“Transitioning to Green Ports: Korea’s Experience”

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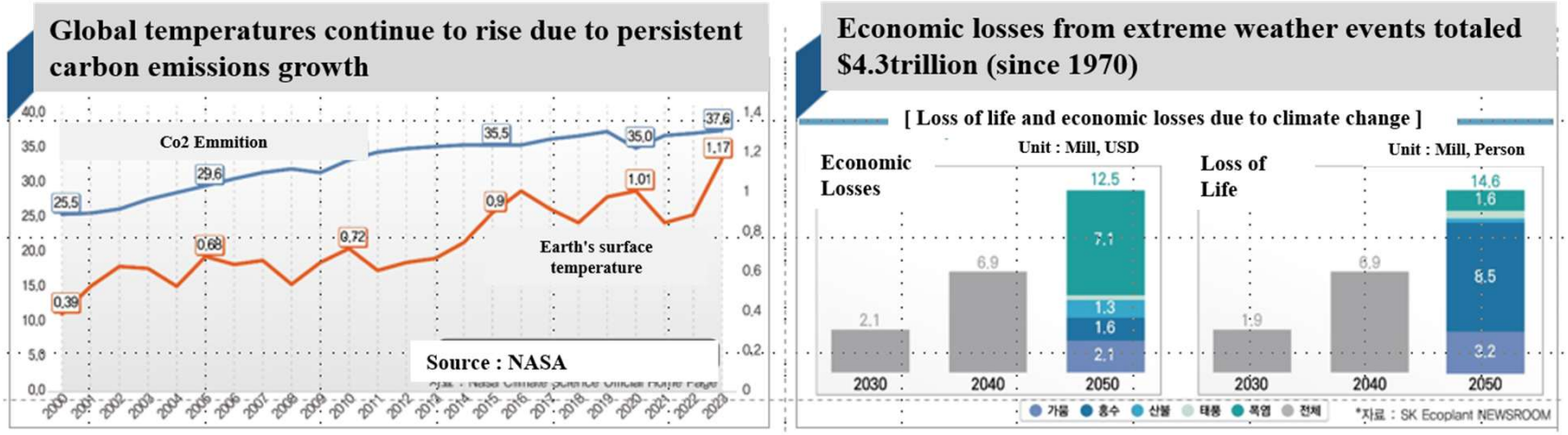
Contents

1. Background

- Transition to a Carbon-Neutral Society in Response to the Global Climate Crisis
  - ✓ (International) To achieve carbon neutrality by 2050 (IPCC), the EU (Renewable Energy Directive, Carbon Neutrality Industry Act, Carbon Border Adjustment Mechanism) and IMO (EEXI, CII) are strengthening environmental regulations
  - ✓ (Domestic) While the National Strategy for Carbon Neutrality and Green Growth (2023) was established, concrete sector-specific industrial policies remain insufficient



Source : SK Ecoplant Newsroom

1. Background

- Expansion of the role and functions of ports in the transition to a carbon-neutral society

Cargo Transportation

Storage

Products Distribution

Raw Material Procurement

[Maritime Regulations]

- EEXI (Existing Ship Energy Efficiency Index)
  - ✓ CO2 emissions index per ton of cargo transported per nautical mile
  - ✓ Applicable to vessels over 400 tons starting in 2023
  - ✓ Failure to meet index results in operational suspension, reduced speed, port access restrictions, and fines
- CII (Carbon Intensity Indicator)
  - CO2 emissions index per ton of cargo transported per nautical mile (based on actual annual fuel consumption)
  - Implemented for vessels over 5,000 tons starting in 2023
  - Speed reduction if index is not met

[Carbon Neutrality at Ports]

- Electrification of cargo handling equipment
- Introduction of hydrogen fuel cells
- Establishment of charging stations (electric and hydrogen), etc.
- Construction of power infrastructure

[Industrial Support]

- Establishment and Operation of Eco-Friendly Fuel Bunkering Facilities
- Installation of AMPs at Ports
- Providing space for renewable energy generation
- Construction of Support Facilities Related to Renewable Energy
- Construction of Eco-Friendly Energy Supply Facilities
- Construction of CCUS Support Facilities

[Industrial Regulations and Support Guidelines]

- RED (Renewable Energy Directive)
  - ✓ 45% renewable energy consumption target by 2030 69% target set relative to total electricity generation
  - ✓ Promotion and encouragement of the renewable energy sector
- NZIA (Carbon Neutrality Industry Act)
  - Granting fast-track permits and financial benefits to projects significantly contributing to the EU's 2050 climate neutrality goal (effective 2024)
- CBAM (Carbon Border Adjustment Mechanism)
  - The EU will impose a tax on imports of carbon-intensive products (steel, cement, aluminum, fertilizers, electricity, and hydrogen) from other countries based on the carbon emissions generated during production (2023)

