The paradigm change in international natural gas markets and the impact on regulation

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Foreword

The main objective of the International Gas Union (IGU) is to promote the technical and economic progress of the gas industry worldwide, mainly by facilitating the exchange of technological information and of more general, business-oriented information.

To that end, IGU organises the World Gas Conference, which takes place every three years. The preparatory programme for the World Gas Conference is implemented by Working and Programme Committees, which study all aspects of the gas industry from the wellhead to the burner tip.

In preparation of the 2006 World Gas Conference, the IGU Dutch Presidency has launched three special projects: Gas to Power, Regulation and Sustainability. For all three, the aim is to engage governments, industry and other stakeholders in a dialogue on gas-related issues to achieve the best solutions for society at large.

IGU organised a number of successful high-level workshops on regulation with a limited number of representatives from the gas industry and the governments, as well as regulators, consultants and customer groups. We experienced generous and active support and above all enthusiasm from many organisations and individuals to realise this project and to contribute to the debate. This Clingendael study was written in preparation for those IGU workshops, which were held:

- On 30th September and 1st October 2005 in Florence, in cooperation with the Florence School of Regulation;
- On 12th and 13th December 2005 in Washington, DC organised by the Dutch Embassy in coordination with representatives of FERC and NARUC;
- On the 26th January 2006 in Paris in cooperation with the IEA;
- On 6th April 2006 in Kuala Lumpur in cooperation with PETRONAS.

The objective of the workshops was to present a platform by the IGU as NGO for the debate on the latest regulatory issues and to verify and update this Clingendael report on the impact of market changes on regulation in the consumer regions.

The discussions at the workshop were subject to the Chatham House Rule (which designates a meeting as one in which individual views can be expressed confidentially, without future attribution or risk to reputation when an individual has an "official position" as well as a personal opinion; information and ideas however can be referred to anonymously).

IGU wishes to expresses its special gratitude to the Clingendael institute team for conducting this study and “EnergieNed”, the federation of Dutch Energy Companies, for sponsoring it while EDI provided the project support. Above all IGU is grateful to all those who dedicated their time to contributing to the workshops.

The International Gas Union

Executive Summary

Natural gas markets and the natural gas industry are subject to substantial regulation all over the world. Regulatory frameworks significantly impact the business strategies of gas companies and shape the structure of the industry. Some key questions are:

- What can the regulatory framework contribute to foster and coordinate timely investments along the complete gas chain, to meet growing natural gas demand?
- Does the increased import dependency of the main consuming markets, require a regulatory response and how?
- How dependant is an effective regulatory framework on market structure and market development phase?
- Is there 'regulatory competition' developing to accommodate the investor, under influence of the worldwide search for scarce energy resources?

Regulation that directly impacts the structure of the gas industry and the functioning of gas markets comprises of six main areas:

- International agreements between governments, which lay the groundwork for the establishment of international supply lines.
- Licensing and permitting procedures in those areas where gas production and gas infrastructure are to be established.
- Competition policy.
- Regulation of the use of 'essential' infrastructures, such as transmission pipelines.
- And, often closely related to the regulation of infrastructure use, regulation of the structure of the gas industry (the degree of unbundling – or not – of production, trade and transport).
- Consumer protection

Energy policy and the related regulatory regime must provide the investor with confidence that his long-term investment projects will bring adequate returns during their economic life. Regulatory changes during such a period that are detrimental to his return on investment, can easily impede the entire investment climate. Therefore, to foster investments, investors must be able to rely on a stable regulatory regime and a clear long-term perspective. Yet, under pressure of changing gas market circumstances the regulatory regime should at the same time be flexible enough to maintain or improve the investment climate if needed.

Discussions with stakeholders in the various workshops have clearly confirmed that the market circumstances, which regulatory systems need to take into account, are indeed changing. It has also been confirmed that the type of regulatory framework that is needed is very much dependent on the development phase of the market. Initially, small and isolated developing markets require more 'managed' market structures and a quite different regulatory regime to large and maturing markets like the United States and the European Union.

In today's main consumer regions, indigenous gas production is in decline and import dependency rises. At the same time emerging gas markets, such as India and China, seek access to the same new gas resources that the established gas markets will increasingly rely upon. Not only consumer markets

are seeking diversification of supply to become less dependent on single suppliers, but also the producers seek diversification of demand.

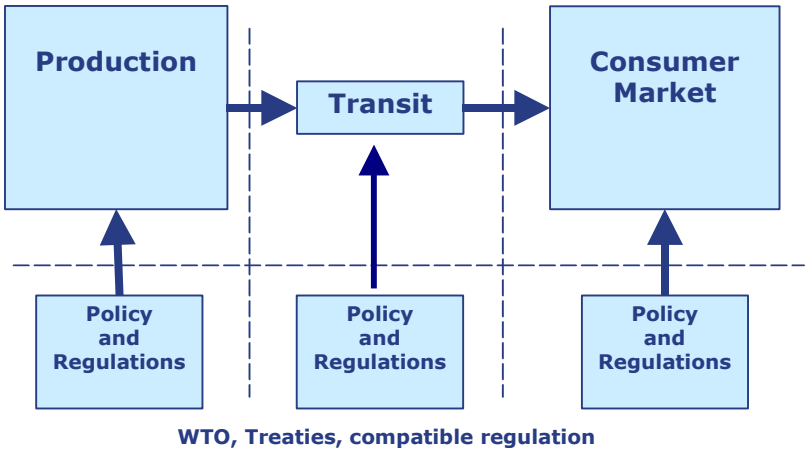
The combined result is an emerging global gas market. LNG from different sources works as a catalyst. Many new pipelines are being developed as new markets are also seeking substantial supplies by pipeline. Despite substantial investment being put forward, decreasing production from existing capacity as well as growth in demand keep supplies tight and a sellers' market appears to be here to stay for a couple of years to come.

Importing regions increasingly compete with each other for new supplies, but also in producing countries domestic use will often compete with exports, further tightening the availability of supplies. The circumstances of the various jurisdictions vary to a large degree. The endowment with resources, the development stages of the gas markets and of the countries as a whole, will result in different policy objectives. As a result, regulatory approaches that deliver optimal results for the societies in question, can be very different as well. There is most likely no 'one size fits all' solution.

The special study on regulation during the IGU Dutch triennium of 2003-2006 has indicated that, by 2006, many energy policies were under review, including some of the regulatory approaches. Regulatory frameworks are often adapted to new market circumstances in such a way that investment conditions for the smooth and timely realisation of new production and infrastructure, necessary to meet demand, is improved.

Examples of such adaptations can be found in the United States and the European Union. The US has taken the lead to remove partly the access regulation for LNG terminals, but also to initiatives are taken to relax the access rules for storage and pipelines in order to increase investors' confidence. The EU has less clear rules on how to deal with TPA rights for investors in new infrastructure.

Figure: Cross border gas chain and different regulatory regimes



Regulatory frameworks should support the investment needed to realise the required supplies in an efficient and timely manner. Along the gas value chain, the interests of stakeholders need to be aligned. Customers need confidence in the availability and competitiveness of natural gas to consider consumption. Pipeline and storage operators need to receive sufficient returns on their investments with reasonable certainty. So do producers of gas. In more mature systems, ideally competitive gas markets offer a choice to customers.

Regulatory frameworks, if skilfully designed and applied, can strongly increase investor assurance and contribute to consumer benefits by enabling the development of secure and efficient new gas supplies.

However, the devil is in the detail and taking account of the many factors influencing the various gas markets is an enormous challenge.

This study conducted by the Clingendael International Energy Programme, is the point of departure for IGU to initiate a debate on the impact of regulation – a debate that certainly will not end at the Amsterdam World Gas Conference 2006.

The main outcome of the study can be characterised as follows.

- A global gas market is emerging. Consumer markets are competing for supply. Strong demand for energy in traditional markets is complemented by strong demand from emerging economies such as China, India and Brazil, which is reflected in rising natural gas prices. Both consumer regions and producer states seek diversification of purchases and sales, respectively.

- Under the prevailing market conditions, in which demand is strong and there are long lead times for major new projects, the global market can currently be characterised as a sellers' market. Major players will remain dominant in international markets, both on the production side as in wholesale markets.

- Energy policies are under review due to changing supply/demand balances. Regulatory regimes are being revisited and adjusted in order to adapt to the new business environment. In the main mature gas markets, the focus has shifted to the security of supply and the investors' need to secure the timely availability of the necessary LNG as well as storage and pipeline facilities.

- It is apparent that even the more liquid, liberalised, unbundled markets will not always provide the necessary investment signals in a full and/or timely manner. Such signals are a pre-requisite for a timely response by investors along the complete gas chain and for the prevention of underinvestment. New and old coordinating mechanisms such as long-term contracting of supply and transportation, vertical integration and exemptions for TPA appear to be required to complement competitive short-term market signals for a balanced supply and demand to result in stable prices.

- Coordination of regulatory regimes along the gas chain and crossing different legal systems to support coordinated investments in infrastructure to maintain supply, are major challenges. International frameworks, such as the Energy Charter Treaty, WTO rules, and bilateral treaties, have the function to support investment initiatives and to resolve disputes.

- Regulatory frameworks should reflect market realities, i.e. prevailing market structures and market functioning as well as policy objectives that can all vary across countries and regions. Developing markets need different and a more "managed market" regulatory framework compared to mature markets. Also, prolonged sellers' market conditions may require different regulatory measures compared to prolonged buyers' market conditions.

- Discussing and adjusting regulatory frameworks requires a new process of exchanging information and coordination between consumer and producer countries. Such a process needs to enhance the mutual understanding of each others interests and the assessment of supply and demand security, of competitive markets and of investor needs. It could be part of a broader energy policy and foreign policy approach, securing long-term relations between producers and consumers based on mutual dependency.

In particular for the maturing markets:

- It should be accepted that markets and regulatory models are dynamic and that a transition phase from regulated regional monopoly (or 'managed') markets to fully liberalised markets with a stable regulatory regime could easily take 10 to 15 years and do only function in maturing markets. Before subscribing to liberalised markets, due attention should be paid to whether such a

market model is best suited to achieving the local policy objectives, given local market circumstances and the development stage of the market.

- Regulation will have an impact on market development, but cannot be the driving force behind designing, at short notice, markets that are very different from present structures and functioning. Markets cannot be expected to be overturned completely in a short space of time. A step-by-step approach is necessary that gives markets sufficient time to adapt. Markets should be given time to evolve and design themselves under the influence of a wider set of factors.

- Incentive-based or command-and-control regulatory action may bring about ex ante or ex post interventions. Ex ante regulatory decisions are required when essential (monopolistic) facilities are in place. Ex ante protective action is required to secure consumer interests when it is likely that abuse of a dominant position will occur. Some ex ante regulatory decisions could also be necessary in market transitions when market forces may need support, for instance by regulating access to essential facilities. However, this kind of interference can easily distort markets also by creating new unwanted vested interests.

- Given that anti-competitive horizontal and vertical integration and other strategic responses may follow certain regulatory decisions such as unbundling, which was implemented precisely to bring about competition, it is very important to establish how and where in the value chain sustainable competition can emerge, and how?

- Competition authorities usually undertake ex post interventions when competition is hindered and/or dominant parties abuse their market power.

- The need for a sustainable balance between ex ante regulation, concentration and integration, industry stability, abuse of market power and competition policy may require a market design based on a broader perspective on the functioning of markets, an enhanced coordination of the several institutions involved in the market, and possibly a revised definition of their tasks and criteria for taking action. Security of supply should be an integral part of such an analysis on the functioning of the market.

- The importance of demand-side participation in the market generally receives too little attention. Consumers can contribute to issues such as reducing price spikes and increasing security of supply by taking a more active stance in markets. The potential for this could be exploited more effectively.

- It remains under discussion as to how much and what kind of stability is necessary in a regulatory framework to secure market confidence, versus the need for sufficient flexibility to adapt to changing market determinants, keeping the investment climate attractive.

- Moreover, ways need to be found to determine the position and nature of the authority that can change these regulatory rules, independent from political processes, assuming that this requires timely decisions that are based on transparent processes with sufficient input from market parties and possibly others.

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Acronyms

AEO	Annual Energy Outlook (EIA)
CEER	Council of European Energy Regulators
CIEP	Clingendael International Energy Programme (NL)
E&P	exploration and production
EIA	Energy Information Administration (US)
EPA	Environmental Protection Agency (US)
ERGEG	European Regulators Group for Gas and Electricity
EU	European Union
	EU-15 The first 15 member states of the European Union: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom
	EU-25 EU-15 plus member states which joined the EU in 2004: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia
FERC	Federal Energy Regulatory Commission (US)
FSR	Florence School of Regulation (IT)
GGPSSO	Guidelines for Good TPA Practice for Storage System Operators (EU)
GIRI	Gas Investment Risk Index
IEA	International Energy Agency
IGU	International Gas Union
INGAA	Interstate Natural Gas Association (US)
LDC	local distribution company
LNG	liquefied natural gas
MARAD	Maritime Administration (US)
NGA	Natural Gas Act (US)
NGSA	Natural Gas Supply Association (US)
NIE	New Institutional Economics
OECD	Organisation for Economic Co-operation and Development
PPP	public-private partnerships
TPA	third party access

TSO	transmission system operators
UN	United Nations
US	United States of America
WTO	World Trade Organization

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Introduction

This paper brings together new perspectives on how different regulatory approaches along the various points of the value chain can help the gas industry meet its future challenges. A first challenge is how to fulfil expected increases in world gas demand from supply centres that are increasingly geographically remote from the markets they serve. This implies huge investments in additional gas production facilities, transmission and distribution pipelines, storage capacity and liquefied natural gas (LNG) infrastructure. These investments along the entire gas value chain have to be realised within a patchwork system of diverse, and sometimes uncertain, regulatory regimes and ownership rules. Moreover, the relatively uncertain international economic and geo-political context impedes investment efficiency when regulatory approaches, for instance, in the upstream and downstream parts of the value chain are in serious conflict.[1] If regulatory provisions are significantly divergent, security of supply and demand concerns of the producing and consuming countries, in addition to environmental issues, could inhibit the market for gas and gas investments.[2]

For the gas industry to realise its potential in the energy mix and fulfil the important role as a bridge to a more sustainable energy system, it is prudent to evaluate current regulatory approaches in the sector and assess their ability to aid or impede international gas industry development. Such an assessment cannot be undertaken in isolation from developments in other energy markets, nor in absence of examining specific alterations to the form, structure and dynamics of the regional gas markets in the US, Europe, Asia and Latin America. National and regional energy policies and regulatory regimes will have to seek adequate responses to meet the changing international energy markets.

The **central question** of the debate focuses on identifying the correct regulatory framework to attract the needed US three trillion in gas market investments over the next 25 years. US and Canadian market investment needs account for 25 percent of this amount.[3] The remaining expected investment needs are not limited to consumer markets, but are required throughout the entire gas value chain. Regulatory framework design must include both current market realities and realistic expectations for future (investment) behaviour of all market participants and stakeholders. Thus, the regulatory framework must facilitate international gas market growth, while simultaneously promoting efficiency, and transparency, and suiting diverse national market development goals. The challenge is to formulate optimal market designs, acceptable to all relevant stakeholders and tailored to the diverse markets and parts of the value chain.

In addition to the changing energy market structure, there has been a steep learning curve for the 'art of regulation' per se and its theoretical underpinnings. On the basis of varying experiences with the regulation of gas supply systems (and other industries) in a wide range of countries, a wealth of new theoretical and practical insights has emerged that deserves to be taken on board in a revised approach to regulatory frameworks. It should be noted, however, that these experiences have also yielded many critical questions, for which the 'artists of regulation' have not yet provided real answers.[4]

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[1] Compare for instance: IEA (2003) *World Energy Investment Outlook: 2003 Insights*, Paris, OECD/IEA; IEA (2004) *World Energy Outlook 2004*, Paris, OECD/IEA; and IEA (2005) *World Energy Outlook 2005*, Paris, OECD/IEA.

[2] However, such concerns could lead to policy measures that in turn might increase *political* efficiency.

[3] IEA (2003). Op. cit.

[4] For an extensive, selective, cross-sector overview, see: Jamison, M.A., Berg, S.V., Gasmi, J., Távara, L. (2005) *The Regulation of Utility Infrastructure and services: An Annotated Reading List,* Developed for: The World Bank and The

The objective of this paper is to inform and guide a discussion among stakeholders in gas industry regulation from all major regional gas markets and the main exporting countries. The aim of this discussion is, first, to identify and explain the main elements of change in the respective regional gas markets in both consumer and producer countries. Second, it aims to draw lessons from past regulatory experience and benefit from newly emerging insights in the regulation of the gas production and mid- and downstream markets of main consumer countries.[5] These lessons are important for the development of the entire value chain, even though the up-, mid- and downstream segments of the market are increasingly falling under different jurisdictions and regulatory regimes. Admittedly, this paper is predominantly written from the perspective of consumer countries, but the evolving policy concerns of the larger exporting countries are actively taken into account. The policies and regulatory arrangements in producer countries are an important determinant for the conditions under which gas is going to flow between producers and consumers. Regulatory frameworks for the mid- and downstream elements in the consumer countries need to take due account of the conditions in producer countries. Conversely, market conditions in consumer countries provide producer countries with the conditions for their gas to enter these markets.

To ground the discussion, this paper provides a perspective on the concept of regulation, linking phenomena such as markets, market design, market structures, market conditions, policies, policy instruments, fiscal instruments, contracts, and guidelines. Eventually, the discussion and consultation will have to shed light on the implications of these regional and global developments for national and/or regional frameworks of governance of the gas industry. What are the main critical issues at stake with regards to the current regulatory approaches? How could new regulatory insights in general – and for gas market regulation in particular – contribute to superior regulatory performance within the sector and hence for the gas industry as a whole? What are the determinants for the (re)design of effective systems of governance for the industry across the regions?

The paper is organised as follows. Section 2, *Changes in the world energy and gas markets*, highlights the main changes taking place in the world energy and gas markets, particularly in North America, Europe, Asia and Latin America. In context of these changes, a number of challenges are identified for energy policy and gas market regulation.

Section 3, *Gas markets and the rationale for regulation: Economics, transactions and policy*, briefly discusses shifts in the rationale for government involvement in the gas industry and the associated evolution in underlying theoretical concepts and perspectives.

Section 4, *State participation in producer countries: International politics and socio-economic development*, discusses some of the perspectives of producer country governments and their policies to optimise their economic rent.

Section 5, *Risk, rents, incentives and regulation: Investment and performance in the gas market*, illustrates how regulation determines investor risk assessments and the distribution of rents along the gas chain and thus influences investment and performance patterns in the gas market.

Section 6, *The interdependence of policies, governance structures, regulation and instruments*, explains the interdependent hierarchy of policymaking, governance structures, regulation and instruments and its relation to the functioning of markets.

Section 7, *Regional gas markets in a global energy system: From variation to convergence?* examines the consequences of developments in the international gas market, such as increasing reliance of regional systems on long-distance gas from outside the region, via pipelines or LNG imports.

Public Private Infrastructure Advisory Facility (PPIAF), New York: World Bank, <rru.worldbank.org/features/regulationbook.aspx>.

[5] Both the North American and the European markets were characterised as markets in which both production and consumption of gas took place and for which regulatory regimes were developed along the entire gas value chain. The maturity of production has recently swayed most attention to the mid- and downstream side of the market, but important lessons from their upstream regulation should not be overlooked.

Section 8, *The agenda for regulatory dynamics and market development*, posits questions regarding the nature of the process of regulation – given the challenges that changing markets present and concludes with the proposal of relevant issues for discussion at the World Gas Conference in Amsterdam, to be held during 5-9 June 2006.

In addition, annexes to this document provide summaries of the workshops that took place in Florence (30 September – 1 October 2005) and Washington DC (12-13 December 2005), covering respectively the European and the North-American markets. A high-level conference at the International Energy Agency (IEA) in Paris (26 January 2006) discussed gas market regulation from a global approach and the outcomes are discussed in appendices III and IV. Finally, appendix V covers the discussions held in a further workshop in Kuala Lumpur (5-6 April 2006), considering the Asian market situation.[6]

[6] The summaries are also available at: <www.clingendael.nl/ciep/events/2005gmr/>.

