jungle. The road map of the European gas market reform is organised along these equilibria and distinguishes five phases.

Figure 2: Evolutionary process of the European gas market reform



1. GD = First Gas Directive; 2. GD = Second Gas Directive; SosD = Security of Supply Directive; R1775 = Regulation 1775

Source: Applied version of Groenewegen and Künneke (2005)

4.3 First phase – first Directive

On 11 May 1998, the energy ministers adopted the first Gas Directive after the European Parliament (EP) had accepted the Council's common position without any amendment. Thereafter, a period of relatively little activity on the community level followed; activity was supposed to take place at the national level. The old member states, except for Finland, Greece, and Portugal which were granted derogations, had time to transpose the first Gas Directive by 10 August 2000. On the European level, the Madrid Forum (MF) had been established and the European Commission, the regulatory authorities, and industry representatives met for the first time 30 September 1999. The first Directive required the European Commission to monitor those harmonisation requirements, linked and not linked to the actual provisions to the Council and the European Parliament. Although it was only at the end of 2001 that the first official benchmarking report was published, earlier reports served as forerunners. For instance, on 23 November 1999 the European Commission released a short report trying to grasp relevant regulatory issues. The report mainly paid a lot of attention to barriers for cross-border trade, and the impact of derogations due to 'Take-or-pay' arrangements on the introduction of effective third Party Access without providing any relevant insights or propositions (see EC Inform-Energy, 1999,

April: 2). The next real assessment of the regulatory reform to come was the review by the European Parliament and the European Council that was designated by the first Gas Directive. In the meantime, the Commission made use of the interim period and merged the formerly separate Directorate-General Energy and Transport into DG TREN - a step which had little influence on the reform as such, except directing some internal attention to the reorganisation.

In early 2000, the European Union formulated a wider strategy at its summit held in Lisbon, reacting to a growing economic competition driven by globalisation processes. What became the 'Lisbon Strategy' aimed for nothing less than "making the European Union (EU) the most competitive economy in the world and achieving full employment by 2010" (European Commission, 2006c). Equally ambitious was the input from the European Commission with regard to their energy related targets. To contribute to the Council meeting in March, the EC published a report in which they suggested "the date 2004 to be set for the full liberalisation and integration of European energy markets" (EC Inform-Energy, 2000, March: 3). The Commission's proposed timetable evoked a chorus of surprise and harsh criticism. Considering the amount of work that still had to be done, the claim appeared to be at best unrealistic. Moreover, the liberalisation faced significant opposition across Europe. All in all, the 2004 target could not serve as a threat, but indicated a beginner's mistake. The resistance of the incumbent industry and some governments did not considerably diminish. The summit on 23 and 24 March 2000 did not suggest a clear roadmap for the acceleration of the gas reform, but instead the EC proposition was abandoned. The common denominator was only to agree on a call "...for rapid work to be undertaken to complete the internal market in both electricity and gas sectors to speed up liberalisation in these sectors with view to achieving a fully operational internal market" (Directive 2003/55/EC, Recital 3). Although member states did not withdraw their support in Lisbon, the summit certainly could not be considered breakthrough. The Commission gained more support later that summer when the European Parliament formulated a resolution on 6 July 2000, "requesting the Commission to adopt a detailed timetable for the achievement of accurately defined objectives with a view to gradually but completely liberalising the energy market." (See Directive 2003/55/EC, Recital 3).

While there was political stagnation, the Madrid Forum turned out to be the relevant Forum to discuss regulatory instruments on the working level. Held on 11-12 May 2000, participants of the Madrid Forum discussed the results of the Brattle Group's comprehensive study on tariff methodology, capacity rights, and balancing regimes (see Lapuerta & Moselle, 2002). This study had been commissioned by DG TREN and clearly took a stand that differed from the industries' view presented by Eurogas. The Brattle Groups' in-depth analysis allowed the regulators, including the EC, to decrease the information asymmetry between regulators and regulated. At the same meeting, another important move was made. The European Commission and the national regulators called the industry to form a separate association to represent the interest of the gas transmission operators. The underlying idea was that transmission operators do not necessarily share the same interests as shippers or traders. Following the motto *Divide et impere!*, the regulatory side invited the creation of GTE and thereby attempted to foster the formulation of independent positions of network operators on regulatory measures. Two months later, the Gas Transmission Europe (GTE) was set up within the structure of the Union of Gas Industry (Eurogas) and was placed literally under their roof (see EC Inform-Energy, July 2000, 19).

The old member states had to implement the First Directive by the end of July 2000. The cornerstones of the First Directive are set by market opening and initial steps towards changing the industry structure and network access conditions by introducing legal unbundling and negotiated and regulated third party access. The legal provisions and their development in the course of the reform are described in detail in chapter 5. Therefore, our attention now focuses on the political activities on the community level in autumn 2000. At that point, the EC opened infringement procedures against France and Luxembourg for not transposing the first Gas Directive's provisions into national law. Germany and Portugal were deferred with regard to their implementation, but an infringement proceeding was not opened, since the EC had been notified that the Gas Directive's transposition was imminent (see EC Inform-Energy, 2001, January: 10). Later, France announced a delay of the transposition of the first Directive and the partial privatisation of Gaz de France until after the French parliamentary elections in 2002. Privatisation of the state-owned company was especially considered too highly politically charged to tackle during the election campaign. As a consequence, the European Commission brought the case to the Court of Justice on 7 May 2001 (see *ibid*; EC Inform-Energy, 2001, May: 12).

4.4 Acceleration phase: second Gas Directive

The hope that the Council meeting in Stockholm in March 2001 or the Energy Council a month later would bring about a timetable, laying down the next steps to accelerate the gas reform, had been in vain (see EC Inform-Energy, 2001, April: 4, 2001, June: 2). No policy decisions on energy issues were made during either summit. The energy related discussions mainly centred on the Commission's Green Paper (GP) on security of supply and the European Commission's proposal amending the first Gas Directive. This time, the European Commission's attempt to foster liberalisation policy in the gas sector was supported by a resolution of the European Parliament and from member states such as the United Kingdom, the Netherlands, and Spain. France and Germany prominently opposed any progress to be reached at the summit (see EC Inform-Energy, 2001, April: 4). In this context, EC Inform-Energy argues that there were strong indications that Germany and France coordinated on a bilateral summit and Germany assured its support of France's liberalisation position. Moreover,

the German Chancellor was quoted as saying that Germany did not want to turn the issue into a conflict with France, and the Finance Minister Hans Eichel was quoted as suggesting that the hard position of France would not change before the next elections" (*ibid*).

Although the prevailing constellation within the Council remained a stalemate, the Commission was prepared to push further. In its proposal amending the first Gas Directive, the Commission called for a liberalised access for business consumers by 2004 and for all consumers by 2005. Additionally, the proposal looked to shift gas market regulation away from governmental supervision to control independent regulators. Moreover, the Directive is supposed to emphasise and introduce more public service obligations. The latter refer to security of supply measures, environmental, and social cohesion concerns (see EC Inform-Energy, 2001, March: 2).

That summer offered another arena to push for liberalisation when the fourth meeting of the Madrid Forum was held. The meeting in July vividly demonstrated the MF's function as a

platform where the constant battle to gain more information on the functioning of the market and its gas networks was fought to decrease the information asymmetry between the industry and the regulatory actors. The GTE was criticised by regulators, the EC, and most member states, for its unwillingness “to publish detailed indicative available capacities at all major entry and exit points” (EC Inform-Energy, 2001, July), requested during the last meeting of the Forum.

The first official benchmarking report was published in December 2001 and confirmed the expected: market performance in terms of competition was disappointing. So far, European national gas markets were characterised by high prices and tariff differentials, a high degree of market concentration, insufficient unbundling, a lack of market based balancing regimes, and ex ante regulation to name just a few. The prices of gas and electricity were especially of concern. In some European countries, natural gas increases its share in electricity generation. During the 1990's the European industry was paying 40% more for its electricity than its American competitors (see EC Inform-Energy, 2004, September: 3). For instance, the average price for households or small commercial businesses in July 2001 ranged from €52 per MWh in Sweden to €22 per MWh in Germany. The same holds true for average large users in 2001. With €34 per MWh Sweden has the lowest prices, whereas Italy comes in last with €77 per MWh (see EC Inform-Energy, 2001, December: 2). In this context it is noteworthy that the price level proved to be not only important for the European Commission as a strategic goal to enhance the European competitiveness, but also to prevent protests against rising energy prices, as had happened in the past when fuel prices went up.

For a liberalisation enthusiast, the course of the liberalisation process in 2001 was certainly not encouraging. At the EU energy minister meeting in 4-5 December 2001, the reform stagnation persisted at first. Giving partially in, the then Commissioner De Palacio,

told the Member states she was prepared to accept a more distant date than 2005 for completion of the internal gas and electricity markets for domestic consumers, but that she was inflexible on the final date for completion of 2003-04 for all professional (including small one-man businesses) and industrial consumers. (EC Inform-Energy, 2001, December: 5)

After extensive discussions on appropriate tariff structures held in the context of the Madrid Forum, the Commission, Council of European Energy Regulators (CEER), consumer organisations and traders formed an alliance and claimed at the fifth Madrid Forum “entry-exit” tariff structures to be most favourable. According to this view, entry-exit meets the principles of cost-reflectiveness and facilitates efficient gas trade, market liquidity and gas-to-gas competition. GTE did not share this clear cut preference. In contrast, gas transmission operators perceive it is a case-by-case question whether entry-exit or point-to-point tariff structures or combinations thereof are more appropriate. Another outcome has been the adoption of the “Guidelines for good practice regarding TPA services, tariff structures and balancing”. (See EC Inform-Energy, 2002, February: 10); (Madrid Forum, 2001); (Madrid Forum, 2002).

The Barcelona summit on 5 March 2002 fulfilled the hopes that a Spanish EU presidency could bring dynamism back into the stalemate. And indeed, France accepted the market opening for the non-household costumers by 2004. Part of the deal was as well, that most member states had to accept that there will be no concrete implementation date for opening household markets. By offering larger commercial users like for instance the energy-intensive industry the possibility to

switch their supplier, the EU could achieve to introduce competition in 60% of the total market. If as a consequence gas prices for large commercial consumers would decrease at least decreasing the monopolistic rents of energy companies, the EU would have achieved increasing the competitiveness of European industry (See EC Inform-Energy, 2002, April: 4).

Some headwind for the so-called acceleration, second Directive came from an unexpected side in 2002. The EP's plenary session on 13 March, closed with 160 amendments the first proposal for the second Directive by the European Commission. Most relevant were the amendments concerning unbundling, and the regulatory authorities on the national and European level. Whereas the EP calls explicitly for ownership unbundling in the electricity sector, it was adherent measures to determine the degree of unbundling. Supporting the European Commissions proposal, the EP says simply "the transmission system operator must be de jure and de facto independent of the gas supply undertaking in regard to access to the assets necessary to maintain and develop the networks" (ibid: 6). The proposal of transferring national regulatory competencies to independent regulators was rejected. Instead, the EP opted for allowing also multi-authority structures by replacing the wording on the need for a national regulator to "one or more competent bodies as regulatory authorities" in deference to Germany's position" (ibid: 5). It was also on this occasion that the EP introduced the idea to change the regulatory authority landscape on the Community level, while suggesting that the European Commission initiates a European Regulators Group. One year later, this idea resulted in the foundation of the European Regulators Group for Electricity and Gas (ERGEG) (see European Commission, 2003b). Although the nature of ERGEG is best described as an intergovernmental body, it was regarded to become the nucleus for a Common European Energy Regulatory Authority. Hence at the current stage, ERGEG is mainly supposed to provide input to the regulatory process, in order to support the European Commission, but without questioning the Commissions right to initiate legislation. Taking into account the political statements made by the member states and the European Parliament, the EC went back to DG TREN's headquarter in Rue du Mot to formulate a more consensual proposal.

The publication of the second benchmarking Report on 1 October 2002 did not reveal any surprises. Referring to the considerable heterogeneity of regulatory regimes in the old member states, it criticises the overall "patchy progress" (EC Inform-Energy, 2002). Progressive developments in Italy, the Netherlands, and Spain were positively alluded to, whereas Germany was rebuked for its slow progress. Even by late autumn 2002, Germany had still not implemented the first Directive, although the deadline had been August 2001. German authorities had yet to draft legislation, but in the communications with the EC, there was no date stated for its adoption. Consequently, the EC finally decided on 16 October 2002 to bring the German case to the Court of Justice. (See EC Inform-Energy, 2002, November: 17).

On 25 November 2002, the Energy Council brought about the final agreement on the opening of the market for households. At last, the opening for all users was set for 1 July 2007 (see EC Inform-Energy, 2002, December: 4). The tug of war between France and the Commission ended in a draw. One party could prevail delaying the adoption of the acceleration Directive, and the other could assert the date of the market opening for industrial consumers. Those left out in the cold were in fact the private household costumers. This outcome seemed to have actually encouraged rather than prevented France and Germany to push harder and soften the unbundling

provisions for Distribution System Operators (DSO). The compromise foresees two derogations for DSO's, one called for a 100,000 customer exemption and the other a postponement option (see section 5.3.3). For proponents of a strict liberalisation policy, the provisions concerning the third party access to storage, linepack, and ancillary services were especially disappointing. Instead of introducing directly regulated TPA of storage, the second Directive follows the old hesitant scheme applied for the first Directive, allowing both negotiated and regulated third party access to storage.

During the summer months, the proposed second Directive entered the usual legislative process on the EU level: an initial reading in the European Parliament on 12-13 May 2003 followed by a revised proposal from the European Commission, revisiting the European Parliament for the second reading on 4 June 2003 and entering the final stage by the Council statements and the Commissions formulation of a common position, finalising on 26 June 2003 with the adoption of the second Gas Directive. By the time the second Directive entered the legislative process all major decisions concerning the degree of intervention had been negotiated earlier and only fine tuning took place.

The European Union took a little more than two years to reach a consensus on the acceleration Directive. Due to active resistance by France and Germany and the affirmative silence of some other member states, the qualitative progress achieved by the Directive is only limited. Overall the second Directive became a watered down version of the Commission's initially ambitious aims. The market opening for households was carried out two years later than initially intended and the degree of unbundling was not changed in principle, but suggests only a functional improvement by introducing the concept of management unbundling. Moreover, the EC could not prevail with establishing independent regulators in the member states but allows regulatory authorities to share the sector regulation. Noteworthy in this context is that the second Directive places more emphasis on security of supply and other public service obligations. This has been one consequence of the ongoing security of supply debates which has been (re-) initiated by the publication of the Green Paper on security of supply. Ultimately, the second Directive also laid the foundation for the creation of ERGEG (see Directive 2003/55/EC, Recital 14).

In 2003 Directorate-Generals Competition (DG COMP) and DG TREN restructured their internal organisation. Under the aegis of Competition Commissioner Mario Monti, the competition rules had been reformed and streamlined in 2003. Then, Regulation (EC) No. 1/2003 established a basis for cross-national sector investigations. In May 2003, the DG COMP entered the reorganisation phase to prepare for the rising work load induced by the enlargement of the EU in May 2004. According to 2001 estimations, the enlargement was supposed to increase the DG's work load by 30% to 40% (see EC Inform-Energy, 2003, May: 10). However, the reorganisation can be also interpreted as a response to the new procedural rules for the enforcement of the anti-trust rules set out in Article 81 and 82 of the Treaty. The major change is that DG Competition was from then on based on sector-specific organisation of merger control in order to allow efficient anti-trust law enforcement. Looking back, the competence to conduct cross-national sector investigations and the sector-specific reorganisation turned out to form the

necessary precondition for DG COMP's later activities in the context of the energy sector inquiry. DG TREN also partly reorganised due to the enlargement but unlike DG COMP no significant changes took place. (See EC Inform-Energy, 2005, March-b: 2; European Commission, 2005e)

4.5 Security of Supply Directive

After the internal market liberalisation went into the legislative process, the security of supply Directive moved up on the agenda. The EC had been trying since 2002 to harmonise oil stock and gas storage policies and thereby attempt to transfer more competencies to the supranational level. The proposal would have implied a substantial shift in economic governance of the natural gas market. So far, gas storage is treated as a commodity which is subject to trade and perceived as private property companies decide over. In turn, introducing strategic storage by regulation would have implied the transfer of substantial decision-making power from private to public. In this sense, the Security of Supply Directive proposed to treat gas storage as public property. During the spring Council meeting on 20-21 March 2003, the Council "underlined the importance of reaching rapidly an agreement on proposals reinforcing cooperation in managing EU gas and oil stocks" (EC Inform-Energy, 2003, April: 3). One would be mistaken to interpret this remark as unanimous approval of the Commission's suggestions by the Council and European Parliament. Instead, the plenary session of the European Parliament on 22 September 2003 revealed the extensive disapproval of establishing the European Commission as keeper of European security of supply, when even the Parliamentarians forcefully opposed the initiative. This was even truer for oil stocks than for gas provisions. One reason for the stronger opposition to create any common European oil stock mechanism might have been related to the fact that an international mechanism within the International Energy Agency framework was already in place.

In the end, the Directive on petroleum products was rejected while the Directive on gas security of supply received 19 amendments but was finally approved (see EC Inform-Energy, 2003, October). The original proposal for the Directive on security of gas supply foresaw for instance that member states should impose minimum storage objectives on undertakings. Prescribing a certain amount of storage would have had an important impact on the gas sector. As the following citation shows, the Commission was not only aiming to intervene in the market, but also to control when to release stored gas. The European Economic and Social Committee refers in their opinion to the Commission's proposal to the Commission by saying,

in the event of crises and in order to ensure solidarity between member states, the Commission wishes to be able to take decisions to release stocks of gas held in the member states and actually to interrupt supplies to the interruptible market. (European Commission, 2003c: 18)

The Commission also proposed the creation of a European Observation System for supply of hydrocarbons. Finally, all attempts to transfer decision competencies from the member states to the European Commission were jointly rejected in the Council, the Parliament, and involved Committees. When the Directive concerning measures to safeguard security of gas supply was published, none of the ambitious aims were included. Instead, the EC increased their sector information by requiring the member states to report the contract durations of supply arrangements. Instead of a full-fledged European gas crisis group equipped with decision-making

power, a light version called the ‘gas coordination group’ was established to enhance the coordination and information exchange between the member states. (See Directive 2004/67/EC, Art. 7, 8).

4.6 Regulation 1775

The main topic during year six of the gas reform was the Guidelines for third party access and the Commission’s aim to translate them into a Regulation. These guidelines had been formulated and introduced on a voluntary non-binding basis by the Madrid Forum in February 2002. After their revision, the guidelines provoked controversy at the Energy Council in June 2004. The opposing camp at the Council put forward three criticisms concerning its timing, the chosen regulatory measure, and the scope of the measure. Firstly, some argued that the regulation came too soon, indirectly blaming the EC for regulatory over-eagerness. According to this line of reasoning, it should have waited until the acceleration Directive (Second Directive) reveals its effects. Second, some member states preferred framework regulation instead of immediate regulation because it offered more discretion and thereby decision-making power to the member states. A regulation reduces the member states influence on the comitology procedure, in which national experts fulfil an advisory role. Third, opponents criticised the scope of the regulation which should have been limited to cross-border access instead of applying to the whole gas network (see EC Inform-Energy, 2004, May: 5-6). In particular, industry associations have not been pleased with the proposal to incorporate the Guidelines and felt cheated, because those Measures had been developed under the premise of voluntariness.

Regardless of the considerable effort with which opponents attacked the regulation, the European Commission was eager enough and equally successful “to tackle remaining barriers” (Regulation 1775/2005) concerning network access conditions. As the EC justified in Regulation 1775 “additional technical rules are necessary, in particular regarding third party access services, principles of capacity allocation mechanisms, congestion management procedures and transparency requirements” (Regulation 1775/2005, Recital 1). The European Parliament added some amendments which had been the result of earlier negotiations with the Council before approving it on 8 March 2005. These amendments did not trigger any substantial changes, but stated more precisely the measures emphasising the need to be cost-reflective.

While new legislation was already on its way, the EC had to take action against member states who failed to transpose the second Gas Directive on 16 March 2005, when the EC entered the second phase of infringement procedure. At that point, reasoned opinions were sent to Belgium, Germany, Ireland, Luxembourg, Spain, and Sweden. (See Directorate-General for Energy and Transport, 2005).

Looking back at the last two legislative initiatives (Security of Supply Directive in 2004 and the Regulation 1775 in 2005), it is striking that the crucial topics concerning storage could not be solved in either. So far, neither a crisis mechanism for European gas supply nor a minimum storage obligation in the case of supply disruption could be established. Instead, storage was left to the Madrid Forum mechanism. There, the Joint Working Group of the Madrid Forum decided in March 2005 to adopt ERGEG’s voluntary Guidelines for Good Practice for Gas Storage System Operators (GGPSSO). Aware of a growing import dependency of natural gas, this

circumstance left some energy experts and politicians concerned. On the one hand, the experience with the first set of Guidelines relating to third party access did not turn out to be a success story of industry self-regulation – the industry’s compliance had been too low. On the other hand, a comprehensive gas storage policy has not been introduced so far, and is still in its infancy. As the next section shows, the effects of this hesitancy to tackle natural gas storage became apparent relatively quickly.

4.7 Exploring the potential: evaluation and reinforcement phase

The European Council adopted the revised Lisbon Strategy in March 2005 to foster European competitiveness in reaction to globalisation and its growing competition between geographic locations. The revision mainly tried to revitalise the common European broader economic goals by formulating European-wide targets and implementation procedures. Energy prices were rising high at that time and brought the gas reform back on the agenda. Carried by the Lisbon spirit, the Directorate-General for Competition announced that the EC was initiating sector investigations in the field of financial services and energy. The launch of the energy sector inquiry marked the start of a new phase of evaluation and enforcement. (See EC Inform-Energy, 2005, March-a: 2).

The official opening of the energy sector inquiry took place on 13 June 2005. Under the new regulation DG COMP was able to conduct an inquiry “where the trend of trade between member states, the rigidity of prices or other circumstances suggest that competition may be restricted or distorted within the common market.” (European Commission, 2005e: 1). In the Commission’s Decision, the enforcement policy was justified by the malfunctioning of the European gas market indicated by slow integration, rising prices, and market concentration. Especially the development of gas and electricity prices were Commissions concerns. According to DG COMP, there was distrust in the existing mechanism of price formulation. Although the accusation of price agreements was not stated explicitly, the Commission suggested that the lack of liquidity in the market “leads to price volatility and may give scope for manipulation” (European Commission, 2005e: 1). To strengthen their argument, the EC referred to energy intensive user’s experience from different member states having difficulties obtaining competitive offers. In this regard, the Commission repeatedly received tailwind from energy intensive user associations such as the Federation of Industrial Energy Consumers (IFIEC-Europe) (see EC Inform-Energy, November 2005: 3). It was not only the energy intensive users who pressed for action on the EU level. Later in 2005 the British gas regulator Ofgem also requested DG COMP to step in. In November 2005, Ofgem asked DG COMP in an official letter to enquire into the market malfunctioning between continental Europe on the one side and Britain and Ireland on the other side. Ofgem then complained, “much higher prices in the UK compared with continental Europe in October 2005 did not result in a comparable inward flow of gas, which the economics of a competitive market expect” (EC Inform-Energy, 2005, December: 7). For an economist the situation was puzzling: Demand and supply was not matching, wholesale prices went up but no gas could be directed to the UK from continental Europe. Looking back, one can say that the UK was suffering from transitional problems as a result of a self-sufficient gas exporter developing towards a net importer. On the one hand, natural gas production (capacities) decreased more than expected and limited to UK offshore fields to serve as swing producers. On the other hand, the UK did not provide over sufficient gas storage to balance out the demand cap. Being a producing country the UK did not have same degree of storage as other Continental European member states (see Ofgem, 2004, October). To prevent such malfunctioning in the years to come and to

foster the gas inflows from Continental Europe, Ofgem lobbied for competition in the market. Armed with EC Regulation No. 1/2003, DG COMP was determined to spearhead the promotion of a competitive European gas market by carrying out cross-EU sectoral investigations (see EC Inform-Energy, 2005, March-b: 2). What could have started as a concerted action between DG COMP and DG TREN, turned out to be an uneasy alliance in the first place. Instead of involving DG TREN in the announcement procedure, DG COMP voted for a solo under the new lead of competition Commissioner Neelie Kroes. The debut of the competition Commissioner and the new challenge of an energy sector inquiry seemed to induce the need to clarify the role the Directorate-Generals were supposed to play within the enforcement phase. During the next half year coordination between the two Directorate-Generals improved and the competencies were redefined. Thereafter, DG TREN was supposed to develop regulation and proposals on the basis of its initiative right regulatory action to the European Parliament and the Council, whereas DG COMP ensured the competition oversight. The benefits of this coordination became evident when DG TREN and DG COMP jointly presented their findings on 15 November 2005. DG TREN published its report on the regulatory performance of the member states and DG COMP presented its initial findings of the energy sector inquiry.

The sector inquiries' initial findings outlined the major malfunctions. In an initial step, the Commission targeted five malfunctions: market concentration, lack of liquidity on the gas market, insufficient market integration indicated by numerous barriers towards cross-border trade, lack of transparency hampering competition, and high prices in conjunction with a lack of trust in price formation on wholesale level (see European Commission, 2005f). In a second step, the EC published the preliminary report four month later which specified some criticism and sketched a way forward in terms of competition law and regulatory enforcement. In the preliminary report, DG COMP elaborates much more on the argument of vertical foreclosure. Accordingly, the prevalence of long term supply contracts in combination with an insufficient degree of unbundling between transport and trade transactions result in vertical foreclosure that hinders the creation of a competitive market. As long term supply contracts and their derogations from third party access are a given, the unbundling came into force under the European Commission (see European Commission, 2006d, 16 February: 3). The preliminary report hardly exposed any new facts, but provided evidence of what was known to the industry and energy experts. Nevertheless, this sector inquiry and its precision was a necessary step to prepare for the regulatory enforcement the Commission was heading for. By stressing the need for a stricter unbundling of the gas industry, DG COMP kept its promise to feed some arguments to the regulatory activities DG TREN was preparing.

On 14 March 2006, the Energy Council was held and discussed the Green paper 'A European Strategy for Sustainable, Competitive and Secure Energy'. The Green paper did not contain any groundbreaking changes but posed

the [...] fundamental question [of] whether there is an agreement on the need to develop a new, common European strategy for energy, and whether sustainability, competitiveness and security should be the core principles that underpin the strategy. (European Commission, 2006: 4)

In other words, the EU proceeded in terms of strategy formulation by identifying six priority areas. These ranged from policy areas concerning (i) competitiveness and internal market, (ii) diversification of the energy mix, (iii) solidarity mechanism in energy supply crisis, (iv)

promotion of sustainable development, to (v) foster innovation and technology and (vi) coordination of external energy policy. The EC used the Green paper to flank the strategy formulation with several initiatives that then could be discussed at the upcoming Council meeting at the end of March. To ensure that the development of a common European energy strategy stays alive and progresses, the EC proposes a Strategic European Energy Review (SEER) to be presented to the European Parliament and the Council on a regular basis (see European Commission, 2006: 5). With regard to the gas reform, the Green paper basically brought together the two strands of the current gas market regulation, internal market integration and security of supply measures for natural gas. With reference to the first strand, the EC proposed the establishment of a European grid code. To facilitate such a common network access code, the EC considered among other forms of oversight the creation of a European Energy Regulator. The Commission also advertised a 'priority interconnection plan' (European Commission, 2006: 5) to promote investments in cross-border transport capacity. In addition, the Green Paper takes up the view of DG COMP and DG TREN and stresses the significance of an effective unbundling to reach a level playing field to allow new entrants to compete under fair conditions. Following up the other strand, the Commission recommended for the establishment of a European Energy Supply Observatory that would gather information on EU demand and supply developments and detect shortfalls of transport infrastructure. Moreover, the Commission aspired to re-examine the Directive on gas security of supply. The selective list of proposals vividly demonstrates a magnitude of ideas to develop a common energy policy. (See *ibid*: 8).

Shortly after its publication however, the Green Paper received a sober response from the head of governments during the Council on 23-24 March 2006. There, the intergovernmentalists emerged victorious. The heads of the European governments and their energy ministers rejected the EC's initiative to create a common energy regulator for electricity and gas. Instead, the member states called for more coordination. Some comments reaffirmed the diverging interpretations on how a liberalised European market should look like. For instance "The German Chancellor, Angela Merkel said that the Single Market could only work 'when electricity flows freely and when we accept European champions and not just think nationally'" (EC Inform-Energy, 2006, March: 5). French president Chirac formulated more elegantly "The construction of a Europe of Energy cannot be confined to the liberalisation of markets" (*ibid*). These comments suggest that it will take much more effort to overcome the divergent visions of a European energy market.

After the harsh disappointment for the European Commission, the European energy regulator group followed the model on the Electricity Regional Initiative and launched a Gas Regional Initiative (GRI) in April 2006. Based on the initiative, seven Electricity Regional Energy Markets were formed as well as three Gas Regional Energy Markets (REM). This divides the European gas market into South, South-East, and North-West Regions. These Regional Initiatives are supposed to identify and remove barriers to trade at the regional level and thereby to overcome stagnation on the EU-level. ERGEG focuses on developing practical solutions for inter-trade and transport of natural gas in Europe, pinning its hope on increased cooperation of the relevant stakeholders when dealing with concrete tasks and projects. Some therefore see the Gas Regional Initiatives as 'springboards' (European Regulators Group for Electricity and Gas, 2007: 1) and a useful interim step towards a fully integrated, well functioning market. Others are more pessimistic; feeling that a regional approach in the end just delays the supranationalisation

of energy policy. Be that as it may, the council meeting in spring 2007 left no doubts regarding political will. There is no sufficient political will, therefore a regional diffusion of liberal ideas and enhanced cross-border cooperation looks the most promising for now.

The year 2007 started with the publication of the energy package, which contained the final report of the energy sector inquiry, the Strategic European Energy Review, and the new energy policy the Commission formulated. The SEER replaced the benchmarking Report and serves as a monitoring tool to examine the performance of natural gas markets with respect to several goals ranging from market structure, security of supply situation, and environmental concerns. For our purposes, the results of the energy sector inquiry and the new energy policy are important and will be addressed in the following paragraphs.

Unsurprisingly, the energy sector inquiry concludes that the overall aim of resolving the barriers currently impeding the development of a fully functioning open and competitive EU wide energy market by 1 July 2007 could not be fulfilled (see European Commission, 2007b). The final report expands the list of malfunctions by addressing phenomena occurring in downstream markets, balancing markets, and liquefied natural gas markets (LNG markets). The criticism with regard to downstream markets mainly centres on a lack of competition stemming from the contract durations for industrial and local distribution companies. After the introduction of liberalisation, balancing regimes are often based on short balancing periods, which according to the reasoning of the Directorate-General for Competition, does not encourage new entrants in the market, but rather reflects the interest of incumbents (see section 5.4). With regard to LNG markets, DG COMP does address the necessity of competition on the retail market and diversification of LNG supply. Although DG COMP indicates no worrying trend towards concentration within LNG markets, the report emphasises the need to monitor its development. (See European Commission, 2007a, January 10: 9-11).

In the context of the energy package, the European Commission made the step from energy strategy formulation to setting out a new energy policy. In the Green Paper the European Commission made the conceptual step to integrate internal market liberalisation, security of supply, and sustainable development. In January 2007, the European Commission translated the integrative concept into a new energy policy. Ultimately, the combination of internal market integration and sustainability will formulate a more coherent European energy policy by bridging both the energy sectors and different policy aims, for instance fighting against climate change. Two subjects were important regarding gas market regulation: the distribution of regulatory power and the unbundling provisions. Whereas the proposition of establishing a common energy regulator had been rejected at the last Council meeting, the EC's way forward in terms of unbundling awoke the interest of the energy community.

After the defeat regarding the creation of a common energy regulator, the European Commission applied a more moderate strategy by outlining three possibilities for enhancing effective regulation of the European gas markets. The first option looks to preserve the institutional status-quo with the only difference that the national regulators are supposed to take a more active role. In the Commission's interpretation, this option implies that national regulators increase the inter-regulator coordination and prioritise community objectives instead of their national objectives.

The second option is described as a European network of independent regulators labelled “ERGEG+”. “Under this mechanism the role of ERGEG will be formalised and it would be given the task to structure binding decisions” (European Commission, 2007, January 10: 8). The third option would be a common energy regulator whose tasks are supposed to mainly centre on cross-border regulatory decisions. Although exposing three options, the Commission rejects the first option in the same document by arguing that effective decision-making will not be provided when 27 regulators with different interests are supposed to agree on cross-border issues on a voluntary basis, be it technical or regulatory standards. Accordingly, the Commission prefers the last option and considers the ERGEG+ variant as a minimal approach (see *ibid*: 9).

In this context, it is noteworthy that the EC propositions did not question the regulatory oversight of the national regulators as such. Instead, the EU tries to follow the US example by suggesting a labour division between state and federal levels. Accordingly, internal market affairs such as tariff setting would remain with the national regulator, whereas derogations for investment in cross-border network linkages would be approved by a European authority, the so-called ERGEG+ (see *ibid*: 8-9; Piebalgs, 2007, 7 February). One underlying idea of centralising regulatory oversight of cross-border issues to the supranational level is to make regulation more effective. Currently, anyone planning to invest in a project such as an LNG terminal and aims to receive a derogation of third party access needs the approval of at least two regulatory authorities, the European Commission as supervisor- and the national regulators involved.

