

BRIDGING THE GAP: PROGRESS AND PROSPECTS FOR ACCELERATING SOUTH KOREA'S MOVE TOWARDS A CARBON NEUTRAL SCENARIO

By Francesca Frassinetti and Francesco Sassi

ABSTRACT

The Moon administration in South Korea has implemented rapid changes to accelerate the decarbonization of the energy sector. While seeking to embrace renewables, Seoul has been relying on the bridging capacity of natural gas—of which it is the world's third largest importer. In this context, President Moon is also confronted with public discontent over weak emissions goals and inadequate policies to curb the negative effects of climate change. Besides, the socio-economic fallout from the pandemic could hinder the enforcement of environmental measures and loosen restrictions for the sake of an immediate recovery. As Seoul attempts to secure more environmentally-friendly and economically sustainable energy sources, this paper examines the advances and major drawbacks of this policy agenda. By shedding light on the dynamics within the gas sector, the analysis also assesses the viability of liquefied natural gas (LNG) as the pillar of this pro-environmental policy shift, including the potential of some LNG-related projects. The paper finds the feasibility of the current goals is challenged by the realities of energy supply stabilization, particularly due to the simultaneous phaseout of coal and nuclear power and the persistent capacity

obstacles for renewables to fill this gap. In light of this, the paper advocates for integrated policy measures aimed at improving consistency in implementing national energy policy in tandem with climate change mitigation efforts.

Key Words: energy transition, natural gas, GHG emissions, Green New Deal, South Korea

INTRODUCTION

Over the last three decades, South Korea has been widely praised for its remarkable record of political and socio-economic transitions. Nevertheless, in the absence of decoupling between greenhouse gas (GHG) emissions and economic growth, the other side of the coin shows a less than positive performance. Aside from the general improvements following the authoritarian era when pollution emissions used to be an "inevitable" by-product of the industrialization strategy that underpinned post-war economic growth and legitimized the military-backed regimes, involvement in climate change negotiations remained rather passive until the early 2000s due to the persistent developmental mindset.

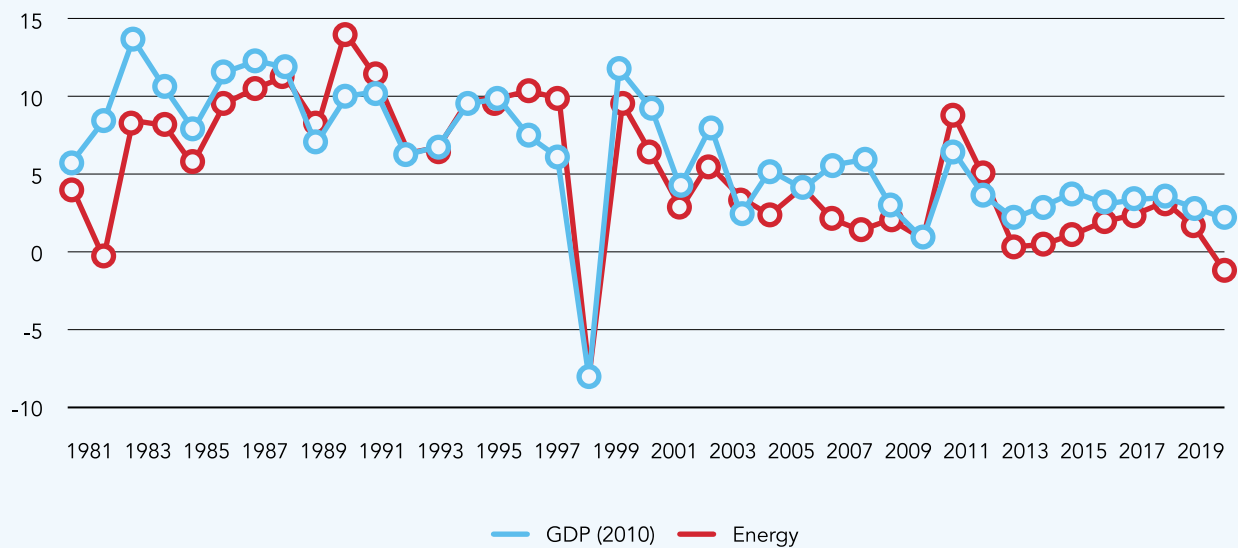
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While many developed countries saw a slower rate of emissions growth, and even a downward trend, South Korea's emissions ramped up by 71.6% on a per capita basis between 1990 and 2005.¹ This was largely driven by demand for its manufacturing products and mounting household electricity consumption favored by government-controlled low prices (Figure 1).² Moreover, South Korea has a poor record in terms of energy intensity, consistently higher than the OECD average (Figure 2). As a result, Seoul came under international pressure to shoulder more of its responsibilities in terms of climate mitigation actions, as hiding behind the developing country claim would no longer be acceptable.³

