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A study for improving LNG Market's efficiency in South Korea under the monopoly of KOGAS

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I. Introduction

South Korea was ranked as the second-largest LNG importing countries in the world before China surpassed South Korea in 2017 (EIA, 2018). South Korea's huge LNG market is under the dominance of one public company called KOGAS, and there are arguments that management of KOGAS is not as mature as its size. KOGAS imports almost entire LNG import of South Korea, except a tiny share of direct LNG import by few private businesses for their internal power generation. There are strict regulations in the market by the South Korean government, and this hurdle hesitates the entrance of possible new businesses in the market. For example, both retail and wholesale prices of LNG are under the control of the South Korean government. According to the 'Gas business act,' Ministry of Trade, Industry and Energy has the authority of deciding wholesale LNG price, and local governments have the authority of deciding retail LNG price for city gas and district heating. Operators can suggest their preferred price only. Many South Koreans argue that excessive regulations in the market are the cause of consumer utility loss from the ineffective management of the monopoly player; KOGAS. At the same time, there is an argument that current monopoly by KOGAS is the most efficient option for South Korea because it is often the case that having monopoly or oligopoly players in the market requiring a massive amount of initial infrastructure investment; such as LNG market.

This research paper is aiming to analyze the current arguments on KOGAS' monopoly in South Korea's LNG market and to suggest policies to improve the current monopoly situation by KOGAS in a positive way. This research uses a variety of raw materials from South Korea government, such as; long-term natural gas supply and demand master plan, long-term electricity supply and demand master plan, interview of a former member of national assembly, and statute books related to gas business published by IEA.

II. KOGAS and the LNG market of South Korea

1. KOGAS: from the start of South Korea's LNG market

In the 1970s, South Korea suffered two oil shocks, and the South Korean government recognized LNG as a cheap alternative to conventional fossil fuels (National archives of Korea, 2007). In 1978, South Korea government enacted 'Gas business act' which defines Natural gas as one of South Korea's primary energy sources for the first time and founded a state-owned natural gas company KOGAS(Korea Gas Corporation) in 1983. Before the 1990s, South Korea was under the dictatorship governments, and dictatorship governments promoted the state-led economic growth to maximize the limited economic resource. Dictatorship government of South Korea considered monopoly of KOGAS helps avoiding duplicate investment in the LNG market, and lower the maintenance costs of facilities by enabling an economy of scale. Still, South Korean government entities are major shareholders of KOGAS; 26.15% by South Korean government, 20.47% by KEPCO(Korea Electric Power Corporation), 7.93% by local governments, 4.21% by employee stock ownership (KOGAS, 2018).

2. The Cost of Service Principle and the monopolization of KOGAS

The price of LNG sold in South Korea is decided by the 'Cost of Service Principle' which declares the price of LNG sold in South Korea based on production cost. According to the 'Gas business act,' the South Korean government is the one who decides an LNG price, not operators in the market. For example, importing material cost of LNG should be reported to the Ministry of Trade, Industry, and Energy. With this imported LNG price information, the Ministry of Trade, Industry, and Energy estimates the sustainable cost of LNG for wholesale vendors every January considering depreciation cost of facilities, maintenance cost, and cost for future investment. Cost for the retail vendor is decided by each local government where each retail vendors are operating their businesses. Every July, each local government hosts public hearings to discuss the sustainable price of LNG for both their people and their retail service operators. South Korean government is worried about the possible side-effect of

the monopoly in the LNG market; such as a drastic price increase passing the burden on to consumers. However, this legal structure of regulating the retail and wholesale price of LNG contradicts to the basic principle of the market economy driven by profit, and price regulation is a hurdle deters new operators to participate in South Korea's LNG market.

