

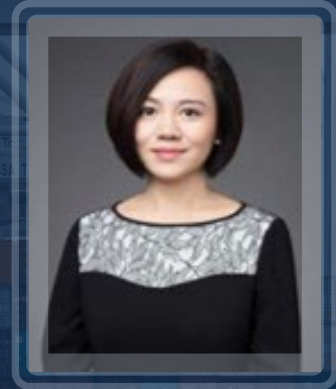
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# Accelerating Green Ports and Shipping Development in Asia





# Part 1: Green Ports and Shipping Development in Asia: Status



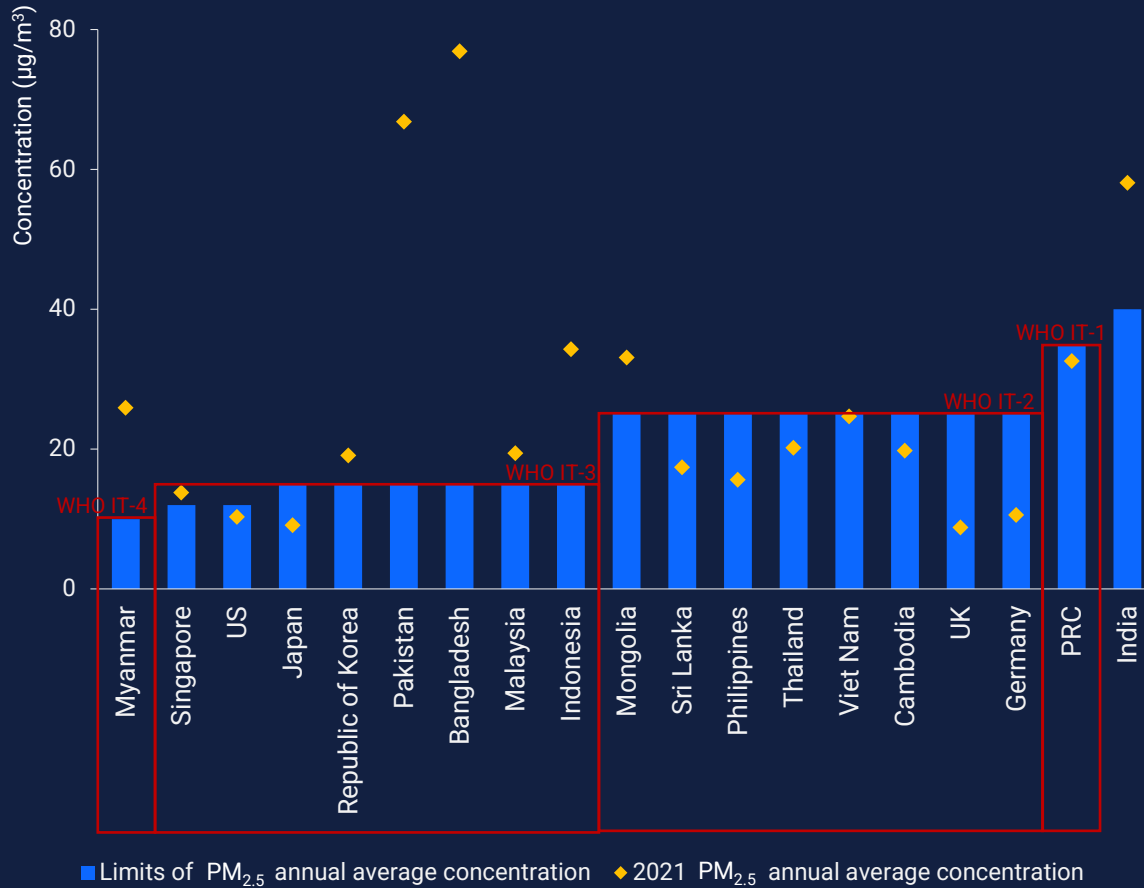
Lu Fu  
China Director  
Clean Air Asia





# Domestic Needs for Air Quality Improvement and Decarbonization

Annual Mean Concentration Limits for PM<sub>2.5</sub> and Monitored PM<sub>2.5</sub> Concentration in 2021 of Various Countries



Decarbonization Goals of Various Countries

Country	2020 CO <sub>2</sub>	Year	Goal
PRC	11,680.4	2060	Carbon neutral
US	4535.3	2050	Net zero
India	2411.7	2070	Net zero
Japan	1061.8	2050	Net zero
Germany	636.9	2045	GHG neutral
Republic of Korea	621.5	2050	Net zero
Indonesia	568.3	2060	Net zero
Viet Nam	321.9	2050	Net zero
UK	313.7	2050	Net zero
Malaysia	262.2	2050	Carbon neutral
Thailand	255.5	2050	Net zero
Pakistan	217.0	2050	Net zero
Philippines	139.2		
Bangladesh	108.5		
Singapore	56.1	2050	Net zero
Mongolia	38.2		
Myanmar	37.7	2050	Net zero
Sri Lanka	23.7	2060	Carbon neutral
Nepal	17.9	2045	Net zero
Cambodia	15.8	2050	Net zero

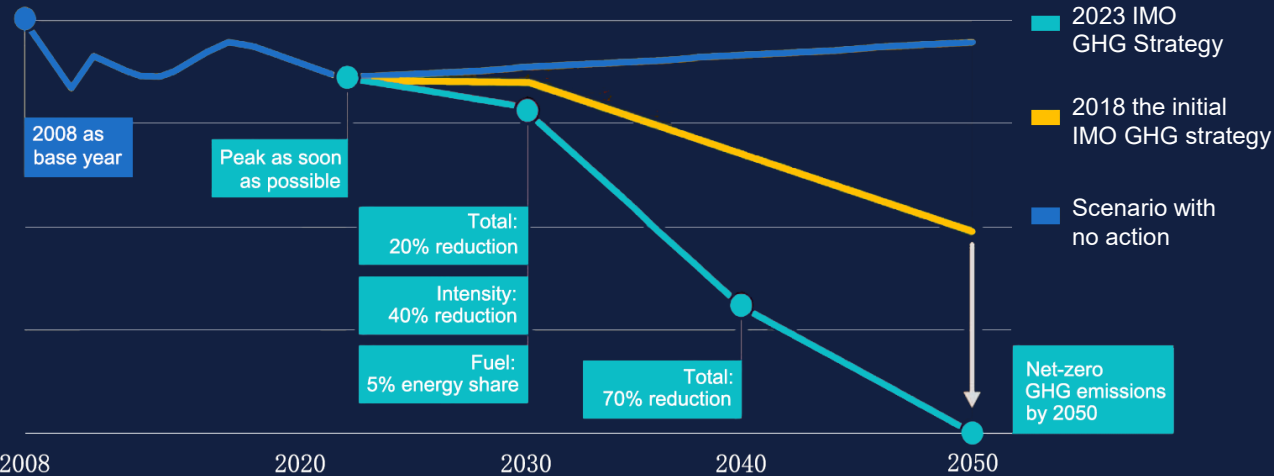
Notes: The blanks indicate the country has yet to release the goals related to Carbon Neutrality or Net Zero



