Blue Economy

Jeollanam-do Wind Power Industry
Jeollanam-do
Wind Power Industry

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02 | Current Domestic & Overseas Wind Power Industry

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01. Introduction of Jeollanam-do
Introduction of Jeollanam-do

The center of Northeast Asia and Gateway to the Pacific

Population
1,868,745 persons

Size – 12% of Entire Territory
12,345 km²

Administrative districts
5 cities, 17 counties

Blue Economy
Jeollanam-do
Wind Power Industry
Jeollanam-do Traffic Network

Aviation

- Muan International Airport: Intl. airlines
  9 countries/7 routes (Shanghai, Tokyo, etc.)
- Yeosu Airport: Domestic airlines
  (Seoul 8 flights/day, Jeju 2 flights/day)

KTX

- Mokpo ↔ Seoul: Approx. 2 hours
- Yeosu ↔ Seoul: Approx. 3 hours
- Mokpo ↔ Busan: Approx. 2 hr 20 min (Completed in 2022)

Expressway

- Seohaean Expressway (Mokpo ↔ Seoul: Approx. 3 hours)
- Namhae Expressway (Mokpo ↔ Busan: Approx. 3 hours)

Marine

- Port of Gwangyang: 101 berths / 3,840,000 TEU
- Port of Mokpo: 29 berths / 23,000 TEU

Blue Economy
Jeollanam-do
Wind Power Industry
Productivity of Key Industries in Jeollanam-do

- **Chemical**: USD 74.4 billion
- **Steel**: USD 18 billion
- **Shipbuilding**: USD 4 billion

*Source: Statistics Korea (2019)*

Boast Having Excellent Wind Power Base
Shipbuilding & Steel Industry
02. Current Domestic & Overseas Wind Power Industry
Global Wind Power Industry

The Global Wind Power Generation Accumulated Facility Capacity is 597GW

- The 2019 Global wind power new facility capacity is 60.4GW
- Around 60% of new installation are made in China and US; China 236GW / US 105GW

The Global Offshore Wind Power Generation Accumulated Facility Capacity is 29.1GW

- 2019, the size of global offshore wind power generation market is 6.2GW (up 37% from 4.5GW on year)

The Annual Average Growth Rate of Global Wind Power Industry is 4%

- From 2020 to 2024, more than 355GW capacity is estimated to add (71GW for each year)
- Importantly, offshore wind power will grow to 50GW for 5 years and annual average growth would be more than 19.5%

Prospect of new installation offshore and onshore

Annual Average Growth Rate 4.0% (CAGR)

<table>
<thead>
<tr>
<th>Year</th>
<th>Offshore</th>
<th>Onshore</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>60.4</td>
<td>6.1</td>
</tr>
<tr>
<td>2020</td>
<td>69.9</td>
<td>12.7</td>
</tr>
<tr>
<td>2021</td>
<td>71.6</td>
<td>15.0</td>
</tr>
<tr>
<td>2022</td>
<td>67.7</td>
<td>7.9</td>
</tr>
<tr>
<td>2023</td>
<td>66.2</td>
<td>52.5</td>
</tr>
<tr>
<td>2024</td>
<td>73.4</td>
<td>58.4</td>
</tr>
</tbody>
</table>

*2019 GWEC Report (2020)
## Current Wind Power Industry In Korea

### Current Wind Power Generation Capacity

- **2019**: 1,490MW
  (Onshore 99 sites 680 units, offshore 4 sites 13 units)

- Offshore Wind power plants: 73MW

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Installation capacity</strong></td>
<td>373MW</td>
<td>1,490MW</td>
</tr>
<tr>
<td><strong>No. of Complex</strong></td>
<td>28</td>
<td>103</td>
</tr>
<tr>
<td><strong>No. of Turbine</strong></td>
<td>233</td>
<td>693</td>
</tr>
<tr>
<td><strong>The Rate of Unit made in Overseas</strong></td>
<td>94.1%</td>
<td>49.9% (346 Units)</td>
</tr>
</tbody>
</table>

*Source: Korea Wind Power Industry Association, GWEC(2020)*
Current Wind Power Industry in Korea

Renewable Energy 3020

"Nurture a new energy industry through Renewable Energy 3020"