Before the publication of the third Energy Package in September 2007, the big question was whether the Commission would call for ownership unbundling to be mandatory, as the earlier announcement of DG COMP and DG TREN might have suggested. In anticipation of the lack of political will from the member states, the Commission did not hold a strong stance. Instead, the EC considered two possibilities. The first option is ownership unbundling, the Commission’s preference. The second option is the designation of Independent System Operators “where the vertically integrated company remains owner of the network assets and receives a regulated return on them, but is not responsible for their operation, maintenance or development” (European Commission, 2007, January 10: 7).

Neither the Energy Council meeting on 15-16 February 2007 nor the following general Council meeting in spring 2007 brought about any progress in terms of unbundling or regulatory oversight. On the contrary, the Council voted for the minimum solution in both instances. Accordingly, the member states opted for Independent System Operators leaving open the degree of regulation imposed on network companies. The initial suggestion from the Commission foresaw a rate of return regulation, whereas the Council spoke of “adequately regulated network system operators” (Council of the European Union, 2007, May: 16). The action plan formulated by the Council did not propose any concrete action which would significantly support the European Commissions attempts.

The third Energy Package contains a bundle of proposals which could have a considerable effect on the governance of the European gas sector once adopted. First and foremost, the Commission continued to strive for ownership unbundling while keeping the option of derogating through designating an Independent System Operator (ISO) by the national government. After the publication of the third Energy Package proposal, the member states and the Parliament divided

up in three groups: the proponents of ownership unbundling represented by the majority of Members of European Parliament, the United Kingdom, the Netherlands, Belgium, Denmark, Spain, Finland, Romania and Sweden; the group of undecided consisted of Estonia, Hungary, Ireland, Italy, Lithuania, Malta, Poland, Portugal, Czech Republic and Slovenia; the group of opponents of ownership unbundling was led by France and Germany and supported by Austria, Bulgaria, Cyprus, Greece, Latvia, Luxembourg, and Slovakia (EurActiv.com, 2007). At the following Energy Council meeting in December 2007, Germany and France announced to propose a third option aiming below the level of ownership unbundling and the ISO option. This strategy has been employed to bottom out the regulatory standard with regard to unbundling and to win time for negotiations with the member states in the group of undecided.

Secondly, the proposed Directive attempts to strengthen regulatory authorities on both levels by extending regulatory powers. For the ISO option accounts that regulators might obtain the right to review and approve 10-year investment plans formulated by the independent system operators and to carry out investigations at the transmission system owner and independent system operators premises (Article 24c), point 2.e). Moreover, regulators shall impose sanctions on companies “not complying with their obligations under this Directive or any decisions of the regulatory authority or of the Agency” (Art. 24c, point 3.b)). These references to the proposal, illustrate the immanent attempt to move from enacting to enforcing regulation. Into the same direction points the addition of Article 24 f) which requires supply undertakings to keep record of their transaction data. The underlying idea of the Directive is to decrease the information asymmetry by expanding the scope of controlling rights and report duties. To support the national regulators and to extend the room for negotiation, the proposal calls for only one single authority to be responsible for the sector oversight (Article 24a, point 1). At the Energy Council meeting in December 2007, Commissioner Piebalgs indicated the EC would not insist on a single-authority-structure, but certainly is more determined to establish the Agency for the Cooperation of Energy Regulators (ACER). The ACER proposition draws on the earlier mentioned “ERGEG+” option. The aim of this Agency is to enhance the coordination of national regulators and ensure the cooperation between transmission system operators (European Commission, 2007d: 10-11). The proposal of the Agency runs the danger to be sandwiched between its proponents and opponents. Objectors simply reject any kind of increase in regulatory power, whereas the advocates of strong regulation criticise the proposal for not equipping the Agency with sufficient competencies to ensure effective regulation that justifies huge administrative costs of establishing a new Agency. It would be mistaken to interpret proposal and limited powers of a new Agency as a lack of ambition; instead it reflects the anticipation of realistic options. The EC employs a piecemeal technique which aims first to ensure the establishment of the Agency and the position of the Commission, then to expand regulatory powers of the Agency in the long run (see European Commission, 2007d: 11-13).

Third, the Commission established the practice of releasing guidelines to steer the further liberalisation of the sector reform and plans to expand this practice in future. On several occasions, the Commission proposes the formulation of guidelines and determines the compliance mechanism of those guidelines (Article 24 e). Last but not least, the possibility to receive derogations for new investment projects or considerable upgrading of infrastructure like for instance interconnector between Member States, LNG or storage facilities is still guaranteed by Article 22.

4.8 Concluding considerations

The nine years of gas market reform were characterised by constant power struggles on the one hand and learning and adaptation processes on the other. Altogether, we identified five phases ranging from one to four years. In our interpretation, the fifth phase is currently ongoing because, so far, no new legislative or regulatory act has found sufficient political support and approval among the member states.

4.8.1 Conclusion and expectation

This conclusion evaluates observations concerning the first layer of Williamson's model by initially asking whether major changes of general or energy policy objectives occurred. This makes it possible to formulate in a second step an expectation regarding the effects of this layer on the convergence of regulation.

Within the Lisbon strategy in 2000 and its revision in 2005, the European Commission formulated its current wider economic policy goals. The inherent claim for competitive and affordable energy prices remained unchanged and induced impulses to continue the liberalisation track by emphasising the need of competitive prices. Economic performance indicated by natural gas prices functioned as a justification to start regulatory action in the form of the energy sector inquiry in 2005. After seven years of reform, it became not only apparent that existing measures would not sufficiently tackle the level of concentration in the market, but also the Directorate-General for Competition was by then equipped with the necessary competencies to launch an energy sector enquiry. The results of the inquiry strengthened the argument for ownership unbundling and support its brother in arms DG TREN. In the short-term, the combined efforts of the Commission did not bring about much progress with regard to the core issues at stake. With reference to Williamson's four-layer model, we can interpret that general economic objectives in conjunction with negative economic performance create regulatory activity striving to improve regulation by prescribing ownership unbundling. Nevertheless, a negative economic performance proved to be a necessary but insufficient condition to change member states' attitudes towards ownership unbundling.

In general, energy policy underwent a significant transformation, moving from a paradigm perceiving liberalisation, privatisation, and competition in the gas sector as paramount, to a new energy paradigm that addresses security of supply concerns and climate change. According to Helm, the latter is a result of structural changes in the energy markets such as a structural upward shift of oil prices, the ageing of assets, network failures, and greater import dependency that became apparent for politicians and policy planners (see Helm, 2005). As a consequence, security of energy supply moved up on the political agenda. Within the gas market reform, this paradigm shift manifested most obviously in the Green paper "Towards a European Strategy for the Security of Energy Supply" (European Commission, 2000) and the formulation and adoption of the Security of Supply Directive. We later saw the European energy strategy, which the European Commission formulated in the Green paper of 2006, based on the core principles of sustainability, competitiveness, and security. With regard to gas market reform, the Green paper (2006) basically brought together the main elements of these two paradigms, internal market

integration and liberalisation and security of energy supply measures for natural gas. In other words, liberalisation, privatisation, and competition as objectives of the reform were not abandoned as policy objectives, but have been diluted by the objective of security of supply throughout the period under study.

Regulators, policy planners, and politicians on European and national levels face the question of how to guarantee and carry out the public service obligation of security of supply in liberalised gas markets. In this context, long term security of supply is perceived as sufficient investment in import and network capacity, to meet future demand. Due to imperfect markets and certain characteristics of the natural gas market, there is a consensus among regulators and policy planners that security of energy supply will not be carried out by the invisible hand of the market alone, but must be ensured by hands-on regulation.

Helm elaborates on five ways in which governments or regulatory authorities may try to ensure security of supply in liberal electricity markets. The first two fall under the category of competitive market approaches. Both put forward price regulation as key element of industry regulation. The second variant combines price regulation with capacity elements. Price regulation and its mixed variant are based on the neoclassical idea to influence performance by influencing price and/or quantity. The third possibility looks to directly impose more complex obligations on network operators. The fourth possibility represents various forms of state subsidy. Subsidies might be granted by direct money flows into investments projects or for instance by taking over planning risks. The fifth possibility is to rely on market power to impose costs. Helm describes this as a kind of virtual barter trade between government and the dominant company, in which the government is not intervening if the company guarantees a sufficient level of investment. Helm (2005) elaborates:

The price of market power is investment. And with the ability that market power renders to pass through costs to final customers, the advantage of the market power model is that it reduces the cost of capital. In principle, provided the threat of regulation stops the undue exploitation of that market power, investment should be higher in proportion to the reduction in the cost of capital. In effect, it is quasi-rate-of-return regulation by default. (Helm, 2005: 11)

This brief listing of the possibilities demonstrates that out of five regulatory possibilities only two competitive market models are in line with a purist application of the liberalisation, privatisation, and competition paradigm. A growing importance of security of supply on the political agenda combined with its regulatory authorities' guarantee ultimately alters the likelihood of employing approaches other than competitive market models.

Regarding European energy policy, the member states' statements and behaviour in the course of the formulation of gas market policy and its related legislation on the European level indicated that the attitude of the majority towards gas market liberalisation remained reluctant during the entire period of examination. Some showed a pro-active attitude; for instance the United Kingdom, Spain, the Netherlands, and the European Parliament in 2001 called for earlier implementation deadlines of the second Directive than the Commission proposed itself. Nevertheless, numerous Council meetings confirmed the general reluctance of the majority of member states to vote for a fully fledged liberalisation policy. A vivid example is the negotiation of the implementation date for the legal market opening during 2000 and 2002. Another

illustration offers the evolution of Regulation 1775, characterised by lengthy discussions questioning the need for regulatory action to deepen the liberalisation of the market – just to name a few.

On the basis of our explorative analysis we can formulate an expectation related to general and energy policy objectives:

Expectation 1: We argue that the coexistence of objectives, market liberalisation, privatisation, and competition on the one hand and security of supply on the other, does not necessarily promote the convergence of regulations towards competition (delta convergence), as those objectives tend to favour different instruments. Whereas the former objective prefers market competition approaches, the latter is likely to alter the attractiveness of less competition supporting instruments.

4.8.2 Outlook

Since 2005, stagnation and regulatory inertia is apparent. Unlike the first stalemate, which evolved with regard to the legal market opening provisions, the obstacles might not be overcome by waiting until an election of one opposing member state has passed. During the European Council meetings the ownership unbundling of trade and transport branches was rejected repeatedly and by unanimous agreement of the member states. On the contrary, instead of voting for a fragmentation of the industry structure along trade and transport, the consensus among the member states appeared to be the support of the evolution of European champions in the gas sector. Most European gas markets have been characterised by vertical foreclosure and concentration processes (re-bundling). As a consequence, regulatory instruments besides unbundling itself could not unfold their full effect. Moreover, both attempts of the European Commission to shift regulatory competencies to the supranational level failed. Neither a common EU mechanism for releasing stored gas in the situation of supply disruption nor a common European energy regulator could be established. The idea of Regional Gas Initiatives (RGI) emerged in light of a lacklustre political will in the majority of member states to deepen the liberalisation provisions and supranationalise gas market regulation. The RGI appear to function as an interim step and current playing field, where substantial progress in terms of market integration and harmonisation is facilitated.

The negotiations on the third Energy Package will continue in 2008. The Director General for Competition Philip Lowe estimated at the Flame conference in 2007: “It will probably take until 2009 to pass into law and in the meantime, member states must anticipate the change and plan for it” (Gas Matters Today, 2007, March 14). Considering the preferences member states voiced with regard to unbundling during the Energy Council meeting in December 2007, it seems to be very unlikely that ownership unbundling will become the dominant mode of unbundling. This would imply a serious setback for the liberalisation of the sector. Thus, the reform would run the danger to be “stuck in the middle”, while at the same time raising the immediate transaction costs on both sides (regulators and regulatees) without changing the industry structure and its underlying incentives.

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5. REGULATORY REQUIREMENTS OF THE EUROPEAN GAS MARKET REFORM: HOW MUCH LEEWAY DO MEMBER STATES HAVE?

The European Union began with a classical soft-power approach by choosing a framework regulation. Instead of prescribing a rigid market design for national gas markets, member states could gradually develop the appropriate regulatory regimes, “[...] to allow the industry to adjust in a flexible and ordered manner to its new environment and in order to take account of the different market structures in the Member States” (Directive 1998/30/EC, Recital 7). In other words, the member states had the freedom to choose the instruments to meet the provisions given by the EU legislation. Often the margins for regulatory regimes were set by compliance with the objectives and principles formulated in the legal provisions. By examining the legal texts constituting the Gas Reform in more detail, we first demonstrate that only a few instruments were compulsory. Second, this proceeding allows identifying which effect the introduction of the new legislation had on the convergence of particular instruments and the regulatory regimes of European gas markets in general. Last but not least, this examination later serves as a reference to facilitate the formulation of an index to describe a ‘best-practice’ model in the methodology chapter.

Either in anticipation of the EU legislation or as a reaction to the EU Reform, member states brought additional and complementary energy legislation into place. Our reference point is supranational law however, and this analysis concentrates on the member states’ choice of instruments. Consequently, we do not expect to learn about how member states precisely transposed the EU legislation into national law, or find an exhaustive and in-depth discussion of the two Directives and related documents. Instead, we aim to show how much room for manoeuvre the member states were given by the framework regulation regarding their choice of instruments. To facilitate this, we first state the major legal acts that form the bases of the EU Gas market reform. We continue with a description of the general objectives and principles as laid out in the legal texts. Finally, we show which regulatory instruments became mandatory for the member states to integrate into the national regulatory regime and formulate expectations with regard to the convergence of the applied instruments.

5.1 Legal framework of the European gas market reform

European gas market reform is mainly based on three legislative acts introduced by the European Union as secondary legislation between 1998 and 2005. The first (Directive 98/30/EC) and second Gas Directives (Directive 2003/55/EC), are both framework regulations. By definition, “Directives bind the Member States as to the results to be achieved; they have to be transposed into the national legal framework and thus leave margin for manoeuvre as to the form and means of implementation” (See European Commission, 2006c). The measures were supposed to be implemented by 10.8.2000 for Directive 1998 (equivalent with $t_0=2000$) and by 1 July 2004 for Directive 2003 (equivalent with $t_4=2004$).

The EU did not formulate a third Directive in the later reform process, but first chose the legal instrument of Regulation. Regulations do not give the same flexibility to the member states compared with Directives, but are directly applicable and binding for all member states. In addition, Regulations do not necessitate national implementation of legislation as it follows the principle of subsidiarity, where national laws are not allowed to be in conflict with European secondary laws (such as Regulations). With the release of Regulation 1775/2005 in 2005 however, the EU overruled national laws with the justification that, “It is now necessary to provide for structural changes in the regulatory framework to tackle remaining barriers to the completion of the internal market in particular regarding the gas trade” (Regulation 1775/2005, Recital 1). They also added that,

[...] since the objective of this Regulation, namely the setting of fair rules for access conditions to natural gas transmission systems, cannot sufficiently achieved by member states and can therefore, by reason of the scale and effects of action, be better achieved at Community level, the Community may adopt measures [...] (Regulation 1775/2005, Recital 23)

The Regulation had to be implemented by 1 July 2006 (beyond t_6).

5.2 Objectives and principles of the reform

The first Recital of the first Directive not only states the overall objectives of the gas reform, but also reflects the tension between Europe’s old and aspiring market design. According to the first and third Recitals, the completion of the internal market and a competitive natural gas market are the major objectives of the reform. Ironically, these two embrace the second Recital, that allows member states to take into account differences in their economies and to derogate from the Directives provisions (see Directive 1998/30/EC, Recitals 1-3). One could argue whether the root for divergent gas market regulation is already disposed. Further constraints might stem from Recital 12 which foresees the fulfilment of public service obligations as objectives, and might interfere with competition goals. Thereafter, “[...] for some Member States the imposition of public service obligations may be necessary to ensure security of supply and consumer and environmental protection, which, in their view, free competition left to itself, cannot necessarily guarantee” (Directive 1998/30/EC, Recital 12). Despite the given ambivalence of objectives, the European Union considers the completion of market liberalisation to be pivotal in order to meet these public service obligations. In other words, the EU continuously expressed the aim to create one common European gas market. Attesting to this declaration, the EU identified the completion of internal market as the first of six priority areas in its recent strategy paper: “Sustainable, competitive and secure energy will not be achieved without open and competitive

energy markets, based on competition between companies looking to become European-wide competitors rather than dominant national players.” (European Commission, 2006: 5).

The second Gas Directive complements the first by stating objectives the EU wishes to achieve through gas market reform. Thereafter, the EU aims to increase efficiency, reduce prices, raise standards of service, and increase competition (see Directive 2003/55/EC, Recital 2).

5.2.1 General principles

In a framework regulation, principles are of considerable importance due to the lack of tailor-made rules. Hence, we start off by exploring the role of principles in the gas reform. In this regard, the ninth Recital of the first Directive appears to be insightful, as it prescribes not only the Gas Directive as framework regulation, but also defines the role of principles to constitute the Gas Reform:

Whereas a certain number of common rules should be established for the organisation and operation of the natural gas sector; whereas, in accordance with the principle of subsidiarity, these rules are no more than general principles providing for a framework, the detailed implementation of which should be left to Member States, thus allowing each Member State to maintain or choose the regime which corresponds best to a particular situation, in particular with regard to authorizations and the supervision of supply contracts. (Directive 98/30/EC, Recital 9)

This clearly indicates that the European Union was not aiming to determine measures or instruments, but instead formulate general principles. Moreover, the EU further specifies in Article 3 section 1 the context in which the general principles are set and thereby leaves no doubt about the binding character of the principles:

Member States shall ensure [...] natural gas undertakings are operated in accordance with the principles of this Directive with a view to achieving a competitive market in natural gas, and shall not discriminate between such undertakings as regards either rights or obligations. (Directive 1998/30/EC)

Given the relative importance of principles in this legal document, one is driven to search for articles in the Directives which summarise the reforms principles. Surprisingly however, there are none. Instead, the principles are defined in relation to the objects of regulatory functions and grouped under the pillars ‘Transmission, storage, LNG’, ‘Distribution and supply’, ‘Unbundling’, ‘Network access’, and ‘Organisation of access to the system’. This still leaves us with the question: what are the constituting principles of the gas reform? A further question is whether these principles changed in light of altering legislation or whether additional principles evolved.

The first Directive names six principles: objectivity, non-discrimination, (information) transparency, efficiency, economics, and security. Within the second Directive, the EU expanded the list by another four principles: fair prices, cost-reflectiveness, environmental friendliness, and consumer protection, meaning that the choice of measures should be in line with the environmental policy of the EU.

Table 1: Principles of the European Gas Directives

<i>Introduced in Directive 1998/30/EC</i>	<i>Added in Directive 2003/55/EC</i>
<ul style="list-style-type: none"> • Objectivity • Non-discrimination • Transparency • Efficiency • Economics • Security 	<ul style="list-style-type: none"> • Consumer protection • Fair prices • Cost-reflectiveness • Environmental friendliness

Source: Directive 1998/30/EC, Directive 2003/55/EC

Regulation 1775/2005 aims to specify regulatory functions rather than revise principles. Thus, it does not add new principles but instead contributes to the principle formulation by specifying the transparency requirements (Regulation 1775/2005, Article 6) and the principles which have to be applied for the regulatory function of capacity allocation mechanism and congestion management procedures.

In summary, the European Union postulates nine core principles member states have to comply with. There is no indication that one can deduce the relative importance of one principle to another by referring to the order in which they are stated in the Directives. The Directives' inherent logic suggests they are of equal importance and complementary in nature.

5.2.2 Issue related principles

Having stated the general core principles, we now look closer at which principles are formulated with regard to different regulatory functions and how they changed over time. In doing so, we adopt the structure of pillars suggested by the Directives.

Unbundling does not specifically rely on principles as the formal requirements are given in the legal text. It is therefore dealt with in more detail in the next section that explores the Directives requirements.

Article 7 is quite central concerning the formulation of principles, as it introduces principles in application to the transmission, storage, and Liquefied natural gas (LNG) business. Section 1 states "each transmission, storage and/or LNG undertaking shall operate, maintain and develop under economic conditions secure, reliable and efficient transmission, with due regard to the environment". (Directive 1998/30/EC, Art. 7 (1)). The next two sections expand the set of principles by non-discriminatory behaviour and information transparency (Directive 1998/30/EC, Art. 7 (2-3)). The principles for the distribution and supply follows the same scheme as those for the former pillar and literally the same principles are outlined for the distribution and supply sector (Directive 1998/30/EC, Art. 10 (1-3)). Directive 2003/55/EC takes over the first Directive's principles and adds environmental friendliness to the catalogue. Complementary to Articles 8 and 12 of the second Directive, Recital 31 requires that "measures

should be taken to ensure homogenous and non-discriminatory access regimes for transmission, including cross-border flows of gas between Member States”. (Directive 2003/55/EC, Recital 31). This legal provision clearly shows the European Union’s intention to harmonise network access conditions.

Due to the discussions of the relative importance of balancing rules to guarantee equal and non-discriminatory transport services, balancing conditions receive much more attention in the second Directive and the proceeding Regulation. Accordingly, balancing rules should be objective, transparent, non-discriminatory, and cost-reflective (See Directive 2003/55/EC, Recital 15, Article 8 (2), Article 12 (5)).

Independent from the member states’ preference with regard to negotiated or regulated third party access, the organisation of the network access shall be “in accordance with objective, transparent and non-discriminatory criteria” (Directive 1998/30/EC, Article 14.). These principles were accompanied by Article 21 (1), where “Member States shall ensure that the parties negotiate access to the system in good faith and that none of them abuses its negotiation position to prevent the successful outcome of such negotiations”. (Directive 1998/30/EC, Article 21 (1)). The EU addresses here the comparative advantages of incumbent companies and the somewhat moral appeal not to use their grandfathering rights.

The EU repeatedly emphasised the necessity of network access and therefore declared in the second Directive, “[...] non-discriminatory access to the network of the transmission and distribution system operator is of paramount importance” (Directive 2003/55/EC, Recital 8). In terms of principle formulation, Directive 2003/55/EC does add the principle of fairly priced network access, which might be interpreted as a growing awareness of highly heterogeneous and intransparent network tariffs (See Directive 2003/55/EC, Recital 7, Article 18 (1)). New elements of the second Directive are certainly the introduction of third party access for storage and the requirement to establish regulatory authorities. Like the third party access for the network, TPA for storages must be in line with the principles of objectivity, transparency, and non-discrimination.

5.3 Mandatory instruments

After elaborating on the gas market reform objectives and principles, our attention is now directed towards the instruments the legal provisions require. These are discussed along with the regulatory functions concerning legal market opening, third party access, unbundling, balancing, and regulatory authorities.

5.3.1 Legal market opening

To achieve a gradual and incremental market opening, the EU chose the definition of eligible customer as the key variable to facilitate legal market opening. The Directive distinguishes between those countries that started to open their markets (e.g., Germany) and those that entered the reform process with a considerable degree of market opening (> 30%) such as the United Kingdom. The first category of new market openers “shall ensure that the definition of eligible customers referred to in paragraph 1 will result in an opening of the market equal to at least 20%

of the total annual gas consumption of the natural gas market” (see Directive 1998, Article 18 (3)). Article 18 continues prescribing the market opening in later states. Accordingly, a legal market opening of 28% by 2003 and 33% by 2008 is compulsory. Countries in the category of advanced market openers shall ensure a market opening of 38% by 2003 and of 43% by 2008 (see Directive 1998/30/EC, Art. 18 (6)).

The Directive requires that Member States specify ‘eligible customers’, defined as those customers inside their territory that have the legal capacity to contract for or to be sold natural gas according to the procedures set out in Articles 15 and 16. It requires that initially two categories of customers – at least- be included as eligible customers. These are:

- (1) all final consumers consuming more than 25 million cubic meters of gas per year on a consumption site basis; and
- (2) gas-fired power generations, irrespectively of their annual consumption level. (Cameron, 2002: 178)

In short, member states are obliged to use the definition of eligible customer as an instrument to facilitate the required market opening. In the end, it was the member state’s responsibility to define the eligible customer in terms of consumer classes, assuming the achievement of the above mentioned targets. For monitoring purposes, the European Commission asks for the annual publication of the countries definition accompanied by all other appropriate information to justify the fulfilment of market opening (See Directive 1998/30/EC, Art. 18 (9)).

In 2003, the second Directive set more ambitious targets. Amending the first Directive, the acceleration Directive foresees the freedom of choice of supplier for all European non-households from 1 July 2004, and for all costumers from 1 July 2007 (See Directive 2003/55/EC, Art. 23 (1)).

5.3.2 Third party access

Third party access is a crucial instrument in introducing competition in the downstream part of the natural gas sector and has therefore already been a major topic within the pre- liberalisation debate. The first Directive foresees both negotiated third party access (nTPA) and regulated third party access (rTPA). The circumstance that only Germany did not have an independent regulator at that time shows the incumbents inclination to employ delaying strategies. Moreover, it reflects the strong resistance of former integrated companies who function as transport operators to open their grids and allow other firms to gain market shares. In general, one could say that the TPA provisions given in the first Directive introduce the objective and idea of third party access rather than ensuring a rigid European-wide implementation. By choosing negotiated third party access, member states can still vote for transaction based transmission and distribution services. Although Article 15 Section 2 requires the publication of the undertakings main commercial conditions for the use of the network, it leaves the information power and thereby negotiation power in the hands of the incumbent firms (see Directive 1998/30/EC). In contrast, regulated third-party access is based on published and common tariffs that offer more transparency and non-discriminatory network access to new entrants. Moreover, the first Directive foresees for both nTPA and rTPA, the possibility of temporary derogations, “if a natural gas undertaking encounters, or considers it would encounter, serious economic and financial difficulties because

of its Take-or-pay commitments accepted in one or more gas purchase contracts” (Directive 1998/30/EC, Article 25, section 1). In addition, Article 17 explicitly allows the refusal of network access in the case of capacity congestion caused by pre-liberalisation Take-or-pay contract obligations. There is no doubt that in this context the possibility of derogations functions as a clear lock-in mechanism that turned out to have massive effects on the amount of available capacity. DG Competition revealed in their energy sector inquiry that “on the Benelux-Italy axis [...] primary capacity on these pipelines is booked until 2022” (European Commission, 2006d, 16 February: 61).

One of the major revisions of the second Directive was the abolition of the negotiated third party access. Directive 2003/55/EC and Regulation 1775 confirm and emphasise the regulated third-party access and determine more detailed terms and conditions for this instrument. Accordingly, tariffs and their methodology shall be approved and published before their entry into force (See Directive 2003/55/EC Article 18, (1). Regulation 1775 specifies

[...] where a transmission system operator offers the same service to different customers, it shall do so under equivalent contractual terms and conditions, either using harmonised transportation contracts or a common network code approved by the competent authority. (Art. 4 (1a))

The mentioning of a common network code reflects the continuing evolution of network access regimes in the reform process: beginning with nTPA under which the main terms and conditions were required to be published and moving on to rTPA with published tariffs and methodologies and envisaging a common network code in Regulation 1775.

The latter regulation focuses on adding technical rules “in particular regarding third party access services, principles of capacity allocation mechanisms, congestion management procedures and requirements” (Regulation 1775, Recital 1). One might expect that after seven years of gas market reform, the EU would alter the level of coercion by naming concrete instruments. One could argue that Regulation 1775 fills existing regulatory gaps; nonetheless the scope of regulation is complementary rather than deepening or widening. This argument will be exemplified with reference to the provisions concerning capacity congestion and tariffs.

As we saw earlier, the Regulation aims to specify capacity allocation mechanisms and capacity congestion mechanisms. To prevent capacity hoarding of incumbent firms under new or renegotiated transport contracts, the following provision entered the legal text:

When transmission system operators conclude new transport contracts or renegotiate existing transportation contracts, these contracts shall take into account the following principles: in the event of contractual congestion, the transmission system operator shall offer unused capacity on the primary market at least on a day-ahead and interruptible basis. (Regulation 1775, Article 5, section 3 (a))

The Regulation clearly states that unused capacity must be offered to other parties. It is worth noting that those derogations due to Take-or-pay commitments are not tackled per se by this provision, since it refers not to transportation contracts but to trading contracts.

Tariffs are a crucial but very complex area in gas market regulation. In general, tariff systems are based on diverse instruments that reflect different dimensions such as the type of capacity booking, allocation method, and tariff structure. In this context, the absence of explicitly

determined instrument is striking. The furthest community law goes is mentioning auctions as a possible instrument: “Member States may decide that tariffs may also be determined through market based-arrangements, such as auctions, provided that such arrangements and the revenue arising there from are approved by the regulatory authority” (Regulation 1775, Article 3 (1)). The tariff system and its instruments are not determined by the EU provisions. Accordingly, one should not expect a convergent impulse in terms of instrument choice.

Third party access to storage is introduced in the second Directive. The EU applied the same approach for the general TPA provisions, by offering the member states the choice between regulated and negotiated TPA for storage. If national regulatory authorities vote for nTPA,

Member States shall require storage system operators and natural gas undertakings to publish their main commercial conditions for the use of storage, linepack and other ancillary services within the first six months following implementation of this Directive and on an annual basis every year thereafter (Directive 2003/55/EC, Art. 19 (3)).

In contrast, regulated third party access is based on published tariffs and other terms and obligations for the use of storage and linepack (See Directive 2003/55/EC, Art. 19 (4)).

5.3.3 Unbundling

The first Directive requires the publication of accounts of integrated gas undertakings (See Directive 1998/30/EC, Art. 13 (3)), but does not prescribe any further measure to ensure the separation of trade and transport in the natural gas markets. In contrast to the Electricity Directive, the first Gas Directive does not impose legal or management unbundling (see below). Instead, “integrated natural gas undertakings shall, in their internal accounting, keep separate accounts for their natural gas transmission, distribution and storage activities” (Directive 1998/30/EC Article 13 (3)). The publication and separation of accounts apply equally to transmission and distribution operators. “The aim of this requirement is to ensure non-discrimination and fair tariffs to avoid cross-subsidisation and the distortion of competition” (Cameron 2002: 181).

Legal unbundling was subject of the second Directive. Thereafter, vertically integrated distribution system operators and transmission system operators are required to be independent in legal form and in terms of organisation and decision-making from other activities not related to distribution or transmission (see Directive 2003 Art. 9 (1) and Art. 13 (1)). The provision of legal unbundling as a minimum standard remains; instead of heading for ownership unbundling, an intermediate step has been taken by introducing the concept of “functional unbundling”. The characteristics of functional unbundling are usually subsumed and referred to as management unbundling.

The unbundling idea is based on the Transmission System Operator or Distribution System Operator having efficient decision making rights to allow them to make decisions in their own right and interests, independent from the interests of the trading branch of the integrated company. To ensure the independence of the transmission and distribution operators the European Union formulated a number of criteria which have to be fulfilled. Thereafter,

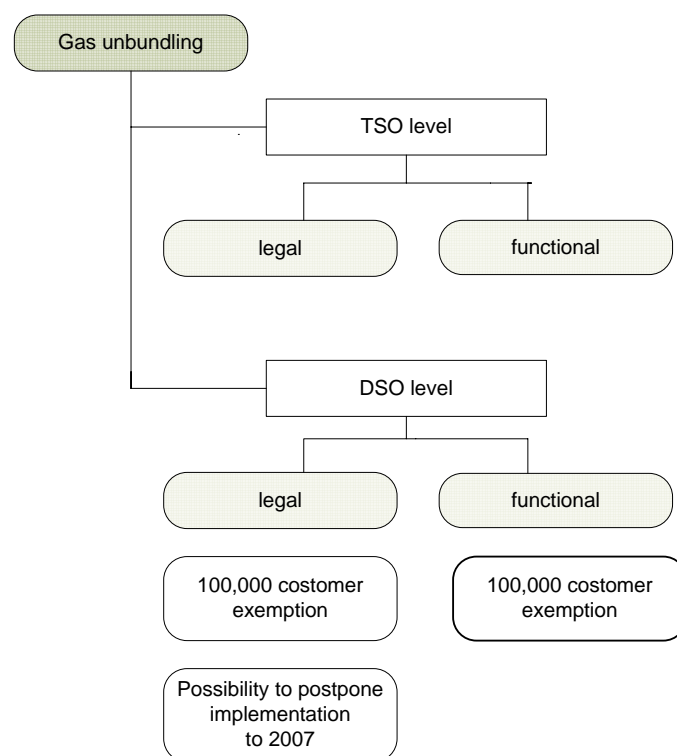
[...] the provisions of the Directive on management separation require firstly that the management staff of the network business do not work at the same time for the supply/production company of the vertically integrated company. This applies to both the top executive management and the operational (middle) management. (European Commission 2004: 8)

Furthermore, the operators are obliged to establish a compliance programme and report annually how the criteria are met; thereby discriminatory conduct shall be excluded.