# Tightening Pressure from International and Regional Regulations

## IMO GHG REGULATIONS

Units: GHG emissions

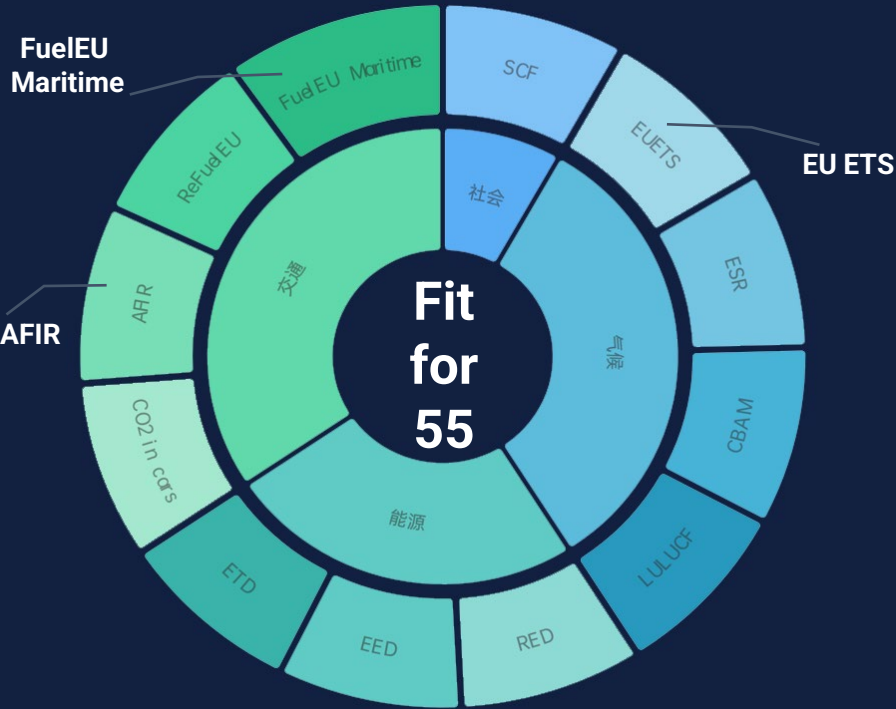


**Total emission:** well-to-wake GHG emissions

**Intensity:** CO<sub>2</sub> emissions per transport work

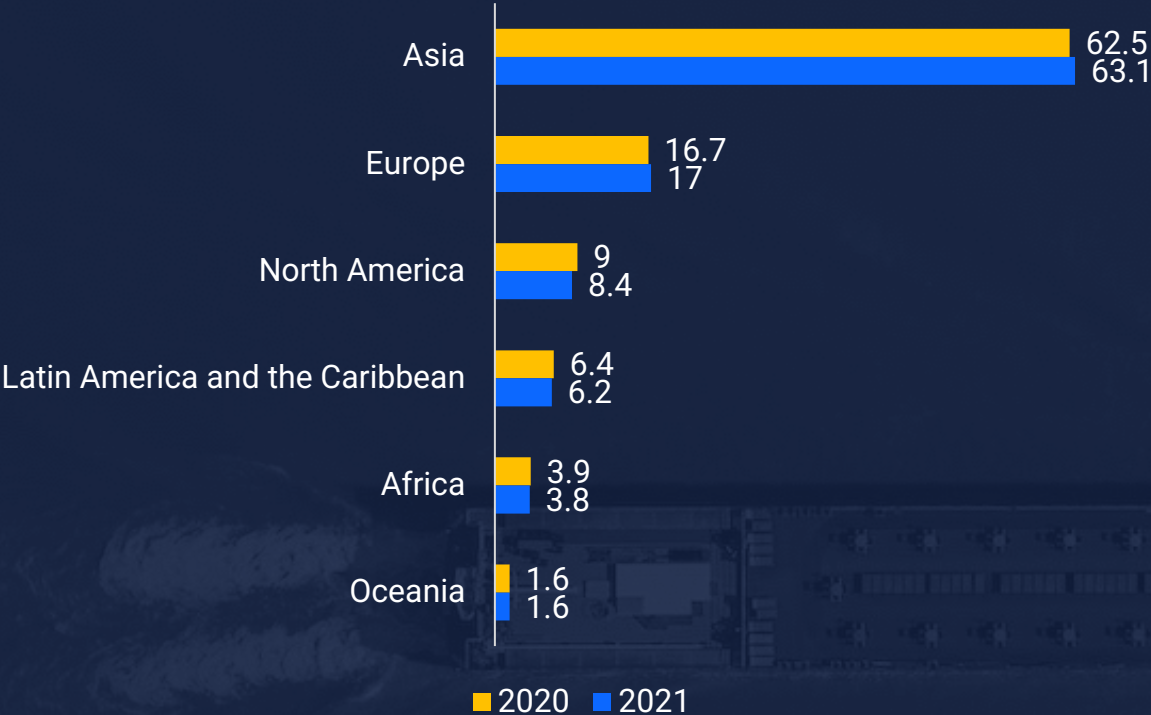
**Fuel:** zero or near-zero GHG emission technologies, fuels and/or energy sources

## EU REGULATIONS



# Importance of Asian Countries in Ports and Shipping

World container port throughput by region (in 20-foot equivalent units), 2020-2021, percentage share in total



Asia, the world's leading maritime cargo handling center, accounted for 42% of exports and 64% of imports (UNCTAD, Review of Maritime Transport 2022), and possessed 50 of the top one hundred container ports. As a result, Asia is one of the most critical regions that need to take action to minimize environmental impacts from the port and shipping sectors, while supporting global shipping to achieve net-zero GHG emissions by 2050.

Source: REVIEW OF MARITIME TRANSPORT 2022, United Nations



# Part 1: Green Ports and Shipping Development in Asia: Status

Ask your questions at  
**[www.pigeonhole.at](http://www.pigeonhole.at)**

输入会议代码

**BAQ2023**

session code

**Please feel free to ask questions**



# Part 1: Green Ports and Shipping Development in Asia: Status

## KEYNOTE PRESENTATION



Raymund Abad  
Sustainable Transport Lead  
Clean Air Asia



# AN INSIDE LOOK INTO GREEN PORTS AND SHIPPING DEVELOPMENT IN ASIA

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CONFERENCE





# OUR GOAL: DECARBONIZE MARITIME TRANSPORT SECTOR

Raise awareness and create a green momentum for clean air and decarbonizing the maritime transport sector

Highlight the different priorities in terms of emissions reduction programs of various container ports in Asia

Highlight opportunities and challenges, best practices and lessons learned in the implementation of these programs in a knowledge sharing-platform





## Summary of Container Ports included in the Study

Country	Container Port (Terminal)
South Korea (KR)	Busan Port Incheon Port
Malaysia (MY)	Port Klang
Vietnam (VN)	Tan Cang Cai Mep Tan Cang Hai Phong
India (IN)	Jawaharlal Nehru
Singapore (SG)	Singapore Port (PSA Singapore, Johor Port)
Japan (JP)	Port of Tokyo
Sri Lanka (LK)	Port of Colombo (Jaye Container Terminal, Colombo International Container Terminal, South Asia Gateway Terminal)
Philippines (PH)	Port of Manila (Manila South Harbor, Manila International Container Terminal)
Indonesia (ID)	Tanjung Priok, Tanjung Perak
Thailand (TH)	Bangkok Port, Laem Chabang Port, Regional Ports

# Maximizing emissions reduction at container ports

## ENERGY EFFICIENCY AND MANAGEMENT

Refers to practices and technologies that reduce energy consumption and its resulting emissions

### Alternate energy sources

- Infrastructure and research for alternate fuel
- Shore power operation and construction
- Mixture of renewable energy sources/production

### Energy-efficient equipment and fixtures

- Cargo handling and port terminal equipment
- Tugboats
- Port fixtures

### Port operations

- Optimization through digitalization and automation
- Truck operations/use
- Other port distribution/collection modes

## PORT POLICIES AND MANAGEMENT

Refers to planning and implementation of relevant policies and standards within ports that have or supported decarbonization policies

### Pollution control and monitoring

- Stringent ship control and inspection
- Emissions inventory and air quality monitoring

### Policies, standards, and community relations

- More stringent ambient air quality guidelines
- Green port, net zero emissions, environmental policy/programs
- Social responsibility and information disclosure

Determined through extensive data collection of policies, plans, and existing practices



## Priorities\* of each country

Indonesia	Philippines	Sri Lanka	Thailand
Emissions inventory and air quality monitoring	Social responsibility and information disclosure	Optimization	<b>Green port, net zero emissions/ environmental policy</b>
<b>Green port, net zero emissions/ environmental policy</b>	Port fixtures	Cargo handling/port terminal equipment	Cargo handling/port terminal equipment
Stringent ship control and inspection	Emissions inventory and air quality monitoring	Stringent ship control and inspection	Stringent ship control and inspection
Optimization	<b>Green port, net zero emissions/ environmental policy</b>	Truck operations/use	More stringent air quality standards
Mix of renewable energy source/production	Other port distribution/collection modes	<b>Green port, net zero emissions/ environmental policy</b>	Truck operations/use

## Priorities\* of each country

Indonesia	Philippines	Sri Lanka	Thailand
Emissions inventory and air quality monitoring	Social responsibility and information disclosure	Optimization	<b>Green port, net zero emissions/ environmental policy</b>

Developing policies that target emissions reduction from container ports is a priority in Asia.

energy source/production	distribution/collection modes	<b>zero emissions/ environmental policy</b>	Truck operations/use
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# Green Port Policies:

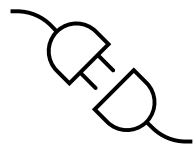
Country	Green Port Policy
India	Harit Sagar Guidelines
Indonesia	Ministry of Transport Decree No. 8 of 2023
Japan	MLIT Carbon Neutral Port (CNP) Initiative Port of Tokyo CNP Implementation Plan
Malaysia	JPA Green Port Policy
Philippines	Port Environmental Policy
Singapore	Green Port Programme Maritime Singapore Decarbonization Blueprint: Working towards 2050
South Korea	Special Act on the Improvement of Air Quality in Ports and Other Areas
Thailand	PAT Green Port Plan
Vietnam	VINAMARINE Green Port Criteria (draft)

## Major themes of green port policies

- Reducing fuel consumption
- Increase energy-efficiency
- Adopt clean fuels
- Utilize renewable energy

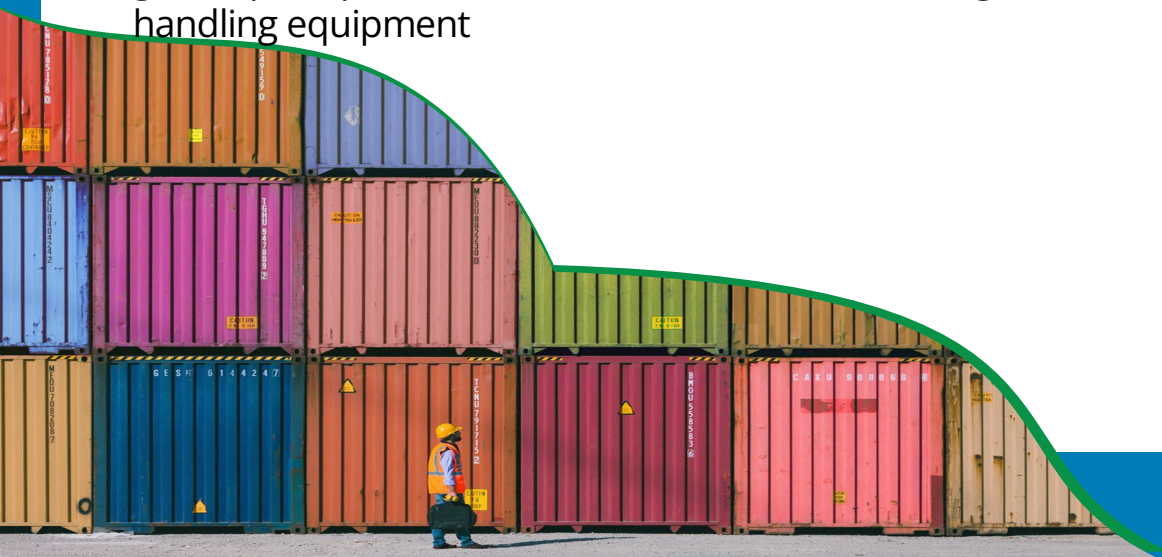
# Energy Efficient Cargo Handling Equipment and Port Fixtures

## Most Common Priority Rubber Tired Gantry (RTG)



### Transition to e-RTGs

All ports in the study are transitioning to energy efficient cargo handling equipment and all their green port policies include electrification of cargo handling equipment



## Ports with e-RTGs:

- JNPT (IND), NCPT1 (ID), Tanjung Perak (ID), PKA (MY), PTP (MY), BPA (KR), IPA (KR), PSAC (SG), Port of Colombo (SL), LCP (TH), TCIT (VN)

## Why electric RTGs?

- RTGs are more versatile than RMGs
- Diesel powered ones are energy intensive and emits more CO<sub>2</sub> emissions
- Transitioning to energy efficient RTGs reduces fuel consumption and GHG emissions

## Hybrid

- Port of Tokyo(JPN) , MSH & MICT (PH), Port of Colombo (SL)

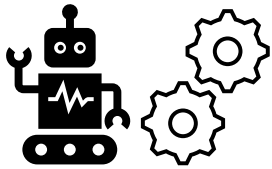
## Why hybrid RTGs?

