



REPORT: REGULATORY DEVELOPMENTS, PROGRESS IN STANDARDIZATION AND THEIR IMPACT ON THE STRUCTURE OF THE GAS INDUSTRY

INTRODUCTION

1. Study group B3 has considered the future changes likely to arise in the structure of the gas industry as a result of regulation.
2. In approaching this analysis, it has been necessary to decide on basic assumptions on how the gas market will develop to 2020/2030. There is general agreement that key trends identified in the Report by Clingendael for the IGU in April 2006 have strengthened.
 - It is expected that there will be a growing demand for natural gas worldwide, both in existing markets as well as in emerging markets, driven by growing prosperity in (specific) developing countries and global and regional environmental challenges. The market share of natural gas in total primary world consumption is generally expected to rise, notwithstanding energy efficiency policy, developments in renewables, nuclear growth and clean coal technologies.
 - There are good reasons for supposing that the natural gas market is becoming an oligopolistic upstream sellers market. The bulk of world gas production lies in a limited number of producer countries and the impact of new gas supplies from new players will be marginal on a world scale.
 - National and regional natural gas markets are increasingly affected by international considerations, as long distance pipelines are developing and the role of LNG becomes more important, and the market becomes more global.
 - The assumption is that environmental measures will have a significant impact on gas demand by 2030, because of measures to “green” the energy chain and to diversify away from fossil fuels. In the next two decades, however, the effects are not likely to be felt, as energy demand will grow at a rapid pace worldwide as a result of industrialisation, and gas and its use in power generation will remain attractive against other less environmentally friendly fuels.
 - A growing demand for energy and a trend towards a global gas market in combination with an upstream sellers market for natural gas creates a market with a growing geopolitical sensitivity. Gas markets, like the whole energy market, will be influenced in many ways by political players who might have regional, national, supra-national or even global interests or aims. It could be expected that energy markets will face more and more political pressures and, in the slipstream of that, changes in regulation and supervision.
 - In former IGU (regulatory) studies it was argued that the regulatory framework and the gas market design in countries are related to the maturity of the market. In emerging markets where major parts of the infrastructure have to be built up, regulation will reflect this and other policies will be orientated to ensuring the necessary investments to give the population access to gas resources. In countries with mature gas markets, regulation might be focussed on market competition (wholesale or downstream) and choice for customers. In both models it is assumed that natural gas will be available on the wholesale market.



- The developments mentioned, along with gas and electricity convergence, are strong drivers for concentration to better handle risks and commercial challenges. Companies in the gas chain, both on the producer side as well as those close to the demand side, recognise the imperative of becoming substantial players and being able to create strategic (political) alliances, though realisation of these ambitions may be subject to antitrust rules.
 - New technical developments, within and outside the gas industry, will have a long term influence on developments in gas markets. The worldwide ambition to create sustainable energy patterns is driving innovation in a lot of different directions, although it is still uncertain which sources, techniques and product/market combinations will be successful in the long run.
 - Investment in production and downstream infrastructure is another factor that will influence gas market developments. Increasing challenges in the area of (gas) production are already widely acknowledged.
 - Globalisation in general and the ups and downs of worldwide financial markets will have an impact on the world economy and therefore on governments and businesses. Developments within the energy industry (including the gas industry) itself are simply a reflection of what happens in these sectors while the complexity of the questions the industry is facing will increase in relation to such external factors.
 - The uncertainty of long term developments and the associated risks might lead to new arrangements and alliances between governments and major industries, such as energy, in order to get control over developments and to lower economic, financial and societal risks.
3. The impact of the trends mentioned on the natural gas industry will be significant. Every part of the chain will be influenced. How the impact turns out for a specific company depends largely on the part of the chain in which this company is active, its position in the market, and its position in the geopolitical environment.
 4. Therefore a lot of factors and issues have to be taken into account in focussing our views on the impact of regulation on the structure of the gas industry, which will increasingly be enacted within a political context, both national and regional. Sometimes the impact of the regulation will be seen to be direct, but the indirect effect of regulation is probably even more important in the long run, the ways in which it introduces market changes that in turn lead to new company mindsets and strategies. Most importantly, regulation will have to be sensitive to the challenges posed by market trends and should provide a framework in which the gas sector can continue to develop its potential, in all parts of the world.
 5. The first part of the report presents a factual overview of regulatory trends. The second part examines how increasing standardization managed at a regulatory level but driven by industry needs will contribute to the globalization of the industry. The third part examines the direct and indirect effects of regulation on the structure of the industry.



PART I

An Overview of Regulatory Trends

6. This part will present an overview of regulatory trends to establish a context for the discussion and policy recommendations found elsewhere in this report. The overview focuses on six topics: unbundling (at the wholesale and retail levels), third-party and open access rules and rates for transmission and distribution, liquefied natural gas (LNG), storage access and rates, market design, and security of supply. The objective is to present information on regulatory structures around the world; however, that aim is constrained by the applicability of some of these concepts in certain jurisdictions. In other words, to state the obvious, the regulation of the natural gas industry varies from continent to continent, from country to country. As a consequence, this overview will not be seamless, and will by necessity discuss some topics for some countries and other topics for other countries. Furthermore it will be a snapshot of situations in early 2009. Its purpose, however, is to give the reader at least a sense of what regulatory structures the global natural gas industry is encountering today, and how those structures compare to or differ from one another. As a final matter, the report will give a brief overview of the enforcement of the various regulatory requirements and policies discussed.¹

UNBUNDLING

7. **Introduction.** Unbundling, a relatively new word in English vocabulary, simply means the separation of charges for related products or services usually offered as a package. It has come to have different meanings in application in the regulatory context, however, so it is important, for the following discussion, to keep these differences in mind. The major difference concerns whether the concept includes legal (also known as functional) separation or ownership separation of particular services (primarily sales and transmission or transportation). For example, the United States of America (USA) has instituted functional unbundling in its regulation of the wholesale and interstate aspect of the natural gas industry, while the European Union (EU) debate has centred on ownership unbundling with respect to the wholesale and international operation of its natural gas industry. Also, even those countries that require neither legal nor ownership unbundling may nevertheless require the natural gas companies to account for the costs of their various services separately. Finally, by way of introduction, industry observers sometimes use unbundling and the ability of customers to choose suppliers interchangeably. For the purpose of this discussion, however, the second concept is viewed as a subset of the first.
8. This introduction would be incomplete without at least a few words on the derivation and significance of unbundling in the regulation of the natural gas industry. First, as mentioned earlier, the concept applies mainly to the separation of sales and transportation services by companies that operate pipeline systems, which are generally considered to be natural monopolies. Whether those pipeline systems are owned and operated by governments, by a hybrid of government and private entities, or by investors alone, the bundling of the two primary services is viewed by many as a source of potential discrimination, which in turn works against the ultimate consumer. The reason is fairly straightforward: a "company" that both sells and transports natural gas is understandably going to favour its own sales over the sales of another seller. This is the major reason, for example, that the USA initiated unbundling over 15 years ago for natural gas pipelines in that country.

¹ For the convenience of the reader, there is a glossary of the abbreviations and acronyms at the end of the report.



9. **Status of Unbundling.** The world-wide natural gas industry is subject to many structural and regulatory configurations: governments own, operate or control every aspect of the value chain (see, e.g., Mexico, Egypt, Malaysia); governments own aspects of the value chain, but nevertheless allow private ownership and even subject their own operations to a comparable form of regulation (see, e.g., Brazil); governments allow for private ownership of transportation systems but heavily regulate them (see, e.g., Indonesia); and governments oversee and regulate all or part of the privately owned value chain (see, e.g., USA, Great Britain). The following discussion will necessarily focus on the second, third and fourth configurations, as separation of sales and transportation services is an oxymoron in the first configuration.
10. Three regions have made significant progress in implementing some form of unbundling: the European Union, North America, and Argentina.

European Union

11. Starting with the first gas directive in 1998 (98/30/EC), the European Commission (EC) abolished national supply monopolies in member states and sought to establish a harmonized regulatory framework. Roughly five years later, Directive 2003/55/EC added greater separation of production and supply from infrastructure and transportation, as well as for the legal unbundling of gas transmission and large and medium-sized distribution companies.
12. Individual member states have been required (unless subject to exemption) to implement the 2003 Directive, resulting in the introduction of legal unbundling for all but the smallest distribution companies as a tool to an enhanced system of customer choice and competition. In the directive, "distribution" means the transport of natural gas through local or regional pipeline networks with a view to its delivery to customers, but not including supply.
13. Investigation, however by the EU into lack of progress in competition led to concerns that, even in a system of legal unbundling, network operators who were part of a supply company group would still be influenced by that group, to the detriment of other market participants. Accordingly, on September 19, 2007, the EC proposed a third package of legislative proposals, including a revised gas directive that would unbundle transmission network ownership and operation. The proposals made clear that the preferred option was for ownership unbundling, i.e., a single company can no longer own both transmission and energy production or supply activities, but this solution was not acceptable to all Member States and a variant of independent system operator is part of the package.
14. The first two packages have been implemented throughout the EU with some variation from country to country. For instance, in **Denmark**, all transmission assets were transferred to a 100% state owned company, Energinet.dk. Similarly, in the **Netherlands**, the integrated Gasunie was unbundled into the current Gasunie (transportation) and GasTerra (wholesale trading). When the split occurred, the Dutch government's stake in Gasunie went from 50% ownership to 100% ownership, making its system look similar to Denmark's. As for trading, GasTerra still has a dominant position within the Dutch energy market, supplying roughly 50% of the country's gas (though this percentage is down significantly from the 100% market share it had in the mid-1990s). In **Germany**, while its energy market began liberalizing in 1998, the wholesale market for natural gas remains concentrated in the hands of a small number of large companies. The Gas Act in **Great Britain** requires, through a series of licenses, that activities related to the supply of gas are legally separated from those relating to the transportation



infrastructure, and in **Italy**, the Authority for Energy, Electricity and Gas (AEEG) determines tariffs for transportation, for storage, for LNG terminals, and for distribution.

15. At the retail level, distribution of gas and supply of gas are also largely separate. In the **Netherlands**, for example, the Dutch Gas Act requires the legal separation of DSOs and supply companies, and in 2007 the Independent Grid Management Act provided a new set of rules that stipulates that as of January 1, 2011 all DSOs must be fully unbundled. In **France**, DSO activities must be kept independent, in terms of organization and decision making (though not ownership) from that of suppliers. DSOs remain monopolies subject to government approved pricing. Furthermore, in EU countries, end use consumers can in principle choose the supplier of their choice. For instance, the **Danish** natural gas market allows residential consumers to switch gas suppliers without charge as frequently as once a month.

North America

16. The **USA**, through the Federal Energy Regulatory Commission (FERC), which regulates the interstate and wholesale natural gas industry, implemented functional unbundling in 1992, in an order entitled Order No. 636, in which FERC required interstate pipeline companies (the functional equivalent of transmission system operators, or TSOs, in the EU and elsewhere in the world) to separate their sales from their transportation services, and, to complete the requirement, directed those companies to make any sales of gas as close to the wellhead as possible with the corollary requirement that those companies could not hold title to the gas as it was being transported.² As a practical matter, this resulted in ownership unbundling, because the pipeline companies decided to forego their sales business, and provide transportation-only service. They turned their sales business over to marketing affiliates that were distinct corporations.³
17. At the retail level, several states have implemented functional unbundling, although none has implemented ownership unbundling. Functional unbundling is generally discussed in terms of "retail choice" where sales are provided separately from distribution. Twenty-one States and the District of Columbia have legislation or programmes in place that let residential consumers and other small-volume gas users purchase natural gas from someone other than their traditional utility company. The availability and characteristics of these customer choice programs, however, vary widely from state to state. Seven states and the District of Columbia allow all residential consumers to choose their natural gas suppliers, but a lack of marketer participation has precluded the development of competitive retail markets in three of these states. Six states are in the process of implementing choice statewide, with programmes available to more than half their residential customers, and another eight states have pilot or partial unbundling programmes in place or awaiting development. Two other states discontinued their pilot programs several years ago after deciding not to proceed with choice. The remaining 27 states are not considering choice programmes at this time. It should be noted that large commercial and industrial consumers have had the option of purchasing the natural gas

² In 1992, most of the natural gas sold, transported, distributed, and consumed in the United States came from domestic production. About 8-10% of the gas was imported from Canada (the border was treated as the wellhead for regulatory purposes), and there was very minimal LNG imports (only into Evert, Massachusetts).

³ Earlier, in 1988, FERC had promulgated strict standards of conduct to apply to the relationship between pipelines and their marketing affiliates to ensure that the pipelines' exit from the sales business did not nevertheless create an environment for the corporate family to benefit by untoward conduct. Several provinces in Canada have also introduced similar restrictions. Some Canadian natural gas utilities are subject to Inter-Affiliate Code of Conduct requirements. For example, in Alberta, regulated utilities are generally required to operate in accordance with an approved affiliate code of conduct and compliance plan.



commodity separately from natural gas services for many years, and in some instances they have done that through by-passing their local distribution company (LDC or DSO).

18. Retail choice has also been introduced elsewhere in North America. For example, Alberta, **Canada**, has unbundled gas services. This means that customers are not required to deal exclusively with a particular utility but can choose their natural gas supplier. The commodity can be purchased either from a regulated rate provider or a competitive retailer. Charges associated with the delivery components of the energy service (which remain regulated) are also identified separately from the energy costs on the customer's bill. Competitive retailers typically offer fixed-price energy contracts for one, three or five-year terms. Offers vary with prevailing market prices, but the commodity rate is fixed over the term of the contract.

