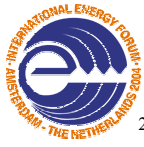


THE FUTURE OF GAS: WILL REALITY MEET EXPECTATION?

**Coby van der Linde
and Jonathan Stern**



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Executive Summary

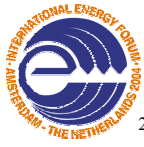
Natural gas is the most dynamically growing fossil fuel in the international energy market. The reasons for this growth are obvious: it has been competitively priced and is highly convenient in both industrial and domestic use, as well as in power generation. Furthermore, it is the most environmental friendly fossil fuel. Given the premise of ongoing competitiveness of gas prices, it is not surprising that most energy forecasts, among them the IEA World Energy Outlook 2002, suggest a continuing, substantial growth in demand for gas.

New supplies, that are needed to meet growing demand, will have to come from sources much more remote from today's markets by means of expensive, long distance transport through pipelines or in the form of Liquefied Natural Gas (LNG). For the next 25 years the International Energy Agency expects a 300 % increase in international trade between the major supply and demand areas around the world. Indeed, the notion of a global market for LNG is gaining ground. However, the growth in LNG trade will fall considerably short of the projected growth in demand of 1700 bcm (IEA). The difference, consequently, will have to be met by cross-border piped gas. Many conceptual opportunities for new pipeline projects are looked at but few have reached the actual investment stage.

The IEA demand-side growth projections, however, will only be realised when the required additional volumes of gas will be made available in a timely and coordinated way. This cannot be taken for granted. The development of new natural gas supplies faces a variety of obstacles. Even when successful, it takes on average 5-10 years to put a pipeline project in place because political issues, regulatory design, as well as the harmonisation of investments and supply risk, prove to be very difficult to align.

Natural gas projects will only materialise if the risks inherent to investment in these projects can be properly mitigated. Characteristic is the great magnitude of risk involved, stemming from the combination of very high investment costs and the lack of flexibility in the supply chain, and the long horizon over which these risks have to be managed. Huge, specific investments have to be made into facilities that produce and transport gas from a specific gas province, or field, to a specific area of consumption over a longer period of time. Long term contracts with competitive pricing clauses have formed an important basis to ameliorate and manage the risks.

Security of supply to consumers is as important as security of demand is to producers and transporters of gas. The development of gas demand, in part, depends on government policies, such as security of supply and environmental



policies, restricting the use of fossil fuels. Security of supply policies can either be aimed at a reduction of the dependence on imported fuels or at an increased diversification of suppliers. Yet, other aspects may also be determined by government policy. Transparency, consistency and predictability of government policies form the backbone of successful gas development. But in addition, positive action and supportive participation in the orchestration of a new gas supply chain is essential.

In some gas markets, notably the United States and EU, the governments have embarked on a process of liberalization. Experience learned that economies need an adequate institutional framework to reduce uncertainties among market participants, to correct un-avoidable failures in the operation of the market, or the sheer lack of a market, for certain categories of goods and services and to safeguard public interests. *Deregulation* became *re-regulation*, and privatization was to be undertaken as a strategic process. Moreover, it was accepted that structural change should pay due attention to public interest issues and to the objectives of competition policy.

Unlike the traditional perspective that denied the feasibility of competition in the whole of the gas industry, the proponents of structural change start from the hypothesis that the introduction of competition is possible in particular segments, and that this would improve the performance of the whole of the value chain. Furthermore, regulatory experience in gas markets has shown that competition in the gas market can be achieved in several ways, each requiring a specific regulatory approach, depending on the stage of development of these markets and the geopolitical and economic characteristics of supply and demand patterns.

The size and the complexity of gas projects require a high degree of confidence and assurance. Generally, the economic risk, particularly for large scale international supply systems, is mediated by sellers and buyers, through appropriate arrangements embedded in long term contracts and only to a lesser extent through spot-markets and hedging facilities. Nevertheless, the need to co-ordinate investments in projects throughout the supply chain and the objective to minimise the lead times will require full cooperation between all stakeholders. Agreements between these parties, as a precondition for investments in large-scale gas projects are complex and may require government support.

This important role for government applies both to the active involvement prior to the investments, facilitating the process of putting the necessary conditions in place, as well as to provide the comfort for a prolonged business climate, positive to these large investments. With regard to the long term period of repayment of investments in gas supply chains, sellers and buyers, together with equity investors and financial institutions, also consider risks which are fully in the domain of governments, like:

- The political stability of producing countries and the risk that gas supply, or transit, will be refused for political or economic purposes.
- The political and regulatory stability of consuming countries and the risk that market circumstances may change unexpectedly for reasons of economic, environmental or other policies.

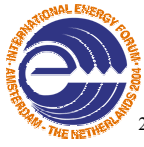
Thus, despite the ability of the private sector to manage many of the risks involved in complex gas projects, the government plays a crucial role in creating such a climate

that these risks remain manageable over time. International gas markets as well as public interests are not static but dynamic. The task of the government is to facilitate an investment climate that evolves in line with the various stages of market.

Assuming that producing and consuming governments wish to realise the full economic benefits of the projected future production and demand for gas in global energy balances, this will require a more pro-active role of governments than would be the case for other fossil fuels. The enabling factors that they should consider include the following:

- Developing clear energy and regulatory policies which facilitate both the production and use of gas and the development of infrastructure;
- Developing policies on environment and emissions where the priority for gas production and gas use - in comparison to other fossil fuels and renewable/nuclear energy sources - is clearly stated, especially in terms of taxation;
- Developing clear policies on security of supply and demand in terms of dependence on:
 - imports of gas from a single source of supply or company
 - exports of gas to a single market or group of markets
 - a specific supply route for gas
- Ensuring that plans for future liberalisation and the development of competition in all phases of the gas chain are articulated well in advance, and that such plans:
 - do not compromise existing long term contractual arrangements;
 - take account of the requirements to ensure long term security of supply
 - recognise the need for long term contractual arrangements (and possibly aggregation thereof) to secure new supplies for most markets
 - recognise the need for capacity contracts, back-to-back to the conditions of new supply contracts
 - are discussed between producing and consuming governments either bilaterally or in multi-lateral governmental fora;
- Providing active assistance in stitching together international gas chains in terms of treaties, and international/multi-lateral relations between states;
- Providing a policy framework for the power generation industry allowing for timely decisions to commit to investments in new gas-fired generation capacity, recognising the anchor role of power generation for attracting new gas supplies
- Providing financial guarantees (via government credit agencies) and limited financial support, particularly for very large multi-billion dollar gas investments;
- Ensuring that taxes and other fiscal measures upstream and downstream do not discourage market players from moving ahead with gas projects in a timely fashion.

The International Energy Forum could play a significant role in developing and achieving these enabling factors for producer and consumer governments.



9th International Energy Forum
22-24 May, 2004, Amsterdam, the Netherlands

Question to Ministers of Consuming Countries:

How do the ministers think they can best organise the balance between liberalisation of the gas market and security of supply?

Question to Ministers of Producing Countries:

How do the Ministers think to they can best organise a balance between risk and rent that facilitates a sustainable exploitation of their gas resources in the future?

