

Renewable Energy Demand in South Korea: A 2030 Forecast and Policy Recommendations

2023. 03

Plan 1.5

Plan 1.5

Plan 1.5 is a non-profit organisation that focuses on policy advocacy for effective and just climate policies in Korea, with an aim to limit the global average temperature rise to 1.5°C. Plan 1.5 works to find practical solutions for the immediate and effective reduction of emissions and seeks to expand and empower the climate movement in civil society.

Corporate Renewable Energy Initiative (CoREi)

The Corporate Renewable Energy Initiative (CoREi) was launched in 2020 by the Korea Sustainability Investing Forum (KoSIF), United Nations Global Compact Network Korea and WWF-Korea. It intends to create an internal drive towards the energy transition within companies in Korea through direct engagement and workshops. It also aims to create a favourable policy environment for companies willing to procure clean energy. Altogether, these activities aim to help establish and reach renewable energy-related goals among companies and create an “ambition loop” between policymakers and corporates to accelerate the energy transition.

Korea Sustainability Investing Forum (KoSIF)

The Korea Sustainability Investing Forum (KoSIF) was founded in 2007 with the mission of promoting sustainable finance in Korea. Its efforts are mainly focused on two areas: making investors, including pension funds, consider ESG factors in their investment decision-making process and making companies disclose their ESG information. KoSIF has been involved in various legislation activities and policy engagement, leading to the amendment of three acts (National Pension Act, Financial Investment Services and Capital Markets Act and Korea Investment Corporation Act). KoSIF has also constructed a broad range of networks consisting of investors, companies, government branches and NGOs thanks to its role as a local partner of CDP (formerly Carbon Disclosure Project) since 2008.

WWF-Korea

WWF is one of the world's most respected and experienced conservation organisations, with over 5 million supporters and a global network active in more than 100 countries. WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which people can live in harmony with nature. WWF's national office in South Korea (WWF-Korea) has been focused on activities to decarbonise our economies quickly enough to limit climate disruptions to acceptable levels and to adapt to unavoidable impacts.

UN Global Compact Network Korea

Established in September 2007, the UN Global Compact Network Korea (GCNK) is a local chapter of the UN Global Compact (UNG) with a wide membership of around 300 companies, civil societies and academic institutions. The GCNK supports its members to implement the UNGC Ten Principles by providing various symposiums, workshops, conferences, research on UNGC/CSR/ESG, policy proposals, networking and dialogue, as well as projects related to the Sustainable Development Goals (SDGs) and the internalisation of ESG strategies to corporate management. This year, the GCNK launched the Climate Ambition Accelerator (CAA) program to provide education and support for member companies to establish science-based targets (SBT) aligned with the 1.5°C pathway, setting them on a path towards net-zero emissions by 2050.

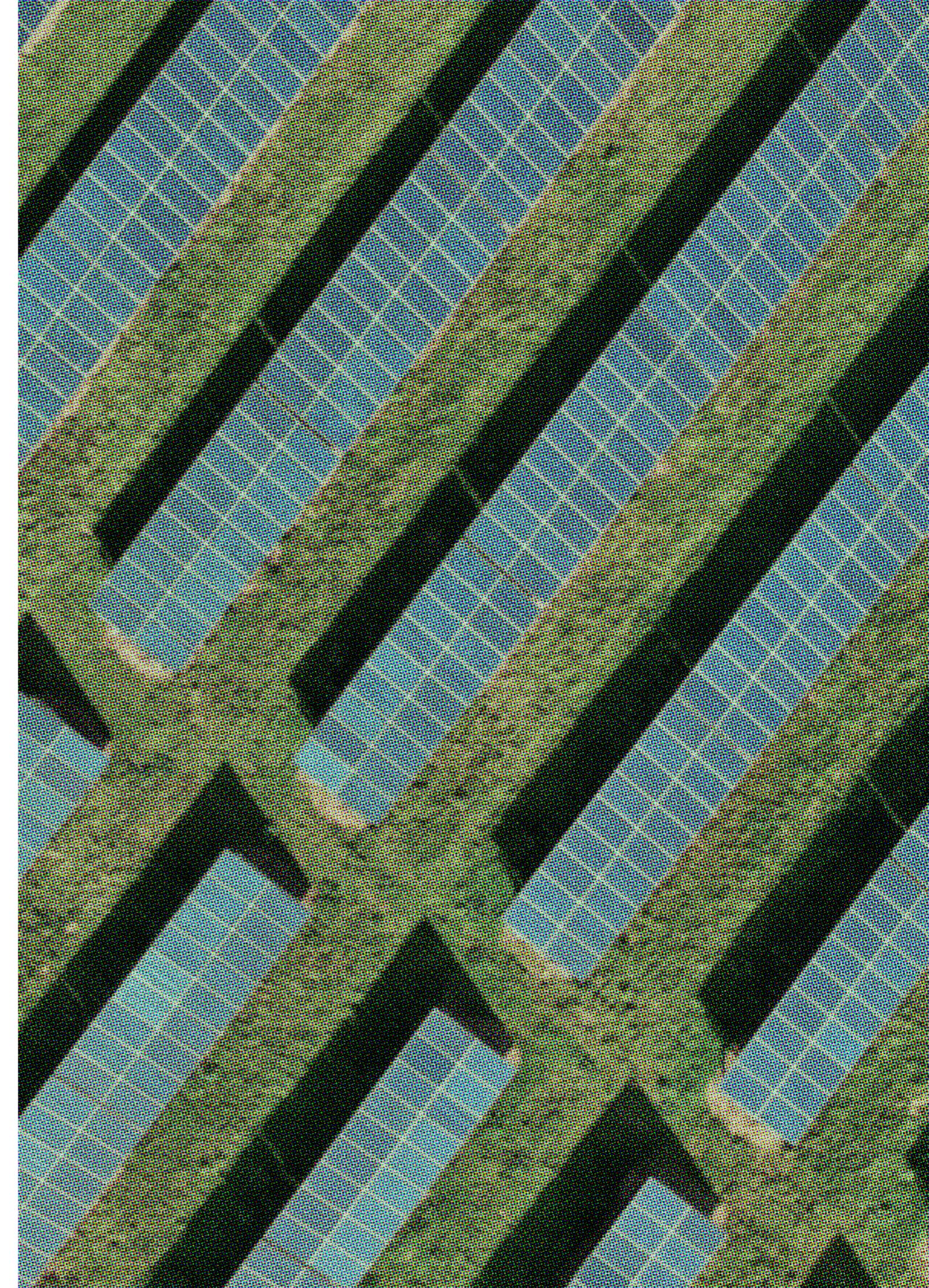


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The Expansion of Renewable Energy: An Irreversible Trend

The growth of renewable energy seen from an *energy security* perspective

Renewable energy generation costing less than fossil fuels

Climate-related policies of the current administration

Growing corporate demand for more renewable energy

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The Expansion of Renewable Energy: An Irreversible Trend

The growth of renewable energy seen from an *energy security* perspective

Europe's energy crisis has been escalating since the beginning of the Russia-Ukraine war in February 2022. Since the war broke out, the European Union has imposed nine sanction packages against Russia. In return, Russia has reduced natural gas supplies through its pipeline to Europe, leading to ongoing concerns about the reliability of natural gas supplies.

This has resulted in the acceleration of the Fit-for-55 policy program that was announced by the EU, as it would speed up its efforts to reduce the share of natural gas in its energy mix – a move that was perceived to be somewhat necessary to reach carbon neutrality. The EU announced the REPowerEU plan in May 2022, stating that investment in renewable energy would see a massive scale-up. The plan also proposed to increase the 2030 renewable energy share target from 40 to 45%. Global energy think tank Ember¹ estimated that the EU is on course to reach at least 45% renewables in its energy mix by 2030.

