Policy Brief

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Evaluating the Economic Viability of Jeju's New 300MW Gas Power Plant Project

ARC Center
ALLIANCE FOR RESOURCE & CLIMATE JUSTICE CENTER

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1. Summary

This policy brief presents a comprehensive economic assessment of the plan to build a 300MW gas-fired power plant in Jeju (Korea Jungbu Power_ Samyang-dong site; Korea East-West Power_ Dongbok-ri site, 150MW each), as outlined in the 10th Basic Plan for Electricity Supply and Demand. The analysis concludes that the project lacks economic viability and carries a very high risk of becoming a stranded asset. The assessment is based on three areas: ① Jeju's electricity demand and generation status, ② the financial performance of existing gas power plants, and ③ an economic evaluation of the green hydrogen full-firing conversion plan.

Key Findings

First

Jeju's power grid has no capacity to accommodate additional gas generation. The commissioning of the Jeju-mainland HVDC Third Interconnector (expanding supply capacity from 360MW to 600MW) increased the 2025 summer reserve margin to 43.3% and the winter reserve margin to 81.1%. Meanwhile, renewable energy installed capacity surpassed fossil fuels for the first time in 2022, and while renewable generation continues to grow steadily, gas-fired generation peaked in 2024 and has since entered a sharp decline.

Second

Existing gas power plants in Jeju have already entered a loss-making structure. Following the revision of the electricity market operating rules in August 2024 — which lowered the minimum must-run output during renewable energy oversupply — capacity factors plummeted. Jeju Combined's rate fell from 60.6% in 2023 to 39.9% in 2025; Hallim Combined dropped from 50% in 2021 to just 6.3% in 2025. As a result, Jeju Combined has been operating at an operating loss since 2023, recording a loss of KRW 29.4 billion in 2025, while Namjeju Combined — which switched to LNG in 2024 — posted losses of KRW 28.0 billion in its first year and KRW 26.4 billion in 2025. Both plants are locked in a structural "reverse margin" where cost of sales exceeds revenue.

Third

New gas power plants will inevitably replicate the same loss-making structure. The Levelized Cost of Electricity (LCOE) for combined-cycle gas turbines (CCGT) is calculated at an 85% capacity factor, yet current Jeju gas plants' low capacity factors expose a structural inability to recover fixed costs. Given that over 2.5GW of renewable energy and more than 1GW of energy storage systems (ESS) are scheduled for deployment by 2030 toward Jeju's 2035 carbon neutrality and RE100 goals, any recovery in capacity factors for new gas plants is virtually impossible.

Fourth

The "green hydrogen full-firing" rationale is neither economically nor technically sound. The following problems have been identified: ▲ Infrastructure requirements exceeding 2.7GW of offshore wind (approx. KRW 16.47 trillion) and 800MW of electrolysis facilities (approx. KRW 4.13 trillion); ▲ Jeju's green hydrogen production cost of KRW 594-1,200/kWh — 4 to 10 times higher than renewables; ▲ CO_2 reduction at 50% co-firing is only 24%, and a 77% hydrogen blend by volume is needed to halve CO_2 emissions; ▲ The 4,242 tonnes of green hydrogen planned for supply by 2030 falls far short of the approximately 14,000 tonnes required for 50% co-firing across four 50MW gas turbines; ▲ The plan entails double turbine expenditure — installing 50% co-firing turbines first and then replacing them with 100% full-firing turbines.

Fifth

The combined-cycle configuration itself is ill-suited for renewable energy backup. Due to the thermal stress and thermal inertia of steam turbines, frequent shutdowns are difficult, forcing must-run operation. This unnecessarily increases green hydrogen demand and causes a surge in nitrogen oxide (NOx) emissions. If renewable backup is the genuine purpose, the plant should have been designed as a simple-cycle facility without a steam turbine.

Conclusion,

The current plan to build a 300MW gas power plant is highly likely to result in stranded assets beyond mere financial losses, and will conflict with the government's renewable energy and ESS deployment plans, becoming an obstacle to the energy transition. An urgent review of the project is therefore required.

2. Background

The plan to build a new 300MW gas power plant in Jeju gained momentum when the 10th Basic Plan for Electricity Supply and Demand, announced in January 2023, included 600MW of new gas generation for the Jeju region, with 300MW prioritized for immediate implementation.

Jeju Special Self-Governing Province responded by announcing the "Clean Energy Grand Transition Roadmap," formalizing plans to build and operate a 300MW gas power plant capable of hydrogen co- and full-firing. Governor Oh Young-hoon emphasized the transition to a hydrogen economy and the rationale for hydrogen use across all energy sectors, including power generation.

With strong backing from the provincial government, the project materialized. Following the Ministry of Trade, Industry and Energy's survey of construction intent for a 150MW LNG combined-cycle plant in Jeju, Korea Jungbu Power (Samyang-dong site) and Korea East-West Power (Dongbok-ri site) were selected as the final project operators in September 2023. Environmental impact assessments commenced in 2024; Korea East-West Power passed its assessment in February 2026, while Korea Jungbu Power is currently in the main consultation phase.[1]

However, criticism from environmental groups has been continuous since the decision was made — from concerns over massive greenhouse gas emissions and local air pollution, to questions about the technical immaturity and limited carbon-reduction effectiveness of green hydrogen co/full-firing technology. More recently, structural concerns have come to the fore, including how gas generation's inflexibility hampers renewable energy expansion, and how the rapid decline in capacity factors of existing gas plants is severely weakening their financial structures.[2]

While debate on environmental and grid stability aspects has progressed to some extent, there has been insufficient rigorous scrutiny of whether building new gas plants and pursuing green hydrogen power generation is a financially sound use of public funds and electricity tariffs.

This brief therefore aims to objectively assess the viability of new capacity additions by analyzing the financial performance and utilization data of Jeju's currently operating gas power plants. It also seeks to clarify the economic reality of the green hydrogen power plan — which is expected to require astronomical costs — in order to diagnose the project's feasibility and propose an alternative energy transition pathway suited to Jeju's circumstances.