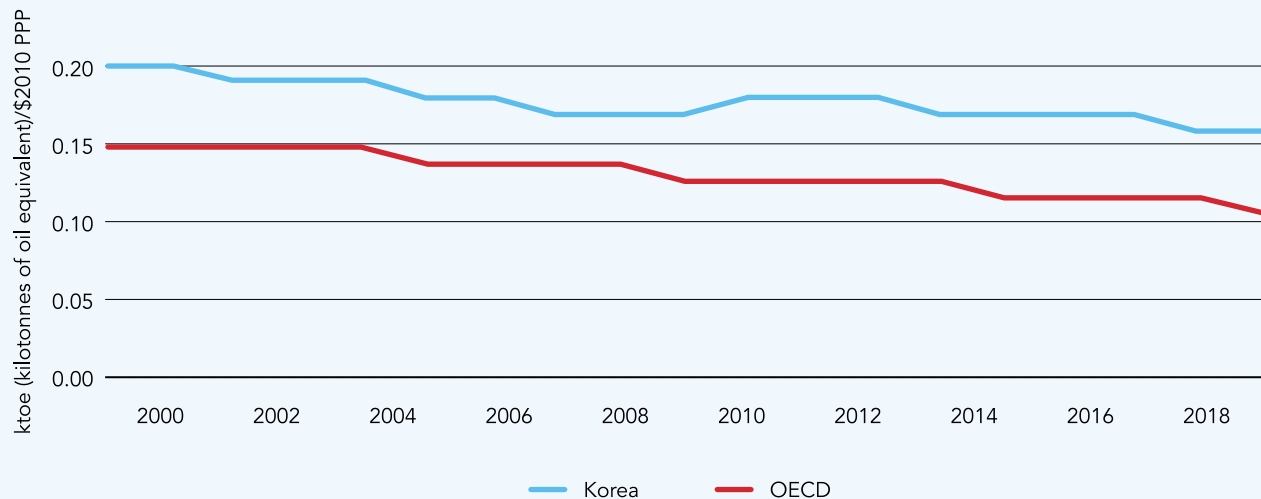
Under the national vision of "Low Carbon, Green Growth" launched by the Lee Myung-bak administration, South Korea's environmental commitments were remarkably upgraded. At the same time, reducing carbon emissions was understood as the outcome of policy initiatives primarily intended to promote new drivers of growth to help Seoul weather the Great Recession. Indeed, increasing the supply

of low-carbon nuclear energy and creating new jobs through spending 2% of GDP in green industries were among the core components of Lee's response to a mix of international and domestic issues dominated by the question of energy security. Aside from serving the foreign policy purpose of being a broker between developing and developed economies, enhancing South Korea's green profile led to its first voluntary international pledge to cut GHG emissions by 30% below "business-as-usual" (BAU) levels by 2020. The successive administration reset the target to 37%, yet extended the deadline to 2030. In spite of being Korea's first binding commitment in this field and part of its pledges at COP21, it was actually weakened and, to this date, it is still rated as "highly insufficient" by Climate Action Tracker on the grounds that if all states that were party to the Paris Agreement were to share the same goal, the temperature would be well above the 2°C limit.⁴ The current Moon Jae-in government has hitherto revised the GHG Reduction Roadmap but not its emissions target, which is thus at odds with the above international undertakings.

Figure 1. South Korean Energy Consumption and Economic Growth Rates



Source: Energy Demand Outlook (KEEI, July 2020)

Figure 2. South Korean Energy Intensity (Primary Energy Supply per GDP)


Source: Economic Surveys 'Korea' (OECD, August 2020)

Nevertheless, President Moon's stance has been heavily influenced by the public outcry over the blanket of fine dust that has periodically enveloped large areas of the country, with detrimental effects on the quality of everyday life. Last year, not a single South Korean city met the minimum WHO annual air quality standard and 61 of them were among the top 100 with the highest pollution levels globally, a considerable worsening if compared to the 44 ranked in 2018.⁵ Therefore, following a peak in March 2019, the State Council declared air pollution as "a social disaster," unlocking emergency funds and leading to the creation of the National Council on Climate and Air Quality. As air quality deterioration becomes more and more visible to the naked eye, aggravated by the trans-boundary nature of fine dust, recent surveys confirm very high levels of concern about climate change among the South Korean population. Besides, they also suggest a positive correlation between the skyrocketing particulate matter levels and the public's risk evaluation of climate change.⁶ Indeed, fine dust was found to be the top environmental news from 2017 to 2019 in South Korea.⁷

In light of the above, the stakes are very high for the government's plan to accelerate energy transition aimed at reducing GHG and fine dust simultaneously through fostering green industrial policies and investments.⁸ Regardless of an insignificant percentage of climate change deniers, the

fact that there is a high degree of climate change literacy within the domestic public can arguably be considered as a positive sign in terms of introducing the changes required to respond to climate change through sustained mitigation and adaptation efforts. On the other side, the growing political and social salience of these issues puts authorities under extreme pressure. As shown by Gallup Korea, before the pandemic outbreak, a major reason why people in their twenties and thirties did not support the administration was because its interventions to stem fine dust, including the seasonal coal-fired curtailments, were perceived as just high-profile and one-off measures. These findings can be explained in part by the cyclical nature of the problem given that the surge of public anger together with the sense of urgency felt by the government tends to plateau and dissipate when the seasonal smog curtain ends.

