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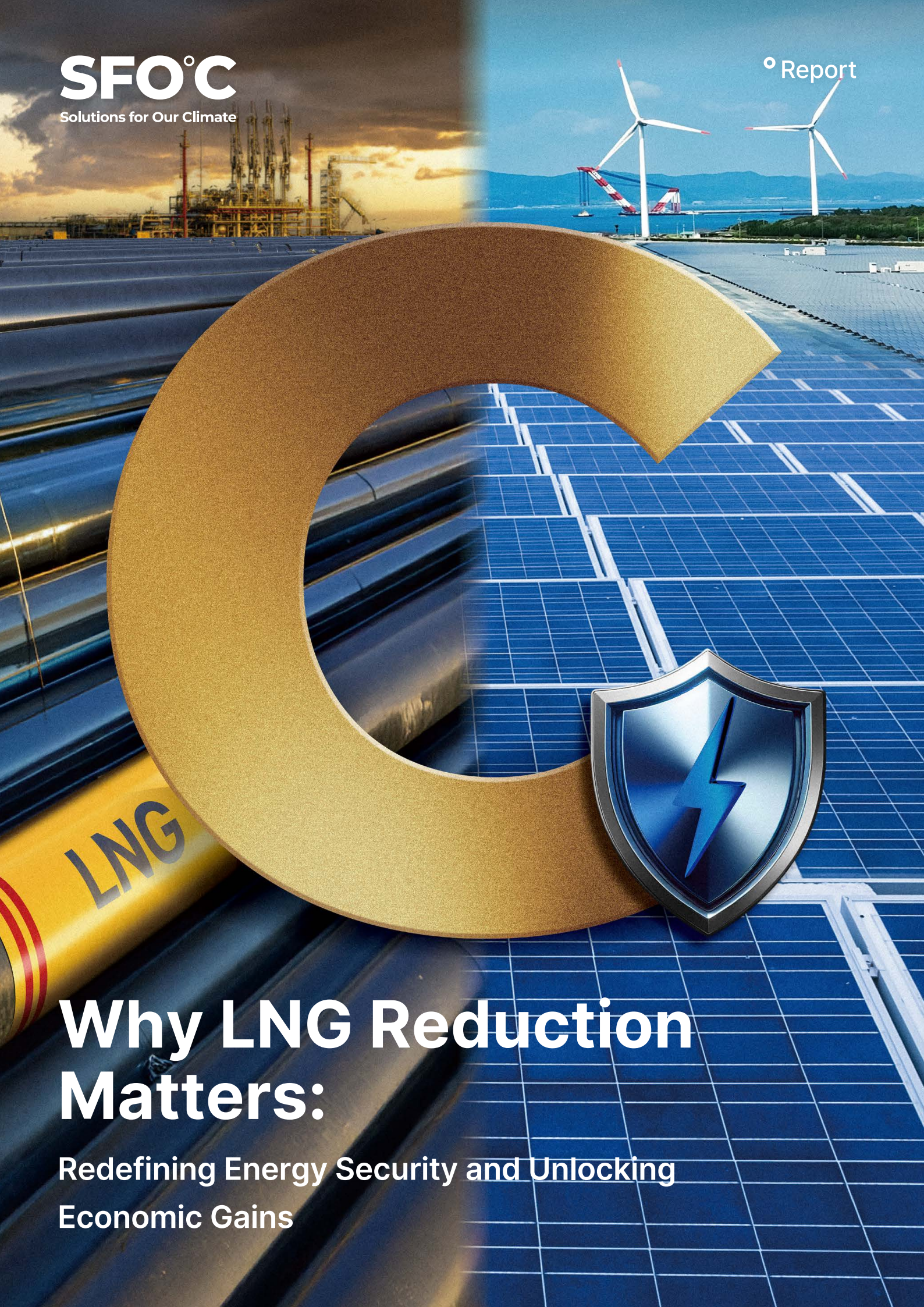

Why LNG Reduction Matters:

Redefining Energy Security and Unlocking Economic Gains

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Redefining Energy Security and Unlocking Economic Gains

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Solutions for Our Climate (SFOC) is an independent nonprofit organization that works to accelerate global greenhouse gas emissions reduction and energy transition. SFOC leverages research, litigation, community organizing, and strategic communications to deliver practical climate solutions and build movements for change.

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Executive Summary

The race to net-zero is accelerating energy transition around the world and demand for fossil fuels, including natural gas, is anticipated to decline sharply. According to the International Energy Agency (IEA), global natural gas demand could fall by as much as 79% from 4,186 bcm in 2023 to 2050.

Historically, fossil fuel imports were once served as the backbone of energy security. Today, however, the table has turned. The global expansion of renewable energy, heightened price volatility caused by geopolitical tensions, and stricter fossil fuel regulations have increasingly challenged the traditional view of energy security. In fact, continued reliance on fossil fuel imports now poses a direct threat to energy security, underscoring the urgent need for a paradigm shift toward a sustainable concept of security.

Building on this perspective, this report analyzes the economic benefits and renewable energy potential that could result from declining LNG demand. The analysis compares three LNG demand scenarios:

Key Scenarios

- As-is: Maintaining 2024-level LNG demand
- The Korean Government's 15th Long-Term Plan for Natural Gas Supply and Demand (2023~2036)
- The IPCC Sixth Assessment Report (AR6) 1.5°C scenario for achieving global climate targets

Key Findings

- Even if the gas demand follows the 2024 levels, under the 15th Long-Term Plan, cumulative LNG import volume would decrease by 77 milion tons, saving KRW 47 trillion(USD 34.4 billion).
- Under the IPCC 1.5°C scenario, LNG imports could decline by a further 250 million tons (Mt) relative to the government plan, yielding an additional KRW 213 trillion(USD 156 billion) in fuel cost savings.

