PORT OF INCHEON

Transforming Waste and Air
Incheon Port's Sustainable Future

Upcycling Waste Plastic into Pallets

Developing Road Pollution Automatic Capture System

INDEX

THE FIRST PORT TO SUCCESS
PORTOFINCHEON

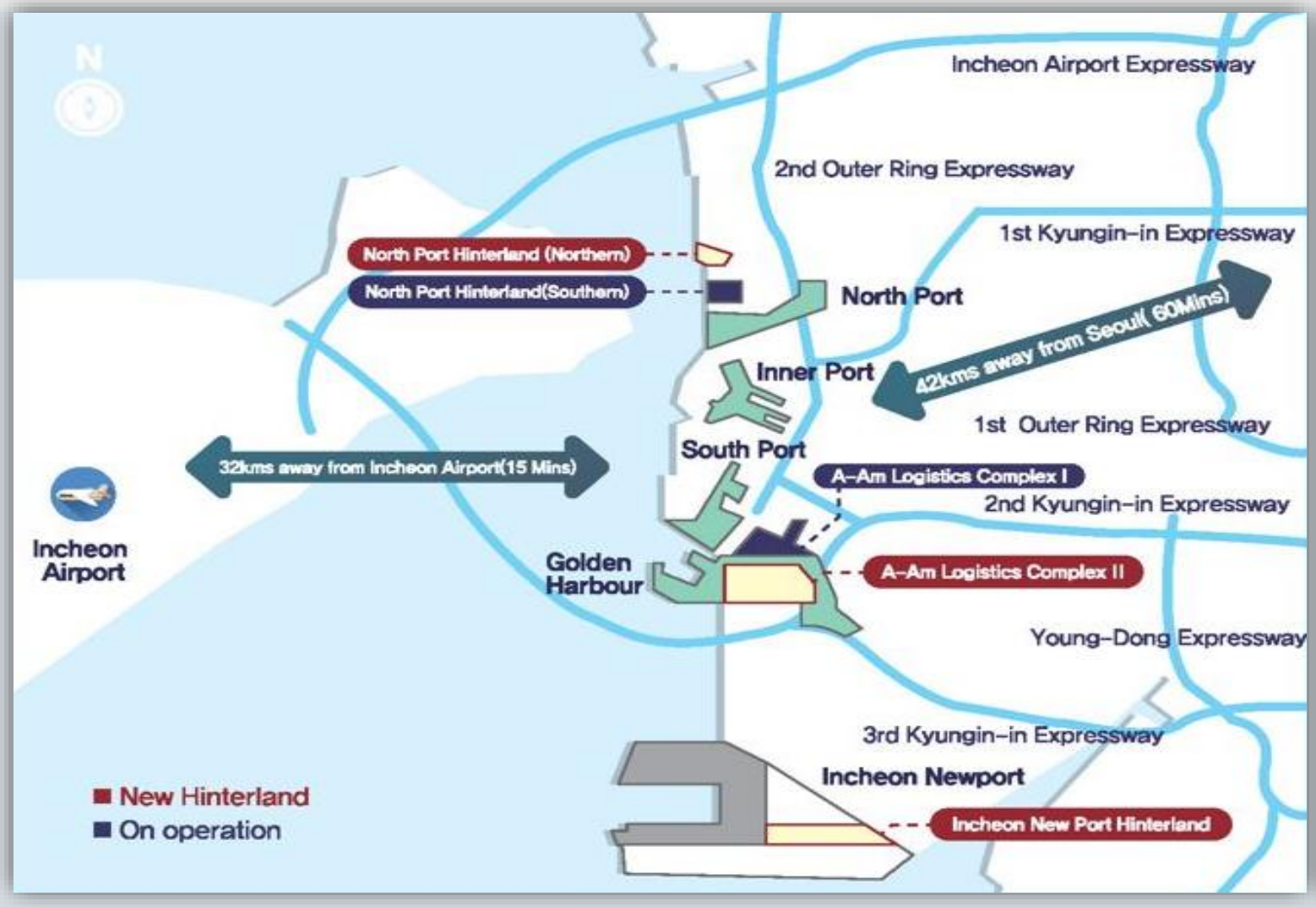
“ Incheon Port Authority (IPA)”

- IPA is established in 2005 based on port authority act as public enterprise under ministry of oceans and fisheries in South Korea, with the aim of developing Incheon Port into competitive maritime logistic hub.

