

**SECOND ANNUAL CONFERENCE ON
COMPETITION AND REGULATION IN NETWORK INDUSTRIES**

20 NOVEMBER 2009

CENTRE FOR EUROPEAN POLICY STUDIES, BRUSSELS, BELGIUM

**Unbundling and Open Access Models for Gas Infrastructure during the Liberalization
Process: Regulatory Patterns in US, Europe, and LNG Countries (Japan, South Korea and
Taiwan)**

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Abstract

Unbundling and open access regime are two important elements during the implementation of gas liberalization in US, Europe and Japan, and the proposal of gas liberalization in South Korea and Taiwan. So far, most contemporary literature mainly focuses on the introduction and analysis of unbundling and open access regime in the individual legal regimes. This article wishes to broaden the research scope of literature by integrating the liberalization regime in the LNG countries into the main stream discussion of the liberalization in US and Europe.

The purposes of this article are to have an overview of the unbundling and open access regime in US, Europe and LNG countries (Japan, South Korea and Taiwan) and to find out the regulatory patterns. For these purposes, this article will firstly investigate into the unbundling and open access regime in US, Europe and LNG countries. Accordingly, four regulatory patterns are found. They are: (1) the regulatory patterns of unbundling in US, Europe and LNG countries(Part 2); (2) the regulatory patterns of open access regime(Part 3); (3) Overall regulatory patterns of unbundling and open access regime(Part 4); (4) *Coherent* and *incoherent* regulatory patterns of unbundling and open access regime across US, Europe and LNG countries.(Part 5)

Keywords

[Unbundling, open access, third party access, gas liberalization]

1. Introduction

The utilization of natural gas started at the beginning of the 20th century.¹ The gas legal regime developed in response to the increasing use of natural gas and the recognition of the necessity for government intervention: economists considered the natural gas industry to be a ‘natural monopoly’; the legal response was to adopt the scheme of ‘utility regulation’. Four types of legal control mechanisms are embraced under this old model: entry control, price control, service control, and exit control.² In addition, the creation of national natural gas enterprises after World War II reflected the extreme regime of government intervention.³ However, since the 1970s, with the paradigm shift of economic thought,⁴ this old regime has been reviewed and many problems have been identified. Therefore, a new regime, the movement of privatization and liberalization, has initiated a reform of the old regime all around the world.⁵ In 1978, the U.S. government pioneered regulatory reform in the gas sector.⁶ This wave flew westward to the U.K. in 1986⁷ and crossed the strait into continental Europe⁸ and Asia⁹ ten years later. Gas liberalization has undoubtedly become a global trend.

According to the recent legislations and legislative proposals in US and Europe,¹⁰ coincidentally, special attention has been paid to improving the *unbundling* and *open access regimes* that apply to the *gas infrastructure sectors* in order to ensure non-discriminatory and transparent access to

¹ Geographically, natural gas can be produced together with oil production. However, because it was originally unknown that one could utilize natural gas, it was regarded as waste. Oil companies just released it into air and flared it in the beginning. See F. Bosselman et al. (eds.), *Cases and Materials: Energy, Economics, and the Environment* (2000), p. 438.

² See M.E. Mansfield, *Energy Policy: the Reel World* (2001), p. 119-120.

³ See P.J.Slot, “Energy (Electricity and Natural Gas)”, in D. Geradin (ed.), *The Liberalization of State Monopolies in the European Union and Beyond* (2000) p. 50-58. This development was not exclusive to the natural gas industry at that time. Many strategic businesses were also nationalized during this trend. On the overall development of nationalization, see e.g., C. Ugaz et al. (eds.), *Utility Privatization and Regulation: a fair deal for consumers?* (2003); D. Parker et al. (eds.), *International Handbook on Privatization* (2003).

⁴ The awareness of the importance of the free market was recovered during this stage. The important economists supporting this thought are the father of deregulation, Alfred Kahn, Richard Vietor, Averch-Johnson, William Baumol, etc. See J.D. Kearney and T. W. Merrill, “The Great Transformation of Regulated Industry Law” [1998] Colum. L. Rev. 98(6), at page 1323-4, 1401-2.

⁵ See Generally, OECD, *The OECD Report ON Regulatory Reform (Volume: 1) : Sectoral Studies* (1997).

⁶ See e.g., Natural Gas Policy Act of 1978 in US. The introduction of Natural Gas Policy Act of 1978, see EIA, “Natural Gas Policy Act of 1978”, available at: http://www.eia.doe.gov/oil_gas/natural_gas/analysis_publications/ngmajorleg/ngact1978.html (visited on 8 September 2009).

⁷ See e.g., Gas Act of 1986 in UK. The legal text of Gas Act of 1986, see OPSI, “Gas Act of 1986”, available at: http://www.opsi.gov.uk/RevisedStatutes/Acts/ukpga/1986/cukpga_19860044_en_1 (visited on 8 September 2009).

⁸ See e.g., European Gas Directive 98/30/EC. The EC’s activities had been focused on the establishment of an internal energy market since 1988. It took almost ten years to transition from the liberalization policy to legislation. See U. Immenga, “Chapter 3. The Development of European Energy Policy from the ECSC Treaty to the Internal Market”, in E.J.Mestmäcker(ed.), *Natural Gas in the Internal Market* (1993), p. 47-57.

⁹ See e.g., the Gas Utility Act of 1995 and 1999 in Japan; the 1999 Gas Restructuring Plan in South Korea; Natural Gas Business Act of 2003 and 2006 (draft) in Taiwan.

¹⁰ The recent legislative proposal in Europe, see Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/55/EC concerning common rules for the internal market in natural gas COM(2007)0529. The recent legislations in US, see FERC Order 717, 2004, etc.

the gas infrastructure and to provide a level playing field for competition between gas incumbents and new players. The lessons show that an appropriate *open access regime* in the gas infrastructure sectors can facilitate the market competition and new entrants, while a proper *unbundling* regime can contribute to an appropriate open access regime. Therefore, even though the legal issues related to the removal of the entry barriers to the competitive gas sectors are provided for US and Europe, this article will focus on *unbundling and open access models in the gas infrastructure sectors (transportation, distribution, underground storage, LNG facilities, LNG storage) in US, Europe, and LNG countries(Japan, South Korea and Taiwan)*.

The purposes of this article are to have an overview of the unbundling and open access regime in US, Europe and LNG countries (Japan, South Korea and Taiwan) and to find out the regulatory patterns. For these purposes, this article will firstly investigate into the unbundling and open access regime in US, Europe and LNG countries. The result will be provided in Appendices. Following this result, four regulatory patterns are found. They are: (1) the regulatory patterns of unbundling in US, Europe and LNG countries(Part 2); (2) the regulatory patterns of open access regime(Part 3); (3) Overall regulatory patterns of unbundling and open access regime(Part 4); (4) *Coherent* and *incoherent* regulatory patterns of unbundling and open access regime across US, Europe and LNG countries.(Part 5) Finally, a conclusion is provided at the end of this article.

2. Regulatory Patterns of Unbundling Regimes in US, Europe and LNG Countries

Generally, the regulatory patterns in US are more similar to those in Europe, while the regulatory patterns among LNG countries are more similar to each other. However, this is just a rough statement. Even in US and Europe, there remains certain differences of unbundling regime. In this regard, this article will elaborate their regulatory patterns respectively and point out any difference if any.

2.1. Overall Regulatory Patterns

2.1.1. Overall Regulatory Patterns in US and Europe

From the unbundling regimes in the US and Europe, two similarities are found.

First, the types of unbundling regimes are quite similar, with both including SU, AU, FU, LU, OU and ISO.

Second, the combination of unbundling regimes is quite similar: The most basic form of unbundling usually combines SU and AU; more advanced forms of unbundling are FU/LU, ISO, or OU. However, it should be noted that LU is usually not combined with OU. Furthermore, these advanced forms of unbundling regimes (OU/ISO, etc.) are combined with SU/AU.

However, there are also differences with regard to introducing unbundling regimes in the US and Europe. For instance, the unbundling target groups are different: There are four unbundling target groups in Europe,¹¹ while there are only two in the US.¹²

¹¹ The unbundling regime in Europe is developed for different gas sectors, including transportation, distribution, LNG facility and storage sectors.

¹² In general, the focus of the unbundling regime in the US is on “interstate pipelines, LNG infrastructure and underground storages, owned by interstate (and certain intrastate) companies” and “interstate pipelines, distribution

2.1.2. Overall Regulatory Patterns in LNG Countries

Even though the unbundling regime in LNG countries are highly influenced by those in US and Europe, the LNG countries seem to develop their own regulatory patterns. First, the types of unbundling regimes in LNG countries are fewer than those in US and Europe, including SU, AU, and perhaps FU. LU, OU and ISO are not mentioned. Second, the combination of unbundling regime is also different: FU is usually not combined with LU. Third, compared with rigid unbundling regime in the underground storage sector, no unbundling regime is proposed in LNG countries.

2.2. Regulatory Patterns in Transportation Sector

2.2.1. Regulatory Patterns in US and Europe

Many similarities are found in the US and Europe with regard to the unbundling of their transportation sectors:

- The *first* unbundling objective: It is the first gas infrastructure sector subject to unbundling regimes in the US¹³ and Europe.¹⁴
- The most *rigid* unbundling regime is applied to transportation sectors in the US¹⁵ and Europe.¹⁶
- *AU and SU are the minimum requirement* in transportation sectors in the US¹⁷ and Europe.¹⁸
- *LU comes together with FU* in transportation sectors in the US¹⁹ and Europe.²⁰
- Currently, *similar unbundling regimes* are applied to the transportation sector in the US²¹ and Europe²², which includes SU, AU, FU, and LU.
- The *interrelationship* between unbundling and open access regime: The LU and FU often

pipelines, LNG infrastructure, and underground storages, owned by intrastate companies or LDCs. However, it should be noted that the FERC Order 436 treats pipelines and underground storages differently.