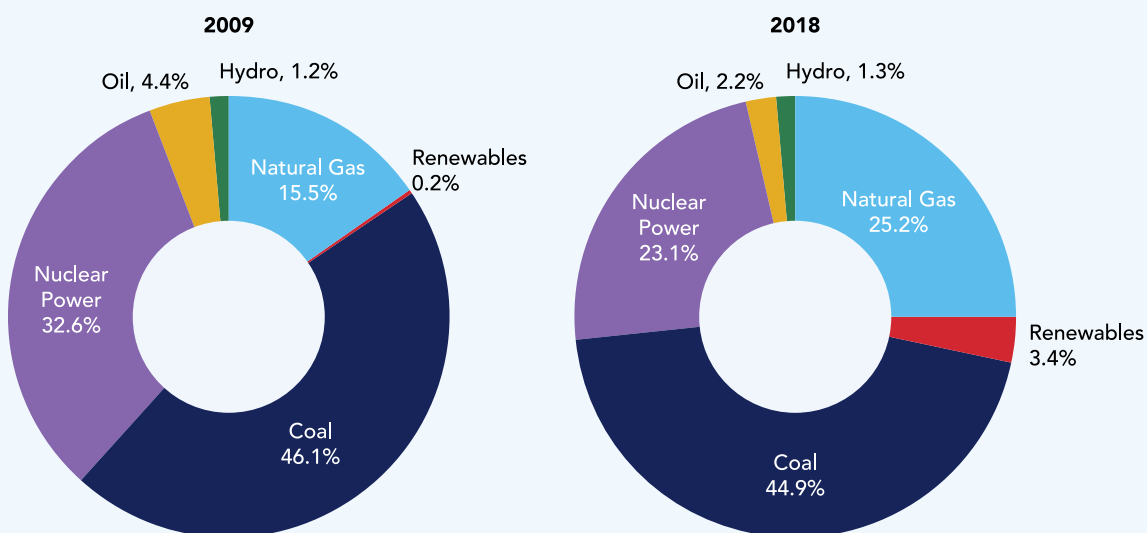
In designing his post-COVID-19 strategy, President Moon has committed one of its pillars to boost investments in new green industries. In doing so, he has relaunched the domestic debate around the green growth paradigm on which the controversial legacy of Lee Myung-bak's Green New Deal looms large, especially in terms of sustainability and social inclusiveness. Unsurprisingly, the similar rationale behind Moon's recently unveiled blueprint has led environmental advocates to voice strong concerns over the risks of reproducing greenwashing practices comparable with Lee's

flagship projects, which have caused severe damage to the natural habitat and a heavy burden for the taxpayers.¹⁰ Having said that, the fact that at the last election, in April 2020, the ruling party secured an absolute majority in the National Assembly bodes well for adjustments to the South Korean global emission footprint, despite the spirit of the Democratic Party’s climate manifesto—the first to aim for net-zero carbon emissions—has not been fully transposed in Moon’s New Deal.¹¹

Against the backdrop of the unfolding new climate regime and the pandemic-induced socioeconomic fallout, the paper assesses the advances and major drawbacks in South Korea’s attempts to secure more environmentally-friendly and economically sustainable energy policies. The first part

dives into the complexities of promoting a concurrent coal and nuclear phaseout on the part of the Moon administration. Amid the many market distortions that hamper the expansion of renewables, the second part focuses on the role of natural gas. By scrutinizing key stakeholders and policy drivers that have shaped a strategy in which natural gas is advocated to bridge the pro-environmental shift in the country’s energy policies, the analysis also addresses the potential implications of some LNG-related projects for the energy transition going forward. Based on its findings, the paper advocates for strong integrated policy measures aimed at improving consistency in implementing national energy policy, in tandem with climate change mitigation efforts.

Figure 3. South Korean Electricity and Heat Generation by Source



Source: Authors’ elaboration based on IEA (various years)

THE CHALLENGES OF A PARALLEL COAL AND NUCLEAR PHASEOUT

Currently, coal is responsible for almost 45% of South Korea’s total electricity and heat generation (Figure 3). In the absence of a carbon tax, which Moon has called for in his Green New Deal, the Energy Target Management System (ETS) has become the main instrument to curb emissions. As the second largest carbon market after Kazakhstan, and the first East Asian nationwide system, a very high allowance price is placed on both direct and indirect emissions—about 68% of total emissions—that are produced from electricity and heat in a wide array of sectors.¹² Within the cap-and-

trade system, covered entities are allowed to trade emission units in order to comply with mandatory obligations, facing penalties proportionate to the number of emissions produced for a certain section of the economy. In 2019, Asia saw the world’s largest increase in the price of carbon with a peak in the Korean ETS due to scarce trading.¹³

According to the International Energy Agency’s (IEA) conservative projections, South Korea’s coal imports are estimated to stay flat in the near future and then drop by nearly 50% in 2040.¹⁴ To scale down the contribution of coal, Moon has vowed to ban domestic construction of new coal-fired plants in addition to retiring the aged

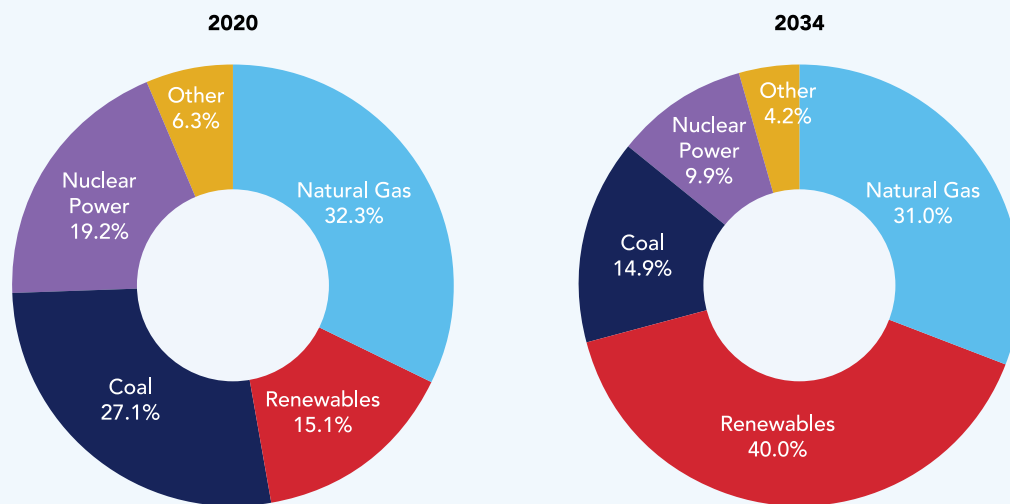
ones (those nearing or above 30 years old) which, due to their obsolescence, also contribute to keeping carbon dioxide productivity in terms of real GDP at very low levels compared to the OECD average, meaning that every unit of carbon dioxide emitted generates less economic value.¹⁵ While ten aged coal power plants are expected to shut down by 2022, adding to the four that have already closed and the twenty more set to be switched off by 2034, Seoul is still the third largest public financier of coal globally. This double standard, which has caused South Korea's inclusion on the infamous list of "climate villains" under the Park administration, undermines the administration's credibility, most notably because it contributes to extending coal dependency of developing countries that do not impose quality and safety regulations as strict as those enforced within South Korea.¹⁶ Therefore, there are high expectations for the two legislative bills scheduled for debate, to ban Korean utilities and companies from expanding coal-fired generation overseas.¹⁷

