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NEW ENERGY TECHNOLOGIES IN THE NATURAL GAS SECTORS:
A POLICY FRAMEWORK FOR JAPAN

FACILITATING DEVELOPMENT OF THE NATURAL GAS MARKET IN JAPAN:
PIPELINES AND GAS LAW

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Introduction

The Government of Japan has indicated its intention to both expand and liberalize the domestic gas market, including the facilitation of pipeline gas, the potential development of a national transportation grid, and the introduction of Third Party Access to the country's gas infrastructure network. Implementing these far-reaching changes will necessitate extensive amendments to the current Gas Law which, when enacted, will establish the legislative framework for the industry.

Historic Japanese Energy Policy

Traditionally, legislative decisions in Japan regarding energy policy have been based on three key principles: (1) economic growth, (2) energy security, and (3) environmental protection. These three principles arise from experiences relating to Japanese history and geography as well as Japanese geology. Each of these concerns has had a strong impact on market development and will continue to influence legislative changes in the future.

With regard to economic growth, there are two major considerations: system reliability and cost. Japan has historically maintained a high degree of reliability in both its electric power and gas industries. The underlying principle for doing so is that the potential economic loss caused by rolling brownouts or blackouts (in the case of electricity) or by insufficient gas supplies is extraordinarily high. This concern for reliability has been a major factor in the development and maintenance of the vertically integrated utility model in Japan. Although deregulation is spurring potential change in this dynamic, the desire to maintain high system reliability will remain an important consideration in the future.

The second concern regarding economic growth is cost. High energy costs obviously affect economic growth. As system reliability has in the past been a national priority, the government has traditionally taken the position that only through extensive rate regulation can energy be supplied to end-users at reasonable costs. However, even with regulated energy prices, large utility fixed costs (primarily due to the need for overhead to maintain the standard of high reliability) have been included into the rate base that has resulted in high costs to end-users.

Indeed Japan has the highest energy costs of any industrialized country. Residential electricity prices, for example, are approximately 90% higher than in the U.S. and 140% higher than in the U.K. A critical issue that Japan must face is how to achieve lower energy prices while maintaining system reliability, or stated another way, what trade-off between energy prices and reliability the country wishes to maintain and how this can be achieved in a deregulated environment.

Japan must rely on imported sources to meet virtually all of its domestic energy needs. Thus security of supply, important to every country, is especially critical for Japan. Since the oil shocks in the 1970s, Japan has had a policy of diversifying energy sources to include nuclear and natural gas as well as diversifying geographical sources for imported oil and gas.

Lastly, Japan has traditionally been a strong supporter of policies to improve environmental quality. The nation has assumed a global leadership role in the reduction of all types of energy emissions and has sought to develop technologies that are both environmentally friendly and promote energy efficiency.

The expanded use of natural gas, either as LNG and/or pipeline gas, in the energy sector is fully consistent with the above objectives. It can be sourced from a number of different regions, and is cleaner to burn than oil or coal. Pipeline gas, by enhancing diversity and possibly lowering costs, not only compliments existing policy, it can strengthen Japan's energy security.

Characteristics of the Japanese Gas Market

As mentioned above, security and reliability of supply are particularly critical for Japan. This is due to the unique set of features that characterize the market. More specifically, the Japanese gas market is characterized by the following:

1. There is virtually no domestic gas reserves or production. Japan is dependent on imports for 97% of its gas consumption.

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2. The Japanese market is isolated from major gas producing areas. All imported gas is Liquefied Natural Gas (LNG), most of which comes from Southeast Asia and the Middle East. Japan is the largest importer of LNG in the world, accounting for 62% of global trade in LNG (IEA, 1999).
3. Most of the LNG is used to produce electricity or as feedstock for the petrochemical industry. Power companies account for more than two-thirds of all LNG contract commitments. Only about 5% of the urban areas are served by a gas distribution system. Use of natural gas by industry and the residential and commercial sectors is very low relative to use in other industrialized countries, both in per capita terms and as a share of total energy use.
4. The gas market is characterized by large, vertically integrated power and gas utilities. The gas division of Tepco, the largest power utility, accounts for nearly a third of all LNG imports. In 2000, Tepco and the two largest gas companies, Osaka gas and Tokyo Gas, accounted for roughly 53% of total imports.
5. Gas utilities control all import terminals, transportation, storage and distribution.
6. Gas has traditionally been imported on the basis of long-term contracts often tied to specific projects. Twenty years is a typical duration for these contracts. Many Japanese LNG contracts will be up for renewal in 2007.
7. There is very limited gas infrastructure interconnecting individual gas utilities. What infrastructure exists is located primarily in the central region. There is virtually none in the north or south of Japan. (See fig 1).
8. The Japanese market is subject to large seasonal demand swings in gas use with winter being the period of peak demand.