The legal provisions of the second Directive allow two exemptions to the unbundling provisions, the so-called 100,000 customer exemption and the postponement option. According to the former, member states have discretion to exempt distribution service operators from the legal and functional unbundling requirements in circumstances where they serve less than 100,000 customers (Directive 2003/55/EC, Article 13). The postponement option allows member states to delay the implementation of the legal unbundling of the DSO beyond 1 July 2007 (Directive 2003/55/EC, Article 33 [2]).

The chart below summarises the legal and functional unbundling requirements of the Gas Directive. Regulation 1775 does not cover unbundling and as a result does not formulate additional provisions.

Figure 3: Unbundling requirements of the 2nd Gas Directive



Source: Gomez-Acebo, Abogandos, & Russels, 2005: 18

5.3.4 Balancing

As a result of the separation of gas trade and gas transportation due to the unbundling requirements, the formerly centralised model of gas flow management moved to a decentralised model. This necessitates the rearrangement of responsibilities between the transmission/distribution system operators and the shippers. In the course of the reform, each member state tried to develop a balancing regime that equally guaranteed the fair distribution of responsibilities and business opportunities among the new entrants and the incumbent formerly integrated companies. According to the legal provisions, the European Union is generally in favour of a market based mechanism. Acknowledging the fact that liquid markets (the precondition for those instruments) have not been realised, the European Union calls for regulatory authorities to step in and set up the necessary balancing rules. These balancing rules are not further specified and left to be determined by the member states. (See Directive 2003/55/EC, Recital 15) In Regulation 1775, the conditions balancing regimes have to fulfil are described in Article 7. Thereafter, balancing conditions should be non-discriminatory, transparent, and cost-reflective. Additionally, the compatibility of balancing regimes across Europe shall be ensured (See Regulation 1775, Article 7).

5.3.5 Regulator

The first Directive does not foresee a common EU energy regulator or national regulatory authorities as separate and independent institutions. Reference is only made to the delegation of dispute settlement. In this context, member states are asked to designate a competent authority to settle disputes that may arise from negotiations or refusals of access to the national network. The criteria this competent authority has to fulfil are not further specified. In the case of cross-border disputes, the competent authorities of each member states shall consult each other and settle the dispute in accordance with the Directives provisions. (See Directive 1998/30/EC, Article 21)

The introduction of national regulatory authorities in the context of the acceleration Directive had a significant impact on the governance of the European gas markets. Though most of the NRAs were already established before the entry into force of the Directive, the anticipation of its coming legal requirement together with the necessity of dealing with other regulatory requirements in light of the EU gas reform clearly pushed member states to establish independent regulators.

According to the Directive 2003/55/EC,

The Member States shall designate one or more competent bodies with the function of regulatory authorities. These authorities shall be wholly independent of the interests of the gas industry. They shall, through the application of this Article, at least be responsible for ensuring non-discrimination, effective competition, and efficient functioning of the market [...] (Article 25 (1))

DG TREN explicitly states that the legal provisions do not require a regulator to be separated from other governmental bodies, “[...] even though a separate regulator is the most common and desirable model” (European Commission, 2004b: 1). The Directive also foresees the possibility of ministry involvement in the regulatory processes. More precisely, the ministry may either accept or reject a Regulator’s decision, but does not have the right to make amendments (See Art. 25 (3)). The member states have considerable leeway and can either vote for the centralisation of regulatory functions or a distribution of regulatory functions among several

authorities. It is noteworthy that the traditional labour division between competition functions and regulatory functions is kept. As a consequence, competition authorities and regulators or regulatory bodies within ministries share the overall governance of the gas sector.

In general, the core responsibility of the regulatory authority should be the approval of network access tariffs, and conditions, including transmission, distribution, and LNG facilities. Methodologies for tariffs and balancing services have to be set up ex ante (See Art. 8 together with Art. 25 (2)). The change with regard to the timing of decision making by shifting from ex post control to ex ante control is substantial and should be highlighted (See Directive 2003/55/EC, Article 25 (1, 2 & 4)).

In particular, the Regulator is responsible for monitoring and intervening if necessary in the following areas:

- 1 management and allocation of interconnection capacity;
- 2 mechanisms to deal with congested capacity within the national system;
- 3 the time taken by transmission and distribution undertakings to make connections and repairs;
- 4 publication of appropriate information;
- 5 the effective unbundling of accounts to avoid cross subsidies and the unbundling compliance programme;
- 6 connecting new producers;
- 7 the access conditions to storage, line pack and to other ancillary services;
- 8 overall compliance of transmission and distribution system operators with the Directive
- 9 the level of transparency and competition. (European Commission, 2004b: 2)

With the requirement to determine regulatory authorities and transfer dispute settlement functions and ex ante control over network access and balancing rules to these authorities, a significant change in the governance of the gas sector has been undertaken. The sector was formerly based on self-regulation, whereas the aim of the legal provisions was to introduce and define public regulation.

5.4 Conclusion and expectations

The conclusion summarises the general aims and principles of the reform. Next, the further development of the legal provisions is portrayed along indicators describing provisions regarding legal market opening, third party access, balancing, unbundling, and regulatory oversight. Our analysis assumes that legal provisions influence the choices of member states designing their regulatory regime. The success of harmonisation depends on the degree of legal specification. The more concrete European law is in setting targets or prescribing regulatory instruments the more likely will be the convergence of national regimes. Examining these provisions, we identify several instruments for which an effect towards convergence can be expected.

The European Union's main reform goals are the completion of an internal market and the creation of a competitive natural gas market. They have been expanded in the second gas Directive by postulating efficiency gains, price reductions, and higher standards of service and increased competition as objectives that are supposed to be achieved through the implementation of the legal provisions.

The legal framework of the gas reform is mainly based on ten principles. In the first Directive: objectivity, non-discrimination, (information) transparency, efficiency, economics, and security

are introduced. In the second Directive by: fair prices, cost-reflectiveness, environmental friendliness, and consumer protection, meaning that choice of measures should be in line with the environmental policy of the EU (see Directive 2003/55/2003, Recital 5, 7 and 27). The Directives inherent logic suggests that they are of equal importance and rather complementary in nature. The principles also have been portrayed with regard to their application of regulatory functions.

With regard to the member states' choice of instrument, the legal provisions proved to be either surprisingly ill-defined or rather complex, leaving the information power with the incumbent companies to a large extent. Such was the case for the advent or increase of legal market opening facilitated by the definition of eligible customer. Depending on their initial degree of liberalisation, the legal norm requested for those countries, which may be called liberalisation beginners, is a market opening of 20% of the total annual gas consumption of the natural gas market, increasing by 2003 to 28% and by 2008 to 33%. For the category of advanced markets, the margins were set higher, a market opening of 38% by 2003 and of 43% by 2008. Later, the second Directive prescribed a full legal market opening for non-household consumers by 1 July 2004 and for all costumers by 1 July 2007. Accordingly, one can expect that the converging effect on legal market opening towards full market opening is most likely to be limited between 2000 and 2004, and not very strong (expectation 2). Due to the legal market opening of non-household consumers, the level of legal market opening should increase after 1 July 2004.

In the course of the reform, the provisions concerning TPA underwent profound improvements: beginning with nTPA as a minimum requirement, under which it was mandatory to publish the main terms of conditions (see Directive 1998/30/EC), moving on to rTPA with published tariffs and methodologies (see Directive 2003/55/EC) and envisaging a common network code in Regulation 1775. In this light, the shift from ex post to ex ante control of third party access can be considered one of the major achievements of accelerating the regulatory process. In the second Directive, the EU followed the same path for the introduction of third party access rules for storage, allowing the member states to apply negotiated or regulated TPA for storage. It is noteworthy however, that no instruments concerning allocation method, tariff structure, type of capacity booking, minimum booking periods of transport capacity, level of tariffs, incentive regulation, and the 'use it or lose it' principle have been explicitly commented on. The same holds for balancing requirements. Although the EU expresses a general favour for market based mechanism, no balancing rules are prescribed. The legal provisions do not prescribe balancing instruments, gas release programmes or certain trading facilities. We therefore do expect a low converging effect (delta convergence) stemming from the European legislation (expectation 3). On the contrary, regulated third party access had to be implemented by 1 July 2004 and we should observe a high degree of delta convergence in the last two measurements of the analysis in 2005 (expectation 4). The same applies to negotiated third party access to storage (expectation 5).

The first Directive introduced legal unbundling, but did not prescribe it as a minimum requirement in Directive 1998/30/EC. Thereafter, the unbundling requirements have been gradually enhanced by demanding first of all legal unbundling and the introduction of so called management unbundling (functional unbundling), instead of voting for a rigid unbundling regime such as ownership unbundling. Concerning the unbundling provisions, we formulate three

expectations with regard to the convergence of regulatory instrument choices. According to the first Gas Directive (GD), separate accounts should be published by 10 August 2000. Therefore, we should detect a full convergence throughout the entire observation period (expectation 6). Legal unbundling of transmission system operators should be the norm by 1 July 2004 (expectation 7). With regard to the legal unbundling of distribution system operators, the second GD allows two exemption options reaching beyond 1 July 2007. Consequently, we expect a low degree of convergence in terms of legal unbundling and no convergence towards ownership unbundling on the DSO level (expectation 8). As a result, the degree of convergence of unbundling measures on the DSO level should be lower than the TSO level (expectation 9).

The acceleration Directive introduces, apart from rTPA, TPA for storage, balancing rules, and management unbundling, and the quest for defining national regulatory authorities. Again, the legal text offers the member states considerable leeway and they can either vote for a centralisation of regulatory functions under the roof of one regulator or a distribution of regulatory functions among several authorities. Nevertheless, DG TREN's interpretive note leaves no doubt that the EU prefers the creation of independent national regulators and along with it the centralisation of regulatory oversight. So far, the legal provisions do not allow the expectation that the member states transfer competencies to the national regulator. In other words, it is unlikely that the legal provisions induce a high degree of delta convergence for the indicators belonging to the polity dimension during our time of examination (expectation 10).

Community legislation started as a rather principle-based regulation and gradually developed. In other words, the nature of the reform (framework regulation) has been preserved and no qualitative shift from a bottom-up approach towards a top-down approach, which determines the member state's instrument choices, has been detected.

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6. RESEARCH METHODOLOGY

A quantitative, cross-national comparative analysis of the natural gas sector in the European Union, as proposed here, has its strengths and weaknesses. On the one hand, the general strength of a quantitative analysis is a higher number of cases, providing more evidence in generalising findings and allowing the comparison of regulatory performance. On the other, a quantitative analysis is often restricted to rather aggregate formal data. That applies to this analysis which draws on the formal aspects of regulatory regimes in European gas market regulation. The study includes data on formal regulatory regimes but does not detect how these measures are precisely implemented and interact in each member state's gas market. Hence, the analysis reflects only partially the regulatory performance or reality of natural gas markets due to a lack of accessible information. Nevertheless, it provides an aggregated analysis of the convergence of regulatory regimes in the old member states since the introduction of the gas reform.

The following chapter exposes the constituent parts of the research methodology. First the case selection is given reason, and second, we specify the data sources. Finally, we elaborate the operation of the research design.

6.1 Geographical scope

The European Union's (EU) political landscape changed profoundly during the period of examination (1998-2006), due mainly to the enlargement of the supranational power in May 2004. For the new member states this implied the implementation of a huge number of measures, including the Gas Directives. Unlike the old member states, where the regulation was introduced in 1998, the gas market regulation has just recently been put in place in the accession countries. For this reason, the trend study incorporates only cases from the group of EU-15.

Yet, the group of EU-15 is relevant in terms of market coverage. In 2000, the enlarged European Union with 25 member states (later called EU-25) consumed 376 million tonnes of oil equivalent (Mtoe) of natural gas. Then, the share of the 15 old member states alone was 339 Mtoe which then corresponded to 90% of the total enlarged European gas market as we know it now. (See European Commission & Directorate-General for Energy and Transport, 2003b: 150-176).

When the first Gas Directive was put in place, it foresaw the possibility for derogations which allowed member states not to implement a new regulatory regime (see Directive 1998/30/EC, Directive 2003/55/EC, benchmarking report 1: 4). These derogations were applied for Finland, Greece, and Portugal who were considered emerging gas markets with a marginal market size or limited network connectivity. To illustrate, the natural gas consumption of the three countries (Finland 3.42 Mtoe; Greece 1.7 Mtoe; Portugal 2.03 Mtoe) amounted in total 7.17 Mtoe in 2000. This is equivalent to 2% of EU-15 total consumption. Consequently, by excluding Finland, Greece, and Portugal and selecting 12 member states for the analysis, the quantitative analysis still covers 88% of the EU-25 natural gas market (based on the data from 2000) and 98% of the EU-15 natural market. For these reasons the analysis of the 12 member states is representative for the EU 15. (See European Commission & Directorate-General for Energy and Transport, 2003b: 150-176).

The cross-national analysis of EU-15 includes Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Spain, Sweden, and the United Kingdom. The selected cases represent small and big countries (gas markets), producing and consuming countries, countries with high and low network connectivity, as well as countries with a small and large number of companies.

6.2 Time-frame and data

The period of examination begins with the introduction of the first Gas Directive in 1998 (which had to be implemented by 2000) and ends with the last available assessment at the end of 2005. The observations cover six years of European gas reform and identify six possible points of measurements.

The relatively short time-frame poses some challenges for the appropriate interpretation of the results, as the concept of policy convergence is based on long term changes. Classical policy convergence studies start off with 10 years, so-called medium time frames cover 15 to 30 years and a considerable number of studies go beyond. Some authors even argue that a time frame of 10 years leads to questionable results (see Howlett cited after Heichel et. al., 2005: 830). Therefore, it is important to be cautious. A short time-frame may lead to the misinterpretation of

a temporal convergence phenomenon which is in effect a cyclical development that does not indicate a one directional, permanent policy convergence. Given the possible time-frame, we conclude that the analysis has rather the character of a trend study which assesses policy convergence with regard to regulatory regimes in the European gas markets. Hence its noteworthy, solid or ultimate conclusions on the convergence of regulatory gas market regimes can only be confirmed after a longer time of observation.

Since 2001, the European Commission has annually published benchmarking reports (BR) to assess the regulatory performance of member states. This set of data, describing the implementation of the Gas Directives and related Regulations, offers the opportunity to create a time series and apply a longitudinal design. The publication of a BR is treated as a measurement point, although changes of regulatory instruments took place within a certain period of time, usually one year.

At the time of this study, five benchmarking reports on the implementation of the internal electricity and gas market have been published: the first benchmarking report (3.12.2001 = t1), the second benchmarking report (2.10.2002 = t2), the second benchmarking report including accession member states (2nd plus benchmarking report) (7.4.2003 = t3), the third benchmarking report (1.03.2004 = t4), the fourth benchmarking report (5.1.2005 = t5), and the so-called 'Report on progress in creating the internal gas and electricity market' (15.11.2005 = t6) which we treat as the fifth benchmarking report. Formally the latter two reports were published in the same year, but being nearly one year apart, they are treated as separate measurement points: one describing the reality in 2004 and the other in 2005. We then have a total of six measurement points. Complementary data has also been collected from the national regulatory authorities through a standardised questionnaire and the CEER Regulatory Benchmarking Report (see Council of European Energy Regulator (CEER), 2005). Sometimes this generated differing data. We then considered the benchmarking reports published by the EC as the primary source, because this data has been handed in by the regulators within their legal binding monitoring requirements.

The European Commission compiled the benchmarking reports by incorporating information from various sources: Accordingly,

the reports have been compiled using information collected from market players and government agencies following a detailed survey. A number of individual studies have also been completed by DG Energy and Transport using both its own resources and external consultants. (European Commission, 2001: 1)

Special attention has to be paid to the data describing the tariffs in European gas markets, because the assessment of tariffs in a single country results in approximated rather than precise figures. During the reform period, methodologies for accessing and regulating tariffs were developed and implemented in an evolutionary process. Therefore, data on tariffs is often not completely available and moreover is not based on the same standardised definition. This is also the case for the data used to access the tariffs in EU-12 between 2000 and 2005. The second and third benchmarking reports are based on the European Commission's own calculations, assessing tariffs for transmission services of large users with an annual consumption of 25mm³ with a daily peak of 100,000 m³ and an hourly peak of 4100 m³. This differs from the fourth and fifth benchmarking reports, in which the national regulators contributed to the data based on

comparatively broad definitions. To describe the tariffs in the latter reports, we applied the Eurostat categories for large users. Large users of category I4 are defined as consumers with an annual consumption of 4,186,000 GJ, and load factor of 250 days (4000 hours) (see European Commission, 2001: 54; Eurostat, 2006). However, 4,186,000 GJ is treated by the Commission as equivalent to the category of 10 mm³. The difficulties in assessing comparable tariffs exposed above thus lead to the conclusion that the primary data on tariffs is rather tentative and trendsetting.

Yet, high tariffs form a significant barrier to new gas market entrants and are therefore an integral part of market regulation. To include the tariff level, we must make two adjustments. First, there is no valid observation of the component tariff contributing to the first indicator “Gas network access conditions and tariffication” in the First benchmarking report (t1). Treating it as a missing value would automatically translate it into high tariffs. Thus, stability is assumed for missing tariffs in 2001. Tariffs from 2002 are chosen to facilitate this (see European Commission, 2002: 38). Second, in the second and third benchmarking reports two levels of tariffs for large users are measured in minimum and maximum tariffs (see European Commission, 2002: 38; , 2003a: 43; European Commission, 2004d: 35), indicating the range and variety of tariffs in each country. To put it into operation, we create a mean of the two indicator components. The degree of convergence is not fully mapped, but the overall trend can be demonstrated. Estimations of tariff levels on the transmission level are tentative and express a certain trend, but do not reflect precise tariff developments in the European gas markets.

6.3 Operationalisation

In the following sections, the concept of regulatory regimes is operationalised. In a first step, Indicators are selected along the two dimensions, regulatory function and competencies. Then, in a second step, the values of these Indicators are scored.

6.4 Assessing the comprehensiveness of a regulatory regime

In previous chapters we pointed out that there is no such thing as an ideal-type competitive market, nor has the EU Commission explicitly defined and officially announced a best-practice model for a competitive European market that would allow us to assess the comprehensiveness of regulatory regimes in the gas market.

Reviewing the literature on gas market regulation, the interested reader is instead confronted with a complex litany of measures and specific terminology. This complexity is reflected by a high number of indicators describing the characteristics of gas market regulation. Due to the lack of a best-practice model, the choice of indicators and their scaling for our analysis is inspired by the literature and publications that served as a preparation for the regulatory reform of the gas market and were generated during the Madrid Forum process. There, national Regulators, the European Commission, and industry and consumer associations incrementally discussed and developed indicators to monitor the regulatory performance. In particular, the Council of European Energy Regulator (CEER) and the Brattle group (see Council of European Energy Regulators (CEER), 2002; Lapuerta & Moselle, 2002) worked extensively on tariff

methodologies for intrastate, cross-border, and transit flows in European gas markets to facilitate the gas market liberalisation. These indicators and definitions were supposed to - if not enter at least influence - the choice of required instruments and wording of the text of the second Gas Directive which came into force in 2004. However, the appropriateness of indicators is by nature controversial, as each indicator and the interpretation of its values added to the interpretation of measures and therefore might potentially imply far reaching influence on the organisation of the gas markets (see Lapuerta & Moselle, 2002). Nevertheless, I claim the indicators proposed in the framework of the Madrid Forum are sufficiently consensual to assess comprehensiveness of regulatory regimes in the gas sector.

As a matter of fact, the lack of a best-practice model of a competitive gas market posed some challenge to put into operation the comprehensiveness of regulatory regime. We suggest a bottom-up approach, starting with indicators applied by the European Union and then weighting and scoring the indicators to create an index. In this context, three critical questions had to be solved: First, which indicators sufficiently describe a regulatory regime in the gas sector and second, how should these indicators be weighted in an index? And even more important, how shall the instruments be scored? The following section is organised according to these questions.

6.5 Choice of Indicators

The following section explains the choice of indicators for the first dimension of the variable “comprehensiveness of regulatory regime”, the regulatory function. Then, in a second step, I define the indicators for the second dimension, the regulatory competencies. The choice of indicators is based on the assumption that the regulatory measures of the whole downstream part (wholesale, network activities, and downstream) of the gas value chain matter.

6.6 Indicators for the dimension of regulatory function

I refer to the concept of regulation the Madrid Forum applied to describe the choice of indicators for the variable regulatory comprehensiveness in its dimension regulatory function. In the beginning of the Madrid Process, the participants basically distinguished between two groups of aspects: first, the

technical and commercial conditions applying to the access to the system, with particular attention to the aspect of tariffication (“conduct regulation”). The second (“structural regulation”) concerns the decision regarding the structure of the gas industry, in particular the obligations imposed to gas companies with regard to the limits to vertical integration (unbundling). (Madrid Forum, 1999: 1-2)

This very general grouping serves as a starting point to present the chosen indicators which are based on the suggestions made in the benchmarking reports and the documents accompanying the Madrid Forum. In the following paragraphs define the indicators and give further explanations where necessary. The indicators are often based on several components which are exposed in detail in the tables (4 & 7).

Table 2: Grouped indicators for operationalisation of the variable “comprehensiveness of the regulatory regime” for dimension regulatory function

Indicator 1	Market opening
Indicator 2	Gas network access conditions and tariffication
Indicator 3	Balancing rules
Indicator 4	TPA storage
Indicator 5	Gas release programme
Indicator 6	Trading facilities
Indicator 7	Network unbundling Transmission System Operator (TSO)
Indicator 8	Network unbundling Distribution System Operator (DSO)

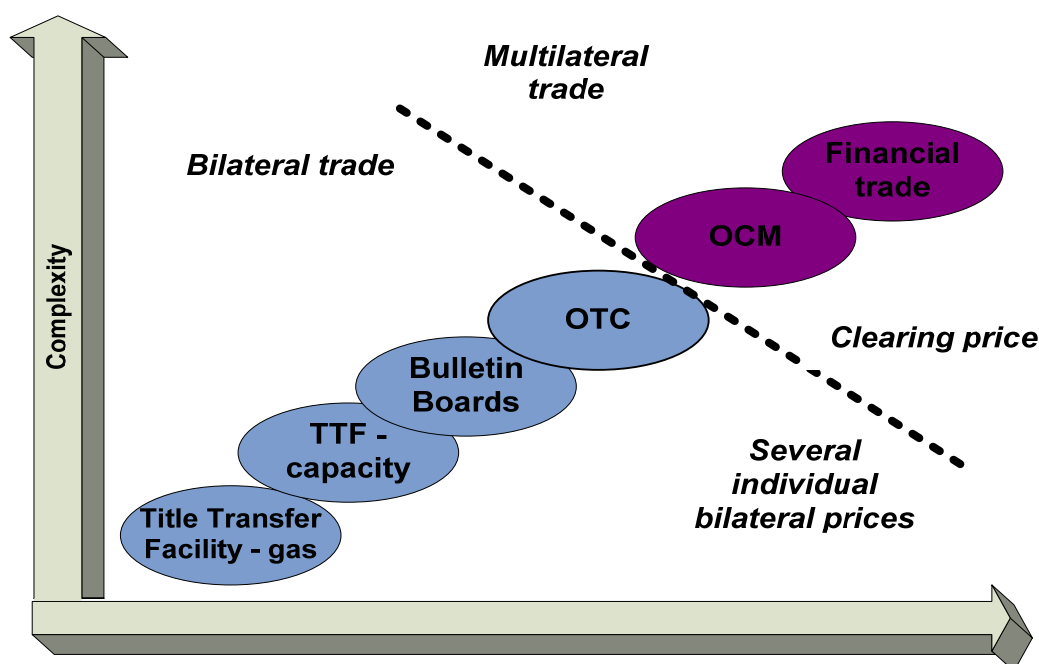
The legal provisions of the Gas Reform required a gradual market opening (Indicator 1) that has been introduced in the course of the reform. The facilitation of the market opening and its precise requirements is addressed in section 5.3.1. Indicator 2, ‘Gas network access conditions and tariffication’, incorporates such information as type of capacity booking as well as minimum booking period and tariff structure to describe the flexibility and transparency of the access regime. Indicator 3 includes ‘balancing rules’, accounting for the fact that certain balancing measures can be a powerful tool to increase the entrant barriers for flexible trade. The latter focuses on the required balancing period, because it is regarded as a key measure to ensure network access, flexible trade, and a balanced network system alike (see Ofgem, 2002). Other balancing rules, such as the arrangement of tolerance bands or the allowance for pooling and trading in the balancing regime, are not included, weighting the gain of adding secondary measures and loss through over complexity of the measurement.

Discussions centred on storage issues during the second half of the Madrid Forum process. These discussions clarified the significance of ‘Third party access (TPA) of storage’ (Indicator 4), in order to guarantee a balanced gas transport system and equal trading opportunities for transmission operators and gas traders alike (see European Commission, 2003; International Energy Agency, 2000: 100; Madrid Forum, 2004b). The last but not least indicator is the ‘Gas release programme’ (Indicator 5). In markets which are dominantly supplied by long-term import gas contracts, market liquidity can either be achieved by gas release programmes for “over-the-counter” (OTC) or by gas trade in the on-the-day commodity (OCM) market stemming from balancing arrangements. Therefore, the existence of a gas release programme is an essential tool to accelerate the intensity of competition in the market by requiring dominant market players to release certain amounts of their long-term contract gas import to other market players such as new entrants.

This leads to indicator 6 which assesses whether there are significant trading facilities in place. The EU provisions do not prescribe the establishment of trading facilities such as gas hubs or gas exchanges. Instead, it is left to the incumbent, the market, and member states to establish trading

facilities. In general, liberalised markets are characterised by a growing complexity of transactions (see Ingwersen, 2004, 14 April). Whereas monopolistic markets are dominated by confidentially contractualised bilateral trade, so called OTC trade, standardisation, and transparent pricing is significant for transactions in liberalised markets (see Wright, 2005: 21).

Figure 4: Growing complexity of trade in a liberalised gas market



More advanced liberal markets such as the UK are characterised by a very differentiated market landscape. Wright identifies four different gas markets in the UK, a retail and three different wholesale markets. On the wholesale level, in addition to the classical long-term bilateral contract market there is the OTC market and the on-the-day commodity market (see Wright, 2005: 52). The latter initially evolved from system operator's need to balance the pipelines system and later served as a vehicle to promote the development of trade. Since liberalisation, more trading opportunities evolved within other European gas markets as well. Mainly, due to the creation of gas hubs and or virtual trading points, new traders could enter the markets. Therefore, the existence of complex trading facilities offering clearing prices can be interpreted as an indicator for market openness, a necessary precondition for achieving competition. More precisely, the volume of traded gas at the OTC and OCM markets in relation to gas trade conducted within bilateral long term contracts could serve as an indicator for the degree of competition. As we see later, the assessment of the indicator is not based on this ratio. Instead, a more technical approach is followed by asking whether there are significant trading facilities such as gas hubs or gas exchanges. The European Commission did not monitor this indicator in most of its benchmarking reports. Instead, the data is collected from primary and secondary literature.

To describe the process of vertical ‘dis-integration’, the so called unbundling of trade and distribution or transmission services within a formerly integrated utility (structural regulation), has been incorporated. In this respect, we chose a group of indicators to describe the network unbundling of Transmission System Operator (TSO) (Indicator 7) and network unbundling Distribution System Operator (DSO) (Indicator 8). Through distinguishing between TSO and DSO a more precise picture of the different levels of services can be achieved. In doing so, we expect to show different rates of implementation with regard to unbundling of gas industry.

6.7 Indicator for the dimension of regulatory competencies

According to Arentsen, the dimension of ‘regulatory competencies’ refers to competencies, capacities, and instruments of the regulator. Elaborating on the latter dimension, he distinguishes two aspects: competencies and capacities on the one hand and the degree of autonomy of the regulator on the other. (See Maarten Arentsen, 2004: 88)

Table 3: Grouped indicators for operationalisation of the variable “comprehensiveness of regulatory regime” for the dimension regulatory competencies

Indicator 9	Type of decision-making by regulatory authority (Ex ante/ex post)
Indicator 10	Capacity allocation rule decided by
Indicator 11	Balancing conditions approved by
Indicator 12	Dispute settlement
Indicator 13	Type of Regulator
Indicator 14	Ratio of consumption of national gas market and staff number of national regulator
Indicator 15	Ratio of consumption of national gas market and budget of national regulator

Regulatory competencies – in terms of competencies, capacities, and degree of autonomy – basically deal with different aspects of decision-making regarding network access conditions. Hence, Indicator 9 ‘Type of decision-making by regulatory authority’ refers to the timing of the network access regulation and the existence of a regulatory authority to regulate third party access. In this context,

two approaches can be distinguished: one applied by a majority of Member States consists of ‘ex ante’ regulation, i.e. it provides for a requirement for operators to submit a schedule for network access tariffs to the regulator for approval prior to its application. The second approach is ‘ex post’ regulation. Under this approach grid operators would, for instance, publish or notify network tariffs applied by them to the regulator, who then has the possibility to intervene or not. (European Commission, 2001: 66)

The next set of indicators describes the degree of autonomy the national regulator has towards the governmental institutions (such as ministries of economic affairs). These indicators inform

which authority or authorities jointly decide on ‘capacity allocation rules’ (Indicator 10), ‘balancing rules’ (Indicator 11), or are in charge of ‘dispute settlement’ (Indicator 12). In other words, the governance dimension is addressed.

The remaining three indicators map the formal competencies and capacities of the national regulator. First and foremost, we assess whether a ‘regulator’ has been set up and distinguish between pure sector regulation and multi-utility regulators (Indicator 13). This is complemented by the next two indicators, which qualify the institutional endowment the regulator received from the member states. By assessing the staff number (Indicator 14) and the budget of the national regulators (Indicator 15) and setting these numbers in relation to the size of the natural gas market (market size/staff or budget) it allows us a tentative judgment about the strength or formal competencies of the member states regulator. Gas consumption (in million tonnes oil equivalent) in the year 2000 serves as a reference point for describing the market size. The staff number and budget numbers comprise the energy regulator as such and don’t distinguish between sectors such as gas and electricity. Often they even refer to a multi-utility regulator, including telecommunication.

6.8 Index: Aggregation and weighting of Indicators

Due to the lack of a best-practice model of a competitive gas market which precisely outlines the characteristics of an ideal regulatory regime, there was no applicable concept available for the formulation of an index. The aim and conceptual contribution of this study is therefore to formulate an index that indicates the relative distance of the member state’s regulatory regimes to an anticipated best-practice model. In doing so, we apply a bottom-up approach to weight indicators. Based on the choice of 15 indicators and its 23 components to describe a regulatory regime, we determine that all 23 components together correspond to 100%.

The alternative would have been to determine criteria according to which the weighting of indicators is carried out. We briefly illustrate why a weighting of indicators is important and at the same time ambivalent if its criteria driven. This involves discussing the comparative impact of two indicators, third party access, and balancing rules. In this context a reasonable question might be: do balancing rules have the same impact as network access rules on the market reality? The answer must certainly be no. Third party access is a crucial instrument that enables new market entrants to trade their gas through a network; balancing rules are rather complementary. Nevertheless, balancing can be used as a tool to influence the amount of available capacity and the market liquidity. At the same time, balancing rules allow sharing responsibility for the optimisation of gas flows in the grid between the network operator and trading companies. The discussion accompanying the European gas reform clearly demonstrated that all the downstream activities of the gas chain have to be taken into account (transmission, storage, distribution) and this necessitates including instruments regulating the entire downstream sector (see European Commission, 2003). In other words, it can be considered moderately consensual to include the proposed instruments, whereas the question of how to deal with different impacts of instruments is analytically pretty nebulous. Indeed, it becomes more complicated and controversial if one tries to express the comparative importance of for instance, TPA and balancing rules in exact figures. Experts may find common ground in the fact that both instruments are relevant and even consider the overall impact of the chosen network access rules to be more decisive than the balancing rules. However, it is unlikely that they would reach an agreement on the impact of one

instrument on the whole comprehensiveness of a regulatory regime expressed in percentage. Due to the lack of a clearly defined best-practic model and the ambivalence of expressing the comparative importance of indicators in exact figures, there is no optimal solution for creating an index.

We identified two criteria the index is based on: one, it should allow the same hierarchical scaling for the values of each indicator, and two, it is supposed to reflect differing significance of indicators regarding their impact on promoting competitive market conditions. These two criteria are carried out by the proposed bottom-up approach. According to this logic, the index is created first by choosing indicators and then calculating the indicators share or impact on the regulatory regime. The indicator's share can be grouped according to the indicator's dimension (e.g., regulatory function) or single indicators (e.g., balancing rules).

Accordance to the calculations, the comprehensiveness of regulatory regime is 70% determined by indicators related to the regulatory function dimension and 30% by indicators describing the second dimension, the regulatory competencies (see figure 6). The result is in line with the assumption that the two dimensions - regulatory function and regulatory competencies - do not have the same impact on the regulatory comprehensiveness.