- If these savings were reinvested in renewable energy, they could individually finance installations equivalent to 184 GW of solar power, 78 GW of onshore wind, or 34 GW of offshore wind capacity, respectively.
- The government's 11th Basic Plan for Electricity Supply and Demand projects that achieving its 2038 renewable targets—77.2 GW solar and 40.7 GW wind—will require around KRW 226 trillion. The KRW 260 trillion in potential fuel cost savings from LNG demand reduction would be more than suffice to cover this investment for renewable energy.

Reducing reliance on LNG would therefore generate significant economic benefits while ramping up Korea's investment in renewable energy. The upcoming 16th Long-Term Plan for Natural Gas Supply and Demand should at least maintain the downward trajectory of the 15th Plan and further align with the 1.5°C path.

1. Introduction

In July 2025, the International Court of Justice (ICJ) affirmed that all nations have a legal obligation to address climate change, establishing the Paris Agreement as the foundation for that duty. This ruling signifies a major turning point: climate change has moved beyond the realm of political declarations into one of global accountability and legal enforcement. South Korea, having ratified the Paris Agreement and declared carbon neutrality by 2050, has joined the global effort to limit the rise in average global temperature to within the 1.5°C trajectory.

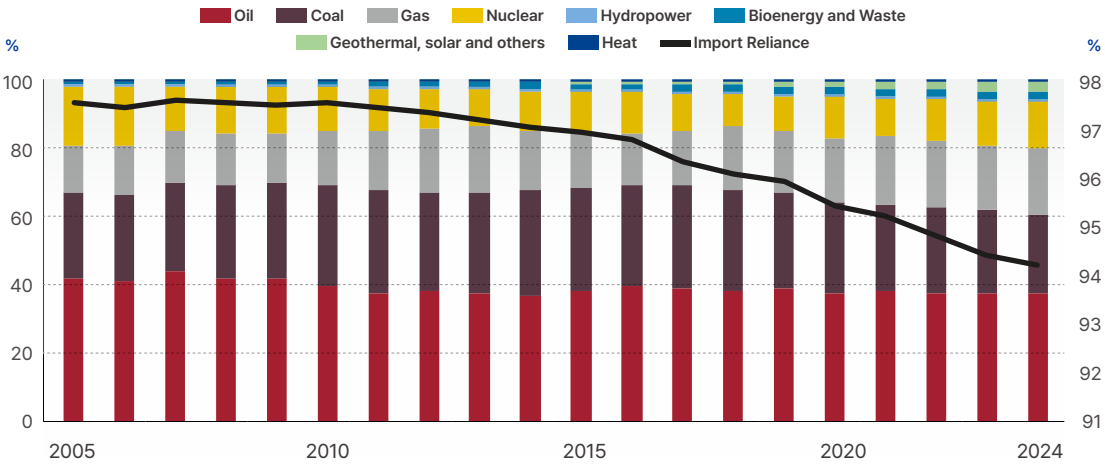
Amid heightening expectations around the world, Korea's energy framework must also be reexamined to align with this global movement. Korea's energy system remains heavily dependent on imports and is vulnerable to external shocks in global energy market. Liquefied natural gas (LNG), among imported energy, plays a pivotal role in the power generation and industrial sectors. However, with global demand for natural gas projected to decline in the long term, questions arise as to whether Korea's continued reliance on its current import structure is sustainable.

This report analyzes of the economic benefits of reducing LNG demand and assesses the potential renewable energy capacity that could be financed by reinvesting the resulting savings. Based on this analysis, the upcoming 16th Long-Term Plan for Natural Gas Supply and Demand, which is scheduled for release at the end of 2025, should move beyond repeating existing demand forecasts and instead outline a pathway consistent with international climate goals.

2. Problems of Energy Dependence

Korea's primary energy system is overwhelmingly dependent on imports. As of 2024, fossil fuels—oil (37.5%), coal (22.9%), and natural gas (20.1%)—accounted for 80.5% of total primary energy supply, with an import dependence of 94%. In the same year, nuclear power represented 13.3% of the mix, while all renewable sources combined—hydropower (0.3%), bioenergy and waste (3.1%), and solar, geothermal, and other renewables (2.8%)—amounted to a mere 6.2%[1]. These stark figures illustrate that Korea's domestic energy supply is critically limited and structurally vulnerable.

[Figure 1] Korea's reliance on energy import and composition of imports by source



In 2022, the Russian invasion of Ukraine dealt a huge blow to the global LNG market, causing extreme price volatility. The average spot price of LNG in Asia, which had previously hovered around USD 10 per MMBtu, skyrocketed to over USD 70[2]—a record-breaking surge. The war clearly illustrated how Korea, as a major energy importer, is directly exposed to price fluctuations and supply chain instability caused by external factors.

Korea's energy import costs have also become a major burden on the national economy. According to the Korea Energy Economics Institute, the country spent USD 216.4 billion (approximately KRW 216 trillion) on energy imports in 2022[3], accounting for 30%

1 Korea Energy Economics Institute (KEEI), Comprehensive Energy Statistics Information System (KESIS) – Energy Statistics Monthly Bulletin, May 2025.

