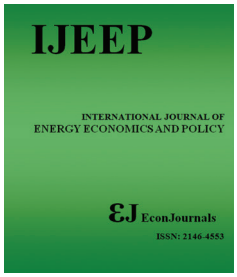

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Towards Sustainable Solutions to South Africa's Energy Crisis: Lessons from South Korea for the Gas-to-Power Programme

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ABSTRACT

This article discusses the Gas-to-Power programme in Korea as a case study for South Africa's attempts to develop Gas-to-Power alternative energy technology. A programme that the government believes could address the nation's present energy crisis. South Africa's government has made the development of clean and alternative energy sources a high priority in order to overcome the current energy crisis. This is due to the tremendous increase in global energy use, especially in emerging nations. This essay utilises a qualitative research methodology and secondary data as a result. The report stated that South Africa must take the following steps to bolster its efforts: implementing executable rules and regulations and developing a clear and legitimate demand for the LNG2P energy technology.

Keywords: Energy Challenge, Energy Demand, Gas-to-power, Power Generation, South Africa
JEL Classifications: Q2

1. INTRODUCTION

The adoption of sustainable, clean, and alternative energy technology to alleviate South Africa's present energy difficulties is one of the government's key priorities. This arises as a consequence of the tremendous worldwide growth in energy demand, particularly in developing nations (United Nations Conference on Trade and Development, 2010). Moreover, according to the International Energy Agency (2018), the worldwide energy consumption increased by 2.1% in 2017, a 10% rise from the previous year. This scenario has been marked by a severe lack of energy sources. Over 70% of the world's energy demand has been satisfied by fossil fuels including oil, gas, and coal (IEA, 2018). China alone accounts for about a third of total expansion (IEA, 2018).

Natural gas is a key component of sustainable energy. This energy source is adaptable, and its spread may be attributed in part to the environmental benefits it has in contrast to other fossil fuels. The 2012 National Development Plan seeks a transition to a low-carbon sector that has no effect on the government's and people's economic and social status (National Planning Commission, 2012). This needs the diversification of South Africa's energy sources. Energy variety may be seen as the use of several energy sources within a certain business. Thus, the Department of Energy (2016) has chosen the LNG2P Independent Power Producer Procurement Programme (IPPP) as an anchor to develop the gas economy in South Africa, which is not limited to the aforementioned objectives. Additionally, it has worked to broaden its use in several industries (i.e., commercial, industrial, residential, and transport). This initiative is seen as a step toward a greener electricity production. This is due to the fact that LNG is cleaner, more efficient, more reliable, less costly, and more abundant than coal, making it the preferable option (Sakmar, 2013; International Gas Union, 2017; Radford, 2011; Tomain,

2017). Importantly, energy diversity must meet the necessary requirements.

2. RESEARCH PROBLEM, AIMS, AND CONTRIBUTION

Therefore, this article seeks to determine the scope and extent of the energy challenge in South Africa and to set a baseline of knowledge based on actions required to strengthen the G2P programme. The South Korean G2P case is studied to bring about historical and existing actions taken to enhance the G2P programme. The purpose of this article is not to propose the implementation of measures that have been successful in South Korea, but rather to discuss the viability of particular propositions in the South African case. This article carries out this objective through qualitative research that employs secondary data. This article thus seeks to address the following objectives of researching strengthening LNG-to-Power as a solution to South Africa's energy challenges:

- To provide a scope of South Africa's energy challenges.
- To conceptualise Gas-to-Power.
- To examine the institutional experiences of the Korean structural and policy arrangements and use them as critical actions that South Africa can adopt to strengthen its' G2P programme.
- To suggest measures to alleviate South Africa's energy challenge through LNG-to-Power.

With the aforementioned objectives in mind, the research provides the following contribution to science. The article discusses the absence of a clear and effective implementation strategy or set of rules for G2P in South Africa. It identifies crucial aspects from worldwide country practises for implementing this energy technology. Gas-to-power as an energy solution for addressing the energy crisis has been the subject of few research. This article will contribute conceptually to the understanding of what South Africa must do to pursue and achieve its strategy.