South Korea, which relies on imports for most of its energy, is facing a similar situation. In Europe's Energy Crisis Trend and Outlook Report published in December 2022, the Korea Institute for International Economic Policy pointed out that the European energy crisis could affect the price of mid-to-long-term energy imports, and therefore, South Korea should expand its domestic renewable share as soon as possible.²

Renewable energy generation costing less than fossil fuels

It is no longer news that investment in clean energy, including renewable energy, has overtaken that of fossil fuels. According to the World Energy Investment 2022 report recently published by the International Energy Agency (IEA), as the impact of COVID-19 subsides, clean energy investment is recovering, and it is estimated to reach USD 1.4 trillion, accounting for nearly three-quarters of all energy investments. China was the largest investor in clean energy as of 2021 (USD 380 billion), followed by the EU (USD 260 billion) and the US (USD 215 billion).³

The most significant reason for the rise in global renewable energy investment is "grid parity". This is the point where the power generation costs of renewable energy equal those of fossil fuels. The IEA report states that the power generation costs of solar PV and onshore wind in 2022 were significantly lower than those of coal or gas in Europe, the US, China and India.³ This trend is expected to continue because the relative wholesale prices of fossil fuel-powered electricity are likely to increase further. This is due to the rising wholesale electricity prices caused by the Russia-Ukraine war and increasingly stringent climate change-related regulations.

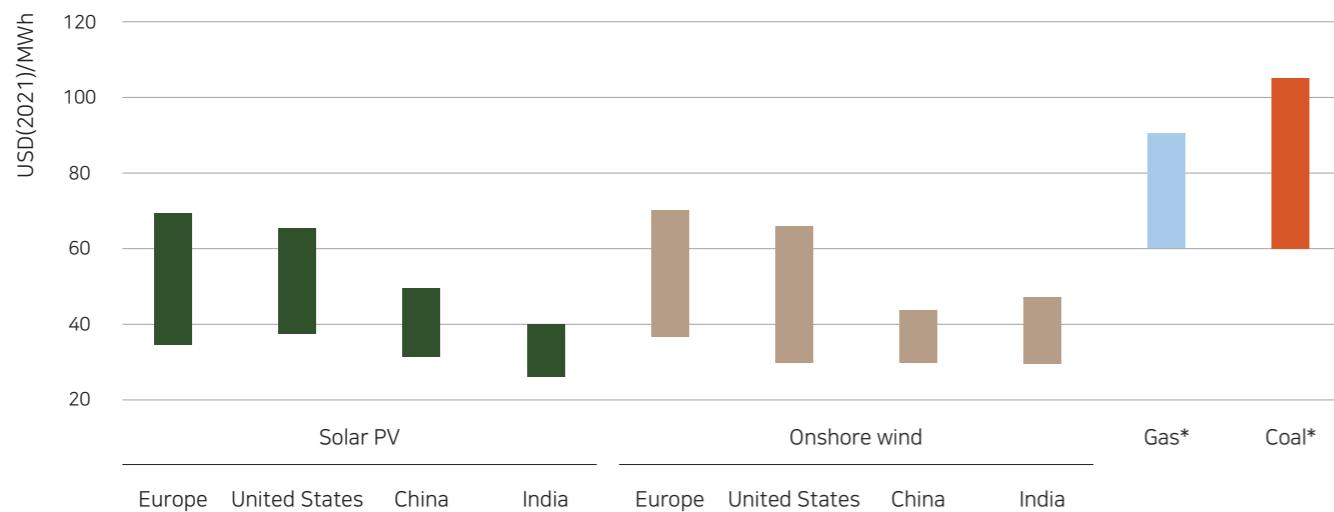
In the past, renewable energy has been perceived as superior to traditional power generation sources such as fossil fuels in terms of environmental friendliness but inferior in supply reliability and affordability. However, current trends suggest that renewable energy is actually more attractive than traditional power generation sources in all three aspects of supply reliability, affordability and environmental friendliness.

¹ Ember. Fit for the future, not Fit-for-55. Feb 2023

² Korea Institute for International Economic Policy. Europe's Energy Crisis Trend and Outlook Report. Dec 2022

³ International Energy Agency. World Energy Investment 2022. June 2022

Global power generation costs of renewable energy and fossil fuels (IEA, 2022)³



Growing corporate demand for more renewable energy

The expansion of renewable energy is emerging as a matter of global industrial competitiveness. In July 2022, the Corporate Renewable Energy Initiative (CoREi) conducted a survey on the renewable energy procurement status and awareness of 61 companies. It found that more than 90% of respondents understood the need for a transition to renewable energy but claimed the renewable energy supply and relevant policies were highly insufficient.⁴ In addition, a recent survey by the Korea Chamber of Commerce and Industry showed that 14.7% of the responding companies were requested to use renewable energy from overseas clients, with one-third of them receiving very specific requests.⁵ For this reason, South Korean companies participating in voluntary initiatives, such as RE100, have continued to call on the government, including the Ministry of Trade, Industry and Energy and the Ministry of Environment, to expand renewable energy and improve related systems.

It is also noteworthy that such demands are coming not only from individual companies but also from the RE100 level. The Climate Group, which leads the global RE100 initiative, sent a letter to the South Korean government in November last year, pointing out that "Korea is regularly cited by our members as one of the most challenging geographies in which to procure renewable electricity, where members currently only consume 2% electricity from renewable sources". It argued that the renewable energy target in the draft of the 10th Basic Plan for Long-term Electricity Supply and Demand Plan from the South Korean government is very insufficient for RE100 members to source renewable electricity.⁶

Climate-related policies of the current administration

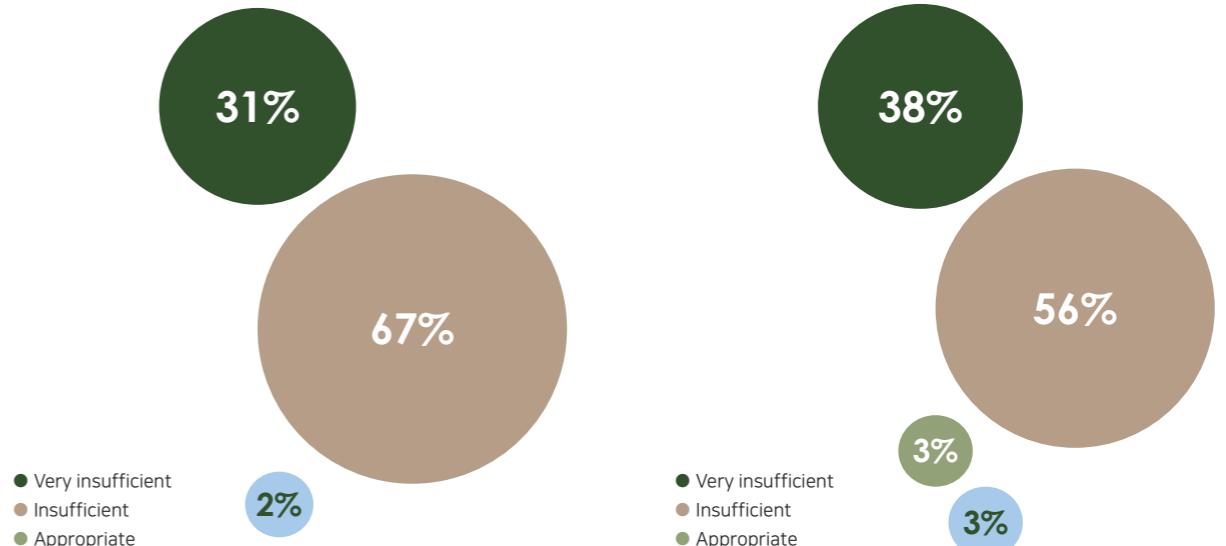
Unlike the global trend of renewable energy expansion, South Korea has not shown a full-scale move towards expanding renewable energy. A typical example is the country's renewable energy distribution target determined through the Basic Plan for Long-term Electricity Supply and Demand. In 2017, the South Korean government announced its plan to expand renewable energy based on the Renewable Energy 2020 Implementation Plan. In 2021, it also promised to step up its nationally determined contributions (NDCs) to the international community by raising the renewable energy share of total electricity output to 30%.

However, the renewable energy expansion plan has been scaled back since the new administration started. In 2022, with the 10th Basic Plan, the renewable energy share target for 2030 was drastically reduced to 21.6%, and the target aligned with the Renewable Portfolio Standard (RPS) of the New and Renewable Energy Act was postponed by four years from 25% in 2026 to 25% in 2030.