Since the 1970s, nuclear power has been one of the pillars of national energy policy together with coal to lessen the heavy dependence on fossil fuels and boost domestic generation capacity amid international debates about its potential for emissions reduction. However, in the wake of the Fukushima disaster, the "nuclear renaissance" has been increasingly difficult to sustain. The nuclear fervor has further cooled due to the issues of false safety tests of many nuclear parts and the psychological fallout from several earthquakes during 2016 and 2018.¹⁸ More recently, the reliability of the nuclear

fleet has been placed under severe stress by consecutive typhoons that have hit the Korean peninsula, causing the failure of power supply equipment and the shutdown of six reactors.¹⁹

Facing increased distrust in nuclear power plant regulations due to the perceived lack of transparency and information, Moon has strengthened the safety standards and accelerated nuclear decommissioning also amid diminishing public support for establishing new nuclear plants for climate change mitigation. Providing about a quarter of South Korea's electricity generation, the operating nuclear reactors represent the fifth largest nuclear output in the world. Regardless of announcements to shut down ten aged nuclear plants and cancel six new construction plans, the share of nuclear power generation of total power generation went up from 22.8% to 28.2% in 2018 and 2019 respectively, as new reactors are still built in accordance with contracts stipulated under Moon's predecessors. Although this casts doubts on the feasibility of consistently reducing the nuclear fleet, Seoul projects to have only 17 operative units by 2034, following a planned peak at 26 units in 2024, which is expected to decrease the nuclear share from 19.2% to 9.9% as stated in the draft of the 9th Basic Energy Plan (Figure 4). Accordingly, it is expected to cut nuclear power generation by 18 gigawatts (GW) and coal production by 15.3 GW by 2034. This parallel phaseout is the key issue of the current energy strategy given that the country still relies on external sources of energy for almost 93.5% of consumption, with a low energy self-reliance rate of 5.3%.²⁰

Figure 4. South Korea's 9th Basic Energy Plan



Source: Authors' elaboration based on MOTIE's draft plan (May 2020)

In this context, the country's thirst for electricity, which produces together with heating slightly over half of Korea's emissions, has led energy consumption levels to climb by more than 450% over the past thirty years. Cutting energy consumption by 18.6%, as planned by the 3rd National Energy Roadmap, is challenged not only by South Korea's energy intensive and export-oriented industrial core, but also by the significant incentives for consumption inherent in its domestic energy environment. Notably, South Korea has the second lowest electricity prices among IEA members, which strongly discourages the government from overhauling the pricing system.²¹

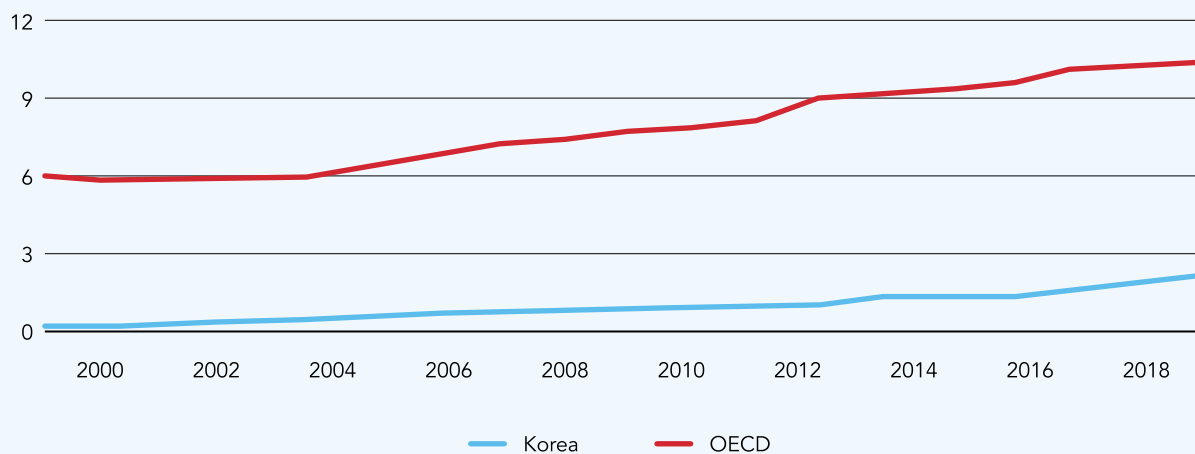
Strenuous opposition to the intended phaseout comes from the nuclear lobby, advocating for nuclear-based power to counterbalance possible electricity shortages throughout the transitioning or converting process. Additional sources of concern are the significant social costs associated with energy reforms, in the absence of proper welfare provisions.²² During the 2018 summer heatwave, their campaign around public anxieties over power shortages and more expensive electricity bills played out most visibly, as a ramp-up in electricity demand caught the government off guard during peak season. While the Korea Electric Power Corporation (KEPCO) switched on some of the then temporarily suspended nuclear plants to provide additional supplies, the progressive electricity pricing for consumers was briefly put on hold.²³