- President Moon Jae-in’s pledge -

Portion of Renewable Energy Power Generation

<table>
<thead>
<tr>
<th>Year</th>
<th>Photovoltaic</th>
<th>Wind Power</th>
<th>Water Power</th>
<th>Bio</th>
<th>Waste</th>
<th>Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>'16</td>
<td>3.8GW (25%)</td>
<td>2.3GW (16%)</td>
<td>1.8GW (12%)</td>
<td>1.2GW (8%)</td>
<td></td>
<td></td>
<td>16.5GW</td>
</tr>
<tr>
<td>'17</td>
<td>5.7GW (34%)</td>
<td>1.8GW (12%)</td>
<td>1.2GW (8%)</td>
<td></td>
<td></td>
<td></td>
<td>15.1GW</td>
</tr>
<tr>
<td>'18~30</td>
<td>16.5GW (34%)</td>
<td>30.8GW (63%)</td>
<td>36.5GW (53%)</td>
<td></td>
<td></td>
<td></td>
<td>63.8GW</td>
</tr>
</tbody>
</table>

Capacity of Renewable Energy

<table>
<thead>
<tr>
<th>Year</th>
<th>Photovoltaic</th>
<th>Wind Power</th>
<th>Water Power</th>
<th>Bio</th>
<th>Waste</th>
<th>Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>'16</td>
<td>13.3GW</td>
<td>27.5GW</td>
<td></td>
<td></td>
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<td></td>
<td>40.8GW</td>
</tr>
<tr>
<td>'30</td>
<td>36.5GW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>63.8GW</td>
</tr>
</tbody>
</table>

renewable energy power generation
Occupy 20% of the total energy by 2030.

Plan to supply clean energy with 95% or
More of new facilities
Renewable Energy Supply Policy

Renewable Portfolio Standard (RPS)

- Subject: 21 power generation and energy companies (with generator capacity of 500mw or more)
  - Subsidiary company of KEPCO (6 companies) + private generator (15 companies)

- RPS quota by year

<table>
<thead>
<tr>
<th>Year</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023~</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPS quota (%)</td>
<td>4.0</td>
<td>5.0</td>
<td>6.0</td>
<td>7.0</td>
<td>9.0</td>
<td>10.0</td>
<td>10.0</td>
</tr>
</tbody>
</table>

*Source: Korea Energy Agency (2019)*

Renewable Energy Certificate (REC)

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>Classification</th>
<th>Subcriteria</th>
<th>REC weighted value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind power</td>
<td>Onshore wind</td>
<td></td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Offshore wind</td>
<td>Connection distance: 5km or less</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Connection distance: 5 ~ 10km</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Connection distance: 10 ~ 15km</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Connection distance: More than 15km</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ESS</td>
<td>Connected to wind power facility</td>
<td>4.0</td>
<td></td>
</tr>
</tbody>
</table>
“Plan to expand renewable energy facilities such as wind power by more than 3 times by 2025”
– First International Day of Clean Air for blue skies(Sept. 7, 2020), President Moon Jae-in –

- Announcement of Korean Green New Deal Policy (July, 2020)
  - Support of large scale offshore wind power complex site research : 13 areas
  - Establishment of large scale offshore wind power demonstration complex and testbed
    (Yeong-gwang County : Jeollanam-do, etc.)
  - Expansion of renewable energy generation capacity such as offshore wind power
    (12.7GW in 2020 → 42.7GW in 2025)

- About $114 bil will be invested in the energy industry in 2021 (22.9% of the total budget)
  - Green new deal related budget would be about $8 billion
    (50% of budget from Ministry of Trade, industry & Energy and Ministry of Environment combined)

- Announcement of Korean New Deal Fund Plan (Sept. 2020)
  - $17 bil scale fund will be created in next 5 years, investment will be made in new renewable energy infrastructure construction
03. Jeonnam, Optimal Location of Wind Power Industry
Abundant potential energy reserves

Jeonnam Wind Power Potential

- **Theory**: 445GW
- **Technology**: 339GW
- **Market**: 32GW


- **Total Permit**: 77 sites 3,715MW
- **Under operation**: 16 sites 329MW
- **Under construction**: 59 sites 3,386MW
Jeonnam Win-Win Job Project

Activate offshore wind industry and build a job creation system

Win-win job project using clean Jeonnam blue energy

Site Development
- Shinan, Yeonggwang -
  Support of 8.2GW large scale offshore wind complex site search
  Large power system Establishment of promotion system
  Realization of win win strategy for locals and regional development model