If the government reduces its renewable energy target and puts on the back burner a number of issues that should be prioritised in the process, such as more investment in grid infrastructure, improvement in resident approval and concrete guidelines for environmental impacts, it is likely to take a longer time for renewable energy to grow in Korea – a prerequisite that businesses demand in order to stabilise renewable prices. In particular, government-led proactive investment is necessary to address the bottlenecks caused by the regionally uneven distribution of renewable energy, but the Korea Electric Power Corporations' (KEPCO) worsening deficit and soaring energy prices have delayed investment.

To address these issues, it is necessary to raise the renewable energy target set in the 10th Basic Plan and establish concrete measures to support the expansion of renewable energy.

[Perception on current renewable energy supply levels]



⁴ Corporate Renewable Energy Initiative(CoREi). Businesses' Renewable Energy Procurement Status and Perception of Renewable Energy Scheme. July 2022

⁵ Korea Chamber of Commerce and Industry. Survey on Korean manufacturing companies' participation in RE100 and policy challenges. August 2022

⁶ Hankook Ilbo. The head of RE100 sent letter of protest to President Yoon, saying "backtracking on renewable energy will undermine economic potential." November 2022

Estimated Domestic Renewable Energy Demand for 2030

Estimated Domestic Renewable Energy Demand for 2030

Mechanisms for creating demand for renewable energy: voluntary initiatives and the RPS scheme

South Korean companies' demand for renewable energy comes largely from (1) voluntary initiatives and (2) the RPS scheme. Voluntary initiatives include CDP, with over 7,000 companies from 91 countries reporting their carbon management strategies and greenhouse gas (GHG) emissions status and targets, and RE100 (Renewable Electricity 100%) initiative, led by Climate Group and CDP.

Under the RE100 initiative, companies make voluntary commitments to source 100% of their electricity consumption needs from renewable energy by 2050. Currently, more than 380 member companies around the world are sourcing a total of 420 TWh of renewable energy. In South Korea, a total of 29 companies are members, including Samsung Electronics, and Hyundai Motor Company.⁷

RE100 is a "voluntary initiative" to create renewable energy demand through businesses' participation regardless of domestic laws and systems. In addition to this, the Renewable Portfolio Standard (RPS) scheme has been implemented in South Korea since 2012. The RPS scheme is one of the main regulatory tools to promote the deployment of renewable energy. It sets forth a mandatory renewable energy ratio on an annual basis for power generators and integrated energy operators exceeding a certain amount of generation capacity based on the New and Renewable Energy Act. In summary, domestic renewable energy demand mainly stems from (1) companies that participate in voluntary initiatives to source renewable energy and (2) power generators that need to meet the RPS obligation under the law.

Although the renewable energy demand is divided into the regulatory market tied to the RPS system and the voluntary market joined by businesses, in reality, the two types of demand overlap to a considerable degree due to the regulatory complexity of the domestic electricity market. One such example is the Green Premium system, which is accredited as one of the methods to reduce emissions under the RE100 initiative.

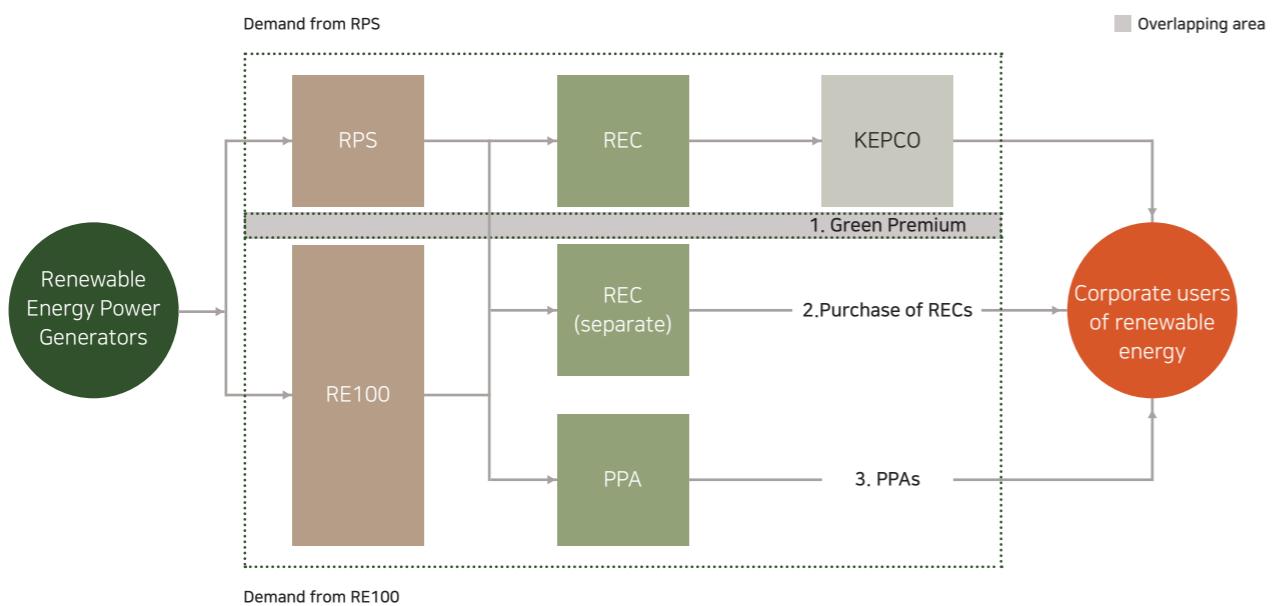
RE100 member companies in South Korea can achieve their renewable energy targets through five procurement options, including (1) self-generation, (2) purchase of renewable energy certificates (RECs) of the RPS system, (3) third-party Power Purchase Agreements (PPAs), (4) direct PPAs and (5) the Green Premium. Currently, the Green Premium is the most accessible and popular option in Korea. Unlike the purchase of RECs and PPAs, the Korea Electric Power Corporation (KEPCO) purchases RECs from power generators with RPS obligations and resells them at a "green premium" price. The renewable electricity output converted to green premiums can be included not just in the renewable energy demand related to the RPS system but also in the corporate renewable energy demand to implement RE100. Therefore, to perform an accurate estimation of the renewable energy demand, we need to consider the double counting of green premiums on both sides.

PPAs and the purchase of RECs, which are in their initial phases of implementation, do not have the issue of overlapping with the RPS system. However, they have not yet been as widely used as the Green Premium option because PPAs involve high electricity network fees, with KEPCO planning to further introduce a PPA pricing scheme. Moreover, the price of a REC is higher than KRW 10-15 per kWh, the winning bid price range of green premiums.

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⁷ According to RE100.org (as of March 2023)

The mechanism for creating domestic renewable energy demand



Estimated RE demand from voluntary initiatives

This report examines whether the renewable energy deployment goal for 2030 set by the South Korean government in the 10th Basic Plan for Long-term Electricity Supply and Demand Plan is sufficient given the corporate renewable energy demand, or whether it should be more ambitious. In particular, companies have expressed concerns lately over the recent reduction of the renewable energy target, while calling for a greater renewable energy supply to respond to increasing pressure from the global supply chain.

In order to estimate renewable energy demand under voluntary initiatives such as CDP and RE100, it is necessary to first review the short, medium and long-term GHG emissions reduction targets and renewables procurement targets voluntarily set by companies. Although there are many voluntary initiatives, this report estimates the corporate renewable energy demand for 2030 based on CDP and RE100, the two standards most widely used by South Korean companies for ESG reporting. The basic data and evidence are based on the responses companies provided to CDP.