- Stakeholders view that full electrification is **expensive**
- Hybrid RTGs are also effective in minimizing fuel consumption and GHG emissions



# Energy Efficient Cargo Handling Equipment and Port Fixtures

## Other Interventions



## Optimization through Digitalization and Automation

## Automation

- Teluk Lamong – Automated stacking cranes
- Hutchison Ports, Thailand – remote operated quay cranes, automated RTG, and Autonomous Trucks
- PTP – autonomous prime movers; RTG optimizer

## Digitalization

- Digital Booking System:
  - TABS (PH), INAPORT & MarineM (ID), digitalPort@SG
- Other Digitalization efforts: e-forms (JNPT) ; Digital trucking and logistics platform (ID)

## Benefits

- Increases efficiency of operations
- Reduces equipment idle time
- Reduces waiting time for vessels and trucks
- Reduces total operational time
- Reduces GHG emissions



# Energy Efficient Cargo Handling Equipment and Port Fixtures

## Other Interventions



### Energy Efficient Port Fixtures

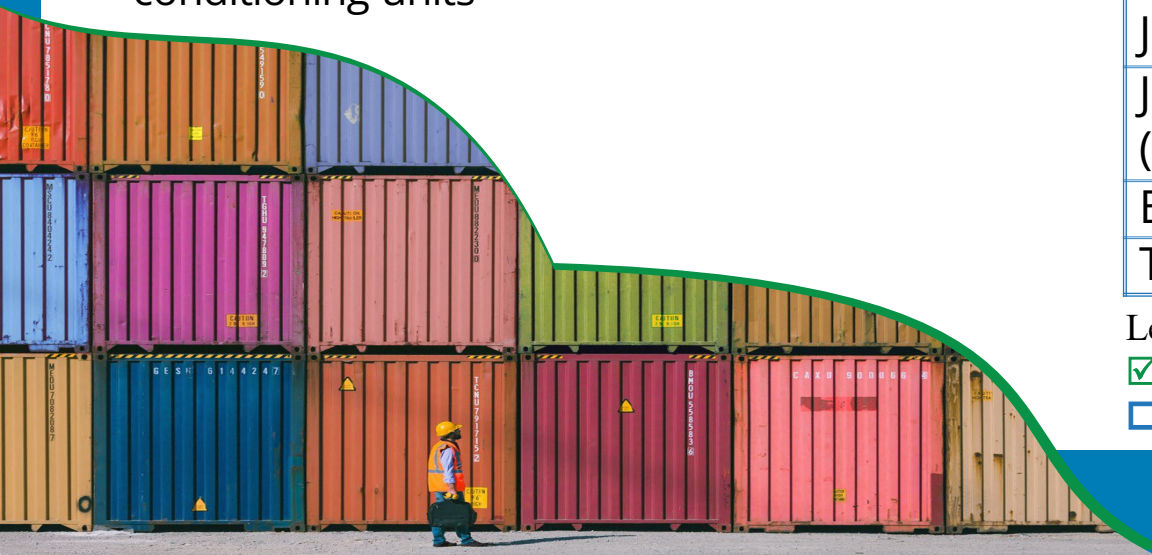
All ports in the study are transitioning to or plans to transition to **LEDs**. Some port also consider the transition to **inverter** air-conditioning units

Terminal/Port (Country)	LED	I-ACU
Jawaharlal Nehru (IN)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Tanjung Priok (ID)	<input type="checkbox"/>	·
Port of Tokyo (JP)	<input type="checkbox"/>	·
Busan Port (KR)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Incheon Port (KR)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Port Klang (MY)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Manila South Harbor, Port of Manila (PH)	<input checked="" type="checkbox"/>	·
Manila International Container Terminal, Port of Manila (PH)	<input checked="" type="checkbox"/>	·
PSA International (SG)	<input checked="" type="checkbox"/>	·
Jurong Port (SG)	<input type="checkbox"/>	·
Jaye Container Terminal, Port of Colombo (LK)	<input checked="" type="checkbox"/>	·
Bangkok Port (TH)	<input type="checkbox"/>	·
Tan Cang Cai Mep (VN)	<input checked="" type="checkbox"/>	·

Legend:

= Implemented

= Planned





# Use of Low Sulfur Fuel for Shipping

Legend:  
 = Planned

	CN	IN	ID	JP	MY	PH	KR	SG	LK	TH	VN
IMO MARPOL ANNEX VI RATIFICATION	<input checked="" type="checkbox"/> 2006	<input checked="" type="checkbox"/> 2005	<input checked="" type="checkbox"/> 2012	<input checked="" type="checkbox"/> 2005	<input checked="" type="checkbox"/> 2010	<input checked="" type="checkbox"/> 2018	<input checked="" type="checkbox"/> 2006	<input checked="" type="checkbox"/> 2000	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> 2014

## 1 Incentives

- Singapore (Green Port and Green Ship Program) – Reduction of port dues, initial registration fee, and annual tonnage tax for vessels using LSFs. Encourages the use of low or zero carbon fuel and compliance with EEDI.
- Tokyo port – waiving of port entry fees for LNG and Hydrogen powered and bunkering vessels.

## 2 ECAs

- South Korea – major ports in south Korea namely, Busan Port, Ulsan Port, Incheon Port, Yeosu Gwangyang, and Gyeonggi Pyeongtaek
- China – waters of Pearl River Delta, Yangtze River Delta and Bohai Rim Delta

## 3 Alternate Fuel

- Singapore
  - Bunkering of IMO 2020 compliant fuel
  - Castor Initiative
- Sri Lanka – Facilities and storage of LSFs
- Japan – provides subsidies for LNG Bunkering

## 4 MOU (Port State Control)

- Tokyo MoU
- Indian Ocean MoU

# Renewable Energy Sources

Typical sources of renewable energy at ports include **Solar Energy** and **Wind Energy**

Terminal/Port (Country)	Solar	Other renewable energy
Jawaharlal Nehru (ID)	<input checked="" type="checkbox"/>	
Tanjung Priok (IN)	<input type="checkbox"/>	
Port Klang (MY)	<input checked="" type="checkbox"/>	
Port of Singapore (SG)	<input checked="" type="checkbox"/>	Tidal (Pilot), Wind (2023)
Busan Port (KR)	<input checked="" type="checkbox"/>	
Incheon Port (KR)	<input checked="" type="checkbox"/>	
Ulsan Port (KR)	<input checked="" type="checkbox"/>	
Port of Colombo (LK)	<input type="checkbox"/> 2025	Wind and wave (n.d.) outside the port area
Bangkok Port (TH)	<input type="checkbox"/> 2015-2019	
Port of Tokyo (JP)	<input type="checkbox"/> 2030	Hydrogen (2030)
Manila South Harbor, Port of Manila (PH)	<input checked="" type="checkbox"/>	Increasing RE mix through utility providers

## Solar PVs

- ① Rooftop Solar
- ② Floating Solar PVs

## Rooftop Solar PVs

- Typically installed on top of buildings and are used to power the building's facilities
- Energy generated may also be sold to private energy providers (e.g., IPA)

Legend:

- = Implemented
- = Planned

# Renewable Energy Sources

Typical sources of renewable energy at ports include **Solar Energy** and **Wind Energy**

Terminal/Port (Country)	Solar	Other renewable energy
Jawaharlal Nehru (ID)	<input checked="" type="checkbox"/>	
Tanjung Priok (IN)	<input type="checkbox"/>	
Port Klang (MY)	<input checked="" type="checkbox"/>	
Port of Singapore (SG)	<input checked="" type="checkbox"/>	Tidal (Pilot), Wind (2023)
Busan Port (KR)	<input checked="" type="checkbox"/>	
Incheon Port (KR)	<input checked="" type="checkbox"/>	
Ulsan Port (KR)	<input checked="" type="checkbox"/>	
Port of Colombo (LK)	<input type="checkbox"/> 2025	Wind and wave (n.d.) outside the port area
Bangkok Port (TH)	<input type="checkbox"/> 2015-2019	
Port of Tokyo (JP)	<input type="checkbox"/> 2030	Hydrogen (2030)
Manila South Harbor, Port of Manila (PH)	<input checked="" type="checkbox"/>	Increasing RE mix through utility providers

## Wind Turbines

- ① Onshore Wind
- ② Offshore Wind

## Challenges in Implementing

- Lack of available space inside the ports
- High initial investment cost

Legend:

- = Implemented
- = Planned



# Shore Power

Terminal/Port (Country)		Details
Jawaharlal Nehru (ID)	<input checked="" type="checkbox"/>	Supplied for tugboats
New Priok One Container Terminal (IN)	<input checked="" type="checkbox"/>	
Tanjung Perak (IN)	<input checked="" type="checkbox"/>	
Teluk Lamong (IN)	<input checked="" type="checkbox"/>	
Port Klang (MY)	<input checked="" type="checkbox"/>	
Port of Singapore (SG)	<input type="checkbox"/> Study	Feasibility for charging infrastructure for full electric harbor crafts
Busan Port (KR)	<input checked="" type="checkbox"/>	Mix of both low-voltage (220-440 V) and high-voltage (6600 V) units
Incheon Port (KR)	<input checked="" type="checkbox"/>	
Port of Colombo (LK)	<input type="checkbox"/> n.d.	Planned for new terminals
Laem Chabang Port (TH)	<input type="checkbox"/> n.d.	Indicated to be phased in development plan
Port of Tokyo (JP)	<input type="checkbox"/> 2030	Committed to introduce shore power to achieve carbon neutrality
Port of CDO (PH)	<input checked="" type="checkbox"/>	

## Challenges in Implementation

Incompatibility

Underutilization

Lack of Infrastructure

## Direction of Asian Ports

For those with existing facilities:

- South Korea – Drafting additional policies to increase utilization of OPS
- Indonesia – DGST SE DJPL 22/2022 encourages more vessels to use OPS in various ports in Indonesia

For those without existing facilities:

- Several green port policies [e.g., Harit Sagar, (IND), CNP initiative (JPN), JPA Green port policy (MY), PAT green port program (TH), and VINAMARINE's green port criteria (VN)] include the provision and utilization of OPS

# Other Sources of Emissions: Trucks

Truck operations emit a significant amount of pollution during operations due to the type of fuel used

## Efforts to address truck emissions

- BKP: Traffic management plan and e-gate system to reduce truck idle time
- PAT: Will require trucks to use fuel compliant with euro 5 standards (PCD announced euro 5 requirements)
- Sri Lanka: double trucking
- During consultations, port stakeholders recognize the impacts of truck emissions, and they were the ones to suggest interagency cooperation to address the matter.