PORT OF INCHEON
THE FIRST PORT TO SUCCESS

Infrastructure construction (International Ferry Terminal and etc)	Port hinterland development and supply	Port management and operation
Location: Songdo(Incheon city)	Organization: 3 Divisions, 5 Offices, 13 Departments, 290 Employees	Asset: About 2.7B $ (‘22Y)

“ Incheon Port Overview ”



Accessibility

- (Kyung-in Exp.) **Within 20 Mins.**
- (OuterRing Exp.) **Within 30 Mins.**
- (Airports) **Within 15~30 Mins.**
- Easy Connection with 1st/2nd/3rd Kyung-In Exp. and Young-Dong Expressway

Nearest Industrial Zone

290 National / Local Ind, Zones
Easy Access To Incheon Port

Within 90minutes
Incheon Port to all Ind. Zones
At Metropolitan Area

Refrigerated Warehouses

98(30%) Refrigerated warehouses
At Metropolitan Area

Within 90minutes
Connection to Incheon port
And Refrigerated warehourses

2. Background

“ The Problem of Marine Plastic Waste ”

1 Staggering Plastic Waste

According to the United Nations, the world produces about 400 million tons of plastic waste every year, and at least 14 million tons of that plastic ends up in the ocean

2 Plastic Dominates Marine Debris

Plastic makes up 80% of all marine debris found in the ocean, posing a significant threat to marine ecosystems

3 Impacts on Marine Life and Humans

Marine species ingest plastic debris, leading to death and injuries. Microplastics can also be consumed by marine life and ultimately end up in the human body, potentially causing health issues

4 Climate Change Implications

If plastic waste is incinerated, it releases carbon dioxide and greenhouse gases into the atmosphere, contributing to climate change

Solution① : Upcycling Waste Plastic into Pallets for Logistic Operation

2. Background

“ The Problem of Air Pollution in Port Areas ”

Sources of Air Pollution

- Ports, shipping, warehouses, international logistics operations, and other components of the supply chain **produce significant amounts of air pollution**
  - · Vessels
  - · Trucks
  - · Locomotives
  - · Cargo Handling Equipment

Environment & Health Impacts

- Port logistics operations **release tons of pollutants into the air**
  - · Impacting plants and trees
  - · Damaging the ozone layer
  - · Contributing to global warming
- **Lead to variety of health conditions**
  - · Including premature mortality
  - · Increased cancer risk
  - · Respiratory symptoms

Addressing the Challenge

- The ESG Open Innovation Project **mitigates the air pollution** generated by port activities, improving the local environment and protecting public health
- **Incheon Port aims to**
  - · Reduce fine dust
  - · Prevent frequent flooding
  - · Improve drainage in entrance

Solution② : Developing Road Pollution Automatic Capture System

“ Solving Problems Through ESG Open Innovation Project ”

step1 Signing joint agreement for ESG practices based on a network between large corporations and public institution

step2 Sharing resources and technology with SMEs(Small and Medium Enterprises) to collaboratively address local environmental issues

Cnku	▪ Upcycling Waste Plastic into Pallets for Logistic Operation
NextE&M	▪ Developing Road Pollution Capture System to address a dust issue

2. Background

“ Solving Problems Through ESG Open Innovation Project ”

Port Authority	Environment Specialist	Large Corporation	Environment Sector SMEs
INCHEON PORT AUTHORITY	KEITI Korea Environmental Industry & Technology Institute	LOTTE FINE CHEMICAL	CnKu NextE&M

Collaboration

IPA plays a role in **creating new collaboration between large corporations and SMEs** to support the development of the recycled plastic pallets