This report analysed a total of 236 companies, limited to those that set and reported their carbon reduction targets to CDP. These companies were classified into (1) South Korean companies that joined the RE100 initiative (29 companies), (2) companies that separately set renewable energy procurement targets in their responses submitted to CDP (11 companies), (3) companies that joined the Science-based Target initiative (SBTi) (4 companies), (4) foreign companies with a presence in South Korea that are members of the RE100 initiative (119 companies), (5) companies that separately submitted their Scope 2 electricity consumption reduction targets (69 companies) and (6) companies that joined the K-RE100 (4 companies).⁸

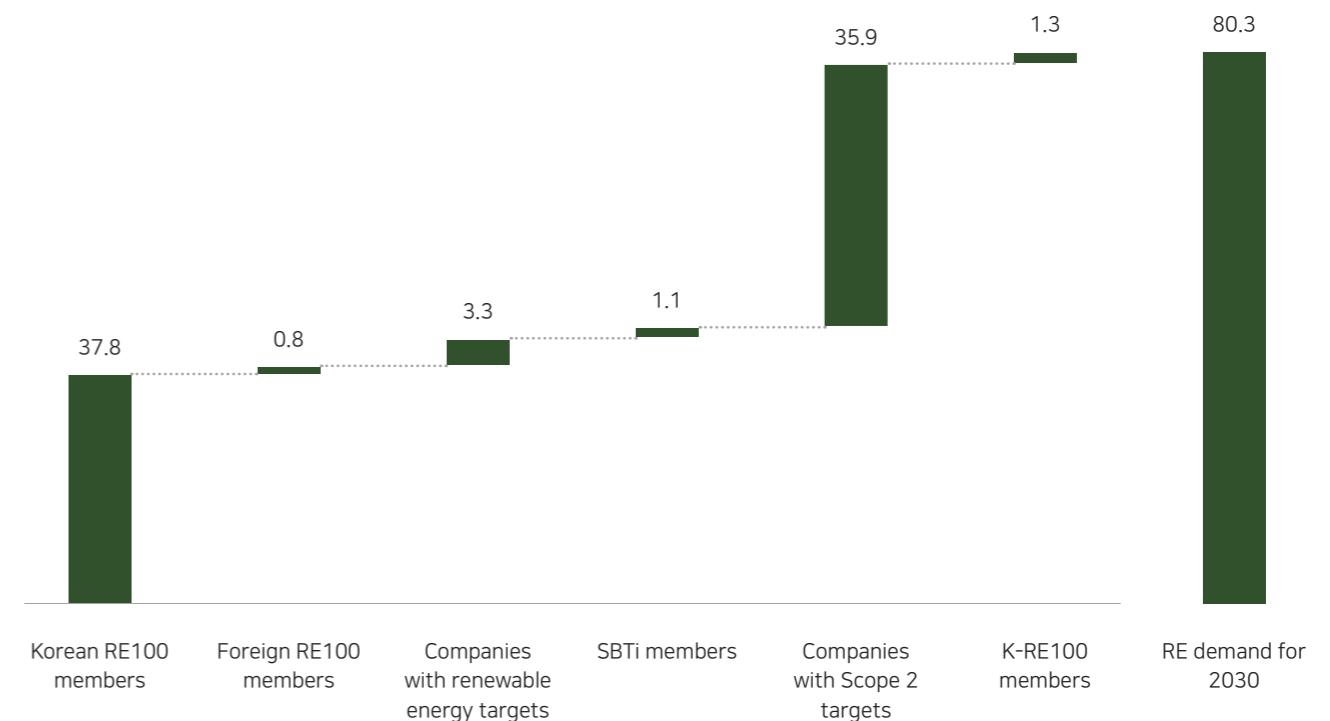
⁸ All data used to estimate the RE demand from voluntary initiatives is based on the internal database of CDP and RE100. In addition, the analysis excluded companies participating in multiple initiatives or those that did not report their electricity use to CDP. The K-RE100 data is based on the data provided by the office of Yang Yiwonyoung, a member of the National Assembly.

To accurately estimate the demand, we gathered the electricity consumption data for 2021, the electricity consumption projection for 2030 and the renewable energy procurement targets for 2030 of the companies in the above six categories. The 236 companies analysed in this report consumed 147.4 TWh of electricity in total, and the projected electricity use for 2030 was derived by using the projected growth of indirect emissions in respective sectors based on the 2021 electricity usage data submitted by the companies to CDP. For the forecasted growth of indirect emissions for each sector, we partially used the GHG emissions growth rates for major industries, which the former Carbon Neutrality Commission (currently the Presidential Commission on Carbon Neutrality and Green Growth) used as a basis of the (draft) plan to increase the 2030 NDC target. As some industries, such as the IT and semiconductor industries, are expected to use a significantly greater amount of electricity for the construction and/or expansion of data centres, we applied the electricity use growth trend of relevant industries identified through interviews with companies and experts.⁸ Accordingly, the electricity consumption for 2030 is estimated at 213.6 TWh.

The duplicates of companies that fell under two or more categories were excluded from the estimation, and the renewable energy procurement demand for each company was estimated based on the responses they provided to CDP and RE100. Then we applied the projected electricity use for 2030 and the 2030 renewable energy procurement targets of the subject companies to estimate the corporate renewable energy demand from voluntary initiatives. The baseline scenario was devised based on the corporate data provided to CDP and RE100. A separate scenario for procuring 60% renewable electricity by 2030, the goal of the RE100 initiative, is also provided. For reference, a total of 96 South Korean companies have set and reported interim targets before 2050, and for the remaining 21 South Korean companies that have not, their targets for 2030 were estimated by assuming a linear reduction trajectory to their 2050 targets.

As a result of the estimation, the renewable energy demand from voluntary initiatives is estimated at 80.3 TWh under the baseline scenario and approximately 98.3 TWh under the enhanced scenario in which the renewable electricity share reaches 60% by 2030. By industry, the electric and electronic equipment industry accounts for 45% of the total, followed by the petrochemical industry at 18%, the automobile industry at 6%, the steel and nonferrous metals industry at 6% and oil and gas at 6%. The sectoral composition suggests that the five leading manufacturing sectors with high trade exposure make up about 80% of the total renewable energy demand.

The estimated RE demand from voluntary initiatives (under the baseline scenario)



Estimated RE demand from the RPS scheme

The renewable portfolio standard (RPS) scheme has been in effect since 2012 under Article 12(5) of the New and Renewable Energy Act and is currently the only regulatory and incentive system aimed at regulating renewable energy supply. It requires power generators or integrated energy operators with an installed power capacity of 500 MW or more to supply renewable energy by following the mandatory supply ratio for each year as prescribed by the Act. If the RPS participants fail to meet the obligation, a penalty of 1.5 times the average trading price of a REC for the year is imposed under Article 12(6) of the Act. Currently, the scheme covers 25 companies, including the state-run power generation companies under KEPCO and private power generators such as SK E&S.

In 2021, the National Assembly amended the New and Renewable Energy Act as a follow-up measure to the carbon neutrality declaration and the updated 2030 NDC target. Accordingly, the mandatory renewable energy supply ratio for 2026 was significantly raised to 25%. However, the current administration postponed the year of achieving the 25% target from 2026 to 2030 in line with the reduced renewable energy targets specified in the 10th Basic Plan for Long-term Electricity Supply and Demand. Accordingly, the annual mandatory renewable energy supply ratios were also significantly lowered.

As stated above, the RPS scheme is the only regulation that can facilitate the deployment of renewable energy in South Korea, so the reduction in the mandatory supply ratio would likely suppress the demand of power operators, negatively affecting the renewable energy demand for 2030.

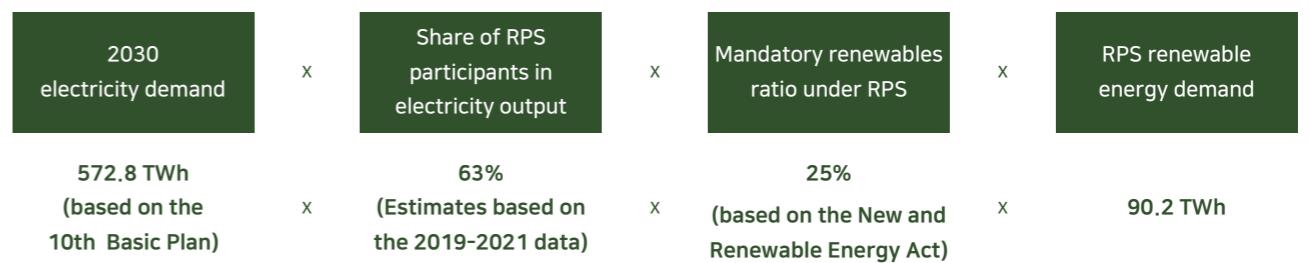
To estimate the renewable energy demand for 2030 from the RPS system, we can utilise the domestic electricity demand, the share of RPS participants in electricity output and the mandatory renewables ratio under the RPS system for 2030. The domestic electricity demand and the mandatory renewables ratio for 2030 can be derived from specific figures stated in the 10th Basic Plan for Long-term Electricity Supply and Demand and the Enforcement Decree of the amended New and Renewable Energy Act, respectively. According to the Basic Plan, the total baseline demand forecast for 2030 is 119.8 GW and the target demand, excluding demand management, is 109.3 GW. Accordingly, the electricity consumption for 2030 is estimated at 572.8 TWh.