¹³ FERC Order 436 of 1985 first introduced unbundling regime to interstate pipelines.

¹⁴ The 1st Gas Directive of 1998 in Europe first introduced account and service unbundling to transportation and other sectors.

¹⁵ FERC Order 436 applies a voluntary unbundling regime to interstate pipelines, while no unbundling regime is applied to other gas infrastructure. Furthermore, FERC Order 717 adopts a rigid functional unbundling regime in the interstate transportation pipeline, underground storage and LNG infrastructure sectors.

¹⁶ Transportation is subject to AU/SU in the 1st Gas Directive, SU/AU/FU/LU in the 2nd Gas directive, ISO/OU in the proposed 3rd Gas Package.

¹⁷ See FERC Order 636.

¹⁸ See the 1st Gas Directive.

¹⁹ See FERC Order 636.

²⁰ See the 2nd Gas Directive.

²¹ See FERC Order 636.

²² See the 2nd Gas Directive.

come together with mandatory open access regimes or RTPA in the US²³ and Europe.²⁴

- The *current regulatory priority* in the transportation sector in the US and Europe focuses on the reinforcement of compliance of the functional unbundling regime. Even though an ISO or OU in the transportation sector is under discussion in Europe, the regulatory priority in Europe remains the implementation of FU in the 2nd Gas Directive before passing of the 3rd Gas Package and Gas Directive.

However, there are three differences in unbundling regimes between the US and Europe. They are:

- With regard to *FU*, more detailed and complicated measures are adopted in Europe than in the US. For instance, more independent organization requirements, such as separation of logos, are adopted in Europe. Additionally, with regard to the independent decision-making requirement, the regime in the US only focuses on the separation of the function of staffs, while the regime in Europe adopts more measures, such as shareholding unbundling between network and non-network companies, etc.
- The *prospective unbundling regime* is different. Further unbundling, including ISO and/or OU, is proposed in Europe, but there is no further unbundling proposed in the US.
- Whether the *exemption from legal and functional unbundling* is provided for transportation sectors: The exemption regime is provided for interstate transportation companies in the US.²⁵ However, the exemption is not applied to gas TSOs in Europe.²⁶

2.2.2. Regulatory Patterns in LNG Countries

Many similarities are found in the LNG countries with regard to the unbundling of their transportation sectors:

- The most *rigid* unbundling regime is applied to transportation sectors in Japan,²⁷ and proposed in South Korea²⁸ and Taiwan.²⁹
- The *first* unbundling objective deals with the transportation sectors in Japan,³⁰ South Korea,³¹ and Taiwan.³²

²³ See FERC Order 636. As there is only a voluntary open access regime in FERC Order 436, there is no legal unbundling regime adopted.

²⁴ See the 2nd Gas Directive. In the 1st Gas Directive, only a free choice between NTPA and RTPA is adopted. There was no functional and legal unbundling introduced.

²⁵ For the waiver from functional and legal unbundling, see FERC Order 2004 and 717.

²⁶ The exemption is only applied to gas DSOs in the 2nd Gas Directive.

²⁷ RTPA is currently applied to transportation and distribution sectors, while NTPA is applied to LNG storages and terminals.

²⁸ A mixed RTPA and NTPA regime for the transportation sector was scheduled in the 1999 Gas Restructuring Plan. Currently, an NTPA regime is applicable.

²⁹ Service and account unbundling in draft Natural Gas Business Act of 2003 and 2006.

³⁰ The transportation and distribution pipelines owned by the Big 3 gas companies in Japan were first subject to an unbundling regime in 1995.

³¹ The POSCO began to use NTPA of KOGAS's transportation pipelines to import LNG in 2005.

- However, there are two different regulatory patterns between US/Europe and LNG countries, and among LNG countries.
- The relationship between FU and LU: Japan only adopts FU without LU in transportation (and distribution) sectors, while Taiwan does not propose FU and LU. However, FU combining with LU is proposed in the 1999 Gas Restructuring Plan of South Korea.
- The relationship between SU and AU: SU and AU were not the minimum requirement in 1995 in Japan. The development of AU, such as a wheeling account, occurred later than that of SU. However, AU is combined with SU in South Korea³³ and Taiwan.

Certain regulatory patterns in individual LNG countries are the same of different from US or Europe.

Japan

Many similarities are found between US/Europe and Japan with regard to the unbundling of their transportation sectors. They are: (1) The FU regime is developed under the mandatory open access regime in US/Europe and Japan.³⁴(2) The *current regulatory priority* focuses on the improvement of the compliance of AU and FU in US/Europe and Japan.

Also, certain unbundling regimes in Japan are similar to those in the US but dissimilar to those in Europe. They are:

- There is a discussion of unbundling exemption in transportation sectors in the US and Japan.³⁵
- There is no proposal of ISO or OU in the US or in Japan.
- The detailed FU rules are also lenient in Japan and the US. For instance, there is no separation of logos in the US or Japan.

South Korea

One unbundling measure of South Korea is similar to that in US/Europe: As there is no mandatory open access regime in transportation sectors in South Korea, no FU is adopted.

However, there are several differences in the unbundling regimes of US/Europe and South Korea. They are:

- The current regulatory priority is different. The regulatory priority in South Korea is to facilitate the deliberation process of gas liberalization bills in the Parliament.
- Unlike Europe but similar to the US, there is no ISO regime proposed for transportation sectors.
- As no FU is introduced, no exemption regime is provided in South Korea. However, recently there has been discussion to develop FU, such as a code of conduct and information handling rules.

³² Both transportation and LNG infrastructure are subject to unbundling regime in draft Natural Gas Business Act of 2003 and 2006.

³³ See 1999 Gas Restructuring Plan in South Korea.

³⁴ The Gas Utility Act introduced the RTPA regime in 1999. The rules of the functional unbundling regime were developed in 2000 and 2004.

³⁵ See FERC Order 2004 and 717 in the US; 2004 Guideline in Japan.

Taiwan

There are four differences in unbundling regimes between US/Europe and Taiwan:

- Unlike US and Europe, there is no discussion of legal and functional unbundling in the proposed unbundling plan in Taiwan.
- Unlike US and Europe, the introduction of an RTPA regime does not coincide with FU or LU in Taiwan. Thus, there is no discussion of unbundling-exempt regime either.
- As there is no gas liberalization in Taiwan, the current regulatory priority focuses on the development of a legal regime for gas liberalization and the facilitation of the deliberation process of gas draft bills in the Parliament.
- Unlike Europe, there is no discussion of a gas ISO regime in Taiwan.

2.3. Regulatory Patterns in Distribution Sector

2.3.1. Regulatory Patterns in US and Europe

Many similarities are found between the US and Europe with regard to the unbundling of distribution sectors. They are:

- There is a certain extent of *SU and AU* introduced to the distribution sectors in the US and Europe. Even if certain distribution companies are not subject to an open access regime in the US and Europe, they are required to adopt an AU regime after gas liberalization.
- Mandatory SU comes together with the RTPA scheme in the US and Europe.
- The detailed implementation of distribution unbundling is determined by a lower-level authority in US and Europe. The authority to determine the detailed regime lies with the state governments in the US, while the authority in Europe lies either with member states or with local governments.
- The RTPA regime comes together with FU and LU in Europe and the US.
- The unbundling exemption is provided for distribution sectors in the US and Europe.
- Recent research in Europe and the US has focused on the substantial implementation of SU/AU/FU/LU, instead of the adoption of further unbundling regimes, such as ISO and OU.

However, there are three differing characteristics of unbundling regimes between the US and Europe. They are:

- *The rigidity* of unbundling regimes in Europe and the US is different: The rigidity of distribution unbundling (SU/AU/FU/LU) is similar to that of transportation unbundling in Europe and the US.³⁶ However, the state governments have authority to determine whether or not to introduce unbundling regimes to their distribution sectors.
- The discretion relating to the introduction of distribution unbundling: As the Gas Directive

³⁶ However, it should be noted that interstate pipelines in the US are likely to be subject to the unbundling exemption. However, there is no similar exemption provided for transportation companies in Europe.

has already set the time frame and basis regimes of unbundling schemes,³⁷ Member States have only limited discretion in the formulation of further unbundling. However, because of the vertical separation of powers in the US Constitution, the state governments have the power to determine whether or not to introduce and how to formulate distribution unbundling regimes.

- The practical implementation of distribution unbundling is better in the US than in Europe. As the implementation of distribution unbundling is monitored by the state energy regulators in the US, the practical implementation of distribution unbundling is similar to the implementation of transportation unbundling. However, this is not the case in Europe. As European and national energy regulators focus on the practical implementation of transportation unbundling, less attention has been paid to the implementation of distribution unbundling in Europe, which leads an implementation of distribution unbundling that is poorer than that of transportation unbundling.