1_ 제주특별자치도, 도의회 환경영향평가 동의안 보류에 따른 신규 LNG 복합발전 건설 필요성 설명자료, 2026.
2_ KBS뉴스, [이슈톡] 동복리 LNG 발전소 신설…찬반 쟁점은?, February 10, 2026.

3. Jeju's Electricity Demand and Generation Status

1) Changes in Jeju's Electricity Demand (2021~2025)

According to the Korea Power Exchange's 2025 Annual Jeju Regional Power Grid Operating Results, changes in Jeju's electricity demand are evident in spring base load[3] and summer peak demand,[4] while autumn base load and winter peak demand show little variation. The five-year average spring base load is 721.5MW and the autumn base load is 735.8MW, meaning Jeju's spring and autumn base loads have remained around 730MW.

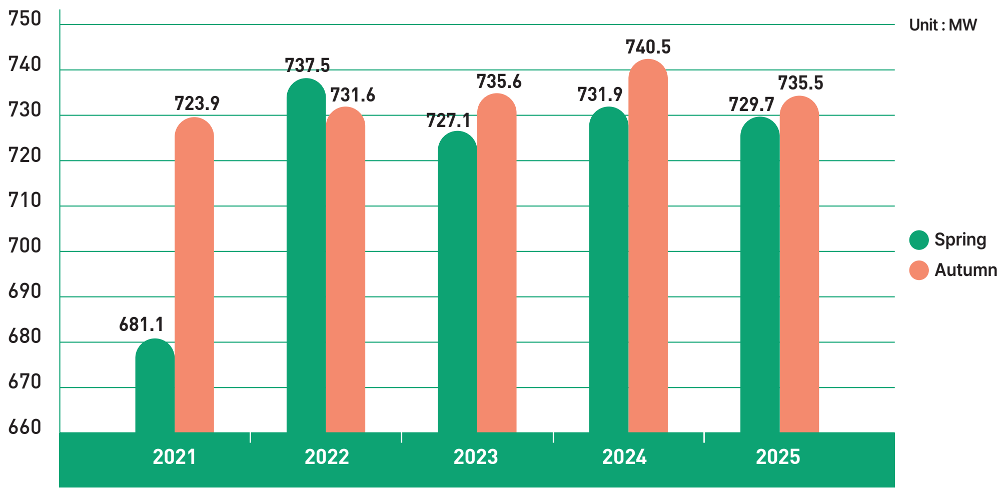

Figure 1. Jeju Spring and Autumn Base Load (2021–2025)(Source: Korea Power Exchange, 2025 Annual Jeju Regional Power Grid Operating Results, 2026)

Summer demand shows notable changes, with significant increases recorded in 2022 and 2024, followed by a decline in 2025. Over the past five years, the highest summer peak was 1,179MW in 2024, and the lowest was 1,012MW in 2021, a year heavily affected by COVID-19.

Category	2021 (Aug 6, 19:00)	2022 (Aug 11, 20:00)	2023 (Sep 3, 19:00)	2024 (Aug 5, 14:00)	2025 (Aug 26, 18:00)
Supply Capacity(MW)	1,297	1,271	1,344	1,441	1,637
Peak Demand(MW)	1,012	1,104	1,096	1,179	1,141
Reserve(MW) (Reserve Margin %)	285 (28.2%)	167 (15.1%)	248 (22.6%)	262 (22.2%)	495.7 (43.3%)

Table 1. Jeju Summer Electricity Supply and Demand Results (2021–2025)(Source: Korea Power Exchange, 2025 Annual Jeju Regional Power Grid Operating Results, 2026)

3_ Demand excluding heating/cooling load (weekday demand in spring: Apr–May; autumn: Sep–Oct).

4_ The highest electricity demand recorded in summer and winter.

Winter demand remained stable with little variation over five years, and in fact recorded the lowest figure in 2025. Typically, heating loads determine winter peak demand; rising winter temperatures due to climate change appear to be causing electricity demand to stagnate or decline.

Category	2021 (Jan 13, 19:00)	2022 (Jan 27, 18:00)	2023 (Jan 22, 19:00)	2024 (Feb 7, 19:00)	2025 (Jan 22, 11:00)
Supply Capacity(MW)	1,474	1,548	1,577	1,562	1,874
Peak Demand(MW)	1,074	1,076	1,058	1,073	1,035
Reserve(MW) (Reserve Margin %)	400 (37.2%)	472 (43.9%)	519 (49.1%)	489 (45.6%)	839.3 (81.1%)

Table 2. Jeju Winter Electricity Supply and Demand Results (2021–2025)(Source: Korea Power Exchange, 2025 Annual Jeju Regional Power Grid Operating Results, 2026)

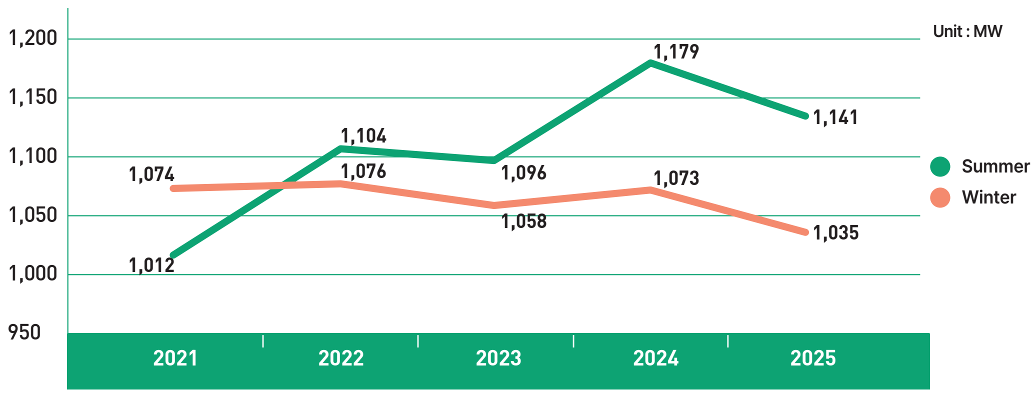

Figure 2. Jeju Island Summer and Winter Peak Demand (2021–2025), Unit: MW(Source: Korea Power Exchange, 2025 Annual Jeju Regional Power Grid Operating Results, 2026)

Against this backdrop of stagnant demand, reserve capacity and reserve margins surged sharply from 2025, attributable to the full commissioning of the Jeju-mainland (Wando Island) HVDC Third Interconnector, which expanded the inter-regional power supply capacity from 360MW to 600MW.