Question to all Ministers:

How do the ministers think they can solve the information gap, that follows from market liberalisation, in order to continue to achieve a timely match between future demand and supply?

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1. Introduction¹

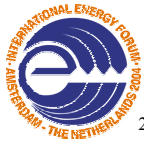
Gas is very different from oil because the supply options are smaller and more rigid and storage of gas is much more expensive than oil. More is needed to realise the development of new gas supplies, often including substantial involvement of governments. In this paper, we will expand on these requirements against the background of the particular circumstances in international markets for natural gas.

Natural gas is the most dynamically growing fossil fuel in the international energy market. The reasons for this growth are obvious: it has been competitively priced and is highly convenient in both industrial and domestic use, as well as in power generation. Furthermore, it is the most environmental friendly fossil fuel. Governments of consuming countries are often in favour of natural gas because it offers an opportunity to further diversify the energy mix of their countries.

For countries with reserves of gas it is attractive to develop their gas resources. In addition to the domestic market and industrial activities based on gas, selling gas in the international market provides an opportunity to expand export revenues. Furthermore, the export of gas allows oil producing countries, also those adhering to OPEC production quota, to increase and stabilize their export revenues.

A third strand of interest to develop gas resources comes from the international oil companies. Oil companies are interested in developing their equity portfolio and have increasingly become oil and gas companies. Investment by international oil companies in new oil developments are mainly frontier developments in the offshore sector, while national oil companies mainly invest in onshore oil developments. The gas sector, also in the onshore sector, is more open for Foreign Direct Investment

¹ The authors would like to thank the members of the 'CIEP Natural Gas Study Group', in particular Aad Correljé, Dick de Jong and Christoph Tönjes, for their contribution to this paper.

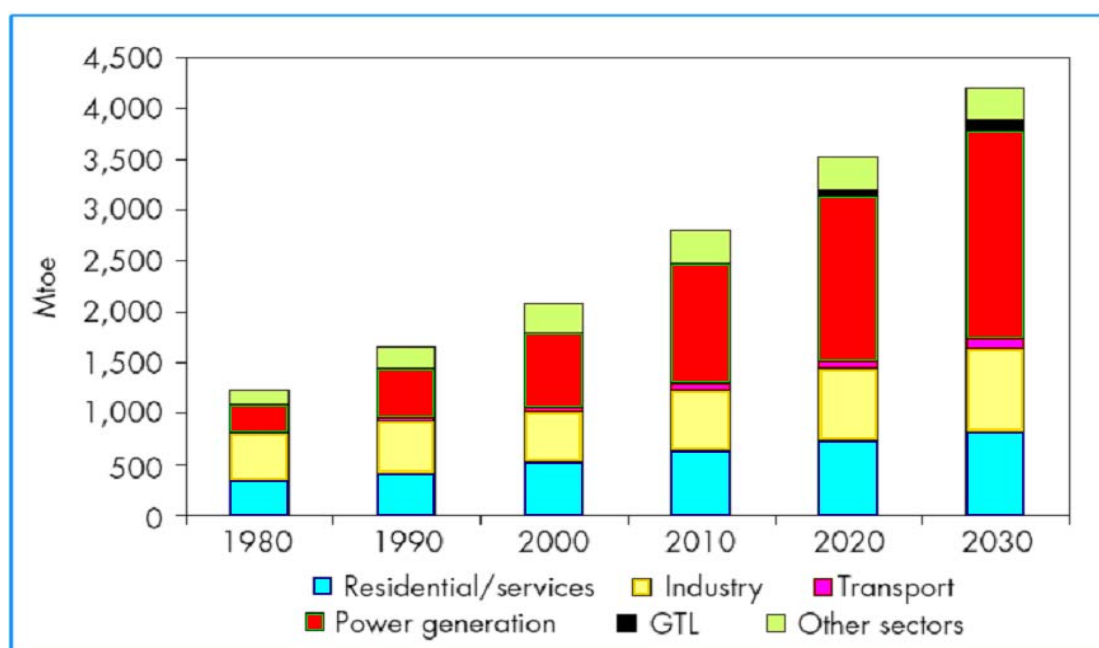


(FDI). In the context of their portfolio development, many oil companies are also interested in further developing their activities in the gas sector.

Given these parallel interests in the further development of natural gas and the premise of ongoing competitiveness of gas prices, it is not surprising that most energy forecasts, among them the IEA World Energy Outlook 2002, suggest a continuing, substantial growth in the demand for gas (see Table 1 and figure 1). Driven by the assumption of a considerable relative cost advantage of natural gas in power generation in many regional markets, most of the growth of gas use is projected in the power sector; by 2020 world demand for gas is expected to have grown by some 1,700 bcm, of which power generation accounts for roughly 1,000 bcm. The total consumption of natural gas was 2,527 bcm in 2000 (IEA, 2002, p. 110).

These demand-side growth projections, however, will only be realised when the required additional volumes of gas will be made available in a timely and coordinated manner. This cannot be taken for granted. The development of new natural gas supplies faces a variety of obstacles. It will be argued that substantial government action might be necessary to facilitate the timely development of production and transport capacity to realise the envisaged growth. We begin with an overview of the issues surrounding natural gas market developments. Then we turn specifically to the situation in the regional gas markets, their supply sources and to the question what national governments can do to efficiently facilitate to realise the growth of the gas markets.

Figure 1 World Natural Gas Demand by Sector

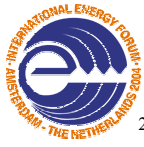


Source: IEA/ WEO 2002, p. 111.

Table 1. Growth of gas demand between 2000 and 2020 in Billion of cubic meters

	2000	% of total	2020	% of total	% growth
OECD North America	788	31.2	1161	27.3	47
OECD Europe	482	19	799	18.8	66
OECD Pacific	122	4.8	201	4.7	65
Transition economies	609	24	876	20.6	44
China	32	1.3	109	2.6	240
East Asia	83	3.2	200	4.7	140
South Asia	51	2	153	3.6	200
Latin America	105	4.1	251	5.9	139
Middle East	201	7.9	349	8.2	74
Africa	53	2.1	155	3.6	192
World	2,527	100	4,254	100	70

Source: IEA, World Energy Outlook 2002, p. 110.



2. There is still plenty of gas in the ground

Gas reserves are ample and current proven reserves can satisfy current demand for at least another 60 years. However, in most places the 'easy' indigenous sources of gas have now been exploited. Indeed, in the major gas markets, gas reserves were developed relatively close to the end-use markets. In the United States, Russia, North West Europe and countries like Australia, gas production, transport and trade initially developed within territories, with a more or less homogenous framework for governance. As a consequence, investments in the systems were supported by appropriate legal and regulatory structures along the whole of the gas chain, from the well-head to the burner tip.

It is argued that the new supplies, that are needed to meet growing demand, will have to come from sources much more remote from today's markets by means of expensive, long distance transport through pipelines or in the form of Liquefied Natural Gas (LNG). For the next 25 years the International Energy Agency expects a 300 % increase in international trade between the major supply and demand areas around the world. Indeed, the notion of a global market for LNG is gaining ground.