2.3.2. Regulatory Patterns in LNG Countries

Japan

Many similarities are found between the US/Europe and Japan with regard to the unbundling of their distribution sectors. They are:

- There is a certain extent of AU and SU introduced to distribution sectors in US/Europe and Japan.
- Once an RTPA regime is adopted, the SU regime is moved from a voluntary regime to a mandatory regime.
- The unbundling exemption is introduced to distribution sectors in Japan and US/Europe.
- Current regulatory priority in US/Europe and Japan is focused on the actual implementation of FU/AU/SU.

Also, the distribution unbundling regime in Japan has elements of both European and US regimes. They are:

- Similar to the US,³⁸ the same unbundling regime is applied to transportation and distribution sectors in Japan.³⁹ In spite of SU/AU/FU in Japan, and instead of SU/AU/FU/LU in the US, these unbundling measures are applied to both transportation and distribution sectors in the US and Japan.
- Similar to the EU,⁴⁰ the rigidity of the distribution unbundling regime is very high in Japan.⁴¹

³⁷ “- With regard to larger DSOs (serving above 100.000 customers), the requirement of legal unbundling may be postponed until 1 July 2007, i.e. the date of full market opening.” See DG’s Note on Unbundling, at p. 5, available at: http://ec.europa.eu/energy/gas_electricity/interpretative_notes/doc/implementation_notes/unbundling_en.pdf (visited on 15March, 2009). See also Article 23(1)(c) of the 2nd Gas Directive.

³⁸ SU/AU/FU/LU are applied to transportation and distribution companies in the US.

³⁹ AU/SU/FU are applied to transportation and distribution sectors in Japan.

⁴⁰ Except for the exemption provided for DSOs, the unbundling regime applied to transportation and distribution sectors is quite similar in the 2nd Gas Directive. The rigidity of unbundling regime in transportation and distribution sectors is higher than that in LNG facility and storage sectors.

⁴¹ The unbundling regime applied to transportation and distribution is more rigid than that applied to LNG storages and facilities in Japan.

- Similar to the EU, the Japanese lower-level authority has less discretion on whether or not to introduce unbundling.
- Similar to the EU, the implementation of distribution unbundling is better in big distribution companies than in smaller distribution companies. Big distribution companies, such as GRDF in France or the Big 4 gas companies in Japan, tend to adopt more detailed sophisticated functional unbundling measures.

However, there are two different characteristics of unbundling regimes between Japan and US/Europe. They are:

- ‘National law,’ which determines whether or not and how to introduce distribution unbundling. The introduction of distribution unbundling in Europe and the US may be determined by laws at the lower level.⁴² Unlike in Europe and the US, where the distribution unbundling is formulated by lower-level law,
- FU and RTPA regimes are introduced without the adoption of LU at the same time.

South Korea and Taiwan

Compared to US/Europe and Japan, South Korea and Taiwan have a less clear plan of distribution unbundling. The features of the distribution sectors in South Korea and Taiwan are different from those in US/Europe and Japan. Unlike in US/Europe, where both transportation and distribution pipelines are well developed and play important roles in the gas supply chain, there are two differences between South Korea/Taiwan and Japan: the distribution pipeline is less well developed, and LNG infrastructure and transportation play a more important role than does distribution in South Korea and Taiwan.

2.4. Regulatory Patterns in Underground Storage Sector

2.4.1. Regulatory Patterns in US and Europe

Even though underground storages are usually owned by major transportation companies in the US and Europe, the storage unbundling regime diverges greatly between Europe and the US. Only a few similarities are found in the US and Europe with regard to the unbundling of storage sectors. They are:

- The minimum unbundling regime in the underground storage sector is voluntary SU and mandatory AU.
- The SU regime will become mandatory when an RTPA regime is adopted.
- However, there are five differences in the storage unbundling regimes of the US and Europe. They are:
- Rigidity of the unbundling regime: A similar unbundling regime is applied to both transportation and underground storage in the US.⁴³ However, a different and less rigid rule

⁴² The distribution unbundling in the US is mainly determined by state laws, while the distribution unbundling in Europe is mainly determined by national laws or local laws.

⁴³ Interstate transportation and underground storage have been subject to the same unbundling regime since FERC Order 636. However, there are two exceptions: (1) transportation and underground storage are subject to different unbundling regimes in FERC Order 436; (2) underground storage at the state level may not be subject to retail unbundling if the state determines not to introduce retail unbundling or retail access programs.

is applied to underground storage than that applied to transportation/distribution in Europe.

- Currently effective regimes are different: underground storage is subject to SU/AU/FU/LU in the US, while only voluntary SU and mandatory AU are applied to underground storage in Europe. Also, only a voluntary FU regime is developed by GGP SSO under the current 2nd Gas Directive. Finally, a mandatory LU/FU is proposed by the 3rd Gas Package and Gas Directive.
- The type of underground storage subject to an unbundling regime: underground storage in the US is subject to an open access regime.⁴⁴ In Europe, the unbundling rule is mainly applied to open-access storage rather than to non-open-access storage.⁴⁵
- The current regulatory priority is different: it focuses on the implementation of SU/AU/FU/LU in practice. In Europe, there are two priorities, the improvement of the implementation of SU and AU and the introduction of mandatory FU and LU in the 3rd Gas Package and Gas Directive.

In spite of so many differences between the US and Europe, a trend of adopting a rigid storage unbundling regime (*AU/SU/FU/LU*) is found. This trend is very likely influenced by the fact that Europe has begun to realize that *underground storage plays a similar role to transportation in the European gas supply chain*; this has already been found and adopted by the US. It seems that only this rigid unbundling can ensure non-discriminatory and transparent open access in both the US and Europe.

2.4.2. Regulatory Patterns in LNG Countries

In contrast to the discussion of storage unbundling regimes in Europe and the US during gas liberalization, less attention has been paid to the unbundling of underground storages during gas liberalization in Japan and Taiwan.⁴⁶ There could be several potential reasons for this contrast:

- Due to the lack of suitable geographical locations for underground storages in Taiwan and Japan, there are few underground storages. This situation makes the role of underground storage less vital to the gas supply chain.
- The gas supply chain in Taiwan and Japan relies very much on the LNG storages and LNG terminals. LNG storage and terminals, instead of underground storage, are the main facilities serving ‘storage’ functions.
- Unlike the underground storages usually owned by gas companies in Europe and the US, they are owned by ‘oil’ companies in Taiwan and Japan. As oil companies are not the main reform objectives, no unbundling regime is provided for them during gas liberalization.

Based on the lesson in the US and Europe, it is found that *rigid unbundling is mainly applied to essential gas infrastructure*. That is also why underground storages are treated rigidly in the US and Europe.

⁴⁴ As noted above, underground storages located in the state that do not introduce retail access/unbundling programs are not subject to the open access regime.

⁴⁵ E.g., the rigid FU/LU is scheduled to be applied to open-access storage in the 3rd Gas Package.

⁴⁶ Currently there is no underground storage in South Korea.

2.5. Regulatory Patterns in LNG terminals and facilities

As the concept of LNG infrastructure is different in the US, Europe and the LNG countries, this article will discuss the unbundling regime applied to LNG ‘terminals’ and LNG ‘storage,’ respectively. Based on the patterns in the US and Europe, this article will compare the situation of each LNG country with US/Europe.

2.5.1. Regulatory Patterns in US and Europe

Overall, there are major differences in the unbundling regimes of LNG terminals between the US and Europe. Few similarities are found in the US and Europe with regard to the unbundling of their LNG terminals. They are:

- The minimum requirement is voluntary SU and mandatory AU in the US and Europe.
- Currently, a mandatory SU regime is adopted by the US (FERC Order 636) and Europe (The 2nd Gas Directive).

However, there are major differences in the unbundling regimes of LNG terminals between the US and Europe. They are:

- LU and FU are adopted in the US, but this is not the case in Europe. Only a voluntary FU regime is planned under the GGP for LNG SOs in Europe.
- The concept of LNG facilities is different between the US and Europe. In US, it involves LNG terminals, regasification facilities, LNG storages, etc. However, it involves “temporary LNG storage,” LNG terminals, etc., but it excludes LNG storages in Europe.
- Onshore/offshore LNG facilities: separate legal regimes are applied to onshore and offshore LNG facilities in the US, but only onshore LNG facilities are subject to an unbundling regime. However, no separate legal regimes are provided in Europe: all LNG facilities, regardless of their being onshore or offshore, are subject to the same unbundling regime.
- The rigidity of the unbundling regime: The unbundling of LNG terminals is similar to that of transportation, which is a rigid regime (SU/AU/FU/LU). However, a different and more lenient unbundling regime is provided to LNG terminals in Europe.
- The unbundling regime for LNG terminals and LNG storages: Both LNG terminals and storages are subject to the same unbundling regime in the US, while different unbundling regimes are provided in Europe.
- The voluntary action of moving beyond the minimum requirement of law: the LNG operators in the US often just follow the legal requirements of unbundling (SU/AU/LU/FU). However, many LNG SOs in Europe voluntarily adopt a more stringent regime, such as LU,⁴⁷ than the lenient legal requirement (SU/AU).
- The current regulatory priority: In the US, in Europe it focuses on the actual implementation of SU/AU/FU/LU, particularly FU. However, it focuses on the actual implementation of SU/AU in the 2nd Gas Directive and the introduction of voluntary FU under the GGP for LNG SOs.⁴⁸

⁴⁷ E.g., Fluxys in Belgium created an LNG subsidiary (Fluxys LNG) to carry out the function of the LNG facilities.