Yet, as shown in Figure 5, the small scale of renewable energy generation is inadequate to fill in for coal and nuclear energy. Although the Moon administration has

significantly increased the budget for renewables expansion to speed up the transition to cleaner energy, its attempts to ride the wave of renewables have been severely constrained.²⁴ A major hindrance is the lack of grid parity. This makes renewable-produced electricity more expensive than that of traditional sources. Given the many persisting market disparities affecting renewables as opposed to fossil fuels, even with advancements in grid and storage systems expected to progressively handle the intermittent nature of renewables, continued government subsidies are required for the transition to go further.

The renewable energy subsidy scheme requires careful recalibration. Since 2014, the most conspicuous part of public support has been directed towards the biomass sector. This has raised many doubts in terms of international competitiveness as well as environmental standards given that the capacity of the South Korean biomass power generation is based on burning biomass within coal power plants.²⁵ In this regard, as shown in a detailed report by the Seoul-based non-profit Solutions For Our Climate (SFOC), due to years of overcompensation, biomass has become much more cost-effective amid the quota system.²⁶ Accordingly, the fact that biomass has become so artificially inexpensive comes at the detriment of investments into other renewables. Because of this, the revised policy in the Operating Guidelines of the Renewable Portfolio Standard, introduced in 2018 by the Ministry of Trade, Industry, and Energy (MOTIE) to encourage utilities to redirect their support towards solar and wind technologies, might not be enough to reverse the trend. As a result, Moon's renewables strategy could be further complicated.

Figure 5. South Korean Renewable Energy Share (% of Primary Energy Supply)



Source: Korea Energy Demand Outlook (KEEI, 2020)

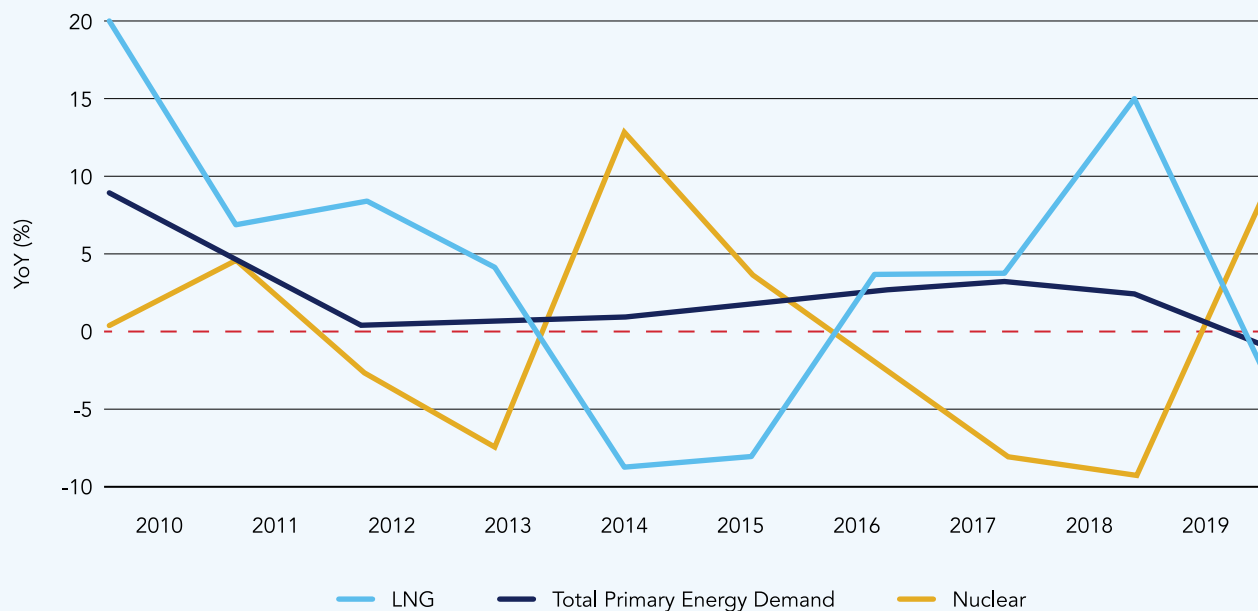
A CONTENTIOUS BRIDGE FOR THE ENERGY TRANSITION

In light of the complications of increasing the penetration of renewables in the energy mix, the Moon administration has joined the trend of choosing LNG as the cornerstone of climate mitigation efforts. Accordingly, LNG and renewables are expected to constitute 71% of new power generation capabilities by 2050.²⁷ Nevertheless, while the GHG generation of natural gas is well below that of coal and oil, it should not be viewed as pollution-free since its production and use can release high amounts of methane in the atmosphere, which is far more potent than carbon dioxide.²⁸ Given the relatively complex lifecycle, the issue of the many potential emissions hotspots across the supply chain has given rise to heated debate as global trade in gas expands.²⁹ Nevertheless, because of its lower carbon intensity, natural gas is largely viewed as the most viable solution in the short-term to help reach carbon-reducing targets, especially the target to replace coal. South Korea's LNG demand is forecast to rise, driven by the conversion of twenty-four of the thirty aging coal-fired power plants (15.3GW) into LNG-fired units (12.7GW).³⁰

Following a slump by the mid-2010s and slight drop last year, LNG imports have risen steeply, leading South Korea to become the world's third largest importer with 11.3% of the global market share, which corresponds to almost its entire domestic consumption of natural gas.³¹ The expected acceleration of South Korea's LNG demand is reflective of the turnover between natural gas and nuclear power that has been happening since 2011. As shown in Figure 6, there has been a significant inverse relationship between consumption of nuclear and LNG. In this context, gas has eventually become the most favored substitute for nuclear in the energy system even though generation from nuclear units will rise in the short-term due to the construction of new plants.