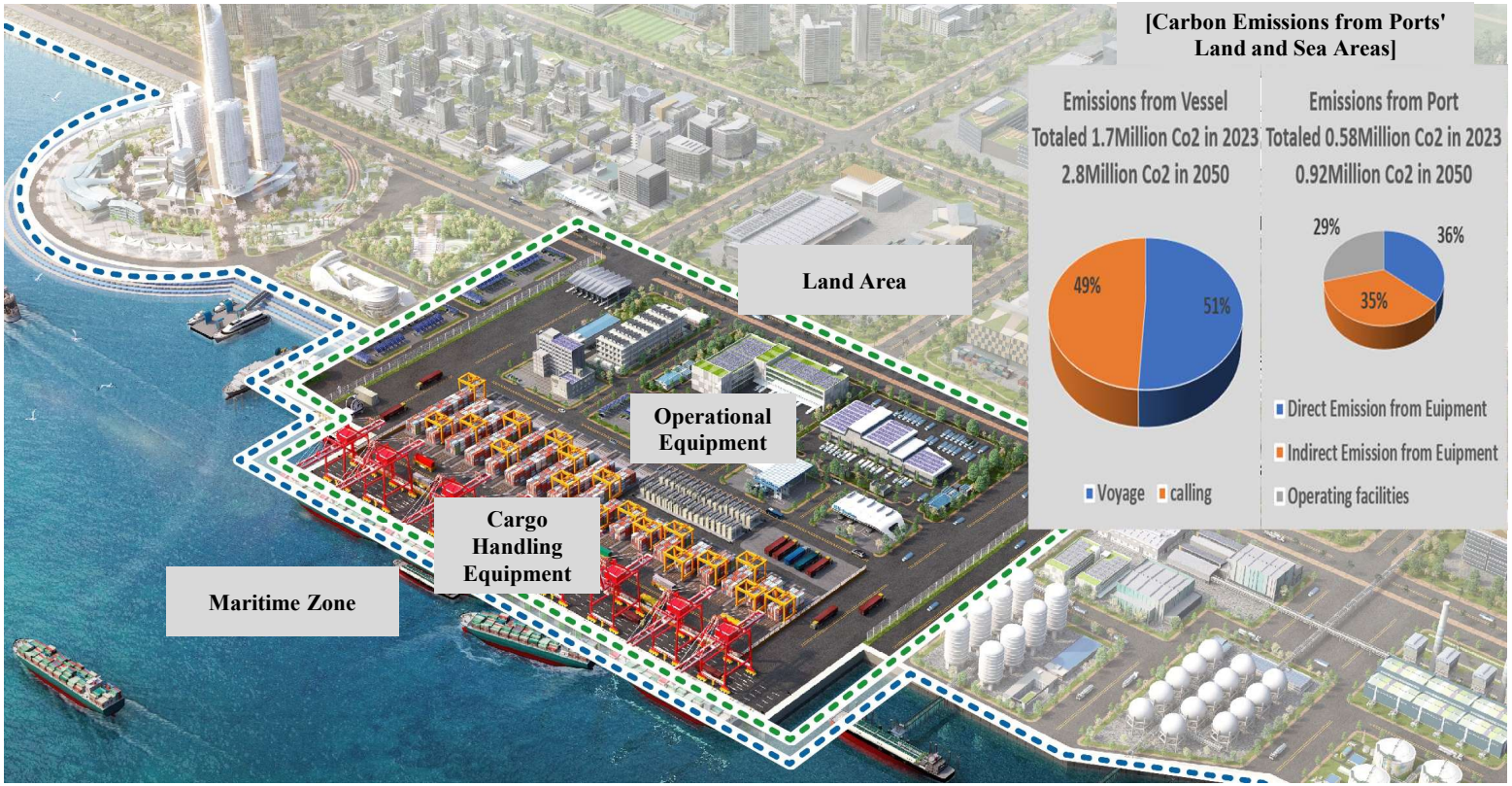
2. Vision and Goals

- (Vision) Building an eco-friendly future port (Net-Zero) and a national carbon-neutral gateway port