⁴⁸ GGP for LNG SOs is a ‘voluntary functional unbundling regime’ under the 2nd Gas Directive. However, it is scheduled to become a mandatory regime after the 3rd Gas Package passing.

The investment in LNG facilities: The rigid unbundling of LNG terminals in the US has impeded the development and the investment of LNG terminals since the gas liberalization in 1978. Recently, FERC loosened the rigid mandatory SU and RTPA regime in order to encourage the development of LNG terminals in the US.⁴⁹ This is not the case in Europe; the gas companies have made large investments in LNG facilities under the regime of mandatory SU/AU and RTPA after the gas liberalization. Even so, there is also an exemption from TPA provided in the 2nd Gas Directive.

2.5.2. Regulatory Patterns in LNG Countries

Japan

Generally speaking, Japan adopts an unbundling regime that combines elements of those in Europe and the US. However, the unbundling regime of LNG terminals in Japan is more lenient and closer to the lenient regime in Europe. Many similarities are found in the US/Europe and Japan with regard to the unbundling of LNG terminals. They are:

- Similar to Europe and the US, at least mandatory AU has been introduced in Japan.
- Similar to Europe, only voluntary SU and mandatory AU have been introduced in Japan.
- Similar to Europe, the unbundling regime applied to LNG terminals is less rigid than in transportation and distribution sectors in Japan.
- Similar to Europe, a mandatory FU regime is only applied to transportation and distribution sectors, instead of LNG terminals.
- Similar to Europe, the lack of a rigid unbundling regime seems to lead to large investment in LNG terminals and related facilities after the gas liberalization.
- Similar to Europe, the current regulatory focus is on the actual implementation of AU/SU. No LU is proposed.
- Similar to the US, LNG terminals are subject to the same unbundling regime like LNG storage.

However, there are three differences in the unbundling regimes of Japan and the US/Europe. They are:

- Unlike the US and Europe, currently only voluntary SU and NTPA regimes are applied to LNG terminals in Japan.
- Unlike the US, there is no separate unbundling regime provided for onshore and offshore LNG terminals in Japan.
- Unlike Europe, there is no development of voluntary or mandatory FU in Japan.⁵⁰

⁴⁹ See, e.g., the Hackberry Decision, available at: http://www.eia.doe.gov/oil_gas/natural_gas/analysis_publications/ngmajorleg/ferc.html (visited on 8 September 2009).

⁵⁰ The 2004 Guideline mainly focuses on the 'open access regime of LNG terminals' and the unbundling and open access regime of transportation and distribution pipelines.

South Korea

Generally speaking, the unbundling regime of LNG terminals in the 1999 Gas Restructuring Plan in South Korea is similar to that in the US. Many similarities are found in South Korea and the US with regard to the unbundling of LNG terminals. They are:

- Similar to the US, the status of LNG terminals is similar to that of transportation in South Korea. For instance, transportation and LNG infrastructure are subject to similar unbundling regimes in the 1999 Gas Restructuring Plan in South Korea.
- Similar to the US, mandatory AU is proposed in the 1999 Gas Restructuring Plan.
- Similar to the US, FU is proposed in the 1999 Gas Restructuring Plan.

[Current regime: a mixture of US and Europe] However, as the 1999 Gas Restructuring Plan was not put into practice, only a lenient unbundling was introduced by the Urban Gas Business Act and Petroleum Business Act in the late 1990s. The unbundling regime is a hybrid regime of the US and Europe:

- Similar to the US, transportation and LNG terminals are subject to the same unbundling regime.
- Similar to the US, a lenient unbundling regime seems to encourage the development of LNG terminals.
- Similar to Europe, FU is under discussion in South Korea.
- Similar to Europe under the 1st Gas Directive, voluntary SU and NTPA regimes have been adopted in South Korea.

Taiwan

Generally speaking, the unbundling regime of LNG terminals in Taiwan is similar to those in South Korea and the US. Many similarities are found in Taiwan and the US with regard to the unbundling of LNG terminals. They are:

- Similar to the US, the status of LNG terminals is similar to that of transportation in Taiwan.
- Similar to the US, RTPA and mandatory SU are adopted in Taiwan.⁵¹
- Similar to the US, the minimum requirement is mandatory SU and AU in Taiwan.
- Similar to the US, LNG terminals and storages are subject to the same unbundling regime in Taiwan.

However, there are three differences in the unbundling regimes of Taiwan and the US. They are:

- The unbundling measures: SU/AU/FU/LU is adopted in the US, while only SU/AU is proposed in Taiwan.
- Unlike the situation in the US, there is no discussion of FU and LU in Taiwan.
- Unlike the US, there is no unbundling exemption provided for LNG terminals in Taiwan.

⁵¹ However, unlike the RTPA regime in the US, a conditional RTPA regime is proposed in Taiwan.

2.6. Regulatory Patterns in LNG Storage Sector

Under the unbundling regime in the US, Japan, South Korea, and Taiwan, LNG storages are subject to the same legal regime as the LNG terminals. However, the situation is different in Europe, where LNG storages are subject to ‘storage’ unbundling regimes and LNG terminals are subject to unbundling regimes of LNG ‘facilities.’ This is why this article respectively discusses the unbundling regime of LNG storages and LNG terminals.

2.6.1. Regulatory Patterns in US and Europe

As noted above, there are major differences between the unbundling regimes of LNG terminals in the US and Europe. The same situation occurs for unbundling regimes of LNG storages as well. Few similarities are found in the US and Europe with regard to the unbundling of LNG storages. They are:

- The minimum requirement is voluntary SU and mandatory AU in the US and Europe.
- Once an RTPA regime is adopted, mandatory SU is introduced at the same time.
- LNG storages are less likely to be subject to an unbundling exemption than are LNG terminals in the US and Europe.

However, there are major differences in the unbundling regimes of LNG storage between the US and Europe. They are:

- The rigidity of unbundling: A rigid unbundling regime (AU/LU/FU and mandatory SU) is applied to transportation, LNG terminals, underground storages, and LNG storage in the US. However, lenient unbundling (voluntary SU, mandatory AU) is applied to underground storages and LNG storages.
- Mandatory FU: A mandatory FU is adopted in the US. However, there is only voluntary FU developed under GGP for SSOs, which would become mandatory FU after the passing of the 3rd Gas Package and Gas Directive.
- The sub-concept of LNG storage: In the US, there is no sub-concept of LNG storage. However, there are two sub-concepts relating to LNG storage in Europe. ‘Temporary LNG storage’ is subject to the unbundling regime of LNG facilities and terminals, while ‘LNG storage’ is subject to a storage unbundling regime.
- Open access storage/non-open access storage: LNG storages in the US are principally considered to be open-access storage and subject to a storage unbundling regime. However, LNG storage in Europe involves the concept of open-access LNG storage and non-open-access LNG storage. They may be subject to different unbundling regimes.⁵²
- The current regulatory priority is different. The unbundling regime in the US focuses on the actual implementation of a current SU/AU/FU/LU regime. However, the unbundling regime in Europe focuses on not only the actual implementation of SU/AU but also the introduction of LU/FU scheme to open-access LNG storage in the future.
- Monitoring the implementation of the unbundling regime of LNG storages: The implementation of unbundling of LNG storages is highly monitored by the FERC and State PUCs. However, the monitor scheme pays less attention to the implementation of LNG

⁵² E.g., open-access LNG storage is scheduled to be subject to SU/AU/FU/LU in the 3rd Gas Package, while non-open-access LNG storage is only subject to SU/AU in the 3rd Gas Package.

storage in Europe.⁵³

Overall, the unbundling regime in the US is much more rigid than in Europe. It may be partly because *there are more LNG storages in the US than in Europe, which makes LNG storages play more important roles in the US market than in Europe*. However, from the recent legal development in Europe, LNG storage seems to have become more vital in Europe as well, as more rigid unbundling (FU/LU) is also proposed in the 3rd Gas Package and Gas Directive.

2.6.2. Regulatory Patterns in LNG Countries

Japan

Similar to the unbundling regime to LNG terminals in Japan, Japan adopts a mixed unbundling regime of Europe and the US. However, the unbundling regime of LNG storage in Japan is more lenient and closer to the lenient regime in Europe. Many similarities are found in the US/Europe and Japan with regard to the unbundling of LNG terminals. They are:

- Similar to the US and Europe, AU and SU are minimum requirements.
- Similar to the US, the same legal regimes are applied to both LNG terminals and LNG storages. However, the unbundling regime in the US (SU/AU/FU/LU) is more rigid than that in Japan.
- Similar to Europe, voluntary SU and NTPA have been adopted in Japan.
- Similar to Europe, Japan has adopted an unbundling regime that is more lenient toward LNG storages than transportation/distribution.
- Similar to Europe, no mandatory FU currently applies to LNG storages in Japan.
- Similar to Europe, the current regulatory priority in Japan focuses on the actual implementation of AU and SU. However, FU/LU is considered in the 3rd Gas Package and Gas Directive in Europe.

In sum, the unbundling regime of LNG storages in Japan is lenient and similar to the unbundling regime in the European 2nd Gas Directive.

South Korea and Taiwan

As similar unbundling regimes are applied to both LNG terminals and LNG storages in Taiwan and South Korea, the comparison with US/Europe for South Korea and Taiwan are the same as noted above.