2 International Energy Agency (IEA), Gas Market Report, Q2 2022.

3 Korea Energy Economics Institute (KEEI), Energy Statistics Monthly Bulletin, April 2025 edition, July 2025.

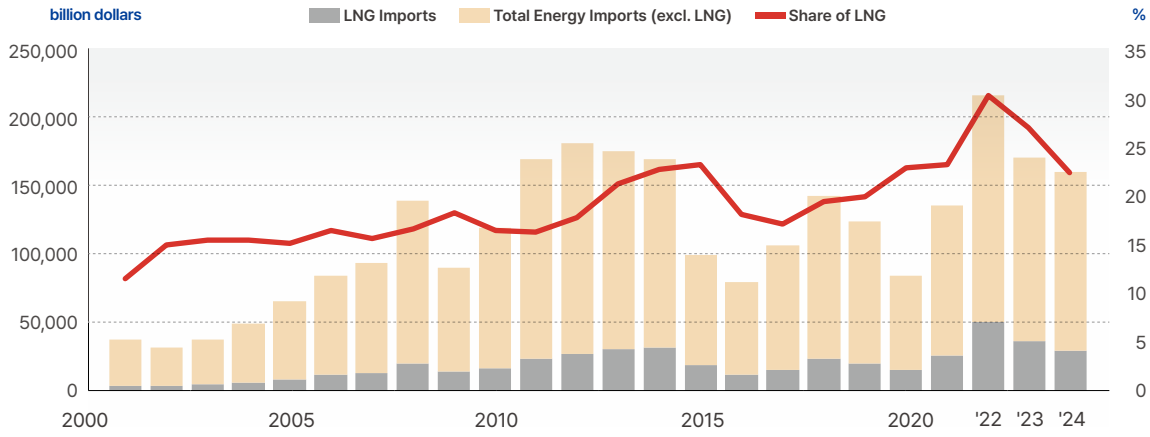
of total imports. This is a 59% increase from the previous year's USD 135.9 billion, and it is evident that then the worsening trade balance was attributable to sharp rise in international natural gas prices.

Indeed, Korea recorded its largest-ever trade deficit in 2022, largely due to energy price hikes triggered by geopolitical instability. Spending around KRW 200 trillion annually on fossil fuel imports not only leads to massive outflows of national capital but also leaves Korea extremely vulnerable to external shocks with insufficient safeguarding mechanisms. Ultimately, ensuring stable energy supply and economic security requires the country to strengthen its energy independence. Reducing LNG demand and expanding renewable energy are two key components of a sustainable national energy strategy.

A Korea's Fossil Fuel Imports Data and Geopolitical Implications

Korea's fossil fuel imports expenditure have grown steadily over the past two decades. In the early 2000s, annual imports were around USD 30–40 billion, but by the mid-2010s they had surpassed USD 100 billion. The figure temporarily dropped to USD 84.7 billion in 2020 due to the global economic slowdown caused by the COVID-19 pandemic. However, as global demand recovered and geopolitical tensions intensified, the total value of imports surged 59 percent year-on-year to an all-time high of USD 215.9 billion (approximately KRW 280 trillion) in 2022.

[Figure 2] Trends in Total Energy Imports and Share of LNG



This figure was exceptionally high even for a single year, highlighting how sensitive Korea's energy import costs are to changes in external circumstances . The surge in LNG prices was the primary driver of the increase imports expenditure, accounting for roughly 30 percent of the additional spending. It is important to note that Korea's energy import bill has not grown gradually, but can instead spike sharply in response to global market volatility. Such fluctuations can have cascading effects on other economic indicators, including the trade balance and public utility costs, underscoring that energy import costs themselves represent a key source of macroeconomic uncertainty.

B Global Energy Crisis Triggered by LNG Price Hike

Following the 2022 Russia–Ukraine war, major energy importers suffered critically due to the instability in global LNG supply and a surge in international prices. Emerging economies in Asia, especially Pakistan and Bangladesh, were unable to absorb the high LNG prices, which led to nationwide blackouts, industrial disruptions, and financial crises, while European nations struggled with unprecedented energy costs and inflation shocks.

In Pakistan, LNG prices in the spot market rose so sharply that the government suspended all spot purchases in the second half of 2022. As a result, the country suffered severe shortages of gas for power generation, culminating in a nationwide blackout in January 2023 that left tens of millions without electricity. Even volumes secured under long-term contracts were interrupted under force majeure clauses[4], and the energy shortfall quickly escalated into a foreign exchange crisis, forcing Pakistan to seek emergency financial assistance from the International Monetary Fund (IMF). The government later announced that no new gas-fired power plants would be built, and a USD 200 million LNG terminal project was delayed for an indefinite period.

In a similar vein, Bangladesh, which relied on natural gas imports for more than 70 percent of its electricity, also experienced nationwide outages as it reduced gas supply in response to skyrocketing prices. Major export industries, including the world's second-largest garment and textile sector, had no other choice but to shut down, inflicting heavy economic blow to the country[5]. The shortfall of energy import

4 Reuters, "ENI unable to deliver Feb LNG cargo to Pakistan, declares force majeure," January 26, 2023.

5 Reuters, Ruma Paul and Sudarshan Varadhan, "Bangladesh plunged into darkness by national grid failure," October 5, 2022.

soon escalated to a broader macroeconomic crisis, forcing the country to accept IMF's restructuring measures.

Japan, one of the world's largest LNG importers, found itself competing with Europe to secure LNG supplies at the onset of the war. Backed by strong purchasing power and infrastructure, Japan avoided fuel shortages or nationwide power outages, but faced enormous cost increases and heightened supply-chain risks. Consequently, Japan posted its largest-ever trade deficit of approximately JPY 20 trillion in 2022, driven largely by the yen's depreciation and soaring energy prices.

In Europe, the suspension of Russian pipeline gas supply triggered a surge in LNG import demand, pushing spot prices to record highs. Major economies such as Germany and France experienced historic trade deficits and severe inflation due to skyrocketing energy costs. Although the EU swiftly introduced emergency responses, including floating storage regasification units (FSRUs), a joint procurement platform, and mandatory gas storage requirements, these steps were only temporarily relief measures. Following the energy price shock, the EU launched its REPowerEU strategy, aiming to reduce gas imports by up to 25 percent and accelerate renewable energy deployment by 2030[6].

The rapid upheaval of the LNG market in 2022 triggered a far-reaching shocks across the real economy and public finances of import-dependent nations, exposing their inherent vulnerabilities of their LNG import structures.

C Energy Price Shocks, Their Impact on Trade Balance and KEPCO's Financial Crisis

The global energy price shock had a direct impact on Korea's trade balance and the financial health of state-owned companies. In 2022, Korea recorded its largest-ever trade deficit of USD 47.7 billion[7], with much of the increase in import costs driven by soaring energy prices.