2) Jeju's Generation Capacity and Generation Output by Source (2021~2025)

Jeju's installed generation capacity has grown steadily, led by wind and solar renewables. Over five years from 2021, thermal generation capacity increased by only 13MW, while solar increased by 192MW and wind by 127MW. Notably, renewable energy installed capacity surpassed fossil fuels for the first time in 2022, and in 2023 reached 1,051MW, marking Jeju's entry into the era of 1GW+ renewables.

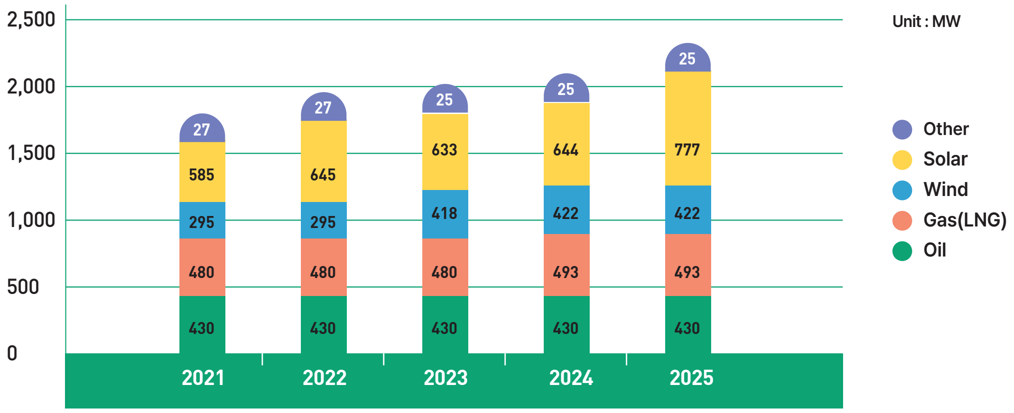

Figure 3. Changes in Jeju's Installed Generation Capacity (2021–2025)(Source: Korea Power Exchange, 2025 Annual Jeju Regional Power Grid Operating Results, 2026)

Generation output trends are equally clear. HVDC imports from the mainland, solar, and wind generation are all on an upward trend — particularly HVDC, which has expanded significantly since 2021 due to the Third Interconnector. Meanwhile, oil-fired generation (bio-heavy oil and petroleum-based heavy oil) has declined sharply after a temporary uptick in 2022, and LNG-fired generation peaked in 2024 and entered a steep downward trend in 2025.

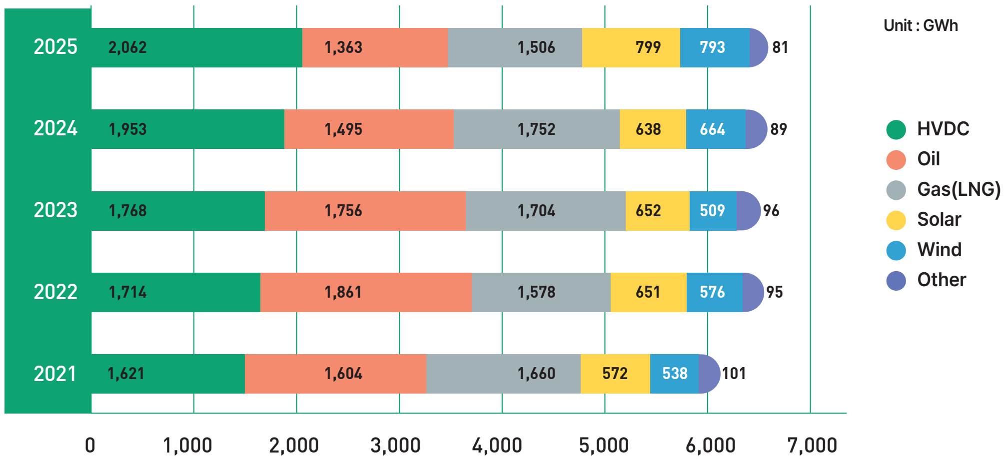

Figure 4. Jeju Island Generation Output by Source (2021–2025)(Unit: GWh)(Source: Korea Power Exchange, 2025 Annual Jeju Regional Power Grid Operating Results, 2026)

In summary, Jeju's renewable energy continues strong growth in both installed capacity and generation output, while fossil fuel generation is stagnating in capacity additions and declining in actual output — indicating that the role of fossil fuel generation in Jeju's grid is rapidly diminishing.

4. Economic Assessment of Jeju's Existing Gas Power Plants

To objectively assess the economic viability of the gas power plants currently operating in Jeju, a quantitative analysis of annual generation output and capacity factors must first be conducted. In addition, trends in the LNG tariff for power generation set by Korea Gas Corporation — which affect both cost of sales and revenue — must be comprehensively reviewed. Analyzing each plant's income statement based on these indicators makes it possible to determine the financial sustainability and economic feasibility of these generation facilities.