South America

19. Until December 1992, the gas industry in **Argentina** was effectively controlled by the government. The integrated system of transportation and distribution of natural gas was under the exclusive control of the state-owned company Gas del Estado. In addition, until 1990, YPF (the former state owned oil company of Argentina), directly or through contractors, was the only producer of natural gas in Argentina. The country distribution network was divided into nine systems on a geographical basis, giving each system the exclusive right to distribute natural gas within their designated service area.
20. The exclusive right to distribute gas in a geographic area does not encompass the exclusive right for a distributor to sell gas within that area. Under certain circumstances, users may purchase gas directly from producers or marketers. If the gas purchased from others is delivered using the distribution system, the same distribution margin is charged by the distributors whether they deliver their own gas to a consumer or the gas is purchased by the consumer from a third party. In 2005 the Argentine Government established an unbundling regime requiring that distributors are not allowed to sell natural gas to certain consumers. The wellhead gas cost, before and after the unbundling regime, is passed through the distributors to customers, subject to the regulatory agency's approval. The regulator may limit the portion of the price of gas which is passed on to gas sellers to the extent it determines that the price paid exceeded the price paid by other distributors in similar conditions and for equivalent volumes.

Asia

21. **Japan** has not undertaken substantial unbundling, though legal firewalls are in place to prevent affiliates from favouring each other.

THIRD-PARTY ACCESS AND TRANSMISSION RATES

22. **Introduction.** Vertical integration of the production, gathering, transmission, and distribution of natural gas was the norm for most of the natural gas industry's history, whether a government-owned or a privately-owned company provided those services. Separation (or unbundling) of those services into distinct components was accompanied in most regions by the requirement that the TSOs and DSOs offer to transmit or transport other sellers' natural gas to market. (This concept was called "open access" at both the federal and state level in the USA, but elsewhere is generally known as third-party access (TPA), a term used in this report.) Indeed, certain countries that do not require any form of unbundling nevertheless afford sellers of natural gas some degree of access to the transmission systems.



23. TPA has a straight-forward goal: enable willing buyers and sellers of natural gas to get together, thereby creating or increasing competition in natural gas sales, which is generally believed to be in the best interest of natural gas consumers and other market participants. To accomplish that goal, TSOs and DSOs must provide their services on a non-discriminatory basis, without favouring their own or their affiliates' competing services. At the same time, the transmission facilities are still essential or monopolistic, so that the rates for services on those facilities continue to be set, for the most part, on a cost-basis to prevent the monopolies from earning egregious profits. One notable exception is in the USA, where storage is generally subject to the same open access rules as pipelines, but many storage providers have been authorized to charge market-based rates for their services if competition can be shown.
24. Outside the USA, the TPA requirement is generally applicable to both wholesale and retail service, although it has probably been more effectively implemented at the wholesale level. In the USA, the TPA requirement was originally implemented at the wholesale/interstate level, but has also been embraced in principle by most state regulatory agencies.
25. **TPA Regulation and Related Rates.** The codified definitions of TPA and the methods to set the rates for TPA facilities are relatively similar, as detailed below:

European Union

26. In the **EU**, Directive 2003/55/EC introduced a requirement for regulated TPA for gas transmission and distribution networks on the basis of published and regulated tariffs. The current regime could also be affected by the third package of legislative proposals, announced on 19 September 2007, including a gas directive that unbundles further transmission network operation. As noted above, the proposals make clear that the preferred option is ownership unbundling, i.e., a single company can no longer own both transmission and energy production or supply activities. As an alternative, the EC also proposed the option of an independent system operator (ISO) to allow presently vertically integrated companies to retain network ownership provided that the transmission assets are operated by a company essentially independent from the owner.
27. EU countries have a system of regulated third party access for both transmission and distribution networks with various requirements and restrictions. For instance, **Austria** initially chose a negotiated TPA regime, but changed to a regulated-access regime already in October 2002. Since then, the network operator is obliged to grant access on the basis of general network terms and conditions (GNTC) and regulated tariffs. The TSO is involved in organizing transportation if a request for network access also concerns pipelines upstream of the distribution network. In **Great Britain**, the Gas Act makes it the duty of every transporter to comply with any reasonable request for it to convey gas by means of its pipeline system to any premises. TPA is implemented through licensing regimes and regulations approved in advance by Ofgem. Transporters have a duty to provide connections for new infrastructure such as storage or regasification facilities. In **Germany**, the legislature has made the Federal Network Agency (*Bundesnetzagentur*, or the *BNetzA*) responsible for fixing or approving and controlling the terms, conditions, and changes for connection and access to national transmission and distribution networks.

North America

28. There are a variety of natural gas pipelines that operate in the **USA**: (i) the small-diameter lines that gather gas in the production area and move the gas to processing plants; (ii) the large-diameter lines that transport gas from the processing plants to the market areas (the "city-gate"); and (iii) the small-diameter lines that distribute gas in the



market areas. All gathering lines are privately or investor-owned. Most of the TSO and DSO lines are also privately or investor-owned, though some are operated by public entities, e.g., municipalities or cooperatives. As a matter of law, storage facilities that serve interstate commerce are considered "transportation".

29. Open access is defined as the provision of service without undue discrimination or preference, including undue discrimination or preference in the quality of service provided, the duration of service, the categories, prices, or volumes of natural gas to be transported, customer classification, or undue discrimination or preference of any kind. Note that the rules do not prohibit discrimination, but undue discrimination. In other words, a pipeline may discriminate as long as that discrimination can be justified (e.g., to meet competition).
30. It is important to note, especially with respect to open access, that USA natural gas pipelines (TSOs) are contract, as opposed to common, carriers. That means that they do not have to make room on their lines for new shippers (FERC's term for pipeline customers), but rather shippers can "book" or "reserve" capacity and know that it will be available when they want it. They do this by taking "firm" service, which has a higher rate than "interruptible" service.
31. While FERC has aggressively encouraged competition over the past two decades, it has nevertheless recognized that interstate pipeline facilities are still, for the most part, monopoly facilities, and set the rates for transportation services on a cost rather than a market basis. (See in contrast discussion below regarding storage rates in the USA.) Specifically, it has ordered that pipelines design their rates using a method called straight-fixed variable rate design where all of the fixed costs of the service are recovered through a demand charge and the variable costs are recovered through a volumetric charge. This rate design is intended to ensure that the transportation rate does not impede market signals for the commodity of natural gas. Nevertheless, FERC-regulated pipeline companies may negotiate with individual shippers for rates based on a different design (subject to public comment and approval by the agency); however, they must have on file rates based on straight fixed variable rate design as default rates. In addition, shippers may release their capacity to other shippers, and, for short term releases, charge rates higher than the rates charged them by the pipeline, that is, whatever the market will bear.
32. The regulation of the prices or terms of service of a **Canadian** pipeline will depend upon whether the pipeline is interprovincial, international or intraprovincial. The National Energy Board (NEB) regulates the charges levied by a pipeline operator for the interprovincial or international transmission of gas, whether or not the pipeline company owns the gas it transmits. The prices or terms of service of intraprovincial pipelines are, in turn, regulated by the provincial government agencies responsible for overseeing pipeline and facilities development in the province. Despite the regulation of rates and terms of service, the federal and provincial boards have no power to regulate the price at which a pipeline company purchases gas that it moves through its pipeline. Both the federal and provincial boards hold rate hearings to determine the rates that may be set by a pipeline operator. The rates are set based on a prediction by the company of the revenue requirements, which includes the cost of service and a fair return on rate base. All tolls charged must be just, reasonable and not unduly discriminatory. Where storage services are integrated with an existing distribution service, rates will be regulated. The rates will be based on withdrawal and injection charges set by the appropriate government agency. However, where storage is not integrated with distribution service, it is subject to the contractual arrangements between the storage facility owner and the customer.



South America

33. In **Argentina**, all transportation pipelines, regardless of their regulatory nature, are subject to open access. In-field storage structures granted by means of a transportation concession under the Hydrocarbons Law would also be subject to open access. Open access is allowed, in principle, on excess transportation capacity. Should no excess capacity exist, the transportation company is not obliged to expand its system. In any case, the new transportation service is awarded by open-season procedures.
34. The Natural Gas Act prohibits gas transportation companies from being marketers in natural gas. Also, (i) gas producers, storage companies, distributors, and consumers who contract directly with producers may not own a controlling interest (as defined in the Natural Gas Act) in a transportation company, (ii) gas producers, storage companies and transporters may not own a controlling interest in a distribution company, and (iii) marketers in natural gas may not own a controlling interest in a transportation company. Transportation companies are not permitted to buy or sell natural gas except for our own consumption and to operate the pipeline system.
35. The transportation tariff for firm transportation consists of a capacity reservation charge and is expressed as a maximum monthly charge based on the cubic meters per day of reserved transportation capacity. Firm transportation capacity contracted by distribution companies must be paid for whether or not the capacity is actually used, but the cost of unused transportation capacity may not be passed through to customers. Shippers are obligated to provide the transportation company with a natural gas in-kind allowance, equivalent to the gas consumed as compressor fuel or lost in transportation.
36. The **Brazilian** Petroleum Law guarantees access to the transportation system to third parties, as long as the facility has been operating for at least six years. Open access is implemented mainly through a public bid for capacity allocation, which is submitted to the Brazilian Petroleum Agency (BPA). The BPA is also responsible for defining adequate compensation if the parties are unable to reach an agreement.
37. Transporters and distributors of gas in **Venezuela** must allow other transporters or distributors to use their facilities if there is available capacity. The terms for the sharing of spare capacity are by agreement by the parties and, lacking such agreement, will be set by the Ministry of Energy and Petroleum.

Asia

38. In **Japan**, eight major gas utilities and seven power utilities import LNG, the main source of gas. The roughly 200 other gas utilities procure their gas through wholesale contracts with the major gas and power utilities, or from domestic natural gas producers. Prior to 2003, the Ministry of Economy, Trade and Industry (METI) approved each wholesale and large retail transaction as a watchdog of the regulated consumer. Now, METI's role has receded. Japan's anti-monopoly laws apply as well as the amended Gas Industry Law, which requires all gas utilities to provide TPA to all their pipelines. METI still has the power to regulate and change rates, but only if there are excess profits over several years. Legal firewalls also prevent discrimination against third party access to transportation. For instance, no general gas utility is allowed to refuse TPA unless there is an appropriate reason, such as a transport capacity constraint.

LNG ACCESS AND RATES

39. **Introduction.** LNG is the basis for a world market for gas, and in many ways is the reason for examining different regulatory structures. To be sure, before the development



of this market a few years ago, comparing such structures on the same continent was relevant to the industry and government policy makers, as the same package of natural gas could be subject to widely different rules and axiomatically could affect how, or even whether, the market functioned. Today it is imperative to have a better understanding of the different structures, because there is competition for LNG cargos, for example, between EU member states and the USA, between and among EU member states, and between Japan and the USA. Industry members must understand these different rules. But it is just as important for government officials to understand them too as they must be able to determine the impact of their decisions on their regulated companies from the perspective of those companies' positions in the world market. For example, new LNG terminals in the USA are not subject to TPA or rate requirements whereas new LNG terminals in the EU must obtain an exemption from those requirements, a step that is seen by some observers as putting LNG siting in the EU at a disadvantage vis-à-vis LNG siting in the USA.

40. **The LNG Industry.**⁴ World natural gas reserves are abundant, estimated at about 5,500 trillion cubic feet (Tcf), or 60 times the volume of natural gas used in 2003. Much of this gas is considered "stranded" because it is located in regions distant from consuming markets. Russia, Iran, and Qatar combined hold natural gas reserves representing more than 50 percent of the world total. The 12 countries that currently export LNG have approximately 28 percent of world natural gas reserves. Three countries with 33 percent of the world reserves are currently building their first liquefaction facilities. At least seven additional countries, with 19 percent of the world's reserves, are potential LNG exporters.
41. The following discussion focuses on the other end of the LNG value chain – the countries that import, rather than export, LNG. Three Pacific Basin importers – Japan, South Korea, and Taiwan – have historically accounted for over half of LNG imports. Japan has long been the world's largest LNG consumer, although its share of the global LNG trade has been declining since 1990. France is Europe's largest LNG importer, although Spain has one of the world's most rapidly growing natural gas markets. The USA has also been increasing its share of the LNG markets. To illustrate, there are about 40 LNG terminals that are either before FERC or being discussed by the LNG industry for North America. Eight terminals (seven import and one export) are already operating on the East Coast, Gulf Coast, Puerto Rico and Alaska (export).

The Regulation of the LNG Industry

European Union

42. **EU** rules do not regulate the ownership and structure of companies engaged in LNG activities. However, Directive 2003/55/EC does regulate the operation of terminals used for the liquefaction of natural gas or for the offloading, storage, and regasification of LNG. It requires member states to impose upon owners or operators of such facilities principally the same obligations as those applicable to companies with downstream transportation activities. The directive also requires operators of LNG facilities to draw up separate accounts for their LNG activities. Regarding the directive's requirement for legal unbundling of pipeline distribution and transmission activities, member states will remain able to allow operators of LNG facilities to operate them in combination with any storage, transmission, or distribution activities.

⁴ PGC-D is looking at LNG in depth, so this part of the PGC-B3 report will only touch upon certain regulatory matters. Nevertheless, some brief background notes are provided for the readers' convenience.



43. In **France**, the LNG industry is primarily privately-owned, and third party access is regulated. In **Great Britain**, LNG import facilities are exempt from the requirement to obtain a gas transporter's license, and no specific authorizations from Ofgem are required to construct LNG facilities. Though the presumption is for TPA, new infrastructure has successfully applied for exemption. In **Italy**, the gasification tariff is defined according to the regulations of the AEEG, which provide for cost-based maximum prices. New investments can be reflected in the tariff if they are economically justifiable. **Spain's** six LNG terminals in operation are all subject to regulated TPA on a first come, first served principle.