The Korea Electric Power Corporation (KEPCO) also suffered heavy losses, as it failed to fully reflect the rise in fuel costs in electricity bills. KEPCO's operating loss rose from

6 Energy Daily (Korea), Nam-Jun Cho, "EU expected to cut gas imports by 25% by 2030 due to energy transition [EU, 에너지 전환으로 2030년까지 가스 수입 25% 감축 전망]," June 5, 2025.

7 Korea Customs Service, Trade Statistics (Exports and Imports), 2022.

KRW 5.8 trillion in 2021 to KRW 32.6 trillion in 2022 and remained high at KRW 6.5 trillion in 2023. According to KEPCO's disclosure system, its total liabilities grew from KRW 114 trillion in 2018 to KRW 202.5 trillion by the end of 2024[8]. In addition, only 2.4 percent of KEPCO's generation capacity comes from renewable energy, revealing anohter layer of structural weakness: the lack of alternative sources when international coal and LNG prices surge[9].

D Structural Risks and Recurring Shocks in LNG Supply and Demand

The economic burdens Korea faced, along with the overseas incidents described above are not isolated incidents but recurring risks rotted in the structural vulnerabilities within Korea's LNG supply system. The system's fundamental weakness lies in its limited capacity to absorb or offset sudden price shocks when international LNG prices surge.

First, the power sector is heavily dependent on LNG. In 2023, 51 percent of Korea's total natural gas demand—22.89 Mt out of 45.09 Mt—was used for power generation. When international LNG prices surge, fuel costs in the sector increase immediately, directly increasing the electricity market prices and placing substantial financial pressure on the public utilities firms.

Second, supply-chain instability poses another challenge. Korea almost entirely imports LNG, and the supply is heavily concentrated in certain regions. Geopolitical conflicts, shipping disruptions, or policy shifts in exporting countries can therefore make it difficult to secure alternative sources within a short period..

Third, exposure to external market shocks and price volatility. Long-term contracts are typically indexed to international oil or hub prices, causing global shocks to be directly transmitted to the domestic market. Spot transactions offer short-term flexibility but are far more volatile and difficult to predict. Together, these two mechanisms operate in parallel, Korea's energy costs remain unstable and uncertainty tends to intensify in response to global market turbulence.

8 ALIO Public Management Information System, Detailed Debt Information of Major Public Institutions (KEPCO, Q1 2025).

9 IEEFA, KEPCO's Fossil Fuel Problem, June 16, 2023, Ghee Peh.

The three factors amplify the risk that the LNG price will make temporary disturbances into structural risks. While short-term policy measures—such as expanding storage capacity, diversifying import sources, and increasing long-term contracts—are being implemented, the underlying risk unlikely to be fully mitigated without a strategic approach to reducing the overall demand.

Reducing demand is not merely a means to achieve climate goals. It serves as a stepping stone to cut fuel expenditures, reallocate savings toward renewable energy investment, strengthen energy resilience, and protect households and the economy from fuel price volatility. In this sense, reducing LNG demand serves as a strategic solution to strengthen enhancing energy security and economic stability.

3. Economic Benefits of LNG Demand Reduction

A Research overview

The IEA projects that global gas demand could decline by 79 percent by 2050. In the past, fossil fuel imports were recognized as the cornerstone of energy security. However, as renewable energy expansion becomes a reality, that logic no longer holds. Persisting with fossil fuel dependence out of inertia may, in fact, weaken energy security.

Korea, among OECD countries, ranks near the bottom in the share of renewable energy in the energy mix[10], underscoring the urgent need for a shift in how energy security is defined. This study aims to demonstrate that reducing LNG demand is not merely a cost-saving measure, but also an opportunity to redefine energy security—from securing fossil fuel supplies to ensuring stability through renewable energy. To that end, the analysis compares three pathways: maintaining 2024-level LNG demand; following the government's 15th Long-Term Plan for Natural Gas Supply and Demand; and achieving the 1.5°C pathway outlined in the IPCC Sixth Assessment Report. By comparing these scenarios, the study calculates the potential fuel cost savings through LNG reduction and translates those energy savings into equivalent renewable energy capacity, thereby identifying a potential for renewable energy expansion.

10 The Hankyoreh, Ki-Yong Park, "Korea's renewable energy share reaches double digits (10.5%) for the first time, still lowest in OECD [국내 재생에너지 비중 10.5% '첫 두자리'... 여전히 OECD 꼴찌]," January 3, 2025.

B Methodology and Key Assumptions for Fuel Cost Conversion

Differences in LNG Demand

- The annual natural gas demand under three pathways was compared to calculate yearly differences in LNG volumes.
- In the IPCC's 1.5°C path scenario, Korea's energy data are provided in terms of **primary energy consumption (EJ, exajoules)**. To convert this into actual LNG volume, a higher heating value (HHV) of 54.7 GJ/ton was applied
- The conversion formula is as follows.

$$\text{LNG}\,(ton) = \frac{\text{Energy Demand}(EJ)\times 10^{18}}{54.7\times 10^{9}}$$

- All LNG reduction volumes and corresponding cost savings were calculated for the period 2026–2038. Missing data for **2037–2038** were adjusted using the average annual rate of change (–1.38%) derived from the 15th Long-Term Plan. Cost savings were converted into Korean won **using the average exchange rate for 2024**.

Assumptions on International LNG Prices

- Projections from the IEA, World Energy Outlook 2024 were used for LNG price forecasts.[11]
- The STEPS (Stated Policies Scenario) trajectory was applied to the government plan pathway, while the NZE (Net Zero Emissions Scenario) trajectory was applied to the 1.5°C pathway.
- Annual LNG prices for 2026–2038 in USD per ton were derived through linear interpolation based on the IEA's 2030 and 2040 projected price indicators.