1) Annual Generation Output and capacity factor Trends by Plant(2021~2025)[5]

As the general overview indicates, total gas generation in Jeju gradually increased from 2021 to 2024, then sharply declined from 2025 — a trend reflected in each individual plant.[6]

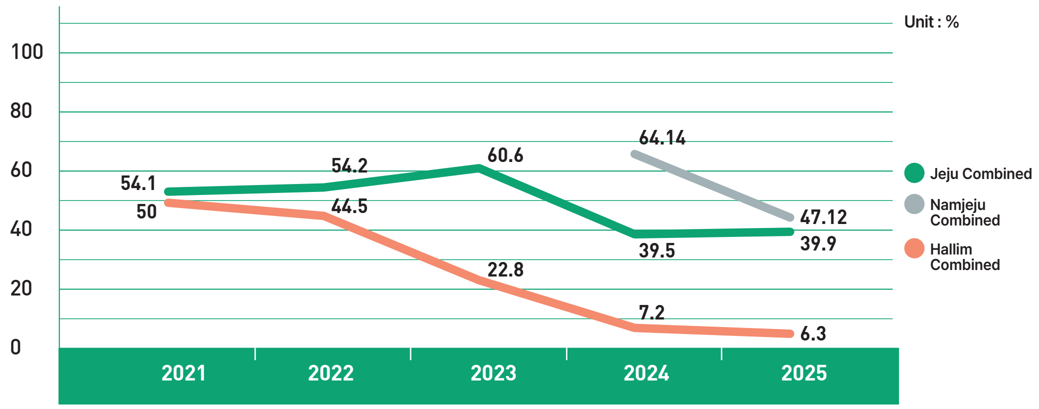

Figure 5. Jeju Gas Power Plant capacity factor Changes (2021~2025)(Unit: %)(Source: Data provided by the office of Rep. Kim Han-gyu, Democratic Party of Korea, 2026) (Jeju Combined, Namjeju Combined, Hallim Combined)

5_ Data provided by the Office of National Assembly Member Kim Han-kyu, Democratic Party of Korea.

6_ Namjeju Combined switched its fuel from diesel to LNG in January 2024.

Jeju Combined, the backbone of Jeju's gas generation, peaked in utilization in 2023 and has failed to recover since its decline began in 2024. Namjeju Combined's partial offset effect — having switched to LNG fuel in 2024 — means the actual decline would have been even steeper without it. This is even more apparent in August utilization data, the month of peak power demand.

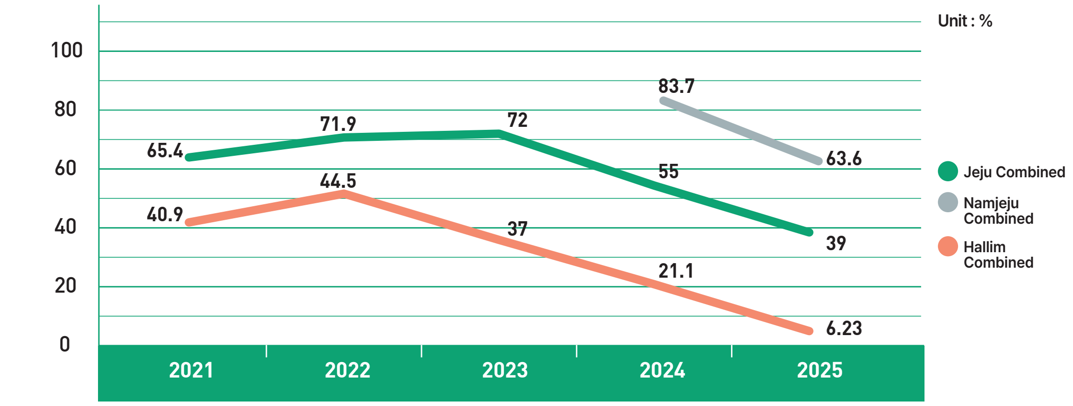

Figure 6. Changes in August capacity factors of Jeju Gas Power Plants (2021~2025)(Unit: %)(Source: Data provided by the office of Rep. Kim Han-gyu, Democratic Party of Korea, 2026)(Jeju Combined, Namjeju Combined, Hallim Combined)

Power generation has also followed the same downward trend as the capacity factor. The decisive cause of the slump in generation and utilization from 2024 onward was the August 2024 revision of electricity market operating rules, which lowered the minimum must-run output of generators during renewable energy oversupply. This revision directly cut revenues and became the central factor undermining the economic viability of operating gas plants.

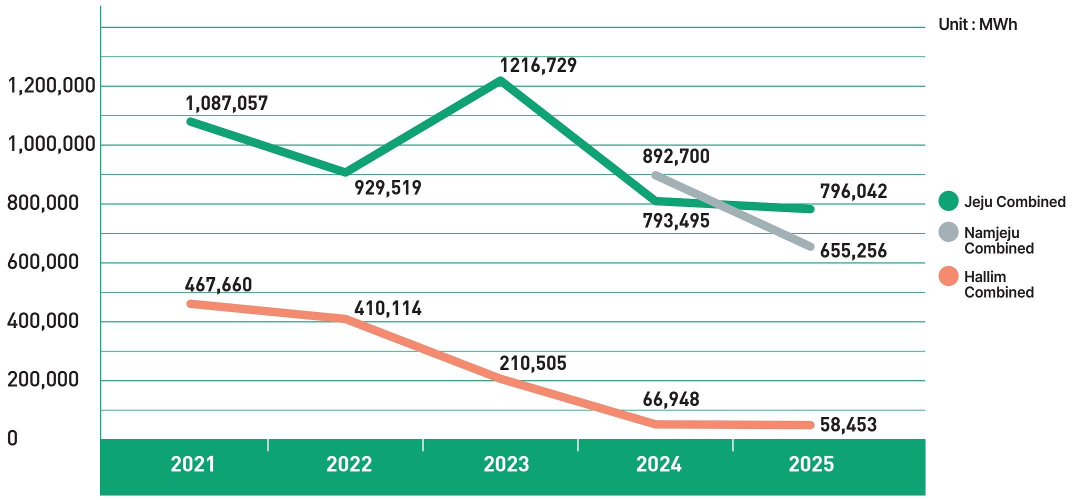

Figure 7. Changes in Generation Output of Jeju Gas Power Plants (2021~2025)(Unit: kWh)(Source: Data provided by the office of Rep. Kim Han-gyu, Democratic Party of Korea, 2026)(Jeju Combined, Namjeju Combined, Hallim Combined)

2) LNG Tariff Trends and Financial Performance of Gas Plants (2021~2025)[7]

LNG tariff data from Korea Gas Corporation shows that gas prices spiked sharply in 2022 and 2023. This cost burden is evident in the income statements of Jeju's gas power plants.