Figure 5: Indicators' share of a comprehensive regulatory regime

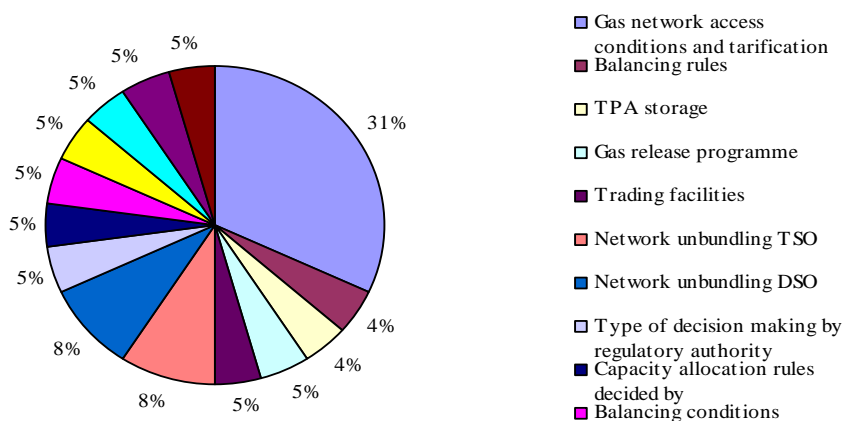
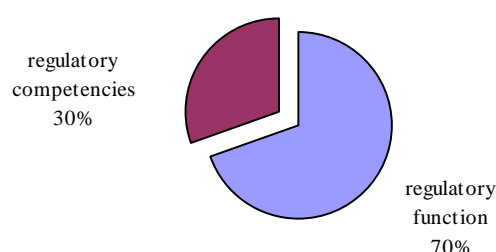


Figure 5 illustrates each indicator's share describing the regulatory regime. The previous section identified 15 Indicators to describe the regulatory regime. The regulatory function is expressed by 8 Indicators, comprising 16 components, while the regulatory competencies are assessed with 7 Indicators. Cumulating the indicators components and calculating their shares, the following composition evolves: 'Gas network access conditions and tariffication' (Indicator 2) hold a share of 31% and 'network unbundling at TSO and DSO' each represents 8% (Indicators 7 and 8). The other indicators are all incorporated with a share of 5%. These are: 'Gas release programme' (Indicator 5), 'Trading facilities' (Indicator 6) 'type of decision making by regulatory authority' (Indicator 9), 'capacity allocation rules decided by' (Indicator 10), 'balancing conditions

approved by' (Indicator 11), 'dispute settlement conducted by' (Indicator 12), 'type of regulator' (Indicator 13), 'ratio of staff number of national regulator and consumption of national gas market' (Indicator 14), and 'ratio of budget of national regulator and consumption of national gas market' (Indicator 15). Due to mathematical reasons Indicator 3, 'balancing rules' and Indicator 4, 'TPA storage', deviate from this scheme and receive only 4%.

Figure 6: Dimensions' share within a comprehensive regulatory regime



The bottom-up approach suggests that the indicators describing the regulatory competencies make up approximately 1/3 and regulatory function 2/3 of the regulatory regime. The latter mainly stems from the comparative importance inherent in the indicators gas network access conditions and tariffication (31%) and network unbundling at TSO and DSO levels (8%). One can argue that the comparative importance is achieved by several components forming the indicators, whereas the other indicators are only based on one component. This is certainly a correct observation, but a different grouping of indicators (e.g., through a split of indicators, all indicators equally based on one component) is still not favourable for analytical reasons.

6.9 Index: Components and scaling of Indicators

The scaling of the variables values is arranged along the logical distance to the necessary condition for the promotion of a competitive market model. Each indicator is ranged from 0 to 10, assuming equal distance between the values. In terms of scaling, there is no distinction made between the nominal and interval measurement of the indicator values. Nominal measures like time, percentage, and other numbers are also grouped and expressed with the 0-10 scaling; otherwise the nominal indicators would gain more weight in the index than transformed interval indicators. The main reference point serves as the distance or closeness to the best practice model. The index applies a scoring rule to each indicator ranging from 0 to 10, where 10 is the most competitive.

Not every indicator has an equal number of values or categories, although the total number of categories does influence the score. One might criticize the scoring method to be value sensitive or even biased. To minimise this effect, the values have been grouped into categories.

6.10 Scoring of Indicators describing the dimension of regulatory function

The scoring is based on the reform's inherent theoretical assumptions as well as the concrete provisions and principles of the reform (see chapter 2 and 5). Thereafter, the chosen regulatory instruments should meet the principles of objectivity, non-discrimination, (information) transparency, efficiency, being economical, and safeguarding security of supply. Moreover, prices should be fair and instruments should be cost-reflective, environmentally friendly, and consumer protective. Both principles and instrument-related European legal provisions were elaborated earlier and serve as a reference for the scoring.

6.10.1 Legal market opening

The scoring of 'legal market opening' takes the legal provisions of the Gas Directives as reference points (see section 2.4). Accordingly, a low market opening is defined as 20-28%, a middle market opening 29-42%, and a high market opening is reached if more than 43% of the market has been formally opened. The Directives distinguish between new and advanced market openers. In terms of scoring, this differentiation is reflected in the percentages of market opening and is later stated by the empirical data.

Table 4: Legal market opening (Indicator 1)

Indicator	data type	values and scores
Legal market opening	numeric	high (10) = >43% middle (5) = 29-43% low (0) = 20-28%

6.10.2 Network access conditions and tariffication

In the first years of the gas reform, the EU was especially concerned with measures that promised to open the market for competition and serve market integration by lowering the barriers for cross border transport. In this regard, network access conditions and tariffication were seen as the spearhead. Often cross-border or even inter-European transport has not been economical because the nationally applied tariff system often resulted in so-called "double-counting" or "pan-caking" (European Commission, 2000a: 7). The second indicator is therefore assessing gas network access conditions and tariffication. The indicator is based on seven components, and thereby reflects different aspects of a tariff system and network access conditions (see Lapuerta & Moselle, 2002: 35). Although the indicator third party access is a genuine part of the network access, this is subsumed under regulatory competencies and treated in the next section (see Indicator 9) due to the fact that the question of whether third party access

is regulated or unregulated reflects the decision mechanism the network access conditions are based on.

Tariff system

The distinction between tariff structures, type of capacity booking, and allocation method is often not clear, or sometimes the terminology is simply mixed up. This is often due to the fact that the tariff structure corresponds with the type of capacity booking. Germany for instance, used to have a distance-based tariff type and applied for the capacity booking a point-to-point method. In contrast, the Brattle Group pointed out several examples where capacity is defined one way and tariffs are set in another way. The different aspects of a tariff system can be described as follows: whereas the type of capacity booking defines the access, the tariff structure determines the pricing rules. In distinction, the allocation method determines the mechanism the network capacity is allocated by. No tariff instruments are prescribed by the European gas market regulation, but left to the member states to decide.

Tariff structure

The Madrid Forum repeatedly stressed the need for convergence in terms of tariff structure (see European Commission, 2002: 16; Madrid Forum, 2001, 2002, 2004a), but the legal norms do not prescribe the tariff structure itself. In this context, the Council of European Energy Regulators stresses the “diversity of tariff structure in Europe in itself could impose transaction costs (associated with gathering the information and understanding it) on new entrants to the point where new entry is deterred” (Council of European Energy Regulator (CEER), 2000: 9). The discussion paper of the Madrid Forum indicates that entry-exit tariff structures are considered to be much more effective in promoting gas trade and market liquidity. Furthermore,

the Regulators, the Commission and most member states expressed serious doubts that distance-related point-to-point tariffs would effectively achieve this and therefore invited Regulators, Member States, GTE, and individual TSO's to consider more cost-reflective and trade-promoting tariff systems such as entry-exit systems. (Madrid Forum, 2001: 3)

The general acceptance of entry-exit tariffs later resulted in the presentation of a report that documents on the implementation of the “a road-map to entry-exit systems” (Madrid Forum, 2004a: 3). To sum up, entry-exit tariffs systems are considered to be cost-reflective, flexible, transparent and non-discriminatory.

Reading these statements still leaves us with the question of why entry-exit tariffs are favoured by the European Commission and the majority of participants of the Madrid Forum. The Brattle Group offers this explanation:

Under an entry-exit system, the total transportation charge is the sum of separate charges for entry and exit capacity. The charges vary by entry and exit point, and should be set to make the total charge for any transportation route as close as possible to the associated cost. (Lapuerta & Moselle, 2002: 42)

Following this line of interpretation, the tariff allows to transparently reflect costs for the transport itself and the costs stemming from keeping up the flexibility of the network, and thereby reduces the risk of monopolistic rents. The claim entry-exit based tariffs are cost-

reflective is contested. In either case, entry-exit tariffs have two characteristics that meet the aims of the liberalisation process. First, entry-exit significantly promotes the transparency of tariffs. As a result, new entrants are able to calculate transportation costs without facing high transaction costs that would otherwise discourage participation in the market. Secondly, it is argued that entry-exit systems give locationally and temporal signals that allow identifying and reducing congestion in the grid. Manifested through high prices at certain entry-exit points, this tariff type is supposed to additionally indicate where investment might be necessary (See Council of European Energy Regulators (CEER), 2002: 4).

In contrast to entry-exit tariffs, distance related tariff structures have to fulfil certain conditions to be cost-reflective and non-discriminatory. According to Lapuerta and Moselle (2002), these conditions are not given in reality. As they point out “in more complicated networks with multiple entry and exit points physical flows will deviate significantly from contractual flows. In these instances, distance-based systems no longer provide cost-reflective charges and therefore are potentially discriminatory” (Lapuerta & Moselle, 2002: 38). It is argued that this deviation allows operators to ask for higher transportation costs, which discriminate against new entrants. In other words, distance related tariff structures permits incumbents (supplying and transporting) to determine the increase of marginal costs for transporting additional gas.

Postal tariffs, so called postage stamp tariffs, can be thought of as a special case of entry-exit tariffs - with the same entry tariff at every entry point and vice versa (see Lapuerta & Moselle, 2002: 35). The CEER working Group elaborates,

if postage stamp (average cost) tariff is applied where the network modelling implies locationally differentiated tariffs, there will be a cross-subsidisation from ‘low cost’ entry points to ‘high cost’ entry points. The tariff will not be cost-reflective. Post-stamp tariffs allow incumbents and new entrants to compete on an equal cost basis. Cost reflectivity is, however, very important because tariffs distort the market. In view of the Working Group (CEER), therefore, the best approach is to set cost reflective tariffs for all and simultaneously ensure capacity arrangements provide for non-discriminatory access. (Council of European Energy Regulators (CEER), 2002: 5)

The benchmarking reports also designate the category “mixed” for countries in which different tariff zones still exist. Some zones may have already introduced entry-exit, whereas others still use distance related or postalised tariffs. In other words, a national market can contain a favourable and an unfavourable tariff system at the same time. Nevertheless, the least optimal solution is no publication of tariffs as such, which is covered by the values ‘not applicable’ or ‘not published’. Thus, we argue mixed systems are less favourable as well, because they offer a lower degree of tariff harmonisation and transparency which in return results in higher transaction costs for the companies. Distance related and post stamp tariffs receive the same score as we could not identify a qualitative difference between their disadvantages (one cross-subsidising different transport cost areas and the other offering the ability to increase the TSO profit due to the deviation of contractual and physical flows). Entry-exit tariffs receive the highest score, mainly because the EC considers it to be the best practice tariff that promotes transparency and non-discrimination.

Type of capacity booking

In practice, tariff structure and type of capacity booking often correspond. However it is also possible to deviate, as they express different functions of network access. The benchmarking reports distinguish eight values that describe capacity booking and group them into four categories. The first category form entry based, entry-exit based, and so-called cost-reflective types of capacity booking, and the second group consists of distance related types postalised and point-to-point based capacity booking. The third category incorporates mixed types of capacity booking and the fourth is reserved for countries that do not provide any information about the way capacity booking services are organised. The most favourable are the most flexible and cost-reflective in the first category. Due to the similarity between the values of tariff structure and type of capacity booking, we apply the same reasoning then for the tariff structure (see above). In this context it is noteworthy that the type of capacity booking described here does not indicate duration. In other words, the different type of capacity booking does not reflect the phenomenon of capacity congestion in some of the European gas markets.

Allocation method

The next indicator describes the allocation method used to distribute transport capacity. Three different types of allocation methods are applied in the EU gas markets that are considered to have different degrees of efficiency and impact on discrimination. The auction mechanism is the first. In the European context, this method was introduced in the UK in 1999 to replace the negotiation based allocation of capacity rights. Under an auction mechanism, available capacity is published and thereafter auctioned. This mechanism allows a transparent and non-discriminatory proceeding to allocate capacity. Moreover, it is claimed that an auction mechanism provides market signals for investment in transport capacity. Since high auction prices are a sign of scarce capacity, it can set incentives to upgrade transport capacity. (See McDaniel & Neuhoff, 2002)

The second category ‘Capacity goes where costumers are’ describes the mechanism used in Sweden. Unlike the other European gas markets, the Swedish gas market enjoys an oversupply of capacity and therefore capacity goes where the costumers are. Although the Swedish situation is comfortable from a regulatory point of view, it is not applicable to other European countries that lack transport capacity. Nevertheless, capacity-goes-where-consumers-are is a very favourable allocation method and therefore receives a high score. The same holds for the value “not applicable”, which is used to express that there is no congestion, but sufficient capacity for all market players.

‘First come first served’ (fcfs) forms the third category. Under this mechanism capacity goes to the shipper that first requests transport services (see American Gas Association, 2006). Here, the pipeline operator is only obligated to provide service to a particular customer to the extent that capacity is available. Although the fcfs can be considered an improvement over the old negotiation practice, it is not the most favourable as it might result in the phenomenon of grandfathering. Under an fcfs arrangement, the system operator publishes available capacity. For potential shippers this means they have to constantly update their information on available capacity while relying on the TSO to publish the necessary information in the right manner.

Incumbents could generate a comparative advantage due to their information power, which might enable their transport arm to react much faster than new entrants. In other words, if the 'Chinese walls' are not very high, the trading part of the incumbent will receive the information much faster and perhaps of better quality than other market players gaining a comparative advantage.

The benchmarking report uses the value 'others' without specifying or giving any further explanation. Following the Latin principle *in dubio pro res*, we subsume the value 'others' not under the least favourable measures. The least favourable situations for supporting competitive market conditions occur if the value information is 'not available' or the implementation of a general allocation method of the capacity is 'planned'.

Tariff

The Brattle Group sheds some light into the tariff formulation principles by offering us a straight forward formula: "an aggregate tariff can (therefore) be conceived as the sum of two components: tariff = "scarcity charge" + "charge to recover balance of fixed costs" (Lapuerta & Moselle, 2002: 38). Accordingly, we can deduce that there is an individual fixed cost component and a relative profit margin component. Though there is a certain degree of discretion stemming from differences in individual network costs, in general higher tariffs are an indicator that network operators are charging above the marginal (long run) costs. As a consequence of high transportation costs in the form of tariffs, the profit margins of all players are reduced. In general, the causality holds true that the higher the tariff, the higher the entrance barrier for new entrants. The tariffs in the European Union show a huge disparity. Between 2002 and 2005, tariffs on the transmission level ranged from 0.75-5.5 Euro/Mega Watt hour (MWh). To score the level of tariffs, we group the values in low (0-2 Euro/MWh), middle (2,1-3 Euro/MWh) and high (3,1-5.5 Euro/MWh), and then score accordingly.

Incentive regulation

The literature distinguishes between four methods of incentive regulation: price-cap regulation, rate-of-return regulation, revenue-cap regulation, and the so called discretionary regulatory regime of tariff determination. (Alexander & Irwin, 1996, September: 3).

The price-cap mechanism imposes a ceiling on prices the network company is allowed to charge as tariffs. The regulatory authority reviews and determines a price-cap regulation for a period of three-to-five years based on a complicated formula. Components of this formula determine the degree to which inflation, operating costs, return of investment (cost recovery), return on investment (profit), and efficiency gains are taken into consideration. The formula and scope of its variables vary for each country. In other words, the method itself does not inform about the strictness of the regulation per se but enables the generation of an efficiency factor, also known as x-factor. In this context, x represents the expected annual gain in the utility's efficiency that the regulator imposes on the gas network operators. Price-caps often distinguish between generic and individual efficiency factors. For instance, the Dutch regulator Dte formulated not only a generic x-factor of 1% per year, but also individual x-factors for the operating companies. During the Dutch price review period between 2005 and 2007 the companies specific x-factors ranged from -0,4% (NRE Energie) to 6,5% (Essent). The Dutch example demonstrates how

considerably the company specific x-factors vary. (See *Directie Toezicht Energie* (DTe), 2007)

Under a rate-of-return regulation utilities are permitted a set rate of return on capital. In contrast, revenue-cap regulation takes the total revenues as the variable on which the ceiling is imposed. For the process of rate-of-return regulation and revenue-cap regulation the estimation of regulatory asset base values is crucial. Regulatory asset base value refers to

the capital value of the assets used by regulators in setting prices or price limits for utility companies. A basic formula in utility rate-setting is: Required Revenue = Operating Costs + Depreciation + Return on Capital. That is to say, utility charges should be designed to recover no more than reasonable operating costs (including taxes), plus capital charges that provide investors with a competitive return equal to what they would have earned on other investments of equivalent risk. Capital charges include both a return *of* investment (also known as depreciation) and a return *on* investment (known as profit). Both depreciation and return on capital require an approach to asset *valuation*, i.e., the determination of the Regulatory Asset Base. (Woodman, 2004)

The last method ‘discretionary regulatory regime’ is not defined and serves as an umbrella for methods other than the two mentioned. Often a mixture of several elements of price-cap regulation and rate-of-return regulation, it is sometimes labelled as a hybrid form.

The European Union did not prescribe any kind of incentive regulation and the European Commission did not declare or promote any preference in this regard. The legal provisions refer only indirectly to incentive regulation through the principles of economic and cost-reflectiveness. For our assessment it is therefore crucial whether any kind of incentive regulation is in place. A more differentiating ranking of the four forms of incentive regulation is not suitable. Moreover, the effect of these forms of incentive regulation vary in their country specific application, which makes an instrument based rating less meaningful.

Minimum booking service firm service

The indicator minimum booking service of firm services describes the flexibility of transport arrangements. The minimum booking period of firm services varies yearly, monthly, weekly, daily, and can also have no minimum. The values are ranked by their degree of flexibility and grouped into scoring categories accordingly (see below).

Use it or lose it (UIOLI)

‘Use it or lose it’ is a voluntary mechanism that can be applied to enhance the market liquidity and foster non-discrimination with regard to transport capacity access. It is supposed to force shippers to release initially booked but ultimately unused capacity. The use it or lose it mechanism is a powerful tool to prevent capacity hoarding for strategic or speculative reasons (see Cavaliere, 2007: 16). The benchmarking reports introduce four values to describe the application of the use it or lose it mechanism. The scoring is self-explanatory except for the value ‘not applicable’. In this context the value ‘not applicable’ is used to describe countries without capacity congestion and is therefore given a high score. Moreover, if information is unavailable to the European Commission it is assumed not to support the transparency principle and is therefore considered unfavourable.

Table 5: Gas network access conditions and tariffication (Indicator 2)

Component	data type	values and scores
Component 2.1: Tariff structure	nominal	entry-exit (10) distance, postalised (6.7) mixed (3.3) not published (0)
Component 2.2: Type of capacity booking	nominal	entry, entry-exit, cost-reflective (10) point-point, postalised (6.7) mixed (3.3) not applicable, not available (0)
Component 2.3: Allocation method	nominal	auction, cgwc, not applicable (10) fcfs (6.7) others (3.3) planned/not available (0)
Component 2.4: Tariffs	numeric	high (3.1-5.5 Euro/MWh) (10) middle (2.1-3 Euro/MWh) (5) low (0-2 Euro/MWh) (0)
Component 2.5: Incentive regulation	nominal	yes (10) no (0)
Component 2.6: Minimum booking period firm service	nominal	no minimum, 3.3=1-3 days (10) day/month, week (6.7) month (3.3) year, no congestion/not applicable/no information (0)
Component 2.7: Use it or lose it (UIOLI)	nominal	yes, not applicable (10) short-term/Partial (6,7) planned (3.3) no, not available (0)
Gas network access conditions and tariffication		sum of the indicators scores (listed above, max. 70 scores)

6.10.3 Gas balancing rules

Regulation 1775 determines principles for the balancing provisions in Article 7. Thereafter balancing rules should be fair, transparent, and non-discriminatory, reflecting costs; the rules should not hamper cross-country trade and transport within Europe (see section 5.3.4). Balancing regimes were a subject of the Madrid Forum earlier within the context of the formulation of the Guidelines for Third Party Access Services (see Madrid Forum, 2000; Madrid Forum, 2002). In contrast to the tariff structure, the Madrid Forum did not reach a consensus about whether hourly or daily balancing is more favourable. Moreover, the European Commission did not formulate any preference with regard to the duration of balancing periods. So far, it is contested whether

hourly or daily balancing is more favourable. The benchmarking reports distinguish between monthly, daily, hourly, and mixed balancing arrangements. These are scored according to their degree of flexibility.

6.10.4 Third party access to storage

The introduction of competition in all parts of the gas chain including gas storage aims to offer equal business opportunities to new entrants and to optimise system flow at the same time. Access to gas storage has not only proven to be relevant for optimising the transport system, but can serve as a powerful tool to meet the balancing requirements and also offers trade opportunities. For instance, gas bought and stored during summer time could be profitably sold at a higher price in winter time. Consequently, third party access to gas storage has been introduced within the acceleration Directive, leaving it open whether to apply negotiated or regulated TPA for storage. A minimised variant of TPA presents the offer of “modulation services only”.

6.10.5 Gas release programme

The introduction of a gas release programme frees up gas to the market, which is originally imported through existing long-term contracts. In the European context, the UK first introduced a gas release scheme in 1991 to open the market to competitors of British Gas (see Helm, 2004: 253). Although many countries implemented a gas release programme, it is not mandatory according to EU legislation. Yet, competition in the market is stimulated by forcing dominant vertical integrated gas companies to auction certain amounts of gas from their gas import ‘bags’ to other market players. For this reason, we consider the introduction of a gas programme as favourable and a forceful measure to weaken dominant market positions and foster gas-to-gas-competition (see Madrid Forum, 2002: 6). There are some countries in which a gas release programme is not applicable, due to a lack of capacity congestion or a competitive market structure. In the latter case, the countries therefore receive a high score.

6.10.6 Trading facilities

To assess the physically available trading facilities, we distinguish between three categories. First, fully-fledged mature trading facilities are characterised by a gas hub or/and virtual trading point in conjunction with a functioning spot market and future market, resulting in a relatively high total traded volume. Second, evolving trading facilities also provide a gas hub and/or a virtual trading point, but do not offer the whole variety of contracts that full-fledged spot and future markets ensure, and are signified by a limited volume of trade. In the third category fall those markets which have not established a gas hub or virtual trading point, or if so, only offer a limited variety of contracts and trade.

Table 6: Indicators gas balancing rules (3), third part access to storage (4), gas release programme (5), and trading facilities (6)

Indicator/component	data type	values and scores
Indicator 3: Gas balancing rules		
balancing period	nominal	hourly, hourly/daily, daily (10) daily/monthly (5) monthly (0)
Indicator 4: Third party access to storage		
third party access to storage	nominal	yes (10) modulation only (5) non available (0)
Indicator 5: Gas release programme		
gas release programme	nominal	completed, yes, not applicable (10) planned (5) no (0)
Indicator 6: Trading facilities		
trading facilities	nominal	Mature (10) Developing (5) Infancy (0)

6.10.7 Unbundling

Although we suggest separate indicators for unbundling, the values to describe unbundling at the transmission and distribution level are identical. Both indicators' scoring are based on the degree of unbundling. Ownership unbundling is the most far reaching variant and implies splitting the companies vertically into a trade company and a distribution or transmission company. Legal unbundling has been mandatory since the second Directive. It preserves the ownership structure, but creates independent organisations under one roof, predominantly in the form of a company holding. For legal unbundling the expression 'Chinese walls' is often used to expose the closeness of the separated organisation in real life. Introduced by the second Directive, management unbundling is an advanced form of legal unbundling because it explicitly requires separating the staff working for the trade and transporting parts of the gas undertaking. The minimal form of unbundling is so-called unbundling of accounts. There an existing and

integrated company separates only the accounting for trade and transport services (see Brunekreeft & Keller, 2001: 7-9). In the progress report from 2005, the Commission only distinguishes between those countries which have implemented ownership unbundling or legal unbundling. 'Unbundling of accounts' is subsumed under the label 'no' legal unbundling. Management unbundling which implies legal unbundling is not taken into consideration. If countries do not offer legal unbundling by 2005, we assume the country fulfils the initial minimum of separated accounts and score them accordingly. (See European Commission, 2005a: 81-82).

Published accounts

With the introduction of legal unbundling in the first Directive (see section 5.3.3), the European Union requires the separation and publication of the accounts. Consequently, the question is whether the transmission system operator and distribution system operator of a formerly integrated gas company in one country meet the implementation requirements as outlined in the legal provisions.

Table 7: Network unbundling TSO and DSO (Indicator 7 & 8)

Indicator/component	data type	values and scores
Network unbundling TSO		Sum of the indicators scores (listed above, max 20 scores)
Component 7.1: Basic unbundling model TSO	nominal	ownership (10) management, legal/management (7,5) legal (5) account (2,5) non (0)
Component 7.2: Published accounts TSO	nominal	yes (10) no (0)
Network unbundling DSO		Sum of the indicators scores (listed above, max 20 scores)
Component 8.1: Basic unbundling model DSO	nominal	ownership (10) management, legal/management (7.5) legal (5) account (2.5) non (0)
Component 8.2: Published accounts DSO	nominal	yes (10) no (0)

6.11 Scoring of indicators describing the dimension regulatory competencies

All indicators subsumed under regulatory competencies inform us about how economic governance in the European gas sector is organised and to whom decision power is transferred to

(see Maarten Arentsen, 2004; Maarten Arentsen & Künneke, 1996). In our discussion of formal rules (section 5.3.5), we showed that a regulator is neither mandatory nor are the member states obliged to transfer all decision making power to one of the member states' regulatory authorities. We also showed that the European Commission prefers the establishment of an independent regulator in charge of regulating the gas sector with regard to network activities and trade related transactions. This preference is in line with the dominant view the current regulation theory holds on the organisation of regulation in the utility sectors (see chapter 2).

The scoring of the indicators describing regulatory competencies distinguishes different degrees of state intervention. Hence, if an independent national regulator obtains the regulatory competence it is perceived as most favourable, whereas the distribution of competencies among multiple authorities is less desirable. In contrast, the absence of regulatory authorities or market based coordination mechanism is considered the least favourable.

6.11.1 Third party access

The first Gas Directive introduced third party access but left the decision to the member states whether to vote for regulated or unregulated TPA. With the second Directive, regulated TPA became mandatory (see section 5.3.2). The legal provisions thus make a clear statement that regulated third party access is considered less discriminatory than negotiated TPA. We would still like to elaborate briefly on this appraisal and thereby discuss why ex ante regulation is more favourable than ex post regulation.

The day-to-day gas business has shown that it makes a huge difference whether the operator's access conditions are regulated ex ante or ex post. Within an ex ante system, the operator has not only to publish the network access conditions prior to its operation, but they also have to be approved before its operation. Consequently, the information and decision power is widely transferred to the regulatory authority. In contrast, ex post systems enable opportunistic behaviour by incumbents. For instance, a network operator can set high tariffs and generate a monopoly rent in the first place. Although regulatory authority may intervene ex post and revise the tariff methodology, it would be the market reality for a certain amount of time. And more importantly, it would necessitate that the regulator has to prove the tariffs to be inappropriate. By applying an ex ante system, transparency and reliability or rules can be enhanced and discrimination and the number of court cases reduced. In other words, ex ante regulation lowers transaction costs. A considerable delay of fair and transparent market conditions could also be prevented. In some countries the decision-making by the regulatory authority received ex ante and ex post competencies, depending on the regulatory function. For that type of decision-making the value 'hybrid' is introduced.

Before transferring regulatory power to regulators or any other regulating authority, the member states had the option to vote for negotiated TPA (see European Commission, 1998). This option is certainly less favourable than any ex ante or ex post regulation by a regulatory authority. In the course of the reform the majority of member states established sector regulators. A special latecomer with regard to TPA is Germany who kept negotiated third party access without simultaneously establishing a regulator. To capture this phenomenon, we introduce the value 'negotiated third party access without a Regulator'. Both nTPA and nTPA without a regulator therefore receive the lowest score.

6.11.2 Decision of capacity allocation rules

The benchmarking reports distinguish between capacity rules made by a single regulator or made together by the regulator and a transmission system operator. The third option foresees that one or more transmission system operator(s) receive(s) the decision-making power. The scoring of the indicators values follows the reasoning given above.

6.11.3 Approval of balancing conditions

In European gas markets, balancing conditions are usually approved by the regulator or ministry alone, or the competence is shared by the transmission system operator and one of the former two authorities. In some countries decision-making capacity is transferred to the market respectively to one transmission system operator. If the market holds the power of approving the balancing conditions it is crucial to have a mature market in conjunction with a comprehensive regulatory regime. If the latter is not ensured, we argue that the balancing conditions may turn out to be less favourable for other market participants than for the transmission system operator in charge of their approval.

6.11.4 Dispute settlement

Dispute settlement is one of the crucial instruments for the functioning of gas markets and a constituent part of faith in regulatory competencies. In some member states this competency is transferred to the regulator, in other gas markets governmental authorities such as the ministry, minister (e.g., economic affairs), competition authority, or regional government settle disputes. To facilitate the scoring of the indicator's value we distinguish three categories: the regulator, single-authority arrangements, and multi-authority variants of decision making. The fourth category foresees the option that no authority has been appointed to settle. This is not perceived as good for building trust or enhancing the credibility in the national regulatory frameworks and therefore receives the lowest score.

6.11.5 Type of regulator

As elaborated earlier, the competencies, capacities, and degree of autonomy of the regulator play an important role in determining regulatory competencies. The next three indicators describe the competencies of the national regulator.

When analysing the effect of regulation on economic performance, the existence of an independent regulator serves as a proxy to describe the variable regulation (see Wallsten, 2001; Zhang, Parker, & Kirkpatrick, 2002). In our operationalisation, we not only distinguish between countries with a regulator and those without, but also differentiate between types of regulators. We distinguish between a multi-utility regulator and an energy specific regulator, incorporating gas, electricity, or other energy sectors such as nuclear or renewable energies. We argue that a regulator whose focus and expertise is related to energy issues only is more likely to build up more expertise and ambition to perform with regard to energy regulation. The internal organisational agenda of an energy specific regulator is likely to be solely determined by the

energy sector regulation, whereas in a multi-utility regulator other regulatory actions might be considered more important than for instance, the launch of an energy sector inquiry or comparable sector investigations. In addition, the staff and budget numbers should be interpreted in conjunction with the type of regulator. A high ratio describing the market size in relation to the budget or staff indicates more capacities when describing an energy specific regulator. Otherwise the ratio expresses the capacity of a multi-utility regulator with several sectors to oversee. For this reason, energy specific regulators receive the highest score, followed by multi-utility regulators with the middle score; countries with no regulator get the lowest score.

6.11.6 Ratio market size/staff number of the regulator

The scoring of Indicator 14 ‘ratio market size/staff number of the regulatory authority’ necessitated a quite similar treatment as the grouping and scoring of the tariff data. The ratio is based on the market size, respective to the consumption of each country in 2000 and divided by the staff number of the regulatory authority in that particular year. The ratio ranges from 0.1 to 1.05. Accordingly, it has been subdivided into the following three groups: high (0.1-0.19), middle (0.20-0.49) and low (0.50-1.05).

6.11.7 Ratio market size/budget of the regulator

The formulation of Indicator 15, describing the “ratio market size/budget of the regulatory authority”, followed the same scheme. It is equally based on the consumption of the respective country, but then divided by the budget of the same country. Here, the ratio ranges between 0 and 11.86. However, the statistical spread is rather concentrated in the first half. Taking this into account, a high ratio is considered less than 1, middle ratio between 1 and 2, and a low ratio corresponds with any value above 2.

Table 8: Indicators (9-15) describing regulatory competencies

Indicator 9: Type of decision-making by regulatory authority (Ex ante/ex post)		
Indicator/component	data type	values and scores
	nominal	ex ante (10) ex post (5) nTPAwR (0)
Indicator 10: Capacity allocation rule decided by		
	nominal	Regulator (10) Regulator/TSO (5) TSO (0)
Indicator 11: Balancing conditions approved by		
	nominal	regulator (10) ministry (7.5) TSO/ministry-TSO/regulator (5) TSO (2.5) Market, not known (0)
Indicator 12: Dispute settlement		
	nominal	regulator responsible (10) Minister; competition authority (6.6) ministry + regulator responsible; regulator/regional government; hybrid (3.3) not regulated; no regulator (0)
Indicator 13: Type of regulator		
	nominal	Energy specific regulator (10) Multi-utility regulator (5) No regulator (0)
Indicator 14: Ration market size/staff number		
	numeric	high (10) middle (5) low (0)
Indicator 15: Ratio market size/budget		
	Numeric	high (10) middle (5) low (0)

6.12 Summary

The literature review and related political discussions show that the term regulatory regime enjoys pluralistic interpretations and is usually not explicitly defined. As a consequence there is no common understanding about what a regulatory regime consists of or which indicators are constituent. In a wide interpretation of the term, contractual arrangements such as for instance long term Take-or-pay contracts or indicators for cross-border interoperability might be included. We suggest that the definition of regulatory regime and its operationalisation focuses on the formal institutional factors of the regulatory performance. The proposed operationalisation of regulatory regimes in European gas markets may be insufficient for a competitive European gas market in future, but we argue that our anticipated best-practice model is reasonably influential in shaping current market reality to legitimate our proceeding. With the limited scope of the concept of regulatory regime in mind, the conceptual work exposed here will certainly inspire controversial discussions and hopefully enjoy further improvements.