9. “Gas prices for Japanese end-users are three to five times higher than those in the U.S. or the UK and more than twice those of other import-dependent countries, such as Germany or France” (Smith). There is also a wide gap between gas prices in different regions. The average price charged by Tokyo Gas, the country’s largest, is less than half that charged by Tomakomai, the country’s second smallest city gas company (OGJ). The large differences between wholesale and retail prices reflect the cost of maintaining a high degree of system reliability in Japan. The CIF price of LNG is very similar for Korea and Japan, when adjusted for transportation cost differences; however, the end-use delivered price to consumers is quite different.

The Pipeline Versus LNG Debate

While almost all of Japan’s current gas supply comes from Southeast Asia and the Middle East, Japanese firms are now looking at the possibility of importing gas, either as LNG or pipeline gas, from Russia’s Sakhalin Islands. The Sakhalin I Consortium, led by ExxonMobil, is proposing a pipeline to the main Island of Hokkaido, with potential extensions to Tokyo and Niigata on Honshu. The Sakhalin II Consortium, led by Shell, is proposing to ship Sakhalin gas by LNG.

While pipelines are the established technology for delivering gas over short to medium distances, LNG has traditionally been the choice for long distance deliveries. Ongoing improvements in LNG liquefaction technology, improvements in the design of LNG tankers and a reduction in their costs are making LNG more competitive with pipelines over shorter and shorter distances. At this point, it is difficult to distinguish between the two Sakhalin proposals on the basis of the cost of Sakhalin gas delivered to Japan’s consumers.

One issue of policy for the Japanese government concerns whether it should encourage the development of gas pipelines or continue its traditional reliance on LNG. To discuss this issue, it is useful to distinguish between long distance trunk lines such as the proposed pipeline from Sakhalin and a domestic gas pipeline grid that would connect cities and LNG terminals throughout Japan.

Long Distance Gas Pipelines

The distance from the southern tip of Sakhalin Island to central Japan, about 1600 kilometers, still favors a pipeline but is nearing a break even point where both LNG and pipelines are equally competitive in terms of transport and delivery costs. Both LNG and pipelines offer advantages and disadvantages. In theory LNG gives suppliers and users considerable flexibility since LNG tankers could be diverted to wherever gas is most highly valued. In practice, however, under the current structure of the LNG market, cargoes are tied to long-term contracts that tie LNG sources closely to specific buyers and/or terminals in Japan. But flexibility will increase in the longer run as a spot market in LNG develops. On the other hand, LNG terminals are significant capital investments, requiring large tracts of ever decreasingly available land, expensive wharf, regasification, as well as storage infrastructure, and are a hazard subject to environmental objections. Pipelines are also subject to environmental concerns but of a smaller magnitude. Under land, pipelines constitute a minor hazard if installed properly. Under water, they invite opposition from the fishing industry that fears the effect of pipelines on their industry. But, in reality, pipelines and fishing have long coexisted in many parts of the world such as the U.S. Gulf Coast, the North Sea and the Mediterranean without the threat of environmental or economic damage.

From the perspective of energy security there are two issues of importance. In terms of vulnerability to war or sabotage, pipelines are more difficult targets in that the infrastructure is spread over a large area and only a small portion can be destroyed at a time. By contrast, an LNG terminal concentrates the infrastructure in one place where the damage would be much more extensive and more costly to repair. The extent of the damage would also mean that repairs will take longer for an LNG terminal as well. Repair of pipeline sections can often be organized in a matter of weeks or months while reconstruction of an LNG receiving terminal, depending on the level of damage, might take more than a year.

The second issue concerns security of supply in the event of a sudden supply interruption and subsequent increase in gas prices. The reliance on LNG implies that Japanese consumers will have to scramble for gas during such an the event and outbid rival buyers for remaining

uncommitted LNG supplies, raising the price of regional LNG supplies that are priced on a market related basis. In the case of a pipeline, Sakhalin gas will be dedicated to the Japanese market and cannot be bid away by other countries. This might allow Japanese buyers to incur some pricing advantages over the open markets of LNG.