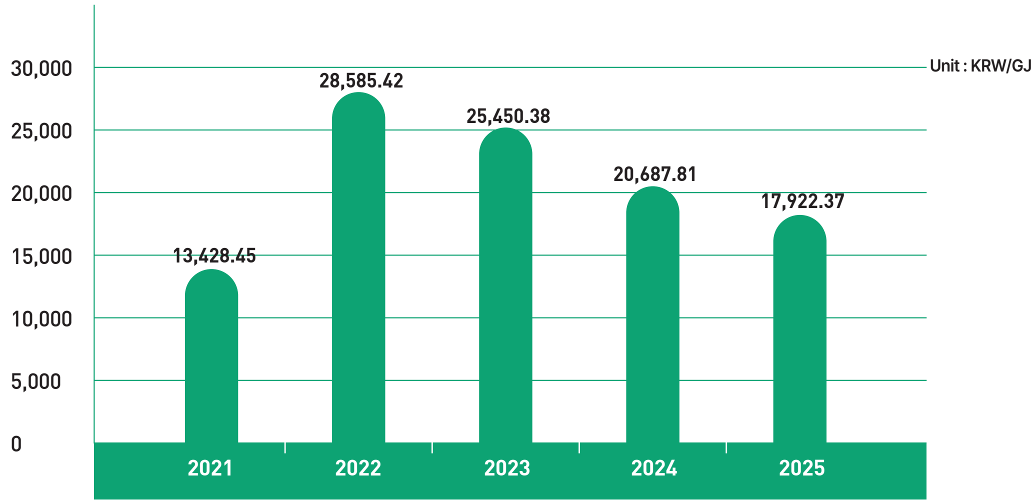

Figure 8. LNG Tariff per Unit for Power Generation (2021–2025)(Unit: KRW/GJ)(Source: Korea Gas Corporation, 2021~2025)

Even excluding Hallim Combined Cycle Power Plant, whose capacity factor has been particularly low, the income statements of Jeju Combined Cycle Power Plant and Namjeju Combined Cycle Power Plant reveal a severely deteriorated financial condition. Both plants exhibit a negative gross margin, with the cost of sales exceeding revenue. In particular, Jeju Combined Cycle Power Plant has been operating at an operating loss since 2023 after accounting for fixed operating expenses, including selling, general and administrative (SG&A) expenses that are essential for maintaining operations. More concerningly, the scale of these losses has continued to increase year by year.

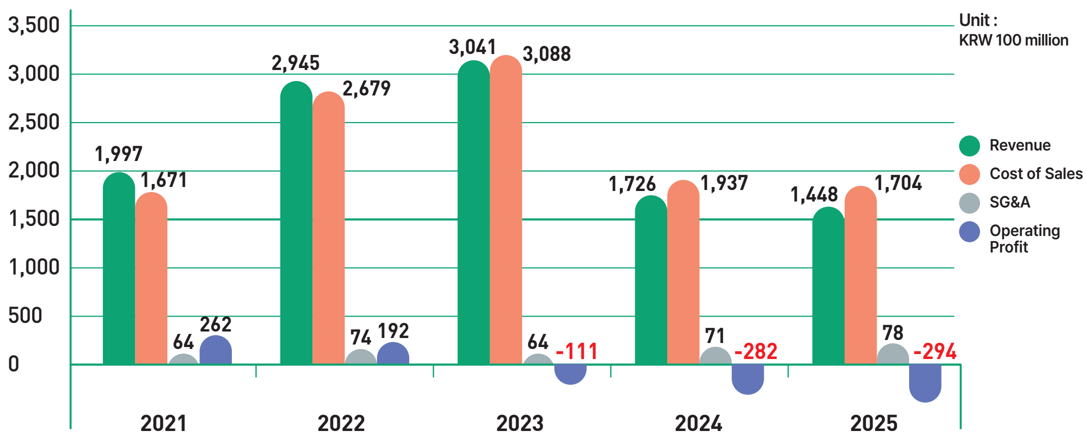

Figure 9. Jeju Combined Operating Profit (2021~2025)](Unit: KRW 100 million)(Source: Data provided by the office of Rep. Kim Han-gyu, Democratic Party of Korea, 2026)Revenue, Cost of Sales, SG&A, Operating Profit)

7_ 더불어민주당 김한규 국회의원실 제공자료, 2026.

Namjeju Combined's situation is equally dire. The plant fell into operating losses immediately in 2024, the first year after switching its fuel to natural gas (LNG), and has remained in the red through 2025. Although international LNG prices have shown signs of stabilizing since last year, they remain well above 2021 levels. The vicious cycle of declining utilization preventing financial recovery continues.