⁵³ For instance, an important storage monitoring report excludes the investigation into the implementation of LNG storage in Europe. See ERGEG, “Final 2006 Report on Monitoring the Implementation of the Guidelines for Good TPA Practice for Storage System Operators (GGPSSO)”, 6 December 2006, available at: http://www.ergreg.org/portal/page/portal/ERGEG_HOME/ERGEG_DOCS/ERGEG_DOCUMENTS_NEW/GAS_FOCUS_GROUP/E06-GFG-20-03_GGPSSO_MonitoringImplementation_2006-12-06.pdf (visited on 8 September 2009).

3. Regulatory Patterns of Open Access Regimes in US, Europe and LNG Countries

3.1. Overall Regulatory Patterns

3.1.1. Overall Regulatory Patterns in US and Europe

In order to facilitate the implementation of non-discriminatory and transparent open access regimes to gas infrastructure, different open access regimes and detailed measures have been introduced to US and Europe. However, several similarities are found in the US and Europe.

- The basic types of open access regimes in the US and Europe are similar. They include NTPA, RTPA and mixed RTPA and NTPA regimes.
- The preferred form of open access regime is RTPA in the US and Europe.⁵⁴
- The current regulatory priorities in the US and Europe are quite similar. They focus on the actual implementation of RTPA regime.

In spite of these similarities, several differences are found. For instance, there are two open-access objectives in the US,⁵⁵ while there are four in Europe.⁵⁶

3.1.2. Overall Regulatory Patterns in LNG Countries

The basic types of open access regimes in the LNG countries are similar. They include NTPA, RTPA and mixed RTPA and NTPA regimes. Yet, there is a special type of NTPA combining conditional RTPA in Taiwan.

Besides, the LNG countries seem to be very conservative towards the liberalization and the introduction of RTPA regime. Except for the RTPA of transportation sector in Japan, NTPA is currently applied to the LNG infrastructure in Japan and transportation and LNG infrastructure in South Korea.

3.2. Regulatory Patterns in Transportation Sector

3.2.1. Regulatory Patterns in US and Europe

Many similarities are found between the US and Europe in the adoption of open access regimes in their transportation sectors. They are:

- The transportation sector is the *first* gas sector subject to an open access regime in the US⁵⁷ and Europe.⁵⁸
- The most *rigid* open access rules are applied to transportation sectors in the US⁵⁹ and Europe.⁶⁰

⁵⁴ An exception is the free choice between an RTPA and NTPA regime in open-access storage sectors in Europe.

⁵⁵ Interstate (and certain intrastate) gas companies; intrastate gas companies and LDCs.

⁵⁶ Transportation; distribution; LNG facilities; underground storage and LNG storages.

⁵⁷ See FERC Order No. 436.

⁵⁸ See the 1st Gas Directive.

⁵⁹ RTPA is applied to interstate transportation pipelines in the FERC Order 636.

⁶⁰ See the 1st and 2nd Gas Directive.

- The *general principles* under open access regimes are similar in Europe and the US. They are: *non-discriminatory* and *transparency* requirements.
- The open access regime *evolved from NTPA to RTPA* in the US⁶¹ and Europe⁶².
- The current regulatory priority in transportation sectors is similar in Europe and the US. Both of them focus on the *actual implementation* of non-discriminatory and transparent *RTPA* regimes. Special attention has been paid to the development of *transparency* rules and the facilitation of non-discriminatory and transparent open access via a more complete *code of conduct*.

However, there are two differences in the open access regimes of the US and Europe. They are:

- The application of RTPA exemption is different between the US and Europe. The transportation sector is likely to be subject to the TPA exemption in Europe, but the TPA exemption is designed mainly for LNG terminals in the US.
- The design of eligible thresholds for an open access regime is different in the US and Europe. There is no eligible threshold for interstate transportation at the federal level in the US, but there is a threshold for intrastate transportation at the state level. However, an eligible threshold for transportation is adopted in the European Gas Directive.⁶³

3.2.2. Regulatory Patterns in LNG Countries

Japan

The TPA regime for transportation sectors in Japan is quite similar to that in US and Europe. Many similarities are found in the US/Europe and Japan when adopting open access regimes in their transportation sectors. They are:

- The *first* open access objective in Japan is for transportation sector. An open access regime was first introduced to the transportation and distribution sectors of the Big 3 gas companies in 1995.
- The most *rigid* form of a TPA regime is applied to transportation sectors in Japan. ⁶⁴
- The development of open access regimes in transportation sectors evolved from NTPA in 1995 to RTPA in 1999 in Japan.
- The general principles of open access regimes in Japan are also non-discrimination (fairness) and transparency ..
- The current regulatory priority in transportation sectors in Japan focuses on the actual implementation of a non-discriminatory and transparent RTPA regime. It also focuses on the development of transparency rules and codes of conduct in order to facilitate an open access scheme.

⁶¹ Voluntary open access regime in FERC Order 436; mandatory open access regime in FERC Order 636.

⁶² A free choice between RTPA and NTPA in the 1st Gas Directive; RTPA regime in the 2nd Gas Directive.

⁶³ However, the gas laws in certain Member States, such as Energiewirtschaftsgesetz 1998 in Germany, do not adopt eligible thresholds.

⁶⁴ NTPA was applied to transportation and distribution pipelines owned by the Big 3 gas companies in 1995. Currently, the RTPA regime is applied to transportation and distribution pipelines.

However, the open access regimes differ between Japan and US/Europe. They are:

- The TPA exemption in Japan is intended to apply to the transportation pipeline. However, it is applied to LNG terminals in the US and to major gas infrastructure (more likely transportation and LNG facilities) in Europe.
- Unlike the federal rules in the US, the eligible thresholds in transportation in Japan have been gradually reduced to give open access rights to gas consumers.

South Korea

Many similarities are found between South Korea and the US/Europe when adopting open access regimes in their transportation sectors. They are:

- The first open access objective in South Korea is in its transportation sector. The 1999 Gas Restructuring Plan is intended to introduce open access to transportation sectors, and an NTPA regime is currently applied to transportation and LNG infrastructure.
- The most rigid open access regime is applied to transportation sectors in South Korea.⁶⁵
- The general principles for open access regimes are non-discrimination and transparency requirements in South Korea.

However, open access regimes have four differences between South Korea and US/Europe. They are:

- Unlike the RTPA regime in the US and EU, only an NTPA regime has been introduced in South Korea.
- TPA exemption is not discussed in South Korea.
- The current regulatory priority in South Korea focuses on the improvement of transparency and non-discriminatory rules under the current NTPA regime and the development of the RTPA regime.
- Unlike Europe, there is no eligible threshold proposed.

Taiwan

Compared with open access schemes being implemented in US, Europe, Japan, and South Korea, no open access regime has been adopted in Taiwan. The open access regime developed under the Natural Gas Business Act remains under deliberation in its Parliament. In general, many similarities are found in the US, Europe and Taiwan when adopting open access regimes in their transportation sectors. They are:

- The *first* open access target is the transportation sector in Taiwan. The Natural Gas Business Act intends to introduce an open access regime to the transportation and the LNG infrastructure owned by the CPC.
- The most *rigid* open access regime is applied to transportation in Taiwan.

However, there are four differences in the open access regimes of Taiwan and US/Europe. They are:

⁶⁵ The transportation pipeline and LNG infrastructures are subject to a more rigid open access regime than the distribution pipeline in the 1999 Gas Restructuring Plan. Currently, an NTPA regime is applied to transportation pipelines and LNG infrastructure owned by KOGAS.

- The open access regime in Taiwan is unique; it is a mixture of NTPA and ‘conditional’ RTPA regimes.
- The general principles of open access regimes in Taiwan are different from those in US, Europe, Japan and South Korea. They are: public interests and anti-competition behaviors.
- The transparency measures are unclear in the draft gas law in Taiwan.
- The TPA exemption and code of conduct are not discussed in the related studies or proposed in the draft gas law.
- No eligible threshold is scheduled in the current draft gas law in Taiwan.

3.3. Regulatory Patterns in Distribution Sector

3.3.1. Regulatory Patterns in US and Europe

Many similarities can be found between the US and Europe when adopting open access regime in their distribution sectors. They are as follows:

- An RTPA regime is favored by the states adopting retail access programs in the US and by the 2nd Gas Directive in Europe.
- The detailed rules of open access regimes are formulated by lower level authorities. The detailed rules of the open access regime of LDCs in the US are determined by the states (instead of the FERC), while those of DSOs in Europe are proposed by the national energy authority or local/regional governments (instead of the European Commission).
- The eligible thresholds are gradually reduced to open the retail markets in Europe and the US.
- The current regulatory priority in Europe and the US is similar. Both focus on the adoption of further measures, such as transparency rules and codes of conduct, in order to ensure the actual implementation of an RTPA regime.

However, there are three different open access regimes between the US and Europe, where these are

- The status and progress of open access regimes in distribution sectors are different in the US and Europe. The DSOs in Europe are currently subject to open access regime under the European 2nd Gas Directive. Yet, the situation of LDC open access regimes differs from state to state in the US: Some LDCs are required to provide open access service to all gas customers in certain states, such as New York and Pennsylvania; some LDCs are only required to provide open access service to gas customers meeting eligible thresholds in certain states, such as Georgia and Ohio; some LDCs are not subject to open access regimes in certain states (such as Alaska or Alabama).
- The freedom to determine whether to introduce open access regimes to distribution sectors. There is no such freedom under the European 2nd Gas Directive, but the freedom is given to the states in the US.