Of course, in the case of a dispute with Russia, the existence of a pipeline tied to Japan may give Russia undue leverage over Japan. Japan's diverse LNG import supplies reduce the political leeway for the Russian government as gas could be obtained from many other sources in such an eventuality. Moreover, a cut-off of pipeline gas deliveries would hurt Russia as well, lowering the chances of such an eventuality. The existence of a pipeline ties Russia's interests more closely to those of Japan. This in itself is of some value from a political and strategic point of view.

The significance of the debate over pipeline gas versus LNG might be overstated, however, given the volumes involved relative to total Japanese gas use and overall energy supply. Exxon Neftegas Limited, a subsidiary of Exxon/Mobil, and operator of the consortium developing the pipeline proposal, estimates that the pipeline would deliver the equivalent of about 6 million tons of LNG per year, beginning at the earliest in 2006, out of a total forecast level of Japanese gas imports of 75 million tons per year by 2010 (Alexander Oil and Gas: Vol. 6, issue #13 – Tuesday, July 17, 2001). Currently gas accounts for roughly 13% of total energy supply in Japan. Even if plans to raise that share to 20% by 2020 materialize, it is clear that Sakhalin pipeline gas will account for less than 2% of Japan's energy use by 2020.

In addition, the "security" dimension of the LNG versus pipeline debate should involve a determination of where the most likely risks are. A disruption in the Middle East is a much more likely event than a Russian cut-off of gas deliveries. Indeed, Western Europe has been importing large quantities of gas from Russia for some time without interruption. A pipeline from Sakhalin ties that gas to Japan, regardless of events in the Middle East. Diversification of supply, therefore, can be best achieved by using both pipeline and LNG technologies.

Finally, as a spot market in LNG develops, the prices of spot LNG delivered to Japan will be at the mercy of tanker rates that have exhibited considerable volatility. An official of BP Gas and Power noted that in the last two years, spot LNG shipping prices had increased to \$150,000 per day, equivalent to \$55 million per year. This compares with the cost of a new vessel of \$165 million! (Alexander vol. 6, #9, Tues. May 8, 2001). An advantage of pipelines is that the transport costs are determined once the line is built and not subject to much variation over the life of the pipeline. Currently, LNG is typically delivered in vessels owned by either producers or buyers and transport prices are determined as part of a long-term contract. However, third parties are increasingly buying transport vessels to be used in the growing spot market.

Brito and Hartley (2001) have pointed out a third alternative for delivering Sakhalin energy to Japan, namely transmitting the gas by pipeline to Hokkaido and then using the gas to generate electricity for transmission by a high voltage direct current line to markets in Southern Japan. They argue that the advantages of this option dominate the pipeline option despite the high cost of converting direct current to alternating current and the cost of “storing” electricity by using electricity to pump water into storage reservoirs.

One disadvantage of this option is that gas is a much more flexible fuel than electricity, depending on whether gas from other sources could cheaply be diverted from electricity generation to other uses, such as residential heating and industrial fuel. Currently only 70% of LNG is used for power generation. The remainder is used as an input into the chemical industry, as a boiler fuel, and for heating and cooking. Gas is a cheaper alternative than electricity generated from gas for uses that require the generation of heat. Gas use in residential and commercial establishments should increase as pipeline networks are developed in cities. To the extent that such demand will substitute for electric heat and hot water, such a development will increase overall energy efficiency. The issue here is where the best place is to locate electricity-generating infrastructure. By building these plants in Hokkaido, upstream flexibility is eliminated. By piping the gas to the main markets in Japan, buyers will have the flexibility to use it either directly or by converting it into electricity.

The real issue in this debate is one of who will bear the risks of price fluctuations (and all the factors that contribute to price volatility). Greenfield gas development, either LNG or pipeline, involves large up-front capital outlays, long lead times, long term shipping commitments and agreements with buyers specifying offtake and pricing formulae. Lenders require long term take or pay contracts to reduce their risk and make a project attractive. Presumably contracts can be written for either LNG or pipeline deliveries to locate the price risk wherever the parties to the contract wish to locate it. Pipeline contracts can be written so that the price fluctuates with some index of LNG prices or some calculation of netback from final use. Similarly, LNG contracts can vary from long term fixed price take-or-pay to short-term spot sales. Producers, transporters, final consumers or financial intermediaries can absorb routine price volatility. The party best able to absorb the risk is best left to the parties themselves and to the ultimate development of a market in gas futures and derivatives.