The share of RPS participants in total electricity output can be calculated by using publicly available statistics, but since the actual generation output of RPS participants and the total national output vary year-by-year, the average of the recent three years (from 2019 to 2021) was used. The share of the electricity output of RPS participants was 77% in 2019, 78% in 2020 and 72% in 2021, and the average was approximately 75%. It is difficult to accurately analyse the proportion of RPS participants for 2030, but on a conservative basis, we can consider that nuclear power, coal and LNG together accounted for 92% of the total and that the RPS participants represented 77% of the total electricity output in 2019. Based on this, it is possible to forecast that their electricity output share will go down slightly in 2030 to about 63%.

In summary, the renewable energy demand for 2030 from the RPS system can be calculated based on (1) the total electricity demand for 2030, (2) the share of RPS participants in electricity output and (3) the mandatory renewable energy ratio for 2030. Consequently, the renewable energy demand for 2030 from the RPS system is estimated at 90.2 TWh. It is approximately 90% of the renewable energy (solar PV and onshore/offshore wind) deployment target of 97.8 TWh, which the Ministry of Trade, Infrastructure and Energy established through the 10th Basic Plan.

The calculation method of the share of RPS participants in electricity output and the estimated demand

Year	Mandatory supply (MWh)	Mandatory supply ratio (%)	Electricity output of RPS participants (MWh)	Total electricity output (MWh)	Share of RPS participants in electricity output (%)
2021	38,926,912	9.0%	432,521,244	601,938,354	72%
2020	31,401,439	7.0%	448,591,986	577,111,901	78%
2019	26,966,632	6.0%	449,443,867	586,806,003	77%
Total			1,330,557,097	1,765,856,258	75%



Estimation of renewable energy demand for 2030

As a result of estimating the renewable energy demand for 2030 from voluntary initiatives and the RPS system, respectively, we found that the renewable energy demand from voluntary initiatives ranges from 80.3 TWh to 98.4 TWh. Moreover, the renewable energy demand from the RPS system is approximately 90.2 TWh.

However, as mentioned before, in the case of the Green Premium scheme, which is one of the options for sourcing renewable energy within the RE100 framework, companies pay green premiums to purchase RECs tied to the RPS system. Consequently, demand related to green premiums may be double counted.

Therefore, it is necessary to separate the demand related to green premiums from the demand from companies participating in voluntary initiatives. Recently, the Korea Power Exchange surveyed companies participating in RE100 to investigate their most preferred means to implement RE100, as well as the preferences of their clients. The survey results show that only 16.5% of the surveyed companies and 11% of their clients prefer the Green Premium option.⁹ When the survey findings are applied to the renewable energy demand from voluntary initiatives, the demand from green premiums for 2030 is estimated to be around 8.8 TWh to 13.2 TWh. Notably, according to the 2022 RE100 Annual Disclosure report published in 2023, the share of green electricity products (such as the Green Premium) out of the variety of sourcing options for all global RE100 companies is a mere 19%.¹⁰

⁹ Korea Power Exchange. The outcome of the survey on the domestic RE100 market aimed to facilitate direct PPAs. 2022

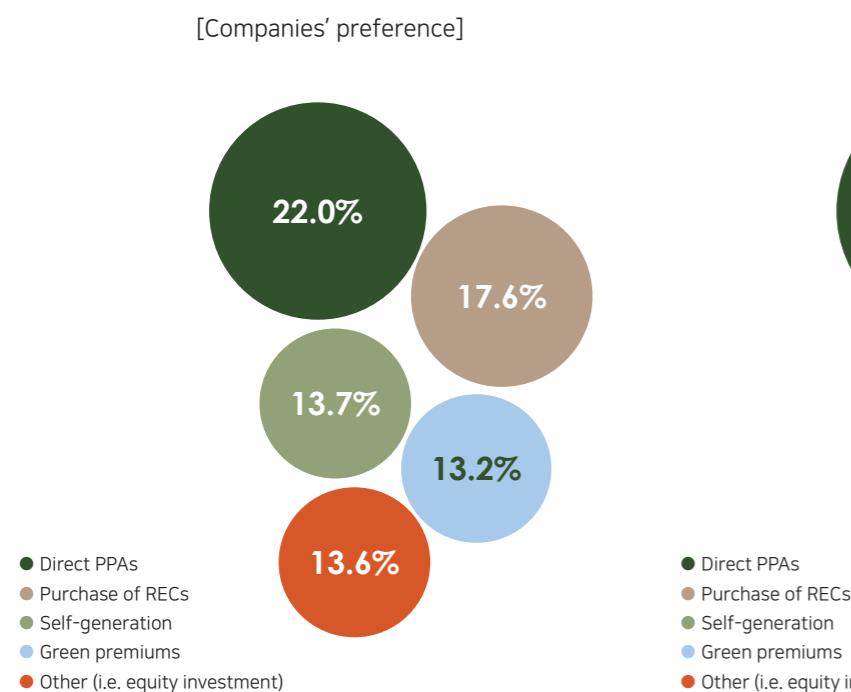
¹⁰ RE100. 2022 RE100 Annual Disclosure Report. 2023

The reason that the future demand for green premiums is low among companies is that under the current system, green premiums cannot be accredited as GHG reductions, and thus they do not really help companies that need to meet their indirect emissions (Scope 2) targets. In the mid-to-long term, the purchase of green premiums will remain purely as a cost, while PPAs will contribute to savings in energy costs after grid parity is reached with rising electricity prices and declining renewable energy prices. Green premiums are not a preferred option for client companies that buy products from other companies, either, given the constant criticism about Green Premiums' low additionality and the fact that they do not practically lead to GHG reductions in their value chains (Scope 3).

In addition, we can refer to the LCOE projections for renewables in South Korea presented by research institutes in South Korea and other countries. BloombergNEF expects the electricity generation costs for solar PV and onshore wind to fall below those of coal, reaching grid parity by around 2027,¹¹ and the Korea Energy Economics Institute forecasts that the electricity cost from solar PV will decline to KRW 121.2 per kWh after 2025.¹² This is close to the average industrial electricity rate of KRW 120 per kWh as of 2023, which suggests that the demand for PPAs will further grow as PPAs become more attractive for businesses than green premiums that are billed in addition to electricity rates.

Therefore, when we address the issue of double counting the demand for green premiums and apply a conservative estimate of 16.2 TWh as the projected RE demand from green premiums, the total renewable energy demand for 2030 can be calculated by adding the (1) demand from voluntary initiatives and (2) demand from the RPS scheme, while excluding the (3) demand from green premiums. As a result, the total renewable energy demand for 2030 is forecast to be between 157.5 TWh and 172.3 TWh.

Renewable energy demand by sourcing options based on companies' preference and requests from their clients (Units: TWh, %)¹³



11 Energy Daily, Korea will reach grid parity with renewable energy by 2027. Feb 2021

12 Korea Energy Economics Institute. Data on the mid-to-long-term LCOE outlook. 2021

13 The charts were produced based on the 2022 Korea Power Exchange's market survey.

Comparison with the government's 2030 goal for renewable energy deployment

In the 10th Basic Plan for Long-term Electricity Supply and Demand announced by the government in January 2023, the electricity output from new energy and renewables for 2030 is expected to be 134.1 TWh. This goal includes not only renewable energy sources, such as wind, solar PV and biomass, but also so-called "new energy" sources, such as fuel cells and integrated gasification combined cycles (IGCCs). Since fuel cells and IGCCs are based on fossil fuels and cannot be used to implement RE100 or RPS obligations, it is necessary to reanalyse the government's goal with a focus on renewable energy.