## Challenges

- Truck emissions are outside the jurisdiction of port authorities
- High quality fuel for trucks are available but are significantly more expensive

# Opportunities and Way Forward



## | Alternative Energy Sources

- Develop/ strengthen **policies** (incentives or mandates) for the use of LSFs and green/ clean fuel
- Providing appropriate **infrastructure** for handling, storage, and distribution of clean/ green fuel
- For **LNG**,
  - Address risks of methane slippage

## | Energy Efficient Equipment and Port Fixtures

- Sustain the transition to **electric / hybrid** cargo handling equipment to reduce diesel consumption
- Explore other types of fuel (e.g., LNG, Ammonia, Methanol, Biofuels)



# Opportunities and Way Forward



## | Shore Power

- Develop/ Expand shore power facilities in the port
- Encourage the utilization of shore power
  - Incentives (e.g., reduction of port dues)
  - Installing more facilities to avoid long wait times for berthing
  - Increase capacity of shore power to cater more vessels

## | Renewable Energy

- Explore other types of renewable energy sources
- Coordinate or partner with utility companies that source energy from renewables (e.g., GEOP)

# Opportunities and Way Forward



- Encourage **inter-agency coordination** to address emissions from the maritime transport sector, including port equipment, vehicles, and vessels



- Encourage **support from the private port stakeholders**
  - Private port stakeholders oversees logistics (e.g., freight, trucks, and ports)

# PITCH DECK: State of Play in Asian Countries



Raden Bonnyswara  
Indonesia



Sung Ho Jung  
South Korea



Renjie Wang  
PRC



Giang Hoang Hong  
Viet Nam



Mayuree Deeroop  
Thailand



Nino Biscocho  
Philippines



Cheryl Rita Kaur  
Malaysia



Rituraj Misra  
India (remotely)



# PITCH DECK

## State of Play in Asian Countries



Raden Bonnyswara  
Indonesia



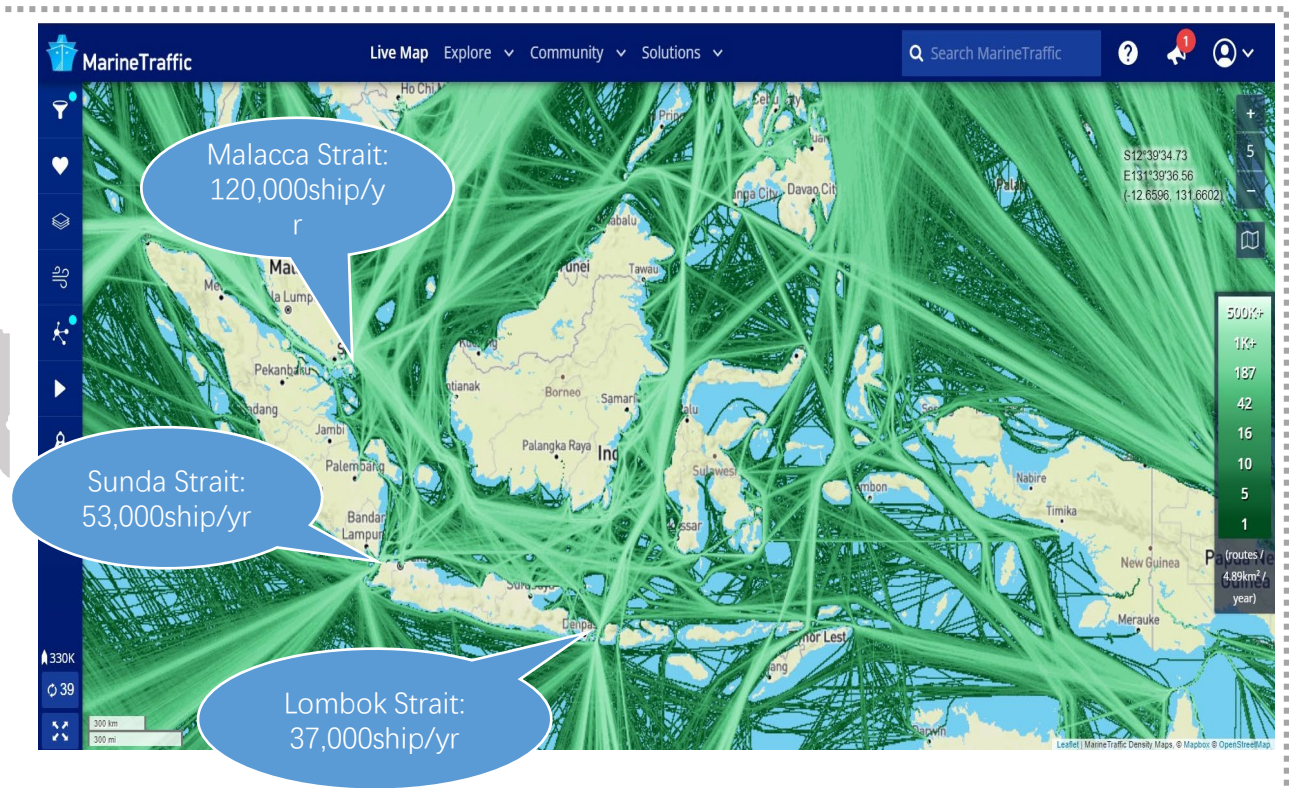
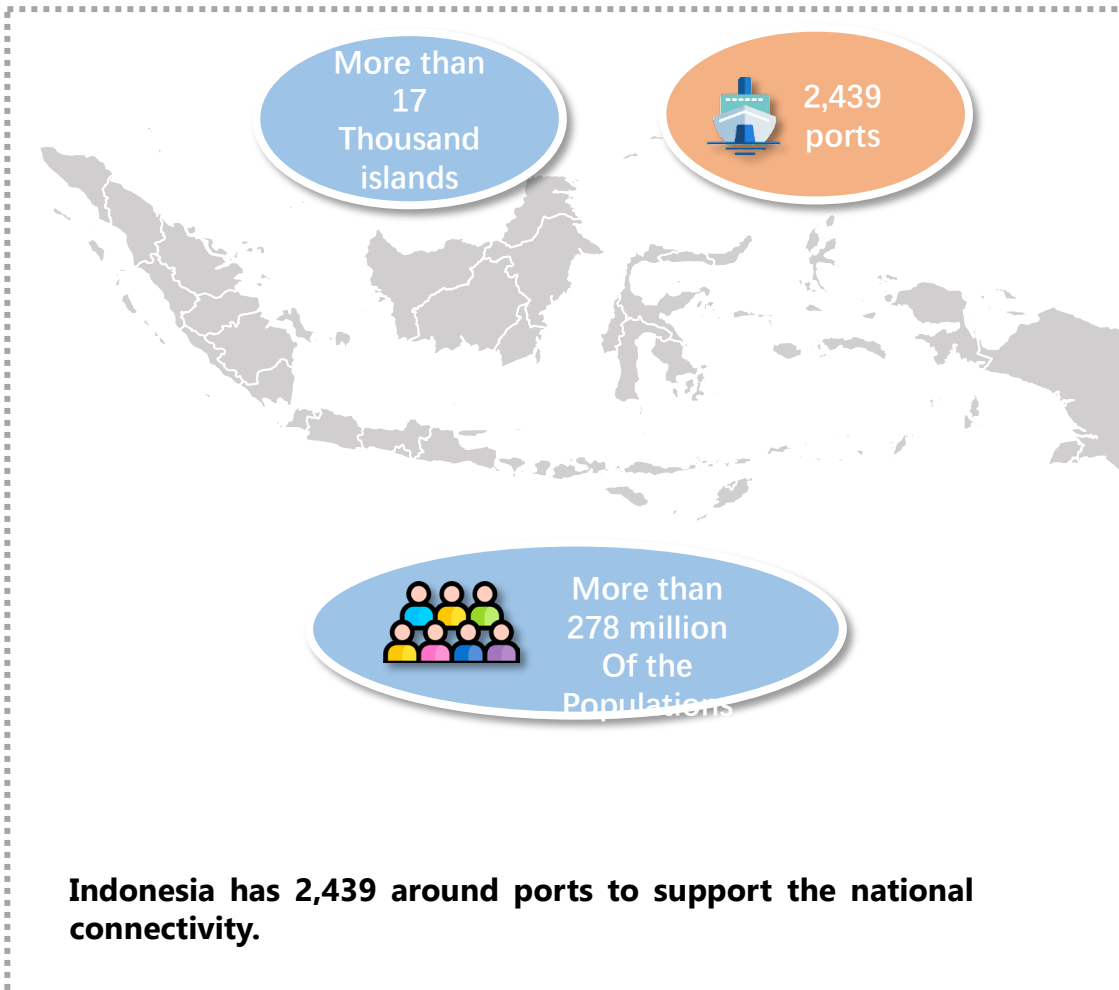
# INDONESIA

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# Indonesia's Existing Condition



**The Vessel Traffic within a year (2022).** It shows that Indonesia has important shipping routes which hundreds of thousands of ships passing through the Indonesian territory.