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Changes in the world energy and gas markets

During the past few years, the prevailing perspective on the world energy markets has been thoroughly shaken-up. This turmoil is not confined to a single branch of the energy industry. On all fronts, business as usual has been truncated, as more-or-less unexpected events and phenomena have heralded a new era.[7]

Within the oil market, a variety of political and economic factors drove up oil prices from 2004 onwards. On the demand side there was an unexpected strong growth in oil consumption by the US, India and China. The supply side has been simultaneously hampered by a greatly reduced surplus capacity in crude production and a weak and unbalanced processing and transport infrastructure, following years of rather meagre investment. Geopolitical tensions evolving from the Iraq situation and local instabilities in Nigeria and Venezuela have again made the world aware of its growing dependence on but a few net exporting countries, among which the Persian Gulf OPEC producers feature prominently. This situation of concentrated supplies is generally expected to worsen, when non-OPEC oil production declines in the near future. The role of Russia in this scenario is still uncertain and will depend primarily on national political and economic developments.

In the main consumer countries in North America and Europe, during the 1990s, there was a growing expectation that foreign direct investments would strongly dilute state ownership of reserves and production assets when the new generation oil and gas fields would have to be developed. To a large extent, liberalisation of energy markets in these consumer countries was founded on this premise. Such a development was seen as a logical continuation of the liberalisation of trade and finance during the 1980s and the difficulties some important producer countries experienced in generating domestic investment capital. With the expected shift of the investment market from North America and Europe to producer countries in Africa, the Middle East, Central Asia and Russia, increased 'private' flows of oil and gas were expected to reach the market. Generally, globalisation was believed to have the effect of freeing up oil and gas reserves from government ownership. Contrary to expectations in the aforementioned consumer countries, producer countries have not privatised their oil and gas production sectors. For oil, only some offshore developments were opened to investment from major oil companies, while state-owned gas companies hold at least a 50% share for gas export projects in the main resource holding regions. Access to reserves of foreign capital generally has remained limited and has recently fuelled concerns about security of demand on the part of the producer governments (who must dedicate scarce capital to the gas industry and fear costly over-investment) and concerns about security of supply on the part of consumer governments (who fear under-investment and politically motivated supply decisions). The issue of ownership also impacts governance structure and compatibility of regulatory design along the various points of the value chain. Moreover, regulatory competition between producer and consumer governments over where rents can be captured is to be expected.

For the electricity sector, several supply interruptions and blackouts in the US, Italy and the UK have illustrated the need to start investing again in power plants, local networks and transmission lines, after

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[7] See for example: Helm, D. (2005) "The assessment: The new energy paradigm," *Oxford Review of Economic Policy*, Vol. 21, no. 1, pp. 1-13. Stevens, P. (2005) "Oil Markets," *Oxford Review of Economic Policy*, Vol. 21, no. 1, pp. 19-42. Michot Foss, M. (2005) "Global Natural Gas Issues and Challenges: A Commentary," *The Energy Journal*, Vol. 26, No. 2, pp. 111-128.

years of asset sweating. Further, this industry sees its reserve margins dwindle rapidly, as is commonly argued. In China, demand for electricity is growing so quickly that despite large investment in new capacities, the country is frequently experiencing blackouts. Chinese consumers very often have to rely on oil-powered generators to overcome electricity shortages. The resulting additional demand for oil is translated into world crude pricing.

A further factor of potentially large importance is increasing awareness and general acceptance of the dangers of global warming caused by carbon dioxide emissions from large-scale use of fossil fuels. Step-by-step, there is gaining momentum towards implementing measures to reduce these emissions, by way of 'sustainable' sources of energy and enhancement of energy efficiency. In a number of countries, environmental concerns and emerging supply security considerations are also rekindling discussions to include nuclear energy in the energy mix.

A critical consequence of these developments has been a considerable increase in the average and peak level of prices. This is occurring, for all types of energy, against the backdrop of consumer country policymakers having underlined a decline in energy prices as one of the main benefits of liberalisation for the consumers.

Within the gas sector, the main issue is the growth of natural gas consumption in conditions of declining production in the main gas consuming areas, such as the US, Asia and the EU. This implies an increasing dependence of these markets on external supplies. The bulk of gas reserves are concentrated in but a few countries, although a rather large number of countries have possibilities to develop some limited indigenous supplies. Moreover, much of new gas supplies, in the form of LNG, will use the same marine trading routes as most crude oil transport, some of which are already considered to be logistical bottlenecks.

Liberalisation policies are confronting increased scepticism. Justified or not, this scepticism is rooted in incidences such as the Enron debacle and perceptions of decreasing security of electricity supply alongside decreasing reserve margins in generation capacity, blackouts and brownouts occurring in e.g. California, Italy, and the UK. Moreover, rising gas and electricity prices are often associated with the liberalisation of gas markets. Governments more often than not decided to immediately tax away most of the efficiency gains, while recent supply constraints have pushed prices further upwards. An increasing number of politicians are apparently losing confidence in the superiority of market mechanisms to provide sufficient energy at reasonable prices and instead seem to prefer more government coordination.

The general expectation of the early 1990s that economic liberalism and globalisation would be the guiding principles for development of international relations appears to be replaced by a world in which state interests play a more dominant role in international relations. In such a world, major consumers and power blocks increasingly compete for scarce resources, employing also non-economic means. This outlook has increased importing countries' fears that energy deliveries can be used as an instrument of political power in international relations. However, increasing import dependency on a particular producer country also implies that that the producer country is likely to become economically more dependent on the consumer country. Nevertheless, there is still manoeuvring room to pick-off certain countries and to apply strong-arm politics.

These fundamental shifts in the determinants of energy systems all over the world are forcing a gradual re-evaluation of the prevailing market-based energy paradigm.[8] Correljé (2005),[9] Van der

[8] A paradigm is defined as "an internally consistent view of the world yielding preferred solutions to the problems as they arise." Cf. Helm (2005) op. cit., and the references therein.

[9] Correljé A.F. (2005) "Dilemmas in Network Regulation: The Dutch Gas Industry," in: R. Künneke, J. Groenewegen, A.F. Correljé (eds.) *Innovations in liberalised network industries: Between private initiatives and public interest*, Edward Elgar.

Linde (2005)[10] and others, including the recent Shell (2005) scenarios,[11] document this re-evaluation. Despite the fact that such a re-evaluation is taking place at a (geographically, ideologically and intellectually) very uneven rate, it is becoming obvious that new models for government-market interactions and their respective roles and responsibilities are necessary. With respect to security of energy supply and environmental concerns, for instance, the market should not be expected to yield the preferred long-term outcomes without clear government guidance.[12]

Considering the gas industry in a somewhat greater degree of detail, a number of important developments should be highlighted:

- Natural gas consumption has grown rapidly over the past decade and will remain the fuel of choice for technical, environmental and – to a lesser extent – economic reasons.

- The medium to long-term outlook for the oil supply and demand balance is very much under discussion. Such uncertainties translate via price linkages (direct or indirect) to the price outlook for natural gas. This unsure price outlook means that the future for natural gas is also uncertain – particularly for power generation. Hence, gas demand projections in general have become more difficult to make.

- A growing share of gas consumption is used as fuel input for electricity generation. The consequences of this development for the overall supply and demand balance, for seasonal and daily patterns, and for price and cross elasticity of gas demand are still uncertain.[13]

- All three large regional consumer markets in the US, the EU and Asia, face the need to import increasing volumes of natural gas from sources outside their surrounding regions in the Middle East, Russia and Africa. The consequent dependence between suppliers and consumers, the imminent conflicts between their interests and the growing linkage of gas supply to the political economy of the world oil market imply the emergence of an increasingly politicised gas market.[14]

- Additionally, it is important to note that foreign private companies have direct access to only about one-third of remaining oil reserves. For gas, state control via large state-owned companies over gas reserves is about the same. This in itself might impact industry structures, requiring large buyers with sufficient market leverage.

- Geopolitics do indeed matter and energy and gas producing countries seem willing to use this strategic asset to their advantage as required. For example, Russia, facing a decline in military power, has turned to using its energy sources as an effective strategic tool for foreign relations.

- Consequently, consumer governments have renewed their focus on (external) supply security. This inspires policies to underscore the growth in gas consumption with assurances and guarantees in supplies. Large consumer regions increasingly compete for the same gas sources. Regulatory models need to take this into account and be designed to stimulate required investments to facilitate increases of imported gas.

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[10] Van der Linde, J.G. (2005) Energy in a Changing World, Eurasiagroup, Managing Strategic Surprise, September, New York. See also Energieraad (2005) *Gas for Tomorrow*, Advice on gas market developments to the Minister of Economic Affairs of the Netherlands <www.energieraad.nl>.

[11] Shell International Limited (2005) *Shell Global Scenarios to 2025. The future business environment: trends, trade-offs and choices*, Shell International Limited, London.

[12] Correljé, A.F. (2004) "Markets for Natural Gas," *Encyclopedia of Energy Volume 3,* (ed. Cutler Cleveland), Academic Press Reference Series, Elsevier Science, pp. 799-808.

[13] IEA (2003) IEA (2004). Op. cit.

[14] Correljé, A.F., Van der Linde, J.G. "Energy supply security and Geopolitics: Aeuropean perspective ", *Energy Policy, 34(2006) 532-543.*

- Issues are arising around the extent to which political circumstances and exploration and production (E&P) regimes allow for necessary investments and production levels. Distribution of incentives, rents and risks throughout the gas value chain is of fundamental importance, while geopolitical considerations and local socio-political conditions are essential determinants of supply security.

- The long haul supply lines necessary to transport gas to consumer markets will increasingly confront transit issues, both in the US and EU contexts. Here a question arises about the adequacy of transit regimes and the positioning of transit markets. Should there be differences between regulatory rules for transit of gas and for gas imported into the markets crossed by these gas flows? What are appropriate connection rules when transit flows are entering the more integrated and connected gas networks and what are the appropriate transmission conditions for volumes of long haul gas once they have entered entry/exit transmission systems? Will (annual) adjustment of network codes and possible capacity reallocations affect transit flows to markets? The supply of long haul gas, via pipelines as well as LNG, generally implies large and constant throughput factors for the infrastructures in place. This requires that the seasonal, weekly and daily demand patterns may have to be satisfied via 'local' provision of storage and other forms of supply flexibility.

- The need to construct additional supply infrastructure in the US, as well as in Europe and Asia, raises the question of who will invest and operate these pipelines, LNG terminals and storage and treatment facilities – and under what kinds of preconditions? How much market and how much 'essential facility' functionalities are to be respected, or to be allowed? Are partial exemptions to third party access (TPA) regimes necessary here and should they be the rule rather than the exception? How much ex ante regulatory policy would be necessary or achievable, in balancing investor requirements with the need to achieve effective and efficient use of infrastructure in support of the competitive markets?

- The free gas market generally lacks mechanisms to coordinate timing and the amount of investment required to balance gas supply and demand under more-or-less extreme market circumstances, thus giving rise to volatile gas prices. As a consequence, regulatory systems will have to involve instruments to stimulate an efficient use of the infrastructure in place, while signalling the need for timely investments in additional facilities. Supplementary capacity generally contributes more to achieving a competitive market than to redistribution of existing capacity among shippers, through pro rata congestion management, auctions, or a shortening of the maximum duration of transportation reservations. The investment climate is served by a regulatory system that makes transparent choices and is clear in its objectives.

- The traditional institutions for gas market coordination, such as long-term contracts with take-or-pay provisions, destination clauses and oil price parity pricing in captive markets, joint horizontal and vertical ownership over production facilities and pipelines, are under serious discussion or have already been removed to a varying extent in the various regional markets. Natural gas projects, given their high sunk costs and long repayment periods, are said to be suffering from a lack of certainty regarding future regulatory frameworks. Restructuring could lead to fragmentation of value chains and markets, creating noise in the information flows and delaying signals that invoke new investment. Is there a rationale for allowing 'alternative' structural coordination devices, such as large conglomerates and joint ventures in the market, or modernised forms of long-term contracts to provide for the necessary levels of predictability and reliability?

- From primarily regional forms of organisation, increasing LNG flows are transforming the natural gas market into a world market, integrating the thus far separated regional gas markets in the US, EU, Asia and Latin America. From a regulatory perspective, relevant questions concern the regulatory regimes for the required infrastructures (pipelines, LNG plants and storage) and how to secure investor confidence in this new setting.

3

Gas markets and the rationale for regulation: Economics, transactions and policy

It is clear that the policy directed towards gas market operations and safeguarding public interests is an urgent concern. In complex and dedicated networks such as gas systems, essential facilities are involved, through which controlling parties can obstruct any serious competition by other (potential) suppliers, while exploiting its monopolistic position *vis-à-vis* consumers. At the same time, natural gas projects are delicate ventures as a consequence of their high sunk costs, long repayment periods and vulnerability to variations in supply and demand.

In brief, the paradigmatic underpinnings of gas industry regulation, since the end of the 1970s, have undergone a shift from a traditional neo-classical view on the functioning of markets, towards paradigms based on monetarist and public choice theories. The standard neo-classical approach justified state intervention based on the concepts of market failure and public goods, for which welfare maximising decision-making was not to be expected in the gas and power sector. Traditionally, the natural monopoly character of such services was understood as justification for regulation and public ownership and 'managed' markets (segmentation, concessions and/or exclusive deliveries). Accordingly, the state had to jump in and remedy imperfections and failures, including problems of excessive market power, externalities, lumpy investments, spill-over and so forth.[15] In the US, privately owned utilities were regulated by sector-specific federal and state agencies. In Europe, many utilities had varying degrees of public ownership and/or involvement. The regulators in the US and public ownership in Europe also secured the public interest elements or public values associated with these services, involving issues of safety, security of supply, acceptable prices for specific types of users, objectives of local and sector development, the supply of jobs, and more recently, sustainability and environmental protection.[16]

By the late 1970s and early 1980s, this perspective was replaced by the kind of liberalism associated with the ideas promoted by the governments of Ronald Reagan and Margaret Thatcher. Efficiency, economic reform and political power were sought through tax reductions, 'rolling back the state' and by introducing market-driven competition into the so-called gold-plated industries.[17] Indeed, perfect competition – modelled upon the revised economic textbooks – was to be imposed upon public sectors wherever possible.[18] Gradually, and initially only in a number of Anglo Saxon countries and Chile, free access to consumers and markets, competition in production and retail sectors and privatisation were introduced as the basic objectives of structural change in the energy sector. After the adoption of the Single European Market in 1985, these objectives became the points of departure for the European

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[15] Scherer, F.M. (1980) *Industrial market structure and economic performance,* (2nd. ed.), Boston: Houghton Mifflin Comp. Stiglitz, J. (1986) *Economics of the Public Sector,* New York: W.W. Norton and Company.

[16] See for example: Foreman-Peck, J., Milward, R. (1994) *Public and Private ownership of British Industry 1820-1990*, Oxford: Clarendon Press. MacAvoy, P.W. (2000) *The natural gas market: Sixty years of regulation and deregulation*, New Haven, London, Yale University Press. Correljé, A.F., Van der Linde, J.G., Westerwoudt, T. (2003) *Natural Gas in the Netherlands: From cooperation to competition?* The Hague: Clingendael International Energy Programme/Oranje Nassau.

[17] Helm, D. (2003) *Energy, the State and the Market: British Energy Policy since 1979.* Oxford: Oxford University Press. Parker, M.J. (2000) *Thatcherism and the Fall of Coal*, Oxford University Press, Oxford Institute for Energy Studies. Friedman, M. (1962) *Capitalism and Freedom*. Chicago: Chicago University Press.

[18] Friedman, M. (1962) *Capitalism and Freedom*. Chicago: Chicago University Press. Demsetz, H. (1968) Why Regulate Utilities? *Law and Economics*, 11.

Commission, initially as the key instrument for tearing down the prevailing intra-communal barriers to trade, and later as an objective in its own merit.[19]

Under this paradigm, the conception of a gas supply system as an unbundled liberalised market, with competition in production, services and retail segments, and regulated essential facilities began to emerge. More recently, particularly due to developments in deregulation of utilities in the UK, the Austrian school of economics became involved as an important source of wisdom, providing the basis for dynamic regulation. In contrast with the traditional static equilibrium approach, the Austrian focus is on the dynamic process in competitive markets. As a substitute for competition, price cap regulation (RPI-X) entices operators of regulated essential facilities to bring down their costs, while letting them keep the increased revenues for some time. Yardstick regulation of costs, tariffs, quality, efficient trading and auctioning arrangements are being applied in the gas and electricity industry.[20]

Moreover, a further requirement for 'dynamic' competition and for harnessing its advantages is that new concepts and solutions can be brought into play. Hence, the success of competition is often defined as the number of (new) competitors in the market. Consequently, all new entry is seen as beneficial and accordingly, incumbents must be obliged to sell their products and services as if they were a standalone business, on equal footing with each new entrant.[21]

As argued by Helm,[22] recently we have been forced to consider a new energy paradigm, due to pressures of, first, the need to modernise and expand the current energy supply systems, and second, the need to adapt the energy system in response to the consequences of global warming by reducing carbon dioxide emissions. These pressures can be perceived as market failures of the (by and large) liberalised international gas/energy market, and as a consequence of externalities, high transaction costs and geopolitics. The market-based system also promoted a short-term focus on market efficiency, with longer-term security of delivery and supply issues not easily incorporated into companies' market strategies. Helm suggests that these problems could be resolved by: a) the (failing) market, causing very high costs and volatile prices; b) the development of new market-based regulatory concepts; or c) vertical and horizontal integration to reduce the uncertainties of incomplete contracting and asymmetric information. Helm thus explicitly invokes an alternative perspective on economic coordination, the New Institutional Economics (NIE), based on the concept of transaction costs.

The traditional economic theories, referred to above, consider the structure of markets as a crucial driver for the conduct of firms and eventual economic performance. The configuration and relative size of the firm itself was seen merely as a means to acquire economies of scale and scope through vertical and horizontal integration, to the end of achieving market power in up- or downstream markets.[23] The institutional, transaction cost approach takes a broader perspective with regards to the rationale of vertical integration. It considers the shape of firms and the associated structure of markets as alternative arrangements of internal and market governance, to deal with risks involved in transacting.

The adequacy of particular arrangements is seen as dependent on the attributes of individual transactions between buyers and sellers of goods or services in a specific market and how these affect the overall cost of a transaction. Transaction costs include the direct costs of writing, monitoring and

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[19] Haaland Matláry, J. (1997) *Energy policy in the European Union.* Houndmills: Macmillan.

[20] See for example: Kirzner, Israel M. (1997) "Entrepreneurial discovery and the competitive market process: An Austrian approach," *Journal of Economic Literature*, Vol. 35 Issue 1. Laffont, J.J., Tirole, J. (1993) *A Theory of Incentives in Procurement and Regulation*. Cambridge MA, USA and London, UK: The MIT Press. Littlechild, S.C. (1983) *Regulation of British Telecommunication's Profitability, Department of Industry*, London: HMSO. Newbery, D.M. (2000) *Privatisation, Restructuring and regulation of Network Utilities.* Cambridge MA, USA and London, UK: The MIT Press. Robinson, C. (2000) "Energy economists and economic liberalism," *Energy Journal*, 21 (2), 1-22. Hawdon, D. & Stevens, N. (2001) "Regulatory Reform of the UK gas market: the case of the storage auction" *Fiscal Studies,* June, 22(2), pp 217-232.

[21] Shuttleworth, G. (2000) *Opening European Electricity and Gas Markets.* London: National Economic Research Associates, 15 November.

[22] Helm (2005). Op. cit.