According to the 10th Basic Plan, the electricity output generated from IGCCs based on coal and fuel cells is expected to be 16.0 TWh and 2.4 TWh, respectively. The two "new energy" sources, excluded from the coverage of RE100, should not be recognised as renewable energy sources companies can use. Furthermore, many other renewable sources, such as hydropower, ocean energy and biomass, need to be also excluded from the potential amount of renewable energy supply, as they are not proven as sustainable under the RE100 initiative.

In other words, the types of renewable energy that companies can actually procure are limited to solar PV and wind power, and when we add their deployment targets of 58.9 TWh and 38.8 TWh, respectively, the total available renewable energy supply will be around 97.8 TWh.

This amount will only meet 56-62% of the estimated corporate renewable energy demand, which is contrary to the government's position: even though the government has cut down its renewable energy deployment goal for 2030 from 30.2% to 21.6%, there will be no problem in achieving 100% renewable electricity by companies. In addition, if measures to promote offshore wind power licenses continue to be insufficient, as we see with the Special Act on Offshore Wind Power that is still pending at the National Assembly, meeting the corporate renewable energy demand in South Korea will be even more challenging.

As pressure from the global supply chain escalates, if domestic companies cannot be supplied with a sufficient level of renewable energy, it is inevitable that the competitiveness of South Korean companies will be undermined in major markets, such as the US and Europe. Therefore, there is a need for the government to review the existing renewable energy supply plan in the 10th Basic Plan to actually meet companies' demand for renewable energy.

According to analysis of this report, when corporate renewable energy demand for 2030 is taken into account, the renewable energy target of 21.6% under the 10th Basic Plan should be raised to at least 33%, a target that should be actively reflected in this year's National Plan for Carbon Neutrality and Green Growth and 2030 Greenhouse Gas Emissions Reduction Roadmap.

Estimation of renewable energy demand for 2030 under two different scenarios

	Major assumptions	Renewable energy demand (TWh)
Baseline scenario	Voluntary initiatives (based on corporate reporting) + RPS demand (excluding green premiums)	157.5
Enhanced scenario	Voluntary initiatives (based on the 60% target under RE100) + RPS demand (excluding green premiums)	172.3
[Renewable energy supply]		
Solar PV	58.9	
Wind power	38.9	
10 th Basic Plan Target	97.8	
[Renewable energy demand]		
Demand from voluntary initiatives (PPAs and REC purchases, etc.)	67.3	
Demand from the RPS scheme	90.2	
Renewable energy demand	157.5	

[Case Studies] Expansion of Renewable Energy Demand at the Supply Chain Level



The trend of growing renewable energy demand at the supply chain level

Some companies agree on the necessity and urgency of using renewable energy but have not used it due to challenging conditions. In particular, the barriers to renewable energy are difficult to overcome for small and medium-sized enterprises (SMEs), since they lack the capacity and financial resources to quickly catch up with the global trend of transitioning to renewable energy use. However, as large corporations in and outside of South Korea – which are clients of SMEs in the global supply chain – join voluntary initiatives like RE100 and begin to manage their Scope 3 emissions, they have started to place pressure on their suppliers in order to manage and reduce GHG emissions. Therefore, renewable energy demand from SMEs is expected to gradually expand. According to a survey of 306 South Korean companies conducted by the Korea RE100 Consultative Body in 2022 on the role of the government and policy priorities for facilitating RE100 in South Korea, the largest share, or 29.3%, of the surveyed companies responded that the deployment of renewable energy facilities and consulting support for SMEs is required. This suggests that the government should promptly introduce measures to facilitate renewable energy sourcing for companies lacking the capacity to achieve carbon neutrality.

While it is difficult to accurately quantify the potential renewable energy demand from SMEs or other companies that are slower in the renewable energy transition, we interviewed two SMEs that are proactively responding to carbon neutrality. We listened to their perspectives and challenges regarding renewable energy use. The two interviewees, despite their different circumstances, found common ground by admitting the necessity of renewable energy and the burden of high renewable energy costs. Renewable energy has become a real problem, as external factors, such as client requests, are putting pressure on organisations and their very survival. The interviewees stressed that the prices of renewable energy should be stabilised, considering the expected growth of renewable energy demand in the future, which should also be backed up by more advanced technology and improved institutional frameworks. However, the interviewees mentioned that their companies are somewhat waiting for such changes to take place, since the entry barrier to renewable energy is still high for SMEs. Throughout the interview, we noticed the companies' efforts to seriously incorporate ESG and carbon neutrality into their operations despite the limiting conditions. The detailed responses from the two interviewees can be found in the following text.

Bluebird Inc.

Bluebird Inc. is the first SME in South Korea to join the Science-based Target initiative (SBTi). The company provides total solutions for industrial mobile IoT, and its main products include payment terminals and RFID solutions. Initially founded as a software company in 1995, Bluebird transformed into an industrial mobile computer manufacturer in 1998 and has grown its global competitiveness with its excellent technologies and market-leading products. Having led the market with technological prowess, the company now hopes to become a market leader through its eco-friendly business practices. We have interviewed a member of Bluebird who is responsible for environmental strategies and regulations, such as toxic substance control.

1. Bluebird is the first SME that joined the SBTi in South Korea. What encouraged the company to make such a decision?

Over 90% of our clients are outside of Korea, and Europe is our biggest market. Currently, the two biggest issues for European companies are ESG and carbon reductions. Our clients are mainly from the public sector, including hospitals, railways and the police, as well as retail and distribution industries that are ESG-sensitive. In the past two or three years, almost all clients have put great emphasis on our ESG performance and carbon reductions when evaluating our products. One client even informed us that they might have to halt business unless we become a member of the SBTi. We joined the SBTi to respond to these client requests.

2. What are the key activities and strategies that Bluebird is implementing for sustainability?

We have introduced an IT system to manage hazardous substances and are working on carbon reductions by joining the SBTi and setting a reduction target. To reduce energy consumption, we have fully shifted to LED lights in our new headquarters and established a policy to prioritise products with high energy efficiency when purchasing office equipment. We constantly conduct campaigns on saving resources (water, waste, recycling, etc.) and actively seek low-carbon methods to deliver our products to our customers. We will soon adopt ESG management as our business strategy. We plan to build a target management system for ESG and issue our first sustainability report by the end of this year.

3. The use of renewable energy is essential to reduce greenhouse gas emissions. Does Bluebird have any renewable energy-related policies?

Through the SBTi, we set our target to reduce GHG emissions by 2.5% annually until 2030. To do so, we plan to firstly establish internal processes to reduce GHG emissions. However, since such measures won't be enough to meet our target, we will have to buy the renewable energy equivalent of 2% of our annual electricity use in at least three years. We are not sourcing renewables for now, partly for cost reasons, but also because we believe more advanced technologies and policies for renewable energy are needed. If we decide to procure renewable energy, we will focus on sources with sufficient supply and price competitiveness. The cost is the biggest consideration for businesses, so price stability is of paramount importance. We approach the issue of renewable energy sourcing as a matter of recovering capital investment over 20 years. Our annual energy consumption as of 2021 was 410,599 kWh, and it seems we will have to ultimately procure around 100,000 kWh of renewable energy each year. If we decide to build our own self-generation facilities, we will need to invest in solar PV facilities with around 1500 m³ /100 kW capacity. But, we haven't made the decision yet.

4. How do you assess the potential impact of RE100 participation and the use of renewable energy on a company's long-term competitiveness?

The use of renewable energy has an enormous impact on a company's competitiveness. We believe a failure to use renewable energy will cause business disruption or drive the company out of the market. The same is true for our company. If we don't act now, it's obvious we will lose many of our clients. Clients are already demanding specific actions. This trend will only intensify, as seen in the EU Directive on Corporate Sustainability Due Diligence. This will put a big burden on Korean companies that are in the EU supply chain.

5. Considering the RPS and companies' voluntary demand for renewables, do you believe there's enough supply of renewable energy now, and do you expect the supply to be sufficient in the future? How do you expect the renewable energy demand of domestic companies to change in the future?