Until recently, a substantial part of world gas reserves was stranded, located at a place far away from centres of significant consumption, separated by oceans, or 'difficult' territory. Major cost reductions, in LNG and new pipeline technology, now allow that these stranded gas reserves are unlocked. Supply may therefore expand substantially.

Particularly the LNG business is more dynamic than it has ever been. For about 30 years, the Asia-Pacific region and the Mediterranean were the main areas of activity in LNG, but today markets and supply options are expanding further into the Atlantic Basin. Many regions are now bristling with activities. Costs have come down sufficiently to extend the economic reach of LNG supplies. Consequently, the traditional regional boundaries are fading when new supply sources become available. Particularly the Middle East, straddling the two main LNG markets, will be able to supply markets further away in both the Asia Pacific and the Transatlantic markets. In the Asia Pacific region, existing markets may further expand with LNG from old and new supply sources. New markets are currently being opened. In the Atlantic Basin, southern European markets and the UK show a growing appetite for LNG, while the US which has no immediate pipeline alternative is developing plans

for massive LNG imports to offset declining indigenous gas production. However, the projects which are currently realized only satisfy a rather small part of the expected growth in demand. The LNG share in international gas trade is expected to grow strongly, mainly due to imports into the US.

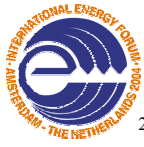
In the period to 2020, LNG trade is expected to grow manifold, with the most optimistic projections assuming a quadruplicating of LNG trade to around 600 bcm/a. This will fall considerably short of the projected growth in demand of 1700 bcm (IEA). The difference, consequently, will have to be met by cross-border piped gas. Nevertheless, the current development of international gas pipelines yields a less dynamic perspective with regard to the actual commitment to new investments. Many conceptual opportunities are being discussed and explored. And indeed, these will be very much needed to achieve the growth projected. But it takes at least 5 and usually up to 10 years for projects to get off the ground. There are discussions and plans around the development of pipelines from Russia to Europe via the Baltic Sea, from the Caspian region and Iran to Europe, and from Russia to China and beyond². So far, none of these have reached the stage of a commitment to invest. Political issues, regulatory design, as well as the harmonisation of investments and supply risk, prove to be very difficult to align.

3. Gas is different from oil

It is clear that the current projects underway will not suffice to meet demand projections. To realise further growth in gas supply and demand, additional investments in gas supplies and supporting assets are needed in both producing, transit and consuming countries. But investments in the gas industry have to overcome higher obstacles than investments in the oil or coal industry, since they are of a totally different nature.

Characteristic is the great risk involved and the long horizon over which these risks have to be managed, based on the combination of very high investment costs and the lack of flexibility in the supply chain: huge, specific investments have to be made into facilities that produce gas and transport that gas from a specific gas province, or field, to a specific area of consumption over a very long period of time. The system

² Other projects also emerge in the US, South America and Africa.



locks producers and the consumers into a long term, mutual relationship of significant dependence. Each side has to face the risk that the other will drop out, for whatever reason, or that prices will go up or down to an unacceptable extent. Long term contracts with competitive pricing clauses have formed an important basis to ameliorate and manage these risks.

Transportation and storage of gas are an order of magnitude more expensive than that for any other fossil fuel. Investments in gas production and long distance gas transit require large incremental capacities and volumes of gas throughput, to obtain the necessary economies of scale. Investments are 'lumpy', so to say. Consequently, every addition in supply capacity is a large project, requiring careful planning and coordinated investments along the whole chain. These multibillion dollar projects bring large volumes of gas to the market when they have come on-stream; far more than is needed by a single customer or even a single region. Markets will have to be 'created' and buyers across different market regions may have to co-operate to absorb the new large volumes of gas, particularly in the case of new pipelines.

The preparation of such investments is complex and the lead times are long; the commitment to invest is made many years before the first gas will flow. Together with the long payment this means that investors and financial institutions look for an environment which offers reasonable financial and economic security. It is widely perceived that these issues do not apply to the same extent to LNG: indeed the 'parcels' of gas are smaller and LNG carriers can be diverted to different markets. However, the size of the investments is considerable and the availability of spare capacity in LNG terminals is limited, making the perceived flexibility largely illusory.

4. Risk, investment climate and the role of the government

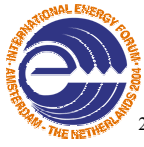
Natural gas projects will only materialise if the risks inherent to investment in these projects can be properly mitigated. Security of supply to consumers is as important as security of demand is to producers and transporters of gas. As is shown above, investments in gas supply chains involve a considered view that an adequate level of sales over a long period can be achieved at market reflective prices. The development of gas demand, in part, depends on government policies, such as security of supply and environmental policies, restricting the use of fossil fuels. Security of supply policies can either be aimed at a reduction of the dependence on

imported fuels or at an increased diversification of suppliers. Yet, other aspects may also be determined by government policy. Transparency, consistency and predictability of government policies form the backbone of successful gas development. But in addition, positive action and supportive participation in the orchestration of a new gas supply chain is essential.

Market Structure

The gas markets around the world differ substantially in their stage of development. Some markets have already matured, such as the United States, Japan and South Korea, while other markets are still in a first expansionary phase (such as India and China). Europe covers the full spectrum from emerging to mature markets. But even mature markets will require considerable new investments in infrastructure to meet projected growth. The United States is in a process of changing from a predominantly domestic gas resource base to a mixed resource base with increasing LNG imports entering an already liquid market. In Europe there are mature markets, mostly based on domestic supplies and/or long term supply contracts from external resources; and new markets (mostly around the periphery) based entirely on imports from outside the region. Based on its economic competitiveness, it is predicted that gas will contribute substantially to the fuel in the power sector. The Asian market remains a mosaic of national gas markets which largely depend on LNG imports and which have different regulatory structures. There are very few mature markets and a relatively high proportion of countries where gas is either a new fuel, or accounts for a relatively small proportion of energy demand.

In an expansionary power market, gas will predominantly be used to fuel new power capacity, while in a more mature market additional gas demand must also come from the replacement of other fuels in the power sector. The size of both new and replacement gas demand will depend on the economics of gas in the power sector and the portfolio management of large power suppliers. In many markets, both developing and mature, the power industry has an “anchor” role in developing new gas supply lines as a consequence of its capacity to absorb significant additional volumes of natural gas. However, if newly planned power stations at the end of the



supply line are not built in line with the development of the rest of the infrastructure, less gas will flow and financial risks are incurred of an unacceptable scale.

The firmness of contractual obligations and the assurance that contracts can be efficiently enforced is crucial in this respect. Yet, given the key role of the power sector, regulatory certainty in this sector is a precondition for a smooth development of the gas sector. In liberalised electricity markets, the commitments for gas purchases have to be made by the power industry proper. In countries where the power sector is a public utility market, the authorities will have to commit. In either case, keeping options open is not going to bring new gas to the market. It will be hard enough to reconcile the volumes and flexibility that the prospective power generator is looking for with the “security of demand” needed to line up the supply chain. Uncertainty about government policies and regulation in a liberalising business environment will not help in making these commitments.