[23] Scherer (1980). Op. cit.

enforcing contracts, plus the costs associated with the risk of ex ante investments having an ex post performance that is lower than anticipated, as a consequence of contractual hazards of various types and of the costs associated with internal organisation of the transactions. As stated by Joskow, "The inefficiencies of particular interest are those that arise as a consequence of ex post bargaining, haggling, pricing and production decisions, especially those that arise as the relationship must adapt to changes in supply and demand conditions over time, though inefficiencies in ex ante investments are also relevant."[24]

The preferable arrangement of governance structures are those that best fit the character of the transactions involved and the broader context in which these take place. Main characteristics involve, on the one hand, the extent to which parties to a transaction are locked-in, as a consequence of asset specificity. On the other, attributes such as uncertainty, product complexity and information asymmetries also come into play. With respect to asset specificity in the gas industry:

- it can be argued that a large portion of investments are site-specific, often linking up buyers and the seller in tight relationships over the use of the asset;

- physical asset specificity may also be relevant, particularly when considering the relation between suppliers and end-users, who have invested in boilers and appliances to burn gas of a specific type and composition, or investments in, for example, gas storage or treatment capacity;

- dedicated assets involve investment by a gas supplier in a remote field to sell a significant amount of gas to a particular (set of) customer(s) at a specific level of revenues, justifying the investment;

- the realisation of lower sales or lower prices would imply an ex post hazard, not anticipated in the investment decision ex ante.

In essence, the idea is that by selecting the right form of governance, whether for a spot-market, a specific contract or a vertically integrated structure, the parties to a transaction will be able to modify the costs of the transaction and exposure to ex ante risks. When, ex ante, it is considered that these costs are not manageable at an acceptable level, the transaction or investment will never likely not materialise, with no additional volumes of natural gas reaching the market. With respect to gas markets, therefore, a leading question would be to what extent the regional/local governance regimes in place reflect the characteristics of the several types of transactions arising within the regional gas markets. It may emerge that the efficient development of markets of a different nature, maturity and risk profile may require different structures of governance, instead of one single market design geared towards a fully competitive market.

Regarding the regulatory perspective, the question seems to arise as to how this new institutional paradigm can to a greater degree contribute to future gas market regulation. Currently, much of the regulator's toolkit and the framework for competition policy are based on the former paradigm of 'full unbundling' and maximum entry in competitive segments. Nevertheless, in the daily practice of regulation, elements of the transaction cost-based approach are already incorporated, such as the conditional allowance of exemptions and large-scale mergers. Moreover, the New Institutional (or transaction cost) Economics, also underscores abuse of market power as a strategy, which depending on the circumstances should be tackled by regulatory intervention. Generally, regulatory literature

[24] Joskow, P.L. (2005) "Vertical Integration," in Ménard, C. and Shirley, M.M. (Eds.) *Handbook of New Institutional Economics,* Springer. See also: Williamson, O. (1971) "The Vertical Integration of Production: Market Failure Considerations," *American Economic Review*, 61: 112-123. Williamson, O. (1975) *Markets and Hierarchies: Analysis and Antitrust Implications*. New York: Free Press. Williamson, O. (2000) "The New Institutional Economics: Taking Stock, Looking Ahead," *Journal of Economic Literature* 38: 595-613.

seems more advanced in incorporating elements of the transaction cost approach, as will be briefly outlined below.[25]

What conclusions should be drawn from these developments? The observations suggest the need for a careful New Institutional reassessment of coordination mechanisms, which are considered to be less beneficial for consumers under 'structure-conduct-performance' approaches. This, of course, should also involve an analysis of their potential market distortion, as there may exist a trade-off between the stability provided by a dominant position and the potential for abuse. A further question would be whether there exists a trade-off between the various components of a governance structure, such as the degree of integration or unbundling, the regulated or 'free' determination of contract prices and tariffs, destination clauses and regulated access to markets, take-or-pay provisions, etc. Is it necessary to arrive at particular 'packages' of measures of governance? Is it possible that a 'workable' balance between the required investments, the anticipated profits and risk and the costs of governance can be struck, while preferably maintaining a credible pressure of the dynamically competitive market? Table 1 provides a simplified summary of the relationship between asset specificity, uncertainty and governance structures, as suggested by transactions cost theory.

Table 1: Asset specificity, uncertainty and governance structures

		Asset specificity		
		Low for both parties	*High for both parties*	*High for only one party*
Uncertainty	*High*	Contract or vertical integration	Vertical integration	Vertical integration
	Low	Spot contracts	Long-term contract	Vertical integration

Based on Joskow (2003).

[25] See for recent examples focusing on gas markets: Creti, A., Villeneuve, B. (2004) "Long-term contracts and take-or-pay clauses in natural gas markets," *Energy Studies Review*, Vol. 13, No. 1, pp. 75-94.

4

State participation in producer countries: International politics and socio-economic development

In the previous section, we briefly referred to developments in producing countries. The organisational structure of the gas sector, investment climate and fiscal issues in producer countries such as Russia and those in Central Asia, the Middle East, Africa and Latin America, are crucial to the development of the international gas market. In an international gas market where long haul gas supplies, either through pipelines or LNG shipments, will capture more and more market share, the terms for which gas supplies will be offered on the international market begin with the terms determined in producing countries. These make decisions about access to their reserves, to which parties and the level of intensity at which they wish to develop their gas sectors. Short-term profit maximisation is not always the main driving force behind governments' decisions to stimulate gas export projects. Issues such as macro-economic stability, domestic economic development, ownership structure, competition with other spending departments of the government and both domestic and international political arguments are aspects of the decision-making process. More often than not, the issues concentrate on the producer country capturing sufficient rents from the development of the gas sector. These rents can partly be captured in the spin-off effects of the domestic gas and non-gas economy. These issues are progressively more important today because the international gas markets will increasingly become reliant on supplies from underdeveloped or single sector dependent (oil and gas) countries. In this sense, the new gas supplies will be developed under completely different economic and social circumstances than the development of gas supplies in the main consumer markets during the past 20 years.

The new gas supplies that need to be developed in the producing regions mentioned will be developed under social-economic circumstances that bear some resemblance to the early developments of the gas sector in the Netherlands. In the early 1960s, the Dutch economy, still recovering from the impact of World War II, was gasified and in the slipstream new industrial developments based on relatively cheap gas supplies could be generated. The large gas field in Groningen was and still is owned by a joint venture of Shell and ExxonMobil. The Dutch government, after discussions of how best to capture local benefits and which ownership structure would be best suited for such a purpose, decided to create a company that had the exclusive rights to sell this gas (and later became the preferred, but not with exclusively rights, company to sell also gas from other, much smaller, gas fields).[26] This company, Gasunie, was a joint venture between the government and the two owners of the Groningen gas field, in which the government held a 50% share. The successful gasification of the Dutch economy and development of the gas and other industrial sectors could also benefit from consumer potential in neighbouring countries. Similar developments took place in Norway, but with a somewhat different model of government involvement. Very often the countries in new gas exporting regions lack the domestic and regional potential, which makes the creation of local benefits harder to realise. Yet, the wider development potential of both oil and gas are important factors driving political decision-making processes, and should be seriously taken into account in discussions regarding the conditions under which new gas can be developed.

For instance in Bolivia, which had privatised its gas sector in the 1990s, serious domestic political problems arose over granting a license to a consortium of private international energy companies that wanted to export Bolivian gas to the US. Apart from domestic political sensitivities around connecting

[26] Correljé, Van der Linde and Westerwoudt (2003). Op. cit.

the Bolivian gas fields with a proposed LNG liquefaction plant in Chile,[27] an alternative route through Peru up to this moment could not be realised because the consortium could not convince local politicians that this gas project would benefit the Bolivian economy. Opponents argue that gasification of the Bolivian economy should be prioritised and that the export plans would not provide employment and social progress to a larger part of the Bolivian population. In short, developing gas export projects are often connected to local development issues.

The level of distrust in some societies of the developmental impact seriously impedes the expansion of the upstream sector. A solution, particularly when the government can bring broader political support to the project, is to insist on a government share in the consortium or in the company exporting and selling the gas. Such a public-private partnership construction is preferred in many producing countries. Often the state, through a national energy company, insists on a 50% + 1 share as a minimum guarantee that state interests are secured. Such a formulation can also serve another purpose. In many countries, the management capacity in government is limited and administrations often lack sufficient deep knowledge of the international gas sector to rely merely on fiscal instruments to capture the rents. This information asymmetry between the government, particularly in developing countries, and large internal energy companies operating the gas export projects cannot easily be remedied. Participation in the projects and exerting control over the level and speed of development of the gas sector provides the government both with information and learning capacities. Moreover, it provides the government with a tool to manage the gas sector within the context of overall economic development.

Ownership therefore matters in producing countries for several reasons: First, because of the wider societal and development impact that the gas sector can potentially generate; Second, because of the limited capacity and capability of governments to monitor and capture the rents with fiscal and regulatory means; Third, to gain political support from the public at large, and centralise the rent-seeking battle among the elite; Fourth, the mixed experience with privatisation and liberalisation in developing countries in general and some producer countries in particular, and the success of some countries who maintained stricter control over the economy, including energy, have reversed the political appetite for full private developments; Lastly, because control over sought after energy resources generates international political clout.

The ostensible re-politicisation of energy relations taking place today is due to the recent tight gas, but also oil, market of recent years, which has rekindled security of supply fears among consumer countries. In turn, the liberalisation drive in the main consumer countries provoked security of demand fears in producing countries. The more deliberate introduction of security of supply and demand concerns in the governance structure of the gas industry, as compared to ten years ago, has already impacted the terms for which gas can enter markets (e.g. the stock holding and diversification requirements in Spain, exemptions on open access rules for major import infrastructures such as export pipelines and LNG terminals in the EU and the US) and the terms under which gas production can be developed or produced (e.g. the production cap on gas production in the Netherlands, the managed development of the gas sector in Norway, and the political blockade on further gas exports in Bolivia unless more local benefits are generated).

Similar awareness on the part of countries fulfilling a strategic role along the value chain of gas (as a transit country for pipeline gas or the location of LNG terminals to serve neighbouring countries' gas markets) will also impact political and economic efficiency policy goals. The success with which the market is thought to be able to provide the proper mix of policy goals will determine the ownership

[27] The consortium's preferred harbour for the liquefaction plant was located in northern Chile, territory that Chile captured from Bolivia and Peru in the late 19th century and resulted in Bolivia's being a land-locked country. Both Bolivia and Peru were politically opposed to this development. An alternative route to southern Peru was economically less attractive, partly because the (potential) gas market *en route* to a harbour in southern Peru was very small (partly due to a planned coal powered electricity plant and partly because of the low level of economic development in the region). Another issue was the low contribution to Bolivian employment. The decision-making around Bolivian LNG for the US market cost two presidents their jobs.

and governance structure in countries, and as such impact the regulatory choices further down the value chain.

The growing interdependency between the main gas markets in North America, Europe and Asia with the large producing countries does engender new questions about the organisation of the gas sector and the regulatory choices that have to be made. Strong producer government interest in ownership and the strategic political and economic power that is embedded in oil and gas flows in today's markets are adding new dimensions to these choices. The long duration of gas export contracts that solidifies economic and political relations between producer and consumer countries can become a source of political coercion in other policy spheres. The international gas market and the regulatory authorities have to take this into account. Costs could easily fall on consumers when the wrong choices are made, forcing consumer governments to intervene in the arrangements within the international gas market. The position of international oil and gas companies could also be at stake. Their access abilities to gas reserves could be influenced, which in turn influences gas supply potential.

5

Risk, rents, incentives and regulation: Investment and performance in the gas market

The literature on regulation in general, or governance, has a broader perspective than the economic theories of industrial organisation, upon which economic market regulation is founded. Regulatory literature sees a main function for the system of governance in allocating business responsibilities and risks among the involved parties and designing tariffs and other rules to achieve an allocation that stimulates the development of the industry and generates balanced trade patterns. Risk exists in an unpredictable world. Demand for gas may develop differently than expected. Costs may become higher or lower and exchange rates will vary. Some risks can be calculated and possibly hedged, others remain completely uncertain or even unknown. The main question is who should bear these risks and losses, or conversely harvest the associated profits?[28]

Risks are allocated by the rules that determine how shifts in the distribution of rents (including revenues, costs and profits) along the value chain affect the position of the several parties involved. Hence, it is necessary to connect the notions of business responsibilities and risks. A main issue in the design of governance structures is to align the business responsibilities of the operator and the public bodies involved with the risk resulting from functional tasks and responsibilities. In essence, this involves the following steps: First, identify the main areas of responsibility involved and the associated risks; Second, assign the responsibilities and associated risks to the party best able to manage them; Third, establish the arrangement to achieve this allocation of risks and responsibilities.

It is obvious that there exists a wide variety of governance solutions, ranging from purely public operated systems, to predominantly privately owned and operated industries with only minor public involvement. Bearing risk has a cost and the party bearing the risk will likely demand something in return. The aim of the design of governance systems should be to allocate responsibilities and risks between the operator(s) and public authorities such that, first, responsibilities are allocated to the parties best able to undertake them; and second, that risks are borne by the parties best able to manage them. Allocating risk generally gives the party an incentive to alter its behaviour to minimise its costs. Risk allocation therefore affects the parties' incentives to improve efficiency. Moreover, some risks cannot be controlled or anticipated and should be allocated to the party best able to diversify or absorb them. In short, parties should have the ability to:

- influence or control the risk factor;
- predict changes in the relevant risk factor;
- control the sensitivity of the business' value to the risk factor;
- absorb the risk.

Allocating each risk to the party best able to manage it reduces costs to consumers and attracts sound private investment.

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[28] This paragraph extensively draws on: Berg, S.V. (2001) "Infrastructure regulation: Risk, Return and Performance," *Global Utilities* 1 (May), pp 3-10. Estache, A., Martimort, D. (1999) *Politics, Transaction Cost, and the Design of Regulatory Institutions*, World Bank Policy Research Working Paper, No. 2073, March. Baldwin, R., Cave, M. (1999) *Understanding Regulation: Theory, Strategy and Practice,* Oxford: Oxford University Press.

A particular element of risk is located precisely in the regulatory role itself. The performance of regulatory frameworks is essential in securing investor confidence. A regulatory system should be efficient, in the sense that the benefits of its involvement to society should outweigh the direct and indirect costs of its interventions. Effective regulation encompasses the following:

- Regulators should have a clear, politically determined, legislative mandate, establishing in unambiguous terms their objectives, tasks and degree of freedom to develop guidelines and rules.

- Functioning independently and in service of their general public responsibilities, regulatory systems and regulators should seek to secure and carefully balance the interests of the different segments of the gas industry and the (large and small) consumers.

- To achieve an appropriate level of legitimacy, regulators should be held accountable both in terms of the rationale for their decisions and by making regulatory processes fair, open and accessible to all stakeholders.

- To gain trust within industry and among consumers, regulators should have a more than adequate level of expertise, which is as independent as possible from industrial, consumer, or political interests. If regulatory uncertainty is reduced, transaction costs follow suit, with a likely lessening of the need for integration (cf. table 1). Possibly, this also allows for a reduction of the overall scope and scale of regulation.

- Regulators can contribute to market transparency by publishing assessments of market developments and investment opportunities.

Box 1: Market design and regulation

Market design is ideally the model of how to redistribute responsibilities amongst actors to achieve predetermined policy objectives. A policy objective can be, for example, the creation of a competitive liquid market with high security of supply standards. The market design allocates responsibility for security of supply, investments, degree of unbundling, etc. However, there is usually no wider debate on how market design and related allocation of responsibilities could best meet policy objectives. Obviously, policy objectives may vary over time. Thus market design is often only implicitly assumed and also gradually evolving in a learning-by-doing process.

The complexity of the gas market and the conflicting interests of stakeholders probably make it necessary for only specific (isolated) elements of market design to be widely discussed. Such elements include the balancing regime, transmission tariff structures, transits, metering, congestion management, capacity allocations, etc. The combined impact of these elements on the functioning of the total gas chain and the investment climate will usually only become clear gradually in practice. If ex ante discussions insufficiently grasp the impact on the total market before implementation, this will create additional regulatory risk.

In previous sections, the impact of environmental policies, security of supply and demand issues and shifting paradigms for market design were discussed. A number of other issues also deserve more detailed examination. First, there is demand for stability in terms of objectives, approaches and instruments, which may conflict with the need to adjust to changing circumstances. Second, there is the learning curve through which the regulator, the industry, policymakers and the general public are moving. The development of new insights – either positive or negative – may suggest adjustments and

revisions for the regulatory framework.[29] The question is how these factors can and should be incorporated in a credible way. Third, there are possible shifts in the roles of parties along the value chain. Should and will there be shifts in market powers, with the development of strong trading companies with sufficient bargaining powers *vis-à-vis* large producers? Will there be further shifts with increasing producer involvements in mid- and downstream market segments? What will be the impact of horizontal (or diagonal) integration with the electricity industry? Fourth, the role of demand side participation in the market generally receives too little attention. Consumers can participate in addressing issues such as reducing price spikes and increasing security of supply by taking a more active stance in markets. The potential for this could be exploited better. Finally, a not unimportant factor is that the gas supply chain is often stretched over a number of jurisdictions, with their own policies, cultures and approaches. An effective perspective on regulation will have to take account of the inherent fragmentation of the value chain.

[29] See: Correljé, A.F. and de Jong, J. (2005) "Liberaliseren: van beleid naar uitvoering: Lastig en ingewikkeld voor alle partijen," in De Jong, J., Weeda, E., Westerwoudt, T., Correljé, A.F., *Dertig Jaar Nederlands Energiebeleid: Van Bonzen, Polders en Markten naar Brussel zonder Koolstof,* The Hague: Clingendael International Energy Programme, pp 337-383.

6

The interdependence of policies, governance structures, regulation and instruments

Whereas the previous section focused on the role of regulation in bringing about a balanced system of governance for the value chain, this section will locate the activity of regulating a gas sector within a broader societal context, involving other policy objectives, governance structures and policy instruments within a common jurisdiction often covering only a part of the gas chain. Examples include fiscal policies, environmental objectives, sectoral and social policies, energy policies geared towards security of supply via the stimulation of particular technologies, diversification by fuel and supplier, and so forth. Figure 1 provides an illustration.

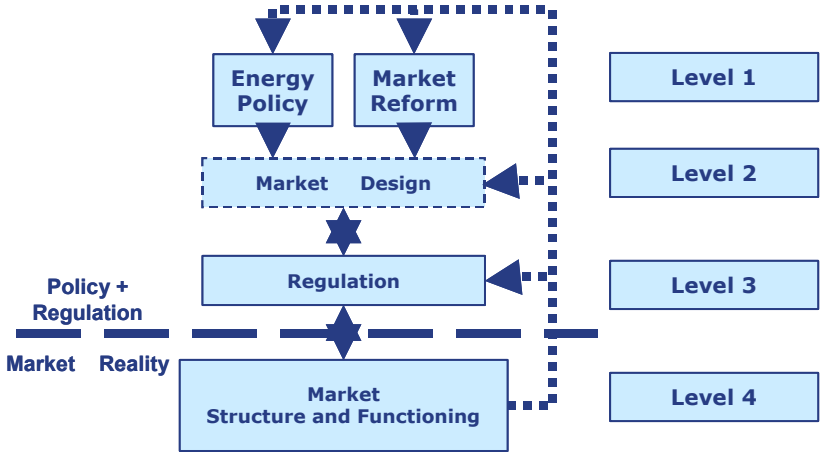
The implication of placing regulation in a broader context is that the system of governance has to take into account a variety of national and international interests and objectives. Traditional approaches basically assume that economic regulation can and should steer clear of these other policies and concentrate on establishing a level playing field for market participants and stimulating full competition. Other policy objectives were at best not included in the overall framework of governance[30] or second-best, not mixed-up with the activities of the regulator.

In actual practice, deregulation has become re-regulation, and privatisation has been undertaken as a strategic process. It has never been accepted that structural change and deregulation should be fully abstracted from public interest issues, either captive or not. In the process of devising the regulatory framework, politicians and interest groups manage to get all kinds of additional demands on the regulatory agenda. In particular, the environment, security of supply and the (often abused) notion of national interest score high in this respect. This refinement of the recipe for restructuring induced an ongoing expansion of the regulatory framework and of the toolbox of instruments – and the associated responsibilities of the regulatory agencies.