Shedding light on the dynamics among the sector's key stakeholders can bring into sharper focus the challenges and opportunities related to the viability of LNG as the pillar of Seoul's pro-environmental policy shift. As South Korea's single buyer and manager of national supplies, the Korean Gas Corporation (KOGAS) has been tasked with meeting domestic gas demand, holding exclusive rights to build, manage, and operate all the infrastructural components

Figure 6. South Korean LNG and Nuclear Growth Rate (2010-2019)



Source: Korea Energy Demand Outlook, (KEEI, 2020)

across the supply chain, in spite of the many attempts to reform the sector that have occurred since the late 1990s.³² Since South Korea is the only OECD member with a monopoly in the natural gas industry, companies are allowed to import LNG only if used for their own purposes and if import prices do not exceed those subject to KOGAS' long-term contracts. In light of this, expanding the private sector's role through reforming the gas regulatory framework has been heralded as a way to correct economic inefficiencies, including by increasing competition among LNG importers to benefit end-users in terms of lowered import prices. At the same time, the measure would help the expansion of gas in the energy portfolio, as well as enhance the government's check on KOGAS.³³

Given that KOGAS charges power companies including KEPCO with city gate prices fairly higher than the market average, the South Korean power companies have managed to source cheap coal from Southeast Asia to balance their budgets as alternatives to increasing expensive gas generation. This system has secured KOGAS oil-linked LNG supplies through long-term contracts, which are based on a high price structure, while power companies have enjoyed economically advantageous seaborne thermal coal imports.³⁴ Amid the various market incentives under the previous administrations, between 2016 and 2017, new coal capacity has eclipsed that of gas in power generation.³⁵

Besides this, KEPCO has been favored by an adjustment factor for its power generation subsidiaries applied by MOTIE, which guarantees de facto operating cash flow through a cost-plus mark-up policy. However, overcompensating KEPCO's companies *vis-à-vis* independent producers risks reducing the efficiency of power generation services together with the likelihood of lowering generation costs. If not properly addressed, this market distortion could lead renewables and gas to compete for access to the same financial assets due to the latter's higher guaranteed returns. Indeed, if the least-cost low carbon power system curve flattens, slowing down the introduction of cheaper renewables in the energy system, the transition to a post-fossil fuels era in South Korea's power generation could be jeopardized.³⁶

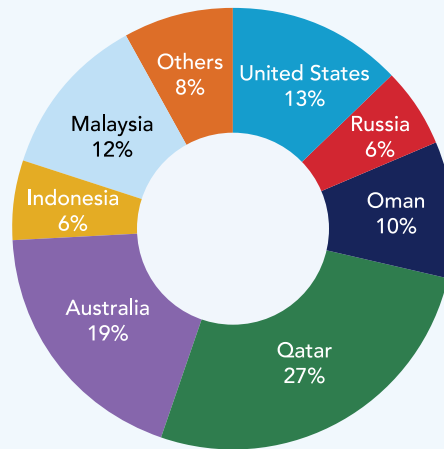
POLICY DRIVERS

To incentivize coal-to-gas substitution, Seoul introduced a double economic incentive between 2018 and 2019. While adding more than 50% in fees on coal imports,

now amounting to \$40 per ton, the LNG import tax has been lowered by 75% to \$20 per ton.³⁷ Besides, the government is willing to encourage further investments in the gas industry by refunding LNG import taxes whenever the source is used for combined heat and power sectors. After many market entrants were discouraged to increase their LNG-based power production in South Korea due to low profitability amid depressed oil prices between 2014 and 2016, reducing taxes on LNG imports is likely to bring commercial benefits to power companies that use LNG in their power generation mix. In addition to supporting power companies for the losses caused by the volatility of oil prices, it improves the outlook for a larger share of natural gas in the power generation mix *vis-à-vis* less expensive coal- and nuclear-based sources. At the same time, the burden related to the "Asia Premium," that has negatively affected the competitiveness of gas imports in Northeast Asia, is expected to be eased.³⁸

As argued above, the relationship between the Blue House and KOGAS is of great importance in terms of accelerating the energy transition and implementing climate policies. In addition to centrally-promoted reform initiatives, power utilities and local suppliers have urged the government to further amend this monopoly whenever the circumstances have favored spot-market conditions or when prices have surged, negatively affecting gas power production.³⁹ However, aside from announcements to allow third parties to import LNG starting in 2025, regardless of KOGAS' dominant position to attract new investments and favor coal-to-gas switching, consistent policy shifts have proved to be slower than aspirations.⁴⁰ In an effort to dodge KOGAS' brokerage, in the mid-2000s POSCO built its first LNG terminal and storage facilities in Gwangyang. Moreover, the long-term deal that POSCO signed with the Indonesian Tangguh gas project is expected to increase Seoul's competitiveness *vis-à-vis* the Chinese gas buyers in one of the main Southeast Asian LNG markets.⁴¹ Likewise, GS Energy and SK E&S have operated jointly the Boryeong LNG terminal, with the latter signing a deal with Shell for over 1 million tons of supplies per year. This helps to further diversify the country's international partnerships, thereby supporting both Seoul's official agenda to expand LNG and the interests of Korean companies in directly challenging KOGAS.⁴²