North America

44. No operating or planned LNG facility in the **USA** is owned by a government entity. Currently, there are about 40 LNG terminals that are either before FERC or being discussed by the LNG industry for North America. Six terminals are already operating on the East Coast, in Puerto Rico, and in Alaska. In addition, there are 16 facilities under FERC jurisdiction in the continental USA. Twelve of the facilities are land-based, peak-shaving plants that liquefy and store LNG during the summer (low demand) months for use during winter (high demand) months. The remainder of the plants is baseload LNG import terminals.
45. The siting and oversight of LNG facilities in the USA is governed by a comprehensive scheme of Federal regulation, which provides that the FERC and other Federal agencies will work with state and local regulators, as well as the general public, to ensure that all public interest considerations are carefully studied and weighed before a facility is permitted, and that public safety and the environment are given high priority. For instance, an LNG terminal project needs to obtain a FERC Order, which will include safety and reliability requirements, such as engineering and environmental inspections every eight weeks during construction, and no operation allowed until a commissioning inspection is completed. An LNG terminal must also obtain a water quality certificate and dredging permits.
46. FERC normally issues certificates for the construction of interstate natural gas pipelines, under Section 7 of the Natural Gas Act. Those certificates set the initial rates and also require the pipeline to follow the Commission's open access rules. Originally, FERC processed LNG applications along the same lines. It changed its approach in 2002 in a decision involving an application by Hackberry LNG Terminal, L.L.C. That approach, which establishes a permanent exemption from the FERC's rate and open access rules, marked a major change in the USA's approach to authorizing LNG facilities, and led to a remarkable increase in LNG terminal siting applications. The approach, simply referred to as the Hackberry decision, was codified into national law by the U.S. Congress in the Energy Policy Act of 2005.
47. At bottom, the market ultimately determines whether an approved LNG terminal is ever built. In addition, even if an LNG terminal project receives all of the federal and state approvals, it still must meet complicated global issues surrounding financing, gas supply and market conditions. Many industry analysts predict that only 12 of the 40 LNG terminals being considered will ever be built.
48. In **Canada**, LNG is presently used only in the operations of gas distribution companies, and as such the pricing and terms of service are covered in the tariffs of the companies involved. These tariffs are overseen in the normal course through the provincial agencies charged with their regulation. There are also privately-owned LNG storage facilities—located in Ontario, Quebec, British Columbia, Nova Scotia and New Brunswick. Canada does not currently import LNG, but projects are in the works to construct LNG receiving



terminals on the east and west coasts of Canada to help meet the significant and growing demand for natural gas in Canada and the United States. The construction and operation of such facilities is governed by both federal and provincial legislation, and requires numerous governmental and administrative authorizations. Prior to constructing a proposed LNG facility, the project is likely to be subject to an environmental assessment. The scope of the assessment will be specific to the proposed project, and may include an assessment of all facilities included in the LNG project and any activities associated therewith. The project will also require authorizations from federal authorities such as the Environment Canada, the Department of Fisheries and Oceans, Transport Canada and the National Energy Board. Authorization will also be required from the provincial and municipal government agencies that regulate construction activities, natural gas resources, and the environment in the province where the LNG facility is located.

South America

49. In **Argentina**, an LNG floating facility was been put in place in 2008 to help LNG cover peak demand.
50. While LNG prices are not controlled, LNG distribution in **Brazil** is a regulated activity that comprises acquisition, reception, storage, transportation, quality control, liquefaction of gas, and sale and delivery of the product. LNG facilities do not need to be owned by the distributor. The construction and operation of LNG facilities are dependent on separate authorizations granted by the Brazilian Petroleum Agency, in addition to the required environmental licenses. The Federal Environmental Agency and the local environmental authorities are responsible for providing environmental licenses to build and operate LNG facilities. Currently, Petrobras is building two floating LNG facilities in the hopes that their mobility will allow their maximum usage based on regional peak consumption seasons.

Asia

51. **Japan** is the largest LNG importer in the world. There are 27 operational LNG terminals which have over 14 million cubic meters of LNG storage capacity (equivalent to 9 bcm of natural gas). The construction of new LNG terminals is not subject to special regulations, but the more general Gas Industry Law and Electricity Industry Law both apply. Third party access to LNG terminals is negotiated, and LNG terminal operators are encouraged to clarify the preconditions and rules for TPA as well as offer reliable estimates of spare capacity.
52. LNG imports account for nearly all of **Korean** supply. Korea began importing LNG in 1986 and by 2005 had become the second-largest importer of LNG after Japan. In contrast to Japan, almost all Korean LNG supply is imported by one company, KOGAS, the state-owned monopoly, making it the largest commercial LNG buyer in the world. Most LNG imports into Korea are delivered according to long-term contracts, usually 20 to 25 years in duration. As has been standard until recently, long term supply of LNG to Korea is organized on a take-or-pay basis. These contracts were designed to insulate buyers from high oil-driven gas prices but provide insurance to suppliers to cover the high investment costs of LNG infrastructure. Long-term contracts have allowed Korea to ensure security of supply through binding supply agreements, but put the onus on Korea to secure downstream demand. KOGAS, the importing company, has to pay for the LNG whether it is needed or not.



STORAGE ACCESS AND RATES

53. **Introduction.** Natural gas storage facilities are used to meet gas demand peaks which exceed production and long-haul pipeline throughput. Increasingly, storage also plays a variety of roles to help market participants manage pipeline imbalance charges and daily and seasonal price volatility. When cold weather or other market conditions create more demand for gas than domestic production or imports can satisfy, natural gas that has been put in storage can be withdrawn to make up the difference. While natural gas is also stored for peak daily and hourly uses mainly by distribution companies and LNG is stored briefly at import terminals, this report will focus on what is known as traditional underground gas storage.
54. Today, storage is being used to: 1) meet the regulatory obligation to ensure supply reliability at the lowest cost to the ratepayer by maintaining specific levels of storage inventory; 2) avoid imbalance penalties and facilitate daily nomination changes, parking and lending services, and simultaneous injections and withdrawals; 3) ensure liquidity at market centres to help contain price volatility and maintain orderly gas markets; 4) offset the reduction in traditional supplies that were relied upon to meet winter demand; 5) increase the comfort inventory level of working gas or top gas; 6) offset, through the injection of more gas during the shoulder months, the growing summer peak impacts from electric generation; and 7) support other electric generation loads.

European Union

55. Directive 2003/55/EC provides for access to gas storage facilities on either a negotiated or regulated basis, leaving great flexibility to member states in the way third party access was implemented in the storage of gas. In the “third package”, the EC has proposed measures to define the requirements of storage operators and make access guidelines legally binding, along with legal unbundling of storage operators from supply.
56. The energy laws of **Germany, France, and Austria** provide for negotiated third party access to storage facilities on the basis of published conditions and tariffs. According to the **Danish** Natural Gas Act, all market actors have access to the storage facilities on a non-discriminatory basis, and storage facilities must be operated in a separate company (legal unbundling). Tariffs are published and are based on the costs of operation plus a fair return on the invested capital. Tariffs and access conditions are monitored by the regulator (DERA). In **Great Britain**, the presumption is for TPA, but new infrastructure has successfully applied for exemptions. In **Italy**, as with LNG, the AEEG determines tariffs for storage. In **Spain**, storage companies can neither develop any production or commercial activities, nor take shares of any company involved in these fields.

North America

57. There are over 390 underground storage facilities in the **USA**. Approximately 205 of these fields are under FERC jurisdiction, accounting for approximately 5.2 Tcf of total storage capacity and 2.5 Tcf of working gas capacity. The others are under the jurisdiction of state agencies. All or most of these facilities are, and always have been, privately owned, in some instances by the pipelines that inject gas into and out of storage. Stand-alone storage facilities, however, have been much more common in the past decade.
58. FERC treats storage as transportation and thereby applies its open access and rate regulation to storage providers. Unlike pipeline transporters, however, storage providers have been able to obtain authorization from FERC to charge market-based, as opposed to cost-of-service or cost-based, rates for their service. Recently, the Commission took a



further step to encourage the construction of natural gas storage facilities, which the Commission views as important to reduce natural gas price volatility and to support LNG imports, by approving a rule, Order No. 678, which provides that a company can receive market-based rate authorization even though it has not been able to demonstrate that it lacks market power, previously a pre-requisite for obtaining market-based rate authorization.

59. In **Canada**, where a transporter has both pipeline and storage facilities, gas storage and transportation may be provided for in a single agreement. Alternatively, a Gas Storage Agreement (GSA) may be executed as a stand-alone agreement with a gas storage provider. A GSA typically includes provisions relating to: term; storage fees; injection and withdrawal rates; delivery periods (such as winter withdrawal and summer injection); measurement; gas quality; point of delivery; risk and possession; security and credit support matters; billings and payment; representations; indemnities; default; interruption; and force majeure. Some gas storage facilities in Canada are regulated while others are unregulated.

South America

60. In **Argentina**, there is only one storage facility (in fact a peak-shaving facility) belonging to a distributor to meet its own peak period demand. In-field storage structures granted by means of a transportation concession under the Hydrocarbons Law would also be subject to open access.

Asia

61. Because of its geology, **Japan** has almost no underground storage facilities of natural gas in its gaseous state.
62. In **Korea**, KOGAS's storage capacity equals five days of supply at peak winter demand. If there is a disruption to either the supplies of LNG or the transportation and distribution system, this amount of storage may not be sufficient for domestic heating and electricity supplies.

MARKET DESIGN (WHOLESALE MARKET DESIGN CHARACTERISTICS, TRADING POINTS)

63. **Introduction.** "Market" is a term often misused or overused, and frequently means different things to different people. For the purposes of this discussion, "market" and "market design" implicate competition for the commodity of natural gas and certain rules that may apply to the operation of that competition, respectively. A trading point or hub is also a term that is not precisely defined. It normally refers to a physical area where, because of a confluence of interconnected systems, natural gas is traded and priced. These areas have been identified by some trade publications, which publish the prices on a regular, sometimes daily, basis. Natural gas markets and market design are in varying degrees of development around the world, as outlined below.

European Union

64. In the **EU**, ownership and structures historically derived from national situations, rather than having a standard design or ownership structure across Europe. Markets are essentially still national in character, with in some areas limited interconnection. A number of trading hubs have, however, emerged, and there are industry and regulatory initiatives to foster the development of regional markets.



65. Directive 2003/55/EC sets out the common rules for the internal gas market. New rules are expected to take effect resulting from the EC's proposed directive of 19 September 2007. Also of particular relevance is Regulation 1775/2005 on access to gas transmission networks. These rules determine the framework for wholesale market design at the EU level. In addition, European regulators are involved in a series of regional market initiatives, determining the framework for market integration at the regional level. This work is at a comparative early stage, and is expected to be taken forward within the 'third package' which is intended to facilitate such work.
66. Because regional markets are still in their nascent stage, and the volume and liquidity of trading points throughout the EU is highly variable, the state and design of market structures vary considerably from country to country. For instance, in **Great Britain**, the wholesale market structure is mature and effective. Market players participate at an EU level in the North/North West regional market initiative. The wholesale gas market, overseen by Ofgem, is characterized by a single, liquid, trading hub, with daily balancing and cash-out regime, cash-out prices which are market-related in accordance with provisions in the Unified Network Code (UNC). The **Netherlands** is a bit less developed. While there are many shippers and retailers, there are three main suppliers of the Dutch gas market with a market share of approximately 80% of the small consumer segment. For the Dutch industrial and power market, the situation is better because it is easier for parties to source high calorific gas from the United Kingdom, Norway or small offshore gas fields.
67. In other countries, markets and hubs are much newer. In **Denmark**, the TSO established a national hub in March 2008 to secure transparent wholesale prices. A second market for transport capacities and for storage capacity is also available. Similarly, the **French** gas wholesale market is still at an early stage and only represents a very small share of total supplies. Though an organized market was launched by Powernext with GRTgaz participation in November 2008, traded gas is generally over the counter (OTC) and supply governed largely by long-term contracts. The **Italian** gas market continues to be dominated by Italy's three large gas players: ENI, ENEL, and Edison, and long-term contracts still account for the vast majority of trading, with spot contracts (with a validity period of one year or less) accounting for a mere 5% of the market. **Spain** has had an active OTC market since 2000, and in late 2005, Enagás launched a trading platform (MS-ATR) to track gas ownership in the system and to facilitate screen-based trading between shippers at both virtual and physical facilities (including transmission, regasification and underground storage). Similar to Italy, however, roughly 95% of gas consumption is still traded in long term contracts between producers and suppliers.

Russian Federation

68. The Russian gas industry has traditionally been a three-tier system: the domestic gas prices were considerably below those paid by CIS-member states, which were again substantially lower than the prices quoted to European consumers. The export price was based on a formula that indexed a basket of oil products, while the domestic price was regulated by the government and set by the federal regulator. In essence, Gazprom subsidized the loss-making domestic market with export revenues.
69. The government has announced that it intends to raise the domestic prices for non-residential consumers to equal net-back export prices. The spot market has also continued to develop, albeit somewhat slowly, and in 2008 [up to 15 bcm] was sold on the electronic trading platform of the spot market. That said, in 2007, some 100 bcm was sold by independent gas producers in the unregulated market. As this segment grows, Gazprom's commitment to the regulated market may reduce, allowing independent producers to capture a larger market share of the domestic supply, whilst Gazprom may



be able to commit more volumes to the export market, meeting growing European demand and committing more investment into exploration and production.