A key element for stable regulatory frameworks involves knowledgeable decision-makers and opinion leaders, agreeing on transparent and undisputed objectives. In some producing countries, the lack of knowledge capacity and capabilities or a concentration of these skills among a small elite group has provoked states into more direct involvement in the sector. In more mature gas markets, the likelihood of ad hoc political intervention decreases with decision-makers coming to accept price spikes as inherent to markets and having confidence that properly regulated markets can eventually resolve such occurrences internally. Very high prices for electricity, for instance, can trigger investment in (peak) generation capacity – and have already done so in the US. But when the process of transition from monopoly to liberalisation is incomplete, the market remains prone to political short-term intervention, which increases risk for investors. The California crisis was a prominent example. It takes time and patience to develop trust in market mechanisms to a degree that politicians might not always be willing, or allowed by their constituencies, to have.

[30] For a forceful exposition of this view, see: Robinson, C. (2000) "Energy economists and economic liberalism," *Energy Journal*, 21 (2), 1-22.

Figure 1: The regulatory framework and the market



As is illustrated in figure 1, the structure and operation of the market evolve as a consequence of market design processes, driven by the traditional principles of market reform (unbundling, access and competition) and modified by specific objectives of energy and other policies. Within the context of this market design, the actual process of hands-on regulation (involving the setting of tariffs and charges, X-factors, quotas, etc.) influences the actual industry performance and the subsequent value distributed to consumers, suppliers and producers.

Table 2 illustrates the wider embeddedness of the governance structure, spread out over formal and informal institutions and the associated institutional arrangements, eventually influencing the behaviour of market actors and other parties involved (such as NGOs, consumer interest organisations, etc.).

At the highest level 1, the very basic, enduring, society-specific beliefs, values and general objectives are located. Examples of drivers in this respect are: perceptions about sovereignty over national energy resources, equity, scarcity and resource (in)dependence, the environment, in/exclusion of social and ethnical groups, beliefs about states versus markets, etc. Often such principles vary over (groups of) countries and are contingent on significant factors such as 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 groups in society via 'deep' political principles and beliefs.

It should be noted that level 1 relationships also occur in terms of policy considerations that extend beyond the energy policy environment and could also have impact on the regulatory regimes. Boxes 2 and 3 illustrate two different examples for these relationships. The first concerns siting of installations, with many LNG-terminals currently being confronted with the NIMBY (not in my backyard) attitudes. The second involves the more general risk perception that gas industry investors confront when taking into account overall regulatory and government climates in gas producing countries.

Without going into detail, the basic factors of level 1 are of influence, and partly crystallise, in the formal institutional framework at level 2, including international treaties, national law and constitutions, defining the fiscal structures, elements of market design, the position of the regulator *vis-à-vis* the administration and the court, etc.

These formal laws are made operational in actual arrangements, often in the form of contracts, rules of conduct, permits and agreements, guidelines, net-codes, rulings, tariffs, etc. These, generally, are more flexible and malleable than the level 2 institutions. Much of the actual regulatory functioning is determined at this level, but also firms' trading practices, contracting, price setting, joint ventures and

so forth, belong to this realm. Fascinating elements at this level, moreover, are the institutions – or mores – that convey the public and private evaluation of risk, profit, price, quality, performance, etc. Typically, these attitudes and perceptions are phenomena, which may derive from the 'deep' values at level 1, being partly fixed in laws and procedures at level 2, and obtaining a real value and meaning at level 3.

Table 2: The socio-political embeddedness of regulation

Level 1	**Informal institutions:**	***Broad values, norms, technological and physical characteristics***	Broad (energy) policy objectives and balance between: security of supply, market and environment
Level 2	**Formal institutional environment:**	***Laws and constitutions***	Regulatory models and market design
Level 3	**Institutional arrangements:**	***Organisations, contracts and hybrids such as PPPs***	Actual regulatory instruments and decisions; Forms of PP cooperation; Firms' tariff structures and trading practices; Public and private evaluation and sharing of risk, profit, market, etc.
Level 4	**(Market) behaviour**	***Interaction between actors with different objectives, strategies***	Market strategies, investments, lobbying, R&D, cooperation and conflict
Source: Adaptation of Williamson (1998) and Groenewegen (2005).[31]			

Eventually, at level 4, the higher-level determinants drive the actual interaction of actors with their specific objectives and inspire concrete strategies and approaches. This gives rise to market strategies, investments (also in lobbying), to cooperation and conflict, and to consumer and producer transactions – buying and selling. 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.

The up-shot of this discussion is that shifts in fundamental expectations and requirements with regards to energy policy and supply security at level 1 may cause tensions between these elements and their development and instrumentality in the lower levels. Such tensions also may arise between regions or countries, in which shifts and developments take place at a different pace (or not at all) or in a different way, as a consequence of particular combinations of the factors referred to above. With regards to the EU, it was observed[32] that because of the low intensity of politicians' involvement, the European Commission and national regulators could initiate initiatives such as the Madrid Forum and the Council of European Energy Regulators (CEER) to address problems that were inadequately tackled by the legislation already in place. These independent initiatives operated without a political mandate and especially the regulators ran the risk of exceeding their assigned tasks, i.e. applying national legislation.

Regulatory frameworks stem from policy choices with respect to the organisation of the gas (and electricity) sector. A fundamental issue is the choice between coordination of the industry by the market or by central planning (or public services) approaches. Both have their limitations. The

[31] Williamson, O.L. (1998) "Transaction Cost Economics: How it works; Where it is headed," *De Economist* 146, No. 1, pp. 23-58. Groenewegen, J. (2005) "Designing Markets in Infrastructures: From Blueprints to Learning," Inaugural Lecture 27th of May 2005, Section Economy of Infrastructures, Faculty TPM, TUDelft.

[32] See annex I.

political choice should, however, be unambiguous for its translation into clear regulatory frameworks. It appears that states in the US, as well as member states of the European Union, have opted somewhat half-heartedly for a market approach. The attitudes of several states have thus caused discrepancies between the regulatory approaches in place. Inconsistencies also exist in the way national regulators implement the regulatory models prescribed by the European directives, while the respective national governments are not fully supportive of the choices made at the Community level. Examples of this are the German and UK markets, for which the responsibility for security of supply is completely left to the market, whereas for France, Italy, Spain and the Netherlands, public service obligations play an important role in this respect.

Roles and responsibilities appear difficult to effectively assign in an environment in which various levels the European Commission, national ministries (mostly of economic affairs), national regulators and competition authorities are all engaged with the natural gas market. The boundaries between competition authorities and regulators are especially unclear.

As a result of different views on how best to organise security of supply and fulfil the public service obligations, in combination with recent shifts in demand and supply patterns, a discussion within the EU is being undertaken on exactly to determine what market structure would best serve the objective of a competitive market and at the same time secure new supplies. This discussion is based on the realisation that prices will increasingly be determined by competition in the international gas market, and that current price differences between regional markets will converge as a result of this competition for international (LNG) supplies. The advance of international competition, which is fairly new to this previously regionally-based industry, will directly impact competition in those regional markets. In order to compete in the international market, relatively large players or aggregators will be required with a sufficient asset base to take on large risks and an ability to generate proper market information to time investments in order to invest or contract new gas.

This development of increasing international competition conflicts with the regional market approach to competition in the sense that some proponents of EU gas market competition wish to advance a model or market structure in which the value chain is broken-up among smaller companies that compete for end-users. With transportation regulated, competition for instance in the EU is predominantly the market for gas services, such as flexibility. A substantial asset base, however, is deemed necessary to successfully compete for new gas (projects) in the international markets.[33] The model of new gas supplies that fits such a market structure is one in which large upstream companies will bring the gas to the consumer market and deliver it in the market when it leaves the export pipeline into the distribution network or when it exits the gasification terminal into the grid. These upstream suppliers are the national companies from producer countries, often in joint venture with one or more of the large international oil companies. This would leave the fragmented regional gas companies in the US and Europe in a position of price takers. Already, we have witnessed developments in which large gas companies such as Gazprom, dissatisfied with their role of only delivering gas at the border of the eastward expanding EU to be collected by midstream companies for further distribution, decide to bring the gas as far as possible into the EU market and build a position as midstreamers in the EU market to control the gas to the end-users doorstep.[34]

This could create a new type of market domination by companies that have more and different assets at their disposal than their local competitors, and eventually could lead to a new type of oligopolistic competition as an unwanted side effect. Those who fear such a dominant position of powerful national upstream companies are advocating a different model of competition in the EU, in which the European gas firms are not forced to be broken-up, but are stimulated to use their strong asset base to invest in new gas projects and pipelines to bring new gas to the market. In other words, rather than have the gas brought to your market by national gas companies, such as Gazprom and Sonatrach (in joint ventures or not with large international oil companies that more often than not are minority shareholders in the

[33] See also Energieraad (2005). Op. cit.

[34] Van der Linde, J.G. (2005) Energy in a changing world. Oration at the University of Groningen, 22 November. Available at: <www.clingendael.nl/ciep>.

gas projects), to actively go get the gas from European companies that invest in upstream and transportation projects. Only companies with a sufficiently large asset base can participate in these projects. Examples of such a strategy is the Baltic pipeline, a joint venture of Gazprom and E.On and BASF, in which the gas company of BASF, Wintershall, obtained gas production rights to fill the pipeline. However, this approach to the gas market could lead to new dilemmas for regulatory and competition authorities and should be considered as a further example of changing paradigms and rethinking regulatory policies.[35]

For the EU, inclusion of security of supply and environmental concerns in the regulatory approach and the tradition in some countries to rely on more coordinated economic policies has created different levels of expectation regarding what markets can and cannot do. With introduction of EU gas market liberalisation, the market should at least provide market players and consumers alike with the same levels of reliability and stability. This high level of expectation with regards to market performance was related to circumstances in the energy markets during 1985-1995 that had been very constructive to the high performance of the more government-dominated system. The fact that the process was running nearly parallel with a structural change in supply and demand relations has never been properly acknowledged. Only of late are changing market circumstances leading some decision-makers away from the ideological properties of gas market liberalisation towards a more pragmatic approach to the market. For the US, a stronger tradition of relying on markets, a separation of market regulation from other policy goals (such as security of supply), and a pragmatic approach to regulation have created stronger market traditions.[36] Of course, the fact that the US market could be supplied with domestic or Canadian supplies (from a European perspective) at very reasonable prices, was reason not to regulate the market with a view to international gas market developments but to focus instead on domestic market operations. The future will reveal whether the US approach is capable of surviving a situation of tight international supplies and growing import dependency.

[35] During the workshop in Florence, the arguments in favour of a more oligopolistic market structure were not challenged. It was, however, observed that there would be an obvious need to balance these perceived advantages with the danger of a competitive oligopoly turning into a collusive one. An argument in favour of the oligopolistic model of competition was that it might be easier for governments to control and influence the behaviour of a smaller number of players while at the same time preserving some advantages of a competitive market.

[36] See also the summary of the IGU/CIEP workshop in Washington, annex II.

Box 2: NIMBY and local opposition

Local opposition to erecting new infrastructure might be a more serious impediment to new investments than shortcomings in the regulatory framework. Many LNG projects in Europe and the US currently have difficulties in either obtaining the necessary local permits at the construction site envisaged or in actually carrying out the project. In one example from the US, a local initiative in the state of Massachusetts attempted to have a bridge that was slated for demolition instead declared as part of the national heritage, which would effectively render the location for a new LNG terminal worthless for that purpose. Safety concerns feature highest on the list of arguments of local opposition groups, followed by environmental concerns.

A possible consequence is that new LNG projects will have to be predominantly erected in industrial areas or in areas in which the population is familiar with large-scale energy infrastructure, such as gas and oil producing regions in the US Gulf coast.

One means to mitigate such problems is to provide extensive information on specific projects and their associated dangers well in advance of the project start date. Governments and private companies should both be involved in this process.

Box 3: The Gas Investment Risk Index (GIRI)

The energy policy of a specific country is sometimes cited as a major element of uncertainty for perception of investment risk, in addition to the absence of an appropriate regulatory framework. Stanford University and the James A. Baker III Institute for Public Policy have developed a more general index for political risk with regards to investments in the gas industry.* The GIRI combines factors such as government stability, investment profile, bureaucratic quality, law and order, internal conflicts, corruption and ethnic tensions with different attributes into a score of 0 to 10, with lower numbers corresponding to higher risks. This index is used to calculate risk premiums for investments in various countries. Scenarios were developed to determine the impact of these risk factors on market developments.

Examples of GIRI for some countries are:

Australia (8.8), Canada (8.9), China (6.5), France (7.8), Germany (8.8), Iraq (3.1), Italy (7.4), Japan (9.0), Netherlands (9.0), Norway (9.2), Qatar (7.5), Russia (5.5), Saudi Arabia (7.2), UK (9.0), US (8.7).

* Hartley and Medlock (2005).[37]

[37] Hartley, P. and Medlock, K.B. (2005) "Political and Economic Influences on the Future World Market for Natural Gas," Working Paper, CESP, Stanford, March, <cesp.stanford.edu/publications/political_and_economic_influences_on_the_future_world_market_for_natural_gas/>.

7

Regional gas markets in a global energy system: From variation to convergence?

The interrelationship between the different layers of the institutional framework and the impact on the development of the regulatory system illustrate the complex relationship between the process of regulation and the subsequent impact on market behaviour. It seems appropriate to highlight here a number of incompatibility issues that may arise in the international gas market and which are related to the national focus of governance systems. Typically gas supply systems involve five segments, with a more-or-less specific focus of regulation under the free market paradigm:

- The exploration and production segment includes a variety of major operators involved in exploration, drilling, production, and the collection of gas from the fields' wellheads, to move it to the transmission pipelines. Main elements of the regulatory environment involve permits, depletion and taxation regimes, plus environmental and safety requirements. Gas exporting countries, such as Russia, Iran and Qatar, prefer to maintain substantial government ownership in this segment of the market. Resources, by international (UN) agreement, belong to the sovereign realm of the national state.

- Gas transit and transmission involves the long distance, high-pressure pipeline transport of gas from the producers to the consumer markets, or LNG systems including, gasification, ocean-going tanker transport and re-gasification terminals. The pipeline transmission segment of the industry is most often seen as a natural monopoly because of economies of scale and scope, the fixed costs of pipeline construction and the relatively low variable costs of their operation, plus their essential facility character. Yet, effective regulation of pipelines is considered problematic, because of the cross-border character of the systems traversing several jurisdictions with sometimes distinct principles and interests. LNG terminals, in contrast, are considered as potentially competing facilities.

- The natural gas distribution segment consists of the local operations necessary to deliver natural gas to end-users, including low-pressure pipeline transportation, metering, and supply activities *vis-à-vis* the different types of customers. The distribution segment of the industry is generally seen as a natural monopoly and an essential facility, to be regulated accordingly.

- There is ongoing discussion about the need for regulation of storage, blending and other facilities, to secure open access and avoid an abuse of a dominant market position in the provision of these services. If, because of the scarcity of such facilities, competition policy fails to provide the required openness, other forms of access regulation – similar to that for pipelines – may be taken into consideration. Perhaps a distinction between strategic, seasonal and market storage could overcome investor fears of regulated access to their storage facilities.

- Trading refers to the resale of natural gas in the wholesale and retail markets. Unbundling of the vertical column of the gas industry is expected to create a large number of supply companies, which aggregate demand and supply for a number of smaller market participants by purchasing natural gas and transportation services on their behalf. New flexible short-term trading and contractual arrangements may better allocate supply and demand and give market participants the flexibility they need. Yet, end-users may have to be protected from the market power of gas traders, while ex ante merger control or ex post competition policy may be necessary to reduce anti-competitive behaviour in this segment.

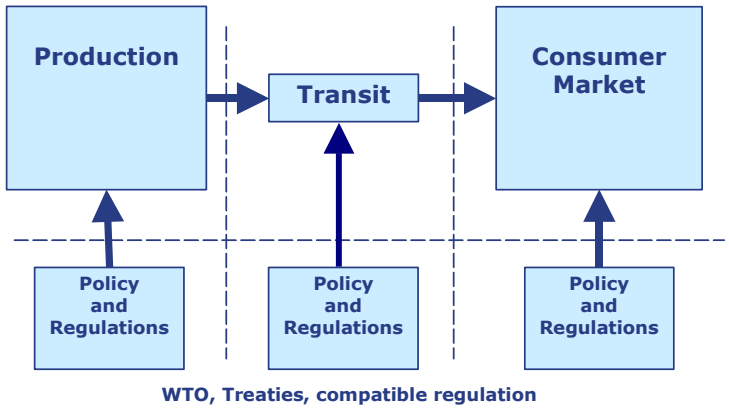
Taking the specific properties of the various segments of the gas value chain into account, the main issues for our consideration are as follows.

The value chain of gas supply systems covers various jurisdictions with different interests, public and private stakeholders, and roles assigned to different stakeholders. Conflicts of interest and difficulties to arrive at mutually acceptable (coherent combinations of) regulatory regimes along the value chain are the logical consequence of this situation. Figure 2 illustrates the segmentation of the supply chain. When the whole of the chain is still located within one 'brand' of jurisdiction, a more-or-less consistent structure could develop, based on contracts and cross-shareholdings, drawing on the same type of principles, laws, arrangements, etc. By and large, this has been the case until recently in the US and Canada, and within Europe.

As noted above, the gas systems in the different world regions and countries stem from radically different traditions in terms of the contents of the layers of the governance scheme and their institutional and structural characteristics. This may require different approaches for the systems of regulation. The question then, is how this fits into the general, one-size-fits-all approaches and recipes for structural reform and market liberalisation proposed by international organisations and the EU. This is particularly important because of the increasing strategic value of gas in international political and economic relations and the impact on local markets of strategic behaviour on the part of governments and companies involved in the international gas market. The transition from a buyers' market to an international sellers' market can impact the way in which regulatory choices are made along the value chain. The resolve of the producer countries to maintain a firm government stake in the industry and their regulating access of private investors to their reserves could imply that supplies will become more orchestrated by governments that have an interest in sustained higher price and income levels. Producers have fundamentally distinct interests from those of consumers. As long as producers and consumer are largely part of the same jurisdiction this rent-seeking behaviour could be successfully regulated, but with the internationalisation of the gas market and future concentration of reserves and supplies, a fair distribution of the rents along the value chain becomes more difficult and increasingly prone to political intervention.

The more difficult development of the gas system in Asia and Latin America illustrate the problems of genuine cross-national systems, in which it is difficult to reach consensus. Box 4 illustrates examples for both the US and the European market. The current developments in supply chains, which extend far beyond the regional borders of the consumer areas and cross several transit jurisdictions, engender the need to consider the consequences of interaction between the different regulatory regimes, based on radically distinct traditions, as suggested in table 2. Moreover, this development is taking place in an environment in which the role of government has changed, particularly in the more liberal systems, in which they have lost their role as a direct actor in public firms and negotiators. Yet, in other countries, governments actually strengthen their position as direct actors in the sector. The consequence is that companies from one jurisdiction must negotiate their terms with governments or state-owned companies. Already we observe a renewed interest on the part of consumer countries to assist their companies with the negotiations.

Figure 2: International segmentation of the supply chain



Moreover, the maturity of the systems and basic geo-physical aspects vary strongly. This begs the question of the extent to which particular arrangements are uniformly applicable to all stages of development of the gas market. Apart from the fact that a regulatory structure is a system and context dependent phenomenon, emerging gas markets may need another regulatory approach than mature ones.

Further, international treaties safeguarding transit will be required, as gas supply is becoming increasingly dependent on long distance cross-border pipelines. World Trade Organization (WTO) agreements may deal with the risk of international transport. Also multilateral treaties like the Energy Charter and its Transit Protocol have been established to this end. But, for other situations, specific bilateral transit treaties may be more appropriate.

Questions arising from these pertinent issues are:

- How will regional gas markets (in particular for the EU, US, Asia and Latin America) interact with each other and with other components of the energy market when they are being brought into contact with each other via long distance pipelines and LNG chains?

- Gas resources are abundantly available in relative proximity to the US and EU gas markets. There appears to be general agreement that in order to attract new gas to the US and European markets, prices for gas supplies would have to exceed the price levels of the 1990s due to the increased cost of new gas supplies. The view that pipeline supplies can be provided to these markets at a lower cost than alternative LNG supplies and that therefore LNG will not be able to provide more than a supplementary supply source may be challenged. The determining factor in attracting new supplies will not be cost, but a combination of access conditions and the costs and prices achievable in the markets.