For the assessment of regulatory regimes in European gas markets we applied the concept of convergence. Thereafter, we distinguish between sigma-, gamma- and delta-convergence. This allows us to assess the degree, speed, and direction of convergence. All three approaches are based on the 15 Indicators that describe the regulatory regime of a national gas market. These are grouped into two dimensions, regulatory capacity and regulatory competencies, thereby differentiating between policy and polity. Accordingly, a decrease of variance indicates sigma-convergence. Gamma-convergence occurs if some countries move faster than others towards a best-practice model. The overall decrease towards a best-practice model can be detected by assessing delta-convergence. For this reason we developed a methodology that allows us to deduce what the European Union represented by the European Commission considers to be best practice. To facilitate this, we created an index based on 15 indicators consisting of 20 components. The sum of these 20 components, each allowing a ceiling of 10, amounts to 200 maximum scoring points. The table displays how the values of the indicators are attributed to the three models referred to in section 3.3.

Table 9: Regulatory regime models in European gas markets

	Model type	Best practice	Emerging	Minimal
<i>Indicators describing regulatory functions</i>	Legal market opening	> 43% legal market opening	< 43% legal market opening	< 28% legal market opening
	Tariff structure	Entry-exit	Point-to-point, postage stamp tariffs	Mixed, not published
	Allocation method	Auction	First come, first served	Planned, not available
	Minimum booking (firm services)	No minimum, day	Month	Year
	Use-it-or-lose-it	Yes	Short-term, partial or planned	No
	Balancing period	Hourly, daily	Daily/monthly	Monthly
	Third Party Access to storage	Yes	Planned, modulation services only	No
	Gas release programme	Yes, not applicable	Planned	No
	Unbundling (TSO/DSO)*	Ownership unbundling	Management or legal unbundling	Separation of accounts
<i>Indicators describing regulatory competencies</i>	Type of decision-making by regulatory authority	Ex ante	Ex post	Negotiated TPA without a regulatory authority (regulator)
	Capacity allocation rules decided by	Regulator	Regulator/TSO	TSO
	Balancing conditions approved by	Regulator	Shared responsibilities	TSO/market
	Dispute settlement	Regulator	Shared responsibilities	not regulated
	Type of regulator	Energy regulator	Multi-sector regulator	No regulator
	Staff of the regulator in relation to the market size	Well equipped	Sufficiently equipped	Low number of staff/market ratio
	Budget of the regulator in relation to the market size	Well equipped	Sufficiently equipped	Low number of budget/market ratio

* Within the unbundling indicator, we distinguish between the unbundling modes of the transmission system operator (TSO) and the distribution system operator (DSO). Further, we separately assess whether accounts are separated.

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7. EUROPEAN GAS MARKET REGULATION: DO REGULATORY REGIMES CONVERGE TOWARDS BEST PRACTICE?

7.1 Introduction

This empirical chapter analyses converging and diverging trends within regulatory regimes in European natural gas markets. The first section outlines the main results of our empirical analysis. We then leave the regime level and show how these results were generated from an indicator level. In the sequence and grouping suggested in the methodology section, we examine three different modes of convergence (sigma, delta, and gamma) for each indicator. Accordingly, the indicators subsumed under the dimension regulatory function are tackled first, followed by the analysis of those indicators belonging to the dimension regulatory competencies. In our definition, sigma convergence indicates harmonisation, whereas delta convergence expresses the direction and degree of harmonisation. Both forms of policy convergence are complementary. Moreover, gamma convergence mainly informs us about countries whose performance is somehow outstanding, be it because some countries move faster towards best-practice or former best-practice countries revise their policy in a less favourable way. Additionally, the index developed earlier allows measuring the degree of delta convergence and thereby seeing how far

the old member states are from best practice in terms of gas market regulation (see chapter 6). Last but not least, we confront our expectations concerning the correlation between the success of delta convergence and the degree of legal specification with our empirical observations.

7.2 Regulatory comprehensiveness at a glance

On the basis of our analysis we conclude that the regulatory comprehensiveness in the EU-12 natural gas markets reached only a moderate degree by the end of 2005. A correlation between the legal specification of the European legal provisions and the degree of delta convergence appears to be positive but not very strong. Accordingly, European law that prescribes regulatory instruments can be interpreted as a necessary but insufficient condition to achieve best practice. These two main results will be specified in three steps. First, we summarise the occurrence of the three types of convergence approaches. An indicator-specific analysis is provided in the next sections and the results are discussed in more detail in the related overviews of the dimensions. Second, we analyse the impact of the two dimensions, regulatory function and competencies. Third, we assess the increase of delta-convergence towards best practice and identify implementation patterns by taking a country perspective.

The analysis of sigma, gamma, and delta convergence is based on 15 indicators consisting of 23 components. A decrease of variance in the form of sigma convergence could be found for 15 of 23 components. Whereas gamma and delta convergence are adequately described from an indicator or country perspective, expressing sigma convergence is better facilitated by comparing changes regarding mean, range, and variance of indicator values. The overall mean of the regulatory comprehensiveness across the old member states decreased by 35 points between 2000 and 2005. At the first measurement point in 2001, the mean was 123 points with a minimum score of 63 in France and a maximum score of 205 in UK. This range of 135 points shows a high degree of variation. The mean gradually increased from 138 points in 2002, to 143 points in 2003, 152 points in 2004, 157 points in the beginning of 2005, and topped by 159 points at the end of 2005. The overall range decreases from 142 points to 88 points, suggesting a moderate sigma convergence.

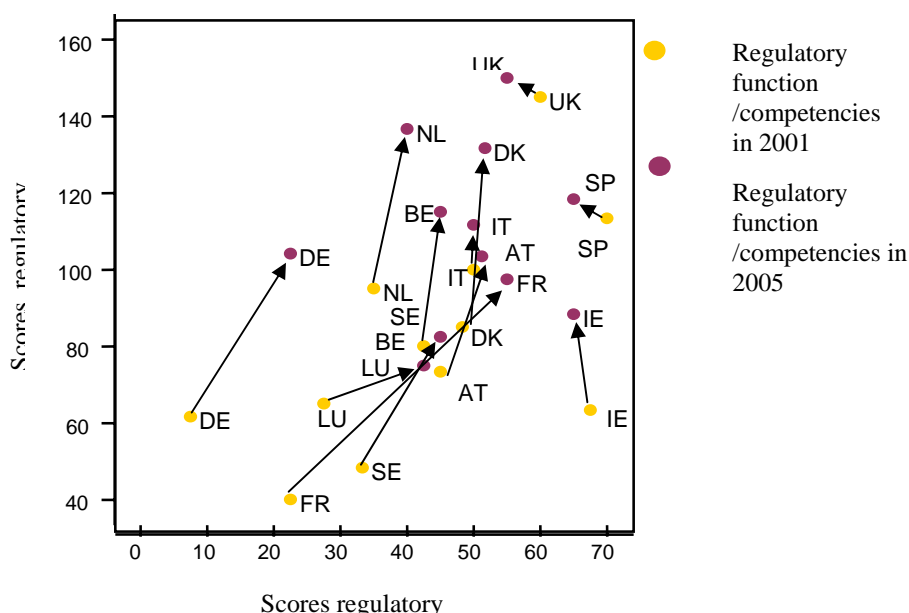
The majority of gamma convergence was positive, meaning that countries caught up towards best-practice application. Up to 22 components showed positive gamma convergence. The degree of positive gamma convergence reached a high degree for seven components, a moderate degree for 10 components, and a low degree for the remaining five components. The only component that was lacking any movement towards best-practice was 'allocation method', because member states considered first-come-first-serve arrangements sufficient and preferred those to the auction mechanism. With 12 of 23 components, the degree of negative gamma convergence is comparably lower. Ten of these indicators showed only a low degree of negative gamma convergence, indicating that a considerably small number of member states were falling behind by applying less favourable instruments. By 2005, only 54% reached best practice, suggesting a moderate delta convergence. From an indicator perspective, the components are relatively evenly distributed, reaching from high to low degree of delta convergence.

With the two dimensions of regulatory comprehensiveness in mind, one might ask which dimension had more impact on minimising the distance to the best-practice model. To answer this, we compare the overall mean change of both dimensions, one expressing the policy and the other the polity dimension in this period. Accordingly, the mean of regulatory functions

increased by 28 points, whereas the mean of the regulatory competencies only increased by seven points. Therefore, we conclude that the overall mean change for the regulatory comprehensiveness stems mainly from the increasing mean of the regulatory function. This result suggests that countries are more reluctant to change their institutional arrangements by transferring decision power to the regulator than by revising a regulatory instrument. At the end of the period, there is a plus mean change of 36 points. Although the number suggests progress, the overall mean in 2005 is still 71 points under the maximum score.

Another way to approach the impact of the two dimensions on the overall comprehensiveness of gas market regulation in EU is to analyse whether countries deviate much in the two dimensions. The underlying question can be stated ‘are policy and polity pointing in the same direction?’ To examine this question, we created a scatter plot in which the scores of both dimensions are set in relation to each other and their position is measured in 2001 and 2005. If countries deviate considerably, we would expect countries’ positions to be in the upper left corner or lower right corner of the figure. Countries predominantly were positioned in the lower left corner however, and moved upwards towards the higher right corner. Accordingly, the upward trend can be described as a diagonal upward trend from bottom left to top right. The United Kingdom and Spain are the only exemptions, first located in the higher right corner before moving slightly to the left.

Figure 7: Relation of the dimension regulatory function and regulatory competencies in 2000 and 2005b



Four patterns can be identified when comparing the degree of delta convergence of the regulatory regimes in European gas markets (EU-12) between 2000 and the end of 2005. First, there are countries whose scores form a steadily increasing slope. Second, some countries' indicators score can be best described as a plateau, suggesting a high degree of stability. Third, we observe scoring patterns shaped like a roof characterised by an increase of scores in the beginning and decrease towards the end of the examination period. The latter phenomenon is partly related to negative gamma convergence or a gradually backward trend. Fourth, there is the group of countries whose scores do not form a pattern or are a mixture of those described.

The overall scoring results of France, Germany, the Netherlands, and Sweden in general steadily increase over time. The Netherlands is a less obvious case of increasing scores due to a small dip in the beginning of 2005. Then, changes in the governance of dispute settlement and capacity allocation abrogated the formation of a stringent slope pattern. The same holds true for Sweden, with a little dip in the beginning of 2005. The downward trend of 117 points in 2004 to 110 points at the beginning of 2005 is based on changes of the minimum booking period from one-three days to one year and a shift of capacity booking from entry to point to point system. The upward trend, reaching 127 points, stems from the introduction of ownership unbundling and changes of competencies regarding the decision of balancing conditions and capacity allocation. In contrast, the regulatory regime in the UK stayed relatively stable, ranging between 200 and 205 points; its regulatory performance is therefore best described as a plateau pattern. Countries following the roof pattern and eventually becoming more hesitant to implement best-practice measures are Austria, Belgium, Denmark, Ireland, Italy, and Luxembourg. A closer look at these countries reveals that no common behaviour other than applying less favourable measures can be found. These countries do not revise the same indicators, nor do they do it to the same extent (downgrading ranges between 7-20 scoring points). It is also not related to the policy or polity dimension. We can observe only a shared hesitation to move further towards best-practice amongst these countries.

The regulatory regime in Spain achieved quite high and relatively stable scores during the entire period. Still its changes are too severe to speak of a plateau pattern. Especially the dip during 2005 from 193 points to 183 points suggests a mixed pattern. According to our indicator analysis, the lack of published accounts induced some negative regulatory performance. Other than that, no real outstanding cases could be detected.

The countries are grouped into high, low, and middle degree of delta convergence. Into the lowest category fall those countries whose score is below 150 in 2005b. The group applying a minimal model consists of Germany, Luxembourg, and Sweden. Although these countries might have been progressive in applying one or two best-practice measures, the overall regulatory comprehensiveness of the regulatory regime is considered less favourable. The middle degree of delta convergence is reached by a score ranging between 150-189 points. An emerging model could be identified in France, Ireland, Austria, Belgium, Italy, Netherlands, Spain, and Denmark. The latter three countries significantly and steadily increased their regulatory comprehensiveness. Therefore, they may be considered forerunners within the group of the

emerging model. The most comprehensive regulatory regimes are expected to reach a score above 189. In 2005, only the United Kingdom could reach this level of best practice. The table below exposes the scoring results of each country in more detail between 2000-2005. The United Kingdom held the first rank for most of the time period with either 200 or 205 points. By 2005, Denmark reached the second and Spain the third rank.

Table 10: Countries scores for regulatory comprehensiveness

	RC 2001	RC 2002	RC 2003	RC 2004	RC 2005a	RC 2005b
Austria	118.4	150	171.5	181.5	175.1	155.1
Belgium	122.6	140.9	135.9	165.1	160.1	160.1
Denmark	133.4	140.1	153.4	170	193.4	183.4
France	62.6	67.6	77.6	112.5	147.5	152.5
Germany	69.2	92.6	92.6	92.6	97.5	126.7
Ireland	130.9	155	158.4	143.4	138.4	153.4
Italy	150	171.6	171.6	176.7	169.2	161.7
Luxemburg	92.6	119.2	119.2	120.9	135.9	117.5
Netherlands	130.1	145.1	151.7	159.2	157.5	176.7
Spain	183.4	183.4	188.4	185.1	193.4	183
Sweden	81.7	91.7	91.7	116.7	110.1	127.5
United Kingdom	205	200	200	200	200	205

7.3 Convergence of regulatory functions

The following section analyses the eight indicators comprising 15 components in order of their description in the methodology section (see chapter 6).

7.3.1 Legal market opening

Since the first Directive left considerable leeway to the member states decision, especially in early reform years, the indicator legal market opening is well suited to identify whether member states followed the liberalisation by letter or in spirit. It was only the second Directive accelerating the process of legal market opening by bringing forward the date of full market opening to 1 July 2007. In foresight of the approaching implementation deadline, the Commission did not pay much attention to the indicator after the fourth benchmarking report was published in 2005.

Originally, the legal provision differentiated between new market openers and advanced market openers. This suggests not only different entry positions, but also creates opportunities for the occurrence of so-called gamma convergence, characterised by different speeds of legal market opening. During the first year of the reform, UK and Germany were the only countries who offered a declared legal market opening of 100%. Both countries, one an advanced market opener and the other a new market opener, suggest a very proactive attitude towards competition supporting market designs. In reality, it may serve as an illustrative example why one single

instrument left alone does not translate in a proactive regulation for competition. Whereas, *inter alia* effective third party access in UK assured the practical application of legal market opening, Germany only offered negotiated TPA when legally opening its market. As a result, customers had the legal possibility to switch and change their natural gas provider, but the third party access regime did not support this competition-induced behaviour. In other words, on a formal level Germany appears to be a fast mover, indicating gamma convergence. Nevertheless, this result has to be set in the context and treated with caution.

In terms of legal market opening, the Gas Directives clearly induced converging effects. In 2002, Austria opened its market. Spain and Italy followed the year after. Next, Denmark implemented 100% legal market opening in 2004 and the Netherlands in 2005. By opening their market by 2005, a total of seven countries met the obligations earlier than required. Countries such as Belgium, France, Ireland, and Luxembourg gradually increased the legal market opening up to a high level without reaching 100% in 2005. The exception was Sweden, who only opened half of its market until 2005. Starting as new market openers, France and Denmark demonstrated good process over time. France started off with a legal market opening of a concise 20% and by 2005 offered 70% market opening. Denmark's case is not only remarkable, but at the same time indicates gamma convergence: With a ceiling of 35% market opening in 2003, Denmark then jumps up to 100% in the following year.

As explained earlier, sigma convergence occurs if there is a decrease in variation of policies among the countries under consideration. The decrease of variation is indicated by a decreasing range and standard deviation. Taking into account the 12 cases and observing the legal market opening between 2000-2005, sigma convergence evidently occurs. In 2001, the mean of legal market opening accounted for 62% and gradually accrued to 89% by 2005. In that period, the range was reduced from 80% to 50%, accompanied by a decrease of standard deviation from initially 27 points down to 17 points. By 2005, 7 of 12 countries had fully opened their gas markets legally. To sum up, 11 of 12 countries legally opened their market more than 70%. The overall mean accounted for nearly 90% legal market opening even before the Directives required full market opening. As a matter of fact, there is evidence for sigma convergence: most of the countries gradually increased the legal market opening between 2000 and 2004, showing through moderate positive gamma convergence 50%. By 2005 a moderate level of delta convergence (58%) was reached, confirming our expectation (2) that legal provisions concerning legal market opening are not ambitious enough to induce a high degree of delta convergence.

7.3.2 Network access conditions and tariffication

The indicator gas network access conditions and tariffication consists of six components and reflects different aspects of the tariff regime and network access conditions. The following portrays each component individually.

Tariff structure

At the beginning of the Reform, the old member states applied a considerable variety of tariff structures. For three (Ireland, Luxembourg, and Sweden) the tariff structure was either not published or its publication was due to limited network capacity considered insufficient to offer market possibilities that would warrant the set up of a tariff structure for third party access. In

2001, only the United Kingdom and Italy offered entry-exit arrangements. In Austria, Belgium, France, and Netherlands network tariffs were distance based; Denmark and Spain started with postalised tariffs. Germany's tariff landscape was too fragmented and based on a variety of tariff structures to find a single label other than "mixed". The different categories Germany received to describe its tariff structure does not indicate several nationwide tariff reforms but shows the difficulties Germany had integrating and harmonising its tariff structures (see Lohmann 2006). In contrast, Ireland and the Netherlands belong to the group of early movers, introducing entry-exit based tariffs in 2002-2003. Belgium and France followed in 2004. The late movers appeared to be Austria, Denmark, and Germany, implementing entry-exit tariffs in 2005. Spain partly revised its postalised system in 2006 by introducing entry-exit tariffs for transport devoted to natural gas re-exported to third countries. At the end of 2005, nine of 12 countries followed the road to entry-exit based tariffs, as promoted by the Madrid Forum and European Commission. Sweden and Luxembourg had earlier applied postalised tariffs, but in 2005 the regulator preferred to choose the category 'not applicable/information not available'. To conclude, sigma and delta convergence occur simultaneously. Moreover, the UK, Ireland, the Netherlands, Belgium, France, Austria, and Denmark suggest positive gamma convergence. By 2005, delta convergence reached a high level (75%). Accordingly, a low degree of precision of European legislation did not translate into a lack or low degree of delta convergence and as a result expectation three cannot be confirmed.

Type of capacity booking

In 2001, capacity across Europe was booked based on postalised, point-to-point or entry-exit arrangements and showed a significant degree of variance. Denmark, Spain, and Sweden applied postalised capacity booking, whereas Austria, Belgium, France, Luxembourg, and Netherlands voted for the distance related point-to-point variant. Ireland, Italy, and the United Kingdom started off either entry or entry-exit types of capacity booking. These were followed by Sweden and Luxembourg in 2002 indicating positive gamma convergence. At the same time, Ireland switched back from entry-exit based capacity booking and introduced point-to-point capacity booking (negative gamma convergence). Interestingly, Denmark took a three step approach by first applying postalised capacity booking then point-to-point in 2002, before finally implementing an entry-exit based method. The same can be observed in Austria, starting with a point-to-point capacity booking, moving to cost-reflective variant, and then finalising with entry-exit based capacity booking. Both show how the parties involved, be it regulator, ministry, or transmission system operator, try to find the most appropriate regulatory instrument or label for their practice. A wave of entry-exit application occurred in 2004, when Austria, Denmark, France, and the Netherlands changed their type of capacity booking. By the end of 2005, 10 of 12 member states had implemented entry-exit based capacity booking. The only two exceptions were Ireland and Belgium: Ireland stayed with its point-to-point system and Belgium offered mixed types of capacity booking.

All three types of convergence could be found for the component 'type of capacity booking'. By moving towards an entry-exit system there is proof for sigma and delta convergence. In addition, positive and negative gamma convergence occurred. The former applies to the UK, Ireland, Italy, Sweden, Luxembourg, Denmark, Austria, France, and the Netherlands. Ireland showed the latter with some time delay as well. Expectation 3 does imply a low degree of delta convergence when European provisions do not prescribe the type of capacity booking. Contrary to our expectation,

we observe a high degree of delta convergence (83%). One may conclude that the member states dominantly followed the road map to entry-exit system promoted in the context of the Madrid Forum between 2001 and 2004 (see section 6.10.2).

Overall, we observe a decrease of variation with regard to tariff structure and types of capacity booking across the old member states towards entry-exit tariffs. The Commission emphasised that disparity between tariff structure and capacity booking might cause disadvantages for the network access. The table below demonstrates that seven countries adapted an entry-exit system for both tariff structure and capacity booking. Not covered by this study is the number of entry-exit zones and their effect on harmonisation. Nevertheless, some countries like France and Germany have either reduced the number of entry-exit zones or will in the near future. (See European Commission, 2005a: 68-69)

Table 11: Tariff system in 2005b

Type of capacity booking	Tariff structure		
	entry-exit	postalised	not published/not applicable
entry-exit	Austria, Denmark, France, Germany, Italy, Netherlands, UK	Spain	Luxembourg, Sweden
point-to-point	Ireland		
mixed (entry-exit/point-to-point)	Belgium		

Allocation method

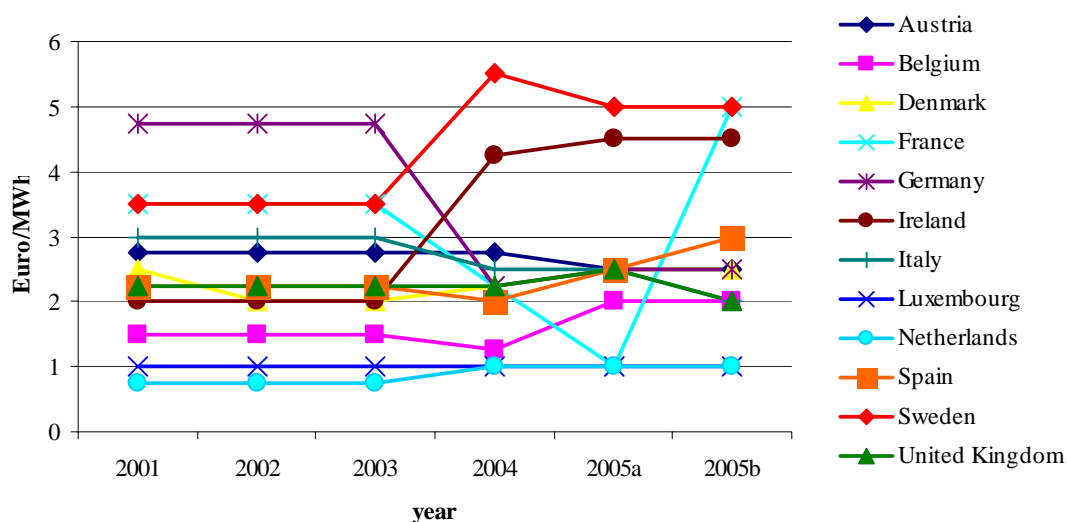
In contrast to other components of the tariff system, the allocation method showed almost no variance during the six years of implementing the European gas reform. From the beginning, first-come-first-serve was unchangeably the dominant allocation method in the 12 member states. Accordingly, no sigma convergence occurred. In the UK market auctions are allocating network capacity. Reflecting the demand side orientation of the small Swedish market, the Swedish regulator introduced the allocation principle ‘capacity goes with customer’ in 2005. As the Swedish authority did not change their practice but instead found a more adequate label, we find no evidence for gamma convergence. Delta convergence occurred only to a low degree (17%). The allocation method chosen by the member states was not determined by the legal provisions. Accordingly, the result confirms our expectation that only a low degree of delta convergence is supposed to be induced by legal institutions.

Tariffs

The previous chapter alluded to the relatively low quality of the data on tariffs. The available data does however, give us some indication of entry barriers new market participants are facing. To compare the tariffs between 2001 and 2005, three tariff groups were created. High tariffs (3.1-5 Euros/MWh) receive low scores, middle tariffs (2.1-3 Euros/MWh) receive middle scores and low tariffs (0-2 Euros/MWh) receive high scores. According to our classification, the transit

countries in the Northwest, Belgium, and Netherlands offered low average tariffs in 2001 and 2005, and therefore receive high scores. Tariffs in Austria and Spain appeared equally stable, representing the middle category. In contrast, France, Luxembourg, and Sweden continuously gained low scores due to their high average tariffs in 2001 and 2005. In the first year, the United Kingdom and Italy offered comparably low tariffs, but an increase of the average tariffs by 2005 resulted in middle scores at the end of the examination. Ireland developed exactly the other way around. High scores in 2001 shifted to the low score category in 2005. Germany and Denmark also downgraded. In 2001, Germany and Denmark were in the middle score category, but changed over time to the low score group.

Figure 8: Tariffs in EU-12 between 2001-2005b



The lowest tariffs could be found in the two transit countries in Northwest Europe, the Netherlands and Belgium. During the entire period, average tariffs in the Netherlands were the lowest across the EU-12. The Netherlands offered an average tariff of 0.75 Euros per MWh during 2000 and 2001. These stunningly low tariffs were only increased up to one Euro per MWh in the subsequent three years. Only Luxembourg was able to compete with the low Dutch tariffs by constantly providing an average tariff of one Euro per MWh as well. Belgium followed closely with a tariff level between 1.25 and 2 Euros per MWh during the same period, starting with 1.5 Euros per MWh in 2001 and levelling at 2 Euros per MWh. We also find relatively low tariffs throughout the examination period in UK, ranging between 2 and 2.5 Euros per MWh.

In contrast, Italy's average tariffs decreased from initially 3 Euros per MWh between 2000-2001 to 2.5 between 2002 and 2003 and shrunk again to a favourable 2 Euros per MWh. Average tariffs in Austria remained pretty stable at 2.75 Euros per MWh. One exceptional year was 2003, when Austrian tariffs averaged 2.5 Euros per MWh. In Spain average tariffs started at moderately low level of 2.25 Euros per MWh in 2000, but more or less steadily increased to 3 Euros per MWh by 2004. Only during 2002, Spanish average tariffs went down from 2.25 E/MWh to 2.00 E/MWh, to jump up to 2.5 Euros the following year.

Positive gamma convergence was found in the case of Germany. Average German tariffs started with 4.75 Euros per MWh and halved by 2002. During 2004, the German average tariffs constituted 2.5 Euros per MWh. Nonetheless, the reverse trend occurs as well. In Denmark for instance the average tariffs double between 2004 and 2005 from 2 to 4 Euros per MWh. The same can be observed in Ireland between 2001 and 2002. Tariffs in France even first decrease from 3.5 Euros per MWh in 2000 to 1 Euro per MWh in 2003, before jumping up to 5 Euros per MWh in 2004.

There are at least three cases of negative gamma convergence. Moreover, in Spain and Sweden tariffs are gradually increasing. Whereas Spain started with a moderate 2.25 Euros per MWh in 2000 this rose to 3 Euros per MWh in 2004. Sweden even started with high average tariffs of 3.5 Euros per MWh, and rose to 5.5 Euros per MWh in 2003, declining only to 5 Euros per MWh in 2004.

The overall range of network charges did not decrease between 2001 and 2005, levelling at 4 Euros per MWh. Instead, it even goes up to 4.5 Euros per MWh during 2002. Looking at the minimum and maximum of the tariffs over time, no decrease of tariffs could be measured. In 2000 and 2001 the minimum tariff accounted 0.75 Euros/MWh and the maximum tariff was 4.75 Euros/MWh. During 2004, the tariff minimum accounted 1.0 Euros/MWh and reached a maximum of 5 Euros/MWh. The reform goal, harmonisation and increasing efficiency in the form of lowered tariffs could not be reached; at least our data suggests little progress in this regard. This observation is confirmed when analysing the overall mean changes. The overall tariff mean for EU-12 increased from initially 2.5 Euros/MWh in 2000 (equivalent to t1) to 2.9 Euros/MWh during 2004 (equivalent with t4=2005). To conclude, sigma convergence did not occur and only a low degree of delta convergence (25%) was evident. Gamma convergence could be found in several cases. France and Germany even showed both forms.

Incentive regulation

In the beginning of the reform, incentive regulation was not in place in 10 of the 12 countries. This situation changed considerably by the end of 2005, when five member states had introduced incentive regulation. Throughout time, sigma convergence decreased and a movement towards delta convergence is apparent.

As usual, the regulatory practice in UK served as prototype for incentive regulation in Europe. There, price-cap regulation was introduced in 1991 (see Waddams Price, 1997) followed by cycles of methodological reformulations and improvements. Taking on the British example, Italy adopted revenue-cap regulation for transmission tariffs with the implementation of the first Directive (see Autorità per l'Energia Elettrica e il Gas, 2005, July 31). Since then, transmission tariffs are regulated via a revenue cap, "...with the exclusion of the commodity charge subject to a pure price cap" (Cavaliere, 2007: 15). Ireland was another early mover introducing revenue-cap regulation in 2002 (see Commission for Energy Regulation, 2002). One year later, Denmark started to regulate annually the revenues of gas distribution companies (see *Energitilsynet*, 2002). In 2003, the Spanish ministry of industry, tourism, and commerce released a decree which introduced revenue-cap regulation. The general rate of return is set for old investments, whereas the rates of return for investments are regulated on a case by case basis. The Netherlands

imposed a mixture of revenue-cap and price-cap regulation in 2005 (see *Ministerie van Economische Zaken* (EZ), 2005). After strong opposition from industry the revenue cap was lifted in 2007 (see van der Hoeven, 2007, March 29). Italy, the UK, and Ireland suggest positive gamma convergence, a trend supplemented by Denmark Spain, and Netherlands. The latter fell back in the end of 2005b, indicating negative gamma convergence. In contrast, Austria, Belgium, France, Germany, Luxembourg, and Sweden had no incentive regulation in place throughout the entire period of examination. France is in the process of examining advantages and disadvantages of incentive regulation for the French gas market (see *Commission de Régulation de l'Energie*, 2005: 55). Germany just recently voted for a revenue cap system (see *Gas Matters Today*, 2007, September 21). Austria and Belgium have plans to introduce incentive regulation in 2008. It is noteworthy that the labels describing the incentive regulation employed mostly refer to the dominant mode of incentive regulation. The applied incentive regulation often differentiates between different levels or parts of the gas value chain such as transmission tariffs, distribution tariff, or for instance an interconnector. Moreover, the regulators across Europe distinguish between old and new investments when applying a regulatory instrument. The most detailed overview concerning the scope and type of incentive regulation member states applied is provided by the 2005 GTE report (see *Gas Transmission Europe (GTE)*, 2005, June). To conclude, incentive regulation is not prescribed by the European provisions, as an effect we see expectation 3 to be partially proven by observing a moderate degree of delta convergence.

Minimum booking service

In the first place, incumbents were reluctant to make the transport market more flexible. Initially the common minimum booking period for firm services was one year, not leaving much room for flexible transport services and trade opportunities. The UK was the exception to the rule, offering a minimum booking period of one-to-three days. Apart from Italy (for which no information on minimum booking periods was available) all other 10 member states applied the one-year rule. Within the member states one can observe a clear hesitation to lower the minimum booking period to one-to-three days. Belgium and Italy employed a one-month period in 2002, followed by the Netherlands in 2003. In 2004, Austria offered monthly booking periods and Belgium decreased its minimum booking period to one week. In contrast, Ireland and Luxembourg retained the minimum contract duration of one year. Further developments in the Italian and Swedish gas markets are a little puzzling. First, Italy gradually lowered its minimum booking period down to one-to-three days in 2004, but then in 2005 fell behind by offering a minimum booking period of one year. The same holds true for Sweden, signifying negative sigma convergence in both cases. As a consequence, the indicator minimum booking period exhibits a relatively wide variance, instead of sigma convergence. Austria, Denmark, Germany, the Netherlands, Spain and the United Kingdom are the most flexible, offering one-to-three days of minimum booking service. Belgium allows weekly and France monthly minimum booking periods. In contrast, Ireland, Italy, Luxembourg, and Sweden allow only transport contracts with a minimum booking period of a year for firm services.

Comparing the situations in 2001 and 2005, there is no decrease of variance to indicate sigma convergence. Although the variance might not decrease, the minimum booking services become more flexible over time in old Europe. In other words, the best practice of one-to-three days is not reached by the majority of countries, but the distance to this goal is decreasing, pointing to moderate delta convergence (50%). Contributing to this development are Austria (2005b),

Denmark, Germany, Netherlands, Spain, and the UK (positive gamma convergence); Italy and Sweden abandoned the one-to-three day contract duration rule (positive and negative gamma convergence). Expectation three can only be partially confirmed by the observations of this indicator component.