Despite the attempts made by various administrations aimed at spurring domestic competition among gas companies to reduce end-consumer prices and support the coal- and nuclear-to-gas transition, these reforms have

Figure 7. South Korean Gas Imports by Source (2019)


Source: Statistical Review of World Energy (BP, 2020)

slowed the process while accentuating the domestic market distortions and the over-politicization of the gas market. Overall, it has created uncertainty with regard to which agency is best suited to support the country's energy targets in the gas market. In early 2020, in order to favor the energy transition and boost gas consumption, MOTIE introduced a new individual tariff formula expected to enter into force by early 2022, according to which KOGAS charges different prices to each of the power utilities through bilateral negotiations. This replaces the tariffs scheme based on a state company's average import cost, which has provided long-term stability to the overall supply chain. On the other side, it has also enhanced the monopoly position of KOGAS and has contributed to keeping domestic gas prices high, therefore, reducing its competitiveness with coal. Under the new system local power utilities are expected to refrain from seeking international agreements, and to negotiate directly with KOGAS.⁴³ This strategy seems to favor South Korea in negotiating favorable deals with gas producers in an oversupplied global gas market, especially in the framework of the new gas imports required after 2024. However, if KOGAS' domestic bargaining power remains unchecked, the economic fundamentals of the gas business could turn unfavorable particularly for private producers, which could instead favor the preservation of coal as a cheaper and easily available commodity for the country's power generation.

FOSTERING AN ENABLING ENVIRONMENT FOR SEOUL'S INTERNATIONAL AMBITIONS

Given the limited competition in the domestic sector, KOGAS has nurtured a large degree of autonomy from political control, developing a strategy based on large-scale acquisition of gas and long-term partnerships with overseas producers. Arguably, enhancing KOGAS' international outlook generates positive returns for Seoul's energy diplomacy in spite of the lack of consistency in long-term goals that, together with over-politicization, have hampered the execution of previous Energy Master Plans.⁴⁴ Since the mid-2000s, gas shortages and price spikes have caused major concerns for both the government and KOGAS. Poor coordination between domestic public and private shareholders has led Seoul to sign deals with LNG sellers, including for Qatar's supplies, under unfavorable commercial terms.⁴⁵ On its side, KOGAS has suffered from a weak bargaining position against price reviews within long-term supply contracts, regardless of where the gas was sourced. Petronas, Yemen LNG, and Sakhalin Gas have obtained higher prices for gas compared to KOGAS whenever market conditions have favored LNG producers. In 2018, due to the more positive market conditions for buyers, Seoul entered into arbitration with Australia's North West Shelf export project regarding an export price renegotiation over a mid-term supply contract that ended in 2016. This is the first-ever publicly known price review arbitration in the Asian LNG market.⁴⁶

While trying to secure stable supplies of natural gas that could also compensate for the sliding contributions from coal and nuclear power, MOTIE views flexibility of deliveries and cooperation with major LNG buyers as pivotal to implement the national LNG strategy. Seoul has been testing the “potential of the Russian and U.S. LNG projects” to increasingly diversify the country’s imports and soften prices (Figure 7).⁴⁷ This should be seen as an intensification of policies implemented in the aftermath of the 2011 price spike in East Asia in order to expand South Korean imports beyond the Middle East and Southeast Asia.⁴⁸

To achieve this goal, mobilizing the country’s energy companies is vital in order to gain the most competitively priced gas on the market.⁴⁹ Indeed, aside from reducing budget deficits caused by imports, diversifying gas imports and upstream partnerships could bring new opportunities to bolster equity revenues, in addition to ensuring gas supply security. Therefore, Seoul could explore new robust measures to secure new sources of LNG supply, while meeting uncertainties of demand by including flexibility clauses in long-term deals, which last around 20 years on average. The Korea Fair Trade Commission (KFTC) has been monitoring the legality of the destination clauses of LNG import contracts, including those signed with Qatar, a practice also followed by KOGAS when trading its LNG cargoes down the road.⁵⁰ Responding to market volatility and fluctuating demand for gas, the contract flexibility clause better positions South Korea’s policies and companies within the East and Southeast regional gas markets in the medium-term.⁵¹ Also, Seoul should consider that China’s growing demand will be another key factor in determining the scope and space of Seoul’s gas diplomacy in the next five to ten years.

As stated, Moon’s diplomacy has been keen to deepen ties with top gas producers, notably the U.S. and Russia.⁵² In dialogue with the Trump administration, Seoul has favored LNG purchases from U.S. projects as part of Washington’s intention to reduce trade deficits with its major trading partners. These include, among others, KOGAS’ first long-term supply contract with Cheniere for the purchase of 3.5 million tons per year of LNG and the deal with BP for LNG deliveries from the Freeport terminal over fifteen years starting in 2025.⁵³ Adding to that, in October 2017, KOGAS and Alaska Gasline Development Corp agreed on a MoU for the development of the Alaska LNG Project to serve Asian markets. Still, the Alaska LNG Project poses a danger in such a shaky investment environment that expands well beyond

American borders, putting pressure on KOGAS to strike a balance between political commitments and economic viability within the framework of its energy cooperation in U.S.-based projects.⁵⁴ Nonetheless, regardless of the outcome of the next presidential elections, energy cooperation will continue to play a significant role in the U.S.-ROK relations within the post-pandemic scenario.⁵⁵

As for relations with Moscow, gas diplomacy stands at the center of Moon’s bilateral agenda, as it did under his predecessor.⁵⁶ Since a Trans-Korean pipeline has been on and off the table for more than three decades amid the many political risks and financial hurdles related to the North Korean missile and nuclear issue, deepening LNG cooperation has seemed a more palatable option. Until 2028, KOGAS has a 1.5 million ton per year contract with Gazprom’s Sakhalin-2 LNG plant, providing geographically close gas supplies. South Korean companies have favorably viewed the major Russian LNG projects, even after the annexation of Crimea and the ensuing Western sanctions.