3. CONTEXTUAL REVIEW: ENERGY CHALLENGES IN SOUTH AFRICA

South Africa has three main energy hurdles. This includes growing demand, mitigation of climate change, and sustained supply. These shortcomings are the result of obstacles to private investment, green-technology power generation, path dependence, demand and supply, and institutional and governance concerns. Three more aspects that contribute to the sustainable and dependable limitation of power supply have been identified (Nel, 2018). Firstly, alternative technologies are not widely accepted by society. This is a prevalent way of thinking on the phenomena known as "not in my backyard." Second, because of historical, social, political, and economic reasons, the country is caught in "dirty" technology and remains path-dependent on coal-fired power generation. Thirdly, a highly centralised power system hampers innovation and the creation of alternative energy generating methods.

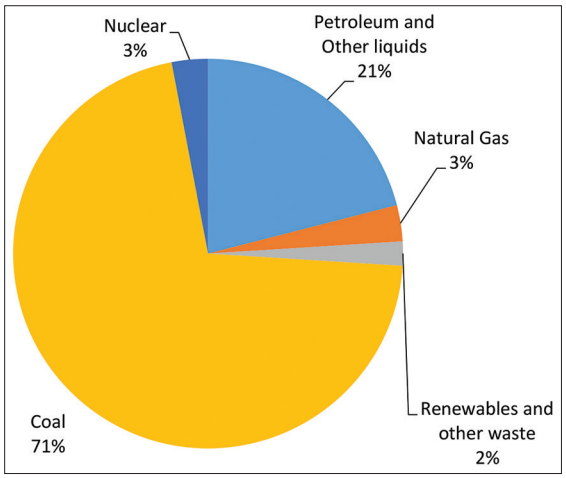
South Africa's energy supply relies mainly on coal, which is highly concentrated (Nel, 2018). This unfortunate combination increases greenhouse gas levels and causes environmental harm. As a result of its dependence on coal, the country has become the largest carbon dioxide (CO_2) emitter in Africa and the fourteenth largest in the world (United States Energy Information Administration, 2022). In order to achieve sustainable economic development, South Africa plans to modernise its gas sector using LNG (SED). This will provide an environment for long-term energy supply that is cost-effective, adaptable, and efficient.

Coal contributes for 71% of primary energy use, followed by oil at 22% and natural gas at 3%. In 2016, nuclear energy contributed 3% of total primary consumption, while renewables and other waste contributed 2%. In this circumstance, instantaneous energy consumption consists of both indigenous energy production and imported energy sources. Figure 1 is a schematic depiction of South Africa's overall use of primary energy.

The NDP considers gas as one of the potential energy sources that might serve as an attractive option to meet the nation's energy demands (National Planning Commission, 2012). A prominent reason is that a shortage of energy hinders the nation's economic development and expansion. Access to and use of gas are crucial for reducing these consequences. In addition, natural gas is compatible with one of the policy objectives listed in the White Paper on Energy Policy, namely the provision of essential energy services to the poor. To alleviate the negative health impacts of specific fuels, this strategy should be encouraged.

In this context, energy backlog refers to obstacles that compromise electricity availability and dependability. Consequently, this has an effect on the social development and sustainability of a great number of South Africans. According to Winkler (2006), energy-related social sustainability concerns are crucial because they are typically entangled with economic challenges, notably in the richest and poorest nations and communities, where overconsumption and poverty constitute threats to sustainable development pathways. According to Winkler (2006), access to electricity is a crucial aspect of South Africa's socioeconomic development. Consequently, a number of governments, including South Africa, are pursuing universal access. The lack of access to

Figure 1: Depicts South Africa's total primary energy usage in 2020



Source: United States Energy Information Administration (2022)

electricity contributes to the socioeconomic disparities between South Africa and other countries.