# State of Play: Indonesian Policy in Reducing GHG Emissions in the Maritime Transportation Sector

*Indonesia adopted the IMO policy in reducing GHG emissions in the maritime transportation sector through Minister of Transportation Decree 8 of 2023 concerning Determination of Climate Change Mitigation Actions in the Transportation Sector to Achieve National Contribution Targets*

## NDC (Nationally Determined Contribution) → Enhanced NDC

“to handling global climate change in order to achieve the goals of the Paris Agreement to the United Nations Framework Convention on Climate Change”

- Indonesia's commitment in the Enhanced NDC is to reduce the level of GHG emissions **in 2030 unconditional by 31.89% and up to 43.2% with the condition of additional international support below the baseline emission level.**
- The energy sector target from before the CM1 reduction (according to the 2016 NDC document) was 314 million tonnes of CO<sub>2</sub>, enhanced to a CM-1 reduction of 358 million tonnes of CO<sub>2</sub> in accordance with the ENDC 2022 document.



## Main Policies and Regulation that promote the Green Port and Shipping within Indonesia

**KP. 201 of 2013 Determination of RAN-GRK for the Transportation Sector**

**Ministerial Decree 8 of 2023 Establishing Climate Change Mitigation Actions in the Transportation Sector**

### Other Policies and Regulation :

- Presidential RI Instruction No. 5 of 2020 on the National Logistic Ecosystem Management (NLE)
- Presidential RI Regulation No. 18 of 2020 on The National Medium-Term Development Plan for 2020 – 2024
- Director General of Sea Transportation (DGST) Decree No. 936 /DJPL/2020 on DGST Strategic Plan for 2020 – 2024
- Presidential RI Decree No. 98 of 2021 on Implementing Carbon Economic Value (NEK)
- Director General of Sea Transportation (DGST) Regulation No. KP-DJPL 689/2022 on Ecoport Guidelines

# State of Play: The Green Port Program that Indonesia Accomplished

## Green Port Concept



### Management

Performance efficiency and governance of port business processes.



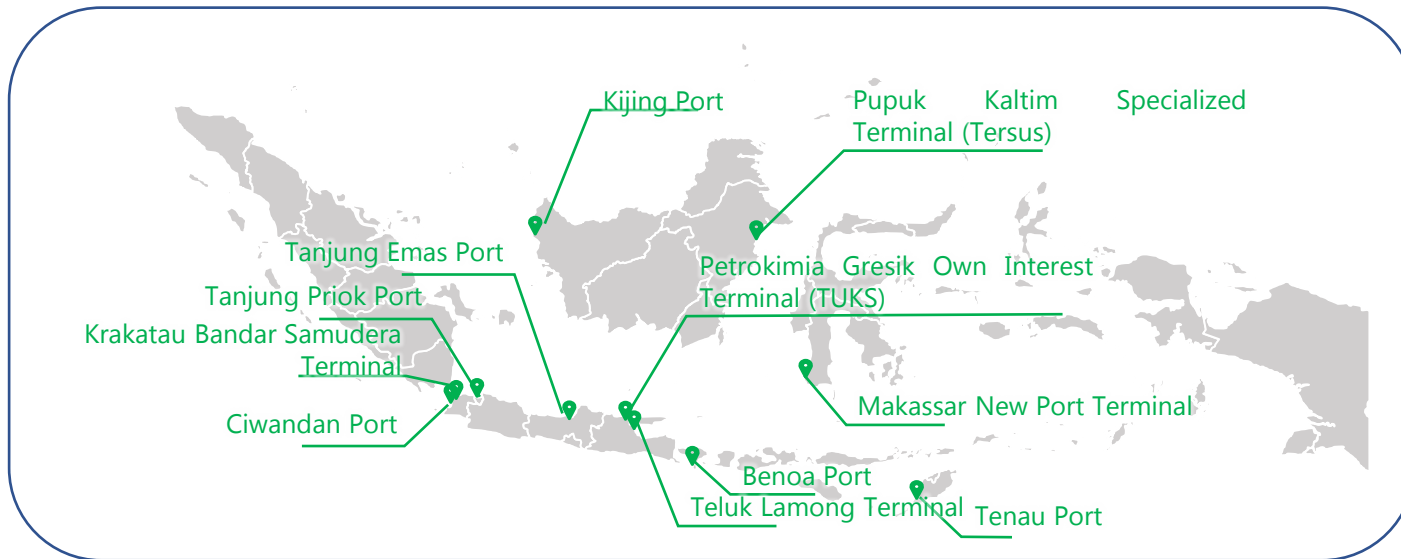
### Technical aspect

Port area management, environment, health safety and security, energy, climate change and biodiversity.



### Digitalization aspect

digitalization in business processes and transactions to improve services.



## Green Port in Indonesia 2022:

- Pupuk Kaltim Specialized Terminal (Tersus)
- Kijing Port
- Petrokimia Gresik Own Interest Terminal (TUKS)
- Tanjung Emas Port
- Tanjung Priok Port
- Krakatau Bandar Samudera Terminal
- Ciwandan Port
- Makassar New Port Terminal
- Benoa Port
- Teluk Lamong Terminal
- Tenau Port
- etc

Source: ID Survey, 2022

# State of Play:

Notable achievements include the development of several pilot ecoports that incorporate green initiatives like renewable energy and energy efficiency. Teluk Lamong Terminal in East Java serves as a best practice example.



## THE IMPLEMENTATION OF ECOPORT IN INDONESIA Teluk Lamong Terminal, East Java



### Decarbonization

- ✓ Using Compressed Natural Gas for Truck fuel
- ✓ Equipment Automatization
- ✓ Develop the Gas Engine Power Plant



### Energy Saving

- ✓ Light Emitting Diode (LED)
- ✓ Solar Cell
- ✓ Exhaust Gas AC system
- ✓ Reducing fossil energy



### First Semi-Automated Terminal in Indonesia

- ✓ Increasing Safety

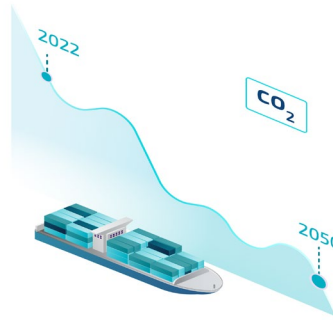


### Other Facilities

- ✓ Waste Management
- ✓ Incinerator
- ✓ Oily Water Separator
- ✓ Oil Spillage



# State of Play: Shipping Decarbonization in Indonesia



## Implementing Energy Efficiency Measurement for Ship

Indonesia has adopted mandatory measures to reduce emissions of greenhouse gases under IMO's pollution prevention treaty (MARPOL) Annex VI Regulation, namely:

- Energy Efficiency Design Index (EEDI)
- Energy Efficiency Existing ship Index (EEXI)
- Ship Energy Efficiency Management Plan (SEEMP) Part I, II & III
- Ship Energy Efficiency Management Plan (SEEMP) IMO Data Collection System (DCS) and Carbon Intensity Indicator (CII)

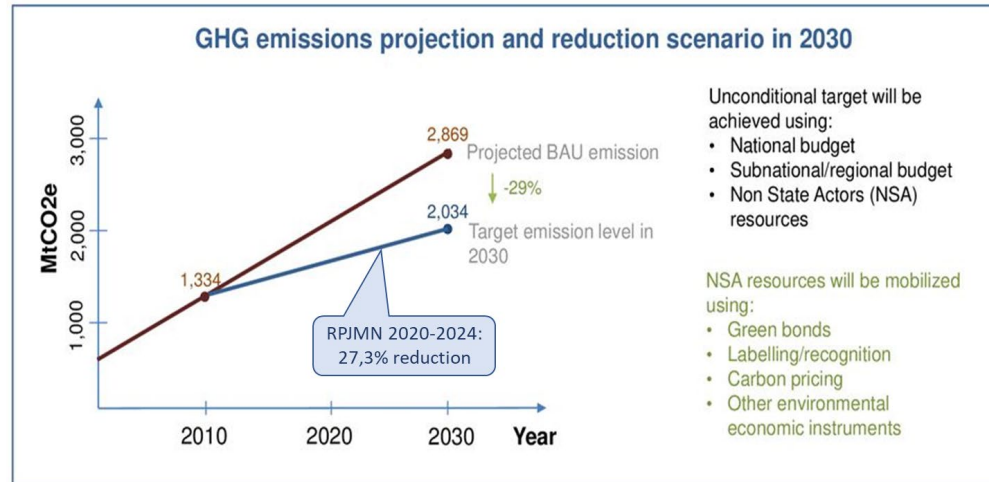


## Utilizing Biodiesel/Fatty Acid Methyl Ester (FAME) as Fuel for Ship

Mandatory use of Biodiesel20 (20% FAME and 80% HSD) is not only for public service obligation (PSO) use but is extended to non-PSO which includes heavy equipment, industry and shipping.

# Drivers for Change: Top-Down Policies

## RPJMN 2020-2024 AND PARIS AGREEMENT



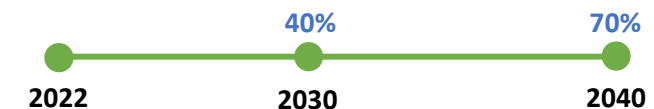
Indonesia will unconditionally reduce its GHG emission 29% below business as usual level in 2030 (RPJMN: 27,3% in 2024) and is confident to reduce further with international support

## IMO TARGET FOR REDUCING GLOBAL SHIPPING



THE INTERNATIONAL MARITIME ORGANIZATION (IMO) IS TARGETING A REDUCTION OF CO<sub>2</sub> EMISSIONS BY GLOBAL SAILING OF 40% IN 2030 AND 70% IN 2040.