Domestic Gas Grid

With respect to a domestic gas grid, the issue is whether gas law should promote its development or whether Japan can rely on LNG terminals distributed over the Japanese coastline, as it does today. A distinguishing characteristic of Japan's gas infrastructure is the underdeveloped state of its domestic gas network. With only 3,000 kilometers of pipeline, its network is far smaller than the 30,000 to 50,000 kilometers one finds in Germany, France and Italy. The United States, albeit much larger geographically, has 400,000 kilometers.

The argument that a domestic pipeline network is not necessary is based on several points. First, the cost of right-of-ways may be prohibitive. (This point may be over-stated – given the collapse of the land market over a decade ago. The argument certainly serves the interests of existing gas companies who are concerned about increasing competition in their markets). Second, LNG terminals can give the flexibility that is needed to ensure that prices are equalized throughout Japan provided that all suppliers have equal access to the terminals. Terminals would have to be regulated entities with prices for re-gasification and rules for access and terms of access established.

There are several arguments for developing a pipeline network. First, the existence of a domestic pipeline network will provide flexibility, which is of some benefit in the event that a terminal is suddenly shut down. Second, pipelines can create a unified market while LNG terminals tend to create a fragmented market. In a fragmented market, deliveries by tanker are large discrete events whereas pipeline gas is continuous. The implication of this difference is that each LNG terminal must have enough storage to meet demand until the next LNG tanker arrives. A tanker will not be diverted from one terminal to another unless the new market can absorb the whole load since it is costly and inefficient for a tanker to make several stops. Pipelines can economize on storage since no one market needs to maintain as much storage. And, since pipeline gas can be quickly delivered in continuous increments from one geographical market to another, balancing short-term supply gaps, price differences will tend to be smaller under a pipeline scenario. A domestic gas grid will provide wider access to potential users and hence, a more diversified customer base. It will expand the use of gas in the overall energy mix within Japan.

Finally, because pipeline gas is continuous and can be delivered in any volume while LNG requires delivery in discrete quantities, a pipeline network facilitates the development of a national gas market. De Vany and Walls (1995) point out that an important factor in the development of a well-functioning gas market in the U.S. was

The wide participation of buyers and sellers in many markets that are interlinked throughout the pipeline network [that] gives the market a high degree of liquidity and graceful adaptability to shocks (De Vany and Walls p. 4).

In addition, they point out that

One important factor in this evolution was the emergence of *market centers* for gas and transportation trading at places where pipelines intersect or pass so close to one another that a short link is all that is needed to connect them. These centers connect the network and make possible the flexible routing of gas that allows shippers to contest many markets from any supply point. Another crucial

factor was the attainment of a connection structure that opened enough paths in the network to arbitrage to force a transition of the segmented special markets to an integrated natural gas market (De Vany and Walls, p. 10).

Japan has a long way to go before it has a pipeline network that compares to the U.S. market and hence, the degree of competition and market institutions that prevail there

Gas Law

Japan's current Gas Law has been designed effectively to cover the conditions of the present domestic market. Recent regulatory changes have introduced some element of competition. For example, the introduction of a revised Gas Utility Industry Law in 1995 allowed new entrants to be guaranteed third party access to pipelines owned by gas majors Tokyo Gas, Osaka Gas and Toho Gas. But government support for new linkages between the Tokyo gas areas and Osaka gas areas to create a master system has not yet progressed. Then in 1999, a gas marketing law allowed non-gas utilities to sell to the largest retail consumers buying a minimum of 1 million cubic meters a year. Moreover, the major gas pipeline holders were required to establish non-discriminatory carrying rates. METI is considering open gas sales to any company, in any volume, by 2003. Regulations are still needed to enforce third party access to LNG receiving terminals. An omnibus deregulation bill that would require oil, gas and power companies to open their storage, pipeline and other infrastructure to third party access has been discussed. At present, Japan's Gas Law does not address key issues such as access to infrastructure -- should an import pipeline and transnational transportation system be constructed in the future. Therefore with respect to establishing a more comprehensive gas market policy for the future, laws and enabling legislation must be implemented to facilitate the evolution of competitive gas markets.

Due to the unique characteristics of the Japanese gas and energy markets, there is no direct parallel between Japan and other national gas markets. Even with the introduction of pipeline gas in the future, the Japanese gas market will remain unique in many respects. As such, there is no ideal regulatory "model" for Japan to adopt. Instead, the country should take the best features

from a number of gas laws/initiatives in place around the world that address aspects of the market most akin to Japan.