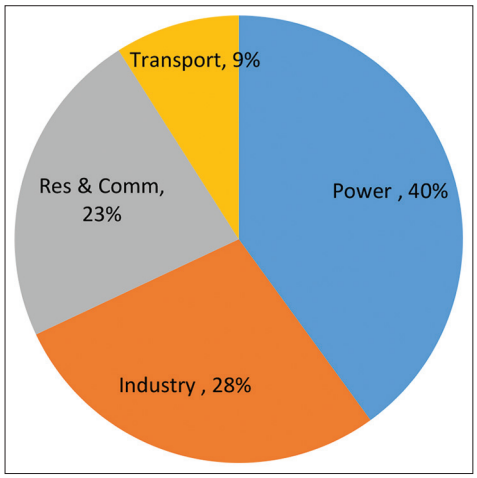
4. A CONCEPTUAL SNAPSHOT: LNG-TO-POWER

LNG is natural gas that is transformed to liquid form for convenience of storage or transportation. The first LNG facility was completed in 1912, but the first LNG transportation, or commerce business, was not launched until the mid-1950s. Because LNG is adaptable, it may be used in a variety of industries, including power, transportation, industrial, and residential and commercial ("Res. and Comm."). Figure 2 depicts LNG demand by industry or source. This graph illustrates that electricity production utilising LNG has the largest growth rate, with a 40% increase by 2020, followed by industrial (28%). In comparison, the residential and commercial sector contributed for 23%, while the transportation sector grew by just 9% in 2019. According to B.P. (2017), the gas trade increased by 4.8%, with LNG imports increasing by 6.2%. It is worth noting that LNG used for power production is also known as gas to power; this article also uses this term.

The connection between LNG and LNG2P is evident when one considers the availability of this source of power, its continued development as an energy source, and its central importance in the global context (Shell, 2018). Compared to other fossil fuels, LNG has little environmental impact and is globally competitive. It also has a growing number of uses, such as substituting LNG for diesel and heavy fuel oil in transportation to reduce emissions (Unsihuay et al., 2007). It is vital to realise that LNG is associated with three unique concepts: CNG, LPG, and liquefied natural gas (NGL). CNG is one alternative fuel that may be used to power cars in place of gasoline or diesel (Unsihuay, et al., 2007). Unsihuay et al. (2007) continue by arguing that this alternative fuel has environmental and air pollution advantages.

LPG, on the other hand, is a collection of compressed hydrocarbon gases that are often utilised as fuel (Day et al., 2016). It is the result of refined petroleum in natural gas processing. The upkeep

Figure 2: Outlook on LNG by source, 2019



Source: Shell (2020)

of According to Mokhatab et al., (2014), NGL refers to a blend of light hydrocarbons that may also include traces of condensate components. According to the U.S. Department of Energy and the U.S. Energy Association (2017), power use should be carried out utilising a range of methods in a number of circumstances. Financial support for essential tools, such as gas transportation (perhaps via Floating Storage Regasification Units [FSRU]), should ensure that gas resources are in sync with local markets.

5. METHODOLOGICAL ORIENTATION AND CASE SELECTION

This article uses a qualitative research technique to discover policy implications for addressing South Africa's energy concerns via the use of G2P energy technology. For this essay, qualitative research was conducted for a variety of reasons. These are the aims of descriptive, exploratory, and explanatory research. These sorts of studies enable researchers to get new information. Because of the central objective and aims of this research, all three of these categories were utilised. According to ase studies may be utilised in qualitative investigations that are exploratory, descriptive, or explanatory. This lends credence to the use of this research strategy for this investigation. This article's analysis relied on secondary sources of data such as relevant government plans, journal articles, government gazzatees, infromation memorandum and credible organisational periodic reports. Secondary data was analysed using unobtrusive approaches such as conceptual and comparative analysis. The approach of descriptive qualitative analysis is used.

5.1. Why the Republic of Korea Case?

South Korea was selected for this article because it is pertinent to the South African G2P case. One of the most obvious parallels to how the South African government intends to embrace this energy technology is Korea's gas-industry boom, which is pushed and backed by the government and is based on imported LNG. Six-point criteria have been devised to confirm that the selection of South Korea as a case study suggestion is accurate, relevant, and feasible for learning lessons. This does not mean that this research proposes that South Africa should simply duplicate or import the techniques of South Korea; rather, the goal of this study is to identify critical areas that should be addressed when developing an effective gas-to-power programme. Despite this, the selection criteria were as follows:

- The country's LNG status must be as an importer of LNG for power production
- LNG importer of natural gas for numerous years
- An emerging or existing LNG importer (if mature, its inclusion in the article is to obtain a long-term outlook on the G2P project)
- Possession of a policy or energy plan (if possible, a Gas utilisation Master Plan (GUMP) or a comparable policy document) and compliance with statutory provisions for its G2P
- The G2P programme achieves measurable success in the economic, social, and environmental spheres, as well as the nation's energy sustainability