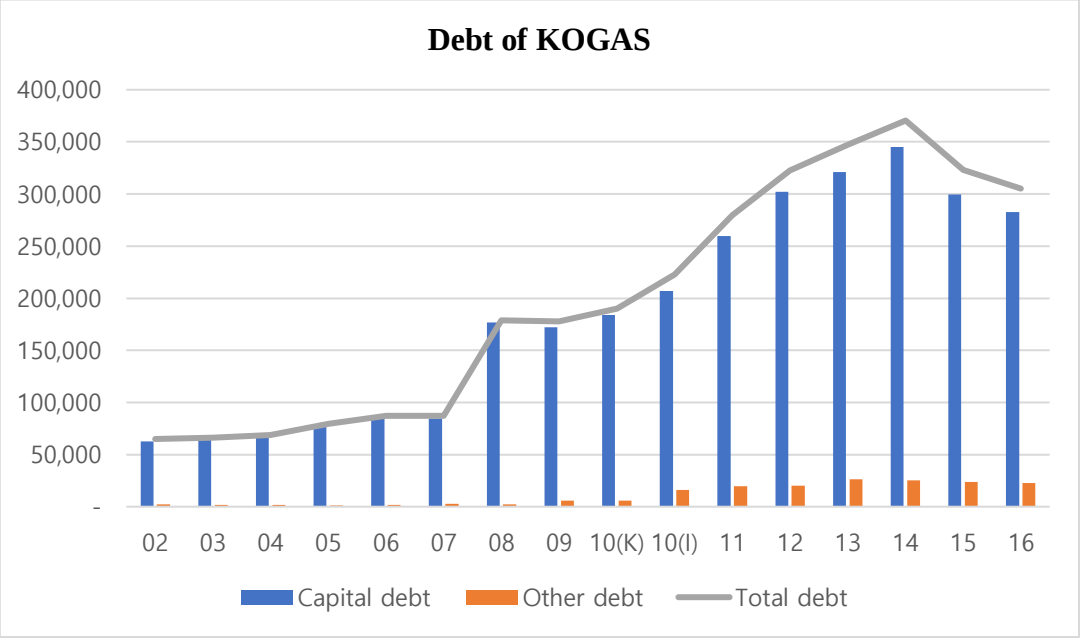
Cost of Service Principle

Consumer price	=	**Cost of imported LNG material** (Updated every two months)	+	**Cost for Wholesale vendors** (Updated every January)	+	**Cost for Retail vendors** (Updated every July)

III. Analysis of the KOGAS' current management performance

1. Deficits in the past decade: Inefficient management of the monopoly player?

KOGAS has recorded continuous deficit in the past decade. However, it is hard to blame KOGAS because there were inappropriate interventions from politics in their management. Below is the graph showing the reported debt of KOGAS during past decade in South Korean currency KRW.



(KOGAS, Details of KOGAS' debt, 2017)

Looking at the graph, it is easy to find out that the debt rate of KOGAS suddenly soared in 2008 and the trend of increasing debt continues until 2014. The reason is inappropriate interventions from the politics rather than the inefficient management of KOGAS. President Lee-Myungbak administration who were in the position from 2008 to 2013 wanted KOGAS to play a core role in the government-led overseas natural resources development projects. As a result of irrational and corrupted investment decisions during this period, KOGAS recorded huge investment loss during President Lee-Myungbak period(2008~2013). According to the National Assembly's report published in 2017, KOGAS lost 63% of the money they invested abroad during President Lee-Myungbak period(2008~2013) which worth 520 million U.S. dollar (National Assembly, 2017). They reported that 325.4% of debt rate in 2016 due to the remains of investment loss (National Assembly, 2017). Debt rate of KOGAS was at the moderate level before the President Lee-Myungbak period, and the debt rate is showing a decreasing trend after the President Lee-Myungbak period. Therefore, inappropriate interventions from politics are responsible to the KOGAS' chronicle deficits happened in the last decade, not the inefficient management of the monopoly player. It is very hard for KOGAS to maintain management independence from politics since the South Korean government is the biggest shareholder of KOGAS.

2. KOGAS' management performance compared to Japan's private businesses

Another possible side effect of monopoly is a price increase passing burden from their inefficient management on to consumers. However, South Korea's LNG market is managed to supply LNG stable at a relatively low price under the KOGAS' monopoly. This paper prepares the following tables to make comparisons with Japan's LNG market where private operators are playing a core role.