Country Experiences

Recent changes in regulatory reform have occurred in many parts of the world, in both developed as well as developing economies. While the overall trend toward market liberalization is taking hold around the world, both the underlying drivers as well as the pathway to achieve a competitive market can be quite different. While some countries have already reached the goal of a transparent, fully competitive gas market, they do not necessarily represent the best “model” for a country like Japan to adopt.

The current system in the U.S. is one that has evolved over a period of three decades (Kalt and Schuller, 1987). MacAvoy (2000) enumerates what he refers to as three periods of gas regulation. In the first period, covering the late 1960s through 1977, the government attempted to fix gas prices at relatively low rates. Price caps were imposed on producers. These prices did not provide adequate incentives to producers to build reserves. The result was gas shortages during the mid 1970s.

During the second period, regulators attempted to increase supply by phasing out wellhead price caps. High prices led to a steep decline in gas demand at the same time producers were aggressively adding supply capability. This resulted in a catastrophic drop in the price of gas. The crash in prices severely hurt the Upstream segment of the industry resulting in a virtual curtailment of all exploration activity for gas for years.

The third period of regulation commenced in the late 1980s. Regulators attempted to stabilize the gas market by unbundling production from transport. Producers were allowed to sell gas directly to brokers, dealers and consumers as well as to wholesalers. Pipelines were removed from the merchant function and required to provide open access to all parties. Transport rates were regulated to provide a “reasonable” rate of return to shareholders. Today, after three decades of effort, the U.S. has achieved a situation where markets generally clear in an orderly

fashion, although recent price volatility has raised new questions about the appropriate regulatory framework to improve the functioning of the market.

Other countries, like Argentina, have attempted to avoid the mistakes made in the U.S. and go straight from a tradition of regulated, low gas prices to a completely deregulated, open gas market. Operating regulations were implemented which to some degree mirror those governing the U.S. gas industry. However, in Argentina, these regulations were underpinned by a focus on privatization of government monopolies without the completion of a comprehensive legal framework for the hydrocarbon industry. The production stage is fully deregulated. Transport is in the hands of two firms. Access is open at regulated rates. Final distribution is still in the hands of typical utilities with a monopoly service area. These firms operate under price caps. Competition occurs in the sense that distributors negotiate with producers and with pipeline firms. Major users are permitted to negotiate directly with producers.

Recently the Argentine national government has raised the issue of creating a new gas law, but along with it the potential to alter some of the practices under which the industry has been operating for nearly a decade. The potential change in the “rules of the game” has raised protests from industry and other interests, highlighting the desirability of establishing a sound comprehensive legislative policy from the start of market liberalization.

Within the E.U., each Member State is currently implementing new national gas legislation designed to meet the general terms of the E.U. Gas Directive. Although aimed at reaching a common goal, the individual aspects of how each nation achieves compliance with the Directive will vary depending on the individual characteristics of each nation’s gas industry.

In its wide-sweeping directive governing change in the gas industry, the E.U. has specifically allowed for “derogations” or exemptions to the requirement for infrastructure access based on the condition of protecting existing long-term, take-or-pay contracts. These contracts are further guaranteed by the allocation of the necessary transportation capacity required to move the volumes to market. New individual country gas laws, such as those recently enacted in Italy and the Netherlands, have specific clauses that ensure the protection of such agreements. This

allowance for denial of access is especially critical to projects such as long-distance import pipelines or LNG receiving terminals that, if developed by a producer, are typically linked to a major Upstream capital investment. Mandating Third Party Access to such a venture without taking into account the contracts underpinning the investment could easily destroy the project's economics, possibly jeopardizing whether much-needed infrastructure would be built.

Japanese Perspectives

Given Japan's participation within the Asia Pacific Economic Cooperation (APEC), any prospective new Gas Law should take into account the basic precepts put forward in the APEC Gas Initiative. However, at the same time, the new legislation needs to address the country's unique location, market characteristics and ability to access gas, either by pipeline or LNG, from a number of global sources.