In addition to the aforementioned, the role and contribution of South Korea to the global gas market are crucial to its selection as a case study in a research paper that aims to capture best practises and provide policy recommendations. South Korea's LNG import volume in 2017 was 33.7 million tonnes per year (13.1%). This, according to Jeong-Joon et al., (2019), provides further support for the government's ambitions to expand the percentage of electricity generated by LNG from 21.1% in 2017 to 38.6% in 2030. The effectiveness of LNG2P schemes in Africa and other developing nations is limited, particularly for LNG importers. The effectiveness of LNG2P schemes in Africa and other developing nations is limited, particularly for LNG importers. Consequently, it was absurd to choose or include an example from Africa or any other high-income nation.

6. LITERATURE REVIEW: COUNTRY-SPECIFIC GAS-TO-POWER LESSONS FOR SOUTH AFRICA

6.1. South Korea

South Korea is the world's third-largest importer. Located in the southern region of the Korean Peninsula in Asia, South Korea is home to roughly 50 million people (AfDB, 2017). Its location allows it to import LNG via numerous LNG terminals and existing infrastructure. The energy intake of this Asian tiger is strongly reliant on fuel (United States Energy Information Administration, 2020). Petroleum and other liquids are significant primary fuels that contribute to the production of energy. Coal is the second-largest fuel source, accounting for 28% of total extra energy use. Natural gas, which can only be imported through LNG, is the third-highest source of energy, accounting for 16% of the total.

Figure 3 depicts the overall energy consumption by fuel type in South Korea, according to the United States Energy Information Administration (2020).

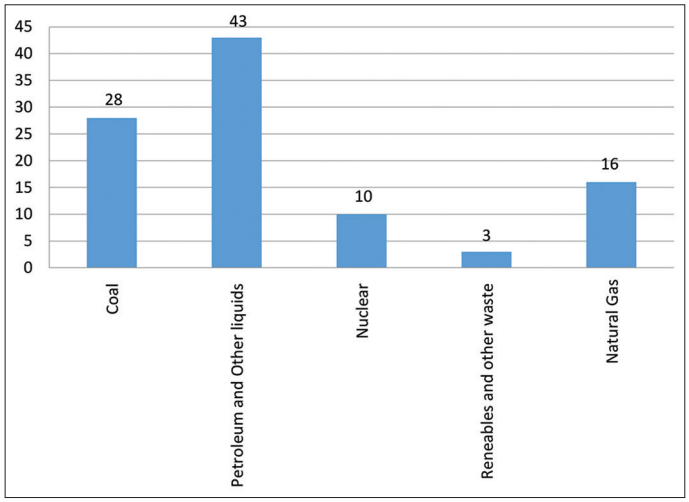
South Korea has no international natural gas pipeline connections (United States Energy Information Administration, 2018; Paik, 2018). Consequently, natural gas importation is only possible through LNG vessels. This has been the key reason for South Korea's position among countries that use natural gas, while China has recently climbed to second place and Japan is the largest importer. In South Korea, use of LNG started in 1985, after the economic crisis of 1981. (AfDB, 2017). Approximately 16% of South Korea's current natural gas imports are LNG. The global increase in prices and the desire to minimise the use of coal-fired and oil-fired power plants have played an important impact in the development of renewable energy (United States Energy Information Administration, 2020). Due to its lack of indigenous resources, South Korea is one of the world's largest importers of energy. The Koreans are vigorously studying and developing energy opportunities overseas. This makes Korea the world's third-largest LNG importer, after China overtook the second-largest position in 2017 to become the world's largest importer (B.P., 2019). In terms of contractual frameworks, the Korea Gas Corporation (KOGAS) acquires LNG primarily via long-term supply contracts. These contracts include several countries or suppliers. South Korea's leading LNG suppliers are Qatar (with a 27% share of total LNG imports) and Australia (with a 19% share of total LNG imports) (United States Energy Information Administration, 2018; Paik, 2018). The US EIA has reported South Korea's LNG imports by source in Figure 4. (2020).