### GLOBAL SHIPPING CO<sub>2</sub> EMISSION REDUCTION TARGET



# Drivers for Change: Advantages Gained by Business Entity



## Increase productivity and efficiency in business processes

- The use of digital technology in green ports can create business processes that are faster, more productive and efficient. This can also have an impact on cutting unnecessary costs.



## Prevent Corruption

- Almost all transactions and data will be recorded digitally. That way, the potential for various forms of business practices can be reduced.



## Operational Cost Saving and Maximizing Profit

- The use of new renewable fuels will increase the efficiency of energy consumption resulting in operational cost savings.



# Public and stakeholder engagement

Policy	Stakeholder	Role/Action
Energy Efficiency	Shipping Companies	<ol style="list-style-type: none"> <li>1. Ship modernization</li> <li>2. Implementing the Ship Energy Efficiency Management Plan (SEEMP)</li> <li>3. Use of On Shore Supply at the port</li> <li>4. Use of Anti Fouling System on the ship's hull</li> </ol>
	Port Operator	<ol style="list-style-type: none"> <li>1. Implementation of On Shore Supply facility at the port</li> <li>2. Equipment electrification</li> <li>3. Digitalization using 1 app for all business processes.</li> </ol>
	Energy Company	Solar electricity in transportation infrastructure
	Shipyards and Shipping Manufacture	<ol style="list-style-type: none"> <li>1. Implementation of Anti Fouling System on the ship's hull</li> <li>2. Machinery and equipment modernization</li> </ol>
Utilization of New Renewable Energy	Shipping Companies	Use of biodiesel fuel (B20)
	Port Operator	Solar Power generation in transportation infrastructure
	Energy Company	<ol style="list-style-type: none"> <li>1. Development of biodiesel fuel with a content above 20%</li> <li>2. Development of solar power plants for transportation infrastructure</li> </ol>

# Public and stakeholder engagement



## Green Port Awarding 2022

- Initiated by the Coordinating Ministry for Maritime Affairs and Investment.
- The assessment was carried out by ID Survey Inc. to assess the fulfillment of the green port criteria that must be met by the ports.
- This awarding is able to encourage port operators to implement green ports to improve the port's image from an international perspective.

# Challenges

## Greenport Challenge

### **Port Electrification**

- Electricity supply in areas outside Java island is still limited (Java have 59% of national power plan capacity).
- Low availability of components supporting electrification.

### **Sustainable Development**

- Ensure the availability of green space
- Formulate evaluation of the Sustainable Development activities that have been implemented (Mangrove Planting Program, Using Non-CFC Refrigerant, etc.).

### **Provide Renewable Energy**

- The cost of new renewable energy is still high compared to fossil fuels.

## Shipping Decarbonization Challenge

### **Fuel Efficiency**

- On average, ships operating in Indonesian waters are old and their engine systems still use old technology that is fuel inefficient.

### **Ship Modernisation**

- The fiscal capacity of domestic shipping liners is low.

### **Engine – Fuel Compatibility**

- It is many ship that not compatible for Biodiesel fuel ship.

### **Energy Alternative Utilization**

- low fiscal capacity and facilities for alternative fuels (fuel cells and ammonia) development.



# Conclusion

**In summary, the policy and regulatory foundation, pilot projects, and iterative processes of multiple stakeholders have helped Indonesia deepen its cooperation with related partners such as Clean Air Asia to promote advance decarbonization at target ports;**

**Pilot priorities could include testing blended finance models for green infrastructure, alternative fuels, electrification and integrating emerging solutions into port market engagement and carbon credits;**

**Ongoing policy improvements and increased employment and capacity will help achieve NDC targets in key maritime sectors.**

# PITCH DECK

## State of Play in Asian Countries



Sung Ho Jung  
South Korea



# SOUTH KOREA

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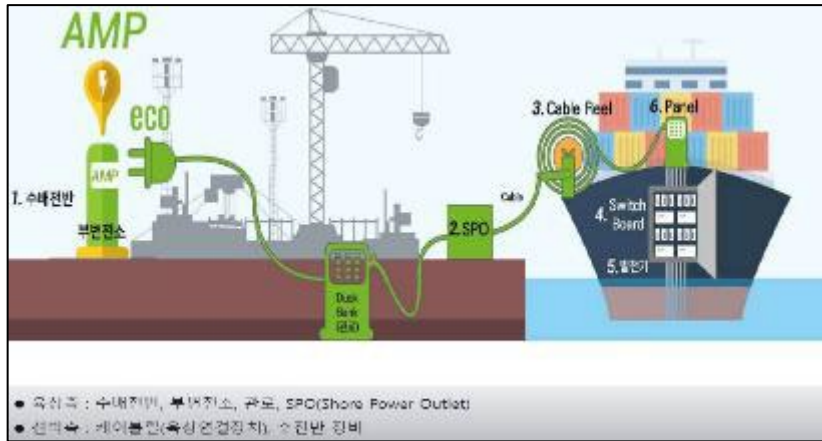




# 04-Reduction Projects(Vessels Sector)

## 1 Achieving zero emissions from berthed vessels through AMP

- ✔ Installation of alternative maritime power systems in Busan Port
  - (Low voltage AMP) 78 AMP stations for small ships has been in operation
  - (High voltage AMP) 20 AMP Stations has been in operation(8 berth)
    - (1<sup>st</sup> pilot project) AMP installation completed for Busan New Port Piers 3 & 4 (Dec. 2019)
    - (2<sup>nd</sup> pilot project) AMP installation completed for Gamman & Sinseondae Pier (Apr. 2021)
- ✔ Movable Connection Cable Manufacture completion(Jun. 2022)



< AMP concept image >



< Movable Connection Cable >

# 04-Reduction Projects(Vessels Sector)

2

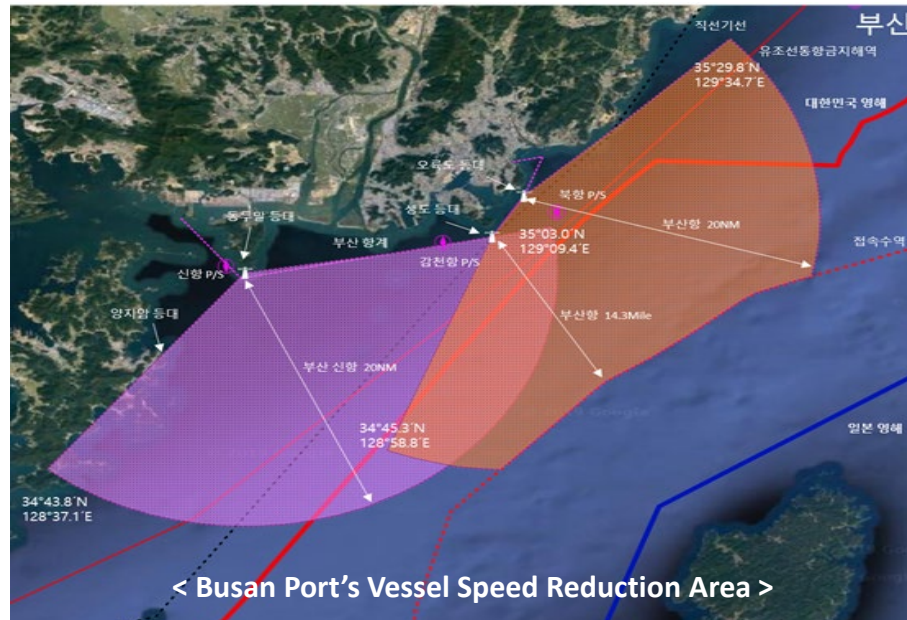
## Incentive Scheme for Low-speed Vessel Operation

\* USD1=KRW1,200

✔ Offering 15~30% of Port Charge Exemption for the vessel operators Reducing Speed

- (Progress) 1.65 billion won exempted for **9,796 vessels**

\* **78% of Shipping Line** called at Busan Port **participated in 2022 (+8% compared to 2021)**



(Vessel Type) Container Vessel, Car Carrier over 3000t

(Speed Limit) 12kn(22km/h) or slower

(Area) within 20 nautical miles from harbor limit)

(Detail) Shipping line should complying with the speed limit over 60% of each vessel's annual entries and departure

## 04-Reduction Projects(Vessels Sector)

3

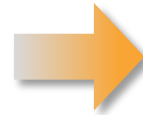
### Building Electric Port Guide Vessel – Achieving Zero Emission

#### ✓ Electric Port Guide Vessel Building Project

- **(Project detail)** By replacing our 20 years old port guide vessel(Saenuri) with the new Electric one, we could reduce harmful emissions to Zero.
- **(Period)** Oct. 2020 ~
- **(Vessel spec)** 300 GT, full length of 40m, 2MWh battery, approximately 80 passengers



< (Before) Busan Port guide vessel (Saenurid) >



< (After) Electric Vesse(E-Green)I >



# 04-Reduction Projects(Cargo Handling Equipment Sector)

## 1 Exhaust gas reduction by switching fuel from diesel to LNG/Electric for yard tractors (Y/T)

\* USD1=KRW1,200

✔ 80% of Fine Dust reduction by changing the Diesel fuel engine to LNG

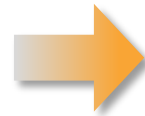
- (Progress) 537 Yard Tractors are on operation as the end of 2023

\* 2023 project : 1,840 Million won (BPA 25%, Ministry of Oceans and Fisheries 25%, Private 50%)

✔ Will Switched to Electricity Y/T for Carbon Neutrality



LNG YT (537 units, 2023)