LNG price for city gas and direct heating of South Korea and Japan (USD/N㎥)

		2010	2011	2012	2013	2014	2015
For households	South Korea	56.35	65.03	69.18	68.49	75.90	58.30

	Japan	142.13	165.61	169.64	146.10	143.10	-
For industries	South Korea	52.47	60.11	64.79	67.22	70.91	53.22
	Japan	54.57	70.39	77.01	72.05	72.24	-

(IEA, 2016)

According to the IEA's natural gas information report in 2016, Japan's LNG consumer prices for city gas and direct heating in the last six years are relatively higher than that of South Korea's. The price gap is more significant in the case of price for households. It is mainly because of the strict price regulation so-called 'Cost of service principle' by the South Korean government. According to Gas news, an in-house newspaper of KOGAS, cost of imported LNG material accounted 88.95% of final consumer price of LNG for city gas and direct heating in 2013 while private operators of Japan show around 50% for the same figure (Gas news, 2018). Using the absolute market-dominating power as a public enterprise, KOGAS can focus on delivering LNG to customers at a lower price to generate public interests instead of making a profit. It is possible because KOGAS is a public company whose major shareholders are South Korean government entities.

Percentage of imported LNG material price to total in Japan and South Korea

	Tokyo Gas	Osaka Gas	Toho Gas	Saibu Gas
Percentage of imported LNG material price to total	55.8%	58.8%	53.5%	44.9%

(Japan Agency for Natural Resources and Energy, 2008)

KOGAS' consumer price (100%)	=	Cost of imported LNG material (88.95%)	+	Cost for Wholesale vendors (5.71%)	+	Cost for Retail vendors (5.34%)

(Gas news, 2018)

Not only the case of consumer price, but there is also very little difference between Japan and South Korea's average LNG import price. According to IEA's data, South Korea's average LNG import prices led by KOGAS were even lower than Japan's average LNG import prices between 2010 to 2013. South Korea's average LNG prices between 2014 to 2015 were higher than that of Japan but show very narrow margins. Average LNG import prices data can be counter-evidence to a stereotype that lack of

competition in South Korea's LNG market is likely to lead inefficient management of the monopoly player KOGAS which may cause loss of South Korean consumers' utilities from the higher LNG consumer price from higher LNG import price.

Japan and South Korea's average LNG import price (USD/MMBtu)

	2010	2011	2012	2013	2014	2015
South Korea	10.17	12.67	14.74	14.98	16.50	10.97
Japan	11.02	14.73	16.74	16.02	16.34	10.48

(IEA, 2016)

IV. Prospect on the future LNG market situation of South Korea

In the previous chapter, this paper finds that the management of the monopoly player KOGAS is showing competitive management performance comparable to that of private businesses in Japan. This chapter will discuss 'How will the current monopoly status of KOGAS be in future South Korea's LNG market.'

1. South Korean government's inconsistency: LNG supply and demand master plan

Government-led long-term LNG supply and demand master plan is likely to grow the power of KOGAS even stronger in the future. South Korean government publishes long-term natural gas supply and demand master plan every two years. The most recent 13th version which published in February 2018 includes South Korea's LNG supply and demand plan until 2031. In this report, the South Korea government made a huge change in their domestic LNG demands from the expectation they made in 12th long-term natural gas supply and demand master plan which published just two years before. Two years earlier, the South Korean government reported that demand for LNG in South Korea

is expected to show an average 0.34% of annual decrease (Ministry of Trade, Industry and Energy, 2016). However, the South Korean government expects an average 0.81% annual increase of LNG demand in the new 13th long-term natural gas supply and demand master plan. According to this expectation, the total amount of South Korea's natural gas demand is expected to be increased from 36.46 million tons in 2018 to 40.49 million tons of LNG in 2031 (Ministry of Trade, Industry, and Energy, 2018). Change of LNG demand prediction in power generation using LNG is more extreme. In the 12th long-term natural gas supply and demand master plan, the South Korean government reported LNG demand for power generation is expected to be decreased average 4.17% annually (Ministry of Trade, Industry and Energy, 2016). According to this expectation, LNG demand for power generation in South Korea is expected to be decreased from the estimated 16.52 million tons of LNG in 2018 to 9.48 million tons of LNG in 2029. However, it was an expectation made before the South Korean government's nuclear exit plan announcement in 2017 as a part of their 8th master plan for electricity supply and demand. In the most recent 13th long-term natural gas supply and demand master plan, the South Korean government expects an average 0.26% annual increase of LNG demand in power generation (Ministry of Trade, Industry, and Energy, 2018). According to South Korean government's new expectation, 17.09 million tons of LNG consumption is expected for LNG power generation in 2031, and this is almost a double of the number they expected two years before for an LNG consumption in 2029, 9.48 million tons. The average 1.24% of annual LNG demand increase for city gas and district heating is another change. KOGAS would take more responsibility to fill the gap of the government's inconsistent plan and the reality.