Approximately 22% of all imported LNG is used for power generation, while the remaining is distributed to municipal gas networks and other industries like as transportation (Korea Electric Power Corporation, 2017). Coal (40%) and nuclear energy (30%) are the second- and third-leading means of energy generation, respectively. Figure 5 is a graphical representation of the types of resources used for energy generation in South Korea, as provided by KEPCO (2017).

6.2. Policy and Legislative Requirements to Implementing G2P in Kore

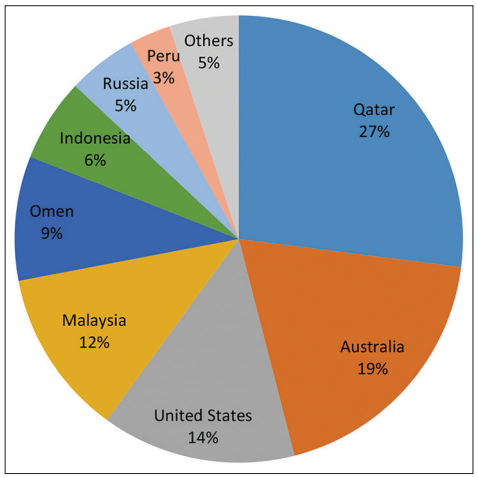
The Korean government is renowned for its "hands-on" approach to energy and economic policy formulation, administration, and implementation (AfDB, 2017). As a result, programmes such as national basic plans are governed by Korean legislation. The

Figure 3: South Korea's 2019 total energy consumption, by fuel type



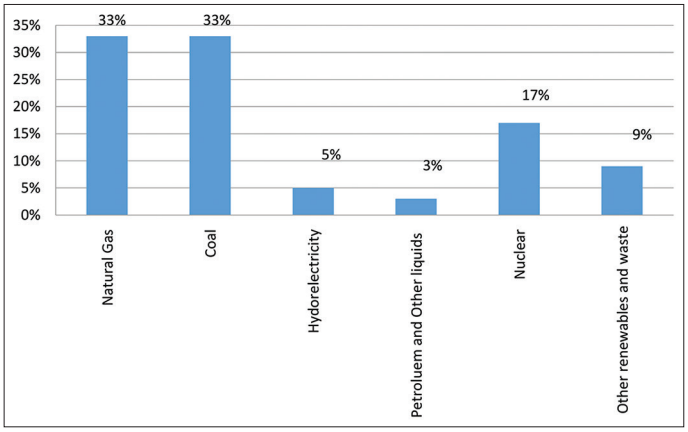
Source: United States Energy Information Administration (2020)

Figure 4: LNG imports by source in South Korea, 2019



Source: United States Energy Information Administration (2020)

Figure 5: South Korea's electricity generation by type in 2019



Source: United States Energy Information Administration (2020)

national basic energy policy is created every 5 years. It has been in place for almost two decades (Ministry of Trade, Industry and Energy [MOTIE], 2014). The current energy policy is known as the "Second Master Plan for Energy." It aims to accomplish the following key goals: shifting to demand-management strategies, constructing a distributed generation system, increasing energy security, establishing a trustworthy source supply system, and expressing public opinion on energy policy (MOTIE, 2014). In addition to these critical responsibilities, the aim of this plan is to establish a fundamental philosophy and vision for mid-to long-term energy strategy, as well as significant targets to help accomplish these goals (MOTIE, 2014). MOTIE prepares a 15-year forward plan for the nation's energy supply and consumption every 2 years. This technique should be implemented on three levels: primary energy balance, electricity balance, and gas balance (AfDB, 2017).

Policies and planning, in particular, have aided the growth of the gas sector. On December 31, 1982, the Korea Gas Corporation Act was passed, and on December 31, 1983, the City Business Act was passed. Table 1 depicts the policy context that regulates the South Korean gas industry.

6.3. Structural Arrangements in the Korean Gas to Power Programme

Paik (2018) state that the KOGAS is the world's biggest LNG importer and controls the Korean natural gas business. In 1983, the Korean government formally formed this corporation (AfDB, 2017). Since then, this enterprise has operated four of the six LNG receiving ports in South Korea. Furthermore, KOGAS utilises the country's pipeline network. The other, a state corporation, is a monopoly on the Korean gas market. Regardless of the national government's goal to liberalise the market, this has occurred (United States Energy Information Administration, 2018). This indicates that private firms will be permitted to import and resell LNG, so becoming KOGAS's rivals. Moreover, it will diminish KOGAS's monopolistic strength.