ESG Open Innovation Project

Demonstration

IPA supports **Pilot Testing with logistics companies,** the main customers, to demonstrate the performance and gather feedback for further improvements

3. Upcycling Waste Plastic into Pallets

“ Process of ‘Eco-friendly Pallets Development Project’ ”

Port Authority	Environment Specialist	Exporters and Importers	Environmental Sector SME
INCHEON PORT AUTHORITY	KEITI Korea Environmental Industry & Technology Institute	LOTTE FINE CHEMICAL	CnKu

Discovery
Identifying SMEs to Address Local Waste Plastic Environmental Issues

Selection
Implementing ‘Waste Plastic Recycling Product Development Project’ from Lotte Fine Chemical

Resource Sharing

INCHEON PORT AUTHORITY / KEITI	Funds for Technology Development, and Test Bed in Incheon Port
LOTTE FINE CHEMICAL	Waste Plastics from Incheon Factory (8 Tons per Month)
CnKu	Upgraded Recycling Technology, and Prototype Development

Technical Support
- Technical Meetings on Product Specifications and Demand
- Support for Technology Escrow to Prevent SME Technology Theft

3. Upcycling Waste Plastic into Pallets

“ Process of ‘Eco-friendly Pallets Development Project’ ”

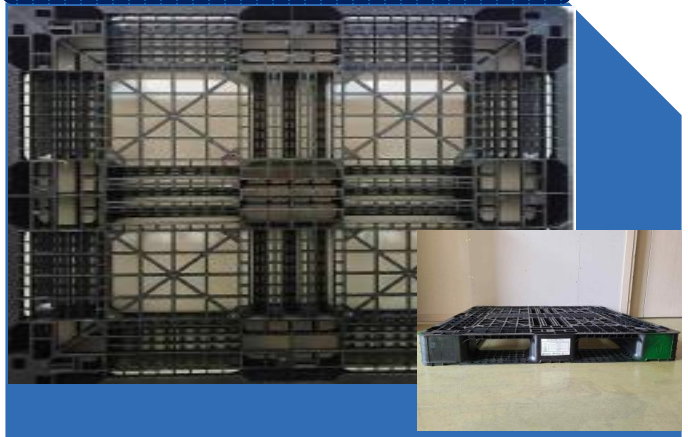
Waste Collection

The project involves the collection of waste plastics from the Incheon factory, providing **8 tons per month** as a raw material

Preprocessing

The waste plastics undergo **preprocessing and advanced recycling technologies** to create the necessary materials for pallet production

Pallet Production



The recycled plastic materials are used to produce pallets that are **superior and more cost-effective**

3. Upcycling Waste Plastic into Pallets

“IPA’s Needs & SME’s Solution Efforts”

IPA’s Needs	Continuous Emission from Industrial Sites, Causing Environmental Pollution and Disposal Cost Burden
Solution ①	Using Innovative **‘Material Recycling Technology’** of CKU(Environmental Sector SME), **Developing Recycled Materials through Preprocessing** Considering Waste Conditions and Properties

IPA’s Needs	Pallets Used for Storage and Transportation Require High Load-Bearing and Hardness Stability
Solution ②	CKU Produces Pallets with **Superior Flexural Strength and Hardness** Compared to Market Products, **at Lower Costs** → Secured Relevant

3. Upcycling Waste Plastic into Pallets

“SME’s Needs & IPA’s Solution Efforts”

SME’s Needs

Limited Collaboration Opportunities with Large Corporations,
Difficulty for SMEs to Hold Negotiation Leverage in Business Relationships

Solution ①

Acting as a Bridge Between Large Corporations and SMEs, Creating New Collaboration Opportunities

- Utilizing Incheon Port Network to Plan Collaborative Projects with Lotte Fine Chemical
- Organizing Meetings to Share Product Specifications and Technical Requirements from Lotte Fine Chemical with SMEs

SME’s Needs

Logistics Companies Tend to Not Change Existing Pallet Products,
Making It Difficult for CKU to Secure Demand for Newly Developed Products