In most of the developed world, a long-term goal is to move towards a market in gas that is as free of regulation and competitive as is consistent with national goals of energy security and consumer protection. Such a policy requires that there be many buyers and suppliers competing at each stage: production, transmission and final distribution. For Japan, competition at the "production" stage is assured since there are many sources of supply. And while Japan has begun to open the final distribution stage to competition, this competition is limited to industrial and commercial users. It is not obvious that allowing open access to residential users will yield much benefit to those users. The local distribution system, being a natural monopoly will have to be regulated. The primary area for efficiency gains generally lies in the terminal, liquefaction and inter-city distribution system and the separation of this "transportation" stage from the end use distribution stage.

Getting to a state of workable competition requires that there be open access to gas infrastructure. Equally important to equal access are prices that reflect the true costs of providing access to LNG terminals and pipeline infrastructures. Before moving to complete open access, Japan must deal with issues that reflect the existing/cost gas marketing institutions. In particular, many terminals are linked by long-term contract to a particular source of supply.

These contracts were considered necessary to provide assurances to investors in both the supply of gas and terminals at a time when gas was not widely traded and LNG markets were still in their infancy. Typically, these contracts are at prices that are higher than those now available in the more developed and expanded LNG market.

Many of these contracts are up for re-negotiation and Japanese importers are demanding (and getting) lower prices and more flexible conditions (Jaffe/Shook, 2001). Still other contracts are not being re-negotiated at this time. Traditional take or pay, high priced contracts are an impediment to rapid price decontrol since new entrants will be able to obtain supplies (as have the Koreans) on much better terms than the established firms. Effective competition requires a level playing field. Otherwise, new entrants may take advantage of the higher priced contracts that bind the larger, established firms either to increase their market share or to obtain profits far above their fixed costs, passing no benefit of more competitive prices onto consumers. Existing high priced contracts act as a penalty on established firms, disadvantaging their participation in the deregulated marketplace. Alternatively, we can think of these contracts as equivalent to the stranded costs that have been an important factor in determining the pace of electricity deregulation in the United States.

Existing LNG contracts will continue to serve as the foundations for Japan's gas supply, even with the introduction of pipeline gas. The need to protect existing contracts may require that open access to gas terminals be phased in to allow gas and power companies to recover the costs of these contracts. Alternatively, access to terminals can be made available to new entrants immediately but at rates which allows terminal owners to recover these costs. This assumes that there is substantial excess capacity in gas terminals. If excess capacity is limited, existing contracts will definitely slow the process of moving to a deregulated regime. That would have to await investments in further terminal capacity. (Another advantage of a national pipeline network is that if excess capacity exists at some terminals and not at others, the ability to move gas by pipeline can substitute for the creation of more terminal capacity in those areas where excess capacity is not available).

In order to reduce risks and facilitate the financing of a pipeline, Sakhalin pipeline gas will most likely have to be given preferential access to its early capacity pipeline grid. Short-term shipments of LNG originated gas should not displace long distance pipeline gas. Clearly, companies will be averse to spending several billion dollars to construct a pipeline if they will be forced to turn over its capacity to competitors, leaving the original suppliers gas stranded through open access rules (Troner, 2001). This rule can be eased over a longer period if a well-developed domestic pipeline network becomes a working reality. Where spare capacity is available, it should be offered to Third Parties on a non-discriminatory, first-come, first-serve basis, subject to issues of credit-worthiness, timing of commercial operations and other genuine commercial and/or operational considerations.

An active secondary market for surplus capacity, gas trading and other "energy services" will naturally develop if enabling legislation clearly supports the basic principles of commercial negotiations. If there is demand for short-term or seasonal sales and services, then competition will move to ensure that market demand is met without legislation mandating a certain percentage of sales and/or capacity be reserved for short-term commerce.

Key Framework Principles

The Government of Japan has recognized the need to create opportunities to further develop and strengthen its domestic gas industry by adding pipeline gas to its current LNG supply base. One of the next steps needed is to create a legislative environment would expand on the existing Gas Law by facilitating the infrastructure investment needed to develop a national transportation grid and sustain strong future market growth. Some basic principles around which new legislation should be centered are as follows:

1. **Stability of fiscal and legal frameworks:** Major capital and ongoing investments will be based on the fiscal regimes in force and the expectations of the investors that existing contracts will be honored and remain in effect for their full life. Continued stability of fiscal and legal frameworks, clarity and consistency of interpretation and avoiding retroactive charges, are important to develop investor confidence. Such confidence is built up over time and is

necessary to ensure that the large, up-front capital investments required for new gas infrastructure projects will be made (Albouy, 1999).