Moreover, there is also a plan for expanding LNG store capacity for reacting demand and supply of LNG more flexible. However, only 27% of increasing capacity is expected from private operators' side while KOGAS is expected to share 73% increased capacity. Also, South Korean government's plan of investing for expanding and improving supply network of LNG would grow the power of KOGAS even stronger because KOGAS is the only operator owns, runs, and maintains all the supply network facilities connected to LNG retail vendors delivering city gas and district heating services. It is difficult to expect the emergence of new operators challenges over KOGAS' current

market dominance without any guarantee of retrieving their investment back under the ‘Cost of Service Principle.’

2. Concerns over Cherry-picking of Chaebol conglomerates

Previous governments tried to downsize KOGAS by sharing the role of KOGAS to private operators instead of pushing privatization of KOGAS. They designed the plan that KOGAS to focus on natural resources development projects in abroad while giving off their domestic businesses such as import, distribution, and sales roles to private operators. However, many worried because private operators are likely to focus on maximizing their profits instead of prioritizing public interests as KOGAS does. For example, if private operators failed to meet LNG demands of South Korea from their mistakes, it is inevitable for KOGAS to intervene in South Korea's LNG market again to secure supply stability by purchasing spot LNG cargoes in a hurry at a higher price than the LNG import price fixed by medium- and long-term contracts. If this happens, KOGAS will take financial burden by backing failures of private operators and this financial burden will turn to all South Korean in the end because KOGAS is a public enterprise backed by the South Korean government. South Korea already has such experience. In the early of 2007, one of the South Korean Chaebol conglomerates GS suggested the South Korean government their business plan of importing LNG directly from the spot LNG cargo trading hub at a lower price than current price of KOGAS’ contract, and selling those to KOGAS during the winter; a peak season of South Korea's LNG market. South Korean government and KOGAS admitted this plan and planned their annual LNG supply plan on the assumption that GS fulfills this agreement. However, there was a sudden price hike of LNG in the late of 2007, and GS notified the South Korean government that they are going to pay penalties instead of fulfilling an LNG supply contract they made in the early of the same year. KOGAS had no other options but import 0.96 million tons of LNG in a hurry from the spot LNG cargo trading hub at a higher price than they could get. A former member of national assembly Mr. Choi-Chulgook said he found during the 2008 parliamentary inspection of the government offices that KOGAS took 88 million U.S. dollar worth unexpected

additional financial burden from this incident (Choi-Chulgook, 2018). He added that, in the same year, another Chaebol conglomerate company SK E&S stopped running their LNG power plants for three months because they failed to import required amounts of LNG by their own from the spot LNG trading market. To make up an electricity shortage from the SK E&S' failure, KOGAS had to increase the rate of operation of their LNG power plants. The unexpected increasing rate of operation caused LNG stock shortage of KOGAS, and KOGAS had to import 0.19 million tons of spot LNG cargoes from the market in a hurry at a higher price than they could import on usual contracts. This gave another unexpected financial burden to KOGAS which worth 22 million U.S. dollar (Choi-Chulgook, 2018). From these two experiences, public opinions have turned negative to the participation of private business in South Korea's LNG market. It was a turning point recognizing the important role of KOGAS contributing to the energy security of South Korea.

V. Suggestions for leveraging current KOGAS' monopoly in a positive way

1. Overcoming Asian premium: Shale gas from the U.S.

According to the Ministry of Trade, Industry and Energy, South Korea imported 31.85 million tons of LNG in 2016, and almost half of the total is from two Middle East countries, Qatar(11.82 million tons) and Oman(4.24 million tons) (Ministry of Trade, Industry, and Energy, 2017). The heavy reliance of LNG supply on few middle east countries has been the reason for 'Asian premium.' 'Asian premium' in the global LNG market means that importers from South Korea, Japan, and China pay a higher price than importers in other regions due to geopolitical disadvantages East Asian region countries have. To address the so-called 'Asian premium,' the South Korean government is trying to diversify the import of LNG. Import diversification is also a way to secure a stable supply of LNG. South Korea government recognizes that the current emergence of shale gas is an opportunity to achieve both goals (Ministry of Trade, Industry, and Energy, 2018).