Pricing

The immense investments require a certain level of prices for natural gas. Tensions may arise with regard to the understandable objective of consuming governments to keep prices low, especially for small consumers. Regulated low prices, however, discourage natural gas developments in many markets with growth potential, which in turn could frustrate the growth of the national economy. In other markets governments have been promoting the introduction of competition and consequently introduced market prices into natural gas markets. Changing markets bring changes in prices and pricing principles. Increasingly, even long term contracts develop different indexations. In the future short term price volatility, like in other fossil fuel markets, will be a fact of life. However, the greater risk, affecting gas prices over the longer term could well be the lack of timely investments in new supplies: shortages of gas supplies drive up gas prices in the markets, leading to economic pain for consumers and in the second instance to a loss of confidence in the competitiveness of gas among the investors in the power sector. It is argued that the governments have the responsibility to foster investments climate conducive to these timely investments and thus prevent unnecessary and prolonged price fluctuations.

Transportation

Shipping oil is much cheaper than transporting pipeline gas. LNG can only compete with pipeline gas beyond a few thousand kilometres from the market. Especially for pipelines, inadequate or non-existing legal and regulatory regimes add extra hurdles to bringing the needed regular supplies to the market at viable economic costs. For transit pipeline projects – that is projects which cross third countries between exporter and importer- unstable bilateral political, economical and regulatory conditions can prevent gas from reaching the markets. The gas chain is as strong as its weakest link.

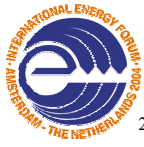
International conflict

In some regions in the world political tensions between countries prevent the construction of international gas pipelines, effectively reducing the availability of competitively priced supplies to the local markets. Seeming a trivial suggestion, the improvement of international relations and a reduction of tension in those regions is a key precondition for the successful exploitation of economic gas resources. Also internal conflicts play a role in the realisation of gas projects; if the security of installations is in doubt, the likelihood that investments will take place reduces drastically.

5. Regulation of gas markets

Where the new rules for a liberalised market environment are still in the process of evolution, natural gas projects, given their long repayment periods, are suffering from a lack of certainty about the future regulatory framework. Liberalisation may, in addition, lead to fragmentation of markets and create noise in the information flow, which in turn could delay the signals that invoke new investments.

In response to the characteristics of the gas industry discussed above, a variety of hierarchical relationships have been established over time amongst gas producers, transporters and consumers. In case of contracts, the volume and the price risk were reduced, by agreeing to price structures and by establishing specific terms of trade for a longer time period, so that the producers' as well as the consumers' investments would not be jeopardized. Often this involved a role for public bodies,



taking ownership and management over (parts of) these systems. As a consequence, gas markets have developed on a regional scale, each with its own market structure, its characteristic institutional framework and specific roles for governments and local authorities and, eventually, its particular outcome, in terms of the economics of supply and demand.

Towards the end of the last century a new perspective on regulation developed, driven by, on the one hand, international economic integration of national markets for goods, labour, capital and services, and on the other, by the general aim to reduce the role of the state in the coordination and ownership of economic activities, in favour of the market and private initiatives. This new approach was slowly accepted in the latter part of the last century. Initially, a simple withdrawal of the state from the economy was advocated, through the privatisation of state owned enterprises and the deregulation of public utilities, which would be sufficient to bring about the advantages of unconstrained markets and the associated gains in welfare and economic growth.

Over time, however, empirical evidence has shown that economies need an adequate institutional framework to reduce uncertainties among market participants, to correct un-avoidable failures in the operation of the market, or the sheer lack of a market, for certain categories of goods and services and to safeguard public interests. This new vision demanded a much more subtle approach. As part of the process, the specific form of economic restructuring in the distinctive industries and sectors and the accompanying sets of rules and regulations appeared on the agendas of policy makers, industry associations and researchers. *Deregulation* became *re-regulation*, and privatization was to be undertaken more as a strategic process. Moreover, it was accepted that structural change should pay due attention to public interest issues and to the objectives of competition policy. Of course, this refinement of the recipe for restructuring induced an expansion of the regulatory framework and the toolbox of regulatory instruments and, associated therewith, the responsibilities of the regulatory agencies. The latter, initially, were meant to operate as lean and mean executive organizations, but being forced to develop and apply new insights in regulatory practice, they rapidly grew in scale and scope.

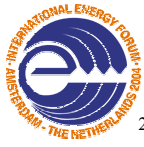
A number of general issues of importance can be derived from recent experiences in the economic regulation of sectors, although there is a large difference in the

regulation aimed at the identification and correcting of abuse of dominant positions and the structuring of the industry and its processes so as to maximise the objective of creating a competitive environment: The latter, in the absence of adequate experience, contains experimental aspects with their inherent risk of failure and uncertainties about future change.

- To operate effectively regulators should have a clear, politically determined, legislative mandate, establishing in unambiguous terms, their objectives, their tasks and the degree of freedom in developing guidelines and rules.
- To operate independently on behalf of their general public responsibilities, regulatory systems and regulators should seek to secure and carefully balance the interests of both the several segments of the gas industry and the (large and small) consumers.
- To achieve an appropriate level of legitimization, regulators should be held accountable both in respect of the reasons they give for their decisions and by making the regulatory process fair, open and accessible to the firms and stakeholders alike.
- To gain trust in the 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.
- Finally, 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.

Approaches to gas market regulation

In this section we discuss policy options in the regulation of the gas sector. Perhaps more so than in other fields of regulation, it is clear that the policy towards the functioning of markets and the safeguarding of public interest is an extremely urgent concern. In complex, specific, networks, such as the electricity, the natural gas, the telecom and the water systems and in transport infrastructures, essential facilities are involved, through which the controlling party is able to obstruct any serious competition by other (potential) suppliers, while exploiting its monopolistic position



vis-à-vis the consumers. This effectively ruled out an integral liberalization of these systems and required the establishment of adequate regulatory regimes.

To be sure this debate is ongoing. For example, recent experiences, such as the blackouts in Europe and California, railway accidents and the emerging problems with the supply of natural gas, provide confirming evidence of the need to create fine textured regulatory approaches. Unfortunately, there is a serious question whether there is a uniformly applicable approach for all stages of development of the gas market. Quite apart from the fact that a regulatory structure is very much a system and context dependent phenomenon, we are doubtful that such a approach would provide an optimal route as the advocates suppose. We argue that four main facets stand out in respect of the regulation of these systems.

- The manner in which the value chain of the industry is re-structured *ex-ante* is related to the question as to what vertical segments of the supply system should be characterized as an *essential facility*, requiring regulation, and which segments could be potentially *competition driven*, if an adequate horizontal structure could be arrived at.
- The determination of the ownership of the essential facilities in the value chain is a strategic issue, involving aspects like the attractiveness to private investors, the degree to which their information can and should be checked by regulators, the possibility to create mutual commitment by establishing public private partnerships, etc.
- The marching orders of the regulatory agency on how to structure the industry and its processes so as to maximise the objective of creating a competitive environment, *vis-à-vis* the government, the industry and other agencies involved, like competition authorities and other countries' regulatory approaches..

Unlike the traditional perspective that denied the feasibility of competition in the whole of the gas industry, the proponents of structural change start from the hypothesis that the introduction of competition is possible in particular segments, and that this would improve the performance of the whole of the value chain.