The gap between RTPA and its implementation. In those states adopting a retail access regime, the implementation of an RTPA regime is guaranteed by the intense supervision of state PUCs. Yet this is not the case in Europe. As the national regulators in Europe focus on the implementation of open access regimes to TSOs instead of DSOs, the implementation of RTPA to DSOs is less promising than in the US.

3.3.2. Regulatory Patterns in LNG Countries

Japan

Many similarities are found between the Japan and US/Europe when adopting open access regimes in their distribution sectors. They are as follows:

- The RTPA regime is currently applied to distribution sectors in Japan and US/Europe.
- Current regulatory priorities in US/Europe and Japan focus on the adoption of further measures, such as transparency rules and codes of conduct, in order to ensure the actual implementation of RTPA regime.
- The eligible thresholds are reduced gradually to open the retail markets in Japan and US/Europe.

However, there are three different open access regimes between Japan and US/Europe. They are the following:

- Unlike in US/Europe, Japan's detailed open access regime in distribution sectors is governed by national laws and regulations.
- Unlike in Europe, the city gas companies in Japan are only required to provide open access service to gas customers meeting eligible thresholds.
- Unlike in Europe, the Japanese government has the freedom to determine whether to introduce open access regimes in distribution sectors.
- Unlike in Europe, the implementation of open access regime in distribution sectors is intensely monitored by the Japanese government.

South Korea and Taiwan

The development of open access regimes in distribution sectors in South Korea and Taiwan is distinct from that in the US, Europe and Japan. The application of open access regimes to city gas companies in Taiwan and South Korea is not the priority of gas liberalization regimes. There is no specific plan for introducing distribution TPA in the short term in Taiwan and South Korea. Furthermore, the city gas companies in Taiwan and South Korea often strongly oppose open access regimes.

3.4. Regulatory Patterns in Underground Storage Sector

3.4.1. Regulatory Patterns in US and Europe

The open access regime applying to underground storage in the US is different from the regime in Europe. In general, a more rigid regime is applied in the US than in Europe. There are five different open access regimes between the US and Europe. They are as follows:

- An RTPA regime is applied in the US, while the regime of free choice between RTPA/NTPA is applied in Europe.
- The open access regime applying to underground storage is similar to that which applies to transportation in the US. Yet, a different and less rigid regime is applied to underground storage in Europe.
- The scope of underground storage subject to open access regime is different in the US and Europe. Most underground storage is subject to open access regime in the US. Yet, only the

underground storage meeting certain conditions⁶⁶ are subject to open access regime in Europe.

- Whether the code of conduct is binding. There is a binding code of conduct for interstate gas companies that conduct underground storage business. However, the GGP for SSOs under 2nd Gas Directive is only voluntary in Europe.
- Different regulatory priority. The open access regime of underground storage in the US focuses on the actual implementation of RTPA regime. Yet, the focus in Europe is not only on the actual implementation of RTPA and NTPA regimes but also on the development of a binding GGP for SSOs.

In this regard, the open access regime of unbundling storage varies greatly between the US and Europe. Even with a tighter unbundling and if efforts to make GGP for SSOs become binding to improve NTPA or RTPA regimes in the 3rd Gas Package and Gas Directive, it does not intend to introduce a RTPA-only regime. Yet, there seems to be a similar approach adopted in the US and in Europe, particularly regarding *improvement of transparency and the development of code of conduct*.

3.4.2. Regulatory Patterns in LNG Countries

As with the lack of developing unbundling regimes for underground storage in Japan and Taiwan, there is a similar lack of open access regimes for underground storage. On the one hand, there is little discussion of open access regimes for underground storage in Japan and Taiwan. On the other hand, underground storage in Taiwan and Japan is not subject to the first stage of gas liberalization. The potential explanations for this situation seem to result from the three reasons: the lack of underground storage sites; the high reliance on LNG storages and terminals to store gas; and the ownership issue of underground storage facilities.

3.5. Regulatory Patterns in LNG Terminal and Facility and Sector

3.5.1. Regulatory Patterns in US and Europe

Even though LNG terminals have not been well-developed in Europe and the US during the past few decades, they will become very important for the energy policy of the US and Europe. Many LNG terminals are currently under construction. In general, the application of open access regimes to LNG terminals is quite similar in both places. Many similarities are found in the US and Europe when adopting open access regime in their LNG terminals, such as

- An RTPA regime is applied to LNG terminals in Europe and in the US.
- Both transportation pipelines and LNG terminals are subject to similarly rigid RTPA regimes in Europe and the US.
- The TPA exemption from RTPA regimes is applicable to LNG terminals in Europe and in the US.
- The current regulatory priority is similar in Europe and in the US. It focuses on the actual implementation of the RTPA regime and the adoption of further transparency rules and codes of conduct.

⁶⁶ Article 19(1) of the 2nd Gas Directive. (“storage facilities ...when technically and/or economically necessary for providing efficient access to the system for the supply of customers, as well as for the organization of access to ancillary services”)

However, there are three different open access regimes between US and Europe, where these are

- LNG terminals and storage sites in the US are subject to RTPA regime. However, different open access regimes are applied to LNG terminals and LNG storage sites in Europe.
- The code of conduct for LNG terminals is binding in the US. Yet, the GGP for LNG SOs is under development and is not binding in Europe.
- The rigid RTPA regime in the US has resulted in inadequate investment in LNG terminals there. However, this is not the reason why there is inadequate investment in LNG terminals in Europe. It is rather due to the reliance on the gas from gas fields in the past. Furthermore, even if a rigid RTPA regime is adopted in the 2nd Gas Directive, many companies apply for the construction of LNG terminals.

3.5.2. Regulatory Patterns in LNG Countries

Japan

Unlike rigid open access regimes for LNG terminals in US/Europe, the open access regime in Japan is relatively lenient. There are five different open access regimes between Japan and US/Europe. These are as follows:

- Currently, LNG terminals are subject to the NTPA regime instead of the RTPA regime.
- LNG terminals are subject to a different open access regime from transportation and distribution pipelines. A more lenient regime is applied to LNG terminals.
- Compared with the US and Europe, there is sufficient investment in LNG terminals both before and after gas liberalization in Japan. In this regard, the discussion of TPA exemption is related to transportation pipeline instead of to LNG terminals.
- Unlike the situation in the US and Europe, where open access service is provided by gas incumbents, the open access service may be provided by electricity companies in Japan. This results from the fact that many big electricity companies have been allowed to construct their LNG terminals and import LNG for purposes of electricity generation.
- The current regulatory priority in Japan focuses on the actual implementation of the NTPA regime. In addition, there is less discussion of further open access regime (RTPA) to LNG terminals in Japan.

In spite of so many differences between them, two similarities of open access regime of LNG terminals nevertheless exist between Japan and the US; these are

- Similar to the US,⁶⁷ LNG storage facilities and LNG terminals are subject to the same NTPA regime in Japan.
- Similar to the US, the code of conduct (2004 Guideline) in Japan is binding. The binding code of conduct was developed in Japan. Furthermore, in order to facilitate an open access regime, each gas company is required to create its own ‘Negotiation Guideline of using LNG Infrastructures’.

⁶⁷ Both LNG storages and terminals are subject to the same (RTPA) open access regime in US.

South Korea and Taiwan

A NTPA regime has been adopted in South Korea and the open access regime to LNG terminals remains a matter of discussion in Taiwan. However, a rigid RTPA regime was proposed in the 1999 Gas Restructuring Plan of South Korea and in the draft Natural Gas Business Act in Taiwan. In this regard, this article will compare the open access regimes in Taiwan and South Korea with those in US/Europe. Many similarities exist between South Korea, Taiwan and US/Europe. These are as follows:

- A certain extent of RTPA regime has been proposed in South Korea and Taiwan. A mixed RTPA and NTPA regime was proposed in Taiwan and South Korea. As the RTPA regime will be applicable under certain conditions, the regimes in Taiwan and South Korea would be considered to be a RTPA regime.
- Similar to US/Europe, LNG terminals and transportation are subject to the same open access regime.
- Similar to the US, LNG storage and terminals are subject to the same open access regime.

However, there are three differences between US/Europe and South Korea/Taiwan. These are the following:

- The code of conduct regarding open access to LNG terminals is not well developed in South Korea and Taiwan. It has only been discussed in South Korea, while there is no such legal requirement in the proposed liberalization legislation in Taiwan.
- No TPA exemption of LNG terminals has been discussed in Taiwan and South Korea, as there are fewer concerns regarding inadequate investment in LNG terminals. In addition, as the expansion of gas infrastructure is emphasized in the energy policy of South Korea and Taiwan, a lot of investment is planned.
- Transparency rules are not well-developed in Taiwan and South Korea. Even though an NTPA has been introduced in South Korea, the Open Access System of KOGAS remains under development. In addition, there is less of a transparency requirement in the proposed liberalization legislation in Taiwan.