Currently, the supply shortage isn't a significant issue, but as the increasing demand for renewable energy is expected to surpass the supply, we are concerned that we might not be able to source enough renewable energy. The demand from the business sector will rise consistently and at a high speed. The early movers have set their short-term targets for 2030, so the renewable energy demand after 2030 is expected to grow exponentially. This is much more the case for Korean companies, many of which are included in the EU supply chain. To reach net zero, the use of renewable energy is essential. Ultimately, all companies will have to secure renewable energy. In Korea, around 80% of electricity is consumed by businesses. If we assume that half of all Korean companies fully shift to renewable electricity by 2030, around 40% of their electricity consumption should come from renewables. However, since the government has decreased the share of renewables out of total electricity generation in 2030 to 21.6%, the supply will cover only half of the hypothetical demand. This concerns us because greater demand than supply means price instability.

6. What do you think is most urgently needed in sourcing renewable energy in South Korea?

The government's promotion and support are urgently needed to ensure that SMEs can source renewables with ease. Until last year, there was no proper guidance available, so it was hard to get the necessary information. If the government provides large-scale promotion and education on how to source renewables, as it did with recycling, this will not only help SMEs with relatively poorer access to support and information but will also change the public perception of the issue. Of course, the government has been providing relevant programs and information at a fast rate starting last year. However, SMEs with insufficient human resources have difficulties searching for relevant information by themselves. I hope the government will provide more active support for actual users of renewable energy, including support for solar PV installation. Support is also desperately needed in terms of costs. There's a concern that renewable energy prices might rise sharply due to the rapid increase in demand. This makes it even harder for companies to shift to renewable energy at a time when electricity costs are also going up. We might need an RE cluster or industrial complex managed by the government where renewable energy is cheaper and more accessible. I heard that considerable amounts of electricity generated by renewable energy facilities are wasted and not used. A method to provide such wasted electricity for businesses is desired.

7. Do you have any final comments to make?

The business environment is becoming harsher for survival. Companies need to meet more stringent requirements. Smaller ones unable to respond to those requirements properly lag behind and are being pushed to the brink. It is hard not only to catch up with large enterprises in terms of ESG management but also to have our employees fully on board. I hope that the government makes efforts to understand such difficulties that SMEs are facing and provide necessary assistance. Policy inconsistency increases risks, and businesses are the ones to suffer as a consequence. I hope renewable energy is supplied in a stable and cost-effective manner based on a consistent energy policy. Under current circumstances, sourcing renewable energy is very difficult but an unavoidable trend for all.

KOS, a manufacturer of stainless wire and ropes, cables, medical devices, etc., received inquiries from 11 clients last year alone regarding ESG practices. To address client requests and with a drive from the management, KOS declared to implement ESG management last year and plans to internalise ESG strategies for the next two to three years. We met a member of its ESG team created this year.

1. How did KOS decide to adopt ESG management?

Client requests and the strong commitment of management were the biggest factors. 70% of our products are exported overseas, and we received many requests from global clients regarding ESG. Most of them were from the US and Europe. One German client set a target of reducing its carbon emissions by 25% by 2025, as well as 75% of its carbon footprint stemming from raw materials. The company demanded that we, as a supplier of its main raw material, report our 2019 carbon emissions and reduce them by 25% by 2025. Having grasped the changing external trends, the management decided our business would face challenges unless we adopted ESG management. Our C-level management thought that even if ESG is currently adopted mostly by large enterprises, it will work favourably to overcome the hurdles if we adopt it proactively.

2. What key activities and strategies is KOS implementing for sustainability?

This year's biggest task is to internalise ESG management. We plan to consolidate its foundation with the creation of an ESG Team based on the ESG strategies developed last year. We have set a realistic target of lowering GHG emissions by 20% by 2030 from the three-year average level of 2019 to 2021. Even before setting the GHG reduction target, we have engaged in emissions-cutting activities, such as saving costs, improving facility efficiency and processes and reducing electricity consumption. As an extension of these activities, we will focus on reducing GHG intensity. One of our three corporate bodies is classified as a mid-sized company, and electricity consumption accounts for 99.5% of its total Scope 1 and Scope 2 emissions. It is also included in the GHG Target Management System. We received government grants for reducing GHG emissions by over 25% annually from 2018 to 2020. Reductions were mostly made through improving facility efficiency. Renewable energy was one of the options but we haven't used it yet due to cost issues

3. You said KOS aren't using renewables yet due to high costs. Does the company plan to do so in the future?

We are considering joining CDP or SBTi two to three years after internalising the ESG strategies. But, we don't have any plans to use renewable energy for now because its costs outweigh the benefits. Since our profit margin is not very high, introducing renewable energy is quite burdensome cost-wise. In addition to the low profit margin, the price of renewables is a bigger issue for smaller companies. However, we may consider the option if we face greater external pressures to do so or if the prices go down. There is no direct external pressure to adopt renewables yet, but there's no guarantee that this will be the case in the future. In addition, the costs of generating renewable electricity are declining. If the levelised cost of electricity (LCOE) of renewable energy decreases below the level of non-renewable energy sources – like in Europe – and the supply increases, there's no reason not to use renewables. We are more likely to use renewable energy if we can use it more efficiently through the introduction of energy storage systems and transnational super grids. In a sense, we are postponing the use of renewable energy until the supply becomes more favourable because it is not easy for us as a mid-sized company to lead the energy market and make our voices heard by the government.

4. Considering the RPS and companies' voluntary demand for renewables, do you believe there's enough supply of renewable energy? Do you expect the supply to be sufficient in the future?

SMEs with large-scale facilities would have a high portion of Scope 2 energy consumption. I have heard that the renewable energy supply isn't sufficient due to various reasons, including Korea's topography. Technological developments and transnational power grids may expand the supply, but this won't be easy and will take a significant amount of time.

5. How do you think that changes in the external environment over climate change will affect Korean companies' demand for renewable energy?

Now, Korean clients have started to care, and it is expected that large enterprises will increase their use of renewables. Therefore, we can't expect that there won't be any further demand. In addition, the disclosure requirements of the US SEC have expanded to cover Scope 3 emissions, and the EU has demanded the disclosure of carbon emissions through the introduction of the Carbon Border Adjustment Mechanism (CBAM) and the Corporate Sustainability Reporting Directive (CSRD). To respond to such external developments, we would need to build the relevant financial capacities. For now, it is not a big deal not to join RE100, but if regulations and pressures increase in the future, reducing carbon emissions alone won't be enough. SMEs in Korea are reluctant to adopt renewable energy because of the cost burden, so once the prices go down, the demand will surge.

6. What do you think is the right direction for South Korea's renewable energy policy to be beneficial for Korean businesses?

I hope that the government introduces policies to induce technological developments. Those policies should be able to improve the competitiveness of Korean companies and expand Korea's market share of renewables. We produce and export materials used in the solar PV industry, and it seems necessary to promptly expand Korea's market share in raw materials and technology for renewable energy. The government should continuously come up with policy measures to support Korean companies. This will definitely require international cooperation in many aspects, including transnational power grids and cooperation in sourcing renewable energy. Subsidies may be used temporarily but can't continue forever, so Korea should cooperate with countries with good renewable energy environments to fundamentally improve the country's renewable energy procurement environment. Without such efforts, it won't be easy to lower renewable energy prices, and when the prices are too high, industrial competitiveness will be weakened. Therefore, government efforts to ensure the price competitiveness of renewable energy are essential. Ironically, even if one or two clients demand we should use renewable energy, due to high sourcing prices, it makes more sense to discontinue the business relationship with them from the standpoint of corporate sustainability. This is a matter of survival for companies. Of course, when we enter into an era where external circumstances force us to adopt renewable energy, it would be difficult not to do so.

Policy Recommendations for System Improvement

Change in the perspective of renewable energy policy

In the 20th century, the stable supply of cheap fossil fuels determined a country's competitiveness. However, entering the 21st century, an era of the climate crisis, countries that supply cheap and stable renewable energy are more likely to take the lead. Businesses are recognising carbon neutrality and the renewable energy transition needed to achieve carbon neutrality as key factors determining their competitiveness in the future. Companies are rapidly responding to the changes. There are not only RE100 companies but also approximately 7,000 companies around the world that have declared net-zero targets and are rushing to adopt renewable energy sources. In addition, an increasing number of companies are choosing the locations of their new sites based on the stable and affordable sourcing of renewable energy. Global companies are very active in this transition not just in their own operations but also in their supply chains. As more companies become subject to climate disclosure requirements including Scope 3 emissions (covering supply chain and customer emissions), the pressure for renewable energy on suppliers will become more intense. South Korea is an export-oriented, open-market economy. Therefore, it is bound to be more vulnerable to this series of changes led by the international community.