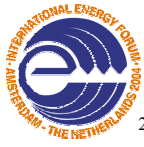
Typically gas supply systems involve four segments. The *exploration and production* segment includes a variety of firms involved in exploration, drilling, production, and the collection of gas from the fields' wellheads, to move it to the transmission

pipelines. Gas production is a potentially competitive segment of the industry. Producers sell natural gas to a gas utility, or to traders, which sell it to the end users. Main elements of the regulation involve a depletion and taxation regime, plus (*ex-post*) competition policy, to restrict the market power of the gas producers, relative to each other, to the utilities and to large consumers.

Gas *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.

Natural gas *distribution* consists of the local operations necessary to deliver natural gas to the end users, including low-pressure pipeline transportation, metering, and supply activities *vis-à-vis* the several types of customers. The distribution segment of the industry is seen as a natural monopoly, because of the 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. Depending on the maturity of local systems, their specific lay-out and the particular function of these connections, this segment should be more or less actively regulated, with a focus on access conditions, the fees charged, the cost recovery of the systems and their timely expansion. What is crucial here is the balance between the longer-term interest of the investor and owner of the system and the short-term users' interest of low cost, flexible transport contracts.

As gas supply is becoming increasingly dependent on long-distance cross border pipelines, international treaties safeguarding *transit* will be required. The WTO agreements may not be sufficient to minimize the risk of international transport. Multi-lateral treaties like the Energy Charter and its Transit Protocol have been established to fill this void. The Energy Charter, as an example, may be an important support to investments in production and transit capacity. So far, 46 countries and the European Communities signed and ratified the Charter, but some important states have not yet ratified. In other situations, specific bilateral transit treaties may be more appropriate. A discussion exists in respect of the 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 - should be taken into consideration.

Trading refers to the resale of natural gas in the wholesale market and retail market. Unbundling of the vertical column of the gas industry creates 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 will be provided to balance 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.

A general view on the way in which economic restructuring in these different segments of the value chain may take place should recognize that liberalization, regulation and unbundling, and merger control , are means to achieve an end. The aim is to establish efficient and effective systems that supply energy, including natural gas, to end consumers in a manner that is commercially sound and that supports the overall welfare, from an economic, a social and an environmental perspective. This implies that, given these objectives, a deliberate choice will have to be made with respect to the precise means to achieve these goals. Arguably, it is in the combination of context, objectives and instruments that the appropriate outcome emerges in different countries and regions.

6. Obstacles to growth in gas use and the role of governments

As argued above, the size and the complexity of gas projects require a high degree of confidence and assurance. Generally, the economic risk, particularly for large scale international supply systems, is mediated by sellers and buyers, through appropriate arrangements embedded in long term contracts and only to a lesser extent through spot-markets and hedging facilities. Nevertheless, the need to coordinate investments in projects throughout the supply chain and the objective to minimise the lead times will require full cooperation between all stakeholders. Agreements between these parties, as a precondition for investments in large-scale gas projects are complex and may require government support.

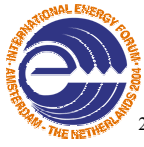
This important role for government applies both to the active involvement prior to the investments, facilitating the process of putting the necessary conditions in place, as well as to provide the comfort for a prolonged business climate, positive to these large investments. We have argued that the sellers and buyers, together with equity investors and financial institutions, also consider risks which are fully in the domain of governments, such as:

- The political stability of producing countries and the risk that gas supply, or transit, will be refused for political or economic purposes.
- The creation of a regulator in consuming countries with the narrow task to create a competitive environment while other oversight is needed to balance the process of liberalisation and security of supply because the tools and processes used by regulators may negatively affect the ability to secure new supplies for the future.
- The political and regulatory stability of consuming countries and the risk that market circumstances may change unexpectedly for reasons of economic, environmental or other policies.

Thus, despite the ability of the private sector to manage many of the risks involved in complex gas projects, the government plays a crucial role in creating such a climate that these risks remain manageable over time. International gas markets as well as public interests are not static but dynamic. The task of the government is to facilitate an investment climate that evolves in line with the various stages of market development but that also secures the public interests over time.

In addition to the establishment of international treaties, transit arrangements and adequate regulation, governments may wish to participate in the development of a gas industry through some state participation in production and distribution entities. In certain markets or countries public participation may provide the stability required for gas developments, solidifying the confidence among the stakeholders involved, and assuring that risks and rents will be distributed in a balanced manner.

Government can also decide to participate in the gas industry for its strategic importance, particularly when key counterparts in the consuming or producing countries also have a mixed ownership structure and government is convinced that public interests can be best served this way.



7. Different problems in different markets but also fundamental similarities

7.1 North America: how to replace declining indigenous supplies

The second largest gas market region in the world, the North American market with a gas consumption of some 750 bcm, has been largely self-sufficient for a considerable period of time. Only in recent years did it become clear that major new sources of supply would have to be developed to sustain the actual and projected growth in gas demand.

In their World Energy Outlook 2002, the IEA projects a growth of gas demand by 1.5% p.a. Most of the growth outlook is driven by the power generation sector, which is expected to turn largely to gas for new generating capacity. The first wave of new gas-fired developments is already in operation. New investments are being held back in view of the uncertainties around the progress in liberalisation of the electric power generation market and the development of gas prices. Based on the assumption of landed prices of around 3-4 US\$/MMBtu, the projected growth in demand will require supplies of some 990 bcm by 2010 and well over 1100 bcm by 2020.

The ability of North America to sustain the growth in supplies from indigenous developments is now far more uncertain than was considered previously. Further government stimuli could help to encourage development of new domestic supplies. The opportunity to bring the vast gas reserves of Alaska to the US market is still under consideration: a pipeline from this area could offer a new source of supply of up to 35 bcm annually. But these measures may still fall short of meeting the potential demand. LNG imports will have to complement the demand shortfall. Already many plans exist for development of LNG supplies and applications for the construction of LNG terminals, both in Mexico and in the US itself, are under consideration. Substantial additional investments in transmission and distribution capacity will be needed. From a security of supply perspective, given its considerable remaining indigenous resource base and the diversity of potential import sources, the North American dependence on gas imports, should not give rise to serious concerns. Time is of the essence. A combination of rapid market changes in 2000-2001 and long lead times for developing incremental supplies has already left the gas market in a situation of insufficient import infrastructure. As a result, supply shortages have driven up the gas prices to levels which, if they continue, will threaten the competitive position of gas as a fuel of choice for power generation. Thus the North American

market would deny itself the benefits of using economic gas options, while, with adequate infrastructure, new imports could be obtained based on costs well below 4 US\$/MMBtu. Developing substantial new gas supplies, in the best of circumstances, could easily take 4-5 years. Supportive government policies and regulatory measures could expedite these processes and the construction of new capacity.

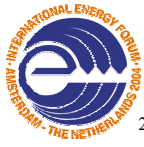
In summary, various policy measures, some of which already identified by the IEA in their World Energy Outlook 2002, could assist in ensuring that gas will continue to offer an attractive economic contribution to the North American energy portfolio:

- Expedite the study of barriers to gas leasing for exploration and production on Federal lands.
- Consider new incentives for gas developments.
- Review the regulation of gas related activities and the location of facilities in coastal areas and on the continental shelf, and improve the predictability of leasing and development approvals.
- Create appropriate conditions for the development of Alaskan gas reserves.
- Facilitate the location of new LNG import facilities.
- Pursue the liberalisation of the electricity generation market to ensure that new gas-fired capacity can compete effectively with existing capacity of large portfolio players.