North America

70. There is, as a practical matter, an unregulated market for the commodity of natural gas sold at wholesale in the **USA**. Natural producers and other sellers set the “rate” or “price” at whatever the market will bear. The market is considered to be robust. Nevertheless, the sellers are subject to a variety of rules set by the Federal Energy Regulatory Commission and the Commodity Futures Trading Commission that prohibit manipulation of the wholesale market.
71. Natural gas market participants in the United States are many and varied. There are the traditional players – producers, gatherers, processors, marketers, pipelines, and distributors. Recently, traders, hedge funds, financial institutions, and asset managers have entered the natural gas market as well. Most of the natural gas market participants in the USA are privately or investor owned companies. Some are part of large holding companies. Some are owned by foreign interests.
72. The U.S. Department of Justice and the Federal Trade Commission administers the USA’s anti-trust laws involving interstate commerce. FERC administers the laws involving the interstate transportation of gas and, more to the point, the new anti-manipulation laws. The Commodity Futures Trading Commission (CFTC) oversees the futures market in natural gas. No Federal (or state) agency currently oversees the over-the-counter market in natural gas, although legislation is pending in the U.S. Congress that would grant some authority in this regard to the CFTC.
73. Natural gas produced in **Canada** is normally sold by hundreds of producers to one of the dozen or so main gas marketing companies, although some of the larger producers have their own gas marketing affiliate. Gas marketers sell the natural gas on a commodity basis, utilizing financial derivative tools such as swaps, options and collars to allocate and manage financial risk.

South America

74. The unfavourable gas price environment in **Argentina** since the economic crisis of 2002 for producers has acted to discourage gas development activities. The government prohibition on distribution companies passing through price increases required by producers, made it impossible for producers to apply any increase in the wellhead price to residential consumers. As a result, supplies of gas in the country have failed to keep up with increased demand for gas. The result is a natural gas and power supply shortage. Since the beginning of 2004, the Argentine government has taken several steps in an effort to prevent shortages. Gas exports to Chile have been curtailed and the country entered into agreements to import natural gas from Bolivia at prices exceeding significantly prices for gas produced in Argentina and more recently importing LNG through the rented, floating LNG facility mentioned above.
75. The Government agreed with gas producers to a mechanism to supply gas to the domestic market, and defining which sectors of the market will have priority during periods of peak demand. During such periods, the residential market will have first priority. Natural gas production in excess of those volumes distributed to residential markets can be sold to electric power generators at regulated prices, and industrial customers at freely negotiated prices. For large consumers (except consumers of CNG for vehicles and power plants), the wellhead gas price has been deregulated. Nevertheless,



the natural gas price for these large consumers cannot be higher than the export parity price (net of tax on exports).

76. Natural gas has experienced a significant increase in market share in Argentina in recent years reaching more than a half of total national energy consumption, which is greater than the comparable percentage for worldwide energy consumption. Despite the relatively high market share for natural gas in Argentina as compared to other countries, significant additional potential demand for natural gas exists as a result of recent growth in the Argentine economy and the constraints on the supply of natural gas resulting from governmental pressures on increases in the wellhead price of natural gas, as well as limits on increases in the transportation and distribution tariffs.

Asia

77. In **Japan**, only four percent of natural gas consumption is produced domestically. Japan lacks the integrated pipeline infrastructure of the US or EU. As a result a substantial wholesale market in Japan has yet to develop. That said, liberalization of the gas market in April 2007, allowing a consumer with more than 100 thousand cubic meters or more of received gas to choose their supplier (as opposed to the earlier threshold, established in 1995, of 2 million cubic meters or more) has caused new entrants in the deregulated wholesale market to capture roughly a 10% market share.
78. **Korea's** gas market is currently dominated by KOGAS, the state gas company, which has control over nearly all gas imports. Traditional, top-down government control of the gas industry has promoted security of supply. Currently, the gas market is caught between vertical integration and competition, with potential adverse effects on the procurement policy of KOGAS as it has discouraged the company from signing long-term LNG supply contracts. Korea is more active in the spot LNG market than its neighbour, Japan, largely because of Korea's very seasonal demand for gas. Korea buys spot gas in winter in addition to its take-or-pay commitments, which are sufficient for gas demand in the summer.

SECURITY OF SUPPLY

Introduction

79. Axiomatically, policy makers worldwide want to ensure that their people have a secure supply of natural gas. Some of them in areas such as the EU and the USA have decided that the best way to ensure greater security of supply is to establish a competitive market, which can also improve the conditions for investments in power plants and transmission networks, and thus help avoid interruptions in power or gas supplies. Regardless of this objective, the measures these policy makers take relate in large part to their proximity to the natural gas fields. Thus, for example, the USA's policies encourage the construction of a strong transportation and storage infrastructure to move the supplies to market and to ensure that use of existing capacity is maximized through an aggressive capacity release program. A country without domestic production may have to focus on other aspects of the value chain to encourage security of supply, including, for example, developing incentives for a diversified portfolio of supply options or ensuring a fair system of curtailments.

European Union

80. Directive 2004/67/EC deals specifically with measures to safeguard security of natural gas supply. This Directive establishes a common framework so that Member States can define general security-of-supply policies that are transparent and uniform. Member



States undertake to protect the supply of gas to domestic consumers, for instance in the event of extremely cold weather conditions. To this end they are required to ensure that supplies for household customers inside their territory are protected at least in the event of: (1) a partial disruption of national gas supplies during a period to be determined by Member States taking into account national circumstances; (2) extremely cold temperatures during a nationally determined peak period; (3) periods of exceptionally high gas demand during the coldest weather periods statistically occurring every 20 years. At the same time, Member States may: (1) extend the scope to small and medium-sized enterprises (SMEs) and other customers that cannot switch their gas consumption to other energy sources; (2) set or require the industry to set indicative minimum targets for a possible future contribution of storage, either located within or outside the Member State, to security of supply; (3) take the appropriate measures in cooperation with another Member State, including bilateral agreements, to achieve the security of supply standards using gas storage facilities located within that other Member State; (4) set or require the industry to set indicative minimum targets for a possible future contribution of storage, either located within or outside the Member State, to security of gas supply; (5) adopt and publish national emergency provisions.

81. In addition to these provisions, the gas directive (2003/55/EC) and the “third package” have provisions related to regional co-ordination and solidarity. The latter includes the development by European Transmission System Operators of a 10-year plan.
82. The implementation of 2004/67/EC country by country underscores its basic framework. For instance, **Denmark** requires two things of the TSO. First, in the case of very cold days (below – 14 C), the TSO must be able to supply all non-interruptible customers for 3 days in the case of any interruption of the supplies. Second, in the case of offshore supply interruption, the TSO must also be able to supply these customers for 60 days in a normal winter. To meet this obligation the TSO reserves approximately 25% of the Danish storage capacity. The costs of the emergency supply obligation are included in the transmission tariffs and are thus paid by all the users of the transmission system. In **France**, an operator must guarantee a certain amount of diversification in its entry points of natural gas on the French market to be authorized to supply natural gas. In the **Netherlands**, the manager of the national gas transmission network is responsible for reserving volume and capacity at low temperatures and is required to charge tariffs which are in line with the European market for the supply of gas during peak demand. In **Spain**, all agents incorporating gas to the system must: (1) maintain minimum security stocks of 20 days to final consumers throughout the year; and (2) diversify supplies so that the proportion from any major country supplying the Spanish market should not exceed 50%.

North America

83. The **USA** has been fortunate to have had an ample supply of domestic (and Canadian) natural gas for most of its history. Only in the last few years has the country realized that it may need to supplement that supply with natural gas from other sources. Accordingly, as described above, FERC changed its policy—a change embodied in the Hackberry doctrine—toward the development of LNG terminals. The USA also has considerable supplies of natural gas on the north slope of Alaska, and Congress has passed legislation to encourage the development of a transportation system to bring that gas to the lower-48 states. There is no definite time; however, for the completion of such a system as the development costs are staggering. It is noteworthy that the higher prices of natural gas in the past few years have significantly incentivized exploration and development of supplies in previously uneconomic areas, e.g., the Western Rockies and the Texas Barnett Shale area. Major pipeline construction projects are underway to bring that gas to market.



South America

84. As a result of the devaluation of the **Argentine** peso in early 2002, natural gas became, by far, the cheapest fuel due to the freezing of transportation and distribution tariffs and the lack of adjustments of both tariffs and wellhead gas prices to residential consumers. As a consequence the total cost of gas to end-users in Argentina, based on energy content, is currently significantly lower than other alternative fuels, generating, among others, a sharp increase in compressed natural gas (CNG) consumption for vehicles.
85. Given the combination of rising demand and lower investments in exploration, production, transportation and distribution of natural gas, the Argentine Government created certain measures to address the shortage of gas offers, such as: (i) a consumption regime created pursuant to which residential and other users receive certain discounts or are surcharged compared to their past consumption of natural gas, and (ii) a regime of cuts to the transportation and distribution services was implemented to guarantee the supply of natural gas to non-interruptible users in peak periods. Further, the Argentine Government is pursuing the construction of a new pipeline to import 20 MMm³/d (706.2 MMcf/d) of natural gas from Bolivia, and is carrying out feasibility studies to analyze the construction of LNG receiving terminals to help meet the growing demand for natural gas in the winter. Since 2008, a rented, floating LNG facility has been used for LNG imports to cover peak demand.

Asia

86. **Japan** takes advantage of a diversity of LNG sources, contract flexibility, and spot market purchases to ensure supply. Almost all of Japan's gas is imported as LNG from eight countries: Indonesia, Australia, Malaysia, Qatar, Brunei, United Arab Emirates, Oman, and the United States. Voluntary stockpiling at LNG terminals is equivalent to roughly 20-30 days of consumption. From the viewpoint of the domestic supply infrastructure, the government is offering low-interest loans and tax benefits for the development of gas pipeline networks.
87. LNG will continue to supply nearly all of **Korea's** gas needs. In recent years, KOGAS, the state-owned gas company, has changed from its old policy of signing long-term take-or-pay deals to a more flexible policy that relies increasingly on shorter-term contracts and spot purchases. As a result, projected gas demand compared to existing long-term contracts indicates a growing supply gap. Projections indicate that the shortfall may be as much as 8 Mt per year by 2010. Currently, the bulk comes from four countries, namely Indonesia, Malaysia, Oman and Qatar, which together supplied over 90% of total LNG imports in 2004. Complementing its overseas oil development projects, Korea is securing over 90 million tons (Mt) of gas, or 120 billion cubic meters (bcm), equivalent to about four years of annual LNG imports. The government is also working to improve natural gas security through additional storage capacity. It plans to increase its total storage capacity rate from 8.8% of annual consumption to 12.7% by 2017.

ENFORCEMENT

88. Enforcement of the regulatory requirements and policies discussed above varies from jurisdiction to jurisdiction. In the **USA**, for example, FERC may enforce compliance with these requirements, including the imposition of up to a penalty of \$1 million a day per violation. FERC has similar authority to police compliance with the prohibition against undue discrimination. Other countries have similar authority in the sense that they can impose fines for failure to follow the rules. For example, in **Great Britain**, breaches of license requirements are pursued by the energy regulator, Ofgem, and may result in



finances. Ofgem also holds concurrent powers with the competition authority (OFT) in the case of infringements of competition law. Also, in **Denmark**, DERA, an independent authority composed of seven members supported by a secretariat, is responsible for regulating the energy markets, supervising access conditions and tariffs to networks and storages. DERA may ask for all types of data and information from the gas operators and can make decisions, audits and fines to secure a competitive gas market. Likewise, in **France**, the CRE, an independent administrative authority composed of nine members, is responsible for regulating the energy markets (including natural gas) and in particular supervising access to the natural gas transmission and distribution networks (tariffs, conditions, complaints regarding third party access). The CRE issues operating rules for the market and has powers to control, audit, and penalize the gas operators. In addition, a committee fully independent of the CRE was instituted for the settlement of disputes and for sanctions in 2007. The CRE guarantees the independence of system operators by demanding and reviewing from each network operator a document called a Code of Good conduct. Each year CRE publishes a report on compliance with these codes along with an assessment of the independence of system operators. If the DSOs are insufficiently independent, the CRE has the power to inquire and penalize any cross subsidy, discrimination or restriction on competition.

89. In many other jurisdictions, the enforcement of the unbundling and TPA requirements appears to be in the hands of the authorities that oversee competition and anti-trust laws. This is understandable in large part because these requirements are inherently bound up with the prohibition against undue discrimination and anti-competitive activity. Notably, too, the European Commission has proposed the Agency for the Cooperation of European Regulators to address gaps in cross border regulation, hopefully leading to enhanced energy trading opportunities and a broader European energy market.

PART 2

Role of Harmonized Business Practices in Natural Gas Regulations of the Future

HARMONIZATION OF NATURAL GAS BUSINESS PRACTICES

90. Harmonization of business practices in the natural gas industry can provide a number of benefits in natural gas markets, particularly in markets where there is some level of unbundling and/or competition. By creating uniform business practices and operational rules that result in a common understanding of natural gas products, services, operational procedures, and requirements, harmonization can:
- strengthen the security of energy supply by introducing new and/or additional supplies into a natural gas market;
 - increase the interoperability of natural gas pipelines that cross or interconnect at regional or country borders;
 - provide incentives and fair access to potential investors in natural gas infrastructure;
 - remove barriers of entry and access to the natural gas market;
 - improve communications among natural gas market participants;
 - streamline operational procedures and ensure compatibility among natural gas market participants' systems;
 - create a more efficient natural gas marketplace that is subject to lower costs and increased automation;
 - develop a more level playing field for smaller and/or new natural gas market entrants; and
 - increase reliability and accountability for wholesale and retail natural gas customers.