South Korea already has experience in fostering industries by supplying cheap energy, which has led to economic growth and improved welfare. In the upcoming decarbonised society, however, the supply of not just cheap energy but cheap renewable energy will determine the competitiveness of industries and the country. Renewable energy is not only an energy policy but also an industrial policy, and it is also a labour market policy that will help to protect existing jobs and create new jobs. Therefore, we need to fundamentally change the perspective on renewable energy policies. The prices of renewable energy cannot be decreased if the renewable energy supply barely meets the demand. Korean companies will not be able to maintain their global competitiveness with the currently high renewable energy costs. Moreover, it will be difficult as a country to expect a strong competitive edge and a high level of welfare without businesses and jobs.

In reality, South Korea is at a disadvantage when it comes to renewable energy expansion in comparison to its competitors. However, it is also obvious that Korea will not be able to maintain its national competitiveness in the future without scaling up its renewable energy supply. It is necessary to recognise renewable energy as a key factor for national competitiveness, not merely just one of many energy sources, and implement more ambitious policies from a broad perspective.

The need to raise the national renewable energy targets

The South Korean government should raise its 2030 renewable energy target to at least 33%, and preferably to 40%, when taking into account the renewable energy demand from other sectors besides the industrial sector, such as building. According to the analysis of this report, renewable energy demand for 2030 is estimated between 157.5 TWh and 172.3 TWh, which is significantly higher than 97.8 TWh, the expected renewable electricity output from solar PV and wind power under the 10th Basic Plan for Long-term Electricity Supply and Demand. Given the current renewable energy deployment targets, it will be clearly difficult to lower the prices of renewable energy to match those of competitors, let alone ensure the global competitiveness of Korean companies.

These days, electricity has evolved into various forms differentiated by how much carbon is emitted in the production process. Renewable electricity demand and trade have grown rapidly in the private sector. Korea's renewable energy targets and plan should respond to the changing environment. The national renewable energy targets should be able to encompass direct supply policies at the national level as well as voluntary production and trading by the private sector. In other words, national renewable energy targets should be established in a way to support the development of sufficient infrastructure for renewable energy production and trading in the private sector (such as PPAs and the REC purchase), along with providing renewable energy supply with subsidies under the RPS policy.

Issues, such as connection delays caused by a lack of grid infrastructure and local resident approval, have slowed the expansion of renewable energy in South Korea. The renewable energy deployment target in the 10th Basic Plan for Long-term Electricity Supply and Demand and the related infrastructure and policies cannot support the growing renewables supply and demand driven by RE100 companies. The government has to consider companies in the private sector as partners who work together toward the growth of renewable energy in South Korea and establish national targets accordingly. Furthermore, it is necessary to separately implement detailed plans to achieve renewable energy targets in two areas: first, by spreading renewable energy through the RPS scheme, and second, by supporting infrastructure aimed to facilitate the voluntary production and trading of renewable energy in the private sector.

Expansion of renewable energy PPAs for businesses

Currently, the Green Premium scheme is the most widely used means to procure renewable energy for South Korean companies. Under this program, the Korea Electric Power Corporation (KEPCO) buys RECs through the RPS system and sells them at a green premium price, but it has been consistently criticised for its lack of additionality. The RE100 initiative has recently strengthened the additionality requirement in its RE100 criteria by recommending that member companies use more impactful procurement options, such as projects associated with new renewable capacity. Global RE100 companies have also gradually moved away from relatively simple green pricing methods, such as the Green Premium scheme, to PPAs with high additionality. In addition, more companies are adopting renewable energy sourcing options with high additionality and recommend that their so as well.

From a corporate perspective, PPAs not just have a high level of additionality

but suppliers do also serve as solutions to both the volatility of electricity prices and GHG emissions. In particular, given that electricity costs and carbon prices will inevitably continue to rise, PPAs can be a cost-effective means in the mid-to-long term. From the government's point of view, PPAs are also effective in expanding renewable energy without spending additional public resources. The expansion of corporate renewable energy PPAs is a win-win policy option both for the government and the business sector. To ensure that the PPA market – which has just begun to take off in South Korea – becomes robust, institutional support is necessary, along with the reform of unreasonable regulations.

In addition to KEPCO's PPA pricing system, settlement methods and the unstandardised contract mechanism, the biggest obstacle to corporate PPAs is the very lack of available projects for which companies can make contracts. The introduction of a "public-private one-stop project for corporate PPAs" can be one of the solutions to this challenge. Under this partnership, the government and public enterprises (or private power generators) can take the lead in solving issues such as site preparation, administrative procedures and public acceptance, while businesses can easily participate in renewable energy projects through equity investment or purchase agreements. Furthermore, the high costs of PPAs compared to the costs under RPS, largely due to expensive electricity network fees and the absence of multipliers, are another problem hindering the expansion of PPAs. Temporary exemptions or discounts on electricity network fees can be adopted until PPA costs become competitive.



Appendix

Companies Participating in Voluntary Initiatives

RE100 members (Korea)	Korea Zinc	Companies with Scope 2 targets	Hotel Lotte	Companies with Scope 2 targets	HL Mando Corporation
	Kia Motors Corp		Samsung SDS		JB FINANCIAL GROUP
	Naver		Sae A Trading		KT&G
	Lotte Chilsung		Shinsung Tongsang Co		LG
	Mirae Asset Securities		Shinwon Corporation		LG Display
	Samsung SDI		Shinhan Financial		LG Household & Health
	Samsung Display		Group		Care
	Samsung Biologics		ISU PETASYS		LG Uplus
	Samsung Life		ILJIN GLOBAL		LG Electronics
	Insurance		Chong Kun Dang		LG Chem
	Samsung Electro-Mechanics		Pharmaceutical		LS Electric
	Samsung Electronics		KAKAO CORP		LX Hausys
	Samsung Fire & Marine Insurance		KMW		SK Gas
	Amorepacific Corporation		Kolon Industries		SK Networks
	Incheon International Airport Corporation		Coway		SK Discovery
	K-water		CRESYN		SK Broadband
	Hyundai Mobis Co Ltd		Pan Ocean		SK ecoplant
	HYUNDAI WIA CORPORATION		Hana Financial Group		SK Innovation
	Hyundai Motor Company		LX, Korea Land and Geospatial Informatix Corporation		SK Chemicals
	KB Financial Group		Korea Shipbuilding and Offshore Engineering		SL Corp
	KT Corporation		Hankook Tire & Technology		TKG TAEKWANG
	LG Energy Solution		Hanssem Company		Companies with renewable energy targets
	LG Innotek		Hanwha Solutions	Companies with renewable energy targets	Lotte Fine Chemical
	SK Inc.		HANDS CORPORATION		Samsung Engineering
	SKC		Hyundai Construction Equipment		Samsung Securities
	SK Specialty		Hyundai Department Store		Samsung Card
	SK Siltron		Hyundai Doosan Infracore		Sungwoo Hitech
	SK ie Technology		Hyundai GLOVIS		POSCO Engineering & Construction
	SK Telecom		Hyundai Engineering		KEPCO Plant Service & Engineering
	SK Hynix		Hyundai Steel		Hanwha Corp.
			Hwaseung Enterprise		CJ Cheiljedang
			Hyosung Corporation		DGB Financial Group
Companies with Scope 2 targets	KISWIRE	Companies with Scope 2 targets	Hyosung Heavy Industries		LS Cable & System
	Kumho Petrochemical		Hyosung Advanced Materials Corp		SBTi members
	Industrial Bank of Korea		Hyosung Chemical		Nexen Tire
	Nobland International		Hyosung TNC		Doosan Enerbility
	DAEDUCK		Humax		Samsung C&T
	ELECTRONICS		BNK Financial Group		Hansoll Textile
	Daewoo E&C		DL E&C		K-RE100 members
	Daewoo Shipbuilding & Marine		DN AUTOMOTIVE CORPORATION		Anonymous
	DONGWOO FINE CHEM		GS Engineering & Construction		NH Bank
	Dongjin Semichem				Young Poong Electronics
	Lotte Chemical Corp				POSCO