7.2 South America: abundant reserves for an emerging market

South America is a large region with as yet a relatively low volume of gas consumption. The role of gas varies considerably from country to country. Argentina is the only country combining indigenous supply sources, a well-developed gas infrastructure and a high gas penetration. In other countries the gas markets are in different stages of development, offering significant potential for growth. However, these markets are suffering from political, regulatory and market uncertainties which could hamper realising the potential.

The continent has abundant reserves of gas, but distances between reserves and demand centres are often very long and pose difficult geographical barriers. Financing transmission projects (both domestic and cross-border) in the presence of market uncertainty is a central issue.



Total demand projected by the IEA in the World Energy Outlook 2002 runs from 105 bcm in 2000 to 177 bcm (2010) and 262 bcm (2020) These projections are now on the high side – developments over recent years, particularly the Argentinean crisis and a stagnation of the Brazilian gas-fired power generation projects, will undoubtedly lead to lower expectations of new demand, while the latter has created serious problems for the supply of gas from Bolivia.

More interconnection and cross-border trade can be expected in the Southern Cone, where the largest population and industrial centres are and because of clear complementarities between countries (small countries with large reserves, large countries with few reserves)

Industry is currently the main gas user in the region. But the power sector is expected to drive gas demand growth in new markets.

The main issues affecting the prospects of growth for gas are

- the absence of a “gas culture” (Brazil)
- the position and competitive vulnerability of thermal power generation in hydro-based markets (Brazil, Colombia)
- lower than expected electricity demand growth (effect of rationing in Brazil, crisis in Argentina) have stalled development of gas-fired power plants and pipelines
- social/environmental/indigenous people’s rights issues around the exploitation of gas reserves (Bolivia, Peru)
- lack of investments in Argentina may result in shortages in the short term and net imports in the medium-long term
- security of supply concerns in Chile, because of its 100% dependence on Argentinean gas
- exploration and development of non-associated gas in Venezuela is a condition to development of gas market in that country

The main challenges for governments on this continent are

- the need for comprehensive approaches to energy policy
- to achieve competitive pricing of gas and elimination of subsidies to prices of energy sources competing with gas (e.g. fuel oil, electricity)

- recognising and dealing with exchange rate risks
- reducing legal and regulatory uncertainty
- promoting cross-border co-operation and harmonisation
- providing government assurances and appropriate market conditions in view of the need to deal with hydro-uncertainties
- developing political and social solutions and creating transparent public-private partnerships for the development of gas reserves

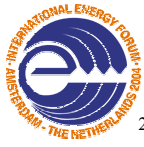
7.3 *Europe: liberalization and uncertainty*

Unless Europe radically changes its position on nuclear energy, an increasing dependence on gas imports will be a given fact for the foreseeable future. By 2020, this would lead to a share of gas in the EU primary energy portfolio of close to 30%, but individual countries may have much high dependence on natural gas. This raises security questions that are often best addressed on a country-by-country basis, given the large differences per country in fuel mix and import dependence. The security of supply risks are dependent on the diversity of the fuel mix and of supply sources.

In principle, there is enough gas within the economic reach of the EU to meet Europe's additional demand for energy in the foreseeable future. European countries generally support the development of new indigenous sources and there are a number of countries interested in exporting their gas to Europe through pipelines, with Russia and Algeria as the key providers and possibly a diversified portfolio of imports from the Caspian Sea area and/or the Middle East.

A second potential source of additional gas supply may come in the form of Liquefied Natural Gas (LNG). There is a lot of activity on the LNG front and, indeed, this could continue to help to supply a growing part of Europe's gas requirements, but because of limitations in scale LNG will not be able to satisfy more than a portion of future demand. Even though the bulk of new gas supply to Europe will have to come through pipelines, LNG supplies from the Gulf and Africa are expected to increase as well.

These solutions, however, will probably never materialise if policy-makers in the consumer countries fail to accept the conditions necessary to bring this gas to the EU markets. Over the past 40 years, the European gas industry has developed a



number of instruments to reduce uncertainty, allowing a more or less continuous growth of the supply system, a high degree of security of supply and a great stability and profitability of the industry involved. At the moment, this specific industry structure is being dismantled and new market conditions are created, that promote short-term competitive business transactions. This also implies that the newly formed businesses are effectively isolated from market information, like patterns of energy use and investments by other parties, necessary to overview their own position in the gas sector.

Whereas the European market contains some 'provinces' that seem to have reached a *mature* stage, it seems more appropriate to consider the entire European gas system as an *emerging* system, in which gas markets and their supporting infrastructure need to grow substantially to deliver the environment in which gas can perform its expected role as the bridging fuel towards a sustainable energy system. For this perspective, there is a need to satisfy future demand from new supplies from relatively expensive sources, far away from the centres of demand.

A key issue for the future development of a liberalised gas industry is how the 'market' will be able to timely perform these functions of evaluation and aggregation of demand, and offer an acceptable financial and demand security, in terms of an acceptable level and distribution of price and volume risk, to justify the huge investments required. In fact, this process of identification and evaluation of demand is becoming even more relevant as a consequence of the shift towards a different target customer base in the future. So far, the European customer base was developed, primarily, through consumption growth in the residential and the industrial sectors. These sectors are relatively captive and predictable markets, compared to the power sector, the main target for future growth of the gas market. The dynamics of power sector development provide only limited certainty about the timing of investments and the fuel of choice, while the size of potentially required additional 'chunks' of supply are very large.

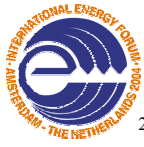
Transit is a particularly difficult issue, as has been shown during the past 4 years of negotiations over the Energy Charter's Transit Protocol, which is still awaiting a final conclusion. An important component is the disagreement between Russia and the EU (acting on behalf of its Member States) on aspects related to transportation rights for existing and new long-term contracts and the provision of a right of first refusal for

transit to users. Non-EU parties were uncertain about the future status of (long term) transportation contracts inside the EU. It must remain possible to contract transit and transportation, parallel to long term supply contracts and to deliver at any agreed location inside the EU on a long term basis, when commercially agreed.

Traditionally, energy policy has been the domain of the EU member states, following the different national positions. Over time, however, the movement towards an internal European market has raised aspects of energy-policy-making to a European level. Unfortunately, the resulting process of multi-level policy-making is complicated and fraught with gaps and imbalances, at the EU and national level. This may bring about a functional policy gap, as (some) national governments do not articulate their national energy policy anymore, while co-ordinated action across the EU has not yet been agreed upon. Indeed, issues of short-term security of supply were deliberately left to intergovernmental cooperation through the IEA. The recent proposal for a EU Directive on Security of Supply tried to capture that ground, but this initiative was quite 'dirigiste', rather than aimed at promoting market efficiency and focused primarily on short-term disturbances.