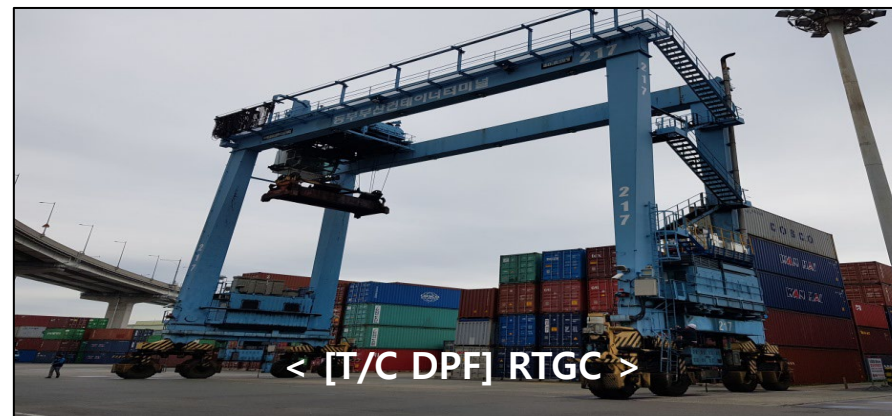
Electricity YT (4 units, 2023)

# 04-Reduction Projects(Cargo Handling Equipment Sector)

2

## Converting Diesel Transfer Cranes (T/C) to eco-friendly Equipment

- ✔ **92% T/C(366)s in Busan Port are in operation under e-RTGC systems**
  - 100% of 279 T/Cs in Busan New Port, 72% of T/Cs in Busan North Port are electrically operated.
- ✔ **By the end of 2023, 6% T/C(25)s in Busan Port are in operation with DPF**
- ✔ **Total 98% of T/Cs are in operation as eco-friendly way, we are planning to convert all equipment to 100% eco-friendly ones by 2024**
  - 103 million won to install DPF for 1 T/C (BPA and Gov.t support 45% each, Private pays 10%)









# THE POLICIES AND PROGRESSES FOR GREEN PORTS AND SHIPPING IN PRC



**WANG RENJIE**

**TRANSPORT PLANNING AND RESEARCH INSTITUTE,  
MINISTRY OF TRANSPORT OF PRC**

# Green ports and shipping policies in PRC

## Shipping

Transportation mode shift

Emission Control Area

Shore Power

Wharf oil vapor recovery

Dust pollution control

Receiving and disposing of pollutants from ships in port

New energy application

## Port

Port operation machinery

Electrification

Improve access condition

Port infrastructure

New energy filling facilities

Green lighting

Port renewable resources

solar energy

Wind energy

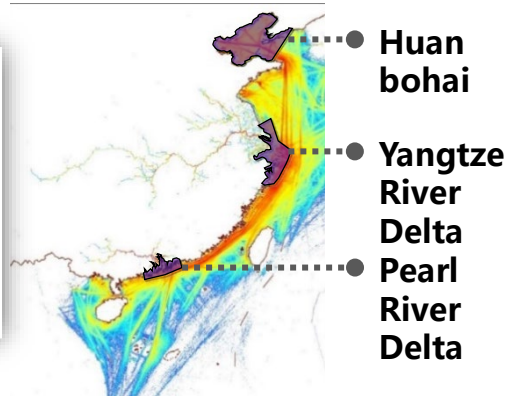
Carbon emission management

Management platform

# Green shipping achievements

## DECA 1

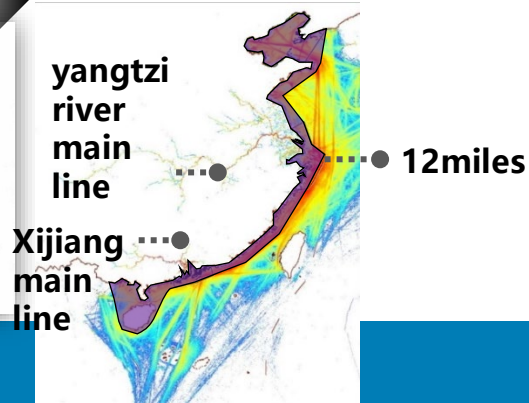
2016—2018



From 3 areas to expand to the coast of the country  
 Put forward Hainan control area, first tighten requirements  
 Two more inland river control areas  
 Enhanced fuel sulfur content requirements (SO<sub>x</sub>, PM)  
 Increased requirements for NO<sub>x</sub> and VOCs control  
 Increase shore power usage requirements

## DECA 2

2019 till now

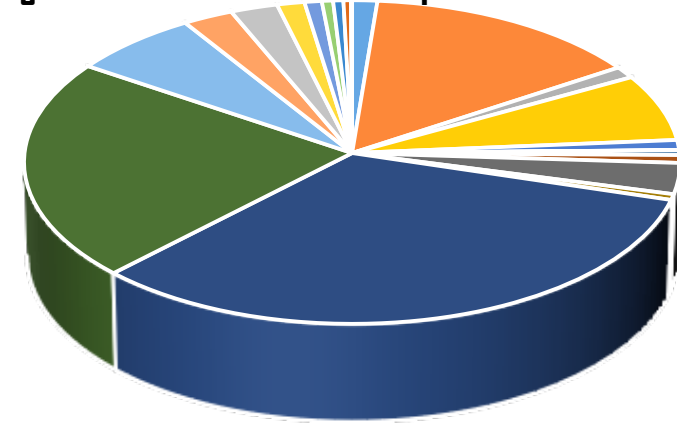


•The shore power cover all the ports.

### Emission reduction of shore power in 2020

SO <sub>2</sub> /ton	NO <sub>x</sub> /ton	PM <sub>2.5</sub> /ton	CO <sub>2</sub> /ton
700	1500	90	60000

### Regional distribution of shore power berths in 2020



- 福建省
- 广东省
- 广西
- 海南省
- 河北省
- 河南省
- 黑龙江省
- 辽宁省
- 山东省
- 天津市
- 江苏省
- 浙江省
- 安徽省
- 湖北省
- 重庆市
- 江西省
- 上海市
- 四川省
- 云南省
- 湖南省
- 贵州省



# Green ports achievements



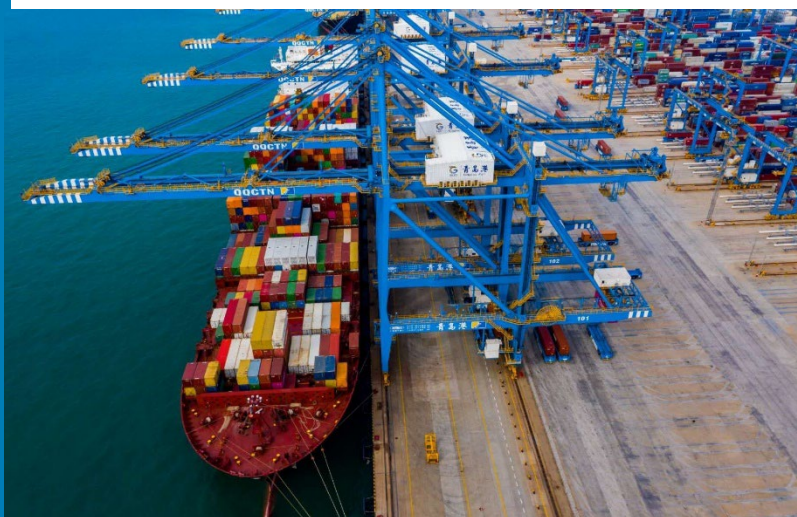
## Yangshan Phase 4 Wharf

Five-star container terminal  
largest single container terminal, Highest degree of automation



## Huanghua Port coal wharf

The first five-star bulk terminal  
Fully closed silo operation,, creating a port "oasis on the sea"



## Qingdao Port Qianwan container terminal:

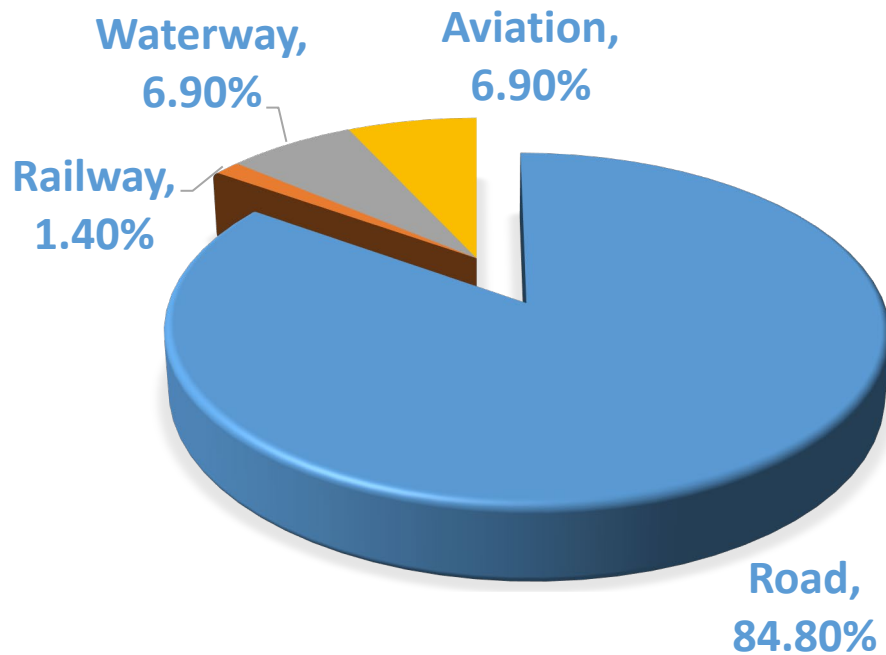
Built the energy system that integrates solar and wind



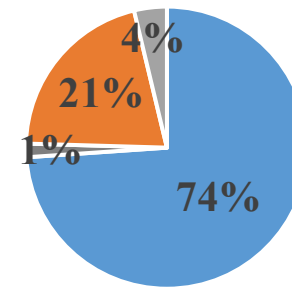
## Pacific Container Terminal, Tianjin Port:

The world's first traditional container terminal to build distributed wind power.