	Net-Zero Port	Gateway Port
Goals	• **Achieve Zero Carbon Emissions within the Port by 2050 and Prepare for Future Eco-Friendly Vessels** ✓ **(Zero Direct Emissions) Energy transition within the port (Fuel oil → electricity, etc.)** ✓ **(Minimizing Indirect Emissions) Expanding the adoption of renewable energy** ✓ **(Future Vessel Readiness) Establishing eco-friendly fuel bunkering**	• **Establishing Energy Logistics Infrastructure to Achieve National Carbon Neutrality by 2050** ✓ **(Energy) Expanding eco-friendly energy infrastructure** ✓ **(Offshore Wind) Establishing an Offshore Wind Support System** ✓ **(Carbon Logistics) Establishing CCS Hub Terminals**
Impleme-Nation Plans	• **(Energy Transition)** ✓ **Conversion of cargo handling equipment, AMP construction** ✓ **Charging (electric, hydrogen) infrastructure establishment** ✓ **Timely Supply of Substations** • **(Expansion of Renewable Energy)** ✓ **Establishment of a system to utilize idle port space** ✓ **Expanding Renewable Energy Utilizing Port Space** ✓ **Establishment of Institutional Framework** • **(Eco-friendly Fuel Bunkering)** ✓ **Enhancing Utilization of Existing Facilities** ✓ **Phased Construction of Eco-Friendly Fuel Bunkering Facilities**	• **(Hydrogen, Ammonia Terminals)** ✓ **Phased construction considering demand by period** ✓ **Developing a plan for shared use of docks** • **(Offshore Wind Support System)** ✓ **Expanding Existing Terminal Functions** ✓ **Establish offshore wind cluster foundation (port + offshore wind industry)** • **(CCS Hub Terminal)** ✓ **Establishment of Carbon Processing, Security, and Export Infrastructure Considering National Greenhouse Gas Reduction Targets**

3. Eco-Friendly Future Port (Net-Zero Port)

- (Emission Management) Port carbon emissions totaled 2.25 million tons in 2023 and are projected to increase to 3.71 million tons by 2050



3. Eco-Friendly Future Port (Net-Zero Port)

- (Equipment Electrification)
  - ✓ (Land-Based Equipment) Equipment Power Conversion (Fuel Oil → Electricity and Hydrogen, etc.) and charging infrastructure development
    - Port-wide equipment transition to eco-friendly energy (electrification of stationary and mobile equipment, introduction of hydrogen equipment after 2040)
    - Introduction of charging infrastructure considering equipment conversion both inside and outside the port
- (Shore Power Supply)
  - ✓ Installation of AMPs for power substitution (fuel → electricity) during ship berthing
    - Installation of AMPs for power supply to berthing vessels (86 berths by 2040)
- (Power Grid Expansion)
  - ✓ Expansion of power infrastructure to address increased power demand due to power conversion
    - Approximately double the power demand compared to existing levels due to power transition and AMP introduction → Introduction of new substations accordingly

3. Eco-Friendly Future Port (Net-Zero Port)

- (Introducing Renewable Energy & Establishing Supply Hubs)
  - ✓ (Renewable Energy Untilization) Solar and wind power planned to reach 115.5GW by 2038 (23GW in 2022) (11th Basic Plan for Electricity Supply and Demand, 2024)
    - Various renewable energy generation projects are being proposed within ports, led by the private sector.
    - Support is being provided while reviewing potential issues in advance of a port (available space, Port Development and Operational Interference, Potential for Energy Supply within Ports, Facility management, etc.) → Establishing institutional frameworks for port space utilization
  - ✓ (Eco-friendly Ship Fuel Supply) While an increase in eco-friendly ships is anticipated due to IMO's 2050 target of 100% greenhouse gas reduction, the diversity of green fuels and their low business viability are current issues
    - To secure business viability, establish bunkering infrastructure linked to related facilities (LNG receiving terminals and storage tanks, methanol and ammonia storage tanks, etc.
    - Phased construction of bunkering facilities considering the trend in orders for eco-friendly fuel ships

4. National Carbon-Neutral Gateway Port

- (Hydrogen / Ammonia Terminals) Securing port infrastructure to support the nation's transition to eco-friendly energy
  - ✓ South Korea's hydrogen demand is projected to rise from 3.9 million tons in 2030 to 27.9 million tons by 2050
    - → Need to prepare countermeasures for establishing hydrogen and ammonia supply chains
    - (Temporary Port Mixing Permission) Discussions underway regarding port mixing and port classification system reorganization for importing ammonia and hydrogen for power generation
- (Offshore Wind Support) The port's role is necessary in light of the projected expansion of offshore wind power generation.
  - → Development of dedicated berths for installation, manufacturing and maintenance
  - → However, phased support considering offshore wind's variability and port operational conditions

4. National Carbon Neutrality Gateway Port

- (CCS Hub Terminal) Requires a terminal for CO_2 emission, capture, and storage
  - ✓ Projected annual CO_2 shipment volume of 35.6 million tons by 2050 from power plants, steel, and petrochemical sectors
  - ✓ Utilization of captured carbon depends on technological development level; priority lies in developing CCS facilities
  - ✓ Overseas ports are constructing CCS facilities and advancing demonstration projects

→ Select target ports for CCS terminal development to support this and pursue as a private-sector-led initiative

Thanks

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