By replacing LNG imports from traditional Middle East exporters with shale gas, South Korea will be less reliant on conventional LNG price formula tied to the price of crude oil which causes the unfair 'Asian premium.' According to the new 13th long-term natural gas supply and demand master plan, 83.3% of current LNG contract is tied to the price of crude oil (Ministry of Trade, Industry, and Energy, 2018). From the same report, the South Korean government expects KOGAS to exercise stronger bargaining power in the negotiation with traditional LNG exporting countries of Middle East by leveraging current emergence of shale gas in the global LNG market. The South Korean government expects that South Korea can save up to 25% of its average LNG import cost (11~15 U.S. dollar per MMBtu) by replacing existing LNG import contracts with shale gas (15~18 U.S. dollar per MMBtu) (Ministry of Trade, Industry, and Energy, 2018). KOGAS already started the import of shale gas from July 2017 based on a contract agreed with American firm Cheniere Energy in 2012. According to KOGAS, this contract includes importing 280 million tons of shale gas for 20 years from 2017 to 2036. This accounts for approximately 8.79% of LNG imported to South Korea in 2017. In the 13th long-term natural gas supply and demand master plan, the South Korean government announced that their plan is expanding the import of shale gas to the 20% of total South Korea's LNG demand (Ministry of Trade, Industry, and Energy, 2018).

Lastly, expanding store capacity of LNG and leverage the increased flexibility of expanded store capacity is another option. South Korean government announces their plan to expand LNG store capacity from current 12.44 million kiloliters to 16 million kiloliters by 2031 (Ministry of Trade, Industry, and Energy, 2018).

2. Synergy from the collaboration: Buyers' club

Another disadvantage East Asian LNG importers are suffering is a destination clause. LNG imported to South Korea is under the strict destination clause that LNG imported to South Korea has to be consumed inside of South Korea. Destination clause deters the generation of possible additional utilities in the regional market by re-selling LNG residuals or swapping LNG using different seasonality

of LNG demands of each country. From the Energy Policies review on South Korea by IEA, IEA advised the South Korean government to consider promoting regional co-operation (IEA, 2012). IEA added that it is necessary to establish a regional cooperation system, such as an LNG trading hub. South Korea and Japan account for almost half of the global LNG market, and there is an idea that South Korea and Japan can generate mutual economic utilities if both countries exchange residuals of LNG because South Korea and Japan have different LNG demand seasonality. Winter is a peak season of LNG demand for South Korea, and Summer is a peak season of LNG demand for Japan. Collaboration with other giant LNG importers of neighboring countries, Japan's JERA and China's CNOOC, can be a solution. KOGAS signed an MOU(Memorandum of Understanding) for LNG business cooperation with JERA and CNOOC in March 2017. MOU includes collaboration in group purchasing, shipping, sharing market information, etc. Three companies import more than half of the total global LNG. Therefore a collaboration of three companies will give stronger bargaining power in negotiation; such as removing a destination clause. Moreover, three companies can share long-term risks by doing joint projects as well.

In September 2012, the South Korean government announced a plan for building a regional LNG trading hub in the southern coast of South Korea. Having a public enterprise monopoly player KOGAS, South Korea would have an advantage that South Korea can speed up the administration process under the leadership of the government. In Japan's case, private operators' intermingled interests may cause conflicts and slow down the process. However, there are still many things to be done. South Korea and KOGAS should consider, first, increasing domestic LNG transactions by promoting the participation of new operators in South Korea's LNG market by attempting active deregulation. Second, securing a stable supply of LNG from the import diversification; such as pipeline networks connected to Russia. Lastly, securing transparency in the market. Dr. Koyama, a chief economist and managing director of the Institute of Energy Economics Japan points out that liberalizing LNG market from active deregulation is a prerequisite of being an LNG trading hub. Dr. Koyama added that securing a stable supply of LNG with advanced pipeline networks is another import background factor which enables liquid regional transactions of LNG (Koyama, 2018).

VI. Conclusion

This research paper starts with the question that 'Is the monopoly of KOGAS in South Korea's LNG market really bad for consumers?' South Korea's LNG market has a fundamental weakness that relying 99.2% its total gas demand on imports from abroad, mostly from few exporters in the Middle East. According to the Ministry of Trade, Industry and Energy, South Korea produces the tiny amount of LNG from 2004, 0.261 million tons, and this domestic production accounts only 0.8% of total domestic LNG demands of South Korea in 2017 (KOGAS, 2018). To overcome the fundamental weakness, the role of the South Korean government's strong leadership was necessary at the start of South Korea's LNG market. However, unnecessary interventions and regulations from politics deter the possible entry of new competitors into South Korea's LNG market. As a result, KOGAS has become a monopoly player in the market.