91. In 2000, the German National Standards Body determined that the direct economic benefit of standardization generally was 1% of Gross Domestic Product. A 1% savings in the natural gas industry world-wide would result in billions of dollars of savings. Harmonized natural gas business practices should not only result in better integration among different segments of an unbundled and/or competitive natural gas industry, but also should improve the interoperability of natural gas markets at geographical borders. As the American National Standards Institute has stated: "Far from impeding business, standards actually break down barriers to trade, provide industry stability, and encourage commerce. Standards are the foundation for innovation, so they hasten the rate of implementation of new technology. Technical standards should be building blocks used to advance the natural gas industry."
92. In contrast, different or non-uniform natural gas business practices within a country or region where there are multiple natural gas market participants can be real barriers to the creation of a successful unbundled and/or competitive natural gas market.
93. Although a number of benefits can and should result from the harmonization of certain natural gas business practices, there are potential costs and potentially detrimental impacts that must be considered and addressed when a country or region is determining how and whether to require the harmonization of certain natural gas business practices. Specifically, the natural gas industry and the appropriate regulatory agencies should determine whether harmonizing a natural gas business practice will be costly, cause delay, hamper competition, benefit larger companies to the detriment of smaller companies, discourage innovation and creativity, and/or limit choices. However, with proper planning, including but not limited to coordination and cooperation by the various natural gas industry segments and the national/regional regulatory agencies, each of these concerns can be addressed.
94. As competition and unbundling in the natural gas markets have developed throughout the world, different approaches have been used to develop harmonized natural gas business practices. Three of the major models include: (1) the essentially voluntary model that has occurred to-date in the European Union; (2) the private-public partnership model that has occurred in the United States; and (3) the co-regulatory model that has developed in New Zealand.
95. The natural gas business practices discussed in this report are distinct from the International Organization for Standardization's (ISO) international technical standards for the natural gas industry. The ISO's international standards provide a common technological language and are generally technical in nature, such as the standard setting forth the means to determine the amount of energy in natural gas by measurement or by calculation. The ISO is a non-governmental organization, whose membership includes the national standards institutions of 157 countries. Individuals and businesses are not eligible for ISO membership, but they can participate in the ISO's work. The ISO's international standards are developed by technical committees that include experts from the relevant industrial, technical and business sectors along with representatives of government agencies, testing laboratories, consumer associations, non-governmental organizations and academic institutions. Harmonized natural gas business practices for countries and/or regions and the ISO's international technical standards (along with similar technical standards developed at a country and/or regional level) are both necessary for the development of efficient and competitive natural gas markets.

PURELY VOLUNTARY MODEL OF HARMONIZATION

96. To-date, the development of harmonized natural gas business practices in the European Union has been largely based on the voluntary efforts of various natural gas industry and



regulatory groups. As a result, Europe still lacks in many aspects a common set of natural gas technical or market business practices. Recognizing that a lack of natural gas business practice harmonization has been a barrier to developing a single internal natural gas market in Europe, the European Commission currently is considering, as part of its proposed Third Energy Packages, the creation of the Agency for the Cooperation of European Regulators (Agency) to advise the European Commission regarding natural gas market regulations, to develop non-binding guidelines of good natural gas practices, and to make specific technical decisions regarding cross border issues. However, as proposed, the Agency would not undermine the independence of the national regulatory agencies, but instead would review any national regulatory agency decisions that directly impact the development and operations of a single internal natural gas market in Europe.

The European Union's Historical Approach to Natural Gas Business Practices

97. As one of the leading proponents of harmonized natural gas business practices in Europe, the European Association for the Streamlining of Energy Exchange – gas (EASEE-gas) was created in 2002 to simplify, harmonize and streamline Europe's natural gas business processes. EASEE-gas is a voluntary, natural gas industry organization that includes producers, transmission pipelines, distributors, traders/shippers, marketing and billing service suppliers, retail marketing and billing service suppliers (an inactive segment), end users, and LNG terminal and storage operators and service providers. EASEE-gas also includes non-voting, advisory associate members. EASEE-gas is funded through annual membership fees.
98. Originally, EASEE-gas included nine working groups that worked on specific topics, such as gas quality harmonization and business rules, with participation in the working groups limited to paying members. In the Spring of 2008, EASEE-gas changed its working group structure to include four broadly-defined working groups. To-date, EASEE-gas has developed [thirteen common business practices] on various issues, such as gas quality, business rules, EDI standards for data exchange, harmonization of units, etc. Not all of the common business practices developed by EASEE-gas have been implemented in all of the European Union countries.
99. Other major natural gas industry efforts related to the harmonization of natural gas business practices in the European Union include the efforts by Gas Infrastructure Europe (GIE) and the European Federation of Energy Traders (EFET). GIE is a European association of 57 companies that own and/or operate basic natural gas infrastructures (such as transportation networks, regasification plants and underground storage facilities) in 27 European countries. GIE carries out initiatives designed to, among other things, promote interconnections and harmonization between national European natural gas markets. EFET is a group of more than 90 energy trading companies from 23 European countries that is dedicated to stimulating and promoting energy trading throughout Europe. The activities of EFET include, among other things, the standardization and harmonization of contracts.
100. In addition to the natural gas industry efforts promoting harmonization, the European Regulators Group for Electricity and Gas (ERGEG), an independent advisory group to the European Commission, has facilitated coordination and cooperation among the national regulatory agencies and the European Commission regarding natural gas issues. ERGEG also has issued non-binding natural gas guidelines and has developed natural gas recommendations for the European Commission.
101. Another official European body that has contributed to the harmonization of natural gas business practices in the European Union is the European Committee for Standardization (CEN). CEN was founded in 1961 by the national standards bodies in the European



Economic Community and EFTA countries. CEN develops voluntary technical standards, including harmonized gas quality specifications applicable to the cross-border trading of gas throughout the European Union. Similarly, Marcogaz is involved in the drafting of European legislation, standards and accreditations related to safety, the responsible use of energy, and the protection of people and the environment in the fields of natural gas transportation, distribution and utilization.

102. Finally, the European Gas Regulatory Forum of Madrid (Madrid Forum) was developed in 1999 for participants to meet twice a year to discuss issues regarding the creation of a true internal European gas market. The Madrid Forum's participants are national regulatory authorities, European Union Member States, the European Commission, transmission system operators, gas suppliers and traders, consumers, network users, and gas exchanges. The Madrid Forum has focused on issues such as cross border trade of natural gas, the allocation of interconnection capacity, and barriers to natural gas harmonization. The Madrid Forum's participants developed the Guidelines for Good Practises (GGPs) for access to basic gas infrastructures, which since have become European Union regulations applicable to natural gas pipelines.

The European Union's Harmonized Natural Gas Business Practices

103. Although the efforts by the various natural gas industry and regulatory groups have lead to some success in the development of harmonized business practices in the European Union, Europe still lacks in many aspects a common set of natural gas technical or market business practices. Instead, natural gas business practices generally are applicable on a national basis and/or implemented on a voluntary basis by transmission pipelines. Although many of the more harmonized natural gas business practices adopted by the national regulatory agencies and/or by the natural gas market participants are based on the recommendations from the various natural gas industry efforts, the voluntary and non-binding nature of the harmonization efforts in the European Union has resulted in natural gas business practices that (i) do not address all areas that should be harmonized in order to create a single internal natural gas market in Europe; (ii) are not legally binding or enforceable; and/or (iii) are not compatible with each other.
104. For example, most natural gas markets in Europe are using normal m3 as the unit of measurement. However, Italy, the United Kingdom and Ireland use standard m3 as the unit of measurement. Legislative changes, network code changes, and/or contractual and system changes are required for normal m3 to be used as the unit of measurement throughout the European Union. Another example of a harmonized natural gas business practice that has not been implemented in all of the Europe Union countries is a common business practice for nomination deadlines. Central Europe and northern Europe are using or are in the process of implementing a harmonized nominations business practice. However, other countries in Europe are still in the planning stage, while others will require legislative, regulatory, contractual, and/or network code changes before a harmonized business practice can be implemented.
105. Due to the difficulty that the European natural gas industry has experienced in its attempts to implement harmonized business practices across Europe, it appears that voluntary compliance commitments are not sufficient. Compliance with the voluntary, non-binding harmonized business practices has been patchy across the European Union. Voluntary industry efforts have been unsuccessful in addressing the various legal, regulatory and/or contractual barriers that have been impeding the harmonization of natural gas business practices throughout the European Union and indicate that such barriers may need to be addressed through binding requirements and mandatory implementation.



Evolution of the European Union's Approach to Harmonized Natural Gas Business Practices

106. The European Commission has recognized that the use of a purely voluntary model to develop and implement harmonized natural gas business practices in Europe has led to inconsistent implementation across the European natural gas market. Thus, as part of the European Union's mission to develop a single internal natural gas market, the European Commission has identified the technical and commercial barriers to cross border natural gas exchanges as issues that must be addressed in order to allow a single internal natural gas market in Europe to develop fully.
107. As part of the European Commission's proposed Third Energy Package, which is currently being considered, the European Commission has proposed the creation of the Agency for the Cooperation of European Regulators (Agency). The Agency would be an independent mechanism for the European Union's national regulatory agencies to cooperate, to advise the European Commission regarding natural gas market regulations, to develop non-binding guidelines of good natural gas practices, and to make specific technical decisions regarding cross border issues. While the Agency is designed to not undermine the independence of the national regulatory agencies, the Agency would have the ability to review any national regulatory agency decisions that directly impact the development and operations of a single internal natural gas market in Europe.
108. In addition, the proposed Third Energy Package also requires improved cooperation among the natural gas transmission pipelines to develop harmonized natural gas market and technical business practices. If the market or technical business practices developed by the natural gas transmission pipelines do not ensure non-discrimination, effective competition and/or efficient market functioning, then the Agency and/or the European Commission would have the option to become involved. Specifically, in a framework of stakeholder consultation, the natural gas transmission pipelines would develop and submit annual work plans, priorities, and draft market and technical business practices to the Agency for comment. If the natural gas transmission pipelines do not agree on harmonized market or technical business practices or do not implement the necessary harmonized business practices, then the European Commission would have the authority to adopt the necessary business practices. Similarly, the Agency could recommend changes or natural gas business practices to the European Commission for consideration and adoption.
109. The European Commission's current focus is to develop an internal wholesale natural gas market in Europe; however, a longer-term goal of the European Commission is to create gradually a competitive and efficient European retail natural gas market. The European Commission recognizes that the development of a European retail natural gas market requires the gradual harmonization of the natural gas market rules in order to facilitate the development of cross border retail natural gas markets.

PUBLIC-PRIVATE PARTNERSHIP MODEL OF HARMONIZATION

110. In the United States, the primary approach for the development of wholesale natural gas business practices is a voluntary model; however, once wholesale natural gas business practices are developed by a voluntary organization, the North American Energy Standards Board, the national energy regulatory agency reviews the wholesale natural gas business practices and requires implementation of the business practices, either as proposed or as revised by the agency based on public comment.
111. In the United States, harmonized wholesale natural gas business practices were the result of the national energy regulatory agency (the Federal Energy Regulatory



Commission) requiring transmission pipelines to develop electronic bulletin boards and to post their available capacity along with other information about their systems on the electronic bulletin boards. Specifically, in 1992, the United States Federal Energy Regulatory Commission required the unbundling of all of the transmission pipelines, such that the transmission pipelines would no longer provide natural gas sales or supply service and required the transmission pipelines to make certain information regarding their transmission services available electronically. In 1993, the United States Federal Energy Regulatory Commission established working groups to develop the requirements for the pipelines' electronic bulletin boards; however, the working groups were unable to agree as to whether a common set of electronic standards should be required for all wholesale transmission pipelines or if each pipeline should be allowed to develop its own electronic standards. In response to the working groups' unsuccessful efforts, the United States Federal Energy Regulatory Commission notified the natural gas industry that if the industry was unable to reach a consensus on voluntary electronic commerce business practices, the agency was prepared to develop and impose such business practices. At the same time, another United States national energy agency (the United States Department of Energy) proposed the concept of a national natural gas standards board.

112. In response to the two United States national energy agencies' efforts to develop a seamless natural gas transportation grid in the United States, a number of natural gas industry organizations that represented the transmission pipelines, the producers, and the distribution companies created the Gas Industry Standards Board (GISB) (which subsequently became the North American Energy Standards Board (NAESB)). In 1996, GISB developed and submitted to the United States Federal Energy Regulatory Commission 140 proposed wholesale natural gas business practices, which the United States Federal Energy Regulatory Commission subsequently adopted as mandatory requirements for the transmission pipelines.
113. It is worth noting that although the United States has developed and implemented hundreds of harmonized natural gas business practices for the wholesale natural gas industry, not all wholesale natural gas business practices (such as gas quality requirements) have been harmonized. In addition, although the North American Energy Standards Board has developed some voluntary harmonized retail natural gas business practices, neither the national energy regulatory agency nor most of the State regulatory agencies have required the implementation of harmonized retail natural gas business practices. At most, some States have required the implementation of some harmonized retail natural gas business practices in their State; however, there has been no adoption of national harmonized retail natural gas business practices in the United States.

United States' Approach to Natural Gas Business Practices

114. The mission of the Gas Industry Standards Board (GISB), which subsequently became the North American Energy Standards Board (NAESB), is to "develop and promote standards to simplify and expand electronic communications, and to simplify and streamline business practices that will lead to a seamless marketplace for natural gas. These standards will assist the natural gas industry in improving customer service, enhancing the reliability of natural gas service and increasing the competitiveness of natural gas markets." The standards developed by GISB/NAESB are voluntary electronic communication business practices and information exchange requirements for the United States' wholesale natural gas industry.
115. To achieve its mission, GISB/NAESB's wholesale natural gas quadrant includes representatives of all of the wholesale natural gas industry segments, including transmission pipelines, producers, end-users, services (which includes marketers, financial services, law firms, consultants, and software developers), and distributors. All



votes are subject to a balanced voting process. In order to have a vote on the final harmonized business practice, a company must be a paying member of GISB/NAESB; however, any company may participate and vote in the working group sessions in which a harmonized business practice is developed. GISB/NAESB also has a non-voting advisory panel and requests comments from national and State regulatory agencies. The annual membership fees, plus fees for products, finance the activities of GISB/NAESB.