- How will the organisational/ownership and regulatory choices of the producing and exporting countries (Russia, Canada, Algeria, etc.) interact with the regulatory arrangements in consumer countries such as the US, EU Member States and Asian countries? How will these perhaps opposing options and choices influence the functioning of the market and security of supply and demand?

- Although it seems that supply diversity will improve with the introduction of LNG supplies, the bulk of total gas supplies would stem from producing countries in which the state determines upstream and export policies and regularly owns the gas producing and exporting companies (Russia, Algeria, Qatar, Oman, Norway, Libya, etc.). There is little reason to believe that producing countries would organise their upstream sectors in a more competitive

way.[38] Moreover, the new upstream and LNG projects are also operated by a very limited number of large oil and gas companies (the most important ones being Gazprom, Sonatrach, Statoil, Shell, ExxonMobil, Total, BP, BG, ConocoPhillips), mostly in joint venture with the national companies. This rather oligopolistic supply structure will meet a large number of dispersed customers for their gas, in the form of suppliers of small consumers, power generators and large industrial users. Aggregators need sufficient size in order to accumulate negotiating power towards producing states and project operators/marketers. New entrants as investors/operators in the upstream market are exceptional. Vested interests are enormous and eventually the state has the final word.

- What are the conditions, in terms of market structure, ex ante regulation and competition policy that facilitate the development of an adequate midstream gas infrastructure in the consuming areas? What is considered *adequate* in this respect? Who should make the investments? Key factors are the delineation of responsibilities and regulation of the tasks of the network operators *vis-à-vis* other potential investors and subsequent incentives for investments in terminals, transport, storage and other facilities.

- In particular, the question arises as to what extent the necessary infrastructure investments, in terms of pipelines, terminals and storage facilities will be influenced by evolving market structures. How much vertical integration or other coordination mechanisms throughout the chain are needed? Are there differences between the investments in the upstream, midstream and downstream parts of the chain? What are the impacts of the various regulatory regimes and should they make a distinction between the various parts?

- Due to increased transiting of international gas flows, for which various jurisdictions are involved, there is a strong need for further regulatory reflection on transit regimes, together with capacity allocation issues.

- Is there a need for intra-regional and/or inter-regional convergence of regulatory approaches and what are their implications for the regulatory concepts and approaches to be applied?

- What is the main variation between these systems on a regional basis? What are the consequences of systemic (in)stability for the coordination of investments along the supply chain and security of supply issues?

- Long-term contracts have been described as the backbone of attracting future supplies, and are considered by many in the gas industry as crucial for attracting new supplies. Only large aggregators can carry the financial risk associated with these. Spot markets are very likely to be unable to support the necessary large-scale investments and could become only complementary market devices. It is easier for market parties within the EU to draw new supplies to the market when they are capable of accommodating imports with high load factors. The need to find an appropriate regulatory framework to efficiently provide flexibility services, especially from storage, was also mentioned in the context of increasing competition for gas resources with other consuming regions.

- The example of Russian gas exports illustrates the importance of the relative attractiveness of a market. Among others, the EU and China are interested in acquiring more Russian gas supplies in the future. Russia most probably has sufficient gas resources to meet additional needs from both markets and to satisfy its own domestic market provided that the domestic price level increases. However, factors such as availability of financing and availability of sufficient human resources might very well prevent the parallel execution of projects targeted at both markets, especially when simultaneous large maintenance projects demand similar

[38] Cf. Van der Linde (2005). Op. cit.

resources and mature fields have to be replaced. Thus, the relative attractiveness of the two markets will determine which project will proceed first.

- It is obvious that the possibility of returning to centralised planned energy sectors or statutory monopolies has been foreclosed for the EU. The discussion focuses on the question of which kind of market structures would be beneficial for European consumers. Two types of market structures are regularly mentioned: on the one hand, a market with many small players, none of them having considerable market power; and on the other hand, an oligopoly of a limited number of large players.

- Provided that this oligopoly does not become collusive and remains competitive, advocates of further consolidation in the European gas industry argue that new gas infrastructure investments would require access to substantial financial means as well as sophisticated experience in the gas market. Only large players in the gas market would be able to combine both. Only large aggregators would have sufficient security of demand to balance the risks associated with rather large incremental gas supplies stemming from new investments. The ability to take large amounts of natural gas decreases the transaction costs involved in the marketing of a single supply project.

Box 4: Some features of EU and US Gas Markets

European markets are confronted with the fact that gas chains from source to end-consumer are increasingly cross-border entities and will require heavy investments. Risks have to be shared amongst many along the chain. Many gas pipelines have to cross transit countries. It is acknowledged that this requires a legal framework to safeguard investments and supplies and the minimum of a reasonably functioning local legal system for each link in the chain. Solving cross-border disputes (if arbitrage fails) is to be based on bilateral or multilateral trade and investment agreements. Such a basis is still lacking or is nonfunctional in some areas.

Various initiatives have been undertaken with more-or-less success. Within the EU-25, the regulatory framework provides for a number of rules and incentives with respect to cross-border infrastructures, including exemptions on TPA rules. The Energy Charter Treaty, within which most European and Eurasian countries participate, is showing signs of becoming active in market disputes and the negotiation of a specific Transit Protocol. A number of bilateral government arrangements exist in support of specific investments. It is noteworthy, however, that in the absence of integrated markets and multilateral regional trade agreements, there is not necessarily a guaranteed compatibility of all regulatory regimes along the chain.

On the other hand, one has to realise that cross-border gas pipelines connect parties in a physical manner for a very long time, usually based on long-term commercial agreements. Disputes on short-term issues are therefore not always productive for maintaining long-term relationships. This works two ways and could provide comfort for concerns about security of supply and of demand. The same applies more-or-less to LNG chains. A further complicating factor is that investments are increasingly outside the geographically limited jurisdiction of the regulatory regime in European consumer markets. This leads to questions regarding market design and regulatory regimes on the downstream side of the gas chain and the objectives of a demand driven supply competition.

In the **United States**, the Federal Energy Regulatory Commission (FERC) Order 636 introduced change in the structure of existing contracts and a breaking-up of the gas industry along the value chain. At the moment, companies are starting to reintegrate various functions along the value chain, at least to some extent. Not needing large-scale long distance imports, the US has traditionally focussed on internal market competition rather than the attractiveness of US gas markets to external suppliers. With rising import dependence this might be a new aspect for regulatory concern.

Long-term transportation contracts are required by FERC before granting licences for new pipelines. In this way, cross-subsidisation of new lines by existing customers should be prevented. Long-term supply contracts that back-up the transportation contracts and provide security of supply are important as well. In addition, since the so-called Hackberry Decision, FERC asserts that, as a rule, no TPA is required in new LNG terminals, whereas in the EU such an exemption needs to be applied on a case-by-case basis. This slows the process in Europe. Even if the regulatory conditions are favourable for investment, investors might still want exemptions when they assess that essential changes in the framework are likely to occur or when they are uncertain about this.

The introduction of competition into US gas markets has been characterised in the discussion as preserving the ‘sanctity of contracts’. There is no ‘common carrier’ approach applied to US gas pipelines. Within the EU, a general tendency appears to have evolved in which government bodies enforce access to gas transport by forcing the release of reserved – and used – capacity from long-term transport contracts and also accepting pro rata allocations and auctions as a proper means of congestion management. In this manner, existing contracts would not be fully respected which in turn reduces investors’ and shippers’ confidence and could reduce security of supply. In the US, long-term transport contracts, in combination with secondary markets and use-it-or-lose-it arrangements, signal investment needs/opportunities in infrastructure. ‘Power of Imminent Domain’ plays a crucial role in the US, facilitating the construction and planning procedures around pipelines.

8

The agenda for regulatory dynamics and market development

Closing the circle, a number of concluding remarks can be drawn, but a number of questions still remain regarding the regulatory dynamics in the system. Concluding remarks are as follows:

- A global gas market is emerging. Consumer markets are competing for supply. Strong demand for energy in traditional markets is complemented by strong demand from emerging economies such as China, India and Brazil, reflected in rising natural gas prices. Both, consumer regions and producer states are seeking diversification of purchases and sales respectively.
- Under prevailing market conditions in which demand is strong and lead times for major new projects are still many years, the global market can be characterised as a sellers' market. Major players will remain dominant in international markets, both on the production side as in wholesale markets.
- Energy policies are under review due to changing supply/demand balances. Regulatory regimes are being revisited and adjusted to adapt to the new business environment. In the main mature gas markets the focus has shifted to supply security and investors' needs to secure timely availability of the necessary LNG, storage and pipeline facilities.
- It is realised that liquid liberalised unbundled markets will not always provide all the necessary investment signals required for a timely response by investors. New and old coordinating mechanisms such as long-term contracting of supply and transportation, vertical integration and exemptions for TPA seem to be required to complement competitive short-term markets.
- Regulatory frameworks should reflect market realities, i.e. prevailing market structures and market functioning as well as policy objectives that can vary across countries and regions. Developing markets need different regulatory frameworks than mature markets, but also sellers' markets need different sets of measures than buyers' markets. In addition, measures to increase market and price transparency together with effective market monitoring should be implemented to strengthen competition and price signals for investments.
- Coordination of regulatory regimes along the gas chain crossing different legal systems to support coordinated investments in infrastructure to maintain supply, is a major challenge. International frameworks, such as the Energy Charter Treaty, WTO rules, and bilateral treaties function to support investment initiatives and to resolve disputes.
- Discussing and adjusting regulatory frameworks requires a new process of exchanging information and coordination between consumer and producer countries. Such a new process needs to enhance mutual understanding and the assessment of supply and demand security, of competitive markets and of investor needs. It could be part of wider energy policy and foreign policy approaches, securing long-term relations between producers and consumers based on mutual dependency.

In particular:

- It should be accepted that markets and regulatory models are dynamic and that a transition phase from regulated regional monopoly (or 'managed') markets to fully liberalised markets with a stable regulatory regime could easily take 10-15 years. Before subscribing to liberalised markets, due attention should be paid whether such a market model is best suited to achieving

the local policy objectives, given local market circumstances and the development stage of the market.

- Regulation will have an impact on market development, but cannot be the driving force for designing markets that are very different from present structures and operations at short notice. A step-by-step approach that gives markets time to adapt is necessary. Markets may evolve (design themselves) under the influence of a wide set of factors. As argued above, incentive-based or command-and-control regulatory action may bring about anticipatory and protective, as well as corrective, interventions ex ante or ex post.
- Ex ante regulatory decisions are required when essential (monopolistic) facilities are in place. Ex ante protective action is required to secure consumer interests when it is likely that abuse of dominant position will occur. Some ex ante regulatory decisions could also be necessary in market transitions when market forces may need support, for instance by regulating access to essential facilities. However, this kind of interference can easily distort markets and create new unwanted vested interests.
- Given that anti-competitive, horizontal and vertical integration and other strategic reactions may follow regulatory decisions and unbundling implemented precisely to bring about competition, an important issue is where in the value chain can sustainable competition emerge, and how?
- Competition authorities usually undertake ex post interventions when competition is hindered and/or dominant parties are abusing their market power.
- The need for a sustainable balance between ex ante regulation, concentration and integration, industry stability, abuse of market power and competition policy may require the construction of a broader perspective on the functioning of markets, an enhanced coordination of the several institutions involved in the market and possibly a revised definition of their tasks and criteria for taking action.
- The role of demand side participation in the market receives too little attention, generally. Also, consumers can contribute to addressing issues such as reducing price spikes and increasing security of supply by taking a more active stance in markets. The potential for this could be exploited better.
- It remains under discussion, as to how much, and what kind of stability in a regulatory framework is necessary to secure market confidence versus the need for sufficient flexibility to adapt to changing market determinants.
- Moreover, ways need to be found to determine the location and nature of authority to change these regulatory rules, independently from political processes, assuming that this requires timely decisions, based on transparent processes with sufficient input from market parties and possibly others.

As a further process we propose to address four groups of questions that follow from the paradigm changes for the ongoing debate. While addressing those question, due account should be taken of local circumstances, development stages of the respective gas markets and the policy objectives which are dominant in the systems in question.

First, how is the development of adequate, cross-regional supply chains influenced by the globalising gas market and the existence of different national regulatory regimes and systems of governance along the gas value chain? What are the consequences of this situation for market-driven and deregulated regimes? What coordinating mechanisms should remain available to stakeholders along the chain? Are there alternatives to substitute existing mechanisms such as long-term contracting and vertical integration?

Second, is it possible to establish an efficient (or workable) balance between de facto monopoly market power and a sufficient degree of coordination between market actors to facilitate timely and

adequate investments, at an acceptable rate of return?

Third, is it possible to define menus of regional or country-specific combinations of components of a governance structure, based on a market design, through which such a workable balance could be achieved along the supply chain? This may involve, on the one hand, ex ante regulatory concepts, such as the degree of integration or unbundling, the regulated or 'free' determination of tariffs and regulated access to markets, take-or-pay provisions, etc., while on the other hand, ex post solutions based on competition policy will have to play a role. The question arises as to how security of supply objectives can be integrated into the regulatory framework, as an inherent element of a functionally competitive market. Should measures aimed at increasing competition, as a standard procedure, be explicitly tested with respect to effects on security of supply and environmental objectives?

Finally, is it possible to free ex ante regulatory concepts and ex post competition policy from their traditional rigid structure-conduct-performance embedding which often does not take due account of changing circumstances in regional and global energy markets? How could regulatory concepts and competition policy be complemented by more dynamic, context and institution-specific means for analysis and regulatory action? And to what extent would this be possible in a stable long-term framework benefiting both producer and consumer interests?

Annex I: Summary FSR/IGU/CIEP Workshop Regulation of Natural Gas Markets in Europe

30 September – 1 October 2005, European University Institute, Florence

The International Gas Union (IGU), in cooperation with the Florence School of Regulation (FSR) and the Clingendael International Energy Programme (CIEP), organised a workshop on the 'Regulation of Natural Gas Markets', held on 30 September and 1 October 2005 at the European University Institute in Florence.[39] More than thirty experts from the gas industry, government bodies and research and consultancy organisations took part in the event.

The workshop focussed on the current European gas market situation and had three main objectives:

- to assess whether there are fundamental changes taking place in world gas markets;
- to discuss whether these changes require changes in approaches to gas market regulation; and
- to facilitate a fruitful discussion between the various stakeholders in the European gas markets, namely the gas industry, gas consumers and government bodies.

The following is a non-chronological summary of the main aspects, which surfaced during presentations and discussions.[40]

A.1.1 Changing circumstances in World and European gas markets

A number of changes in energy markets have been identified:

- Liberalisation policies are being met with increasing scepticism. This scepticism, justified or not, is rooted in events such as around Enron and perceptions of decreasing levels of security of electricity supply with decreasing reserve margins in generation capacity and blackouts and brownouts occurring in e.g. California, Italy and the United Kingdom. Moreover, rising energy prices are apparently perceived as being directly linked to liberalisation of gas and electricity markets. An increasing number of politicians appear to trust less in market mechanisms to coordinate the provision of energy.

- Combating climate change features ever higher on political agendas. The importance of international cooperation in reducing greenhouse gas emissions is becoming increasingly apparent.

- The medium to long-term outlook for oil supply and demand balance is very much under renewed discussion. Such uncertainties translate via the price linkage between oil and gas (direct or indirect) to the price outlook for natural gas. This uncertain price outlook makes the outlook for natural gas in power generation also very uncertain, and thus projections for gas demand have become more difficult to make.

- The gas import dependence of all major consuming regions in the world is predicted to rise significantly. At the same time:

    - The institutional framework is changing within the European Union. Whereas in the past there was a rather tight framework binding producers, gas merchants, gas distributors and gas users together by various contracts of similar (long) durations, in

[39] IGU and CIEP are very grateful to the Florence School of Regulation for the excellent organisation and support during the workshop.

[40] The workshop was held under the Chatham House Rule. Accordingly, this summary does not assign any views to specific participants of the workshop. In case of controversy, an effort has been made to report the different points of view. If certain statements in this summary are not contradicted, however, this does ***not*** mean that there was general agreement on the argument in question.

liberalised markets supply contract duration for gas distributors and gas users tends to shorten. The shorter planning horizon trickles through the whole value chain, often across multiple countries, and makes the necessary large-scale investments in principle more risky.

- The general expectation of the early 1990s that economic liberalism would be a guiding theme for the development of international relations appears to be replaced by a somewhat gloomier outlook of a world in which major power blocks increasingly compete for scarce resources, employing also non-economic means. This also increases the fear of importing countries that energy deliveries can be used as a political power tool in international relations. However, increasing import dependency on a particular producer country also means that the specific producer country is likely to become economically more dependent on the consumer country, limiting its scope for political leverage.

- The improved economics of LNG and the associated increase in volumes of LNG on world gas markets establish price and physical links between the major importing regions in North America, the European Union and Asia, which previously had been basically isolated from each other. It will be interesting to see whether this interconnectivity will require adjustments to the prevailing different sets of governance in the various consuming regions.

- A higher share of imports at rather high load factors necessitates the local provision of additional flexibility services, among others, provided by storage facilities.

A.1.2 Regulation and impediments to investments today and tomorrow

Institutional issues

Regulatory frameworks stem from policy choices with respect to the organisation of the gas (and electricity) sector. One fundamental choice to be taken is between coordination by markets or central planning. Both approaches have their limitations. The political choice should be unambiguous in order to be translated into clear regulatory frameworks. The European Union has chosen the market approach. It appears that Member States are following, although some of them half-heartedly. The different political attitudes in different Member States have led to inconsistencies between different national regulators. Inconsistencies even exist between national regulators implementing regulatory models determined by European directives and the respective national governments that are not completely abiding to European policy choices.

Roles and responsibilities appear to not be very well assigned in an environment in which various governmental bodies, the European Commission, national ministries (mostly of economic affairs), national regulators and competition authorities, all are engaged in natural gas market. Especially the limits between competition authorities and regulators appear not to be clear-cut.

One participant observed that due to the low involvement of politicians, the European Commission and national regulators have started initiatives such as the Madrid Forum and CEER/ERGEG to solve problems that have not been adequately addressed by the legislation in place. Those initiatives would operate at large without a political mandate and, especially in case of the regulators, might exceed the tasks regulators are assigned to, i.e. applying national legislation.

Room for improvement in current regulation

The following issues surrounding current regulatory regimes in the European Union were discussed.

Participants generally agreed that further harmonisation of the different national regulatory regimes would be helpful for facilitating competition in gas markets. Currently, the differences in systems for access to transportation and distribution lines and to storage and in balancing regimes increase barriers

to entry. However, it should be investigated first how necessary further harmonisation really is, as such efforts carry significant costs as well.

Especially representatives of the gas industry, but also academics, voiced concerns about the instability of rules,[41] which would make planning of strategies and investments very difficult. This uncertainty would be augmented by an unclear division of responsibilities between European and national regulators and competition authorities. The sector inquiry of the European Commission and the efforts of the *Bundeskartellamt* to break up existing gas supply contract structures in the German market increase the uncertainty for the gas sector additionally.

Gas industry representatives argued for the establishment of nonbinding guidelines to afford more planning security, especially for parts of the industry that are not assumed to have natural monopoly characteristics. This view was strongly rejected by a representative of energy consumers who claimed that voluntary agreements in gas markets for access to transportation have not worked in the past and that such systems for storage access in the future would most likely not work either. Consequently, the argument was in favour of binding regulation. In the same vein, there followed an argument for full ownership unbundling in order to ensure nondiscriminatory access to gas transportation.

Ownership unbundling was also mentioned as one of the two items missing in the current gas directive, which would be necessary to ensure effective competition. The other important omissions are provisions for enforcement tools for regulators.

There was a slight difference in opinion between representatives of gas merchants about exemptions from TPA under article 22 of the current gas directive. While some praised the exemptions as increasing planning certainty to the investor, others expressed their concern that article 22 exemptions are becoming the rule rather than the exception, hampering access to gas markets for competing gas undertakings. Other participants noted that especially LNG terminals would be in principle 'competitive' assets with no need for regulation; however, if an LNG terminal was built by a party, already dominant in the respective market, regulation might be warranted nevertheless. This however could lead to an unwanted situation in which incumbent dominant parties would not want to invest under a regulated regime (or would be prevented from investment at all due to competition concerns), while other parties might be hesitant to invest, lacking either financial capacities or experience in the respective market, or both.[42]

[41] Gas industry representative: "There is a new set of rules every six months."