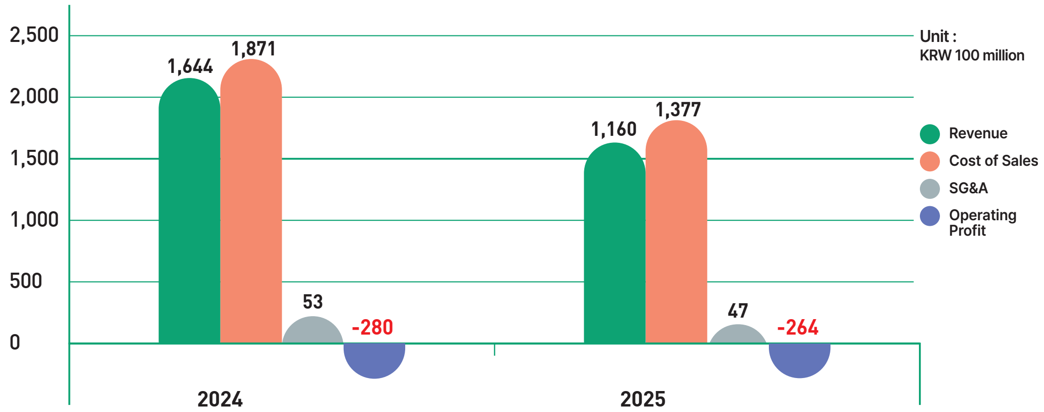

Figure 10. Namjeju Combined Operating Profit (2024~2025)(Unit: KRW 100 million)(Source: Data provided by the office of Rep. Kim Han-gyu, Democratic Party of Korea, 2026)Revenue, Cost of Sales, SG&A, Operating Profit)

3) Economic Analysis of Jeju's Gas Power Plants

As the data confirm, Jeju's operating gas power plants have already solidified into a loss-making structure and lost their economic viability. Given fuel price instability and declining utilization, a return to profitability is extremely unlikely. Furthermore, tightening greenhouse gas regulations make it impossible to artificially increase gas generation capacity factors, so the economic value of gas generation assets will continue to erode.

The economic competitiveness once secured through low gas prices has been completely eroded — first by the 2022 Russia-Ukraine War and subsequently by the ripple effects of the 2026 US-Iran conflict. Geopolitical uncertainty and volatility in international energy markets have become permanent variables, making normalization through lower gas prices virtually impossible.

The technical structure is also an obstacle to economic viability. Jeju's gas plants are combined-cycle (CCGT) facilities combining gas and steam turbines.8) Such facilities carry very high fixed-cost ratios, requiring sustained utilization above a minimum threshold for financial stability. The LCOE for combined-cycle plants is typically calculated at an 85% capacity factor; below that level, fixed-cost recovery becomes problematic.9) The currently low capacity factors of Jeju's gas plants thus expose a structural inevitability of financial losses.

Can capacity factors rebound? Realistically, the opposite is more likely. The government targets carbon neutrality and RE100 for Jeju by 2035. As Minister Kim Sung-hwan of the Ministry of Climate, Energy and Environment stated at the "Jeju Town Hall Meeting" on March 30, more than 2.5GW of renewables and 1GW of ESS are planned for deployment by 2030.10) Given this rapid renewable-led capacity expansion plan, gas plants will have even less room to operate, and increasing utilization is essentially impossible.

Under these circumstances, adding another 300MW of combined-cycle capacity (two 150MW units) will further deepen the cycle of economic deterioration — replicating all the profitability-undermining factors already identified and accelerating the financial deterioration of the entire grid through competition over utilization with existing capacity. Ultimately, introducing new capacity amounts to embarking on a path of "stranded assetization" that will impose enormous financial burdens on both generators and grid operators.

8_ 전기신문, '남제주복합' 준공…제주도 전력수급·전력계통 안정 기여, November 30, 2020.
9_ International Energy Agency(IEA)/Nuclear Energy Agency(NEA), Projected Costs of Generating Electricity 2020, 2020.
10_ 제주의소리, 2030년부터 제주도 신차 절반은 전기차, 35년에 100%, March 30, 2026.

5. Economic Analysis of the 300MW Gas Plant's Green Hydrogen Full-Firing Conversion

The plan to build new gas power plants faces fierce criticism due to its structural flaws — massive greenhouse gas emissions and the hindrance to renewable energy expansion. This controversy is particularly intense in Jeju, where the targets of achieving carbon neutrality and RE100 by 2035 have been set. Indeed, opposition centered on environmental groups has continued to this day since the announcement of the 10th Basic Plan for Electricity Supply and Demand.

In response, the government has proposed "green hydrogen full-firing" as an alternative to quell the criticism. Jeju Province has followed suit, pursuing a plan to address renewable energy intermittency and secure grid flexibility through hydrogen power generation. However, this plan has only discussed the outlines of infrastructure construction, with no substantive economic assessment conducted whatsoever. This brief therefore aims to rigorously evaluate the financial viability of the green hydrogen full-firing plan based on previously published data.

1) Current Status of Green Hydrogen Co/Full-Firing Plans

Through the Jeju Hydrogen Economy Development Master Plan 2025, Jeju has confirmed a roadmap for co/full-firing green hydrogen in the new 300MW gas plant — commencing co-firing (hydrogen blended with LNG) immediately after the plant's completion, and achieving 100% full-firing by 2035.

Accordingly, Jeju Province has set annual green hydrogen production targets of 4,242 tonnes by 2030 and 71,056 tonnes by 2035 for power generation. The planned hydrogen production for 2030 would support a co-firing ratio of less than 20%, yet the roadmap calls for a transition to 100% green hydrogen full-firing just five years later. Achieving this target would require the construction of an enormous amount of new infrastructure within a very short timeframe. To this end, the province estimates that approximately 2.7 GW of offshore wind capacity and 800 MW of water electrolysis capacity will be required.

Category	2030 (Medium-term)	2035 (Long-term)
Hydrogen Production	7,299 tonnes/year	91,110 tonnes/year
Hydrogen Demand	6,083 tonnes/year	75,925 tonnes/year
For Hydrogen Power Generation	4,242 tonnes/year	71,056 tonnes/year

Table 3. Jeju Annual Hydrogen Production Plan.

Korea East-West Power, which is preparing to break ground in the second half of 2026 (Dongbok-ri, Gujwa-eup, Jeju City), has specified hydrogen co/full-firing capability in its equipment procurement conditions. The strategy is to first introduce turbines capable of 50% hydrogen co-firing and then replace key components such as combustors once 100% full-firing technology becomes commercially available after 2030.