The essence of the problem is in the absence of shared agendas, to discuss longer-term objectives and solutions for the future supply of gas. Indeed, the current process of regulatory trial and error causes large uncertainties regarding the market rules and the business environment. A situation is emerging in which policy-making is dangling in between the theoretical blue print of an ideal market and the nasty characteristics of a real-life market situation. The gas producing countries, particularly Russia, Algeria and Norway, and some of the large oil companies and financing groups involved, are un-mistakenly showing signs of confusion and discontent with these developments. For example, at conferences in Algiers, in May and September 2002, they – with exception of Norway and the Netherlands - made clear that the concepts that have emerged from the process of liberalization are not helpful in creating the environment for a further expansion of the gas market.

Clarity is needed in defining areas of responsibility between EU and member states and also in recognising the fundamental problems arising out of the potentially conflicting objectives of liberalisation and the need for many of the Member States to secure additional future gas supplies. Objectives and policies towards *liberalisation*



and *security of supply* do not mix easily. The acceptance by the Commission and national regulators that long-term contracts do have a role to play in supply suggests that this has been recognised. But this may not be enough to ensure that the gas will find its way to the European market. Potentially the Madrid Forum, with some changes in its marching orders from the single-minded pursuit of liberalisation to the broader energy policy issues including security of supply, the promotion of gas utilisation, and the recognition that priorities need to be established, could provide the framework for a dialogue on a new approach to gas market co-ordination.

7.4 Russia: largest producer and exporter

Domestic demand growth and exports require Russian production to increase substantially. The Russian reserve base is very large with about 30% of world proven gas reserves. Most of the Russian proven gas reserves are located in the west Siberian basin. For Russia to meet the increasing demand for gas, substantial investments in the entire value chain are required. According to the national energy strategy (2003), the investment needs are estimated between \$170 and \$200 billion for the period up to 2020. Most of the investments capital is needed for upstream developments to replace the ageing gas fields in west Siberia. The possibilities for foreign capital mobilization have thus far been limited due to uncertainties about access to the national gas transmission system and the domestic price structure.

Russian production is expected to grow in the base case from 583 bcm in 2000 to 680 bcm in 2020. The independent producers would be entirely responsible for the increase. In more optimistic projections, Russian production can grow to 730 bcm in 2020 but in a pessimistic scenario output would stabilize after 2010 at 550-560 bcm.

Exports to Europe accounted for 22% of Russian output in 2003. Total Russian output remained stable due to increased output by independent gas producers and gas production by oil companies (both responsible for 6% of Russian gas output) despite declines in Gazprom production in the late 1990s and early 2000s. In 2003, both Gazprom and total Russian gas output increased. Independent gas producers are exerting some degree of pressure on the Russian government and Gazprom to create more transparency in access to gas pipelines terms and gas-processing facilities. These companies also advocate greater transparency of the tariff structure.

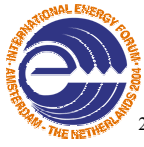
The very strong position of Gazprom in both production and the transportation of gas make it very difficult for other companies to compete and the position of Gazprom also poses a serious barrier to enter the Russian market. This is a particular problem with regard to attracting foreign capital to the Russian gas sector. Another major barrier to foreign companies is the fact that Russian domestic gas prices do not reflect market prices yet. The possible difficulty to export gas from new resources through the Gazprom pipeline system and the economics of the Russian domestic market are a major impediment for foreign direct investments in the gas sector. The national energy strategy expects domestic gas prices to rise from about \$0.70 /MBtu to \$1.40/MBtu in 2006 and to full-cost levels of 1.40/MBtu in 2010. Such a development would create a more attractive investment climate, particularly if foreign investors are also allowed to sell gas in the domestic market.

Although exports to Europe will remain the main export market for Russian gas, some diversification of markets is expected to develop over the next decade. The development of Sakhalin 2 projects will see exports of LNG to Asian markets and possibly the US west coast.

7.5 Africa: important player in the Atlantic basin

The African continent is well endowed with gas reserves. Its total production today amounts to 134 bcm and is expected to grow to 246 bcm in 2010, 389 bcm in 2020 and 589 bcm in 2030 (IEA WIO 2003). In that same period exports will grow substantially from 64 bcm in 2001 to 145 in 2010, 212 bcm in 2020 and 299 bcm in 2030. Further developments of gas supplies are in train or under serious consideration, from countries like Algeria, Nigeria, Libya, Egypt, Mozambique and Angola. However, most of the current and projected gas supplies are being exported to Europe and the US.

The domestic African gas markets are not well developed. A total consumption of some 60 bcm per year (IEA WEO 2002) for the whole continent indicates its growth potential. The IEA WEO 2002 projects growth potential to some 100 bcm by 2010 and over 150 by 2020. Some markets can grow their gas markets on indigenous gas supplies, but the fullest benefit for the continent can only be achieved by vigorous pursuit of cross-border business.



Given the size of the continent and the location of the reserves it should be expected that this would lead to the development of regional markets, e.g.

- a north African region, including Tunisia and Morocco, with Algeria as the main source of supply
- a south African region in which the South Africa market is the engine attracting supplies from surrounding countries like Mozambique and creating gas supply opportunities on the way,
- a west African sub-region based on supplies from Nigeria

Regarding the latter region, the proposed development of the West African Gas Pipeline is not only an example of the economic opportunities that could arise from the gasification of (at least) three neighbouring countries, but also of the complexities surrounding its realisation and the need for full government support and participation to bring this project to fruition.

The main challenges for governments are:

- to create an investment climate based on political, social and legal stability
- to foster the development of regional gas business by means of cross-border co-operation and harmonisation
- to work with international organisations to manage the risks associated with the developments of new markets for gas

7.6 The Gulf: high potential

The vast gas resources of the Gulf are pivotal to meet future gas demand in both the Pacific and the Atlantic LNG markets. The potential to become an important net exporter of gas compares to the similar position in the oil market. However, many obstacles need to be overcome to unlock the stranded reserves. These obstacles are mainly in mobilizing sufficient capital to realize the growth in output. Gulf gas production is projected to grow from 242 bcm in 2001 to 861 bcm in 2030. The biggest increase in production is expected to occur in Iran, which has by far the largest gas reserve base in the region. Although domestic consumption of gas is expected to grow substantially, a large part of the growth in output, 360 bcm, will be exported by 2030.

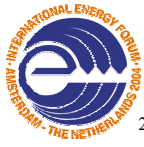
The most important export markets for Gulf gas will be the US, Europe, India, China and to a lesser extent other Asia Pacific. Although gas pipelines will undoubtedly be developed to supply markets in Europe, LNG developments allow the Gulf to supply the various export markets around the world. The current expansion of gas projects in Qatar are a clear sign of the large potential in the region and offer additional energy export incomes to the countries in the region.

Uncertainties surrounding the expansion of the gas sector in the Gulf are partly due to the government budget restraints and limitations on national companies borrowing and the pricing terms and partly due to the greater project risks (insurance risk) as a result of political instability in the region. Continuing political instability could raise the cost of capital in the future and increase the project risk compared to other potential LNG exporting countries. However, in a situation of political uncertainty, LNG projects will be easier to finance than pipeline projects, particularly if these risks also involve transit countries.