[42] Italy took action to mitigate the financial risks associated with the construction of new LNG facilities. Italian law prescribes that 20% of the capacity of a new LNG terminal has to be available for regulated TPA. If market parties make insufficient use of this capacity to cover the cost associated with it, part of the financial shortfall will be covered by a surcharge on national transportation tariffs.

NIMBY and local opposition

Local opposition to erecting new infrastructure might be a much more serious impediment to new investments than shortcomings in the regulatory framework. Many LNG projects in Europe and the United States currently have difficulties in either obtaining the necessary local permits at the construction side envisaged or in actually carrying out the project. In one example from the US, a local initiative in Massachusetts attempted to have a bridge, slated for demolition, declared as being a part of the national heritage. This would render the location for a new LNG terminal worthless for that purpose. Safety concerns feature highest on the list of arguments of local opposition groups, followed by environmental concerns.

A possible consequence is that new LNG projects will have to be predominantly erected in industrial areas, offshore or in areas where the population is familiar with large-scale energy infrastructure, such as gas and oil producing regions at the US Gulf coast.

One means to mitigate such problems is providing extensive information on specific projects and dangers connected to them well in advance of projects starting. Governments and private companies should both be involved in that process.

Market structures

The road back to centrally planned energy sectors or statutory monopolies appears to be foreclosed in the European Union. The discussion focuses on the question of which kind of market structures would be beneficial for European consumers. Two types of market structures are regularly mentioned: on the one hand a market with many small players, each of them not having considerable market power, and on the other hand an oligopoly of a limited number of large players.[43] Provided that this oligopoly does not become collusive and remains competitive, advocates of further consolidation in the European gas industry state that:

- New gas infrastructure investments would require access to substantial financial means as well as sophisticated experience in the gas market. Only large players in the gas market would be able to combine both.

- Only large aggregators would have sufficient security of demand to balance the risks associated with rather large incremental gas supplies stemming from new investments. The ability to take large amounts of natural gas decreases the transaction costs involved in the marketing of a single supply project.

- Although apparently supply diversity would improve, the bulk of total gas supplies would stem from producing countries in which the state determines upstream and export policies and regularly owns the gas producing and exporting companies (Russia, Algeria, Qatar, Oman, Norway, Libya etc.). There would be no reason to expect that producing countries would organise their upstream sectors in a more competitive way. Moreover, new upstream and LNG projects would also be operated by a very limited number of large oil and gas companies (the most important ones being Gazprom, Sonatrach, Statoil, Shell, ExxonMobil, Total, BP, BG, ConocoPhillips). This rather oligopolistic supply structure would meet a large number of gas consumers in the form of suppliers, power generators and large industrial users. Aggregators therefore would need sufficient size in order to accumulate negotiating power towards producing states and project operators/marketers.

- Long-term contracts are considered by many in the gas industry as crucial for attracting new supplies. Only large aggregators would be able to carry the financial risk associated with them.

[43] There appears to be agreement that, regardless of the number of companies in the market, the market will in any case provide for a set of long-term and short-term contracts.

- It might be easier for governments as well to control and influence the behaviour of a smaller number of players while at the same time preserving some advantages of a competitive market.

During the workshop, arguments in favour of a more oligopolistic market structure were not contradicted. One challenge noted however was the obvious need to balance these perceived advantages with the danger of a competitive oligopoly turning into a collusive one.

Attracting gas to EU gas markets

Gas resources are abundantly available in relative proximity to EU gas markets. There was general agreement that, in order to attract new gas to the European market, prices for gas supplies would have to exceed the price levels of the 1990s due to an increased cost base for new gas supplies. The view that pipeline supplies from especially Russia, Norway and Algeria could be provided to European markets at lesser cost than alternative LNG supplies and that therefore LNG would not be able to be more than a supplementary supply source was challenged. The determining factor in attracting new supplies would not be cost, but the combination of costs and prices achievable in the market. In 2004, Spain for example was able to attract supplies from more than ten different producing countries, among them Australia and Indonesia.

Long-term contracts have been described as the backbone of attracting future supplies. Spot markets would probably not be able to back up the necessary large-scale investment and would in the future be only a complementary market device. Other participants see a more prominent role for short-term contracts, however always in co-existence with long-term contracts.

Market parties within the European Union can more easily draw new supplies if they are capable of accommodating imports with high load factors. The need to find an appropriate regulatory framework to provide flexibility services, especially from storage, efficiently was also mentioned in the context of increasing competition for gas resources with other consuming regions.

The example of Russian gas exports illustrates the importance of the relative attractiveness of a market. Among others, the European Union and China are interested in acquiring more Russian gas supplies in the future. Russia most probably has sufficient gas resources to meet additional needs from both markets. However, factors such as availability of financing and availability of sufficient human resources might very well prevent the parallel execution of projects targeted at both markets, especially in times when a lot of investment is already going on in maintenance of existing gas fields and pipelines and in new upstream projects which simply replace dwindling existing production. Thus, the relative attractiveness of the two markets will determine which project will proceed first.

A.1.3 Summing up

Changes in world gas markets such as increasing import dependence of the major gas consuming regions against the backdrop of increasing concerns about the liberalisation of gas markets on the one hand and producer market power on the other hand were generally acknowledged by workshop participants. However, such observations did *not* lead to a general conclusion that current regulatory frameworks in the European Union need a fundamental revision.

Some, but certainly not all participants doubted that liberal gas markets with a relative inclination towards shorter-term transactions could provide security of supply levels comparable to those of a traditional statutory monopoly system and bring forward the necessary investments. The limited number of major gas exporting countries and the related worries about abuse of market power in economic and political terms remain major attention points in the discussions on European natural gas markets.

Strong volatility of regulatory provisions over time and inconsistency of regulatory regimes among Member States are additional concerns with respect to the current regulatory frameworks in European gas markets.

Regulation can only be truly effective if hard policy choices at national and EU political levels lead to clearly defined objectives and approaches on how to get there. Given the manifold objectives and large number of stakeholders involved, getting these hard choices, consistent across Member States, will remain a major challenge.

Annex to the Florence workshop summary: Selected aspects of regulation of interstate gas pipelines, LNG terminals and storage facilities in the United States

Wellhead gas competition in the United States is facilitated by an open access system to interstate pipeline gas transportation and the requirement of functional unbundling of selling and transporting gas. All interstate gas pipelines are subject to open access rules. Provided that there is free capacity shippers can demand transport capacity in the pipelines.[44] Rates are subject to negotiation, but shippers can demand the recourse rate, which is regulated by the Federal Energy Regulatory Commission (FERC). This default rate is calculated on a cost-reflective basis. FERC also regulates access conditions and services. Pipeline companies are still allowed to sell gas, but only at the entry point of the network. Although functional unbundling between transportation and selling of gas is required, many companies decided to put the two activities in two legally unbundled companies, as they find it easier to deal with the regulator this way.

Differences in terminology between the United States and the European Union

Many issues currently under discussion with respect to natural gas markets are similar for the United States and the European Union. However, discussions between US and EU residents are at times complicated purely by the use of different terms for comparable topics. A selection of terms and their (approximate) counterparts:

US jargon	*EU jargon*
Seller	Supplier
Supplier	Producer
Open Access	Third Party Access (TPA)
Transporter / Pipeline	Transmission System Operator (TSO)

Since the Hackberry Decision in 2002, new LNG terminals under FERC jurisdiction (all onshore terminals) are effectively exempted from rate and access regulation. Terminal operators are free to negotiate rates and do not have to grant open access. In fact, LNG terminals are treated similarly to production facilities rather than as part of gas transport infrastructure.

Since 1938, the FERC is the responsible body for licensing interstate natural gas pipelines and natural gas storages. A *federal* licensing authority has been chosen in order to prevent that local interests impede the construction of infrastructure of national interest.[45] The FERC solely reacts to applications filed by investors instead of identifying needs for new investments itself. The market decides where new infrastructure is required. The construction of new infrastructure under FERC jurisdiction (interstate pipelines, storages, onshore LNG terminals) is facilitated by eminent domain, i.e. once a licence has been issued, in principle land property can be condemned in order to construct the project in question.[46]

For the certification of new infrastructure FERC considers following principles:

- Pricing: no financial subsidies from existing customers (i.e., presumption for incremental pricing);[47]

[44] Pipeline companies can deny access to the pipeline if the capacity is already fully booked (contract carriage). Notably this is a different regulatory regime than applied to US interstate oil pipelines. If shippers demand capacity in an oil pipeline, the pipeline company has to accommodate (part of) that request and free capacity on a pro rata basis (common carriage).

[45] It has been stressed during the workshop that the nationwide application of a consistent set of common rules for interstate pipeline regulation has also helped greatly to foster interstate wellhead competition and increase transparency in the transportation market.

[46] However, pipeline companies usually try to avoid recourse to this means and focus on coming to agreements with landowners.

- Applicant's efforts to minimise adverse effects on its existing customers, on existing pipelines in the market and their captive customers, and on landowners and communities affected by the route of a new pipeline;
- If adverse effects remain, balance between those effects and evidence of public benefits (essentially an economic test) and review of any appropriate conditions;
- If balance weighs towards proposal, review of environmental impacts and application of relevant environmental laws.

During the certification process, FERC provides guidance to investors by preliminary determinations in order to facilitate a speedy proceeding of infrastructure projects without unnecessary delays.

Changes introduced by the Energy Policy Act of 2005

The Energy Policy Act of 2005 provides for further streamlining of the licensing process. The FERC has been made lead agency for all applicable federal authorisations and will also set the compulsory schedule for the licensing procedures for all relevant bodies. Moreover, it confirmed that FERC has exclusive jurisdiction over siting, construction, expansion and operation of LNG terminals.

Another remarkable change introduced by the Energy Policy Act of 2005 concerns the regulation of underground gas storage. An economic test to assess the market power in the storage market used to be applied to companies investing in new storage facilities. In the event that the company failed the test, rates were regulated by FERC. The Energy Policy Act of 2005 now provides that rates and conditions for access to new storages can be freely negotiated (market-based) between storage operators and customers, even if the storage company fails the market power test.

[47] Note: pipeline rates are generally cost-based and designed using fixed-straight variable methodology with no minimum bills or take-or-pay provisions. Under certain conditions, FERC can defer from the presumption of incremental pricing and decide that 'roll-in' pricing can be applied, meaning that existing customers do finance part of the new infrastructure.

Annex II: Summary IGU/CIEP Workshop Regulation of Natural Gas Markets in the United States

12 - 13 December 2005, The Royal Netherlands Embassy to the United States, Washington, D.C.

The International Gas Union (IGU), in cooperation with the Clingendael International Energy Programme (CIEP), organised a workshop on 'Regulation of Natural Gas Markets' on 12 and 13 December at the Royal Netherlands Embassy in Washington D.C.[48] Around thirty experts from the gas industry, national and state government bodies, and research and consultancy organisations took part.

The workshop focussed on the situation in US gas markets and had three main objectives:

- to assess whether there are fundamental changes taking place in world and US gas markets;
- to discuss whether these changes, if any, necessitate a change in approaches to gas market regulation; and
- to facilitate a fruitful discussion between the various stakeholders in the US gas markets, namely the gas industry, gas consumers and government bodies.

The following is a non-chronological summary of the main aspects, which came forward in presentations and discussions.[49]

A.2.1 United States Natural Gas Supply and Demand.

In its 2006 Annual Energy Outlook (AEO)[50] the EIA has lowered the gas demand outlook for the next 20 years due to higher price expectations for natural gas by around 10% in 2025 as compared to the AEO 2005.[51] The revision of gas prices in particular makes gas less attractive for power generation, reducing the projected increase of gas demand in that sector. The importance of coal for the power sector was underlined several times during the workshop and also nuclear power is perceived to be on the rebound. The prospect of much less gas in power than predicted earlier was challenged in part during the workshop. The advantages of gas-fired power generation, in particular the flexibility in size of new power plants and the relatively low front end capital expenditures would make gas still very attractive for investors in power generation. Moreover, environmental regulations would promote the use of gas over the use of other fuels in many cases. It has been pointed out that the overwhelming majority of power plants under construction or planned up to 2010 would be gas-fired.[52]

The gas demand and supply balance has been tight in recent years with prices having multiplied since the year 2000. This situation has been attributed to a combination of interrelated factors, such as the simultaneously increasing oil product prices, the construction of a significant amount of new gas-fired power-generation plant, environmental restrictions, which shift fuel preferences in favour of natural gas and the limited ability to increase natural gas supplies for the US market in the short-term. Workshop participants in general stated that they believed in the presence of very large remaining gas reserves on US territory. Significant new domestic gas production is expected to come from the Rocky Mountains and from Alaska. For the latter region, a new pipeline is planned to be operational past

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[48] IGU and CIEP are very grateful for the opportunity to organise this event at the Royal Netherlands Embassy and would like to thank Ambassador H.E. Boudewijn van Eenennaam and his staff for hosting the event and the excellent support throughout the entire organisation. IGU is also grateful for financial support received for this project from EnergieNed, the federation of energy companies in the Netherlands.

[49] The workshop was held under the Chatham House Rule. Accordingly, this summary does not assign any views to specific participants of the workshop. In case of controversy, an effort has been made to report the different points of view. If certain statements in this summary are not contradicted, however, this does ***not*** mean that there was general agreement on the argument in question.

[50] Early release, available at <www.eia.doe.gov/oiaf/aeo/index.html>.

[51] The expected higher gas prices have also led to an upward revision of expected onshore gas production. Interestingly, the cumulative US onshore and offshore production is forecasted lower across the whole projection period up to 2025 as compared to AEO 2005 due to long-term effects in offshore production caused by hurricanes Rita and Katrina.

[52] See also: <www.eia.doe.gov/cneaf/electricity/epa/epat2p4.html>.

2015, aided by special regulatory treatment. Much of the remaining US reserves would be located in nature protection areas, which would prevent their exploitation. LNG imports would be required. Opinions differed to which extent LNG imports would be required, with some participants having higher expectations for US gas production than others. Two aspects came to the fore: first, the outlook for new domestic supplies depends on the extent to which nature protection regulations would be eased in order to allow gas production in areas which are currently off-limits. Second, some participants believe that LNG would in any case be cheaper than the marginal domestic production unit, therefore making its way into the US market in any scenario. One participant suggested that it would be better to concentrate on fostering US domestic production as this kept jobs in the country and limited the dependence on politically unstable gas producing countries as well as the market power of foreign companies.

As of 30 November 2005, there are five operational LNG import terminals in the US and a further 14 projects have been approved by either FERC or MARAD/Coast Guard. There are approved plans for three terminals in Mexico and two in Canada, also partly expected to serve the US market. This list is complemented by another 21 projects proposed to the licensing agencies and another 20 possible projects in the US, Canada and Mexico.[53]

In fact, EIA expects on basis of their AEO 2006 that in addition to some capacity expansions at existing facilities, only the projects currently under construction (Sabine Pass LNG and Freeport LNG), two additional terminals in Mexico, two terminals in Eastern Canada and another one at the US Gulf Coast will eventually be built. Workshop participants estimated the total number of LNG terminals serving the US market up to 2015 at between 9 and 18.

A.2.2 Globalising Natural Gas Markets

Workshop participants in general agreed that indeed gas markets would become more and more global and that competition between the various consuming regions for additional gas supplies, in particular but not only for LNG would increase in the future. In recent years, Spain, due to general gas shortage and Japan due to extra safety inspections at nuclear power plants after an accident were able to acquire a significant number of spot LNG cargos when they needed it. However, those transactions also increased the prices to be paid on spot LNG cargos. Investors in the US currently appear to be concerned about the ability of Europe and Asia to offer better terms for LNG producers than the US, thereby not only bidding away spot cargos, but generally reserving new LNG supplies for European and Asian gas suppliers

Table 1: Main gas consuming regions

	Gas import dependence	Cultural predisposition to government guidance and state involvement
Asia	High	High
Europe	Medium, increasing	Medium
US	Low, increasing	Low

It has been pointed out that the regulatory and business approaches to gas supplies at the moment would differ across the main gas consuming regions. Such differences might have evolved historically also due to different conditions in the various regions with respect to import dependence and visions on the role of the state in general economic life (see table 1). It remains to be seen whether an increasing competition for additional gas supplies will lead to gradual convergence of approaches to national gas supplies.

A.2.3. Regulatory and Market Developments in the United States

Regulatory History

Table 2 provides an overview of main steps in the development of the regulation of US natural gas markets. Orders 436 and 636 had a strong impact on the way natural gas markets are organised today. Order 436 enabled large customers to choose gas supplies whereas by Order 636 shippers of all sorts

[53] See also: <www.ferc.gov/industries/lng.asp>.

could access various gas sources. As a consequence of these orders, contract durations shortened drastically. Whereas the traditional contractual framework integrated the whole chain from wellhead to burner tip by back-to-back contracts of 20 years and longer, nowadays commodity contracts often have a duration of one day and hardly ever run longer than a year. Transportation contracts have durations of up to five years.

Table 2: US regulatory adaptations

	Market Structure or Regulatory Model	**Problem**	**Fix**	**Mechanism**
Pre- 1938	No regulation of pipelines	Market power by pipeline companies who sold and transported gas	Regulation	NGA
Pre- 1954	No regulation of producers	None	Wellhead price controls and regulation	Phillips Petroleum v. FPC (S.Ct)
1954-89	Wellhead price controls and regulation	Supply shortage	Wellhead deregulation	NPGA (1978) Decontrol Act (1989)
1978-86	Bundled sales	Limited access to low cost gas	Open-access	Order No. 436
1986-92	Sales and transportation	Transport inequality, take-or-pay	Unbundling	Order No. 636
1992-present	Unbundled transport	Short-term focus, need for long-term investment support	Enhance project support	Hackberry (LNG), return to long-term LDC contracts?

Source: Workshop presentation

Long-term contracts

There appears to be some concern at pipeline companies and state regulators that necessary investments in gas infrastructure might not be forthcoming as needed in the absence of security provided by long-term transportation capacity contracts. Long-term contracts for both, transport capacity and commodity would be discouraged, at times explicitly, at times implicitly, by either regulators or shareholders in local distribution companies (LDCs) and power generators. Prudence reviews by regulators might lead to the situation that LDCs could not recover the cost incurred by the long-term contract if the regulators consider the conclusion of the contract in question as not being prudent ex post. Pipeline companies and state regulators now call for assessing means to encourage the conduction of long-term contracts, in particular for transportation contracts.[54] A structural problem connected to such considerations is that LDC shareholders and power generators are often not in favour of long-term contracts as it removes considerable flexibility for them.

Individual participants questioned the view that investments in infrastructure would be so risky that investment would be delayed. There would be clear market opportunities for new infrastructure and

[54] Cf. e.g.: INGAA Foundation (2005) Discussion of effects of long-term gas commodity and transportation contracts on the development of North American Natural Gas Infrastructure. Washington D.C. <www.ingaa.org/Documents/Foundation%20Studies/Long%20Term%20Contracts%20FINAL.pdf> and NARUC/IOGCC Joint Task Force (2005): Policy recommendations on long-term contracting for natural gas transportation, storage services and liquefied natural gas delivery, <www.ferc.gov/eventcalendar/Files/20051020121613-NARUC-IOGCC%20REPORT%20_9_.pdf>.

larger projects with higher risks might be done as joint ventures, limiting the risk exposure for individual parties.[55]

LNG regulation and the global market

Since the Hackberry Decision in 2002, new LNG terminals under FERC jurisdiction (all onshore terminals) are effectively exempted from rate and access regulation. Terminal operators are free to negotiate rates and do not have to grant open access. In fact, LNG terminals are treated similarly to production facilities rather than as part of gas transport infrastructure. FERC regards this as necessary for the realisation of the projects, altering the risk/reward outlook for investors such that the realisation of projects becomes possible. LNG terminals in the United States are developed according to three different types of business models. First, there are independent project developers who offer capacity at their terminals to parties interested in importing LNG. Second, some terminals are developed by companies who own or control the entire chain from gas production, liquefaction, shipment, vaporisation to gas sales. Third, there are hybrid forms of the former two business models, in which the terminal developer owns or controls some elements of the chain from production to sales. There appears to be general agreement across stakeholder groups that all those business models for LNG require long-term relationships between gas producers and terminal capacity holders in order to attract supplies to the market. However, there also appears to be general agreement that the US market offers sufficient liquidity that the terminal capacity holder does not necessarily need long-term gas sales contracts to balance the volume risk of long-term purchase contracts.