Fuel Cost Savings Calculation

- Annual fuel cost savings were calculated by multiplying the yearly LNG demand gap (in tons) by the corresponding projected LNG price for each year in USD per ton.

11 International Energy Agency (IEA), World Energy Outlook 2024, Section 2.2.3 "Prices," Table 2.3 "Wholesale fossil fuel prices by scenario."

C LNG Demand Outlook under the 15th Long-Term Plan for Natural Gas Supply and Demand

The Korean government prepares a Long-Term Plan for Natural Gas Supply and Demand every two years to project future gas demand and import infrastructure needs for the next decade. The 15th Long-Term Plan for Natural Gas Supply and Demand, released in 2023 and covering 2023–2036, presents two scenarios based on total demand combining both power generation and city gas use: the Baseline Demand and the Managed Demand.

The Baseline Demand Scenario serves as a basic pathway that reflects existing domestic and international policy and technological conditions, assuming no additional reduction measures are implemented. This concept is comparable to the IEA's Stated Policies Scenario (STEPS)[12]. The Managed Demand Scenario represents an upper-bound projection designed to account for unforeseen circumstances such as extreme weather events or project delays. In this framework, power sector demand is estimated based on the generation mix outlined in the Basic Plan for Electricity Supply and Demand, while city gas demand is projected by applying usage-based consumption rates.

According to the 15th Plan, Korea's total natural gas demand is projected to peak at 45.09 Mt in 2023 and is expected to gradually decline to 37.66 Mt by 2036. Compared with a scenario in which the 2024 demand levels are maintained, this represents a cumulative reduction of more than 60 Mt, suggesting a modest decline in total demand. However, most of this reduction is concentrated in the power sector, while city gas demand is projected to increase by 19.7 percent, revealing limits to structural change in the overall demand composition.

The plan also shows a notable difference between its two scenarios: in 2036, the gap between the Baseline Demand and Managed Demand amounts to roughly 8 Mt. This wide gap between normal-demand outlook and the risk-adjusted outlook highlights significant uncertainty in Korea's long-term demand forecasting.

While the 15th Plan provides a moderate reduction compared with current levels, it falls short of aligning with the ambition required to achieve the 1.5°C climate target. The forthcoming 16th Plan should therefore outline a more ambitious reduction pathway and reassess long-term demand projections accordingly.

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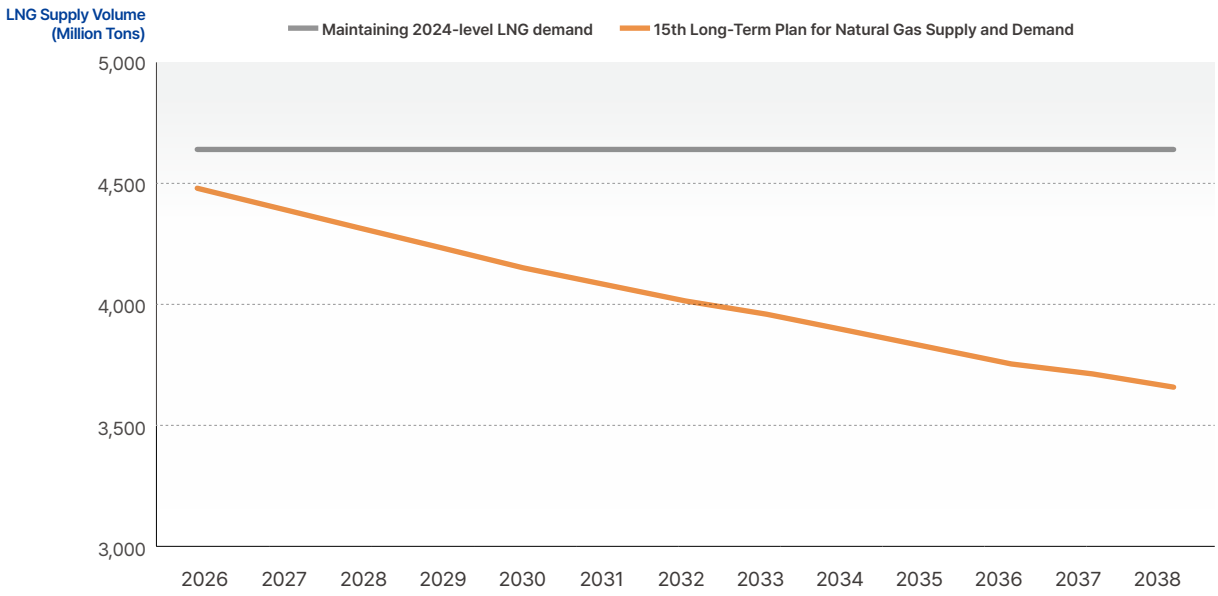
12 Korea Energy Economics Institute (KEEI), 2024 Long-term Energy Outlook (2023–2050): Scenarios and Main Assumptions [2024 장기 에너지 (2023~2050), 「시나리오 및 주요 전제」], February 28, 2025.

[Figure 3] Comparison between 2024 Demand Maintenance and the 15th Natural Gas Supply Plan