KOGAS collaborates with 34 municipal gas providers in South Korea to distribute gas (Paik, 2018). Aside from Gwangyang and Boryeong terminals, other private entities are active in LNG

Table 1: Policy framework governing the natural gas/LNG business in Korea

Legislation(s)	Nature or essential condition
Act of December 31, 1982 establishing the Korea Gas Corporation	• Enable KOGAS to contribute to enhancing the convenience and well-being of residents by integrating KOGAS and providing the framework for a sustainable gas supply. • The development, operation, and maintenance of natural gas receiving terminals and local supply networks; and the City Business Act of December 31, 1983.
City Business Act of December 31, 1983	• Establish the framework for the city gas sector, including licence requirements for gas delivery, construction of gas supply infrastructure, terms and conditions of gas service, and safety management.

Source: African Development Bank (2017); Republic of Korea (1982)

regasification facilities. These are Independent Power Producers (IPPs) within the ownership of the South Korean gas sector. State-owned KEPCO is responsible for delivering and manufacturing electricity in South Korea. In 2001, the Korea Electric Power Exchange was established as the wholesale electric power market's operator and coordinator (United States Energy Information Administration, 2018). In order to lessen KOGAS's monopoly, IPPs that are permitted to import LNG were introduced. In addition, the LNG market is governed and influenced by other influential parties. The Ministry of Trade, Industry, and Energy (MOTIE), the Ministry of Environment (MOE), the Korea Energy Economics Institute (KEEI), and the Korea Electricity Regulatory Commission indicate government engagement and support (KOREC). Below is a full description of these parties involved.

The Ministry of Energy (MOTIE) is in responsible of "energy planning, sector supervision, climate change policy, resource development, and energy savings," as well as other energy policy-related issues, according to the AfBD (2017,5). The Ministry of Environment (MOE) is in command of energy-related environmental policy (Paik, 2018). This includes the development and implementation of climate change policies and actions. The KEEI was created in 1986 and joined the government-funded Korea Council of Economic and Social Research Institutes in 1999, according to the AfDB (2017). (KCESRI). As a research organisation, the KEEI harnesses world-class energy expert knowledge to take the lead in understanding local and worldwide trends in the energy market (AfDB, 2017). Furthermore, the KEEI is entrusted with conducting a comprehensive assessment of energy policy and serving as a sector-specific advising organisation for energy resources, namely oil, gas, renewables, and electricity, all of which are climate change and green growth initiatives (KEEI, 2018).

The Electricity Business Act of 2000 established KOrec in April 2001. The electrical regulator in South Korea plans to secure a "transition to a competitive and well-functioning power market" (AfDB 2017:20). Furthermore, KOREC is in charge of preserving customers' rights and interests, resolving disputes between

electricity companies and between energy firms and consumers, and regulating unfair practises in power market activities (AfDB, 2017). The Commission is overseen by a chairman and eight commissioners, with just one full-time commissioner and the MOTIE's primary energy policymaker (Tsai, 2016). KOREC is affiliated with MOTIE and does not get any independent financial assistance for its operation or purpose.

KEPCO does not have policymaking power. This company has a significant link to this article and electricity generation in Korea, needing a quick overview of its structure and nature. KEPCO is responsible of South Korea's electricity supply. This State-Owned Enterprise (SOE) founded in 1961 manages the nation's retail sales, transmission, and electricity distribution (United States Energy Information Administration 2018). According to the AfDB (2017), KEPCO is in charge of electricity production, transmission, and distribution, as well as electricity and industry research. Because the Korean government and the Korean Development Bank own around 51% of KEPCO, it is not entirely an SOE (Tsai, 2016).

According to a 2017 AfDB report, further best practises might aid developing countries such as South Africa. Competitively priced energy import security, sovereign guarantees for long-term LNG import contracts, and the separation of gas trading from national monopoly infrastructure operations were all part of this. Interestingly, the AfDB (2017) warns that failing to implement best international practises in gas governance and structure may result in uneconomic private-sector investments in gas infrastructure supported by subsidised pricing, bringing artificial competition. As a consequence, a long-term LNG strategy is essential, which may be achieved by learning from global best practises.