Solution ②

Supporting Demonstrations for Logistics Companies to Develop Sales Channels

- Distributing 200 Pallets Free of Charge to 3 Logistics Companies in Incheon Port to Demonstrate CKU’s Products
- Conducting Satisfaction Surveys and Sharing Feedback with Each Logistics Company

3. Upcycling Waste Plastic into Pallets

“Achievement of ‘Eco-friendly Pallets Development Project’”

the Virtuous Cycle in the Logistics Environment at Incheon Port

1 (IPA) Waste Collection

Collects waste plastics
from hinterland of Incheon port

2 (CNKU) Material Recycling

Upcycles waste plastics
into eco-friendly pallets

3 (Hinterland) Use Pallets

Increasing Use of Incheon Port
through Eco-Friendly Pallets

Performance Results

- Each pallet results in a **carbon emission reduction of 67.2kg**
- Economic effects such as **reducing the discarding cost of waste plastics (8 tons per month)**
- After Commercialization, **reducing annual carbon emissions by 10,395 Tons of CO2eq**

4. Developing Road Pollution Automatic Capture System

“Process of ‘Road Pollution Automatic Capture System Development’”

PORT OF INCHEON — Support — Partnership — Execution — NextE&M

Support the Implementation of SMEs Proposal to Address Local ESG Issues

Utilization of an Innovative Environment Technology Idea

Incheon Port Authority and **Next E&M** (an innovative environmental technology company) established **partnership** on the development of mutually beneficial cooperation for sustainable port development and green port

4. Developing Road Pollution Automatic Capture System

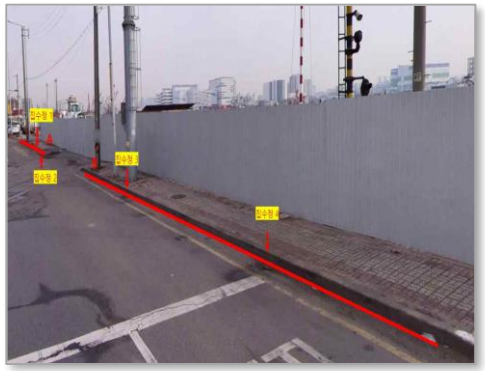
“Process of ‘Road Pollution Automatic Capture System Development’”

Port Authority	Environment Specialist	Environmental Sector SME
INCHEON PORT AUTHORITY	KEITI Korea Environmental Industry & Technology Institute	NextE&M

Discovery	Identifying SMEs to Address Local Road dust Issues
Selection	Implementing ‘Road Pollution Automatic Capture System Development Project’
Resource Sharing	INCHEON PORT AUTHORITY, KEITI: Funds for Technology Development, and Test Bed in Incheon Port
	NextE&M: Upgraded Dust Emission Technology and System Development
Technical Support	- Technical Meetings on Product Specifications and Demand - Application and Selection for the Government's Technology Development Assistance Program

4. Developing Road Pollution Automatic Capture System

“Process of ‘Road Pollution Automatic Capture System Development’”