D LNG Demand Outlook under the IPCC AR6 1.5°C Scenario

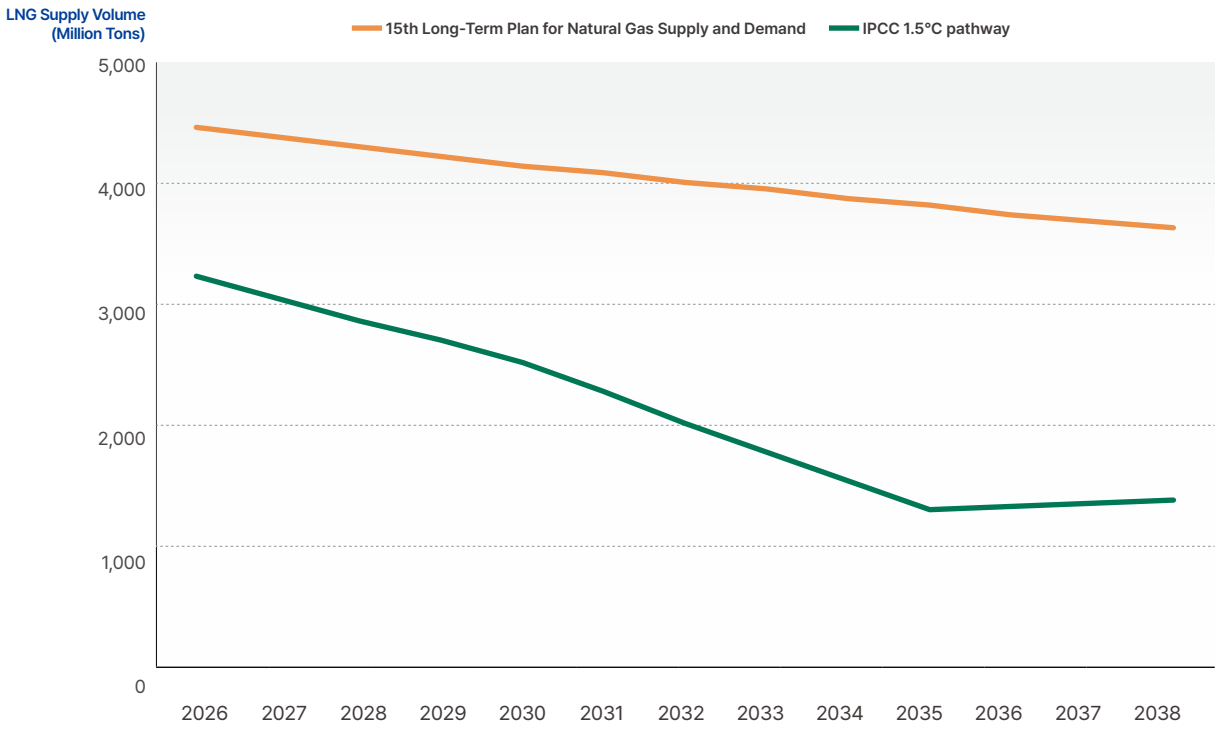
While the 15th Long-Term Natural Gas Supply and Demand Plan outilnes a gradual decline in consumption, additional reduction pathways are required to achieve the 1.5°C climate target. This section analyzes Korea's natural gas demand trajectory based on the IPCC's AR6, using Global Change Assessment Model (GCAM) framework and compares it with the government's exisiting plan.

The GCAM model, developed by the Pacific Northwest National Laboratory (PNNL) in the United States, is an integrated assessment model that links energy, economy, land use, and climate systems to assess long-term transition pathways. As one of several global integrated models adopted in IPCC AR6, GCAM is widely used to evaluate greenhouse gas mitigation pathways and energy transition scenarios. A GCAM-based analysis provides scientific and international credibility for assessing Korea's decarbonization trajectory.

The IPCC AR6 1.5°C scenario assumes global net-zero emissions around 2050, requiring a phased reduction in fossil fuel use and rapid decarbonization of the power sector. Given Korea's heavy dependence on LNG for power generation, reducing gas consumption plays a critical role in achieving carbon neutrality.

According to the IPCC AR6 1.5°C scenario, Korea's natural gas demand is expected to peak at approximately 32.22 Mt in 2025 and then sharply declines, reaching around 14.05 Mt by 2038. This indicates that, compared to the government's 15th Long-Term Plan, Korea still has significant room for deeper reductions to align with the 1.5°C pathway.

[Figure 4] Comparison between the 15th Gas Supply Plan and the IPCC 1.5°C Scenario



E Comparison of Fuel Cost Savings Across Scenarios

A comparison between the government's 15th Long-Term Natural Gas Supply and Demand Plan and the IPCC 1.5°C Scenario shows that Korea could save up to 260 trillion KRW in fuel costs over the next decade. The analysis was conducted in two phases:

- **Phase 1**

  Comparison between the 2024 Demand Maintenance Scenario and the 15th Plan for Natural Gas

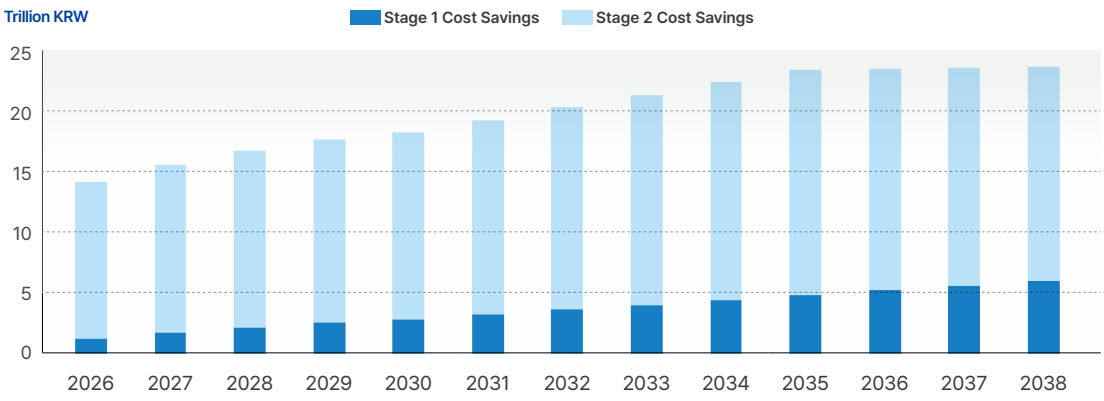
  The cost savings resulting from the demand gap amount to approximately **KRW 47 trillion(USD 34.4 billion)**. This indicates that even under the 15th plan, Korea can achieve substantial savings compared to maintaining current demand levels.