Industry Support
- Mokpo, Yeongam -
  Offshore wind power of the shipbuilding industry linkage and conversion
  Support for development of marine equipment suitable for the Southwest Sea
  Port-oriented wind power industry Build a support system
  Wind power system International certification 
  Build a support system

Technology Development
- Mokpo Daeyang Industrial Complex -
  Offshore wind power connection Hydrogen energy Conversion study
  Consumable parts Localization rate improvement study

Maintenance Support
- Mokpo Daeyang Industrial Complex -
  Offshore wind farm Control system Construction
  Ship utilization maintenance Build a support system
  4th industry connection Advanced Maintenance
  Wind farm output improvement control tech support

Education and Experience
- Yeonggwang, Naju -
  Maritime safety training and Secure international certification
  Wind power field Technical education
  Wind energy promotion and safety experience program operation
Jeonnam Win-Win Job Project

Offshore wind power convergence industrialization platform construction

**Period**
From 2020 to 2022

**Size**
Mokpo Daeyang Industrial Complex/ KRW31.5 billion

**Participants**
KEPCO, KPS, Jeonnam Development Corp., Green Energy Research Institute, Energy Valley Industry–Academic Convergence Center

**Contents**

Offshore wind power convergence industrialization platform center

- **R&D field support**
  - Logistics management operation S/W development
  - Support system for the hinterland of the wind complex
  - Offshore wind power integrated control system construction

- **Support for manufacturing fields**
  - Large-scale offshore wind complex EMS server construction
  - Large parts storage and assembly site: 287,000㎡
  - Offshore wind power equipment warehouse construction
# Jeonnam Renewable Energy R&D Infrastructure

## Energy & New Technology Research Institute
- **Size**: 98,781㎡ / Research, test, demonstration test site
  - Project period: 2016. ~ 2021. (5 years)
- **Project cost**: USD 71.7 mil / Approx. 100 employees (2021)
- **Function**: New Energy Business Nurturing, Research, Demonstration

## Green Energy Institute
- **Size**: 15,070㎡ / R&D facility, test production facility, etc.
- **Function**
  - Development of profit-generating energy convergence technology such as solar and wind power
  - Energy welfare support projects such as building an energy independence island, etc.

## Energy Valley Enterprise Development Institute
- **Size**: Total floor area / 10,186㎡
- **Facilities**: R&D support center, research facility, job center, etc.
- **Project cost**: USD 21 million
- **Institutions**: KEPCO materials inspection & disposal center, Korea Electric Industry Promotion Association, etc.

## Jeonnam T.P. Wind Turbine System Assessment Center
- **Size**: 908㎡ / wind power test site (5 large, 6 small)
- **Function**
  - Attracting & Supporting wind power system test bed companies
  - Wind turbine performance evaluation/certification/verification support and technical development support
Designated as an Energy Industry Convergence Complex:

- Designation Purpose: Fostering a convergence base for new energy industries (Ministry of Trade, Industry and Energy: December 6th, 2019)
- Key industries: ① smart grid, ② energy efficiency improvement, ③ wind power
- Designated area: Bitgaram Innovation City, Mokpo, Hampyeong, Jangseong, etc. 10.9 km²
- Support information
  - Institutional support: ① Establishment of infrastructure, ② Designation and Support of energy-specialized companies, ③ Support energy specialized research and human resources training institutions, etc.

<table>
<thead>
<tr>
<th>Infrastructure</th>
<th>Necessary facilities for R&amp;D, corporate support, and manpower training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy specialized company</td>
<td>R&amp;D / Local tax reduction / Priority product purchase request</td>
</tr>
<tr>
<td>Specialized research institute</td>
<td>R&amp;D and demonstration / Discovery of new energy industry / International joint research</td>
</tr>
<tr>
<td>Professional manpower training institution</td>
<td>Education and training expenses such as practical equipment / International exchange</td>
</tr>
</tbody>
</table>

Other support: preferential treatment for local investment promotion subsidies, additional points for participation in government technology development projects, tax benefits, etc.
## Jeonnam, Optimal Location of Wind Power Industry