KOGAS is an essential part of the South Korean government's future long-term supply and master plan, and KOGAS is expected to keep maintaining a monopoly status in the market for several reasons. In Chapter III, this paper finds that KOGAS' monopoly is not necessarily negative because current low consumer prices of LNG are possible by using KOGAS' special status in the market as a public company. Failures of Chaebol conglomerate operators in 2007 created concerns about Chaebol conglomerate operators' 'Cherry picking' which gave unnecessary financial burden to KOGAS. These incidents turned public opinion on KOGAS' role in the market positive.

With the emergence of shale gas in the global LNG market, there is an expectation that KOGAS can leverage their bargaining power as one of the biggest LNG importers in the world as a company. Also, there is an expectation that KOGAS can maximize its bargaining power by collaborating with operators in Japan(JERA) and China(CNOONC) in the current market transition period led by the emergence of shale gas. Building a regional LNG trading hub by removing the destination clause is one possible outcome. However, active deregulation and solving the problem of KOGAS' current high debt level are two prerequisites. Therefore, both KOGAS and the South Korean government should consider further regulatory reforms on South Korea's LNG market together by

attempting an active deregulation policy, and by cutting vicious cycle from inappropriate political interventions on the management of KOGAS.

Due to the lack of open access data, this paper has weakness in presenting an exact number of actual loss/gain from the KOGAS' monopoly in South Korea's LNG market. For further research, it would also be interesting to look at the import and market diversification by connecting the pipeline to the Russia.

VII. References

- Choi-Chulgook. (2018, 2 6). Why does the Union of KOGAS opposes expanding LNG direct import? (Song-Seungon, Interviewer)
- EIA. (2018, 2 23). TODAY IN ENERGY. Retrieved from U.S. Energy Information Administration: https://www.eia.gov/todayinenergy/detail.php?id=35072
- Gas news. (2018, 1 4). Three challeges to KOGAS in the new era of energy. Retrieved from Gas news: http://www.gasnews.com/news/articleView.html?idxno=81202
- IEA. (2012). Energy Policies of IEA Countries: Republic of Korea 2012 Review. Paris: IEA.
- IEA. (2016). Natural Gas Information. Paris: IEA.
- Japan Agency for Natural Resources and Energy. (2008). ガス事業を取り券く環境變化. Tokyo: Japan Agency for Natural Resources and Energy.
- KOGAS. (2017, 4 11). Details of KOGAS' debt. Retrieved from ALIO(All Public Information In-One): http://www.alio.go.kr/popReportTerm.do?apbaId=C0147&reportFormRootNo=63601#toc-123
- KOGAS. (2018, 4 27). LNG supply and demand. Retrieved from Public data portal: https://www.data.go.kr/dataset/fileDownload.do?atchFileId=FILE_000000001441261&fileDetailSn=1
- KOGAS. (2018). Shareholders of KOGAS. Retrieved from All public information in-one: http://alio.go.kr/popReportTerm.do?apbaId=C0147&reportFormRootNo=31701
- Koyama. (2018). Analysis on Asian Natural Gas/LNG Trading Hub Development. Tokyo: The Institute of Energy Economics Japan.
- Ministry of Trade, Industry, and Energy. (2016). 12th long-term natural gas supply and demand master plan. Seoul: Ministry of Trade, Industry, and Energy.
- Ministry of Trade, Industry, and Energy. (2017, 10 26). Supply and demand of LNG. Retrieved from Government Index: http://www.index.go.kr/potal/main/EachDtlPageDetail.do?idx_cd=1165
- Ministry of Trade, Industry, and Energy. (2018). 13th long-term natural gas supply and demand master plan. Seoul: Ministry of Trade, Industry, and Energy.
- National archives of Korea. (2007, 12 1). Gas Policy. Retrieved from Energy and natural resources development, National Archives of Korea: http://www.archives.go.kr/next/search/listSubjectDescription.do?id=006592
- National Assembly. (2017, 4 11). Detailed debt information of KOGAS. Retrieved from All public information in one: http://www.alio.go.kr/popReportTerm.do?apbaId=C0147&reportFormRootNo=63601