Use-it-or-lose-it

Anti-hoarding mechanisms were not popular in European gas markets before the introduction of the gas reform. Only three countries (Netherlands, Spain, and the UK) offered a use-it-or-lose-it provision in the early days. For Sweden this measure has not been applicable, because the Swedish network is under-utilised and therefore there are no incentives for hoarding capacity in the first place. Other European markets were characterised by a lack or scarcity of transport capacity. To meet contractual congestion in European gas networks the reform targeted those countries which did not offer use-it-or-lose-it arrangements in 2001, including Austria, Belgium, Denmark, France, Germany, Ireland, Italy and Luxembourg. The implementation of UIOLI arrangements took place in three waves. First, Denmark, Ireland and Italy went ahead in 2002, implying sigma convergence. Second, Austria and Belgium followed in 2004 with the last movers in France and Germany in 2005. In 2005, all old member states had formally implemented anti-hoarding mechanisms, where it was applicable. Regulators in Ireland, Luxembourg, Sweden, and the UK claimed for different reasons that imposing anti-hoarding measures was not necessary, due to either a lack of capacity congestion or effective secondary trading. A view held by the relevant national regulators was not officially questioned by the EC in their reports. Consequently, a high degree of delta convergence is reached for UIOLI provisions and our expectation (3) cannot be confirmed. All three types of convergence can be ascertained for the UIOLI indicator.

7.3.3 Balancing period

In 2001, balancing periods ranged from hourly to non-transparent arrangements. Most of the countries were distributed in two groups, each consisting of five member states. In the first group, hourly balancing was required (Austria, Belgium, Denmark, Germany and the Netherlands). The second group (France, Ireland, Luxembourg, Spain and UK) voted for a daily balancing period. The Commission did not receive any information concerning the balancing period Sweden applied at that time. Italy offered a mixture of daily and monthly balancing arrangements in the first year, but then decided to allow only daily balancing periods thereafter (positive gamma convergence). Other countries proceeded the other way round. The Netherlands moved in 2002 from a single time frame balancing period to a dual arrangement, and since then proffers hourly and daily balancing periods. Germany followed the same scheme in the beginning of 2005; by the end of 2005 the EC received the notice that only hourly balancing periods are required in Germany. Between 2001 and 2005, we observe more countries switching from hourly to daily arrangements, namely in 2003/2004 Denmark and in 2004/2005 Belgium and Sweden were revising its balancing arrangement. At the end of 2005, nine countries preferred daily balancing periods and followed the Anglo-Saxon practice. There is a clear decrease of variance, pointing to sigma convergence. In 2005, only three countries deviate. The Netherlands also deviate by offering partly hourly and partly daily arrangements. Opposed to the Anglo-Saxon daily balancing practice, Austria and Germany required hourly balancing. Keeping in mind that the European Union did not specify preference with regard to hourly or daily

balancing periods, the delta convergence shows in a less strict interpretation even stronger, cumulating to 100% by the end of the examination period. Consequently, expectation three cannot be confirmed.

7.3.4 Third party access to storage

In the beginning, third party access was formally granted in Austria, Denmark, Italy, Netherlands, Spain, United Kingdom, whereas Belgium, France, Germany, Ireland, Luxembourg, and Sweden did not foresee negotiated or regulated TPA to storage facilities. In 2002, Germany made the first move and in 2004 Belgium and France caught up by introducing TPA for storage. Sweden decided to implement open access to its storage facilities by 2005. Exceptions are Ireland and Luxembourg. Ireland provides extra natural gas storage and additionally may use the Interconnector to the UK market to balance its moderate seasonal fluctuations (see International Energy Agency, 2003a: 69-70). Nonetheless, no formal third party access to gas storage was granted. An exceptional case is Luxembourg where no natural gas storage is available. Instead, the de facto monopolist *Société de Transport de Gaz* (SOTEG) is able to fulfil the balancing function that gas storage usually offers through the flexibility measures arranged in the long-term contract with the neighbouring supplier *Distrigaz*. This arrangement does secure the public need of security of gas supply and allows the transmission system operator to fulfil its balancing mandate. It does not however, offer any other market participant access to storage or its related balancing opportunities. For this reason, Luxembourg receives a low score. (See International Energy Agency, 2004a: 60).

The analysis clearly indicates a decrease of variance with regard to third party access to natural gas storage. Thus, 10 countries provided the formal conditions of granting third party access to storage by 2005. Consequently, not only sigma convergence occurred, but also a high degree of delta convergence (83%) was reached. Moreover, positive gamma convergence can be found due to progressive choices made in Austria, Belgium, Denmark, France, Germany, Italy, the Netherlands, Spain, and the UK. The second Directive prescribed third party access to storage by 1 July 2004. Accordingly, we expect to see a high degree of delta convergence (expectation 5) from 2004 onwards. This expectation was confirmed in the case of Belgium, France, and Sweden, which contributed in 2005 to the high delta convergence.

7.3.5 Gas release programme

Although the European Continental market lacked liquidity, gas release programmes enjoyed only meagre application at first. The UK, and at some distance Spain, were clearly the forerunners that showed other countries how gas release programmes in practice induce market liquidity and competition. In 2001, the Italian ENI started its so-called “innovative sales” by releasing capacity for the Italian market. These “innovative sales” were not conducted under regulated terms and were replaced by an official gas release programme by the end of 2004. Other countries such as Austria (2003) and Germany (2004) hesitantly implemented gas release programmes. By 2005 seven countries including Denmark, France, and Italy were running a gas release programme, auctioning imported gas from incumbents. The indicator clearly shows different speeds of implementation: Whereas Belgium, Ireland, the Netherlands, Luxembourg, and Sweden are not officially planning to implement a gas release programme, the UK and Spain

have already completed the programme. Summing up, 2/3 of the sample countries met best-practice by implementing a gas release programme. Although the necessary condition to fulfil moderate delta convergence is thereby met, an overall decrease of variance cannot be reported. Instead, the range of values increased between 2001 and 2005. Last but not least, the UK, Spain, Germany, Austria, Italy, Denmark, and France are examples of positive gamma convergence. Although the adoption of gas release programmes was not prescribed by the legal provisions a moderate degree of delta convergence occurred, partially confirming our expectation (3).

7.3.6 Trading facilities

Although the overall measures of the European gas market regulation aim to stimulate trade and thereby achieve effective gas-to-gas competition, no common European virtual trading point has been created so far. The following discussion reveals how far the EU is still from that aim. On the national level, the governments and regulators were at best setting a framework, but did not prescribe the creation of trading mechanisms. This was pretty much left up to the companies and proves to be an evolutionary process with different speeds and scope.

In its review of European spot gas markets *Heren* refers to NBP as virtual spot market and names Bacton and Fergus in the UK, *Zeebrugge* in Belgium, and *Bunde* in Germany where spot prices are generated (see *Heren Energy*, 2005, 27 May). Additionally, Austria has created a gas hub at *Baumgarten*. In general, natural gas markets show huge differences in terms of traded volumes, number of short-term or forward trades, variety of contracts offered and number of players involved (see Wright, 2005). Referring to different modes of trading, we can divide the countries into three groups: mature natural gas markets, developing natural gas markets, and infant natural gas markets (see section 6.10.1) Until now, the UK is the only European country offering a mature spot market and full-fledged trading facilities since the introduction of the European Gas Reform. In 1996 the National Balancing Point (NBP) was created. Since then, the NBP has functioned as a virtual trading point for the UK market. Two years later, the *Interconnector Bacton-Zeebrugge* began operation and thereby marked the beginning of UK-Continental gas trading. Wright offers an excellent reconstruction and analysis of the maturing UK gas market by tracing the evolution of gas prices and gas trading in the UK (see Wright, 2005).

As indicated earlier, Belgium, the Netherlands, Germany, and Austria belong to the group of developing natural gas markets. There, the second rank holds Belgium and the Netherlands. From the start, Belgium benefited from the Interconnector, the pioneer gas hub on Continental Europe. Within the recent years, Belgium's hub became an active and liquid trading point in North-West Europe. Initially, the Netherlands and Germany shared a hub at the border points *Bunde/Oude*, where several pipelines from Germany, Norway, and Russia link with the Dutch pipeline network. Some trading evolved only from 2002 but the hub has been abandoned (see Lohmann, 2006). A year later, the Dutch Gasunie set up the Title Transfer Facility (TTF). Since then the TTF has functioned as a virtual trading point, allowing natural gas trades within the Dutch network (see Gas Transport Services (GTS), 2007). Over the years the idea evolved to integrate trading facilities in the British, Belgian, and Dutch gas markets, establishing a common north-western market area.

In June 2004, APX (Amsterdam Power Exchange – owner of OCM operator EnMO) in partnership with Endex (Dutch-based Energy Derivatives Exchange) signed an agreement with Huberator to open a full-fledged, screen-based Gas Exchange (online market and clearing services) at Zeebrugge in January 2005. (Wright, 2005: 65)

Since 3 February 2005, the exchanges APX Gas NL and APX Gas ZEE have been integrated with the established UK Gas Exchange, APX Gas UK, which enables online transactions to be fully cleared and conducted anonymously. Although there are clear attempts to integrate trading facilities, Neumann et al. have demonstrated that trading activities have so far not resulted in price convergence between British and Continental markets (see Neumann, Siliverstovs, & von Hirschhausen, 2006). Just recently, the APX group announced the full integration of UK Gas and continental gas onto a single trading platform by June 2007. Moreover, APX declared “APX Gas UK (NBP), APX Gas NL (TTF), and APX Gas Zee (Zeebrugge) will be consolidated onto the trading system EuroLight, which will also include a common clearing.” (Gas Matters Today, 2007, May 9: 3). The fusion of three trading platforms is a market induced development; it still goes with and complements the European regional initiative promoted by CEER/ERGEG.

The Dutch-German gas hub (Oude/Bunde/Emden) was established in 2002 by creating first the EuroHub BV in February and later in October the North West European Hub Service Company (HubCo). Both hub operators merged in 2003 into EuroHub GmbH (see Lohmann, 2006: 160-162), but the shareholder of EuroHub GmbH suspended its activities already in 2006. German gas trading is developing at a very slow pace. (Before the creation of gas hubs or trading points, trading occurred in the regional markets (BEB, EON-Ruhrgas etc). Only by October 2006, the new German energy law foresaw the establishment of virtual trading points. The lack of liquidity and the fragmented structure of the German gas market with 19 initial market areas were the main obstacles for establishment of an active OTC market. The recently established regulator announced that they are planning to reduce the number of market areas to 10 to increase the attractiveness of trading (see Gas Matters Today, 2007, April 12). The establishment of the European Energy Exchange is supposed to accelerate German gas trade. The opening was scheduled for 1 July 2007, but was postponed until autumn 2008. In anticipation of the European Energy Exchange, BEB, Erdgas Münster Transport, Exxon Mobil Gastransport Germany and EWE Netz plan to merge their L-gas market areas in Germany into one joint market area by October 2008 (Gas Matters Today, 2007, 11 September).

The group of infant natural gas trading markets consists of the other seven countries: Denmark, France, Ireland, Italy, Luxembourg, Spain, and Sweden. Although we cannot fully map their trading facilities, we would like to give reasons why they were subordinated into this category. Some of the countries established virtual title transfer points in the second half of the Gas reform. Nevertheless, the absence of gas hubs and/or significant volume of trading does not allow to speak of anything other than infant trading facilities. This is the case in Denmark, where in 2004 the GTF was introduced and more trading is planned. France did introduce virtual title transfer points for five zones of the transmission network, but the European Commission does not observe NBP type trading in 2005. In Italy, a virtual balancing point (*Punto di Scambio Virtuale* (PSV) was established; where according to the EC in 2005 limited trading took place (see European Commission, 2005a: 33; Harris & Jackson, 2005; Héritier, 2005). Ireland has an interconnector pipe starting at the Scottish town of Moffat, ending near Dublin on the east coast

of Ireland. Until now, the direction of gas flow is only in one direction from UK to Ireland. At this interconnector no significant trade is taking place other than the old-fashioned bilateral long-term supply contracts. In a comment to the Regulator, the Irish Bord Gais does not see the need to put up sophisticated trading facilities (see Commission for Energy Regulation, 2007; International Energy Agency, 2003a). In fact, Luxembourg might be too small as it would justify the establishment of a trading platform of its own. Nevertheless, Luxembourg has not made any effort to enable trading through cooperation with Belgium or Netherlands for instance, or at least such a proactive attitude has not been reported. Spain does not have a gas hub or any other significant trading facilities. Instead, the Spanish government is in the stage of taking some legal measures such as fixing lower tariffs and introducing transparent conditions for TPA to promote trade by making trading activities more profitable. The EC detected limited activities in Spain of NBP type trading in 2005. Sweden's gas market as such is in its infancy, not only trading wise. (See International Energy Agency, 2004b, 2004a; International Energy Agency, 2005; Rasines García, 2006).

To sum up, in 2001 it was only the UK market which had a mature gas trading market and Belgium which started to develop its trading opportunities, whereas all the other 10 European markets were in their infancy. Some dynamics evolved in the Netherlands and Germany in 2002. In 2003 Austria developed some trading facilities. Comparing the variance with regard to trading facilities in 2001 and in 2005, there is a slight positive shift towards increasing trading facilities in the European Union. Although delta convergence occurs, no significant decrease of variance suggesting sigma convergence could be observed. The UK, the Netherlands, and Belgium show evidence for positive gamma convergence, whereas Austria and Germany are less clear cases. For trading facilities, our expectation (3) holds: a low degree of delta convergence (8,3%) corresponds with objective based legal provisions.

7.3.7 Unbundling on transmission system level

Basic unbundling model TSO

Until July 2004, member states were not obliged to assure legal unbundling, which explains why in 2002 four different modes of unbundling were applied across Europe. The first group consists of France, Germany, Luxembourg and Sweden, separated only by the accounts of the incumbent and its transport arms. The second group is characterised by the application of legal unbundling, established in Austria, Belgium, Denmark, and Italy. Third, the Netherlands and Ireland even voted for management unbundling. Fourthly and most forcefully the UK and Spain went ahead by implementing ownership unbundling. Between 2002 and 2005, UK, Austria, and Belgium remained unchanged, UK maintaining ownership unbundling and two remaining on the level of legal unbundling. Positive moves from legal unbundling to ownership unbundling were taking place in Denmark (2002-2004), Italy (2004-2005), the Netherlands (2004-2005), and Sweden (2005), indicating positive gamma convergence. Conversely, Spain revised its ownership unbundling by falling back to legal unbundling in 2004. Consequently, Spain appears to be a case of both positive and negative gamma convergence. A similar case is Ireland. The Irish regulator declared that they had applied management unbundling until the beginning of 2005. The fifth benchmarking report states quite the opposite when reporting without giving any further explanation that Ireland has not ensured legal unbundling in its market. One can only

wonder whether this change of labelling is due to more insights into the unbundling practice of gas companies operating in the Irish gas market, changing definitions of management unbundling, or in fact reflects a real step backwards (see European Commission, 2005a: 81). The same holds true for Luxembourg which started with unbundled accounts, advanced by implementing management unbundling in the fourth benchmarking report, but did not offer legal unbundling by the end of 2005. In the beginning of 2005, the German gas landscape showed initial signs of legal unbundling, but predominantly solely accounts were separated. By the end of 2005, German gas trade and transport companies were considered partly legal unbundled in 2005.

Altogether the variance of the indicator did decrease, which allows us to attest sigma convergence. The trend towards delta convergence certainly holds true towards legal unbundling and confirms our expectation (7). Delta convergences towards ownership unbundling occurred to a much lesser degree, reaching only a moderate level (41.7%). In 2005, five member states met the legal unbundling requirements and another five exceeded the Directives yardstick by implementing ownership unbundling. The European Commission officially stated its preference for ownership unbundling in the new energy package published in January 2007. This preference was reinforced in the context of the Third Energy Package in which the Commission proposes the introduction of ownership unbundling. Seven countries still have to make the step towards ownership unbundling to achieve best-practice across the old member states: Austria, Belgium, France, Germany, Ireland, Luxembourg, and Spain. Yet, this step is a fundamental one. For this reason, most of those countries opposed the Commissions proposal of the third Energy package to prescribe ownership unbundling.

Published accounts on TSO level

The publication of accounts has been mandatory since the first Directive came into force. Therefore we expect full convergence throughout the entire observation period (expectation 6). By 2002, all old member states except France and Ireland published accounts of natural gas companies, distinguishing between trade and transport services in their national markets. Stimulated by the legal rule, the member states entered with a high level of harmonisation at the beginning of the reform, suggesting an 83.3% positive gamma convergence in the first year of monitoring. Surprisingly, the trend did not develop towards full convergence in later years, but instead more disparity evolved. In Germany published accounts were the rule until 2004. Afterwards the European Commission's reports declare the absence of published accounts. 2005 turns out to be an interesting year, when most changes happened. France and Ireland advanced and published their accounts, whereas in Austria, Italy, and Luxembourg published accounts were not the common practice anymore. As a matter of fact, the two former cases show positive gamma convergence and the latter negative gamma convergence. The reasons for not publishing the accounts are unclear, because the relevant EU documents make no reference to this phenomenon. Supposedly, more comprehensive monitoring revealed the gap between the declaration of published accounts and the quality of those publications. Comparing the situation in the beginning of the reform and 2005, the variance of this indicator increased and shows a reverse trend. Eight countries followed the Directive requirements and four countries deviate from the rule. Accordingly, sigma convergence did not occur and a moderate degree of delta convergence was reached in 2005. Thereby expectation six is rejected.

7.3.8 Unbundling on distribution system level

Basic unbundling model on DSO level

The second Gas Directive envisaged legal unbundling of the distribution system operators by July 2007. Notably, the distant implementation deadline together with the 100.000 customer exemption did not urge the member states and natural gas undertakings to quickly unbundle the natural gas trade and transport on the distribution level (see European Commission, 2005d: 81-82; Gomez-Acebo, Abogandos, & Russels, 2005). Therefore, we expect a low degree of delta convergence towards legal unbundling and no delta convergence towards ownership unbundling on the DSO level (expectation eight). In the first assessment in 2002, unbundling on the distribution level pretty much resembled the level of unbundling on the transmission level of that year. The member states voted dominantly and equally distributed in groups of five either for account unbundling or legal unbundling. France, Germany, Luxembourg, the Netherlands, and Sweden decided for the minimalist approach of separating accounts for natural gas trade and transport. Austria, Belgium, Denmark, Italy, and Spain implemented legal unbundling of trade and transport services and thereby exceeded the legal obligations of the first Directive. According to benchmarking reports, Ireland appeared to be more advanced by implementing management unbundling. Only the UK demonstrated best-practice at that time by assuring ownership unbundling.

The mode of unbundling in five countries remained unchanged: the United Kingdom preserved ownership unbundling and Austria, Belgium, Denmark, and Italy favoured legal unbundling throughout the time of examination. The Netherlands legally unbundled its natural gas transport on the distribution level in 2004. Furthermore, the Dutch ministry of economic affairs proposed a legal act that foresees ownership unbundling being implemented by January 2008 (see Gomez-Acebo, Abogandos, & Russels, 2005: 5). These countries can be considered progressive; the other countries were more reluctant to ensure legal unbundling of the distribution system operators.

France, Germany, Ireland, Luxembourg, and Spain so far show no signs of fulfilling the legal requirements before its implementation deadline. France and Germany explicitly intend to not implement legal unbundling of the gas distribution system operators before July 2007 (see European Commission, 2005d: 82; Gomez-Acebo, Abogandos, & Russels, 2005: 5). Both countries and Austria also made use of the 100,000 customer exemption. In the process of completing the transposition of the unbundling provisions concerning the DSO, Austrian regulation has lowered the threshold of the exemption from 100,000 to 50,000 customers (ibid). In earlier years, Ireland and Luxembourg claimed to provide over management unbundling. In contrast, the benchmarking reports considered even the conditions for legal unbundling unfulfilled (see European Commission, 2005a: 82). So far it is unclear whether these shifts are the product of different definitions of management unbundling or the regulator investigated the unbundling praxis more precisely than earlier. In the EC progress report, Spain does not receive a label, instead referring to the fact that the single DSO is the default supplier (see European Commission, 2005d: 82). Gomez-Acebo et. al. show in their unbundling analysis that legal unbundling in Spain on DSO level is legally only partially transposed. Due to its market size Sweden is an exceptional case in gas market regulation, especially when it comes to unbundling of the distribution system operator. With only 55,000 customers in the distribution portfolio, the

unbundling requirements do not apply. At the same time Sweden is not moving forward under its own volition for regulation-for-competition by applying legal unbundling regardless of its formal exemption. For this reason, the indicators score for Sweden is relatively low. (See Gomez-Acebo, Abogandos, & Russels, 2005).

Unbundling the distribution system operators shows quite unsatisfactory results in terms of harmonisation and the willingness to implement more than the minimal requirements set by the unbundling provisions. At the end of 2005, the European Commission considered only four countries, Austria, Belgium, Denmark, Italy and Netherlands as legally unbundled and the United Kingdom as the only country practicing ownership unbundling. The other seven countries are hesitant to transpose the unbundling obligations earlier than the second gas Directive requires. Only the United Kingdom showed a positive gamma convergence (8,3%) when applying ownership unbundling for distribution system operators. Consequently our expectation is partially right, as the degree of delta convergence is not zero but marginal. Below the level of best practice we see some improvements in Austria, Belgium, Denmark, Italy, and the Netherlands towards legal unbundling. For this reason, low delta convergence can be detected, which confirms the initial expectation with regard to legal unbundling at DSO level. Yet, the variance of the indicator only marginally declined, suggesting a very weak sigma convergence.

Published accounts on DSO level

The publication of accounts for the distribution level has been mandatory since the first Directive came into force. Therefore, we should detect full convergence throughout the entire observation period (expectation 6). By 2002, eight out of 12 countries claimed to meet this obligation: Austria, Denmark, Germany, Italy, the Netherlands, Spain, Sweden, and the United Kingdom. French, Belgian, Irish, and Luxembourg natural gas companies did not facing the publication and separation of their trading and transport activities. And until 2005, little change took place according to the EU documents. In 2004, Germany's optimistic declaration was worked over, saying the publication of accounts is not assured. Italy and Spain revised their proclamation of published accounts of distribution system operators one year later. The Luxembourg practice of account publication was even changed twice, claiming that publication of accounts took place in 2004, but was revised by the end of 2005. In other words, there is evidence for four cases of negative gamma convergence. Only Ireland adjusted upwards in 2005, indicating positive gamma convergence. Consequently, the group of countries publishing accounts on the DSO level over the whole period of examination includes Denmark, the Netherlands, Sweden, and the United Kingdom. In contrast, France only maintained its non publication policy.

By the end of 2005, only six countries fulfilled the obligation to publish accounts of the distribution system operators; the other six member states did not fulfil the requirement. Consequently, the indicator shows an increase of variance. As a matter of fact, sigma convergence did not occur and only a moderate level of delta convergence (50%) could be reached. As noted earlier with regard to the similar component of indicator seven (publication of accounts on the transmission level), the reasons for countries changing implementation declaration are not explained in the benchmarking reports. Consequently, European legal provisions did not have a strong effect on the implementation policy in the member states as expected.

7.4 Overview: convergence of regulatory functions

Type of convergence		Sigma	Gamma	Delta
Indicator 1	Legal market opening	X	(+) 50%	58.3%
Indicator 2	Gas network access conditions and tariffication			
Component 2.1	Tariff structure	X	(+) 58.3%	75%
Component 2.2	Type of capacity booking	X	(+) 75% (-) 8.3%	83.3%
Component 2.3	Allocation method		0%	16.6%
Component 2.4	Tariff		(+) 33.3% (-) 75%	25%
Component 2.5	Incentive regulation		(+) 50% (-) 8.3%	41.7%
Component 2.6	minimum booking period firm service		(+) 58.7% (-) 16.6%	50%
Component 2.7	Use-it-or-lose-it (UIOLI)	X	(+) 75.5%	100%
Indicator 3	Balancing rules	X	(+) 8.3%	100%
Indicator 4	TPA storage	X	(+) 75%	83.3%
Indicator 5	Gas release programme	X	(+) 58.3%	58.3%
Indicator 6	Trading facilities		(+) 41.7%	8.3%
Indicator 7	Network unbundling Transmission System Operator (TSO)			
Component 7.1	Basic unbundling model TSO	X	(+) 50% (-) 8.3%	41.7%
Component 7.2	Publication of accounts TSO		(+) 83.3% (-) 33.3%	66.7%
Indicator 8	Network unbundling Distribution System Operator (DSO)			
Component 8.1	Basic unbundling model DSO	X	(+) 8.3%	8.3%
Component 8.2	Publication of accounts DSO		(+) 66.7% (-) 33.3%	50%

Table 12: Occurrence and degree of convergence (dimension regulatory function)

The following section begins by summarising converging trends focusing on indicators representing the dimension regulatory function. Sigma, gamma, and delta convergence are analysed by combining an indicator with a country perspective. Thereby we explore patterns of member states implementation and measure the distance of the best practice for each country.

In seven cases we observe no decrease of variance. A lack of harmonisation is evident for the indicator and components ‘allocation method’, ‘tariff’, ‘incentive regulation’, ‘minimum booking period firm services’, ‘trading facilities’, and ‘publication of accounts on TSO and DSO level’. Sigma convergence is predominantly induced by the other nine indicators. The decrease of variance can also be measured for the dimension regulatory function.

The member states scores for the dimension of regulatory function increase yearly by approximately three-10 points. Beginning in 2001 with 81 points, adding up to 92 points in 2002, 95 points in 2003, the scores reached 104 points in 2004, and closed with 110 points in 2005. At the same time the range decreased from initial 105 points in 2001 to 75 points in 2005.

The shift towards a competition supporting regulatory regime is to a large extent generated by positive gamma convergence. Within the dimension regulatory function, positive gamma convergence occurs predominantly moderately. Table 12 displays these indicators. With regard to ‘tariffs’, ‘balancing period’, and unbundling measures on the distribution level a low degree of positive gamma convergence showed. Whereas components such as ‘type of capacity booking’, ‘UIOLI’, ‘third party access to storage’, and ‘publication of accounts of TSO’ even showed a high degree of delta convergence. On the contrary, regulatory inertia became visible in the case of five indicators where a low degree of negative gamma convergence was found. Those are ‘type of capacity booking’, ‘minimum booking period firm services’, ‘unbundling on the transmission level’, and the ‘publication of accounts for TSO and DSO’.

Network access conditions and tariffication were prominent features of the gas reform; the EC in conjunction with national regulators CEER and ERGEG greatly emphasised harmonisation and the promotion of competition-inducing and promoting measures. For this reason, the success of these efforts is given more attention and the indicator network access conditions and tariffication is therefore considered separately. The indicator is comprised of seven components, five alone which confirm a moderate or high degree of delta convergence, meaning a clear trend towards best practice over time. This is remarkable and unexpected, when considering that specific regulatory instruments were not prescribed by the legal provisions. The introduction of auctions as allocation method and the reduction of tariffs across Europe were less successful. For some countries the component tariff shows even reverse trends towards higher tariffs. Denmark, France, and Ireland’s tariffs formerly were in the upper middle range tariff zone and even increased their tariffs over time.

Figure 9: Regulatory function (2000-2005b)

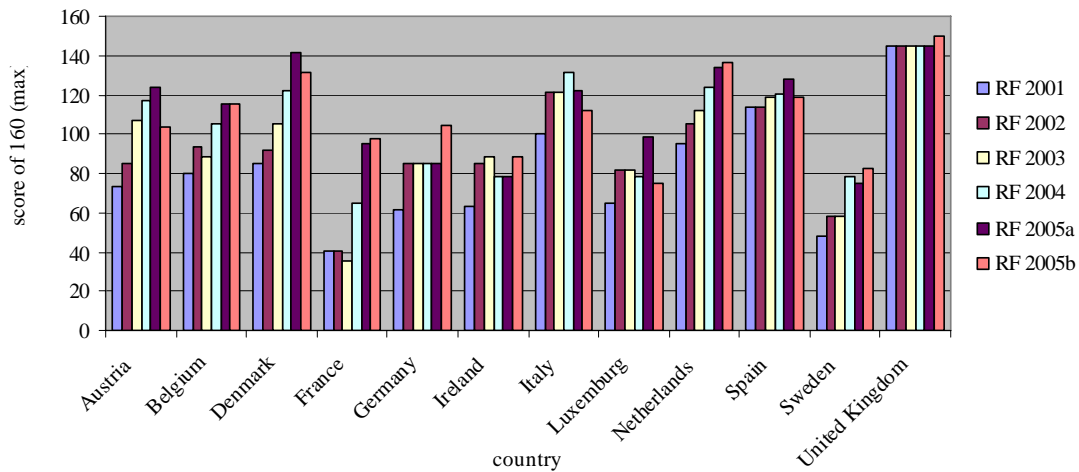


Figure nine shows the countries scoring results for the indicators describing regulatory functions. Accordingly, we observe countries of all four patterns. Four countries develop improvement in a single direction and thereby follow a slope pattern (Belgium, Germany, the Netherlands, and Sweden). The British regulatory regime remained stable over the entire period and resembled a plateau. The scores of most countries form a roof. Austria, Denmark, France, Italy, Luxembourg, and Spain manage to increase their scores during the first year scale down in the second half. The angular point of this pattern differs from 2004 in Italy and 2005 in Austria, Denmark, France, Luxembourg, and Spain. In contrast, no significant pattern could be identified in Ireland. The figure does not show any constant development. The exception to the rule is in fact the UK. Unsurprisingly, the Anglo-Saxon model which served in many ways as a model for best-practice in European gas market regulation did not need to adjust during the gas reform.

In general, the indicators representing the dimension of regulatory function show a moderate degree of harmonisation (54%) and trend towards best practice. A high degree of delta convergence could be achieved for the component 'tariff structure', 'type of capacity booking', 'UIOLI', balancing period' and the indicator 'third party access to storage'. The majority of indicators developed a moderate degree of delta convergence including 'legal market opening', 'incentive regulation', 'minimum booking period firm service', 'gas release programme', basic unbundling model for the transmission system operator, and publication of accounts on transmission and distribution level. In four cases delta convergence is low: 'tariffs', 'allocation method', 'trading facilities', and unbundling on the DSO level.

We get a mixed picture if we set the indicators' performances in terms of delta convergence in relation to the degree of precision of the European legal provisions. For the indicators 'legal market opening', 'TPA storage' and 'legal unbundling on the TSO level' we observe a high degree of precision concerning the legal provisions corresponding with a high or at least moderate delta convergence. The observations regarding 'trading facilities' and to a lesser extent those of 'incentive regulation', 'minimum booking period firm service', 'gas release programme', ownership 'unbundling for TSO', legal and ownership 'unbundling for DSO' point in the same direction. For those indicators a low precision of legal provisions accompanies a low

or moderate degree of delta convergence which suggests a positive correlation. The legal provisions for the unbundling model on the TSO and DSO levels deviated in terms of their ambitions. Therefore, we expected (expectation nine) the degree of convergence to be lower for the unbundling of the DSOs than for the TSOs. As a matter of fact, we observe a marginal delta convergence of 8% for unbundling of the DSO as opposed to a moderate level of delta convergence of 42% for unbundling of the TSO.

The positive correlation is contested by contrary observations. Several indicators reached a high degree of delta convergence although the legal provisions were not prescribing the regulatory instrument. This is the case for the components ‘tariff structure’, ‘type of capacity booking’, ‘UIOLI’, and ‘balancing period’. For the publication of accounts of transmission system operators and distribution system operators we expected full convergence, because this instrument has been mandatory since the introduction of the first Directive. These expectations are rejected, indicating little influence of the legal provisions on the member states implementation practice.

To sum up, we see indications for a positive correlation between the degree of precision regarding the European legal provisions and the degree of convergence. Although the majority of indicators support a positive correlation, the number of contradicting observations is too high to speak of a strong correlation that allows formulating conditions.

Table 13: Countries score of regulatory function

	RF 2001	RF 2002	RF 2003	RF 2004	RF 2005a	RF 2005b
Austria	73.4	85	106.7	116.7	123.4	103.4
Belgium	80.1	93.4	88.4	105.1	115.1	115.1
Denmark	85.1	91.8	105.1	121.7	141.7	131.7
France	40.1	40.1	35.1	65	95	97.5
Germany	61.7	85.1	85.1	85.1	85	104.2
Ireland	63.4	85	88.4	78.4	78.4	88.4
Italy	100	121.6	121.6	131.7	121.7	111.7
Luxemburg	65.1	81.7	81.7	78.4	98.4	75
Netherlands	95.1	105.1	111.7	124.2	134.2	136.7
Spain	113.4	113.4	118.4	120.1	128.4	118.4
Sweden	48.4	58.4	58.4	78.4	75.1	82.5
United Kingdom	145	145	145	145	145	150

To differentiate the different degrees of progress member states achieved by the end of 2005, we distinguish three groups. The highest degree of delta convergence reached those countries whose score for indicators describing regulatory functions was above 120: Denmark, the Netherlands, and the United Kingdom. The middle group scored between 100 to 130 points. Austria, Belgium, Germany, Italy, and Spain received a middle degree of delta convergence for this set of indicators. The lowest scores were seen in France, Ireland, Luxembourg, and Sweden with less than 100 points in 2005. The detailed scoring results of each country and the countries ranking are summarized in tables 14 and 15 below.