Demonstration Area → **System Installation** → **System Design**

1 → 2 → 3

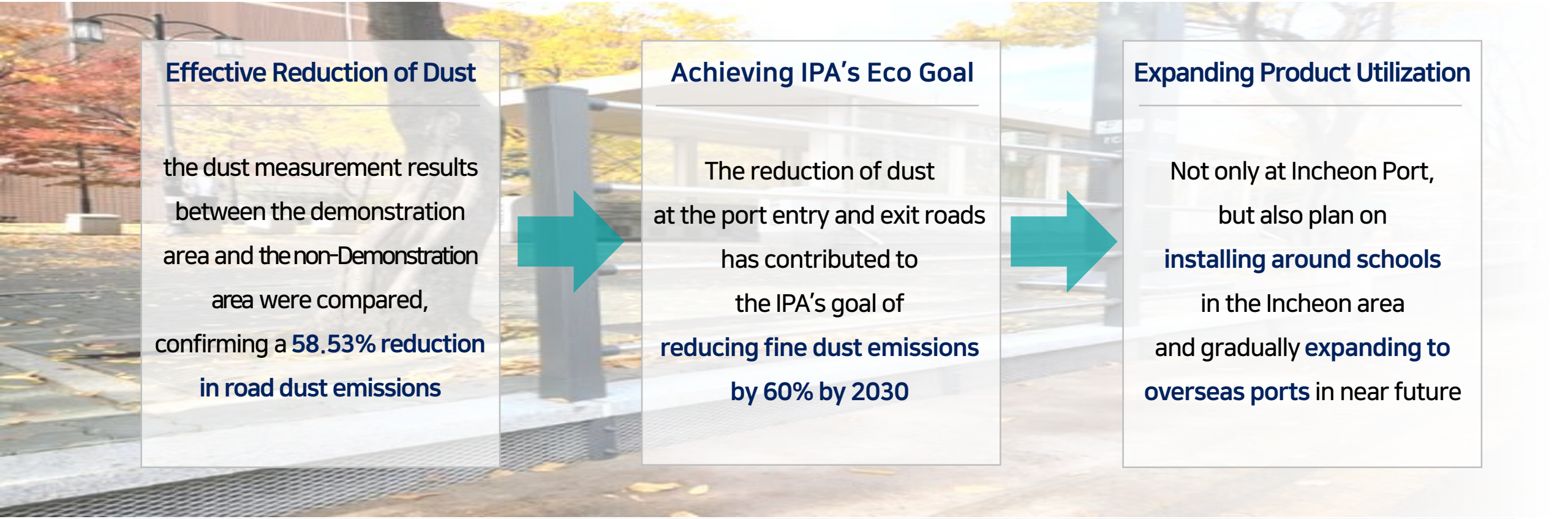
The entrance and exit roads of **Incheon South Port have been selected as the demonstration area**, considering the characteristics of the demonstration system, the working environment, and effectiveness

The ‘Road Pollution Automatic Capture System ’ developed by Next E&M has been **installed along the right side of the road for a distance of 50m** to reduce road dust emissions

The transformed product of kerbstone (curbstone) between the roadway and the sidewalk **captures road dust by using vehicle-generated wind and nature airflow**

4. Developing Road Pollution Automatic Capture System

“ Achievement of Road Pollution Automatic Capture System ”



Effective Reduction of Dust

the dust measurement results between the demonstration area and the non-Demonstration area were compared, confirming a **58.53% reduction in road dust emissions**

Achieving IPA’s Eco Goal

The reduction of dust at the port entry and exit roads has contributed to the IPA’s goal of **reducing fine dust emissions by 60% by 2030**

Expanding Product Utilization

Not only at Incheon Port, but also plan on **installing around schools** in the Incheon area and gradually **expanding to overseas ports** in near future

Performance Results

- Cleaner air & healthier environment, **by 58.53% reduction in road dust emissions**
- Achievement of the IPA’s goal of **reducing find dust emissions by 60% by 2030**
- **Providing SMEs with opportunities for new sales channels** such as other Industries and countries

5. Conclusion

“ Collaboration and Partnerships for Sustainable Ports”

Stakeholder Collaboration

The successful implementation of The ESG Open Innovation Project at Incheon Port is the result of **close collaboration between SMEs, Incheon Port Authority, and other key stakeholders,** aligning their efforts towards **a common goal of environmental sustainability**

Alignment with ESG Goals

The implementation of these innovative Ideas directly **contributes to the Incheon port and Global ESG goal**, demonstrating the synergy between SMEs’ technological solutions and the port's sustainability commitments

Sustainable Growth

By addressing both environmental and operational challenges,
The ESG Open Innovation Project paves the way for the Incheon Port to **continue its sustainable growth, balancing economic development with environmental stewardship**


Look forward to a better tomorrow
Creating shared value through inclusive growth
Incheon Port is with you
Thank you!