116. To-date, GISB/NAESB has adopted hundreds of wholesale natural gas business practices and has published eight versions of its wholesale natural gas standards manual. GISB/NAESB also has developed standardized agreements, including a base purchase and sale agreement, an operational balancing agreement, a gas funds transfer agency agreement, an EDI trading partner agreement, and a day trade interruptible contract. The GISB/NAESB harmonized business practices have “regularized the means by which the entire industry conducts business across the interstate pipeline grid” and, thus, has helped foster a seamless and internal wholesale natural gas market. For example, as a result of the GISB/NAESB harmonized business practices, the New York Mercantile Exchange has reduced the trading cycle for gas futures from five (5) days to three (3) days.

United States’ Natural Gas Business Practices Harmonization

117. Although participation in GISB/NAESB is purely voluntary and is primarily self-funded by its membership, a key element of the successful implementation of harmonized wholesale natural gas business practices in the United States has been the fact that the national energy regulatory agency (the United States Federal Energy Regulatory Commission) has required the implementation of most of the harmonized wholesale natural gas business practices, as proposed by GISB/NAESB or occasionally as revised by the United States Federal Energy Regulatory Commission based on public comment. Following public comments and any necessary revisions, the GISB/NAESB harmonized business practices (but not the standardized agreements) have been adopted by the United States Federal Energy Regulatory Commission as binding requirements that must be implemented by the transmission pipelines.
118. In addition to adopting most of the GISB/NAESB harmonized business practices after they are subject to public comment, the United States Federal Energy Regulatory Commission also has requested reports, comments and feedback from GISB/NAESB over the years on various business practice issues. The United States Federal Energy Regulatory Commission also has provided guidance to GISB/NAESB in an effort to eliminate or reduce policy disputes among the different natural gas industry segments. Furthermore, on occasion, the United States Federal Energy Regulatory Commission has decided to defer its own development of certain mandatory wholesale natural gas business practices until after it has provided GISB/NAESB an opportunity to develop the business practices.
119. Adopting wholesale natural gas harmonized business practices developed by the natural gas industry has allowed the United States Federal Energy Regulatory Commission to adopt natural gas business practices that largely are prepared by industry experts and, thus, have generally resulted in fewer objections by the natural gas industry. In addition, because the business practices are developed by the natural gas industry, they should be less ambiguous, more cost-effective, and based on real world conditions. The United States Federal Energy Regulatory Commission has recognized the value of GISB/NAESB, as well as the value of harmonized business practices being developed through industry consensus:

“As the Commission found in Order No. 587, adoption of consensus standards is appropriate because the consensus process helps ensure the reasonableness of the



standards by requiring that the standards draw support from a broad spectrum of all segments of the industry. Moreover, since the industry itself has to conduct business under these standards, the Commission's regulations should reflect those standards that have the widest possible support."

"Industry possesses specialized knowledge and expertise in the relevant technical areas, and the procedural process of consensus standards development helps ensure the process is open to all interested and that the standards reflect a consensus of these interests." (United States Federal Energy Regulatory Agency, October 29, 1996 Order 587-A, p. 7).

120. The United States government as a whole also has recognized the benefits of harmonized business practices:

"In S. 12(d) of the National Technology Transfer and Advancement Act (NTT&AA) of 1995, Congress affirmatively requires federal agencies to use technical standards developed by voluntary consensus standards organizations, like GISB, as a means to carry out policy objectives or activities." (United States Federal Energy Regulatory Commission, April 2, 1999 Order 587-K, pp. 3-4).

United States and Canada Natural Gas Business Practices Harmonization

121. In addition to there being multiple transmission pipelines in the United States that interconnect and cross borders at various locations through the United States and provide service to multiple producers, marketers, and distributors, a number of the transmission pipelines in the United States also interconnect with and/or flow gas from Canadian transmission pipelines. As a result, GISB/NAESB has an agreement with the Canadian EDI technical organization (GasEDI) to develop and maintain common North American information standards. The mission of GasEDI is to promote the development and implementation of North American business and electronic information standards. GasEDI cooperates with and supports NAESB.

122. An example of the harmonization and continuing evolution of United States-Canada cross border natural gas business practices is the development of the standardized base contract for sale and purchase of natural gas. In 1996, GISB adopted a standardized agreement that was optional and voluntary, but has since become an industry norm in the United States. In 2000, GasEDI adopted a base contract for sales and purchases of natural gas, which was based on the GISB 1996 contract. According to GasEDI, the most significant differences between the two agreements were (i) the addition of language to be more consistent with Canadian commercial practices while also retaining the equivalent United States language; (ii) the addition of language that was similar to the GISB contract's special provisions; (iii) the addition of language addressing Canada's goods and services tax; and (iv) the addition of financial risk enhancements. In 2002, NAESB replaced the 1996 GISB base contract with an updated NAESB base contract. The 2002 NAESB base contract was updated to include an optional Canadian addendum, along with additional financial risk enhancements. According to GasEDI, the Canadian addendum added the most significant Canada-specific components of the GasEDI 2000 base contract. In 2005, GasEDI updated its 2000 base contract, with NAESB updating the NAESB base contract in 2006 in order to reflect typical special provisions that parties were adding to the 2002 NAESB base contract.

CO-REGULATORY MODEL OF HARMONIZATION

123. In New Zealand, in 2004, the New Zealand government made changes to the New Zealand Gas Act that established a role for an "industry body" to make recommendations



to the New Zealand Minister of Energy on a wide range of natural gas industry matters, including the making of rules and regulations in relation to the wholesaling, processing, transmission, distribution and retailing of natural gas. To meet this requirement, the Gas Industry Company, a private company with industry shareholders, was created and funded by a natural gas industry levy. New Zealand's co-regulatory model is essentially a partnership between the New Zealand government and the New Zealand natural gas industry where the New Zealand government sets natural gas policy objectives and the natural gas industry works together to determine the most effective means of meeting the government's natural gas policy objectives. The New Zealand Gas Act sets out the New Zealand government's overall policy objectives for the natural gas industry, and provides that a government Policy Statement can be issued from time to time to set more specific objectives and outcomes for the natural gas "industry body", i.e., the Gas Industry Company, to pursue. The Gas Industry Company has been responsible for the most recent efforts to harmonize natural gas business practices.

124. Before the introduction of the co-regulatory model in New Zealand, harmonization of the natural gas business practices began primarily as a self-regulatory initiative. The New Zealand natural gas industry had begun to make efforts to self-regulate. For example, the New Zealand Gas Industry Communications Standards Working Group, which included producers, pipelines, shippers and welded parties, worked to develop efficient, reliable, proven and low cost communication standards for the New Zealand natural gas industry. The Working Group's communication standards generally governed the exchange of information related to natural gas transmission commercial activities, such as forecasts, nominations, allocations, etc.

Evolution of New Zealand's Natural Gas Business Practices and Co-Regulatory Model

125. Although the natural gas industry's self-regulatory initiatives did result in certain harmonized business practices in New Zealand, it proved difficult for the New Zealand natural gas industry to achieve voluntary agreement on how to ensure compliance with the harmonized business practices. With the subsequent development of the co-regulatory model in New Zealand, the Gas Industry Company is able to recommend to the New Zealand Minister of Energy that natural gas business arrangements be placed in a regulatory framework and be subject to the appropriate compliance and enforcement provisions where necessary.
126. The Gas Industry Company's focus is to, among other things, improve retail natural gas market operations, enhance wholesale natural gas market trading arrangements, and address access to natural gas infrastructure. The New Zealand Minister of Energy adopts natural gas rules and recommends natural gas regulations to the New Zealand Governor-General; however, before certain types of natural gas rules or regulations are adopted by the New Zealand government, the New Zealand Energy Minister first must receive recommendations from the Gas Industry Company. The Gas Industry Company is subject to certain procedural requirements, including consultation, considering practical options (such as non-regulatory arrangements) and alternatives to regulations, performing a cost/benefit analysis, and taking into account the New Zealand government's Policy Statement on Gas Governance and the New Zealand Gas Act's policy objectives (which includes (1) ensuring efficient, reliable and sufficient natural gas deliveries and (2) minimizing barriers to natural gas competition).
127. In 2008, the New Zealand government issued a new Government Policy Statement on Gas Governance, which re-confirmed the 2004 Policy Statement's policy objectives. According to the 2008 Policy Statement, the Gas Industry Company's core focus for at least the next three years should be the development of the fundamental elements of a



well-functioning natural gas market. If the co-regulatory model is unsuccessful, the New Zealand government has stated that it may create an Energy Commission; however, for now, the Gas Industry Company is responsible for recommending wholesale gas market, natural gas distribution, transmission and processing regulations, rules, and non-regulatory arrangements to the New Zealand Minister of Energy.

New Zealand's Natural Gas Business Practices Harmonization

128. The New Zealand Gas Act provides that the natural gas "industry body", i.e., the Gas Industry Company, should promote access to essential natural gas infrastructure and to competitive natural gas markets, should minimize barriers to the upstream and downstream natural gas markets, and should reduce and manage the risks to natural gas supply security, including transportation arrangements. Recent examples of harmonized natural gas business practices implemented in New Zealand include the Gas Switching Rules of 2008 (which include standardized switching and registry requirements for retail natural gas consumers switching between retail natural gas providers, a central natural gas registry database, and a standardized data exchange process for switching natural gas consumers) and the Gas Downstream Reconciliation Rules of 2008 (which include uniform processes for allocating and reconciling natural gas at gate stations and at interconnects between high pressure transmission lines and lower pressure networks or major natural gas end-users).
129. In regards to the harmonization of wholesale natural gas business practices for the two major transmission pipelines in New Zealand, the Gas Industry Company is still reviewing and developing recommendations regarding how to improve transmission pipeline access, including changes to natural gas balancing arrangements, interconnections, and transmission services. Recommendations by the Gas Industry Company on wholesale natural gas issues are expected in 2008-2009.

LNG AND HARMONIZATION

130. Although the majority of the benefits related to harmonization of natural gas business practices discussed above relate to competitive and/or unbundled natural gas markets, the growth in LNG demand world-wide has increased the importance of harmonizing certain natural gas business practices and requirements in non-competitive or less competitive natural gas markets that import LNG. Because LNG is a commodity that is subject to world market dynamics, natural gas markets that utilize or would like to utilize imported LNG, particularly markets that also use indigenous or local natural gas, can benefit from harmonized gas quality and interchangeability requirements.

The Relationship Between LNG and Natural Gas

131. Because of the processing that occurs prior to and as part of the liquefaction process, imported LNG may be of a different quality than the typical indigenous natural gas of a LNG-importing country. For example, in some countries where there is local natural gas supply, there often also is a developed market for natural gas liquids, which results in the natural gas liquids being removed from the natural gas stream. However, there is not a local market for natural gas liquids in all of the LNG processing countries and, thus, natural gas liquids are not necessarily removed from the natural gas stream prior to the liquefaction process. Another example of the difference between local natural gas supplies and imported LNG involves the calorific density (BTU/gallon) of the gas supplies. Some importing LNG countries, particularly those without a large local natural gas supply, such as Japan, prefer higher Btu LNG because, among other things, a higher Btu content allows more Btus to be delivered per gallon and, thus, reduces delivery costs. However,



other importing countries with local natural gas supplies, like the United States, traditionally have relied on natural gas with a lower Btu than the Btu of most imported LNG and have designed and/or adjusted their turbines and electric generators based on the local natural gas supplies' lower Btu levels.

132. Because the demand for LNG is growing, countries needing LNG supplies, particularly countries that do not have their own local natural gas supplies or have a diminishing amount of local natural gas supplies, have been and/or are likely to impose as broad as possible gas quality specifications on LNG supplies. However, countries with local natural gas supplies have conflicting interests – they want to increase their energy security with access to new and additional sources of gas while also needing to take into account any local conditions, such as appliance or turbine gas quality limitations. Similarly, to the extent a transmission pipeline and a distributor are not owned by the same entity that owns the LNG import terminal, there is a need for harmonization among the transmission pipeline, the distributor, and the LNG import terminal regarding gas quality specifications.

Gas Quality Harmonization

133. The different regions of the world have approached the issue of gas quality and LNG imports differently. To-date, the issues are less pronounced for regions that have not had a long history of using local natural gas. Similarly, the issues have been less pronounced for regions or countries where the gas supply is single source and/or where the LNG terminals, the transmission pipelines (if any), and the distributors are owned and/or operated by the same entity. However, countries that have historically relied on local natural gas supplies that are decreasing and/or are no longer sufficient to meet the increased demand for natural gas have been forced to address the gas quality differences between local/historical natural gas and imported LNG supplies. In addition, the globalization of the LNG market also has caused some countries and regions to begin to revisit their gas quality business practices to take into account the gas quality business practices of other countries and/or regions.
134. With Europe as one of the major importers of LNG, EASEE-gas has developed voluntary common business practices for the harmonization of gas quality specifications for the European gas market. EASEE-gas' gas quality common business practices are designed to streamline interoperability at cross-border points in Europe and include gas quality parameters, parameter ranges and an implementation plan. The common business practices are limited to cross border and European Union entry points, including LNG import terminals, and do not apply to natural gas flowing within a country. The gas quality specifications also do not address production areas and isolated systems where production, transportation and utilization are combined. Each individual national regulatory agency is responsible for how to address any differences between its national gas quality requirements for natural gas flowing within the country and EASEE-gas' cross border point gas quality common business practices. In addition, some of EASEE-gas' gas quality common business practices were to be implemented in 2006, while others are not to be implemented until 2010.
135. As discussed above, the EASEE-gas common business practices remain voluntary and, thus, have not been adopted uniformly throughout the European Union. In some countries, the EASEE-gas gas quality common business practices have been implemented, partly implemented, or are in the process of being implemented. In other countries, the EASEE-gas gas quality common business practices have not been implemented because they require agreements with other countries and/or various system, legislative and/or regulatory changes. The EASEE-gas gas quality common business practices also have not been uniformly adopted throughout Europe because each European country has a significantly different history with natural gas. For example,



Spain and France have limited local natural gas supplies; in contrast, the United Kingdom has local natural gas supplies along with access to natural gas supplies from Norway. Recognizing the need to address gas quality interchangeability issues, the European Commission has directed the European standards organization (CEN) to develop common gas quality requirements, based on the EASEE-gas gas quality common business practices.