Table 14: Countries ranking describing the dimension regulatory function

Rank	Countries rank in 2005b
1	United Kingdom
2	Netherlands
3	Denmark
4	Belgium
5	Spain
6	Italy
7	Germany
8	Austria
9	France
10	Ireland
11	Sweden
12	Luxembourg

7.5 Convergence of regulatory competencies

The following section analyses seven indicators in the order of their description in the methodology section.

7.5.1 Type of decision-making by regulatory authority

In 2001, the way countries applied third party access showed some variation, although more than half of the old member states did grant third party access ex ante. Among these progressive countries were Belgium, France, Ireland, Italy, Luxembourg, Spain, and the United Kingdom. At that time, Sweden and Denmark offered only ex post arrangements. Quite the opposite group was formed by Austria, Germany, and the Netherlands who implemented the minimum requirement of the first Gas Directive by applying negotiated third party access. Austria and the Netherlands revised their third party regime assuring ex ante decisions from 2002 onwards. Austria differentiated between ex ante regulation for inner Austrian transport and distribution and negotiated TPA for transit transport. Similar to the Austria, Denmark chose a hybrid mode of regulation which contains elements of ex ante and ex post regulation. Surprisingly, the Dutch regulator (*Directie Toezicht Energie*) stated that in 2004 network access was based on negotiated third party access, while in 2005 ex ante regulation was back in place. Germany was the most reluctant government forcing introduction of ex ante regulation. Until July 2005, neither a regulator nor an ex ante regulation was ensured. Instead, an association agreement of the gas industry was supposed to guarantee non-discriminatory access to the network. (See Lohmann, 2006: 25-82).

By the end of 2005, ex ante regulation had become the dominant mode of decision-making to ensure third party access. Belgium, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Spain, Sweden, and the UK applied ex ante regulation; Austria and Denmark partially did. To sum up, there is a high degree of delta convergence (83%) with regard to ex ante

regulation. Moreover, the cases of Austria, Denmark, Germany, and the Netherlands support our expectation (4) because we observe a high degree of delta convergence towards ex ante regulation in the last two measurement points.

7.5.2 Decision over capacity allocation rules

In the first year of the reform, transmission system operators were traditionally in charge of allocating the transport capacity within the national natural gas markets. Then, the Transmission system operators allocated the capacity in more than half of the member states. Explicitly this was the case in Austria, Belgium, Denmark, France, Germany, Ireland, and Luxembourg. In the Netherlands and the United Kingdom these responsibilities were shared between the transmission system operator and the regulator. Only in Italy, Spain, and Sweden was the decision power to allocate capacity entirely transferred to the regulator. As we will show, some initial positions of the member states changed over time, but did not result in a decrease of variance with regard to the distribution of decision power.

Denmark, Germany, and Luxembourg left control over the capacity allocation entirely with the transmission system operators. Equally stable, but at the other end of the continuum were the UK and Spain. Positive changes occurred in Austria and Ireland between 2001/2002, followed by France the following year and Belgium in 2004, when transferring decision power from the transmission system operator partly to the regulator. There were also countries who switched back and forth. The Netherlands is such a case. According to Directie Toezicht Energie's answer to the questionnaire, capacity allocation was jointly decided by the regulator and the transmission system operator throughout 2001-2003 and 2005. Nevertheless, this information deviates from the fourth benchmarking report which states that the TSO was in charge of capacity allocation during 2004. Ireland is a comparable case. There, the regulator claimed to share the responsibilities of capacity allocation with the TSO in 2004, whereas the year before and after it was declared to be the regulators responsibility only. The picture at the end of 2005 can be described as follows: In three cases (Denmark, Germany, Luxembourg) the transmission system operator allocates capacity. Austria, Belgium, France, the Netherlands, and the UK preferred to share responsibilities between regulator and TSO. Ireland, Italy, Spain, and Sweden entirely transferred the allocation of capacity to the regulator. Compared to the initial distribution of decision-making power in terms of capacity allocation, there is no decrease of variance. Consequently, no sigma convergence occurred. Ireland and the Netherlands are interpreted as cases of positive and negative gamma convergence. In general, we observe member states transferring the responsibility for capacity allocation away from transmission system operators to either shared control between TSO and Regulator or solely to Regulators. Expectation 10 is confirmed, detecting a low degree of delta convergence regarding the distribution of decision power of capacity allocation.

7.5.3 Approval of balancing conditions

When the monitoring of the balancing regime began in 2002, the member states fell mainly into two categories. Balancing conditions either were approved by the transmission system operator or the regulator. Belgium, France, Germany, and Luxembourg left the approval with the TSO, whereas in Austria, Denmark, Ireland, Italy, the Netherlands, and Spain balancing conditions were approved by the regulator. Initially, Sweden's practice was unknown to the Commission. In

contrast, gas market balancing conditions were set by the market in the UK, a practice only considered best practice if applied in mature markets with a comprehensive sector regulation in place. Therefore, the UK receives a high score.

The year 2004 turned out to be eventful year; seven countries changed the authority in charge. Both originally having the TSO responsible for fixing the balancing conditions, Belgium voted for shared competencies and France transferred this task to the government (ministry). Ireland, Italy, Luxembourg, the Netherlands, and Spain made the reverse step. Initially, the regulator centrally held the responsibility to approve balancing conditions in these countries, but then more authorities became involved in the facilitation of balancing conditions. As a result, a moderate degree of negative gamma convergence (50%) occurred. The most interesting cases are Italy and the Netherlands. In both the distribution of decision power changed three-times from regulator to shared competencies to the ministry and back to shared competencies. This is a strong indicator for a regulatory game in which the potential authorities are struggling to gain control or at least to share it. Less spectacular but still noteworthy is the Austrian case in which the regulator received first the regulatory control and then transferred it to the market in 2005. The interpretation of this decision and its effect is less obvious, because the Austrian natural gas market cannot be compared with the regulatory comprehensiveness that the UK gas market regime and its mature liberal gas market offers. On the contrary, we vote for a conservative interpretation giving Austria a low score for its instrument choice.

From a regulatory perspective, the distribution of power in 2005 reveals an insightful development. At this point, only the regulators in France, Italy, and the Netherlands were still determining the balancing conditions. In most of the other countries balancing conditions were jointly approved by more than one authority, be it the TSO in cooperation with the ministry or the regulator. Only in Belgium did the TSO remain in charge during the entire period.

The state of the play appears to be too ambivalent to suggest more than low delta convergence towards the best practice. The approval of balancing conditions holds: objective based European legal provisions translated into low convergence (10). The range of the indicator only marginally decreased between 2001 and 2005, but still allows identifying a weak form of sigma convergence. During the time of examination, we observe seven cases of positive gamma convergence, though only in France was the approval of the balancing conditions shifted directly from the TSO to the regulator. Furthermore, we observe several cases of negative gamma convergence opposed to six cases of positive gamma convergence.

7.5.4 Dispute settlement

Originally, disputes were settled by the regulator in six countries: Belgium, Denmark, Italy, the Netherlands, Sweden, and the UK. In most of the other countries, the member states preferred a clear allocation of rights and duties by either the ministry or the competition authority (responsible for dispute settlement). The ministry was considered the most appropriate authority to settle disputes in Austria, Ireland, and Luxembourg, while in Germany the competition authority settled disputes. Due to the autonomy of the regions in Spain, disputes were partly settled by regional government and the regulator in the first year and then in the second year conveyed to the regulator. By 2001, only France hadn't appointed an authority to ensure dispute

settlements, but was then catching up by transferring the dispute settlement to the competence portfolio of the regulator (positive gamma convergence). In 2002, Austria, Ireland, and Luxembourg had already passed on dispute settlement from the ministry to the regulator. For 2004 and 2005, the Belgium regulator declared that the responsibilities of dispute settlement were hybrid, whereas in former years the regulator was supposed to be the only authority settling disputes. According to our data, the Netherlands had the most unstable regulatory framework with regard to dispute settlement. In the first year the regulator held the responsibility, then transferring it for three years to the competition authority, and afterwards shared it with regulator and regional government in 2004, before finally staying with the competition authority in 2005. For the sake of regulatory stability, one can only hope these shifts in competencies are related to the fact that the Dutch regulator, *Directie Toezicht Energie* (DTe), is situated under the roof of the Dutch competition authority (*Nederlandse Mededingingsautoriteit*) and that this might have caused some labelling irritations on the regulatory side. In contrast, Denmark, Italy, Sweden, and the UK provided a stable regulatory framework, by using the regulator as the only mediator of disputes during the entire reform period. German authorities performed less progressive but equally stable, appointing the competition authority to be solely in charge of dispute settlement. By 2005, we observe a converging trend towards the regulator being responsible for dispute settlement in nine countries. In other words, there is a decrease of variance towards what we assume to be best practice. Here sigma convergence goes along with a high degree of delta convergence. The group of best practice is Austria, Denmark, France, Ireland, Italy, Luxembourg, Spain, Sweden, and the UK. Belgium appears to be off beat, because the competencies are shared between the regulator and the competition authority. In Germany and Netherlands disputes are still settled by the competition authority instead of the regulator. To conclude, our expectation implying a low degree of delta convergence due to objective based legal provisions is disapproved for dispute settlement.

7.5.6 Type of regulator

Even before the introduction of the first Directive, some initial movers created independent regulators to supervise the gas sector. Early birds were the UK (1986/1999), Italy (1995), the Netherlands (1998), and Sweden (1998). These countries were followed by Spain (1999), Belgium (1999), France (2000), Denmark (2000), and Luxembourg (2001). Slight latecomers turned out to be Ireland and Austria. Ireland's regulator, Commission for Energy Regulation (CER), was established in 1999 to regulate the electricity market and in 2002 was extended to the gas market. Likewise, the Austrian regulator e-control was established in 2001, but started its regulation of the gas sector in 2002. Creating sector regulation only after the second Directive, Germany (2005) clearly is at the bottom of the league.

The remit of the regulator was already quite homogenous in 2001 with ten energy specific regulators in place. The two exceptions were Luxembourg and Germany. A small country with a small gas market, Luxembourg located its regulatory staff (two-three staff) under the roof of a multi-utility regulator. On the contrary, Germany is one of the largest European gas markets. Lohmann's analysis of the German gas market shows how well organized gas business interests in conjunction with a lack of political will in the government, namely the ministry of economic affairs, deferred the establishment of a regulator. This finally occurred only in 2005, when a regulatory authority for natural gas was set up within the Federal Network Agency. The Agency

started off with telecommunication and incrementally expanded its sectors to become a multi-utility regulator.

Comparing the regulatory landscape in 2001 with 2005, we balance only a minor decrease of variance induced by the Germans setting up a multi-utility regulator at the very end of our period of examination. To sum up, there are ten energy-specific and two multi-utility regulators in 2005. Consequently, we observe very little sigma convergence, but a high degree of positive gamma and delta convergence. The distance to the best-practice remained unchanged at the same high degree of delta convergence as in the beginning. At first glance the result is puzzling; hardly any effect was observable regarding the type of regulators set up and at the same time we see a high degree of delta convergence throughout the examination period. Expectation 10 cannot be confirmed because here vague legal provisions correspond with a high degree of delta convergence.

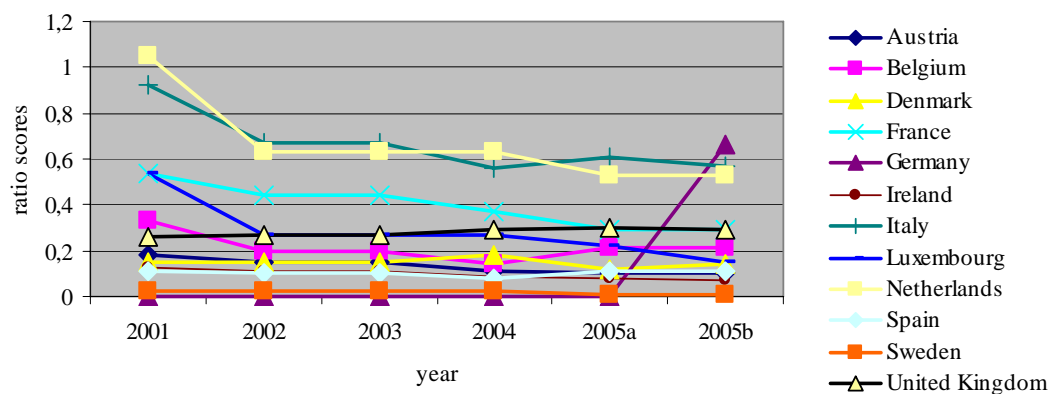
7.5.7 Ratio of consumption of national gas market and staff number of national regulator

Before turning to the results, the quality of data needs some more explanation to allow an appropriate interpretation. While gathering accessible data on staff working on natural gas market regulation for the regulator, we learned that staff numbers do not necessarily differentiate between professional staff and support staff, or indicate whether this staff is working on gas or electricity regulation. Furthermore, regulators may frequently rely on outsourced expertise which is not reflected in the staff number. The ratio does not take account for input through consultants to the national regulators. For this reason, the results of the ratio are somewhat tentative or could even be considered to be problematic.

Our sample countries show a relatively high degree of variation in terms of staff number, annual budget, and market size. In 2001, staff numbers ranged from 1 in Luxembourg to 340 in the United Kingdom. There is the same disparity with regard to market size. Citizens of Luxembourg consumed only 0.6 billion cubic metres (Bcm) of natural gas in 2000, whereas UK consumption in the same year was more than 160 times higher, reaching 97 Bcm. Having said this, there is no doubt that the ratio setting the market size in relation to staff number of the regulator can at best be a proxy to describe the institutional endowment. At first glance the indicator seems abstract. Therefore, we illustrate the meaning of the ratio by referring to the UK example. In 2001, the UK had a ratio of 0,27. This can be read as one staff member from the Office of Gas and Electricity Markets (Ofgem) was responsible for a market share equivalent of 300 million cubic metres. One could argue that the higher the ratio, the weaker the institutional endowment of the regulator. In line with this reasoning we divide the countries into high, middle, and low scores groups.

The indicator changes over time are displayed in figure 10. Initially, the figure suggests a relatively high degree of stability for most of the countries, which needs to be specified by a closer look at the individual cases.

Figure 10: Ratio natural gas consumption/regulators staff (2000-2005b)



Initially, there is a considerable number of countries in the first group with a ratio below 0.2 in 2001: Austria, Denmark, Ireland, Spain, and Sweden. The second groups' ratio ranges between 0.2 and 0.49, and consists of Belgium and the UK. The third group with the highest scores above (0.5) incorporates France, Italy, Luxembourg, and the Netherlands.

The ratio of consumption of market and staff of the regulator did not show significant changes in three countries. Sweden stayed at a plateau of 0.2 - 0.1. The UK and Spain ratios appear equally stable. Both increased slightly between 2001 and 2005, English Ofgem from 0.26 to 0.29 and the Spanish *Comisión Nacional de Energía* from 0.8 to 0.11. The case perspective also reveals a gradual downward trend in the market-staff ratio indicating an increase of institutional endowment of the regulators. The Netherlands and Luxembourg had the sharpest and most abrupt declines between 2001 and 2002, indicating negative gamma convergence. The Netherlands is a particularly interesting case. With a ratio of 1.05 in 2001, it cuts back down to 0.63 the year after and closes with 0.53 in 2005. Although it is still a comparably high ratio, the change is significant. Similarly, Luxembourg, employing less staff, lets the ratio drop from 0.54 down to 0.27 in 2002. Though, as such a tiny natural gas market the drop could be solely explained by a single new employee.

Austria, Belgium, and Ireland represent the group of countries whose regulators provide a high number of staff in relation to their market size and who increase even more the regulatory density in the course of the reform. The Irish Commission for Energy Regulation started with a ratio of 0.13 in 2001 and shrank to 0.7 in 2005. Austria followed the example by reducing its ratio from 0.18 to 0.10 during the same period. The staff endowment of the Belgian *Commission de Régulation de l'Electricité et du Gaz* developed in the form of a wave, starting with 0.33 in 2001, decreasing to a low of 0.14 in 2004 and mounting up again to 0.21 in 2005.

Contrary to the group of fast movers, France, Italy, and Germany appeared to be rather reluctant to provide a strong institutional endowment. France entered in 2001 with a ratio of 0.54 and reduced it gradually to 0.29. Italy started off with a higher ratio of 0.92 in 2001 and reached 0.57

by 2005. Germany brings up the rear, by not institutionalising any regulator until 2005. When put in place, the number of staff generate only a conservative ratio of 0.66. As a result, in the group of late movers it is only with France could we speak of negative gamma convergence.

Bergmann et al. (see Bergman et al, 1998) showed that usually the scope and intensity of regulation sharply increases in the beginning of a reform. A number of European and national laws and regulations had to be implemented and their compliance monitored during the EU gas market reform. To meet the growing work load of the regulator, one would therefore expect an increase of staff which translates into a lower ratio. In the case of the European gas reform, this observation can be confirmed. The range of the indicator ratio market/staff decreased from 1.03 in 2001 to 0.65 in 2005. Earlier we described a downward trend of the ratio on a case by case basis. This trend is also reflected by the overall mean change from 0.38 in 2001 to 0.26 in 2005. In general, the decreasing range and mean of the indicator confirm the occurrence of sigma convergence. To conclude, a moderate delta convergence does not fully support our expectation (10).

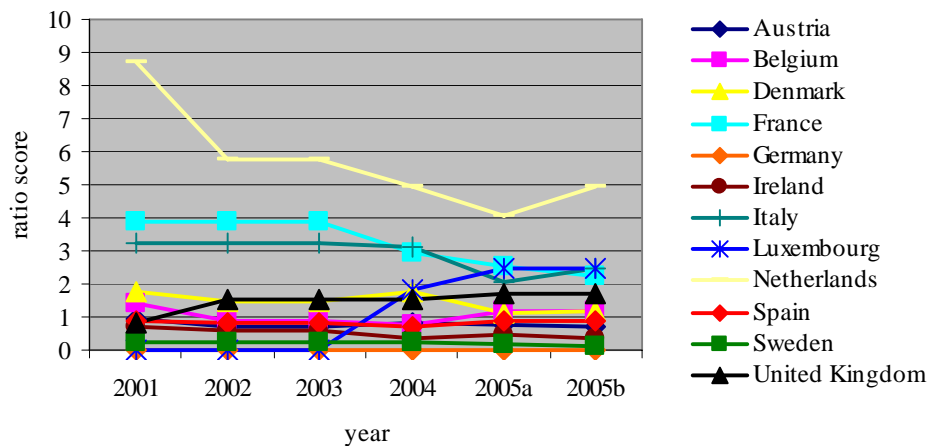
7.5.8 Ratio of consumption of national gas market and budget of national regulator

Studies on utility reforms observe a rise of regulatory costs due to the increased regulatory activities after the legal introduction of the reform (see Bauer, 2006; Bergman et al., 1998). The following section covers the other dimension of institutional endowment, indicated by the annual budget the national regulators have at their disposal. Just as the staff numbers of the regulators show a wide range, so does the height of annual regulators budgets across the old member states. For instance, the lowest budget has Luxembourg with 0.22 million Euros; this is contrasted by the sum of 103 million Euros Ofgem generated through the licensing system in 2001.

Before describing the indicators performance, we would like to give some illustration of its interpretation, using France and the Netherlands as examples. Both countries market size is comparable, consuming approximately 39 Bcm in 2000. Setting the consumption level in relation to the budget the regulator can use to oversee the market, the two countries differ considerably with respect to their ratio. Whereas the French regulator provides over one Euro to regulate a market share of 2.5 Bcm, the Dutch regulator only has one Euro to regulate a market share of 5.5 Bcm. As a result, the regulatory density in France appears to be much higher than in the Netherlands, considering the regulators' budgets.

The figure below displays the scoring of the 12 member states between 2001 and 2005. Austria, Ireland, Spain, and Sweden receive high scores. As a result of its budget cuts, the British Ofgem achieved high scores in 2001, but only middle scores in subsequent years. Belgium and Denmark form the group whose score levelled in the middle. The group attributed by two lows consists of France, Germany, Italy, Luxembourg, and the Netherlands. No member state with low scores caught up to the middle or even higher score group. Accordingly, no positive gamma convergence occurred. Instead, the case of UK shows negative gamma convergence. Although the UK falls back, Ofgem still has the highest annual budget in total numbers.

Figure 11: Ratio natural gas consumption/regulators budget (2000-2005b)



Looking at the member states, no homogenous trend can be identified. On the one hand there is Sweden, steady between 0.23 and 0.20 during 2001-2005. Then in 2005 the regulator increased the budget from initially 3.53 million Euros to 7.61 million Euros and thereby improved the ratio to 0.9. On the other hand, Ofgem cut its budget between 2001 and 2002 from initially 103 million Euros to 58 million Euros. Hence, the budget constraints of the early reform years are reflected in a change of the ratio from 0.85 in 2001 to 1.71 in 2005. The German case is an exception in two ways. Germany had no regulator until 2005, but when the Federal Network Agency came into existence, it only published the budget for regulating multi-utilities. In other words, even for 2005 no appropriate data is available.

The group of positive movers whose ratio is steadily declining consists of Ireland, Austria, Italy, and France. Within this group, Ireland holds the first rank with a ratio of 0.69 in 2001 diminishing even further down to 0.35. Austria closely follows with a ratio of 0.93 in 2001, decreasing to 0.70 in 2005. Italy's initially ratio is less favourable, starting with a height of 3.22 in 2001 dropping to 2.48 by 2005. Similarly, France starts with a high score of 3.86 in 2001 and gradually improves the annual budget, closing with a ratio of 2.26 in 2005.

Moreover, we observed sharp declines in Belgium and the Netherlands between 2001 and 2002. At that time, Belgium improved its ratio from 1.42 down to 0.9, but reversed the trend a year later. By 2005, Belgium's ratio was at 1.19. The Netherlands considerably strengthened its budget which translated into a decrease of its ratio from 8.68 (2001) to 5.79 (2002). In the course of the reform, the Dutch ratio lowered even further to 4.96 in 2005. The Netherlands certainly made an effort to strengthen its institutional endowment. Nonetheless, it remains behind compared with ratios of the majority of the other old member states.

As in Belgium, the Spanish regulator shows contradicting trends with regard to the development of its regulators annual budget, though the loops are rather flat. Starting with a very robust ratio of 0.91 the Spanish National Energy Commission (CNE) even raises the budget, thereby

lowering the ratio to 0.71 in 2004. Surprisingly, CNE cuts the budget again in 2005, thereby reaching nearly the old level with one Euro corresponding to a market share of 0.97 Bcm.

The range of the indicator ratio of budget and market nearly halves between 2000-2005, shrinking from 8.68 to 4.87. In general, this decrease of variance indicates sigma variance. Altogether eight regulators could raise their budgets and thereby improve the ratio expressing the market size in relationship to the annual budget. Opposed to our initial expectation (10), a moderate degree of delta convergence occurred. This also shows in the mean change of the ratio. Formerly, the ratio's mean was 2.05 in 2001 and then decreased to 1.66 in 2005. Despite the fact that the annual budgets did not develop homogenously, we could identify a general trend that the institutional endowment is improving towards better practice.

7.5.9 Overview: convergence of regulatory competencies

This section portrays and summarises the occurrence and degree of the three convergence types for the dimension regulatory competencies (see table below). First, we explain the results for sigma convergence. Thereafter, we assess gamma convergence from an indicator perspective and with the outcome of this we show patterns of regulatory choices from a country perspective. We then present the distance towards best-practice is by measuring delta convergence for the indicators of the dimension of regulatory competencies.

In comparison to the indicators of the first dimension, those of the regulatory competencies show a similar trend towards convergence, though the degree appears at first glance even stronger. Sigma convergence occurred in six out of seven indicators. The mean of scores mean for regulatory competencies are very stable and only increase slightly from 42 points in 2001 to 51.5 points in 2005. The range diminishes from 63 points to 43 points. This decrease of variance is mainly induced by Germany. The German scores marked the bottom line with a minimum of 7.5 points in the first two years and a score of 23 points in 2005. In other words, the sigma convergence found in the dimension regulatory competencies is partly generated by the strengthening of the German regulatory competencies.

Table 15: Occurrence and degree of convergence (dimension regulatory competencies)

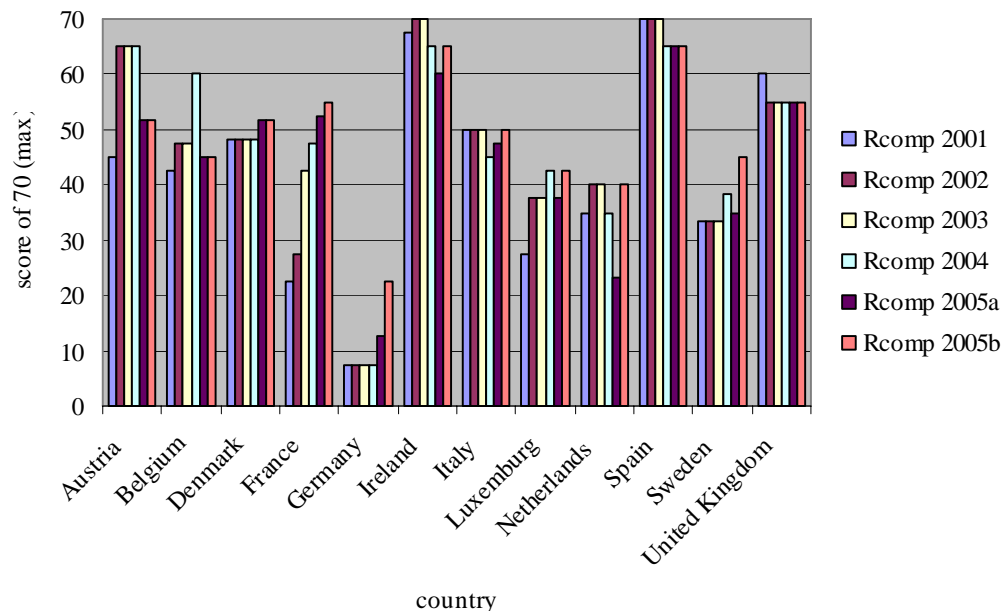
Type of convergence		Sigma	Gamma	Delta
Indicator 9	Type of decision-making by regulatory authority (Exante/expost)	X	(+) 75% (-) 8.3%	83.3%
Indicator 10	Capacity allocation rule decided by		(+) 33.3% (-) 16.6%	33.3%
Indicator 11	Balancing conditions approved by	X	(+) 58.3% (-) 50%	33.3%
Indicator 12	Dispute settlement	X	(+) 91.7% (-) 16.6%	75%
Indicator 13	Type of Regulator	X	(+) 83.3%	83.3%
Indicator 14	Ratio of consumption of national gas market and staff number of national regulator	X	(+) 50% (-) 16.6%	50%
Indicator 15	Ratio of consumption of national gas market and budget of national regulator	X	(-) 16.6% (+) 8.3%	41.7%

The process of harmonisation and directional convergence towards best practice was accelerated by countries which moved forward and applied more favourable instruments. Both forms of gamma convergence are visible in every country, but the degree to which they occur for each indicator varies substantially. For instance indicators such as ‘type of decision-making by regulatory authority’, ‘type of regulator’, and dispute settlement show a high degree of positive gamma convergence, whereas the other four indicators only reached either a moderate or low degree of positive gamma convergence. The degree of negative gamma convergence does not vary to the same extent, ranging from 8% to 17% for six indicators. Only the indicator ‘balancing conditions approved by’ shows a moderate level of negative gamma convergence which in conjunction with a moderate degree of gamma convergence results in an overall low delta convergence. Whereas positive gamma convergence is found quite often simultaneously with negative gamma convergence or just on its own, negative gamma convergence usually comes together with positive gamma convergence. This is not the case for the indicator type of regulator, for which negative gamma convergence is absent.

The low degree of positive gamma convergence for the ‘Ratio of consumption of national gas market and budget of national regulator’ indicates a reluctance to improve the institutional endowment of the regulators. The figures for the indicator describing the ratio market size/staff point in the same direction, observing here a moderate level of positive and a low degree of negative gamma convergence. Equally we observe a general reluctance to empower the regulator deciding the capacity allocation rules, signified by the absence of or a low degree of all three types of convergence.

Section 7.2 introduced four different patterns describing the performance of indicators with regard to their distance to best practice. Accordingly, we analyse the indicators performance of the second polity dimension in the same manner. Here, Denmark, France, Germany, Luxembourg, and Sweden gradually minimise their distance to the best-practice model in the form of a steady slope. Even though the incline of the slope differs in total scores, the direction of change is the same. In the case of Spain the slope follows the reverse trend, first providing high scores which in the course of the reform decline by 5 points. This change reflects the shift of governance in terms of the approval of balancing conditions. During the initial years, the regulator was responsible, whereas after 2004 the ministry and the transmission operator shared this competence. Although Sweden shows an overall upward trend, we observe an outlier in the beginning of 2005. Due to changing responsibilities in terms of the approval of balancing conditions and capacity allocation rules, Sweden's score shows a small dip. The UK and Italy display only marginal changes with regard to their regulatory competencies and therefore its scores resemble a plateau. In contrast, scores of Austria, Belgium, and Ireland show an upward and downward trend like a roof. Especially in Austria the changes are significant. The Netherlands appear to be not only a country with relatively little low centralization of decision power at the regulator but also exceptional regulatory instability. The Dutch regulatory competencies show mixed performance without indicating any clear direction. In this context the dip at the beginning of 2005 is remarkable. As we see in figure 12, the scores of the Netherlands see-saw from 35 in 2004 down to 23 in beginning of 2005 and up again to 40 at the end of 2005. The dip is a result of less favourable instrument choices related to dispute settlement and capacity allocation that took effect by 2005.

Figure 12: Regulatory competencies (2000-2005b)



The figure accentuates two peaks to which more attention is given. The first occurs in Belgium in 2004. Then, Belgium revised three measures at once. First, the capacity was no longer allocated by the TSO alone, but jointly with the regulator. Second, the approval of balancing conditions was shared by TSO and regulator. Third, the regulator temporarily employed more staff. The next year regulatory staff number and budget decreased and the regulators competence for settling disputes was decentralised. The second peak happens in Germany, when the regulator was finally introduced in 2005. Reaching only a maximum score of 23 Germany has by far the lowest score with regard to its regulatory competencies.

Previously, we demonstrated that the European legal provisions have not determined which authority has to be in charge of overseeing the different regulatory functions. Therefore we anticipated it as unlikely that the legal provisions induce a high degree of delta convergence for the indicators belonging to the polity dimension during our examination. This expectation (10) corresponds with a moderate delta convergence of 52% for the dimension regulatory competencies. Nevertheless, this does not hold true for all indicators. For instance, ex-ante regulation (Indicator 9), dispute settlement (Indicator 12), and type of regulator (Indicator 13) showed a high degree of delta convergence. The expectation is strongly confirmed by the two Indicators ‘capacity allocation rule decided by’ and ‘balancing conditions approved by’ and to a lesser extent by the two ratios describing the institutional endowment of the regulator (Indicator 14 & 15).

Taking a country perspective, the table below shows the detailed scoring results describing delta convergence between 2000 and 2005b.

Table 16: Countries score for the dimension regulatory competencies

	Rcap 2001	Rcap 2002	Rcap 2003	Rcap 2004	Rcap 2005a	Rcap 2005b
Austria	45	65	65	65	51.7	51.7
Belgium	42.5	47.5	47.5	60	45	45
Denmark	48.3	48.3	48.3	48.3	51.7	51.7
France	22.5	27.5	42.5	47.5	52.5	55
Germany	7.5	7.5	7.5	7.5	12.5	22.5
Ireland	67.5	70	70	65	60	65
Italy	50	50	50	45	47.5	50
Luxemburg	27.5	37.5	37.5	42.5	37.5	42.5
Netherlands	35	40	40	35	23.3	40
Spain	70	70	70	65	65	65
Sweden	33.3	33.3	33.3	38.3	35	45
United Kingdom	60	55	55	55	55	55

The countries’ scoring results at the end of 2005 were divided into three different groups. Accordingly, a high degree of delta convergence is reached if the country accumulated a score between 60-70 points. Ireland and Spain received the highest score with 65 points. A middle degree of delta convergence could be found in the United Kingdom (55), France (55), Austria

(52), Denmark (52), and Italy (50), ranging between 50-59 points. The lowest degree of delta convergence appeared in Belgium (45), Sweden (45), Luxembourg (43), the Netherlands (40), and Germany (22.5). The table below displays the countries ranking describing the dimension regulatory competencies.

Table 17: Countries ranking describing the dimension regulatory competencies

Rank	Countries rank in 2005b
1	Ireland, Spain
2	France, UK
3	Austria, Denmark
4	Italy
5	Belgium
6	Luxembourg
7	Netherlands

Strong independent regulators are one of the preconditions to enhance regulatory effectiveness. The results do not suggest that this precondition is met. The indicators describing the development of regulatory competencies indicate only a moderate degree of delta convergence (average 57%). Moreover, we explained that the results have to be treated with caution due to the quality of data (staff and budget numbers). Finally, the effectiveness of regulators or regulation is not assessed here. This would be a valuable contribution of future research.

