



Report 2023

# Korea

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**Having newly installed 169 MW capacity of wind turbines in 2023, the accumulated capacity in Korea reached 1,970 MW at the end of 2023.**

Starting in 2022, the new government announced that it would keep the carbon neutrality target for 2050 and renewable energy deployment goals of 33% of electricity generation by 2036. The wind energy sector in Korea, which has shown slower deployment than the photovoltaics, is preparing large-scale installation of wind energy, especially offshore, for the energy transition.

## Highlight(s)

- Total installed wind capacity reached 2 GW in 2023 – a 9.2% increase from the previous year.
- New plans for offshore wind aim for 12 GW by 2030, with economic benefits also trickling down to the local communities.

**Table 1. Key National Statistics 2023: Korea**

Total (net) installed wind power capacity	1970 MW
Total offshore capacity	158 MW
New wind power capacity installed	169 MW
Decommissioned capacity	0 MW
Total electrical energy output from wind	3.35 TWh (in 2022)
Wind-generated electricity as percent of national electricity demand	0.6%
Average national capacity factor	23.7%
Target	34.1 GW by 2036
National wind energy R&D budget	45 mil USD

- The development of offshore wind farms is a key component of the Korean Green New Deal.
- By the end of 2023, a total of 37.7 GW wind projects have received the Electricity Business License EBL, 27.3 GW offshore, and 10.4 GW onshore.

## Market Development

### National Targets and Policies Supporting Development

- At the end of 2017, the Ministry of Trade, Industry and Energy (MOTIE) announced the “Renewable Energy 2030 Implementation Plan,” which states the national renewable energy target and its implementation plans towards 2030. The national objective is 20% renewable energy generation of electricity demand by 2030 [1]. According to that plan, 63.8 GW of renewable capacity will be required by 2030 [1].
- In January 2023, the Ministry of Trade, Industry and Energy (MOTIE) announced the latest

10th Basic Plan for Long-Term Energy Supply and Demand, which includes the national renewable energy target and plans towards 2036. The renewable energy generation objective is 33% of the national electricity demand by 2036 [2]. Wind capacity will be increased to 19.3 GW in 2030 and 34.1 GW in 2036.

- The Renewable Energy Portfolio Standards (RPS) is the leading policy supporting wind energy development, which is essentially a technology-neutral, market-based system. In the RPS system, multiple factors adjust the amount of renewable electricity generated from each technology, which varies from 0.25 to 3.8 (excluding ESS Energy Storage applications) [3]. For onshore wind, the factor is from 1.0 to 1.3 depending on the type of project (e.g., how many local communities were involved in the project). Among various renewable energy sources, offshore wind has the most significant factors, from 2.0 to 3.8, which means that the government strongly drives the deployment of offshore wind within the

country [3]. It is expected that the country is going to deploy about 12 GW of new offshore wind capacity by 2030 [4].

- The new president of the Republic of Korea, Mr. Yoon, stated to maintain the policy of the carbon neutrality target in 2050, which former president Moon established. He also announced an increase in nuclear power generation, which currently supplies 29.6% of annual electricity consumption.
- Because carbon neutrality is a promise to the world and the new government aims to succeed, Korea’s renewable energy policies will continue. In addition, requests from major companies to achieve RE100 are getting stronger in Korea. The low wind share of demand of 0.6% indicates possibility and room for growth of wind energy development in Korea.

### Progress and Operational Details

- 169 MW wind turbine capacity was newly installed in 2023—76%

higher than the previous year but still slow deployment [5]. Seven wind farms with 39 wind turbines were installed in 2023, including one 4.2 MW offshore project [5].

- The total installed wind capacity in the country reached 1,970 MW by the end of 2023—a 9.2% increase from the previous year [5]. There are 121 wind farms with 814 WTGs in total. In 2022, the electricity generated from wind power was 3.359 TWh, which accounted for 0.6% of the national electricity demand (593.949 TWh) [6].
- According to the Electricity Business License (EBL) by the Ministry of Trade, Industry and Energy, a total of 37.7 GW wind projects received the EBL at the end of 2023 [5]. 27.3 GW is planned offshore and 10.4 GW is onshore. 82% of new EBL in offshore wind projects has been placed in 2021-2023.

### Matters Affecting Growth and Work to Remove Barriers

- The main challenges are complicated regulations, lengthy and unreliable permitting processes, local opposition, and grid uncertainties.
- In 2023, a new bill for offshore wind development was introduced in the Korean National Assembly to promote offshore wind deployment. Key components of the bill include government-led maritime zoning and permit centralisation to coordinate with relevant stakeholders. However, the bill is still being reviewed by the subcommittee.
- On the 17th of July, 2020, the Ministry of Trade, Industry and Energy (MOTIE), the Ministry of Oceans and Fisheries (MOF) and the Ministry of Environment (MOE) jointly issued a “Plan for Offshore Wind Power Generation

in Collaboration with Local Residents and the Fishing Industry”. The Collaboration Plan sets out specific measures to encourage the speedy development of large-scale offshore wind farms and trickle-down benefits to local stakeholders [8].