136. The United States, another importer of LNG, also has had to address the impact of LNG imports on transmission pipelines and distributors that have historically flowed local natural gas with different gas quality characteristics. In response to the growing demand for new LNG supplies in the United States, in 2004, a voluntary natural gas industry working group called the Natural Gas Council Plus (NGC+), which included representatives from LNG suppliers, transmission pipelines, generators, distributors, power generation, feedstock, appliances, and gas processing, developed gas quality interchangeability guidelines. In response to the NGC+ submitting in 2005 its gas quality white papers and interim guidelines, the United States Federal Energy Regulatory Commission issued a non-binding 2006 Policy Statement that encouraged the natural gas market participants to use the NGC+ interim guidelines as a common reference point to resolve gas quality and interchangeability issues, but did not require the NGC+ interim guidelines to be implemented on a national basis. Instead, the United States Federal Energy Regulatory Commission decided that it would consider transmission pipeline gas quality requirements on a pipeline-by-pipeline basis, with historical and local experience taken into consideration.
137. Both the United States and the European Union have recognized that they should develop gas quality and interchangeability requirements for LNG supplies in part because there are multiple market participants and different owners along the gas supply chain. To-date, the experience in the United States and in Europe with LNG imports and interchangeability requirements has been different than Japan's experience with LNG imports. At least part of the difference is due to the more integrated nature of the energy supply chain in Japan. In particular, in Japan, the local power generation companies often also own the LNG facilities and tankers and/or are partners with the natural gas distributors. However, the issue of gas quality and interchangeability requirements is likely to become a greater issue for Japan as the Japanese local power generation companies' long-term LNG supply agreements expire and the LNG sellers demand the contractual flexibility to source their LNG supplies from different sources, including sources that have different LNG gas quality characteristics.

CONCLUSION

138. Effective harmonized approaches to natural gas business practices are essential to underpin the efficient development of integrated natural gas markets. At a global level, a voluntary approach to harmonization, especially on LNG-related activities, will bring benefits and, thus, governments and the natural gas industry should cooperate to achieve progress. In some areas of the world, however, the rapid convergence of natural gas business practices is needed to deliver interoperability improvements in both competitive and cross border natural gas markets, irrespective of the need for LNG supplies. In these cases, unless a voluntary approach is able to bring timely results, then the answer better lies in binding solutions, reached on the basis of consultation by regulatory authorities with natural gas industry stakeholders.



PART 3

How will these developments impact on the gas industry chain?

139. From the foregoing analyses, it is evident that the gas industry is evolving globally and at regional level, and that to a large extent market regulation and standardization have driven and will continue to drive changes. As discussed above enforcement of competition legislation in the EU in particular is leading to enhanced trading opportunities and more open markets, a drive facilitated by increased harmonisation. In this respect, different supply patterns notwithstanding, there are growing similarities between EU and US markets. In other parts of the world, the industry's transformation is less marked, but because of the growing globalization of the gas business, the changes in the US and European markets are influencing thinking and practices of regulators and markets elsewhere. In turn there is evidence that the gas business is changing variously to meet new requirements or indirectly as a result of shifting strategies.

IMPACT ON GAS PRODUCERS

140. All producers-exporters have realized that their strategies need to take account of regulatory developments in the markets they supply and they are considering strategic responses. For example, they may have to take into account the impact of downstream market opening, which could result in lower gas prices, and potentially generate lower value for them. This could perhaps lead to problems of dwindling government revenues or affect the viability of investments aimed at developing new gas supplies. The volatility of recent oil-prices arguably weakens this impetus especially if an upward trend resumes, but on the other hand producers perceiving political concerns about the gas-oil price link may still wish to develop precautionary strategies. Liberalisation allows them to enter directly into the markets, and ensuring access to end users through different routes than those previously available will be a crucial move for producers.

141. Thus as traditional markets open up to competition, producers especially those exploiting large reserves are looking for opportunities to move downstream to achieve economies of scale, and to have more and more control in other parts of the total gas chain, to add value to their business, to create security of demand and for other long term ambitions. Some wholesale gas supply companies notably in the US see this tendency of producers to seek more downstream involvement as an opportunity for enhancing security of supply for their customers. Others, perhaps less sure of its implications, respond by seeking to enter into reciprocal cooperation in ventures upstream. Governments might respond in different ways too, perhaps in order to avoid too much dependency on major suppliers or to strengthen positions in geopolitical negotiations. Producers moving downstream will in turn have to adapt to the regulations of the local market, although the regulatory jurisdiction is necessarily limited.

IMPACT ON WHOLESALE GAS SUPPLIERS

142. As a result of the transition from monopoly to competition that is taking place in parts of the world, and the accompanying regulatory frameworks, significant changes are affecting the structure of the wholesale businesses. The changes are most marked in Europe, which is probably down to two principal factors. The first is that the transition from monopoly to competition has involved regulation covering a number of sovereign countries, with a view not only to creating competition within those countries' borders,



but an internal Community market. Secondly this policy objective was facilitated by a highly interlinked gas transport network in parts of the European continent.

143. The first step has often been to remove monopolies on wholesale supply, where it has existed. This was not a challenge for the US but was a necessary approach followed in Europe and Japan and Argentina but this is not enough in itself to change the market dynamics and it is often the accompanying measures that have the most significant impact.
 144. Sometimes the removal of monopolies has been accompanied by full or partial privatisation of state gas companies. It is not a prerequisite of liberalisation, but in practice the two often go together. Often privatisation results in drawing in new entrants to a market otherwise characterised by strong entry barriers, and with them their capital, business opportunities and investment funding.
 145. At the same time, there are perceptible counter-trends, especially encouraged by the new sensitivities about energy issues in the current geopolitical climate. State interest remains significant in a number of countries. In several European countries, there is also some element of control retained in the supply side, variously in the number of shares retained or by means of a golden-share system, designed to protect a company against foreign takeover or, within the restraints of competition law, other means to safeguard national interests.
 146. In those parts of the world, determined to move towards more gas to gas competition, the regulatory approach has been to seek to “unbundle” companies, that is separate their supply and transport businesses. Effective unbundling between supply and infrastructure activities is essential to ensure competition. Different forms of unbundling are found: accounting, legal, managerial and ownership unbundling. It is not the intention here to enter into the details of the unbundling debate. Whatever form effective unbundling takes, it has an important impact on company structures and the overall shape of the industry.
 147. Logic favours that the parts of the chain which are natural monopolies should be regulated and monitored, and this is generally infrastructure, while regulation (other than customer protection measures) should be minimal in the other parts of the chain, once the transition to competition is complete. In practice, the boundaries between regulated and non-regulated parts of the chain are blurred and market concerns encourage regulatory powers to intrude into areas previously left for entrepreneurial decision.
- **Gas Release Programmes/Disaggregation of Long Term Contracts.** Requirements on incumbents to sell gas from their portfolios have been used in some countries with the agreement of the incumbents as a regulatory tool to allow new entrants to access gas more easily for their customer base. They can be difficult to put into operation if for example the market price is different from the price of the gas supposed to be released. If implemented successfully, however, they reduce the risk of market foreclosure and will facilitate market entry for new players. Nonetheless, the consequences for market functioning and investments of intervening in the commercial business including in the legally valid contracts of major supply companies have to be seriously considered.
 - **Actions regarding long-term downstream contracts.** Regulators have also been looking at ways to ensure that market opening is not prevented by the presence of long-term downstream supply contracts and it is likely that in future shorter, more flexible contracts with customers will be standard. Long-term upstream contracts,



however, are still expected to remain the backbone of the industry, although the spot market will become more important.

Such measures will contribute to market liquidity in trading terms particularly in the transitional phase, but will not increase overall supply to the market.

148. In any case, trading practices and approaches to supply portfolios are evolving. Although long-term contracts remain important as a backbone of gas supply for many wholesale suppliers (and also producers), hubs and exchanges are developing rapidly. Europe does not yet have a hub to rival the Henry Hub and others in the US, but some hubs are developing important churn rates, and companies are exploring way to enhance hub, trading for example by taking on the role of market maker. Also in Russia, [a gas exchange has been established].
149. In Europe, whatever the eventual progress in a functioning competitive market, there will be no turning back to gas businesses within national frontiers structured on national vertically integrated monopolies. The major new players who have evolved there to take advantage of the opportunities opened up by a liberalizing market will ensure that. They will become global players. Further reinforcement and consolidation of regulatory measures, at both national and European level will strengthen the competitive framework.
150. Elsewhere, in markets where competition is scarcely developed, it is far from certain to what extent the momentum towards liberalisation will be maintained, especially in a tightening supply market marked by rising energy prices globally and geo-political sensitivities, and in those cases the wholesale industry may undergo less change.
151. The impact of the sort of measures which aim to reinforce the introduction of competition in place of monopoly has been significant on the structures of companies in certain parts of the world.
 - Incumbent companies have had to face up to the challenge of competition as new comers, including traders entering their markets. A resulting fall in market share may be compensated by their entry into the electricity market which has been opened in parallel.
 - Companies anxious not to rely only on growth in the gas supply business are expanding into electricity sales as well as electricity generation, a tendency that reflects a desire to hedge a gas position otherwise vulnerable to competition and a move away from fossil fuels.
 - Companies are not only exploring market opportunities beyond their borders but asset swaps and joint ventures.
152. The signals about the extent to which policy on privatisation will further change the sector are mixed. Market opening legislation in Europe is acting as a more important stimulus to mergers and takeovers, and some of these have been subject to anti-trust remedies which have themselves created further dynamics for change. Regulation to introduce competition has also stimulated gas companies into other areas of business but moves on gas companies by electricity only or electricity dominated companies will prove much more significant. Also, electricity companies are generally bigger, and will have strategic reasons to enter the gas business.
153. The underlying conditions in Europe and the US are not a pattern that will be repeated. Elsewhere, the regulation, developed with different needs in mind, has not acted as an



impetus on companies to develop new commercial strategies, and there may be other restraints on evolution.

IMPACT ON THE RETAIL BUSINESS

154. In Europe and elsewhere, retail sales businesses will also experience change as a result of regulatory developments. It may be that in countries where city-gate distribution retail companies operate, especially if they are owned by municipal interests, there may be more reluctance to change. In those countries in which companies handle retail as well as wholesale customers that do not have a separate distribution retail outlets, any structural change will be in line with the changes in the wholesale market. Overall, however, market dynamics for consolidation, given impetus by the sweep of regulatory changes and pressures, could reduce the number of distribution companies in some countries.
155. As the implications of market opening are studied, there is concern about the volatility of prices. Even in well-functioning markets, gas prices will rise when supply-demand is tight as at present and the oil price is high. Legislators or regulators may consider introducing compensating mechanisms to safeguard public interest, especially if confidence in the market declines. Thus state controlled prices have been overtaken in some countries by regulated end-user prices, which are sometimes below market prices. Alternatively where a national gas supply chain exists, as in Argentina, the well-head gas cost has been artificially depressed. Whether the regulatory intervention is upstream or downstream, similar negative consequences arise as artificially low regulated prices distort the market.
156. Regulated prices are applied in many countries in Europe and there is a risk that they will result in significant distortions to the competitive dynamics, for instance if the regulator fixes the level of such prices with little or no correlation with prices in the wholesale market. On one hand, the definition of correct price signals is prevented - fundamental to emphasize eventual critical issues and correctly address investments - on the other, leaving segments of customers outside the competitive market will lead to a limitation of the development of competition itself and of its liquidity. Nonetheless, the system of regulated rate provider persists in Canada and in some US States, and the concept of default supplier or supplier of last resort is gaining currency in Europe. It may be that competitive markets will increasingly settle on such a solution in general. Alternatively, we may see a growing trend towards fixed-price energy contracts, offered by competitive retailers. Nonetheless if high prices continue, there is an increasing risk of general regulatory intervention in this area instead of targeted policies to assist customers most in need of support.
157. Meanwhile in markets that are in a transitional phase, prices can be left artificially low but only at the expense of competition.
158. In Russia, there has been an increasing debate on regulated prices and we could in the future see a move towards more market-based prices, which could have implications for the import/export balance.
159. Artificially low gas prices on the Indian internal market have always negatively affected its appeal to gas (LNG) exporters, and the same can be said for China. Development of the gas industry has been seriously affected, in both countries, and by the consumption of gas with other energy sources (subsidized petroleum product in India, cheap coal in China) but there are signals that those two economies have by today enough strength to sustain higher local (and therefore import) gas prices.