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8. CONCLUSION

The main purpose of this study is to assess how far the regulatory regimes of European gas markets converge towards a best-practice model formulated on the basis of economic theory and the European legal provisions constituting the gas reform. The analysis shows whether member states are ahead or behind best practice in European gas market regulation and thereby indicate implementation patterns. Moreover, the study explores the impact of European policy related to general policy objectives and energy specific goals on the one hand and sector-specific European law on regulation on the other hand. To facilitate this, it is necessary to deconstruct neoclassical assumptions of the gas reform and identify key principles of market reform which determined ex ante the reform's market design and form the basis for the methodology.

8.1 Theoretical and methodological approach

Drawing on the structure conduct performance paradigm, the European Union strives to increase economic welfare by introducing regulation-for-competition in natural gas markets. Thereafter, regulation aims to affect market structure and business conduct by applying traditional principles of market reform such as competition, third party access, unbundling, and independent regulation. These principles function as the starting point for the formulation of a best-practice model in the methodology. To define regulatory regimes and variables that shape regulation, we applied the framework of New Institutional Economics in the form of Williamson's (1998) four layer model to the natural gas market sector liberalisation. From an evolutionary perspective, informal institutions (first level) such as member states' beliefs, norms, or European (energy) policies influence formal institutions such as national or European laws (second level). Those informal institutions then shape institutional arrangements (third level). So-called actual regulation in turn determines the market structure and market performance (fourth level). In the process of applying the model to the gas sector reform, we proposed two additional criteria, which enable definition of regulatory regimes and formulation of two hypotheses. The application of the four-layer model to the European gas market reform firstly showed that the distinction between formal institutions and institutional arrangement is not as straightforward as the model originally suggested. In the case of European gas market reform, most of the actual regulatory functioning is finally determined on the level of institutional arrangements within the member states. Therefore, we distinguish between European legislation on the formal level and regulation on the level of institutional arrangements. As we elaborated in the theory chapter, this proposition is not a final solution to the demarcation problem. Secondly, energy policy and member states' beliefs (first level) expressed through attitudes towards liberalisation might change within an examination period and directly or simultaneously affect the institutional arrangements on the third level. Accordingly, intra-variable flows are not only possible but even likely in the course of changing governments (see Stern, 1998: 209-210). Earlier empirical research on natural gas market organization in Europe attempted to incorporate member states' positions to analyse their impact on the regulatory regime model. For instance, Stern maps the pre-liberalisation positions of the continental European governments, distinguishing between convinced opponents, willing accepters, and grudging accepters (206-211). Arentsen applies a

similar trichotomy, when differentiating the dominant regulatory orientations in 2000 between competition-, national gas industry, and national public interest oriented (see 2004: 97). Both suggest that those do indeed influence next steps within the EU reform process. So far, a systematic analysis of the member states positions has not been undertaken. Our analysis of energy policy objectives also showed that there is little knowledge about those countries' positions and actions which are not prominently promoting or opposing the liberalisation process. Even less is known about how member states' positions changed within the negotiations on the EU level and what factors evoke possible change of attitudes. It became apparent that much more research is necessary to understand the whole causes and regulatory dynamics which shape the evolution of regulatory regimes. However, this study starts by assessing those regimes and exploring the converging effect of European energy policy objectives and European sector-specific legal provisions. Expectations about these causal relations were derived from New Institutional Economics (North, 1990; Oliver E. Williamson, 1998) and European Public Policy Studies inspired by new institutionalism (chapter 2).

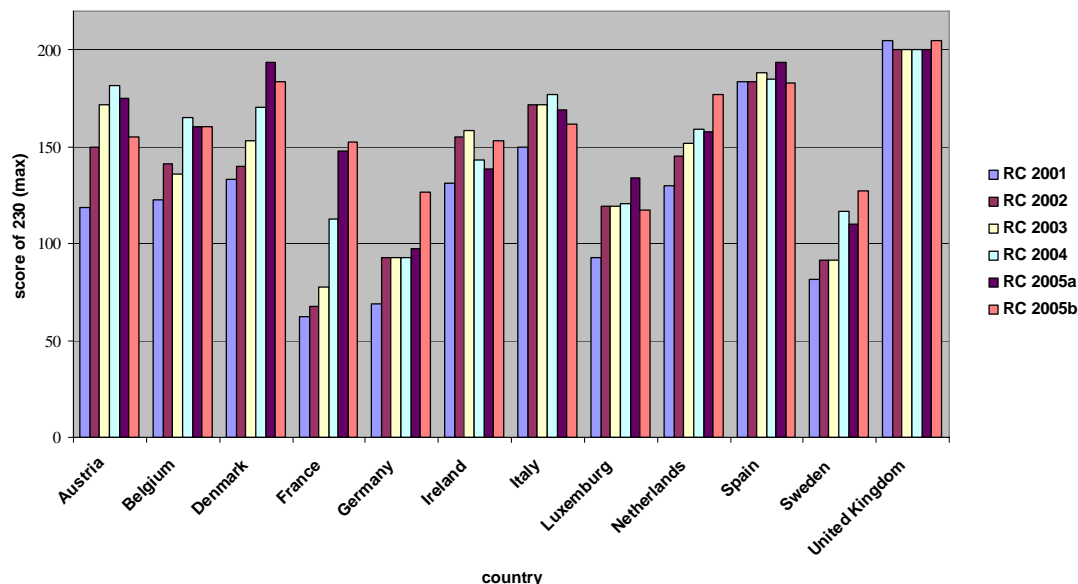
The concepts of policy convergence and regulatory comprehensiveness form the basis of the methodology for assessing regulatory regimes in European gas markets. To capture patterns of institutional change, the concept of policy convergence enables distinguishing between three different approaches to assess convergence. Sigma convergence addresses solely the decrease of variance, whereas gamma convergence indicates the rate and direction of change. By introducing the distinction between negative and positive gamma convergence, it can be differentiated between member states falling behind (-) and countries catching up (+) to best practice. Moreover, delta convergence allows measuring the quality of change in form of the distance to best-practice model. For this purpose, we develop a methodology that deduces what the European Union anticipates to be best-practice for gas market regulation. The definition of regulatory regime and its operationalisation focuses on the formal institutional factors of regulatory performance. For the operationalisation of regulatory regimes we refer to the concept of regulatory comprehensiveness that suggests organising the indicators along the dimensions of regulatory function and regulatory competencies. This distinction allows exploring differences concerning implementation patterns that are either attributed to the policy or polity dimension. To measure the member states' distance to the best-practice model for European natural gas market regulation, we created an index based on 15 indicators consisting of 23 components. The sum of these 23 components, each allowing a ceiling of 10, amounts to 230 maximum possible points. Finally, total scoring results and indicator values are attributed to three models: minimum model, emerging model, and best-practice model. (See section 6.12, table 9)

8.2 Convergence of regulatory regimes towards best practice

Change of regulatory regimes in European gas markets appears to be incremental. Member states did redesign their regulatory regimes stepwise. In general, regulatory regimes in European gas markets reached only a moderate degree of delta convergence accounting for 54% by the end of 2005. The overall increase of countries' scores translated into a decrease of variance in form of sigma convergence. Expressed in numbers, the overall range abated from 142 points in 2001 to 88 points in 2005b, suggesting a moderate sigma convergence. The mean of 123 points in 2001 increased to 159 points of 230 points by the end of 2005. At the end of the period, the distance from the mean scores to the best-practice scores still accounted for 70 points. These observations from a birds-eye perspective suggest confirmation of the Northian regulatory inertia assumption

(section 2.6). The member states' reluctance to move towards best-practice becomes even more visible analysing the rate and degree of convergence from a country perspective. In doing so, we identified four different implementation patterns.

Figure 12: Regulatory comprehensiveness (2000-2005b)



The British gas market regulation functioned as a kind of raw model for the European best-practice. Therefore, the UK was not forced by EU legislation to make any changes, but levelled at a plateau of best-practice during the entire period with scores between 200 and 205 points. Spain followed up as forerunner and immediately chose the emerging model as starting position. The regulatory regime in Spain achieved quite high and relatively stable scores during the entire period and in the end received the third rank. Still its changes are too significant to speak of a plateau pattern as in the UK. Especially the dip during 2005 from 193 points to 183 points suggests a mixed pattern. Austria, Ireland, and Italy managed to move early from the minimal to the emerging model. Thereafter, Denmark and the Netherlands followed the example in 2003. Belgium joined that group in 2004 and France caught up by the end of 2005. Altogether seven countries moved from the minimal model to the emerging model, but none reached the best-practice model. On the contrary, Germany, Luxembourg, and Sweden voted for the minimal model during the entire period. Countries of both groups followed either a slope or a so-called roof pattern. The slope pattern indicates a steady movement towards best-practice, whereas the roof pattern shows reluctance towards the end of the examination period to adopt best-practice. Yet a particular model cannot be attributed to a certain pattern.

The Netherlands, France, Germany, and Sweden steadily increased their scores. The Netherlands started with 130 points and reached 177 by the end of 2005. France and Germany considerably improved in terms of total scores. Between 2001 and 2005 France added 90 points and Germany 57 points. This resulted in 153 points for France and 127 points for Germany in 2005. Sweden increased steadily but reached only 128 points altogether.

Table 18: Countries ranking with regard to regulatory comprehensiveness

Rank	Countries rank in 2005b
1	United Kingdom
2	Denmark
3	Spain
4	Netherlands
5	Italy
6	Belgium
7	Austria
8	Ireland
9	France
10	Sweden
11	Germany
12	Luxembourg

Other countries such as Denmark, Italy, Belgium, Austria, Ireland, and Luxembourg first increased their scores, but at some point adopted less favourable measures which translated into a roof pattern. In those countries low or moderate negative gamma convergence occurred. The top of the roof was not reached during the same year, but in most of those countries 2004 or 2005 is the turning point. Denmark holds the second rank with 184, closely followed by Spain and the Netherlands. Denmark's dip in 2005 goes back to the rise in average tariffs from 2 to 4 Euros per MWh. Italy reached 162 points by the end of 2005. The reverse trend within Italian gas market regulation goes back to expanding the minimum booking period to one year in 2005 and the non-publication of accounts on TSO and DSO level for the same year. Belgium's reluctance showed within the dimension regulatory competencies. Whereas before 2004 the Belgian regulator was solely responsible for the dispute settlement, Belgium voted for a hybrid form of executing this responsibility thereafter. Moreover, the institutional endowment in terms of staff number and budget was induced by data from the third benchmarking report which included the regional regulators in addition to the national regulator. In fact, taking this into account, changes within the national regulator CREG appear minor between 2003 and 2005. Due to a lack of more precise data for that year we can just imagine that the roof pattern is flatter. This case exemplifies the general problem stemming from only partially unified data and definitions the analysis was facing. In fact, gathering the relevant information to execute sector regulation appeared to be a collective learning experience for all actors involved. Austria downgraded from 182 points in 2004 to 155 points by the end of 2005. Between 2001 and 2004, Austria declared that they provided more than ex ante regulation. This was more specified during 2005 explaining the dual system of ex ante regulation for inner Austrian transport and ex post regulation for transit transport (section 7.5.1). Moreover, since 2005 the balancing conditions are not determined by the regulator but instead formulated within the market, although trading is not mature and the overall regulatory framework not as advanced as in the UK for instance. Finally, the non-publication of accounts for TSO and DSO level reduced scoring at the end of the measurement (see European Commission, 2005a: 81-82). The latter phenomenon occurred as well in Luxembourg and reduced its final score to 118 points. Last but not least, Ireland's score shrank to 154 points due to a sharp increase of average tariffs between 2003 and 2004 and the transfer of

regulatory competencies from the regulator to the ministry and the Transmission system operator. During the same period, balancing conditions were no longer determined by the regulator but jointly formulated by the ministry and the TSO. Moreover, capacity allocation rules were shortly commonly elaborated by the regulator and the TSO, before returning to the regulators portfolio of competencies.

To conclude, analysing positive and negative gamma convergence from an indicator perspective in chapter 7 revealed that the phenomenon of member states falling back by adopting less favourable instruments than earlier on is generally not related to a specific set of instruments. The only distinctive common feature appeared to be the publication of accounts on the TSO and DSO level at the end of 2005. A more detailed analysis of the empirical results from an indicator perspective is provided in chapter 7.

The two dimensions of regulatory functions and competencies point in the same direction, indicating a moderate move towards regulation-for-competition. The dimension regulatory function shows a slightly higher impact on inducing best-practice. This suggests that countries are more inclined to change their institutional arrangements by revising a regulatory instrument than by transferring decision power to the regulator. In terms of regulatory strategy this suggests in turn that progress towards best-practice is possibly more forcefully promoted within the dimension regulatory competencies, but also more difficult to reach. Analysing how distribution of regulatory oversight changed between 2000 and the end of 2005 showed that the struggle for competencies does not only take place between the regulator and the transmission system operator but to a large extent between national ministries and regulators. As a result, governmental institutions and regulators often share regulatory competencies. Re-emphasising public service obligations such as security of supply, environmental concerns, or protection of disadvantaged consumer groups sometimes brings the government back in. One early example is the United Kingdom and the Utilities Bill from 2000. Although the regulation of the sector stayed with Ofgem, the Bill provided the government represented by the Secretary of State with more formal opportunities to intervene in the regulatory process by imposing social and environmental guidance or levy schemes for disadvantaged consumers. Graham judges “It is unlikely that these formal powers will actually be used to any great extent but they provide more the possibility for informal influence by the government over the Authority’s agenda.” (2000: 102-103)

8.3 Impact of European law and energy policy objectives on regulation

Deduced from Williamson’s four-layer model, the effect of two endogenous factors, European law and energy policy objectives, on regulation was analysed in an exploratory manner. This paragraph gives the concluding considerations about whether the correlations as formulated in the two hypotheses held.

Regarding the second layer, we expected those subjects of the gas market reform promoted by European provisions to converge towards best-practice. On the basis of this general hypothesis (1) we formulated several sector specific expectations that have been individually answered in the empirical chapter. In general, a low precision of European law corresponds with a low or

moderate delta convergence; the results suggest a relatively weak correlation. The sum of expectations cannot be confirmed in a straightforward manner, but necessitate a more considered answer.

Precise European provisions concerning third party access and TPA to storage translated into a high degree of delta convergence. Furthermore, a low precision of legal norms resulted in a low degree of convergence regarding trading facilities, capacity allocation rules and balancing conditions. Imprecise European legal provisions evoked a moderate move towards best practice with respect to components like incentive regulation, minimum booking period, gas release programme, and ratios setting the consumption in relation to the staff members or budget of the regulator. For legal market opening and unbundling measures the European Commission started off with precise but rather lackadaisical regulatory targets. Legal market opening was incrementally introduced with relatively low targets set by first Directive and reached only a moderate degree of best-practice. The same tendency can be observed for the unbundling of TSO and DSO. Whereas legal unbundling achieved a high degree of application, ownership unbundling is moderate with respect to TSO and marginal for DSO.

The claim of a positive correlation between the precision of EU legal provisions and a high degree of convergence is weakened by reverse observations. The publication of accounts on the DSO level for instance, results only in a low degree of delta convergence, although the publication of accounts is unequivocally prescribed by the first Directive. On the contrary, several indicators were not precisely determined by the EU law and still show a move towards best practice. This is the case for components describing network access conditions such as tariff structure, type of capacity booking, UIOLI, and balancing, and holds true for the two indicators dispute settlement and type of regulator. Thus, this indicates that there are complementary factors or mechanisms inducing convergence. One of those is the Madrid Forum mechanism, which the European Commission employed to complement the legal instruments. The tariff design has been a prominent example where the Madrid Forum was used to promote the convergence of tariff structures and capacity booking arrangements. Other regulatory instruments not belonging to network access conditions have been subject to the Madrid Forum without generating a sufficient consensus among the participating actors. Yet, the success conditions of this mechanism are not sufficiently understood.

To sum up, precision of regulatory instruments in European provisions is a necessary but not a sufficient condition to achieve convergence towards best practice. Setting precise and ambitious targets is important. The empirical results confirm that member states tend to apply the provisions in the letter rather than in the spirit. Moreover, the example of published accounts emphasises that the effect of law is related to the degree of law enforcement stemming from action on European and national levels. The first enforcement cycle on the EU level just began. Nevertheless, these efforts only can be successful if they are accompanied by a determined enforcement practice by the regulatory authorities in the member states.

Chapter 4 traced the evolution of general and sector specific policy objectives to identify the impact those endogenous institutions have on regulation. The analysis shows that the general economic goals formulated in the Lisbon strategy induced stimuli to follow the liberalisation track. At the same time, energy and sector-specific European policy combined goals from two

energy paradigms; one setting liberalisation, privatisation, and competition as pivotal; the other emphasising security of energy supply and climate change. The first energy paradigm, evolved in the 1980s and 1990s when the political economy of natural gas was based on supply competition, long-term supply contracts, access capacity and comparably low energy prices. Structural changes in the political economy of natural gas and raising concerns of climate change gave rise to the new energy paradigm which started evolving around 2000. Since then, the depletion of indigenous gas resources, rising energy prices, internationalisation of natural gas markets through an increase of LNG, blackouts and transit conflicts between Russia and Ukraine heavily influenced the problem perception of the main actors involved and questioned whether market-based solutions are still the most appropriate answer. Stern adds another dimension to the discussion when describing a new security environment for European gas. According to Stern, the worsening of geopolitics and increasing global competition for LNG will influence and most likely (negatively) revise the supply outlook for the European gas markets as it has been projected so far (Stern, 2006). This argument supports the expectation that security of gas supply concerns will gain importance in politician's problem perception.

Until now, the two European energy strategies do not explicitly prioritise one or the other goal. The Green Paper on security of supply (2000) served as an initial step to formulate a comprehensive European energy policy by identifying structural weaknesses of the current and future energy supply. Furthermore, the Green Paper prepared the argument to bring together the streams of internal and external energy policy and develop an ambitious demand-side management. In 2006 the next Green Paper followed up and combined the goals of the old and the new energy paradigms. Thereafter, European Energy Strategy strives to achieve a sustainable, competitive, and secure energy supply. The downside of this holistic "as well as" approach might be that its strength, the ambition to incorporate several objectives, is at the same time its weakness, because it leaves room for ambiguity. Security of gas supply entered the sector specific regulation and institutionalised in form of the Security of Supply Directive. In chapters 2 and 4, we elaborated on the argument that once security of energy supply enters the equation the likelihood alters to employ approaches other than competitive market models. The empirical results give weight to our second hypothesis (section 2.6) and first expectation, where ambiguous or rival energy policy objectives decrease the probability that member states adopt best-practice. Moreover, in the mid and long term it is most likely that liberalisation of the internal energy markets will not keep a prominent place on European agenda. The gas sector liberalisation has been on the agenda for already more than two decades and for the time being the Third Energy Package is supposed to be the last. In future, other subjects like climate change or the guarantee of sufficient gas supply for European markets might be perceived as more urgent and therefore fill the agendas of politicians. Despite indications for a correlation between ambiguous energy goals and convergence of regulation towards best-practice, the claim cannot be terminally verified, because this would necessitate checking for more endogenous and exogenous factors. For this reason, the scientific exploration of natural gas markets needs to dig deeper into the causes that determine regulation and explain with the help of qualitative case studies how exactly energy policy objectives such as security of supply come into play.

APPENDIX 1

Table 19: European gas market reform, 1998-2007: A road map

DATE	EVENT	CATEGORY*
22 June 1998	Publication of Directive 98/30/EC EC of the European Parliament and of the Council concerning common rules for the internal market in natural gas	L
30 September – 1 October 1999	1st Madrid Forum	Me/Inst.
23-24 March 2000	European Council in Lisbon calls for rapid progress**	Me
10 August 2000	Implementation deadline for the provisions prescribed in Directive 1998/50/EC (Art. 29 & Art. 30)	I
11-12 May 2000	Second Madrid Forum	Me
26-27 October 2000	Third Madrid Forum	Me
23-24 March 2001	Council meeting in Stockholm without any agreement on the timetable for the next steps concerning gas liberalisation	Me
13 March 2001	First proposal for a Directive amending Directives 96/92/EC and 98/30/EC concerning common rules for the internal markets in electricity and natural gas	(L)
2-3 July 2001	Fourth Madrid Forum	Me
3 December 2001	Publication of the first Benchmarking report	Mo
7-8 February 2002	Fifth Madrid Forum	Me
5 March 2002	Council Meeting held in Barcelona decides to open the market for non-household customers by 2004	Me
13 March	EP amends EC's first proposal for an acceleration Directive	Me
7 June 2002	Publication of the amended proposal for a Directive amending the Electricity and Gas Directives	(L)
26 June 2002	Publication of the final report on the Green Paper "Towards a European strategy for the security of energy supply"	S
2 October 2002	Publication of the second Benchmarking report	Mo
30-31 October 2002	Sixth Madrid Forum	Me
25 November 2002	Energy Council reaches political agreements on second Gas Directive.	Me

2003	Legal market opening required for new market openers (> 28%) and for advanced market openers (> 38%)	I
7 April 2003	Publication of the second Benchmarking report including new member states	Mo
26 June 2003	Publication of Directive 2003/55/EC EC of the European Parliament and Council concerning common rules for the internal market in natural gas and repealing Directive 98/30/EC	L
DATE	EVENT	CATEGORY *
24-25 September 2003	Seventh Madrid Forum	Me
11 November 2003	Commission decision on establishing the European Regulators Group for Electricity and Gas (ERGEG)	Inst.
1 March 2004	Publication of the third Benchmarking report	Mo
26 April 2004	Publication of Directive 2004/67/EC of the European Parliament and Council concerning measures to safeguard security of natural gas supply	L
17-18 June 2004	European Council meeting discusses next regulatory steps (applicability of Regulation 1775)	Me
1 July 2004	Implementation deadline for the provisions prescribed by Directive 2003/55/EC (Art. 33 (1))	I
8-9 July 2004	Eighth Madrid Forum	Me
3 December 2004	Ninth Madrid Forum	Me
5 January 2005	Publication of the fourth Benchmarking report	Mo
10 March 2005	DG Competition announces energy sector investigation and second phase of infringement procedure begun (16 March) in the context of the second gas directive	Mo
15-16 September 2005	10 th Madrid Forum	Me
28 September 2005	Publication of Regulation (EC) No 1775/2005 EC of the European Parliament and Council on conditions for access to the natural gas transmission networks	L
15 November 2005	Publication of the report on progress in creating the internal gas and electricity market (fifth Benchmarking report)	Mo
16 February 2006	Presentation of the preliminary results of the energy sector inquiry by DG COMP	Mo
8 March 2006	Publication of the Green paper. "A European Strategy for Sustainable, Competitive and Secure Energy"	S
14 March 2006	Extraordinary Energy Council: presentation of the Green Paper, rejection of a common energy regulator, rejection of a common European energy policy.	Me

23-24 March 2006	Council meeting	Me
18-19 May 2006	11 th Madrid Forum	Me
19 May 2006	Implementation deadline for Directive 2004/67/EC	I
8 June 2006	Energy Council	Me
15 November 2006	Initial findings of the energy sector inquiry published by DG COMP and TREN	Mo
29 November 2006	Meeting of the joint working group of the MF	Me/Inst
11-12 December 2006	Energy Council without any energy related outcomes	Me
DATE	EVENT	CATEGORY *
1 January 2007	Regulation 1775 including Guidelines for Third Party Access comes into force	I
10 January 2007	Publication of the final results of the energy sector inquiry, Strategic European Energy Review, and the energy package	S/Mo
15-16 February 2007	Energy Council rejects ownership unbundling and common European energy regulator	Me
8-9 March 2007	European Spring Council adopts the energy Action Plan, but confirms rejection of ownership unbundling and a common energy regulator	Me
1 July 2007	Deadline for complete legal market opening. DSO exemption for legal unbundling expires (Directive 2003/55/EC, Art. 33 (2)).	I
19 September 2007	Publication of the proposal for the Third Energy Package	L
3 December 2007	Energy Council debates about the proposed Energy Package in general and the unbundling provisions in particular	Me

* Categories: L=Legislation; Mo=Monitoring; Me=Meeting; I=Implementation; S=Strategy; Inst=Institutionalization

** Please note, only those EU Council meetings have been included which were influential with regard to the reform.

APPENDIX 2

Table 20: Tariffs between 2001 - 2005b

	network charges 2000 average (E/MWh) *	network charges 2001/2002 average (E/MWh)	network charges 2001/2002 average (E/MWh)	network charges 2003 average (E/MWh)	network charges 2004 (E/MWh) I4	network charges 2005 (E/MWh) I4
Austria	(2.75)=5**	(2.75)=5	(2.75)=5	2.75=5	2.50=5	(2.50)=5
Belgium	(1.50)=10	1.50=10	1.50=10	1.25=10	2.00=10	2.00=10
Germany	(4.75)=0	4.75=0	4.75=0	2.25=5	2.50=5	(2.50)=5
Denmark	(2.50)=5	2.00=10	2.00=10	2.25=5	2.00=10	4.00=0
Spain	(2.25)=5	2.25=5	2.25=5	2.00=10	2.50=5	3.00=5
France	(3.50)=0	3.50=0	3.50=0	2.25=5	1.00=10	5.00=0
Ireland	(2.00)=10	2.00=10	2.00=10	4.25=0	4.50=0	(4.50)=0
Italy	(3.00)=5	3.00=5	3.00=5	2.50=5	2.50=5	2.00=10
Luxembourg	(1.00)=10	1.00=10	1.00=10	1.00=10	1.00=10	1.00=10
Netherlands	(0.75)=10	0.75=10	0.75=10	1.00=10	1.00=10	(1.00)=10
Sweden	(3.50)=0	3.50=0	3.50=0	5.50=0	5.00=0	(5,00)=0
United Kingdom	(2.25)=5	2.25=5	2.25=5	2.25=5	2.50=5	2.00=10

* Euros per Mega Watt hour. Further information concerning source and definition of categories for large users (I4), please find in section 6.2.

** Values in brackets are missing values. The first decimal number expresses the tariff and the second number after the equal refers to the scaling measure.

Table 21: Data and scoring of ratio market size/staff (Indicator 14)

	Ratio staff b1	Ratio staff b2.1	Ratio staff b2.2	Ratio staff b3	Ratio staff b4	Ratio staff b5
Austria	.18 (0) *	.15 (0)	.15 (0)	.11 (0)	.10 (0)	.10 (0)
Belgium	.33 (0)	.20 (0)	.20 (0)	.14 (0)	.21 (0)	.21 (0)
Germany	. (0)	. (0)	. (0)	. (0)	. (0)	.66 (10)
Denmark	.15 (0)	.15 (0)	.15 (0)	.18 (0)	.12 (0)	.14 (0)
Spain	.11 (0)	.10 (0)	.10 (0)	.08 (0)	.11 (0)	.11 (0)
France	.54 (5)	.44 (5)	.44 (5)	.37 (5)	.29 (0)	.29 (0)
Ireland	.13 (0)	.11 (0)	.11 (0)	.09 (0)	.08 (0)	.07 (0)
Italy	.92 (10)	.67 (10)	.67 (10)	.56 (5)	.61 (5)	.57 (5)
Luxembourg	.54 (5)	.27 (0)	.27 (0)	.27 (0)	.22 (0)	.15 (0)
Netherlands	1.05 (10)	.63 (10)	.63 (5)	.63 (5)	.53 (5)	.53 (5)
Sweden	.02 (0)	.02 (0)	.02 (0)	.02 (0)	.01 (0)	.01 (0)
United Kingdom	.26 (0)	.27 (0)	.27 (0)	.29 (0)	.30 (0)	.29 (0)

Source: (Council of European Energy Regulator (CEER), 2005; European Commission, 2001, 2002, 2003a, 2004d, 2005a, 2005d)

* Numbers in bracket refer to the scoring values (see section 6.11.6).

Table 22: Data and scoring of ratio market size/budget (Indicator 15)

	Ratio budget b1	Ratio budget b2.1	Ratio budget b2.2	Ratio budget b3	Ratio budget b4	Ratio budget b5
Austria	.93 (0)*	.73 (0)	.73 (0)	.82 (0)	.79 (0)	.70 (0)
Belgium	1.42 (5)	.89 (0)	.89 (0)	.79 (0)	1.17 (5)	1.19 (5)
Germany	.00 (0)	.00 (0)	.00 (0)	. (0)	. (0)	. (0)
Denmark	1.78 (5)	1.48 (5)	1.48 (5)	1.78 (5)	1.11 (5)	1.20 (5)
Spain	.91 (0)	.80 (0)	.80 (0)	.72 (0)	.87 (0)	.87 (0)
France	3.86 (10)	3.90 (10)	3.90 (10)	2.93 (10)	2.54 (10)	2.26 (10)
Ireland	.69 (0)	.57 (0)	.57 (0)	.34 (0)	.48 (0)	.35 (0)
Italy	3.22 (10)	3.22 (10)	3.22 (10)	3.12 (10)	2.07 (10)	2.48 (10)
Luxembourg	. (0)	. (0)	. (0)	1.80 (5)	2.45 (10)	2.45 (10)
Netherlands	8.68 (10)	5.79 (10)	5.79 (10)	4.96 (10)	4.08 (10)	4.96 (10)
Sweden	.21 (0)	.23 (0)	.23 (0)	.23 (0)	.20 (0)	.09 (0)
United Kingdom	.85 (0)	1.51 (5)	1.51 (5)	1.53 (5)	1.68 (5)	1.71 (5)

Source: (Council of European Energy Regulator (CEER), 2005; European Commission, 2001, 2002, 2003a, 2004d, 2005a, 2005d)

* Numbers in bracket refer to the scoring values (see chapter 6.11.7).

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APPENDIX 3

Questionnaire

Q1. Which allocation method has been applied in the year 2001?

- ☐ auction
- ☐ first come first served (fcfs)
- ☐ others
- 4 planned
- 5

Q2. Have there been 'use-it-or-lose-it' capacity agreements in 2001?

- ☐ yes
- ☐ short-term 'use-it-or-lose-it' option
- ☐ partial "use-it-or-lose-it" option
- 6 planned
- 7 no

Q3. Has a gas release programme been put in place in 2001?

- ☐ Yes ☐ No

Q4. In the European Commissions process of benchmarking the implementation of the gas market reform the Indicator "TPA storage" has only been assessed in 2002.

Was there Third Party Access to storage available in 2001, 2003, 2004 and 2005?

- | | | |
|-------------|------------------------------|-----------------------------|
| 4.1 In 2001 | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 4.2 In 2003 | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 4.3 In 2004 | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 4.4 In 2005 | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

Q5. Which institution/authority decided the capacity allocation rule for the gas market?

5.1 In 2001 the capacity allocation was decided by

- ☐ Regulator
- ☐ Regulator/Transmission Operator
- ☐ Transmission Operator

5.2 In 2002 the capacity allocation was decided by

- ☐ Regulator
- ☐ Regulator/Transmission Operator
- ☐ Transmission Operator

5.3 In 2003 the capacity allocation was decided by

- ☐ Regulator
- ☐ Regulator/Transmission Operator
- ☐ Transmission Operator

5.4 In 2005 the capacity allocation was decided by

- ☐ Regulator
- ☐ Regulator/Transmission Operator
- ☐ Transmission Operator

Q6.1 Who was in charge for the dispute settlement in 2004?

- ☐ Regulator responsible
- ☐ Ministry plus regulator responsible
- ☐ Minister
- ☐ Regulator/regional government
- ☐ Competition authority
- ☐ Hybrid
- 8 Not regulated/no regulator

Q6.2 Who was in charge for the dispute settlement in 2005?

- ☐ Regulator responsible
- ☐ Ministry plus regulator responsible
- ☐ Minister
- ☐ Regulator/regional government
- ☐ Competition authority
- ☐ Hybrid
- ☐ Not regulated/no regulator

Q7.1 How much staff did the national regulator have in 2004?

.....

☐ <30

☐ 30-80

☐ >80

Q7.2. How much staff did the national regulator have in 2005?

.....

☐ <30

☐ 30-80

☐ >80

Q8.1 How much was the budget of the national regulator in 2004? (in Euros)

.....

☐ <10 Million Euros

☐ 10-25 Million Euros

☐ >25 Million Euros

Q8.2 How much was the budget of the national regulator in 2005? (in Euros)

.....

☐ <10 Million Euros

☐ 10-25 Million Euros

☐ >25 Million Euros

Q9. Who decided the network access conditions in 2004?

☐ Regulator responsible

☐ Ministry plus regulator responsible

☐ Minister

☐ Regulator/regional government

☐ Hybrid

☐ Not regulated

Q9.1 Who decided the network access conditions in 2005?

- ☐ Regulator responsible
- ☐ Ministry plus regulator responsible
- ☐ Minister
- ☐ Regulator/regional government
- ☐ Hybrid
- ☐ Not regulated

Q10.1 In which mode was Third Party access regulated in 2004?

- ☐ ex ante
- ☐ ex post
- ☐ negotiated Third Party access

Q10.2 In which mode was Third Party access regulated in 2005?

- ☐ ex ante
- ☐ ex post
- ☐ negotiated Third Party access