Market power and market monitoring

The idea that strong parties are required in order to compete with gas purchasers from other consuming regions was generally supported in the workshop. Participants pointed out that Americans in general would be less concerned about the formation of oligopolies in the energy sector than Europeans. This attitude however would also rely on trust in market monitoring performed by regulatory authorities such as FERC.

FERC in part relies on information from and cooperation with market participants for monitoring the market. Cooperation and information sharing with state regulators and other agencies supports the detection of the abuse of market power. Information flows between different agencies generally are well organised in terms of confidential treatment; however, at times information flows are impeded when confidential treatment of information cannot be guaranteed.[56] In comparison with European regulators it was noted that European regulators would have more ex ante powers, whereas FERC would have more ex post powers, being able to require refunds or sanction fines in case of abusive behaviour of market parties. A continuous movement towards ex post monitoring could still be observed in US gas markets.

Energy Policy Act changes

A remarkable change introduced by the Energy Policy Act of 2005 concerns the regulation of underground gas storage. An economic test to assess the market power in the storage market used to be applied to companies investing in new storage facilities. In the event that the company failed the test, rates were regulated by FERC. The Energy Policy Act of 2005 now provides that rates and conditions for access to new storages can be freely negotiated (market-based) between storage operators and customers, even if the storage company fails the market power test. Apparently the government is concerned that storage investment is insufficient and would like to encourage additional

[55] In between the lines, it was also suggested that United States cost-based rate regulation for pipelines would leave considerable more room for pipeline companies to recover costs and make reasonable profits during the lifetime of their investment projects than European-style incentive (RPI-X) regulation.

[56] It was mentioned that some specific agencies would have a duty to publish certain information when they become aware of it. Obviously, such an agency will not qualify for sharing information in many cases.

investment this way. It remains to be seen to what extent market-based rates will become common practice rather than the exception.[57]

The Energy Policy Act of 2005 also provides for further streamlining of the licensing process, welcomed by most workshop participants as lowering the barriers for investments. The FERC has been made lead agency for all applicable federal authorisations and will also set the compulsory schedule for the licensing procedures for all relevant bodies. Moreover, the Environmental Protection Agency (EPA) confirmed that FERC has exclusive jurisdiction over siting, construction, expansion and operation of LNG terminals.

The EPA also increased FERC's competence to handle competition issues. FERC will be able to prosecute any entity that is found to manipulate transportation or commodity markets and will be able to charge fines of up to one million US dollars per day for the duration of the transaction in question.

A.2.4 Dynamic regulation

The workshop also dealt with the dilemma of keeping regulation adaptive to changes in market circumstances while concurrently being stable and predictable to market participants. Some participants expressed the view that especially the statutes of FERC would be flexible enough to provide sufficient adaptability. The FERC mandate is very basic and simple, calling for ensuring "adequate supply of natural gas at reasonable prices." This mandate holds since its formulation in the Natural Gas Act (NGA) in 1938 and workshop participants in general had confidence in the adaptability as well as in experience and long-term consistency of FERC policy. However, uneasiness remains with some participants who have the feeling that regulators would often solve problems of the past with new regulations while not infrequently creating new problems by just that action.

It has also been pointed out that it is a challenge to adequately staff the public utility commission in all states and FERC for ensuring adaptability and constant high quality of regulation, simply because there would be a lack of people with the relevant knowledge.

Workshop participants were in general very much concerned about the level of knowledge among the public and especially among politicians about the functioning of energy markets. High gas prices have triggered discussions among politicians about windfall profit taxes on gas suppliers' earnings and about national gas allocation schemes. The need for educating the public and politicians about energy markets was underlined and the efforts of FERC in that respect were mentioned as a positive example.[58]

A.2.5 Summing up

The US gas market at the moment is characterised by historically high prices due to a combination of factors. The future role of gas in power generation in the US is under discussion. Some workshop participants pointed out that the competitive position of gas for power generation would still be strong. However, gas demand projections are currently being revised downwards significantly, which reduces the need for additional imports in the medium and long run. Thus did EIA reduce its LNG import outlook for 2025 by about 30%. With respect to supply, especially the gas industry is concerned that the potential that US domestic gas resources still offer won't be realised mainly due to environmental regulations.

With particular relevance for the regulation of US gas markets, the following points were highlighted:

- The US government and FERC as well, appear to be concerned that investments in storage and LNG infrastructure are not forthcoming in sufficient quantities. This is evidenced by

[57] Cf.: "Commission proposes rules on market-based rates for interstate natural gas storage facilities." FERC press release, 15 December 2005, <www.ferc.gov/press-room/press-releases/2005/2005-4/12-15-05-C-1.asp>.

[58] Cf. the FERC website with much information on the functioning of gas markets, such as for instance a brochure explaining the underlying drivers of current high energy prices and the value of prices as investment signals <www.ferc.gov>.

changes in regulatory approaches to LNG terminals and storages (Market-based Rates, EPA 2005), which increase the attractiveness of such investments.

- Long-term contracts and strong market parties are in general considered to be necessary to attract additional LNG supplies to US markets, as otherwise other consuming regions might have a competitive advantage.

- Gas industry and state regulators seem to be concerned about investments in pipelines as well and are recommending a reassessment and encouragement of long-term contracts in particular for gas transportation. However, LDCs and power generators appear to be reluctant with respect to long-term contracts. That reluctance applies in particular to gas purchase contracts, but to a lesser extent to transportation contracts as well. The view that long-term transportation contracts are needed in order to finance new infrastructure was not shared by all participants.

Annex III: Summary IEA/IGU/CIEP High Level Conference Regulation of Natural Gas Markets

26 January 2006, International Energy Agency, Paris

(This summary has been prepared by the Clingendael International Energy Programme on basis of the outcomes of the High Level Conference on 26 January 2006. This paper is complementary to annex IV)

The International Energy Agency (IEA) and the International Gas Union (IGU), in cooperation with the Clingendael International Energy Programme (CIEP), organised a high-level conference on 'Regulation of Natural Gas Markets' on 26 January 2006 at the International Energy Agency. More than hundred experts from the gas and power industry, government bodies and research and consultancy organisations took part.

The conference, organised within the framework of IGU's special project on gas market regulation, had three main objectives:

- to assess whether there are fundamental changes taking place in world gas markets;
- to discuss whether these changes, if any, necessitate a change in approaches to gas market regulation; and
- to facilitate a fruitful discussion between the various stakeholders in gas markets, namely the gas industry, gas consumers and government bodies.

The following is a non-chronological summary of the main aspects, which came forward in presentations and discussions.[59]

A.3.1 Changes in world gas markets

Domestic gas production in major OECD regions is currently declining while demand keeps on rising. In attracting the necessary additional imports, OECD regions increasingly compete with each other and with countries such as India and China. Cost reductions in gas transport, in particular in liquefied natural gas (LNG), have not only opened up the possibilities for consumer countries to diversify supplies but have also offered more outlets for producers. Regional gas markets are increasingly linked and opportunities for arbitrage between markets arise, although not on a large scale yet.

The gas demand/supply balance looks to be rather tight at the moment. But rather high gas prices lead to a reduction in demand expectations while at the same time major new investments in LNG liquefaction and pipeline supplies are advancing. Various forecasts show a potential surplus in global LNG liquefaction capacity starting after 2010. It has been suggested that the current tightness of gas (and particular oil supplies) could have been avoided. According to calculations by IGU, the five largest international oil companies have spent $70 billion over the last five years on share buy-back programmes. Some conference participants suggested that one reason for that money had not having been invested in more oil and gas production was the fact that many oil and gas producing countries heavily regulate and restrict access to their resources. National oil and gas companies control the majority of the reserves.

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[59] This summary has been prepared by the Clingendael International Energy Programme (CIEP). Views and opinions expressed in this document do not necessarily represent the views of the International Energy Agency, nor of the International Gas Union or CIEP. In case of controversy, an effort has been made to report the different points of view. **We recommend to also consult the IEA conclusions**, which can be found together with the conference presentations at www.iea.org/Textbase/work/workshopdetail.asp?WS_ID=238 and in annex IV. The IEA conclusions and this summary are mutually complementary.

If certain statements in this summary are not contradicted, however, this does not mean that there was general agreement on the argument in question. For more information on IGU's special project on gas market regulation see <www.clingendael.nl/ciep/events/2005gmr/>.

Energy policies in consuming countries, in particular in Europe, are again increasingly emphasising security of supply and climate change mitigation. This shift in emphasis follows upon a period in which energy policies particularly in Europe concentrated on liberalising gas and electricity markets and making more efficient use of the existing (over-)capacities in gas and electricity markets ('asset sweating'). Increasing concerns about energy import dependence and climate change among governments have also led to a renewed interest in nuclear power, possibly further limiting future demand for natural gas.

A.3.2 Can markets principally deliver security of supply?

The discussions at the workshop dealt to a large extent with the question of whether markets can principally ensure sufficient levels of security of supply. Many markets work in cycles in which investments follow with a time lag on price increases which signal scarcity. Given the rather long lead times associated with many energy investments (pipelines, power lines, power plants, etc.) there is a chance that investments are not made in a timely manner. It has been pointed out that the risks of a delay of investment would be asymmetric: the societal cost of scarcity as a result of investment coming too late would by far exceed the cost of providing slight overcapacity in energy infrastructure. Moreover, the presence of infrastructure with natural monopoly characteristics but also the size of investments in the competitive parts of energy markets, limiting the number of potential investors, would make the energy sector in general prone to the presence of market power. On the one hand, having market power makes it easier for investors to obtain financing for necessary investments and increases bargaining power towards gas producers. On the other hand, exercising market power keeps supplies scarce and costs unnecessarily high which can principally warrant government intervention. Striking a balance between ensuring the realisation of sufficient economies of scale while at the same time avoiding exercise of market power to the detriment of consumers and the economy at large remains a key challenge in designing the wider regulatory framework, especially in the fields of competition policy and market monitoring.

Citing the example of the UK gas and electricity markets it is argued that after a time of policies focussing on 'asset sweating', it would be time to shift the policy focus towards policies which promote climate change objectives and, more particularly, security of supply.

Other participants however underlined the advantages of a market-based approach to gas and electricity sectors on ensuring security of supply while at the same time controlling cost. Again quoting the UK market as an example, it is pointed out that:

- Excessively high reserve margins in power generation capacity had been reduced to below 20%, thereafter the market would have reacted to scarcity signals and found a balance with keeping the reserve margin stable at around 20%.

- Availability factors of power plants have increased in the liberalised market environment, adding to electricity supply security.

- Investment in new gas infrastructure has picked up and infrastructure is currently under development, which has the capacity to easily accommodate the UK's gas needs in the future.

- Investment in new gas import infrastructure is manifesting in sufficient amounts in all European and North American gas markets demonstrating a significant demand potential. In some markets, regulatory adaptations (e.g. TPA exemptions in the UK) facilitated such investment.

Advocates of a market-based approach to gas markets acknowledged that market signals might come slightly too late to avoid scarcity and that already half a year delay in the completion date for a large pipeline can cause serious harm to consumers. They doubt, however, that a more government directed approach to gas and electricity markets would provide decisions that lead to a more efficient and secure energy system.

A.3.3 Regulation and issues in gas markets today.

Regulation of gas markets usually focuses on the regulation of networks. However, aspects related to competition policy and broader security of supply aspects were also included in the discussions at this conference.

The strategic importance of the energy sector for a country's economy, the dependence on external energy suppliers, the likelihood of market power being present (see above) and the fact that residential gas and electricity consumers, i.e. voters, have virtually no opportunity to switch to other energy forms in times of high prices or supply shortfalls makes the energy market prone to political influences and interventions.

In view of the likelihood of politicians wanting to interfere, regulatory frameworks should be designed as stable and resistant to intervention as possible, while concurrently allowing for adaptations to changing market circumstances. Obviously, this is a challenge.

Many workshop participants underlined the importance of *unambiguously* assigning responsibilities, e.g. for security of supply, to various market parties (public or private) as a crucial element of gas market regulation. Unambiguous assignment of responsibility means that parties who do not live up to the standards imposed on them have to face clear pre-determined consequences, without the possibility of being 'bailed out' afterwards.

Local opposition to the realisation of large infrastructure projects is a major concern in gas markets, especially for LNG facilities. Mitigating so-called NIMBY (not in my backyard) concerns is a difficult task and requires in first instance educational efforts, to be undertaken by a coalition of the gas industry, governments and possibly regulators.

Some more specific discussions took place on the situation in the US and EU respectively.

United States

The Federal Energy Regulatory Commission (FERC) regulates rates and terms of conditions of interstate pipelines and storages serving interstate markets. Since FERC's 2002 Hackberry Decision, LNG terminals are treated as a functional equivalent of the wellhead and are therefore not subject to open access or tariff regulation. Investment in LNG terminals as well as in pipelines is forthcoming on a large scale. The regulatory rules with respect to storages and interstate pipelines are currently under review with the objective to promote investment. The Energy Policy Act of 2005 provides that rates and conditions for access to new storages can be freely negotiated (market-based) between storage operators and customers, even if the storage company fails to demonstrate lack of market power. The Natural Gas Supply Association (NGSA) and the Interstate Natural Gas Association (INGAA) have filed a petition that more favourable rates can be applied for those shippers whose commitments to new pipelines make the investment feasible. FERC reportedly sees scope for amending regulatory practice accordingly.[60]

European Union

Discussions with respect to continental EU gas markets concentrated on the interrelated issues of a fragmentation of markets and concerns with respect to the competitive structure of markets. Market concentration in various national markets would be high and incumbents would hardly ever enter other national markets than their traditional home market. Unavailability of cross-border pipeline capacity limits the scope for cross-border competition. Regulators call for a harmonisation of tariff principles across the EU Member States, harmonised rules for capacity allocation and congestion management as well as for more transparent access conditions to storages (implementation of the guidelines for storage – GGPSSO). The ongoing sector inquiry by the European Commission highlights the presence

[60] For the more information on regulation in the US, see annex II. For the petition of NGSA and INGAA to amend pipeline regulation see: <www.ngsa.org/filings_testimony/docs/NGSA_INGAA_11_22_05.pdf>.

of barriers to entry for new players on gas markets. Barriers are seen as created by the incumbents' control of gas production, import contracts and import infrastructure. Long-term import contracts offer high flexibility to incumbents and the lack of necessity for gas trading. This limits liquidity in spot markets.[61]

Suggested improvements to the regulatory approach in Europe for gas markets include amongst others the establishment of a Europe-wide entry-exit system tariff system and inter-TSO (Transmission System Operators) compensation schemes, more transparent and efficient methods to offer unused pipeline capacity, especially also on transit lines, to the secondary market, as well as an obligation to offer unused flexibility in existing long-term import contracts on wholesale markets on hubs. Especially the latter suggestions contrasted with calls for a light-handed approach to regulation. Long-term contracts as such have been accepted by all stakeholders as a necessary and welcome tool to manage various risks involved in the gas business. It is the foreclosure affect of some of the existing contracts on import and wholesale level, which attracts criticism by consumers and competition authorities. Participants underlined the necessity to reduce barriers to entry by stating that new entrants would be in principle much more eager to invest than incumbents in the respective markets.

A.3.4 Market parties adapting to changing markets

Various market parties are adapting to the changing circumstances in world gas markets. Gas producers, such as Gazprom and Sonatrach, are actively engaging in wholesale and at later stages possibly even retail activities in liberalised markets in the European Union and the United States in order to grasp business opportunities. Large gas consumers such as Tokyo Gas attempt to reduce price and volume risks by obtaining stakes in gas production and LNG liquefaction and shipping.

The oil price linkage of gas prices in Europe and Asia is increasingly questioned, with some workshop participants pointing out that the substitutability of gas and oil would ever reduce. However, many gas producers and especially financial institutions still fancy the oil price linkage and a shift to other pricing mechanism is expected to come forward only gradually.

A.3.5 Summing up

Liberalised markets in principle appear to be able to deliver security of gas supply although investments based on market price signals may face time lags. A review of the regulatory frameworks in support of investments currently applied, might be advisable now that ever more gas imports are needed in major gas consuming markets and existing internal infrastructure needs to be extended. In fact, examples from the US suggest that such changes are increasingly acknowledged as being necessary to bring forward the necessary investment in time.

Regulatory frameworks need to unambiguously assign responsibilities, e.g. for security of supply to market parties.

[61] Other participants pointed out that the flexibility in import contracts would reduce the need for storage.

Annex IV: IEA paper on Gas Market Regulation. Conclusions from the IEA/IGU/CIEP High-Level Conference on Regulation of Natural Gas Markets Paris, 26 January 2006

(This paper has been prepared by the International Energy Agency on basis of the outcomes of the High Level Conference on 26 January 2006. This paper is complementary to annex III)

1. A global gas market is emerging. Gas demand is growing rapidly, mainly driven by the power sector. Not only in OECD countries but also in emerging economies like China, India and Brazil. LNG is playing an increasingly important role in connecting what were previously regional gas markets (North America, Europe, Asia).

2. Consumer markets across the globe are competing for supplies of gas as domestic supplies in OECD countries are depleted and transportation of gas becomes cheaper. As a response to this opportunity, both consumers and producers are seeking diversification of their trade partners. This has started to create a global gas market, although views may differ as to how quickly regional markets will converge.

3. Due to strong demand and the long lead times for major new projects, the global gas market currently seems to be a sellers' market with major players increasingly dominating production and wholesale markets. Governments of consuming regions which are all facing rapidly increasing import dependence are well advised to build more attractive markets in the light of diminishing local resources. Regions with more flexible gas markets will be more able to attract gas supply when it is needed.

4. Regulatory frameworks in regional markets aimed at creating a competitive market for natural gas should give the necessary incentives for investors to attract sufficient timely supplies. This requires energy policies and subsequent regulatory measures that lead to competitive market outcomes and long-term objectives. We are experiencing a new phase in which investment in order to ensure security of supply is taking centre stage. There is cause for serious concern on whether sufficient investment is coming forward in a timely manner, both in OECD countries and in the countries that have the largest gas reserves (Russia and the Middle East).

5. Energy policy should recognise the structural features of a region, and provide for suitable market design. Lack of timely long-term investment is a by-product of uncertain energy policy, and/or poor implementation of that policy.

6. In order to make sure that the market works well, regulators must be given the responsibility to monitor the market and propose necessary changes if policy outcomes are not being realised. Whilst stable regulation is desirable, the dynamics of energy markets make this impossible within all aspects of the market all the time. Dynamic regulation takes into account the feedback mechanisms from the market. A good example is the way in which the US regulator FERC adapted its regulation of LNG terminals in order to provide a clear incentive to get more investment in LNG terminals (Hackberry Decision). Similar changes were made by FERC to get more investment in commercial storage capacity. Other jurisdictions may benefit from taking a close look at these examples.

7. Infrastructure investments in the gas industry often involve large front-end costs with long-term revenues. Naturally, some of these investments should be financed by long-term contracts for the use of those newly-created assets. However, more competitive assets are generally better matched to equity investments and short-term contracts. One challenge of regulatory design is to match the long-term investments to suitable contracts whilst enabling flexibility in the competitive market. The key issue for regulation is to create a level playing field and a good framework for competition.

8. While many markets continue to price long-term gas contracts on oil products, there may also be a place for long-term gas contracts on gas pricing. In markets with more gas-to-gas competition and excess supply, we see gas prices more decoupled from oil prices but also more volatile. However, even in those markets gas prices tend to show a strong correlation with oil prices again when markets are tight. In a functioning gas market, consumers are free to choose from many viable pricing alternatives.