160. Market regulation will also have an indirect impact on energy services. Traditionally in a situation of inter-fuel competition the gas retailer wants to create a positive image for gas in order to sell gas to customers, thereby creating a return on his investment in a) the grid and b) on his purchase portfolio. The margin for the retailer is essentially the margin on selling gas, not the margin of the energy services. Energy services may be seen as marketing costs, and sometimes as costs linked to a social licence to operate. The introduction of gas-to-gas competition has an impact on this conceptual approach. Energy Services become part of a marketing strategy to gain the loyalty of customers who would otherwise choose another supplier or have to be profitable by themselves. Either approach means that energy services have to be based on their own business case, and the investment in these activities competes with alternative potential investments by the retailer. In some cases there might be still a component of investing in a social licence to operate, but this is only sensible if there is in this aspect a broad level playing field with competitors.
161. This consideration, however, is much less significant than the likely impact of the drive in some parts of the world towards sustainable energy driven by climate change policy. In the longer run, the energy efficiency emphasis coupled with the drive to increase the use of renewables will reduce per capita consumption of gas in the household sector, and it is also likely that multi-energy systems, including gas/RES based solutions will develop. The retailer will be less interested in selling gas than tailoring whole energy systems to customer needs. How great an impact this will have on gas companies and their marketing will also depend on technological developments, including micro-cogeneration schemes, and the extent of shifts locally to all electric solutions.

IMPACT ON THE GAS INFRASTRUCTURE BUSINESS

Pipelines

TSOs

162. A well-functioning and adequately sized infrastructure business is necessary to underpin the market. Sufficient investment in gas systems is widely acknowledged as a sine qua non condition for efficient and secure and safe gas supply. Regulation will have an important impact on this business. Tariff or rate-based systems, as we have seen, differ, but in a competitive market, the objective is the same to provide an access framework for users designed to meet their needs.
163. In Europe, market opening, especially the unbundling measures referred to above, has been supported by a number of other regulatory requirements to facilitate market development. The regulatory access regime in particular required a move away from point to point reservation systems which are generally associated with distance based tariffs to entry-exit booking systems within their own balancing zones. This, coupled with a consolidation of balancing zones, implies a different concept of network operations, sometimes entailing changes to the physical configuration of the networks. Increasingly therefore, regulation will require cooperation between different grid operators on a range of issues including capacity calculation and allocation, and congestion management including capacity release measures. The highly integrated European grid unlike the situation in Japan facilitates this co-operation.
164. The consequence of this is that infrastructure management within Europe in particular is reflecting a new mind-set. Its main objectives for the largely regulated business will be to facilitate the market, while maximising returns on the provision of transport services to all users. Furthermore, within Europe, the concept of national TSOs is replaced by the objective of supra-regional grid operations. Elsewhere, no such concept is envisaged.



165. With reference to the question of grid ownership it is interesting to note that a number of countries have preferred to retain at least some element of state control, while introducing private capital into the supply side of the business. This is the case in a number of European countries, and also the reported intention in Turkey. Furthermore the provision in the third EU Directive to safeguard networks from the “wrong sort” of foreign ownership especially with implied foreign state involvement was argued to be strategically necessary to safeguard national energy interests.
166. It is very possible that except for grids owned by the state or still in some form of integrated company, there will be a tendency towards mergers and acquisitions in grid based systems, perhaps also between electricity and gas grids.
167. The unbundled structure, nevertheless, challenges previous approaches to infrastructure development, as investment planning will have to be carried out even if there is incomplete information on shippers’ planned volumes or routes. The changed circumstances have required the definition of changing roles and responsibilities of different market players. Inappropriate regulation, however, could have a negative impact on investment and consequently on supply to the markets. Regulation, therefore, has to provide a framework conducive to investment, including where necessary appropriately designed mechanisms to postpone or exempt in part or whole access obligations, if a growing gas market is the aim. Exemption mechanisms should offer incentives to investment and should not be unduly restrictive.
168. Another possible consequence of the changed approaches to supply and delivery of gas within Europe is a trend of growing competition in gas transport routes. This leads to more flexibility in delivery choices for customers and positive effects on competition are indisputable, but it also increases the risk for existing investors as well as for future projects if there is too much uncertainty about the utilisation of capacity.
169. Over time, it may be expected that the impact of regulation will change traditional investment patterns.
- If for example policy makers were to treat security of supply as a public good, then we are likely to see a grid configured more on the basis of central planning than entrepreneurial risks.
 - On the other hand, if TSOs are not ready to undertake some investments, then we may see more types of investor enter the market. If returns in infrastructure come to be viewed as steady investments, investors may enter the market, including public-private infrastructure funds.

As in so many other areas, the outcome may depend on the extent of trust in the market, as well as the extent to which regulation is investment-friendly.

DSOs

170. Regulatory developments in some areas are also likely to bring more business uncertainties for DSOs, as competition will change the economies of gas distribution. In addition, there may be consequences from the drive to achieve higher efficiency in energy use, in which energy supply companies and commercial energy service companies have main roles as mentioned above, but requirements to deliver energy efficiency improvements may in other circumstances be placed on DSOs. The changing revenues may have a negative impact on DSO investment in gas infrastructure, something that will in turn have a negative impact on the gas chain.



171. It is very possible that except for grids owned by the state or still in some form of integrated company that, pushed by the consequences of this regulation, there will be a tendency to seek economies of scale through mergers and acquisitions in grid based systems, perhaps also between electricity and gas grids. Due to the nature of their businesses this will be more likely for DSOs than TSOs. (There are examples of mergers, and reshuffling via exchange of connections by DSOs inside the Netherlands). This movement to combine electricity and gas grids is, especially in Europe where unbundling measures are part of the market design, supported by a number of other regulatory requirements to facilitate (retail) market development. Other DSO strategies may involve exploration of opportunities offered by renewables policy, including the transport of biogas and eventually a mix of hydrogen and natural gas.
172. The consequence of all this for DSOs is that infrastructure management is reflecting a new mind-set. In the future there may no longer be an independent growth possible for separated electricity and gas infrastructure. A well balanced energy infrastructure (either electricity or gas or heat) is likely to be essential, with a tailored infrastructure designed, built and maintained giving rise to cities with areas with either an electricity or a gas infrastructure or other energy solutions, involving smart grids, a prerequisite for which are smart meters.
173. The changing role also makes DSOs more vulnerable for political pressures on a national or even a regional level. Because of societal pressures (to protect their medium and long term interests) regulatory changes are to be expected, not only to safeguard investments in networks, but also to control other variables in the regulatory framework.

Other Investments

174. The regulatory approach may need to consider a distinction between pipeline infrastructure, which generally will be a monopoly and essential facility, and other parts of the system like storage and LNG terminals which, depending on the relevant markets, raise more complex issues and different types of investment decisions.

Storage

175. Unlike pipelines, storage is not an essential facility, but a market flexibility tool. At the same time, however, in some countries adequate storage is necessary for security of supply reasons, and the different functions require different understanding and responses from regulators, but recognizing that there is a link nonetheless between regulation to deliver an efficient access regime and the need to ensure sufficient incentives to new investments.
176. There is a very long lead time for storage projects, especially for aquifers and storage investment will present significant challenges. The development of the importance of storage in the supply chain is mainly responsive to market trends in supply and demand coupled with geopolitical concerns. Regulation can have an impact in two main ways. It is possible that in future we could see more nation states have recourse to some gas stocks policy, although the risk that this could also develop at European level has for now receded, with the promotion of the concept of security of supply as a public good. On the other hand such an interventionist approach could have detrimental consequences for commercial storage.
177. A less interventionist solution lies in recognizing that the relevant market should determine the level of regulation affecting storage. Therefore in the US, Canada, and Europe there are to varying degree mixes of regulated and non-regulated or less regulated regimes.



178. It remains to be seen to what extent examples of lighter regulatory regimes will deliver the needed commercial storage, or if we shall see a move towards regulated stocks of gas, which would be a costly imposition on the gas chain and have supply side implications.

LNG

179. A similar question of the balance between regulated and non-regulated regimes concerns LNG terminals. In parts of the world supplied by pipelines and LNG, once more, it is not regulation as such that will have an impact on the LNG market, that commentators agree will become more important because of the need for most consuming countries to have more and more diversified gas sources. It is recognized, however, that regulation, especially a lighter regulatory approach can make a difference to the rate of terminal construction. As mentioned above the Hackberry rule facilitated terminal construction in the US, and a lighter access regime may also apply to many European terminals, although Spanish experience shows that terminal investment can also flourish in a regulated environment.

180. In countries like Korea and Japan, wholly dependent on LNG, considerations are different. It remains to be seen what impact the Government required shift way from take-or-pay contracts will have on the procurement policy of the state monopoly company and the market structure.

181. Competition has changed the potential for cooperation of downstream companies with suppliers. Specifically purchase consortia are no longer possible, and joint ownership of LNG regasification facilities is subject to strict provisions.

CONCLUSIONS AND RECOMMENDATIONS

182. **Part 1** of this study confirms that there is a trend in many countries worldwide to introduce competition in some form or other depending on various factors, including political culture, and the stage of development of the gas industry. The IGU supports the competitive market and welcomes this trend. Part 1 shows that, while there is a certain commonality of approach, different systems and instruments can deliver results that move in the same direction. Moving in the same direction will contribute to the globalization of the market. [Other conclusions should be added after discussion of Part 1]

183. **Part 2** shows that the role of standardization will reinforce this trend [role of standards – harmonizing trends transactional efficiency– underpinning more interoperability and flexibility of supply – boosting LNG]. [Other conclusions should be added after discussion of Part 2]

184. **Part 3** summarizes the way in which the developments mentioned are changing the structures of the gas industry. As Europe emerges from a further legislative cycle, the degree of the regulatory impact is seen to be especially strong there. The developments are a strong driver for concentration to better handle, risks, commercial challenges and consolidation. Companies in the gas chain, both on the producer side as well as those close to the demand side, feel the need for becoming substantial players, and to create strategic (political) alliances, in order to have more control over developments and to lower economic, financial and social uncertainties. Arguably, however, producers will have more success in their ambitions as downstream players may have problems in linking with the production side of the business, if it requires access to reserves within state sovereignty or likely to be withheld for political reasons. The introduction of competition kick-started this process, that has taken on its own momentum. It remains



to be seen, however, whether when 2020 analysis are undertaken the biggest factor on the shape of the gas wholesale and retail industry will not be by then recognized as climate change, linked with the merger of gas supply business with electricity interests. TSO and DSO activities, however, will continue to evolve as a consequence of regulation and the success of the pipeline business will depend at the very least on de facto co-operation and convergence.

185. It is not clear at present to what extent this combination of factors will be met elsewhere [to discuss and develop].

186. The picture presents challenges, but is positive overall. Nonetheless mistakes in the regulatory approach could introduce problems. Therefore, IGU would like to emphasize the following points (Introductory sentence to be amended depending on elaboration above):

- The IGU supports the goals of competition and recognizes that well-designed regulation can facilitate market evolution.
- The IGU favours a light-touch regulation that is sensitive to the maturity of the market, but also its long term needs to promote a robust gas industry, including the importance of supply security to which a well functioning market will contribute.
- Regulation is increasingly no longer able to be exercised solely within a national context. With limited sources of supply and the growing importance of international trade of both pipeline gas and LNG, markets no longer function in isolation. This has implications for national regulatory and competition policies, as well as operationally and regional and supra-regional co-operation has to be strengthened.
- Concomitantly national regulators should concentrate on frameworks for ensuring more local market development, developing a robust retail market, secure and safe supply and sound investment.
- All regulatory interventions, even if they are made with good intentions to safeguard the general interest, generate costs for the system; so that, the introduction of excessive or inappropriate regulations risks leading to market distortions or an inadequate allocation of resources, which can act as a disincentive to innovation and poor quality of the services. Impact assessments should be carried out.
- In general, the IGU favours the introduction of private capital into the gas business, [but recognizes that for policy reasons governments may justifiably take steps to protect sensitive interests].
- Regulation should facilitate market-driven investment in a stable and predictable framework and promote appropriate co-operation among all parties along the transport route.
- Standardization and harmonization of gas quality should be accelerated in order to underpin greater interoperability in regional as well as global markets.
- Price volatility is a natural outcome of a functioning market and risks being more extreme in conditions of fairly rigid supply and limited demand elasticity. While it is important to have appropriate social measures to alleviate fuel poverty, general price regulation should be avoided.



- Regulators have to recognize and trust more in the dynamics of the market and be sensitive to the growing internationalisation of the market.



List of Acronyms

AEEG: Authority for Energy Electricity and Gas (Italy)

AGGM: Austrian Grid Gas Management

BNetzA: Bundesnetzagentur or Federal Network Agency (Germany)

BPA: Brazilian Petroleum Agency (Brazil)

CCGT: Combined Cycle Gas Turbine

CNE: National Energy Commission (Spain)

CNG: Compressed Natural Gas

CRE: Energy Regulatory Commission (France)

DERA: Danish Energy Regulatory Authority (Denmark)

DSC: Distribution and Supply Companies

DSO: Distribution System Operator

EC: European Commission

EU: European Union

FERC: Federal Energy Regulatory Commission (USA)

GNTC: General Network Terms and Conditions

GSA: Gas Storage Agreement (Canada)

GTS: Gas Transport Services (Netherlands)

ISO: Independent System Operator

LDC: Local Distribution Company (USA and Canada)

LNG: Liquefied Natural Gas

MEP: Member of the European Parliament

METI: Ministry of the Economy, Trade and Industry (Japan)

MITyC: Ministry of Industry, Tourism and Trade (Spain)

NBP: National Balancing Point (Great Britain)

NEB: National Energy Board (Canada)

NGG: National Grid Gas (Great Britain)

Ofgem: Office of Gas and Electricity Markets (Great Britain)



OFT: Office of Fair Trading (Great Britain)

PEG: Gas Exchange Points

PSV: Punto di Scambio Virtuale (Italian gas exchange)

TPA: Third Party Access (equivalent concept to Open Access in the USA)

TSO: Transmission System Operator

UNC: Unified Network Code (Great Britain)

YPF: Yacimientos Petrolíferos Fiscales Sociedad Anonima (oil and gas company, formerly owned by Argentina)