7. FINDINGS AND DISCUSSION

The Korean case highlighted several key policy actions and players. This case yields several practices that contradict the view on the gas-to-power market and policy experience. Despite this, the methods commonly lead to specific areas that should be considered within the public policy side of implementing gas to power in any gas importing country. For South Africa, the following implications emanate from the discussion of the selected country are suggested as key findings of this paper.

7.1. Establish Implementable Policies and Laws to Support LNG2P

Implementing any energy source, especially for electricity generation-whether for residential or transport use requires specific policies and laws to be enacted or formulated. The literature on the Korean gas business reveals the necessity for laws and regulations. Among some of the others, legislation were discovered to give direction and vision for mid-to-long-term energy strategy, as well as major milestones for accomplishing these objectives. Policy and legislation should be designed to support an energy master plan. A master plan should be built on three foundations: main energy balance, electricity balance, and gas balance (AfDB, 2017). According to the literature, it is critical for the government and individuals in charge of executing this master plan to take a "hands-on" approach.

Notwithstanding from the concept of effective policy via a master plan, numerous national and local government legal frameworks are required. According to the research, rules are necessary on a national level for provisions for investments, project execution plan approvals, bond issuance, and profits. Furthermore, it can only achieve its purpose if the following activities are taken: generating and providing urban gas in compliance with the Act's other requirements; and constructing, operating, and maintaining natural gas-receiving terminals and local supply networks (African Development Bank, 2017; Republic of Korea, 1982). In the case of Korea, on December 31, 1982, the Korea Gas Corporation Act added additional requirements for the Second Energy Master Plan. Legislative frameworks are required at the local government level to provide the groundwork for the municipal gas industry. The City Business Act of December 31, 1983 is an analogous piece of law established in Korea for the gas industry. 2017 (African Development Bank). Through specific regulations, South Africa would be able to define the proper licencing requirements for developing gas supply infrastructure, providing gas, terms and conditions of gas delivery, and safety monitoring.

Although this study only covered a sample of two legislations on regulating the gas industry both at the national and local level, there may be additional frameworks that could be useful for the South African case – these could include broader energy strategies, and resources plan such as the Integrated Resource Plan (IRP).

7.2. A Clear and Rational Demand for the LNG2P Energy Technology

To effectively implement LNG2P in a country like South Africa, there is essential to demand sufficient energy. The energy demand is vital, not only for the generation of power or its' reasons to develop the country's economy. However, it is crucial to ensure a sufficient and reliable energy technology supply. For instance, it was found that South Korea has a significant energy demand being met through LNG. According to KEPCO (2017), 22% of the Korean electricity generation is from natural gas. With its apparent demand for natural gas, South Korea has implemented contractual agreements with several international players in the gas market. There are vital commonalities from the two countries that should be taken into consideration by South Africa is the diversification of the energy sources in its energy mix, as well as clearly defining the demand for LNG2P energy technology. Lastly, several players, some of which are within the African continent, could be available to meet the LNG demand that South Africa would have-should it further increase the LNG demand for its energy demand.

Uncertainty in policy regulation (a barrier to effective governance) and South Africa's over-reliance on "dirty" and inefficient energy sources like as coal hinder the ability to properly execute and enhance South Africa's participation in the world's gas/LNG viewpoint. As a result, clear and realistic goals must be established to reduce our dependency on filthy energy sources. This may take the shape of a framework or law to prevent additional coal development and to allow alternative energy technologies to play a large role in the country's energy mix.