3.6. Regulatory Patterns in LNG Storage Sector

3.6.1. Regulatory Patterns in US and Europe

Open access regimes for LNG storage vary greatly in the US and Europe. Many differences are found in the US and Europe. These are as follows:

- A rigid RTPA regime is adopted in the US, while a free choice between RTPA and NTPA is adopted in Europe.
- LNG storage sites are subject to the same rigid open access regime as transportation pipelines in the US. Yet, LNG storage sites are subject to less rigid rules than transportation pipelines in Europe.
- LNG storage sites in the US are generally subject to the open access regime. Yet, this is not the case in Europe. Only open-access LNG storage is subject to the open access regime in Europe. In addition, temporary LNG storage is subject to the open access regime of storage

instead of that of LNG facilities.⁶⁸

- The implementation and the application of open access regimes to LNG storage are clearer in the US than in Europe. The implementation scheme in the US is highly monitored by FERC or state PUCs. Implementation schemes are less clear in Europe.⁶⁹
- The code of conduct for LNG storage is binding in the US. However, there is only a non-binding code of conduct (GGP for LNG SOs) under development in Europe.
- The current regulatory priority in the US focuses on the actual implementation of the RTPA regime. Yet, there are many priorities in Europe, including the actual implementation of the RTPA and the ‘NTPA’ regime, the development of a non-binding code of conduct under the 2nd Gas Directive, and making the code of conduct binding in the 3rd Gas Package and Gas Directive.

In sum, the open access regime for LNG storages is more rigid in the US than in Europe. This may be due to the situation that *larger numbers of LNG storage sites in the US than in Europe lead to the importance of LNG storage during gas supply.*

3.6.2. Regulatory Patterns in LNG Countries

Japan

Unlike the rigid regime in the US, a lenient open access regime is applied to LNG storage in Japan, which is similar to the regime in Europe. First, LNG storages are subject to the NTPA regime in Japan. Second, the open access regime of LNG storage is less rigid than that of transportation. Third, the code of conduct in Japan focuses on the actual implementation of the NTPA regime.

However, there are several differences between Japan and Europe and several similarities between Japan and the US, where these are

- LNG terminals and LNG storage in Japan are subject to the same open access regime. This situation is similar to the US but different from Europe.
- There is a binding code of conduct for LNG storages (2004 Guideline) in Japan. This situation is similar to the US but different from Europe.
- There are a large number of LNG storage sites in Japan. This situation is similar to the US but different from Europe.

In sum, the open access regime of LNG storages in Japan can be seen as a mixture of the regimes in Europe and the US. The regime in Japan is ultimately closer to the lenient regime in Europe.

South Korea and Taiwan

Only an NTPA regime is currently applied to LNG storage in South Korea, while a mixed RTPA and NTPA regime is scheduled in draft liberalization legislation in Taiwan.

⁶⁸ As ‘temporary LNG storage’ is considered to be part of LNG terminals in this article, the article will not discuss open access regimes applying to temporary LNG storage separately in this section.

⁶⁹ The main focus of one important storage monitoring report is on the implementation of open access regime in ‘underground storage’ instead of in LNG storage. See e.g., ERGEG, above n.53.

4. Overall Regulatory Patterns of Unbundling and Open Access Regime

After discussing the development of unbundling and open access regime, this article will summarize the findings noted above.

First, before the development of unbundling and open access regime in individual gas infrastructure sectors, the most fundamental question is “which gas infrastructure should be subject to open access regime in the proposed liberalized gas market?” As noted above, this issue is very related to ‘essential nature of the gas infrastructure during the gas supply chain’,⁷⁰ ‘special market situation’,⁷¹ etc. Only for those gas infrastructure sectors subject to open access regime, there is a need to design the detailed unbundling and open access regime for them.

Second, the design of unbundling involves three important issues:

(1) *The choice among different types of unbundling regime* determines the general direction and the success of the reform in different gas infrastructure sectors;

(2) *Overall measures* are required to facilitate the development of different unbundling regime. The development of *appropriate code of conduct* is very vital in ensuring the overall implementation of unbundling regime, particularly that of functional unbundling regime. Furthermore, in order to put the laws into practice, the establishment of *regular monitor scheme* to evaluate the implementation of unbundling regime is also important. Finally, *transparency information* can also contribute to the implementation of unbundling regime.

(3) *Regime-specific measures*: Different unbundling regimes may require different detailed measures to ensure the implementation. For instance, further accounting rules governing sectoral account and wheeling account are important for the implementation of AU. Furthermore, the implementation of FU should rely on ‘appropriate code of conduct’, ‘proper information prohibition rules’, ‘proper rules to ensure the independent decision-making and organizations’, ‘regular monitoring scheme to ensure the implementation of these complex rules’. In addition, the implementation of ISO may require a strong reviewing and monitoring scheme developed by energy regulators. Finally, the implementation of OU may require a proper code of conduct and monitoring regime. However, it should be noted that the overall measures are sufficient to ensure the implementation of legal unbundling.

Thirdly, the design of open access involves three important issues as well:

(1) The choice among different types of open access regime determines the general direction and the success of the reform in different gas infrastructure sectors;

(2) Overall measures are required to facilitate the development of different TPA regime. At first, the development of appropriate code of conduct is also very useful to facilitate the

⁷⁰ E.g., transportation is very essential in both US/Europe and LNG countries. That is why it is subject to open access regime during the first-phase of liberalization in US/EUROPE and LNG countries.

⁷¹ E.g., LNG facilities are not subject to open access regime at the first-phase of liberalization in Japan, in spite of the essential nature of them.

implementation of non-discriminatory and transparency open access regime. Furthermore, sufficient gas infrastructures on the gas market can facilitate the arrangement of open access regime. Finally, transparency information can also contribute to the implementation of transparent open access regime.

(3) Detailed non-discriminatory and transparency rules should be developed for tariff, capacity, and open access conditions, etc. For instance, transparency tariff rules, such as the publication of discount provided for market affiliates, are important to ensure the non-discriminatory behaviors of the gas incumbents. Furthermore, the ‘fairness’ of tariff and capacity rules should be under close scrutiny of national regulators. Finally, transparency info is helpful in helping the formulation of non-discriminatory tariff and capacity rules.

The checklist to develop an appropriate unbundling and open access regime is illustrated in Table 1.

The Related Issues	Check list
Fundamental issue	-Which gas infrastructure should be subject to open access regime in the proposed liberalized gas market?
Unbundling regime	<ol style="list-style-type: none"> 1. Choice among AU/SU//FU/LU/ISO/OU 2. The development of overall measures <ul style="list-style-type: none"> -Code of conduct -Monitoring the Implementation of the Unbundling regime -Transparency measures relating to unbundling regime 3. The development of regime-specific measures: <ul style="list-style-type: none"> -Account unbundling: The development of accounting rules on ‘sectoral account’ and ‘wheeling account’. -Functional unbundling: code of conduct; information prohibition rules; rules to ensure independent decision-making and organization; regular monitoring scheme. -ISO: Reviewing and monitoring regime. -Ownership Unbundling: code of conduct; monitoring regime.
Open access regime	<ol style="list-style-type: none"> 1. Choice among NTPA, RTPA and mixed NTPA/RTPA, etc. 2. The development of overall measures: <ul style="list-style-type: none"> -Code of conduct -Measures to ensure sufficient gas infrastructure on the gas market. -Transparency measures relating to open access regime. 3. The development of detailed measures: <ul style="list-style-type: none"> -Non-discriminatory and transparency tariff rules -Non-discriminatory and transparency capacity rules

Table 1 Check list for Developing Unbundling and Open Access Regime
(Source: Compiled by this Author.)

5. Coherent and Incoherent Regulatory Patterns of Unbundling and Open Access Regime Across US, Europe and LNG Countries

5.1. Coherent Overall Regulatory Patterns

Three regulatory patterns can be found.

5.1.1. Upstream Reform First, Downstream Reform Second.

In the liberalization regimes in US, Europe and LNG countries, the upstream gas infrastructure sectors have been the first priority for reform. The evidence in US, Europe and LNG countries is provided as follows:

In the US, the interstate gas companies conducting interstate transportation, LNG infrastructures, and underground storage facilities have been subject to the first-wave of reform. The reform of the downstream LDCs may be introduced in a later phase.

In Europe, the main reform objective at the first phase of gas liberalization has been the transportation sector. Many implementation measures have focused on the transportation sector, rather than the LNG facilities, storage and distribution sectors.

In Japan, the main reform objectives have been big city gas companies conducting transportation, distribution and LNG infrastructure operations. Smaller downstream city gas companies will be subject to reform at a later stage.

In South Korea and Taiwan, the first phase of reform has focused on LNG infrastructure and transportation.

5.1.2. Focus on Large Incumbents in the First Phase of Liberalization

In the liberalization regimes in US, Europe and LNG countries, the big gas incumbents have usually been subject to the first phase of the liberalization regime. The evidence in US, Europe and LNG countries is provided as follows:

In the US, larger interstate companies and certain intrastate companies have been subject to the first phase of reform. The liberalization regime may be gradually introduced to smaller intrastate companies and LDCs.

In Europe, larger gas incumbents, who often conduct import, transportation, underground storage and LNG business, have generally been subject to the first phase of liberalization. Even though rules were also applied to the DSOs in the first phase, the focus of the implementation has been less on the distribution sectors.

In Japan, the liberalization regime has gradually expanded from Big3, Big city gas companies to smaller companies.

In South Korea and Taiwan, the super size state-owned companies, CPC and KOGAS, have been subject to the first phase of reform. The reform plans for downstream city gas companies are either planned later or unplanned.

5.1.3. From More Essential Facilities to Less Essential Facilities

Different gas infrastructure companies may not play the same roles in the gas supply chain. Some may be more essential in one country than others. Sometimes this may relate to the number of gas facilities in one country. For instance, large numbers of LNG storage facilities in the US, South Korea, and Taiwan make them more important during the gas supply chain than in Europe. Additionally, large numbers of underground storage facilities in the US and Europe make them more essential during the gas supply chain than in Japan and Taiwan. However, sometimes the presence of large numbers of gas facilities can lead to an opposite result. For example, large numbers of LNG terminals and storage facilities in Japan render these facilities less essential.⁷² Thus, the importance of certain facilities may vary from country to country, depending on their role in a specific market.