2. Administration of laws and regulations in a non-discriminatory manner: All market players, including new entrants into a liberalized market, should compete on equal terms. New entrants should be allowed access to gas infrastructure but at a price that includes a fair return to investors for access to infrastructure. Market transparency and agreed network codes can then maintain the level playing field between players.
3. Reducing obstacles to building, owning and operating gas infrastructure: Companies wishing to build, own and/or operate gas infrastructure should be allowed to do so provided safety and environmental safeguards are satisfied. Regulations regarding such safeguards and facility permitting processes should be implemented and maintained in a non-discriminatory manner. Eminent domain laws need to be implemented in order to facilitate pipeline investments. Environmental protection regarding new pipeline right-of-ways need to be balanced with national security of supply considerations. There is a need to consolidate, or at least co-ordinate, the permitting process to reduce the delays and obstacles imposed by separate administrative departments.
4. No import restrictions: Import restrictions potentially hinder market development and should be eliminated in order to allow companies to freely conduct business in areas of their choice and on a commercial basis. Any future source of gas, such as imported pipeline gas or domestic production, should not receive any preferential treatment with regard to any other source of natural gas.
5. Sanctity of Contracts: Contracts have traditionally been designed to cover market needs over a period and therefore reflect a balance of risk and reward. These contracts must be respected. Companies need to know that freely negotiated commercial arrangements will not be “re-traded” or downgraded by new governments in the future. This includes no increase in obligations, exposure or risk, which could adversely impact lenders’ security interest.

6. Freedom to negotiate commercial arrangements and structures: Negotiations between producers, transporters and consumers should be conducted on a commercial basis, without actual or threatened regulatory intervention. Those who invest in gas infrastructure should be free of legislative interference in their ownership and contractual relationships.
7. Market based, non-subsidized commodity pricing: All prices, both natural gas as well as its competitive fuel alternatives, need to be market based and transparent such that interfuel and gas-to-gas competition will establish the most competitive delivered price to the end-user. No one source of gas should receive preferential price treatment in the market relative to any other source.
8. Regulatory Oversight: While a general regulatory policy of minimal oversight is desirable, it is recognized that there may be a need for regulatory intervention in certain instances. Regulation may be needed to protect consumers from price gauging, speculative gaming of the system that results in unnecessary rate hikes, reliability of supply etc (World Bank, 2001).

Investors will prefer that laws be enforced by a clearly autonomous entity that is free of government influence or intimidation. This does not necessarily imply the establishment of an independent regulator. Indeed, Japan has rejected the idea of setting up an independent regulatory body such as the Federal Energy Regulatory Commission (FERC) as in the U.S.. Other countries have used a Competition Authority rather than a Gas Regulatory Agency to oversee the operation of their gas systems. In either case it is essential that the regulatory process be transparent to all industry players. Rate methodologies for services like terminal charges, transportation and storage, need to be published in order to ensure non-discriminatory practices. Lastly, consistent oversight needs to be given to the entire gas value chain by a single authority that has jurisdiction over the Upstream (production), Midstream (transportation and storage) and Downstream (end use). This authority needs to be at the National (Federal) level whose decisions supersede those of regional agencies.

Conclusions

Japan needs to send a clear signal to the energy investment community if it is serious about developing an expanded and diversified gas market that includes adding pipeline gas and a transnational transportation grid to the current LNG industry. The first step in achieving this goal is to put into national law comprehensive amendments to the present Gas Law that will facilitate future investment and market development. Based on Japan's unique location and market characteristics, no single “model” currently exists for the government to adopt. Instead, the country should take the best aspects from a number of laws/initiatives that are in place around the world.

The absence of a national pipeline grid means that for Japan, pipeline gas will enter each local market on a competitive basis with whatever the alternative fuel is in that market. This may or may not have an immediate price relationship with LNG, especially if the two sources are supplying separate markets. If a pipeline grid is established in the future such that there is gas-to-gas competition, then over time, market forces will favor the lower price alternative and either increase its demand or lower overall gas prices. The key is to let the market define the outcome through competition and commercial negotiation.

The protection of existing long term contracts will limit, for some time, the degree to which there can be open or third party access to its gas infrastructure. Companies who take the risk of making the initial investment in essential gas infrastructure will not do so unless they are reasonably assured of making an acceptable rate of return on that investment. New entrants should not be allowed to gain “a free ride” by using existing infrastructure *unless* they pay a fair price for that utilization.

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