7.3. Prioritise Global Sustainable Driven Energy Practices in National Plans and Policies

South Korea presents a lesson that implementing the LNG2P program should be undertaken through a "hands-on" approach. Earlier, this approach should be throughout the public policymaking cycle (from formulation to evaluation). Furthermore, the system allows for an implementation to be evidence-based with checks and balances carried out over a certain period. A key component in the Korean cases is that the performance should be based on actions plans, mid-to-long-term plans, and national energy interests or needs. Significantly, the Korean instance indicates that the strategy to deploy LNG should be oriented on demand, a distributed generating system, increasing energy security, and strengthening the sustainability of energy policy. In conclusion, although planning and processes were important for the implementation of the Korean LNG2P instance, law was essential for establishing the gas business. Improving the alignment of GEG metrics for the implementation of G2P in South Africa is essential. There has been a convergence of global and regional energy-related policies, laws, conventions, protocols, and institutional requirements. This has been negligible, particularly when considering the country's carbon emissions, despite being a participant to the Paris Climate Agreement.

7.4. Adopt a Multi-Party Institutional Approach to Implement the G2P Programme

While it is essential to diversify the energy sources in a country's energy mix, it was found that there is a need for an energy environment that has multiple players. The Korean cases highlighted the importance of state-owned enterprises and privately-owned companies. An interesting finding was that South Africa needs to carefully consider that the Korean gas industry is dominated by one entity, the KOGAS. Despite this entity being a public enterprise, there have been many critiques on its significance in the gas industry. Much of the reviews focus on addressing the monopolistic nature of the market. Against this, Independent Power Producers were introduced, although the rights and responsibility to supply electricity were put to KEPCO. This was to further allow for more players in the industry. For instance, most private companies are involved in the LNG regasification facilities, while others are engaged in gas supply within South Korea. The gas industry has multiple players supplying and transporting gas within Korea – although all of this gas is bought from KOGAS.

It advised that South Africa should extend the scope of entities interested in generating power from natural gas. This may need the participation of other SOEs, such as Transnet, in the deployment of G2P. Additionally, a research unit for energy technologies is essential for actively comprehending and advancing energy-related problems and solutions. This will provide high social sustainability for the whole energy programme. Additionally, this will enable competition within the energy industry, which is currently non-existence.

8. CONCLUSION AND IMPLICATIONS

South Africa has, over time, expressed its interest and ambitions to pursue an Gas-to-Power programme as one of its energy commitments aimed at addressing the current energy challenges that the country faces. The South Korean scenario demonstrates the viability of government-driven and -financed gas sector growth based on imported LNG. It provides a concrete illustration of the relevance of gas in the energy industry. The study found that strengthening the Gas-to-Power programme or even the industry requires several actions, such as establishing implementable policies and laws to support Gas-to-Power, apparent and rational demand for the Gas-to-Power energy technology, prioritising global sustainable driven energy practices in national plans and policies, and adopting a multi-party institutional approach to implement the G2P programme.

Strengthening the Gas-to-Power programme or even the industry requires several actions, such as establishing implementable policies and laws to support Gas-to-Power. This is in addition to prioritising global sustainable driven energy practices in national plans and policies. A multi-stakeholder institutional approach also needs to be adopted to implement the Gas-to-Power programme. Therefore, further research is necessary to augment academic knowledge on addressing energy challenges and crises through Gas-to-Power, especially in African LNG importing countries. In addition, it was argued in this article that South Africa's attempt to implement this energy technology is still at its' early stages-therefore, a further study (which could be once this programme is at its advanced stages) on factors that either contributed or hindered efficient and effective implementation of this energy technology in South Africa. This study's centers within the parameters of The success of gas-to-power strategies relies heavily on technological advancements. The viability and efficiency of gas-to-power initiatives may hinge on the accessibility and cost of relevant technologies. That's why it's crucial to grasp the present status of gas-to-power technology and the forces that push for its development and widespread implementation.

Government policies, market pressures, and technology improvements all play a role in driving technological innovation and acceptance in gas-to-power programmes. Investment in innovative technologies may be encouraged and adoption aided by government policies such as subsidies and incentives. New innovations may find an audience and gain traction thanks to the efforts of the market. Improved materials science and computer modelling are two examples of technological developments that may spur innovation by paving the way for the creation of novel, more effective tools. These technical considerations should be taken into account by policymakers when they craft gas-to-power policies. They need to ensure that policy objectives, including energy security and environmental sustainability, are addressed while simultaneously fostering a climate that is conducive to investment in cutting-edge technology. Decisions on policy should be influenced by a variety of viewpoints and knowledge, therefore it is important for policymakers to actively include relevant groups like businesses, universities, and citizens in the process.

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