During the liberalization regimes in US, Europe and LNG countries, gas facilities considered more essential to their gas markets were more likely to be subject to the first phase of reform. The evidence in US, Europe and LNG countries is provided as follows:

The interstate transportation, underground storage, LNG storage, and LNG facilities have been subject to the first phase of reform in the US.

The transportation and network facilities in Europe have been subject to the first phase of reform.

The transportation and distribution sectors have been subject to the first wave of reform in Japan.

The transportation and LNG infrastructure in South Korea and Taiwan have been subject to the first phase of reform.

5.1.4. Coherent Interrelationship between Unbundling and Open Access Regime:

Except for the overall patterns of unbundling and open access regime mentioned in III.1.A-C and the dynamic relationship between unbundling and open access regime in II.1.D and II.2.D⁷³, there are also two regulatory patterns regarding interrelationship between unbundling and open access regime *among US, Europe and LNG countries*.

⁷² This may result from the fact that the ownership of LNG infrastructure in Japan is more diverse than in South Korea and Taiwan, making the LNG infrastructure less essential in Japan than in Taiwan and South Korea.

⁷³ The examples are such as:

- The *interrelationship* between unbundling and open access regime in the transportation sector: The LU and FU often come together with mandatory open access regimes or RTPA in the US and Europe.
- In Japan, the FU regime in the transportation and distribution sector is developed under the mandatory open access regime in US/Europe and Japan.

Lenient Unbundling Combined with Lenient Open Access Regime

This regulatory pattern can be found in all gas infrastructure sectors in US, Europe and LNG countries.

In US, a lenient unbundling and open access regime (voluntary SU/FU and voluntary negotiated open access) was applied to interstate transportation, underground storage, LNG facilities and LNG storage at the first phase of liberalization in 1980's. Besides, a similar regime (no unbundling/no open access regime) is also applied to intrastate pipeline and local distribution company where the States do not introduce gas liberalization to the retail level.

- In Europe, a lenient unbundling and open access regime (SU/AU+free choice between NTPA/RTPA) was applied to transportation, distribution, underground storage, LNG facilities and LNG storage sector in the first Gas Directive. A similar lenient regime (SU/AU+free choice between NTPA/RTPA) is applied to underground storage and LNG storage under the second Gas Directive.
- In Japan, a lenient unbundling and open access regime (SU/lenient FU+NTPA) was applied to transportation and distribution in Gas Utility Act of 1995 and 1999. Besides, a lenient regime (SU/AU+NTPA) is applied to LNG facilities and LNG storage in the early and recent phase of gas liberalization. Finally, underground storage does not subject to unbundling or open access regime(no unbundling/no open access).
- In South Korea, a lenient regime(no unbundling/no open access) is scheduled for distribution sector in 1999 Restructuring Plan.
- In Taiwan, a lenient regime (SU/AU+mixed NTPA and conditional RTPA) is scheduled for transportation, LNG facilities and LNG storages in draft Natural Gas Act of 2003 and 2006. A lenient regime(no unbundling/no open access) is scheduled for distribution sector in the same drafts.

Rigid Unbundling Combined with Rigid Open Access Regime

This regulatory pattern can be found in all gas infrastructure sectors in US, Europe and LNG countries.

In US, a rigid unbundling and open access regime (mandatory SU/AU/FU/LU+RTPA) was applied to interstate transportation, underground storage, LNG facilities and LNG storage in 1990's. Besides, a similar regime (SU/AU/FU/LU+RTPA) is also applied to intrastate pipeline and local distribution company in certain States, such as Pennsylvania and New York..

- In Europe, a rigid unbundling and open access regime (mandatory SU/AU/FU/LU+RTPA) was applied to transportation and distribution sector in the second Gas Directive and to distribution sector in the third Gas Directive. Besides, a rigid regime (SU/AU/FU+ISO/OU) is applied to transportation sector in the third Gas Directive.
- In Japan, a rigid regime(SU/AU/FU+RTPA) has applied to transportation and distribution sectors since the gas law reform in 2003 and 2004.
- In South Korea, a rigid regime (SU/AU/FU/LU+RTPA) was scheduled for transportation, LNG facilities and LNG storages in the gas law reform in 2000. A similar regime (SU/AU/FU/LU+open access) was scheduled for the distribution sector at the second phase

of gas liberalization.

- In Taiwan, due to the lenient nature of the proposed legislations, there is no rigid unbundling combined with rigid open access regime.

5.2. Incoherent Regulatory Patterns and Potential Explanations

5.2.1. Exceptions to the Overall Regulatory Patterns

Certain exceptions to these regulatory patterns have been found in US, Europe and LNG countries. Certain gas infrastructure sectors are less essential, less upstream, or owned by smaller incumbents, yet are subjected to the same rigid regime as those that are more essential, upstream, or owned by big incumbents. Examples include:

In the US, LNG terminals are a ‘small’ sector, and play a ‘less essential’ role than transportation. Yet, the same unbundling and RTPA regime is applied to both transportation and LNG terminals.

Compared with LNG facilities, underground storage is a ‘bigger’ and more ‘essential’ sector in the gas supply chain in Europe. Yet, the open-access regime in the LNG facility sector is more rigid than in the underground storage sector.⁷⁴

Even where LNG storage facilities and terminals in Japan are upstream sectors and owned by large gas incumbents, they are subject to less rigid unbundling and open-access regimes than transportation and distribution facilities. The unbundling and open-access regimes applied to LNG storage facilities and terminals in Japan are also less rigid than those in the US and Europe.⁷⁵

In Japan and Europe, more rigid rules are applied to the distribution sector than in Taiwan and South Korea.

There could be two possible explanations for these exceptions. First, the *mixed regulatory patterns* in some examples make it difficult to apply these regulatory patterns with complete consistency. For example, even if a LNG terminal is a ‘small sector’ in the US, the fact that ‘big gas incumbents’ usually own it makes the regulations more rigid. Even if LNG storage and terminals are essential and upstream, as in Japan, the fact that they are owned by related diverse gas or electricity incumbents may result in the adoption of less rigid rules. Among these examples, the exception may be the result of the conflict between different regulatory patterns.

However, a second explanation for these exceptions may be *political influence*. This may be the reason why underground storage is subject to less rigid open-access regimes than LNG facilities. Because LNG facilities are less-developed than underground storage facilities in Europe, there may be less political opposition to a rigid open-access regime from the owners of LNG facilities. There appears to be more political opposition to a rigid open-access regime in the underground

⁷⁴ First, an RTPA regime is applied to LNG facilities, but a free choice between NTPA and RTPA is applied to underground storages. Second, LNG facilities are principally subject to an RTPA regime, while only part of underground storage facilities (i.e., open-access storage) is subject to open-access regimes.

⁷⁵ For instance, a NTPA regime is applied to LNG terminals in Japan, while an RTPA regime is applied to LNG terminals in the US and Europe.

storage sector, because large gas incumbents who have political influence usually own underground storage facilities.

5.2.2. Incoherent Interrelationship between Unbundling and Open Access Regime

Among the US, Europe and LNG countries, incoherent interrelationship between unbundling and open access regime is only found in the European Second and Third Gas Directive.

- **Rigid Unbundling Combined with Lenient Open Access Regime:** In the third Gas Directive, a rigid unbundling(SU/AU/FU/LU) combined with lenient open access regime(free choice between NTPA and RTPA) will be applied to open-access underground storage and LNG storage.
- **Lenient Unbundling Combined with Lenient Open Access Regime:** In the second and third Gas Directive, a lenient unbundling(SU/AU) combined with rigid open access regime(RTPA) will be applied to LNG facilities.

6. Conclusion

In spite of *different* and *diverse* detailed measures of unbundling and open access regime in US, Europe, Japan, South Korea and Taiwan, the results of this study proves that it remains likely to discover similar regulatory patterns and models. This discovery is really helpful for us to analyze and evaluate the priority of the gas law reforms. For instance, even though the open access regime applied to transportation sectors in US, Europe and Japan are all evolved from NTPA to RTPA, a RTPA regime is suggested for those countries wishing to introduce liberalization regime. There is no need to repeat the failure history of NTPA again. Besides, even though the adoption of functional and legal unbundling in storage sector under the 3rd European Gas Directive may facilitate the competition in the gas market, this article suspects that it would work well without the adoption of RTPA regime at the same time.

Ideally, the design of open access and unbundling regime should reflect *the economic nature, essentiality, the dominant position of each infrastructure during the gas supply chain*. Small, downstream, less-essential-nature gas infrastructure should not be treated more rigidly than big, upstream, more-essential-nature gas infrastructure. However, the legislators may be intervened by political influence and may not always act rationally. That is why certain exceptions of coherent regulatory patterns are found.

Finally, the introduction of unbundling and open access regime should take into account of not only economic viability but also *political feasibility*. Even though the RTPA and ownership unbundling are considered as the best options for the transportation sector, they usually attracts violent objection from gas incumbents and most of national governments. Perhaps, that is why a *step-by-step* approach from lenient to more rigid unbundling and open access regime, rather than an aggressive one adopting the best unbundling and open access options, is favored during most of legal regimes.

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Appendices: Overview of Unbundling and Open Access Regime in US, Europe, Japan, South Korea, and Taiwan