7.7 Asian Gas Markets: a continent of regions

The Asian gas market is highly compartmentalized and the regional systems are relatively isolated from each other. It is therefore difficult to make generalizations. The projected overall increase in gas demand in Asia for 2020 compared with 2000 is three-fold. With projected demand of 472 Bcm in 2020, Asia will come closer to rival Europe and the transition economies as a gas market. For this to happen a considerable amount of infrastructure will need to be built throughout the continent and a significant proportion of this infrastructure will need government support – financial, regulatory and political.

The continent of Asia can be separated into four regions: 1) China; 2) OECD Pacific: Japan, Korea, Australia and New Zealand; 3) South Asia: Afghanistan, Bangladesh, India and Pakistan, and 4) East Asia: ASEAN countries, Taiwan, DPR Korea, Papua New Guinea. Within these regions, some countries have long-established gas industries while others are only just beginning to develop an industry. With the exception of South East Asia – where there is a degree of regional pipeline gas trade – there is very little interconnection between gas markets in Asia. In south Asia –



India, Pakistan and Bangladesh – there is no trade and countries are dependent on domestic resource development. Gas markets in OECD Pacific countries are entirely different: Japan and Korea – largely lacking in domestic resources - have built gas industries based on imported LNG; Australia has a number of regional pipeline networks with growing interconnections but is also a major LNG exporter; New Zealand is entirely dependent on indigenous resources.

While growth prospects are significant throughout the Continent – it is China and India where the fuel could make the biggest impact over the next three decades. In both countries the currently known domestic gas resources would be insufficient to support the growth potential. However, such demand developments would require a significantly expanded role particularly for international trade in pipeline gas. Gas in the eastern part of Russia is located sufficiently far from large scale alternative markets and coastal locations to make pipeline exports to China the favourite – and in many cases the only viable – export option. The same can be said for a large part of the Central Asia and Middle East/Gulf resource base.

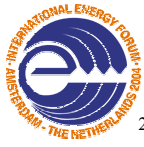
However, relatively few major international pipeline gas developments seem likely to get under way. Combined pipeline import capacity for China and India is 11 Bcm in 2020, which is substantially less than the potential of the major pipeline projects which have been under consideration for a number of years: to China from Eastern Siberia, Western Siberia, Sakhalin and Central Asia and to India from Turkmenistan, Iran or other Gulf countries. The principal reasons for this situation are financial, regulatory and political uncertainties. From a financial point of view many billions of dollars are needed not just to build the pipeline connecting the gas field(s) to the market(s) but also to develop the market infrastructure not just for gas transmission, distribution and storage, but also new gas fired power generation.

Investors will need to be clear about – at least the medium term – regulatory framework in terms of the degree of competition, which is anticipated to be introduced during the life of the infrastructure. In most of the OECD, the policy emphasis of the past decade has been on the creation of liberalised and competitive markets. In Asia – and particularly in China and India – the emphasis need to be on the creation and establishment of new gas markets based on both indigenous and imported gas. The first steps of such a policy are the financing of infrastructure and

appropriate pricing of gas. Governments have traditionally been involved in pricing and are indirectly involved in creating conditions in which financing may take place. Traditionally the mechanism for organizing and financing multi-billion dollar gas investments has been long term “take or pay” contracts, until the start of liberalization. Liberalization and competition are well established in Australia and New Zealand; have already begun to be introduced in Japan; and are anticipated in Korea and a number of other countries. But in many other Asian countries, liberalized and competitive markets must be considered a distant aspiration until the markets have been firmly established and infrastructure amortised. In countries such as India and China, where the emphasis is on creating new markets, such conditions may be many years (perhaps decades) in the future. This does not mean that certain competition safeguards should not be put in place at the creation of a gas market, such as minimum periods of a monopoly for companies at various stages in the gas chain, plus the stated objective that the eventual aim is the creation of a competitive market.

The substantial investment requirements for gas market development – both in terms of transportation and distribution infrastructure - in Asia will require strong commitment by governments and clear and stable frameworks for private sector participation. This will be particularly important in order to realize the potential for large scale pipeline gas and LNG supplies to China and India. Governments need to give close attention to the pricing of gas, particularly where it is regulated by government agencies. In some countries regulated prices to industry and customer groups involves subsidies, which are both damaging to government finances and strongly discouraging to investors in exploration, production, and transmission projects. Nevertheless, there are strong arguments that (cross)-subsidies may be acceptable for a “transitional period”, as high regulated prices are discouraging consumers from switching to gas in many countries and hence holding back market development. But it is then very difficult to phase out such subsidies.

Governments need to devise appropriate regulation defining the speed and extent of market transition and liberalization which is envisaged. The key elements of this are the transition from prices set by regulation to market-determined prices and from



monopoly to competition throughout the gas chain and in particular the introduction of third party access to networks and LNG terminals.

Slow development of regional cooperation and coordination – both bilateral and multilateral - are holding back the potential for gas development in Asia. These problems are particularly acute in south Asia where bilateral political difficulties between India and Pakistan (and to a lesser extent India and Bangladesh), have been the main cause of unsuccessful development of cross-border gas trade from the Middle East and Central Asia. Cross-border pipeline trade in East Asia has also been very slow to develop, despite the huge potential for Russian (and to a lesser extent Central Asian) gas exports to China, Korea and Japan. The reasons for the slow pace of this development are largely in the hands of governments. Without progress on these issues – progress which can only be achieved by governments – it is difficult to be optimistic that the potential for gas can be realized.

8. Conclusions and Policy Recommendations

Assuming that producing and consuming governments wish to realise the full economic benefits of the projected future production and demand for gas in global energy balances, the enabling factors that they should consider include the following:

- Developing clear energy and regulatory policies which facilitate both the production and use of gas and the development of infrastructure;
- Developing policies on environment and emissions where the priority for gas production and gas use - in comparison to other fossil fuels and renewable/nuclear energy sources - is clearly stated, especially in terms of taxation;
- Developing clear policies on security of supply and demand in terms of dependence on:
 - imports of gas from a single source of supply or company
 - exports of gas to a single market or group of markets
 - a specific supply route for gas
- Ensuring that plans for future liberalisation and the development of competition in all phases of the gas chain are articulated well in advance, and that such plans:
 - do not compromise existing long term contractual arrangements;

- take account of the requirements to ensure long term security of supply
- recognise the need for long term contractual arrangements (and possibly aggregation thereof) to secure new supplies for most markets
- recognise the need for capacity contracts, back-to-back to the conditions of new supply contracts
- are discussed between producing and consuming governments either bilaterally or in multi-lateral governmental fora;
- Providing active assistance in stitching together international gas chains in terms of treaties, and international/multi-lateral relations between states;
- Providing a policy framework for the power generation industry allowing for timely decisions to commit to investments in new gas-fired generation capacity, recognising the anchor role of power generation for attracting new gas supplies
- Providing financial guarantees (via government credit agencies) and limited financial support, particularly for very large multi-billion dollar gas investments;
- Ensuring that taxes and other fiscal measures upstream and downstream do not discourage market players from moving ahead with gas projects in a timely fashion.

The International Energy Forum could play a significant role in developing and achieving these enabling factors.