- Two objectives of the “Offshore Wind Power Collaboration Plan” are as follows. First, it will install 12 GW of offshore wind power, creating 87,000 new jobs annually. By 2030, it will become one of the world’s five largest offshore wind power generating countries. Second, it will share the economic benefits of offshore wind development with local residents and the fishing industry [8].
- Three collaborative initiatives: 1. Government-led Siting and Streamlined Permitting 2. Encouraging Stakeholder Acceptance 3. Leveraging Large-Scale Projects to Enhance Industrial Competitiveness [8].

### RD&D Activities

#### National RD&D Priorities and Budget

- In Korea, one of the RD&D priorities has been the development of wind turbine generators and their major components for the wind industry’s value chain. Also, developing intelligent O&M strategies and technologies to reduce LCOE were important—especially in the offshore sector.
- Recently, the topics of social acceptance and safety issues are being emphasised. Furthermore, RD&D activities related to deploying wind farms and reducing LCOE will be continued.

#### National Research Initiatives and Results

- A project titled “Development

of the 8 MW High-Capacity Offshore Wind Turbine” is successfully completed. Additionally, a project titled “Development and Field test of 10 MW class offshore wind turbine system (‘22-‘25)” is in progress.

- Another project, “Development of localised technology for pre-piling to reduce the construction cost of sub-structures in the large scale of offshore windfarms (‘21-‘24),” is finished and applied in Hallym Offshore Wind Farm.
- Projects on floating wind technologies such as “Development of Design Technology for TLP-type Floating Offshore Wind Turbine Systems and Scaled Model Test Technique (‘22-‘25)”, “Development of 70 kV Dynamic Cable System Technology for FOWT (‘22-‘24)”, “Design technology development for innovative LCOE saving substructures of 20 MW+ ultra-large floating offshore wind turbine systems (‘23 ~ ‘26)” and “Development of Deep Sea Suction Anchor Technology for Floating Offshore Wind (‘23 ~ ‘27)” are newly launched.
- Other important RD&D projects include “Development of FEED and Detailed Design Technologies for Fixed Offshore Substation for Offshore Wind Farms (‘23 ~ ‘26)” and “Development of layout design and underwater noise management technology for coexisting suitable offshore wind farm (‘22 ~ ‘25)”.

#### Test Facilities and Demonstration Projects

- A nacelle test bench is being constructed in Changwon-Si since 2022. The construction is expected to finish in a couple of years. The facility will be able to test 15 MW wind turbines.
- A blade material and component centre has been built near the

full blade test centre. It contains facilities for complex environment tests, blade part structure tests, material tests and optical tests.

## Collaborative Research

- Currently, Korea is participating in IEA Wind TCP Task 11, Task 42, Task 49, Task 52 and Task 55. As the wind industry expands in Korea, more participation in IEA Wind Tasks from the industry is expected.

## Impact of Wind Energy

### Environmental Impact

- The electricity generated from wind power covers only about 0.6% of the national electricity demand, which is a very low percentage. However, in Korea, the increase of renewable energy (photovoltaics and wind) and curtailed operation of coal-power resulted in the reduction of 30.4 Mt CO<sub>2</sub> in 2022. The deployment of large-scale offshore wind energy is an essential measure for the carbon-neutral strategy in Korea.

### Economic Benefits and Industry Development

- Regarding the domestic wind industry, it seems that the amount of economic benefits and the level of industry development in 2023 did not deviate much from the previous years. In 2021, the domestic wind manufacturing industry revenue recorded an overall turnover of KRW 1.920 billion (USD 1.477 million) [9].
- As an indicator of the domestic capability of the wind manufacturing industry, roughly half of the installed capacity was covered by domestic WTGs in recent years [4]. The statistics show that national utilities had

more preferences in domestic WTGs than those private companies as developers or owners [4]. However, domestic wind turbine suppliers are looking for other solutions for the offshore market, such as strategic partnerships with major global wind turbine OEMs.

- The development of offshore wind farms is a key component of the Korean Green New Deal, which would invest KRW 73.4 trillion (USD 53.7 billion) to create 659,000 jobs in new and renewable energy sectors [9].

## Next Term

Rising energy prices are an opportunity for the expansion of renewable energy generation and the investment in renewable energy generation is expected to expand in terms of energy security. Based on the determined REC (Renewable Energy Certificate) multiplying factor for offshore wind energy in 2018, greater involvement of local governments and communities and increased feasibility study cases will act as further positive drivers for large-scale offshore wind development. Also, some FEED studies for offshore projects and the increased number of cases for EBL (Electricity Business License) applications are indicators of the current status of offshore wind development in Korea.

Wind energy is a key component of South Korea's energy transition, especially offshore wind, which has tremendous potential in Korea. Efforts to remove hurdles and bottlenecks for the deployment of offshore wind need to be more harmonised and accelerated.

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