The planned 150MW combined-cycle plant at Korea East-West Power consists of two 50MW gas turbines and one 50MW steam turbine. Since the steam turbine uses waste heat from the gas turbines, both 50MW gas turbines must be involved in hydrogen co/full-firing. Korea Jungbu Power is pursuing the same configuration.[11]

11_ 제주특별자치도, 도의회 환경영향평가 동의안 보류에 따른 신규 LNG 복합발전 건설 필요성 설명자료, 2026.

2) Economic Analysis of the Green Hydrogen Full-Firing Plan

Given the situation outlined above, the infrastructure required for the green hydrogen full-firing plan, the production cost of green hydrogen, and the current state of gas turbine full-firing technology are the key factors in assessing economic viability. First, the scale of capital expenditure required for the infrastructure needed under the green hydrogen full-firing plan was confirmed through the costs associated with developing 2.7GW of offshore wind and the 800MW electrolysis facility and its operating infrastructure.

The most critical infrastructure for producing green hydrogen is the construction of offshore wind turbines. Based on the project costs of offshore wind power projects currently operating in Jeju, the minimum capital expenditure required for a 2.7GW offshore wind project is estimated at approximately KRW 16.47 trillion.12) In addition, the cost required to operate an 800MW electrolysis facility amounts to approximately KRW 4.13 trillion.13) Infrastructure costs alone thus require an enormous budget exceeding KRW 20 trillion.

Given that such massive infrastructure would need to be built and operated, is the resulting hydrogen sale price realistic? The IEA estimates the production cost of green hydrogen at USD 3.5-12+/kg H_2,14) equivalent to KRW 5,148 to KRW 17,649 or more at current exchange rates.15) The International Energy Agency (IEA) projects that the cost of green hydrogen could decline to USD 2-4/kg H_2 by 2030. Even at this level, however, it is widely regarded as insufficient to achieve economic viability.

The current production cost of green hydrogen in Jeju is KRW 19,800/kg, far exceeding the figures presented by the IEA. There are also concerns that the price could rise even higher. According to a KBS analysis of results from a renewable-energy-linked green hydrogen demonstration project conducted by 11 institutions including Jeju Energy Corporation, the production cost of green hydrogen was found to rise to approximately KRW 40,000/kg when daily consumption is assumed at 200kg.16) By IEA standards, this level offers no economic viability whatsoever.

Based on KRW 19,800/kg, the hydrogen cost per kWh is approximately KRW 594; at KRW 40,000/kg, it reaches KRW 1,200/kWh. By comparison, as of 2023, the levelized cost of electricity (LCOE) is KRW 123-144/kWh for solar, KRW 166-168/kWh for onshore wind, and KRW 271-300/kWh for offshore wind.18) This clearly demonstrates that directly utilizing renewable energy is, in the end, the most economical approach.

Source	Green Hydrogen (Jeju)	Solar	Onshore Wind	Offshore Wind
LCOE (KRW/kWh)	594~1,200	123~144	166~168	271~300

Table 4. Levelized Cost of Electricity by Generation Source(Unit:kWh)

The plant's turbine configuration is also economically reckless. While the plant is currently being pursued with the goal of eventual full green hydrogen firing, the gas turbines actually to be installed are 50% hydrogen co-firing units. Combusting gas blended with 50% hydrogen achieves an actual CO_2 reduction rate of only 24%. Despite the enormous cost involved, the resulting greenhouse gas reduction effect is very limited.[19]

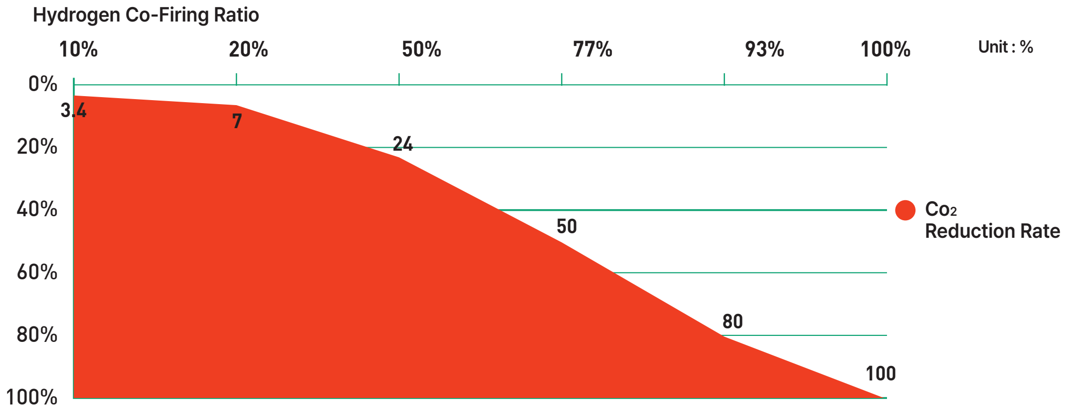

Figure 11. CO_2 Reduction Rate by Hydrogen Co-Firing Ratio(Unit: %)

Moreover, the current plan involves installing 50% hydrogen co-firing turbines first, then later replacing them with 100% hydrogen full-firing turbines. This means the turbines themselves will need to be replaced in the future at enormous cost. The turbine is a critical piece of equipment in building a gas power plant, and its price accounts for a very large share of the total project cost. Gas turbine prices have recently surged, and the construction cost of new high-efficiency gas turbines scheduled to come online in 2030 has been shown to double compared to existing turbines.[20]

Furthermore, despite the massive quantities of green hydrogen that will need to be secured, no concrete supply-and-demand plan exists. Only the 2035 full-firing target volume and input volume exist as figures. Under the current plan, the new gas plants would begin commercial operation in 2029 or 2030, yet the green hydrogen volume scheduled to be supplied to the plants in 2030 is only 4,242 tonnes per year. Achieving 50% hydrogen co-firing across four 50MW gas turbines (combined total for Korea East-West Power and Korea Jungbu Power) would require approximately 14,000 tonnes. The volume scheduled for supply in 2030 falls short of even achieving a 20% hydrogen co-firing rate.[21]

The shortfall in green hydrogen would ultimately need to be made up with hydrogen extracted through other methods — most likely grey hydrogen, produced by reforming methane. In the United States, which leads in hydrogen co-firing technology development, nearly all hydrogen produced in the U.S. through 2050 is projected to come from natural gas. This demonstrates that hydrogen co-firing technology functions not as a backup resource for renewable energy, but effectively as a means of extending the lifespan of fossil fuel power generation.[22]

In addition, the combined-cycle configuration of gas and steam turbines currently planned itself undermines the function of serving as a renewable energy backup resource. Because steam turbines require considerable time to start up due to thermal stress and thermal inertia, frequent shutdowns are difficult, forcing must-run operation to maintain a certain level of output. In this case, power output is maintained even in situations where the gas turbines need not be running, unnecessarily increasing green hydrogen demand and further worsening economic viability.