### Local company that can be linked with offshore wind power business

<table>
<thead>
<tr>
<th>Sector</th>
<th>Field</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offshore structure manufacturing industry</td>
<td>Offshore plant, jacket, etc.</td>
<td>Hanyoung Industries, Bowon M&amp;P, Sungchang ENC, Daesang Heavy Industries, etc.</td>
</tr>
<tr>
<td>Ship component parts manufacturing industry</td>
<td>Ship components, ship structures, shipbuilding equipment</td>
<td>Daehan Shipbuilding, Yooil Heavy Industries, Hyundai Samho Heavy Industries Co., Ltd. and more than 140 companies</td>
</tr>
<tr>
<td>Other ship building business</td>
<td>Offshore floats, offshore structures, power plants, etc.</td>
<td>Vinsen Co., Ltd., Wooyoung Marine Co., Ltd., Jeongsu Marine Co., Ltd., Cobuy Tech, Dae-a Energy, Innovation</td>
</tr>
<tr>
<td>Steel wire drying industry</td>
<td>Shipbuilding, etc. repair, steel wire construction, ship, Iron equipment, ship components, etc.</td>
<td>Winner Shipbuilding Co., Ltd., Joongang Offshore &amp; Heavy Industries Co., Ltd.</td>
</tr>
<tr>
<td>Painting and other film treatment business</td>
<td>Painting, shipbuilding equipment, ship components</td>
<td>Hyundai Samho Heavy Industries Co., Ltd. and 25 other companies</td>
</tr>
</tbody>
</table>
Jeonnam, Optimal Location of Wind Power Industry

Easy to convert and utilize shipbuilding infra
Which is a major industry in the region

Offshore Wind Power System Components
- Materials
  - Hot rolled plate
  - Carbon fiber
  - Glass fiber
  - Epoxy resin
  - Surface treatment rolled steel
- Parts
  - Tower
  - Blade
  - Accelerator
  - Driving system component
- Power Equipment
  - Generator
  - Power rectifier
- Service Industry
  - Complex building
  - Transportation and Installation Maintenance
  - System Connection

Shipbuilding and Marine System Components
- Propeller
  - Similar to blade design principle
- Engine room
  - Reducer
  - Driving system component
- Hull
  - Steel plate
  - FRP (Small and Medium size vessel)

Ocean platform
- Tower
- Substructure
FTA Platform in Korea

- Signing status: Signing with 73.5% of countries around the world (as of October, 2019)
- Main contents: tariff elimination between signatory countries, economic cooperation, trade relief, etc.

Source: Ministry of Trade, Industry and Energy
04. Proposal of Investment

Jeollanam-do Wind Power Industry
Efficient production and assembly at the integrated wind power industrial complex with excellent transportation infrastructure such as Muan International Airport & Mokpo Port, Consistent demand in large-scale wind power complex that are advantageous for transportation & adjacent to infrastructure.
Site proposal for wind power equipment factory

**Daebul National Industrial Complex**

- **Location**: Samho-eup, Yeongam-gun, Jeollanam-do
- **Size**: 11,374,000㎡ / 342 companies moved in
- **Advantages**
  - Easy to convert wind power equipment business to shipbuilding equipment integration complex
  - Excellent manpower pool: about 26,000 / year
    * universities, vocational training centers, etc.
  - Adjacent to various research inst. (new energy technology research center, etc.), easy to establish industry-academia-research cooperation
- ※ Hyundai Samho Heavy Industries will be moved in (Global Top 5 as of 2018)
Site proposal for wind power equipment factory

Daebul Foreign Investment Zone

- Location: Yeongam-gun, Jeollanam-do / 135,061㎡ (3 companies)
- Estimated building cost: USD 10.8 mil
- Land rent: USD 0.74 /㎡/year
- Advantages:
  - Easy to convert shipbuilding equipment integration complex to wind power equipment business
  - Excellent manpower pool: about 26,000 / year
    * universities, vocational training centers, etc.
  - Adjacent to various research inst. (new energy technology research center, etc.), easy to establish industry-academia-research cooperation

※ Hyundai Samho Heavy Industries will be moved in (Global Top 5 as of 2018)
Mokpo Daeyang Industrial Complex

- **Location:** Daeyang-dong, Mokpo-si, Jeollanam-do
- **Project scale:** 85,000 m²
- **Pre-sale price:** USD 232 / m²

**Advantages**
- Excellent manpower pool: about 26,000 (universities, vocational training centers, etc.) / year
- Infrastructure, research institutes, tax support, etc.: according to the designation of the new energy industry convergence complex
Site proposal for wind power equipment factory

Mokpo New Port hinterland

- Project period: 2017. ~ 2021. (Phase 1)
- Project cost: USD 40 million
- Location: YuDal-dong, Mokpo-si, Jeollanam-do
- Scale: 485,000㎡ (residence facilities, yard, etc.)
- Advantages: low rental price