- **Phase 2**

  Comparison between the 15th Plan for Natural Gas and the IPCC 1.5°C Pathway

  By pursuing additional reductions aligned with the 1.5°C climate target, Korea could save an additional **KRW 213 trillion(USD 156 billion)**. This represents the economic advantage of aligning national energy policy with global climate targets beyond the scope of the current government plan.

[Figure 4] Annual LNG Fuel Cost Savings



From 2025 to 2038, it is anticipated that fuel cost savings would amount to KRW 260 trillion(USD 190 billion), equivalent to four times Korea's LNG import expenditure in 2022 of KRW 65 trillion. This demonstrates that achieving climate goals is not only an environmental necessity but also an source of substantial economic gain.

4. Analysis of Renewable Energy Capacity Potential from Fuel Cost Savings

The LNG fuel cost savings identified earlier represent not merely a reduction in overseas expenditure but also a significant investment opportunity to accelerate the energy transition. This section converts the estimated savings from LNG demand reduction into renewable energy capital expenditures, estimating the additional capacity that could be deployed in solar and wind power. The analysis assesses how these savings could be a financial source for Korea's clean energy transition..

A Trends in Renewable Energy LCOE and Assumptions on Capital Cost

Over the past decade, the cost of renewable energy has steadily gone down, becoming more affordable. The Korea Energy Economics Institute's (KEEI) long-term outlook projects that this downward trend will continue[13]. Solar energy has already achieved cost competitiveness, while wind, especially offshore wind, is expected to see further reductions driven by technological advancement and broader deployment.

- **Solar PV** | The levelized cost of electricity (LCOE) is expected to decline from 135 KRW/kWh in 2023 to between 65 and 111 KRW/kWh by 2036, representing up to a 52% cost reduction.

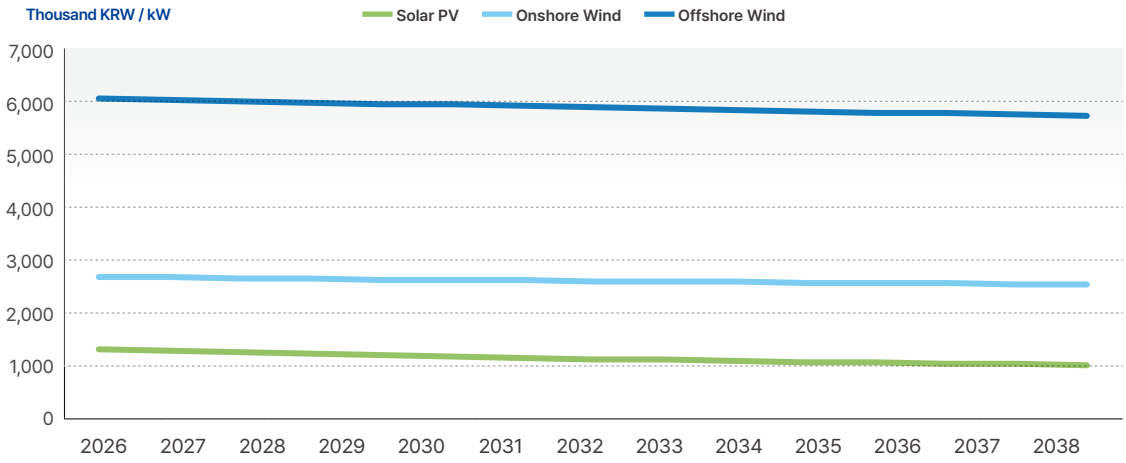
- **Onshore wind** | The average LCOE is 166 KRW/kWh in 2023 is projected to fall to 78–159 KRW/kWh by 2036, a reduction of 23%. Around 2030, it is expected to reach parity with coal and LNG, allowing direct competition with fossil fuels.

- **Offshore wind** | The LCOE is expected to fall from 287 KRW/kWh in 2023 to as low as 170 KRW/kWh by 2036, representing about a 41% cost reduction.

13 Korea Energy Economics Institute (KEEI), Keun-Dae Lee and Deok-Oh Lim, Development and Operation of Mid-to-Long-Term LCOE Projection System for Expanding Renewable Energy Supply (4/5) [재생에너지 공급확대를 위한 중장기 발전단가(LCOE) 전망 시스템 구축 및 운영 (4/5) 23-22], December 2023.

Capital expenditures (CAPEX) were also derived from KEEI's domestic performance-based forecasts. Between 2023 and 2036, solar CAPEX is projected to decline by approximately 22% for solar and 5% for wind. Linear interpolation was applied to construct annual cost trajectories. The analysis in the study covers the 2026-2038 period, missing values for 2037 and 2038 were extrapolated by applying the same annual reduction rate observed between 2030 and 2036. These estimated costs serve as the baseline for converting LNG savings into equivalent renewable energy capacity.

[Figure 6] Investment in Renewable Energy Installations



* Reconstructed from data in KEEI, Development and Operation of a Mid- to Long-term Power Generation Cost Forecasting System for Renewable Energy Expansion (4/5)23-22, CAPEX dataset.

B Achieving Renewable Energy Capacity Achievable through Fuel Cost Savings

The LNG fuel cost savings estimated in the previous section amount to approximately KRW 47 trillion in Phase 1 and KRW 213 trillion in Phase 2, for a combined total of KRW 260 trillion.

Assuming that the entire amount is reinvested exclusively in each renewable source, the converted installation capacities for period 2026-2038 are as follows:

Category	Phase 1 (GW)	Phase 2 (GW)	Total (GW)
Solar PV	34	150	184
Onshore wind	14	64	78
Offshore wind	6	28	34

In total, the combined investment could enable additional capacity of 184 GW in solar, 78 GW in onshore wind, and 34 GW in offshore wind. This expansion potential is overwhelmingly larger than South Korea's current cumulative capacity, which stands at 24 GW in solar, 2 GW in onshore wind, and 0.26 GW in offshore wind.