However, in spite of mutual interest to further expand cooperation in this field, domestic and institutional disputes have hampered the development of existing projects.⁵⁷ The participation of Korean companies in Novatek’s \$20 billion Arctic LNG-2 project has been discussed by Moon and Putin in the framework of Korea’s assistance to the development of hydrocarbon deposits in the Arctic.⁵⁸ Yet, in spite of KOGAS’ announcement establishing a “strategic partnership with Russia in the fields of gas pipelines, Arctic LNG development, and bunkering among others,” no binding agreement has been reached.⁵⁹ But, the shipbuilding companies have been far more successful. In 2013, Daewoo Shipbuilding and Maritime Engineering (DSME) won the tender for 15 tankers designed for servicing the Yamal LNG plant in the Arctic. Both Samsung Heavy Industries and DSME have been cooperating with the implementation of the Arctic LNG-2 project, the former by providing a technology partnership with Russian shipyard Zvezda, and the latter by building two floating LNG storage systems in Kamchatka and Murmansk, which will support Arctic LNG-2 and shorten supply routes to Northeast Asia and European markets.⁶⁰ Clearly, fulfilling the potential of the South Korean shipbuilding sector could be instrumental to enhance cooperation with Russian companies, particularly with Novatek. So far, though, KOGAS seems to have only mildly capitalized on this collaboration while also falling short of engaging in long-term commitments.

CONCLUSION

Against the backdrop of being the world's ninth largest energy consumer—only ranking behind China, the U.S., India, Russia, Japan, and Germany in terms of carbon footprint—this paper has shown that improving the environmental dimension of South Korea's development is intertwined with its energy policy strategy. To achieve the proclaimed climate-related goals, major changes in the current levels of energy demand and electricity consumption are necessary. In this regard, given the expected rise in the costs of electricity consumption during the shift from fossil fuels towards cleaner sources, a coherent evolution of policy coordination among different sectors is critical in terms of climate mitigation and energy targets. Yet, various structural constraints loom large on the administration's efforts.

Arguably, the effectiveness of climate mitigation and GHG reduction policies hinges on changing the relationship between energy and society, and on bearing the accompanying costs at both the political and social level. In light of this, the most pressing question for the South Korean energy transition is how to constructively reform the production mix, electricity rates, and energy prices to favorably influence energy demand in accordance with the transition targets. At the same time, increasing the overall efficiency of the energy system and correcting the market distortions, which hinder the competitiveness of renewables, are pivotal elements for the ongoing energy shift.

Moreover, to avoid false steps in the energy policy implementation, the analysis has pointed out the extra commitment necessary in the field of natural gas to bridge the coal and nuclear decommissioning as well as to integrate renewables in the medium- to long-term. Consequently, particular focus has been devoted to the role of KOGAS amid the much awaited yet still ambiguous reform path of the gas sector, including the recent proposition to favor the state-run company against the power utilities and cut off independent purchases in order to support Seoul's international partnerships. Overall, a broader engagement with Washington and Moscow could support the Blue House's energy transition through diversifying LNG imports and helping to lower the cost of gas power generation in the electricity mix. Nevertheless, the analysis has stressed that due to poor cooperation among key stakeholders,

KOGAS may be unable to capitalize on the involvement of the other national heavyweights, notably the shipbuilding industry. Therefore, the period of 2021-2024 is expected to be a major testing ground for the implementation of energy reforms, as major revisions could be executed, especially if another progressive candidate wins the next presidential election. Any new quarrel between KOGAS and power utilities should be addressed through an improved level of coordination of their gas import policies aimed to lower import prices and favor systemic efficiency. Due to the expected post-pandemic market trends and the government's reforms, KOGAS will likely see its leverage strengthen in the short and medium term both at the national and international level. This requires the South Korean government's continued oversight of the dynamics within the energy sector in which striking a balance between market and political goals is necessary given that a renewed spat among some of its main actors could backfire on the energy diversification policy objectives as well as the climate targets.

Amid falling oil prices, the fact that the LNG industry has shown great resilience sends a positive signal to Seoul's fuel switching strategy because the oil-linked LNG supply contracts are likely to hold more competitive advantages over the national coal fleet during the next winter since they source prices across an average of 3 to 6 months ahead of the delivery. Following the pandemic outbreak and the havoc on the energy markets, KOGAS has recorded high inventory levels and deferred "as far ahead as possible" dozens of cargoes within a weakened downstream market following the industrial slowdown, nuclear competition, and warmer winter temperatures.⁶¹

The pandemic has exposed the long-standing structural weaknesses of the gas sector at the global level, which has absorbed the brunt of the decline of the global energy demand. In this context, the proverbial bridge role of gas in the energy transition will likely narrow and shorten, complicating decision-making and policy efforts.⁶² In light of this, as President Moon's end of term approaches, guaranteeing coherence and consistency in the country's energy policies will be pivotal should the next administrations endorse the carbon neutrality goal for 2050.

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