Current Location

Mokpo New Port
Site proposal for wind power equipment factory

Yeongam Yongdang Industrial Complex

- Location: Yongdang-ri, Samho-eup, Yeongam-gun
- Scale: 318,000 m² / Pier and yard
- Sales price: about USD 161 / m²
- Owner: Hyundai Samho Heavy Industries
- Advantages: Easy to supply raw materials and transport products by utilizing own infrastructure such as piers
Site proposal for wind power equipment factory

Shinan Bokryong Industrial Complex

- Location: All over Abhae-eup, Sinan-gun
- Size: about 490,000 ㎡
- Project period: 2022 ~ 2027
- Advantages: The closest industrial complex to the power generation complex, capable of large-scale assembly and transportation
05. **Investment Incentive**
### Local Investment Promotion Subsidy

<table>
<thead>
<tr>
<th><strong>Location subsidy</strong></th>
<th>Subsidize up to 50% of land purchase cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Facility subsidy</strong></td>
<td>Subsidize up to 34% of facility investment</td>
</tr>
</tbody>
</table>

### Incentives for Investment Companies

<table>
<thead>
<tr>
<th><strong>Location subsidy</strong></th>
<th>USD 358,000 limit, within 30% of the pre-sale price</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Facility subsidy</strong></td>
<td>Up to USD 448,000 in construction cost, facility equipment purchase cost, infrastructure installation cost, etc.</td>
</tr>
<tr>
<td><strong>Employment subsidy</strong></td>
<td>If the number of regular employees exceeds 10, USD 538 per month per person, for one year</td>
</tr>
<tr>
<td><strong>Special support for large-scale investment</strong></td>
<td>Support for up to USD 90,000 in case of investment of 45,000 or more or permanent employment of 100 or more</td>
</tr>
<tr>
<td><strong>Local tax reduction</strong></td>
<td>Acquisition tax and income tax reduction (up to 15 years)</td>
</tr>
</tbody>
</table>
### Investment Incentive

#### Foreign investment incentives

<table>
<thead>
<tr>
<th>Cash support</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>- (Subject to support) When investing in materials and parts, high-tech, and large-scale job creation</td>
<td></td>
</tr>
<tr>
<td>- (Content of Support) Support for land purchase cost and capital goods purchase cost</td>
<td></td>
</tr>
</tbody>
</table>

| Rent reduction or exemption | Rent reduction or exemption when moving into a complex-type foreign investment area (max. 100%) |

*Conditions of support*: foreign investment ratio of 30% or more

#### U-turn company incentives

<table>
<thead>
<tr>
<th>Main Contents</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate Tax</td>
<td>50-100% reduction for up to 7 years</td>
</tr>
<tr>
<td>Tariffs</td>
<td>Facility introduction tariff reduction 50~100%</td>
</tr>
<tr>
<td>Investment subsidy</td>
<td>Support for up to 44% of investment in location and facilities</td>
</tr>
<tr>
<td>Transfer subsidy</td>
<td>Overseas facility transfer cost support within 400 million won</td>
</tr>
<tr>
<td>Build a smart factory</td>
<td>1.5 ~ 200 million won support</td>
</tr>
<tr>
<td>Employment Creation Incentive</td>
<td>Partial support for labor costs up to 100 new employees</td>
</tr>
<tr>
<td>Financial support</td>
<td>Facility investment interest rate preferential treatment and guarantee</td>
</tr>
<tr>
<td>Consulting support</td>
<td>Offer consulting expenses for liquidation of overseas business sites</td>
</tr>
</tbody>
</table>
Investment Incentive

Investment incentives in areas of employment and industrial crisis

**Response to industrial crisis Special area**
(May, 2018 ~ May, 2021)

- Designated area: Mokpo-si, Haenam-gun, Yeongam-gun
- Support contents
  - Technical support (prototype production, patent/certification, consulting, etc.),
  commercialization support (exhibition, marketing, etc.)
  - Tax support
  (Target) SMEs and mid-sized companies newly investing in employment and industrial crisis areas
  (Content) 100% reduction in corporate tax (start-up company) and income tax (workers) for 5 years

**Employment Crisis Area**
(May, 2018 ~ May, 2021)

- Designated area: Mokpo-si, Yeongam-gun
- Support contents
  - Employer: Employment maintenance support, employment and industrial accident insurance premium support, etc.
  - Workers: training benefits, support for life stabilization, support for employment promotion, etc.