9. Coordination of the regulatory regimes along the gas chain crossing different legal systems, is a major challenge to support coordinated investments in infrastructure to maintain supply. The Energy Charter Treaty, WTO rules and bilateral arrangements are designed to support investment initiatives and to resolve disputes. Energy policy should in addition be a major element in foreign policies securing long-term dialogue between producers and consumers recognising mutual dependency. With OECD countries becoming increasingly dependent on gas supplies from a limited number of countries in the Middle East and Russia, this dialogue will obviously be more important in the future.

10. The market is a tool to deliver security of supply objectives and flexibility. Within the gas market there are opportunities to value security of supply, and to assign responsibilities to parties best placed to manage it. It is increasingly realised that even the more-developed liberalised markets may not provide all the investment signals required for a timely response by investors or valuing security-of-supply. Unless policymakers design markets which value security, this may tend to be under delivered, noting that long-term contracting of supply and vertical-integration provide (or are assumed to provide) this in many cases. Within interconnected markets there is a strong case to promote more coordination and harmonisation of regulation in order to have gas cross borders much more easily.

11. There is reason to be sceptical of current moves to organise strategic gas stocks as a policy response to supply disruptions on several grounds. Gas emergency stocks would be ten times more expensive than oil, and their effectiveness in terms of being able to deliver the gas when and where it is needed is questionable. Furthermore there is evidence to suggest that companies' plans to develop commercial stocks might be delayed or modified if there was a perception that 'strategic' stocks were providing a buffer for some market conditions. Non-commercial gas stocks may be useful in exceptional cases, but these are much more limited than for oil because the gas delivery system is so much less flexible. Most countries might prefer a suite of other measures tailored to their circumstances and needs, for example demand flexibility or fuel switching.

12. Global and regional gas markets have a variety of complex and specific characteristics. Awareness and understanding of this by policymakers and the public at large is of major importance if long-term investment is to be attracted in the right place, at the right time and in adequate amounts. Even in markets with the right set of incentives we see increasing problems with approval procedures for LNG terminals, pipelines etcetera. This so-called problem of NIMBY (not in my backyard) is causing unacceptable delays in getting new infrastructure in place and thus slowing down the supply reaction to price signals. Governments around the world are called upon to start attacking this problem aggressively by substantially reducing the time and effort it takes to get approvals for new infrastructure investments, since Governments will tend to be blamed if inadequate infrastructure leads to supply shortages.

Annex V: Summary PETRONAS/IGU Workshop 'Regulatory Issues in the Asian Pacific Gas Market'

6 April 2006, Shangri-La Hotel, Kuala Lumpur, Malaysia

PETRONAS and the International Gas Union, in cooperation with the Clingendael International Energy Programme, organised a workshop on 'Prospects of gas for power and the regulatory issues in the Asian Pacific Gas Markets' on 5/6 April 2006 in Kuala Lumpur, Malaysia.[62] More than thirty high-level experts from the gas and power industry, government bodies and research and consultancy organisations took part.

This is a summary of day two of the workshop, which addressed the regulatory issues in the Asian Pacific gas market. As with proceeding workshops organised by IGU in this series, the objectives of the meeting were:

- To assess whether there are fundamental changes taking place in world gas markets;
- To discuss whether these changes, if any, necessitate a change in approaches to gas market regulation, in particular in Asian gas markets;
- To facilitate a fruitful discussion between the various stakeholders in gas markets, namely the gas industry, gas consumers and government bodies.

The following is a non-chronological summary of the main aspects that came forward in presentations and discussions.[63]

- There is a wide range of local circumstances that characterise the various national gas markets in the Asia Pacific region. The region comprises developed and developing countries with or without substantial natural gas resources; the development level of gas markets and the economies differs per country; some countries import predominantly pipeline gas from a few other countries, whereas other countries rely exclusively on LNG imports. Pipeline interconnections between countries in the region are limited, and in some areas non-existent. Often, regions within countries form local markets, which are little connected to other regions (e.g. in Japan and China).
- The differences in circumstances in the various countries lead to different energy policy objectives in different countries. In particular, perspectives on domestic pricing systems vary. In countries with substantial indigenous natural gas resources, there are some debates about the extent of domestic consumption versus exports. Differences in policy objectives can lead to differences in the regulatory framework between countries.
- The extent to which liberalisation of gas markets is pursued varies as well: from partly liberalised markets in Japan to only very limited plans for liberalisation in countries such as Malaysia. Liberalisation policies are at times not considered beneficial as gas markets are rather small and the scope for consumers to benefit from competition appears to be limited or absent.

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[62] IGU and CIEP are very grateful for the excellent organisation and the great hospitality offered by PETRONAS and the Malaysian Gas Association.

[63] In the case of controversy, an effort has been made to report the different points of view. If certain statements in this summary are not contradicted, however, this does not mean that there was general agreement on the argument in question. For more information on IGU's special project on gas market regulation, as well as for summaries of comparable events held in Florence, Washington and Paris, see www.clingendael.nl/ciep/events/2005gmr/

Table: Gas-consuming countries in Asia Pacific[64]

	Gas Importing	Gas Exporting
Developed countries	Japan, South Korea, Taiwan (China), Singapore	Australia
Developing countries	Thailand	Indonesia, Malaysia, Brunei Darussalam, Myanmar

- At the moment, LNG plays a dominant role in the major import-dependent countries in the region, in particular Japan, South Korea and Taiwan (China). At the moment, the LNG supply situation is rather tight, owing to strong demand, while operational problems in some LNG exporting countries in the Middle East and Asia restrict supplies. All LNG supplies are developed on the basis of long-term contracts to secure funding and to minimise risks exposure in order to enable the development of LNG projects, which require huge upfront capital investments. Those contracts also provide security of supply to LNG consumers. Although some consumers need some flexibility in such contracts, the obligations of parties under the current contractual arrangements do not provide much such flexibility. In the opinion of some consumers, destination clauses may restrict the development of a spot market in the foreseeable future. The strong position of LNG in many countries means that market circumstances are very different from, e.g., Europe and the United States. Moreover, gas markets in Europe and the US are much larger and infrastructure is much better developed. According to some participants, this would make the application of EU- or US-style regulatory models less suitable for the region. But with respect to prices, the construction of LNG terminals on the American West coast could lead to the situation that US gas prices would likely influence LNG prices for LNG importers in the Asian Pacific region.

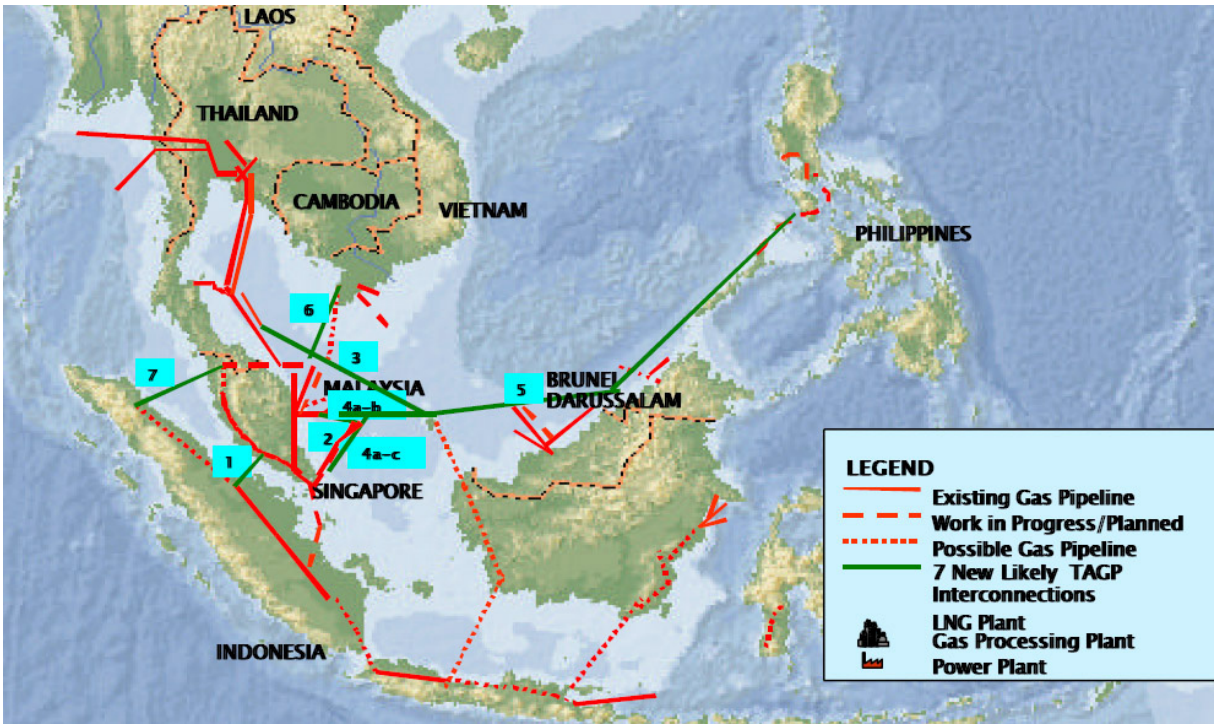
- However, pipeline supplies are set to gain ground in the region, with pipeline imports to China (from Russia), India (from the Middle East), Japan and Korea (from Russia) among the mid-term options, while in the longer run imports from to South East Asia from Australia might also belong to the options.

- In many markets in the region there is no demand for gas for space heating, and power generation accounts for the main gas demand share. Thus, any regulation of such gas markets ought to be coordinated with the regulation of electricity markets.

- International and regional cooperation in gas matters is gaining ground in the Asian Pacific region. Plans exist for establishing or strengthening links in the ASEAN region comprising Brunei Darussalam, Cambodia, Indonesia, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam. The ASEAN Council on Petroleum (ASCOPE) Gas Center and the ASEAN Gas Consultative Council have been set up to support and facilitate the realisation of such a gas network and gas market amongst the ASEAN member countries. It is still very much in the early stage of discussion to harmonise standards, specifications and rules in the countries to be interconnected by cross-border gas pipelines. Conference participants agreed that issues related to technical interoperability and gas qualities need to be addressed to facilitate the realisation of such cross-border gas pipeline interconnection. The main objectives of establishing stronger pipeline links are to forge greater cooperation amongst ASEAN member countries and to enhance security of gas supply through the promotion of gas trade between countries to benefit both importing and exporting countries.

[64] Various criteria for the distinction between developing and developed countries exist and grouping a country into one of the groups is not always straightforward. We apply here a grouping as brought forward by some individual workshop participants.

Figure: ASEAN Gas Map



Source: ASCOPE

- Participants expressed the view that new gas pipelines that interconnect markets would have to be built initially on the basis of bilateral contracts between the gas supplier and buyers. Liberalisation and third party access to such new pipelines would be an option that could be gradually considered over a longer timeframe in the future as the regional gas market develops on a more integrated basis.

- Given differences in domestic policy objectives and pricing policies, any further integration of various national markets at a later stage needs to be designed such that gas pricing is based on market-oriented pricing.

- Participants discussed the possibility of either exporting natural gas or electricity. They noted that export of electricity is less likely to take place if domestic gas prices for power generation are still being subsidised.

- According to some industry representatives, the partial liberalisation of gas markets in Japan has made it more difficult for Japanese gas companies to predict the demand that they have to satisfy and has reduced their buying power in international gas markets. LNG import contracts today have to be concluded in smaller volumes and on shorter terms due to increased uncertainty about future market shares and demand development.

- In Singapore, the government and the regulator acknowledge the advantages of a liberalised gas market with open access regulation and competition between various gas suppliers. However, as the Singapore gas market is quite small, pursuing strict liberalisation policies might be counterproductive as economies of scale would be lost. A pragmatic approach has been chosen instead. Singapore's gas market regulator has been established on the basis of the following considerations:

  - The regulatory framework should be very transparent and predictable in order to give market players a higher degree of certainty about what they can expect. This way, risk and cost of financing for gas market parties should be minimised;

  - The regulator must be impartial; and
  - Decisions need to be made in a transparent way, and the regulator can be held accountable for its decisions.

- In Thailand, gas production is open to foreign investment. The state gas company, which currently holds a transport and supply monopoly, buys the domestic production from international oil companies at 'international market prices'. The Thai government is seriously considering opening up the network to third party access, which could lead to competition between current producers and increase sector efficiency.

- Developments in Indonesia are of importance to the whole region, as it is a major natural gas producer. Discussions are ongoing as to whether domestic consumption of natural gas resources should be prioritised over exports, and at the same time policies that aim at introducing third party access and competition are being pushed forward. Two new regulatory agencies have been established for the upstream and downstream sectors, respectively. Their work is very much determined by energy policy objectives set by the government.

- Australia has a regulatory framework that aims at promoting competition and comprises independent regulatory authorities. Experience has been gained on how to resolve technical and economic issues involved in managing and extending a pipeline grid that comprises multiple states. Currently, pipeline companies criticise the details of Australian regulation, stating that new investments in infrastructure could hardly be undertaken profitably.

Concluding remarks

Energy policy objectives, in part related to the development stages of a country's economy and gas markets, diverge across the region and determine the various regulatory frameworks. Participants in the workshop stressed that circumstances in different gas markets vary widely and that the regulatory models that are applied need to reflect such differences. Differences relate, for instance, to the state of the economy, the development phase of gas markets and the pricing systems applied. The circumstances in the region's gas markets would particularly differ from those in the US or the European Union. Some South East Asian gas markets are still in early development stages. Other, more developed gas markets are heavily dominated by LNG imports. Both aspects would make it very difficult to apply European- or US-style regulation to gas markets in the region. Especially importing countries that are dependent on LNG experience a tighter market environment, due to changing circumstances in world gas markets. The need for regulatory adaptations is, however, not felt to be obvious.

Planned pipeline links crossing borders may impose new challenges to regulatory regimes, initially for the operational side and later for the market side of the business. WTO rules and international frameworks, such as the Energy Charter Treaty, could complement the bilateral agreements on which present and future cross-border links will be based.

Project Partners

International Gas Union (IGU)

The International Gas Union (IGU) is the official NGO of the world's gas. The objective of IGU is to promote the technical and economic progress of the gas industry. The members of IGU are associations and entities of the gas industries in 67 countries. It co-operates with many global energy organisations. IGU's working organisation covers all domains of the gas industry from exploration and production of natural gas on- or offshore, pipeline and piped distribution systems to customers' premises and combustion of the gas at the point of use. From 2003 – 2006 the IGU is under Dutch presidency and is organising the 23rd World Gas Conference and Exhibition on 5-9 June 2006, in Amsterdam, The Netherlands.

In preparation of the World Gas Conference, IGU initiated and coordinates the special project 'Regulation of Gas Markets'.

Clingendael International Energy Programme

The Clingendael International Energy Programme (CIEP) is affiliated to the Netherlands Institute for International Relations "Clingendael". Supported by seventeen institutions from the public and private sector, CIEP participates in and seek to make a major contribution to the public debates on national and international developments in the energy sector by means of own research and the facilitation of dialogues between relevant stakeholders. CIEP serves as an independent forum for governments, non-governmental organisations, the business community, politics, the academic world, the media and other stakeholders or interested parties.

CIEP conducts the research and supports the workshops held in the framework of IGU's special projects on 'Regulation of Gas Markets'.

Energy Delta Institute (EDI)

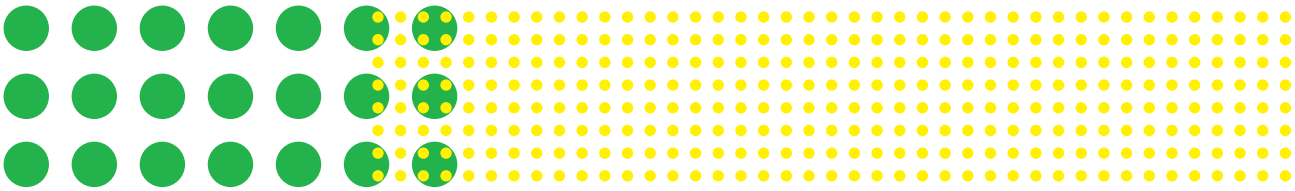
The Energy Delta Institute (EDI) is an International Business School and Research Centre for Natural Gas and structurally contributes to the knowledge and skills that are necessary for all of you working in the gas industry. EDI performs research and training, focused on all economical, managerial and geopolitical facets of the gas value chain. EDI cooperates with business and academic parties to ensure our products meet your demands and are of the highest quality, this global network of partnerships is rapidly expanding.

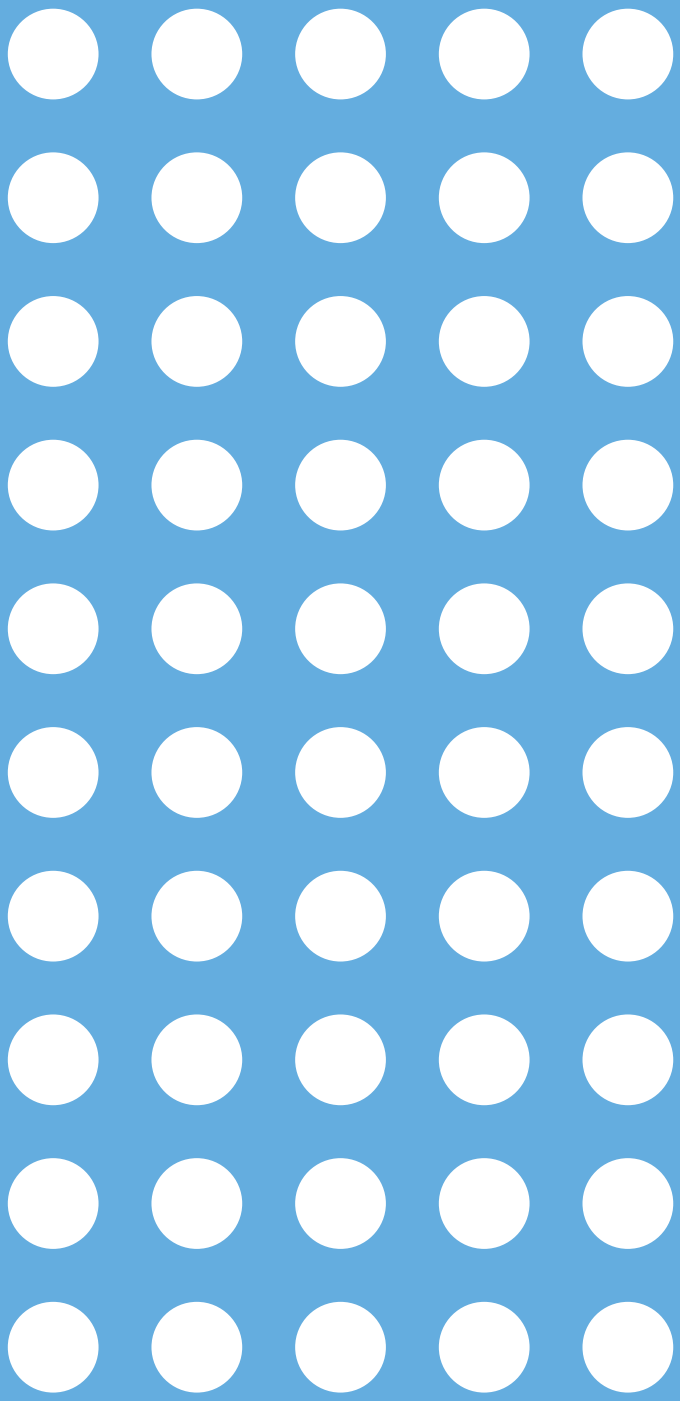
EDI has a coordinating role in IGU's special project on 'Regulation of Gas Markets'.

EnergieNed

The Federation of Energy Companies in the Netherlands, EnergieNed, is the representative body for all companies in the Netherlands playing an active role in the production, transport, trade or supply of gas, electricity and/or heat. The Federation represents the interests of its member companies. EnergieNed is the point of contact for government bodies, political parties and pressure groups representing business, consumers and environmentalists. On behalf of its members, EnergieNed maintains a dialogue at national and international levels with these stakeholders.

EnergieNed is the main financial contributor to IGU's special project on 'Regulation of Gas Markets'.





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