Moreover, because it is difficult to shut down the power source, repeated low-output operation not only reduces generation efficiency but also causes a sharp increase in nitrogen oxide (NOx) emissions, resulting in additional environmental and economic losses. To genuinely serve a renewable energy backup role, the plant should be designed as a simple-cycle facility using gas turbines alone, without a steam turbine, enabling immediate start-up and shutdown. Only then can both project costs and the required volume of hydrogen be dramatically reduced.

As a result, even considering the turbine configuration alone, this facility cannot ensure economic viability and is set to incur massive losses. This goes beyond a mere management issue for the power plant_ it will ultimately become a burden on the public as a whole, whether through electricity tariff increases or government fiscal expenditure. Should the asset become stranded, the resulting damage will fall entirely on the public. The current plan to build a new gas power plant under the pretext of hydrogen co/full-firing therefore lacks economic justification.

12_ The total project cost was calculated using the average of two reference projects: the Hallim Offshore Wind Farm (100.08MW, currently in commercial operation), with a total project cost of approximately KRW 630 billion, and the Handong-Pyeongdae Offshore Wind Project (105MW, currently under development), with a total project cost of approximately KRW 590 billion.

13_ The total project cost for the electrolysis facility was calculated based on the project cost of the "10.9MW Renewable Energy-Linked Large-Scale Green Hydrogen Development" project, which amounted to KRW 57 billion.

14_ International Energy Agency(IEA), Global Hydrogen Review 2025, 2025.

15_ USD 1 = KRW 1,470.72, as of April 21, 2026.

16_ KBS뉴스, 그린수소 생산 단가 '4만 원'…적자 어쩌나, February 18, 2026.

17_ 1kg of hydrogen = 33.3kWh(based on lower heating value, LHV)

18_ 에너지경제연구원, 재생에너지 공급확대를 위한 중장기 발전단가(LCOE) 전망 시스템 구축 및 운영(4/5), 2023.

19_ Institute for Energy Economics and Financial Analysis (IEEFA), Hydrogen: Not a Solution for Gas-Fired Turbines, 2024.

20_ U.S. Energy Information Administration(EIA), Annual Energy Outlook 2025, 2025.

21_ The required hydrogen volume was calculated based on the specifications of Siemens Energy's SCC-800 package — a combined-cycle solution among 50MW-class generators capable of 50% hydrogen co-firing — applied in conjunction with the 2025 average capacity factor of 43.5% for Jeju regional gas power plants (excluding Hallim Combined, whose capacity factor is exceptionally low). (Calculated based on a lower heating value of approximately 36 MJ/m³ for methane and approximately 10.8 MJ/m³ for hydrogen.)

22_ U.S. Energy Information Administration(EIA), Annual Energy Outlook 2026, 2026.

6. Policy Recommendations

The preceding economic analysis demonstrates that building new gas power plants does not guarantee economic viability and, on the contrary, risks aggravating the financial distress already facing existing gas power plants. This is because the capacity factors and generation output of currently operating gas plants have shown a clear downward trend, gas prices remain unstable, and operating profits have already turned negative as a result. Operating an additional 300MW of gas capacity using the same facilities and operational approach as existing plants is a plan that fails to account for economic viability.

In particular, it has been clearly confirmed that co/full-firing with green hydrogen would further worsen economic viability. This is because the cost of green hydrogen is markedly higher than the levelized cost of electricity (LCOE) of solar and onshore/offshore wind power. Furthermore, given the scale of infrastructure required for large-scale green hydrogen production and the associated financial investment, green hydrogen co/full-firing is unlikely to serve as a valid justification for building new gas power plants.

Ultimately, if the current plan to build a 300MW gas power plant — which lacks both economic viability and a credible pathway for green hydrogen conversion — continues to be pursued, it risks going beyond mere financial losses to result in the stranding of assets, as well as conflict with the government's renewable energy and energy storage system (ESS) deployment plans, thereby becoming an obstacle to the renewable energy transition.

Therefore, the plan to build a new 300MW gas power plant in Jeju should be halted, and the project plan — including its economic viability — should be comprehensively reviewed. In particular, given that the government and Jeju Province have committed to achieving carbon neutrality and RE100 for Jeju by 2035, the negative impact that the new plant plan may have on achieving these goals must be carefully examined. Based on the results of a thorough review, a final decision should be made on whether to retain the project plan, and this outcome should be reflected in the 12th Basic Plan for Electricity Supply and Demand.

In addition, the incoming 9th popularly elected provincial administration, to be launched following the local elections in June 2026, should take into account the ripple effects that the gas power plant plan would have on the regional economy and the energy transition, and formally request that the government halt and review the project. It must also actively work to persuade the government to ensure that the outcome of this review is reflected in the 12th Basic Plan for Electricity Supply and Demand.

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Evaluating the Economic Viability of Jeju's New 300MW Gas Power Plant Project

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The organization investigates and analyzes the human rights and environmental impacts associated with domestic and global resource supply chains and energy transition processes, while working to promote responsible transition pathways through civil society collaboration and policy research.

Cover Photo : Panoramic View of KOMIPO Jeju Thermal Power Plant