Although these figures reflect the theoretical maximum based on the assumption that all savings are fully reinvested in a single energy source, the magnitude alone demonstrates the substantial potential of LNG demand reduction to accelerate the renewable energy deployment. Moreover, such reinvestment could reduce Korea's dependence on energy imports while generating broader economic impacts, including domestic industrial growth and job creation.

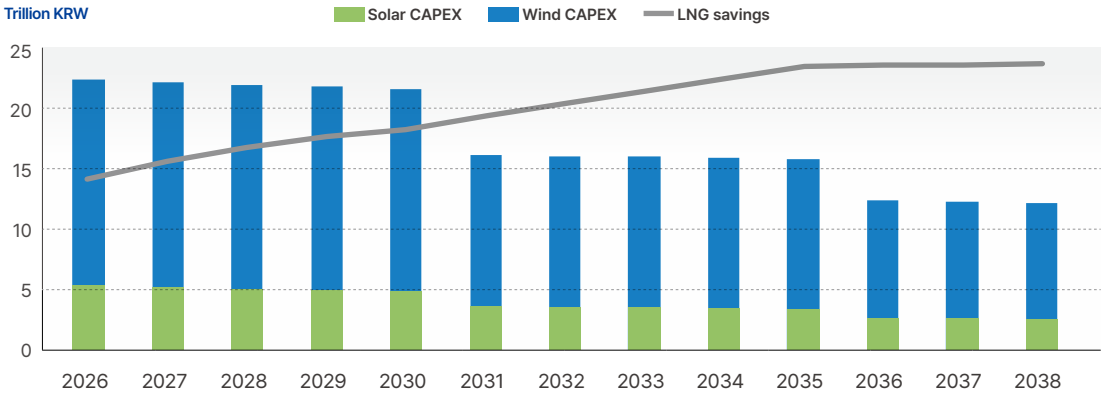
C Achieving Renewable Expansion Targets under the 11th Basic Plan for Electricity Supply and Demand through LNG Reduction Savings

The previous analysis demonstrated the theoretical maximum renewable capacity that could be achieved if savings from reduced LNG demand were fully invested in renewable energy projects. To assess how these savings could contribute to actual policy goals, this section compares them against the renewable energy expansion targets set in the 11th Basic Plan for Electricity Supply and Demand (2024–2038).

As of 2024, South Korea's cumulative renewable energy capacity stands at approximately 28.3 GW for solar PV[14] and 2.3 GW for wind[15]. The 11th Basic Plan sets targets of 77.2 GW for solar and 40.7 GW for wind by 2038, requiring an additional 48.9 GW and 38.4 GW, respectively. By applying the same annual growth rate projected in the plan through 2038 to estimate annual CAPEX, and by distinguishing wind power into offshore (14.3 GW) and onshore (5 GW) categories based on the ratios presented in the 10th Basic Electricity Plan, the total investment required would be approximately KRW 226 trillion.

In contrast, the total fuel cost savings, estimated at around KRW 260 trillion, would be sufficient not only to fully finance renewable energy projects envisioned in the government plan but also to leave a surplus.

[Figure 7] Comparison between LNG Savings and Government Renewable Expansion Costs



14 Korea Energy Agency, Renewable Energy Cloud Platform –Status of Installed Solar Power Plants Nationwide, 2024.

15 Korea Wind Energy Industry Association (KWEIA), Jin-Young Yang, Current Status of Wind Power in Korea [한국 풍력발전 현황], February 27, 2025.

5. Conclusions and Recommendations

The analysis in this study reveals that a significant gap remains between the Korea's current 15th Basic Plan for Long-Term Natural Gas Supply and Demand and the IPCC 1.5°C pathway. While the government plan would still yield some fuel cost savings, shifting to a climate-aligned pathway could reduce cumulative LNG imports by 320 Mt and achieve fuel cost savings of KRW 260 trillion by 2038. These outcomes translate into braoder macroeconomic benefits, including improved trade balance, mitigation of price volatility, and enhanced fiscal stability in the power sector. If the savings were reinvested in renewable energy, they could finance the additional capacity of 184 GW in solar, 78 GW in onshore wind, and 34 GW in offshore wind. These findings present three key implications for the forthcoming 16th Basic Plan for Long-Term Natural Gas Supply and Demand..

First, the 16th Basic Electricity Plan must set a more ambitious reduction target.

Although the 15th Basic Electricity Plan marked a shift toward a gradual LNG demand reduction, delivering partial fuel cost savings and incremental gains in energy secutiry, it still far short of the pace required to achieve carbon neutrality by 2050 and the 1.5°C goal. The forthcoming 16th Plan should therefore move beyond the current trajectory by setting more ambitious LNG demand-reduction goals, supported by concrete strategies in the power and industrial sectors.

Second, additional LNG import contracts and infrastructure expansion must be canceled.

As reflected in the government's current projections, Korea's LNG demand has already peaked and is expected to decline gradually. Under these conditions, constructing new terminals or signing additional long-term import contracts is neither economically viable nor compatible with energy security objectives. Given the global decline in LNG demand, additional investmenet in infrastructure would only heighten the risk of stranded assets and should be clearly discouraged through policy measures.

Third, renewable energy expansion is the foundation of stronger energy security.

Redirecting fuel cost savings toward renewable energy investments can reduce import dependence and strengthen domestic supply chains, thereby enhancing long-term resilience. At the same time, accelerating the deployment of solar and wind power directly contributes to the achievement of Korea's carbon neutrality goals. Therefore, reducing LNG demand and scaling up renewable energy, in tandem, represent a strategic pathway, advancing climate action and national energy security.

SFO°C

Solutions for Our Climate (SFOC) is an independent nonprofit organization that works to accelerate global greenhouse gas emissions reduction and energy transition. SFOC leverages research, litigation, community organizing, and strategic communications to deliver practical climate solutions and build movements for change.