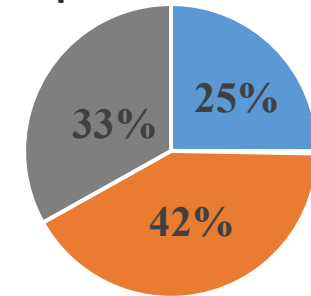
# PRC aims to achieve carbon peak by 2030 and carbon neutrality by 2060



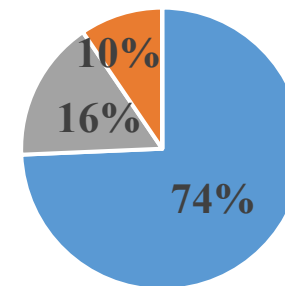
Proportion of passenger traffic



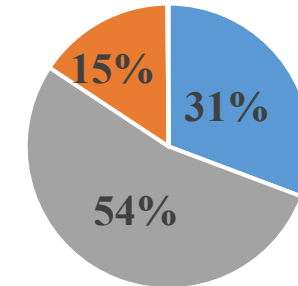
Proportion of passenger transport turnover



Proportion of freight volume



Proportion of freight turnover



Data Source: Research on China's Long-term Low-carbon Development Strategy and Transformation Path, Tsinghua University

# The trend of carbon emission reduction in international shipping is remarkable

Organization /country	IMO	American Bureau of Shipping «Ship sustainable development path»	Det Norske Veritas «Maritime Outlook 2050»	Eu 'Fit for 55'	Britain «Maritime 2050»	Japan “Zero Emissions roadmap for international shipping “
<b>emission reduction target</b>	At least 50% less in 2050 than in 2008			Compared to 2020 , the emission will reduce 6% by2030 , reduce 26% by2040 , reduce 75% by2050.	80% of 1990 level by 2050 (excluding international)	By 2030, emissions will be reduced by no less than 90% compared to 2008
<b>Promotion of new energy</b>	EEXI、CII	Share of low-carbon fuels: 18% in 2030, 37% in 2040 50% in 2050	The proportion of carbon neutral fuels : 14% in 2030, 60% in 2040 60-100% in 2050		2025: Zero emissions from new ships.  2035: Low - or zero-emission Marine fuel refueling options are readily available	Introduction of zero-emission ships from 2028 to 2030:  LNG to carbon cycle methane; Promotion of hydrogen and/or ammonia fuels



# Pathway and Challenges for green ports and shipping

## Green ports & shipping Stage 1

- **Scope:**
  - 1、 Working machinery in ports
  - 2、 Ships enter into the ECA
- **Emission type:**  
direct emission  
(fossil fuel)



**Direct emission in port & ECA  
for shipping**

## Green ports & shipping Stage 2

- **Scope:**
  - 1、 Working machinery in ports
  - 2、 vehicles in the ports
  - 2、 Ships enter into the ECA
- **Emission type:**  
direct emission  
(fossil fuel)  
indirect emission  
(electricity)



**All emission in port & new  
energy ships and delicacy  
management**

## Green ports & shipping Stage 3

- **Scope:**
  - 1、 Working machinery in ports
  - 2、 Collecting and dispatching  
system for ports
  - 3、 All Ships
- **Emission type:**  
direct emission  
(fossil fuel)  
indirect emission  
(electricity)



**Coordinated promotion for  
green ports and shipping**

THANK YOU



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MINISTRY OF TRANSPORT OF PRC



# PITCH DECK

## State of Play in Asian Countries



Giang Hoang Hong  
Viet Nam



# VIET NAM

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# VIET NAM MARITIME ADMINISTRATION

## GREEN PORT AND IMPLEMENTATION PLAN OF VIETNAM MARITIME INDUSTRY



1. VINAMARINE'S MAJOR FUNCTIONS AND DUTIES
2. GREEN PORT IMPLEMENTATION ROADMAP
3. VINAMARINE IMPLEMENTATION PROGRESS







## VINAMARINE'S MAJOR FUNCTIONS AND DUTIES

**VINAMARINE** is one of administrations under the management of Ministry of Transport of Viet Nam. Its main functions and duties are as follows:

- 1.To build maritime development strategies, development master plans, shipping policies and regulations, management policies and legal norms
- 2.To manage and execute maritime infrastructure projects
- 3.To propose for signing maritime agreements, memorandum of understanding
- 4.To propose for ratifying international maritime conventions
- 5.To issue permission to foreign ships to territorial waters of Viet Nam





## VINAMARINE'S MAJOR FUNCTIONS AND DUTIES

**VINAMARINE** is one of administrations under the management of Ministry of Transport of Viet Nam. Its main functions and duties are as follows:

6. To declare seaports opening for navigation

7. To manage maritime services

8. To carry out search and rescue operations at sea

9. To implement port state control procedures

10. To supervise maritime safety, security, and environmental protection

11. To investigate and settle maritime activities.

# **GREENPORT IMPLEMENTATION ROADMAP**

**Decision No. 876/QD-TTg dated July 22, 2022 of the Prime Minister approving the Action Program on green energy conversion and reducing carbon and methane emissions of the transportation sector:**

## **1) Maritime green transition roadmap**

Period 2022 - 2030

+ Encourage the transition of using electricity and green energy or draft the implementation plan of equivalent measures for new and existing investment ports.

From 2031: Focusing on investing in electricity and green energy equipment or issue equivalent measures for new and existing investment ports.

From 2040: Conversion of vehicles, equipment at existing ports, maritime signaling equipment to use electricity, green energy or equivalent measures.

From 2050: All facilities, port equipment, and maritime signaling devices use electricity and green energy or have equivalent measures.



## 2. Tasks and solutions for green transformation and carbon emission reduction

- Build and implement institutions, policies, and planning.
- Transit vehicles, and vessels to use electricity and green energy.
- Develop green transport infrastructure
- Improve energy use efficiency and reduce greenhouse gas emissions.
- Strengthen international cooperation, science and technology, human resource development and communication.



## **Decision No. 2027/QĐ-BGTVT dated October 29, 2020 of the Ministry of Transport on approving the Green Port Development Plan in Vietnam:**

Period 2020 - 2025:

- Develop and promulgate basic standards on green port criteria;
- Pilot the green port model at some Vietnamese seaports and evaluate implementation results.
- Propagate, disseminate and communicate to raise awareness and capacity to apply green port criteria in Vietnam to all levels, sectors and businesses that are exploiting and operating seaports.
- Promote inspection, examination, urging, and ensure compliance with legal regulations on environmental protection, economical and efficient use of energy, and response to climate change in investment activities. investment in construction, business, and exploitation of seaports;

## Tasks and implementation solutions of period from 2020 - 2025

- Propose amendments and supplements to regulations in planning management, investment, construction, and exploitation of seaports to comply with green port criteria in Vietnam.
- Propose policy mechanisms to encourage and support businesses implementing the green seaport development process.
- Research, apply, and transfer clean, low-carbon, environmentally friendly technology in seaport operations to reduce emissions, use energy economically, and effectively protect the environment as a basis for applying the green port model in Vietnam.
- Strengthen international cooperation in developing green ports in Vietnam.





## 2) Period from 2025 - 2030:

- Develop and promulgate national technical standards on green port criteria; Deploy voluntary application of green port criteria at Vietnamese seaports.
  - Develop and promulgate policy mechanisms on reviewing, amendment, and supplementing regulations of the management of planning, investment, construction, and business, and exploitation of seaports in accordance with green port criteria in Viet Nam.
-

# Tasks and implementation solutions of period from 2025 - 2030:

- Continue to carry out propaganda, dissemination, and training to raise awareness and capacity to apply green port criteria in Vietnam; Promote the application and transit of clean, low-carbon, environmentally friendly technology in seaport operations.
- Evaluate the results of voluntary application of green port criteria at seaports; Propose the development and promulgation of regulations on mandatory application of green port criteria for the seaport system in Vietnam.



## c) Period after 2030:

Deploy mandatory application of green port criteria in planning, investment in construction and business and exploitation of seaports in Vietnam



# VINAMARINE IMPLEMENTATION PROGRESS

- Vietnam Maritime Administration has been conducting propaganda and dissemination of programs and action plans of the Government, Ministry of Transport, Vietnam National Administration to seaport and shipping enterprises to know and have plans for investment and exploitation business in accordance with the roadmap and commitments of the Government;
- The Vietnam Maritime Administration has been directing planning consultants to integrate viewpoints and goals of green energy transition, greenhouse gas reduction and green seaport development into the master plans for development of Vietnam's seaport system and detailed planning of port groups;
- Vietnam Maritime Administration develops and promulgates TCCS 02:2022/CHHVN base standard on green port criteria (in Decision No. 1909/QD-CHHVN dated 29/12/2022); Currently applied at seaports in Vietnam;
- Vietnam Maritime Administration is also reviewing, amending and supplementing the legal corridor on green ports and green transformation;
- Currently, the Vietnam Maritime Administration is also promoting and requesting support from countries to improve capacity, develop mechanisms, policies and technical assistance, green transformation projects



THANK YOU VERY MUCH!







# THAILAND

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CONFERENCE





# BUSINESS OVERVIEW



## Port Authority of Thailand (PAT) Laem Chabang Port



**21st**  
by throughput in 2022  
8.73 Mil (teu)



**27th**  
the rankings of container port  
performance in the CPPI 2022

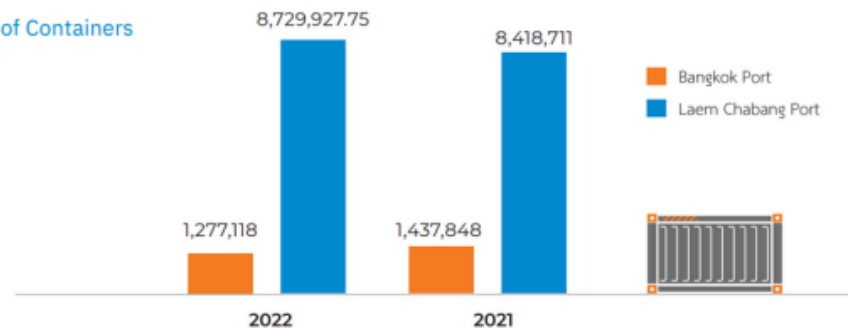


**2505.93 acres**  
LCP covers an area

### Vessels and Cargoes Statistics

at Bangkok Port and Laem Chabang Port

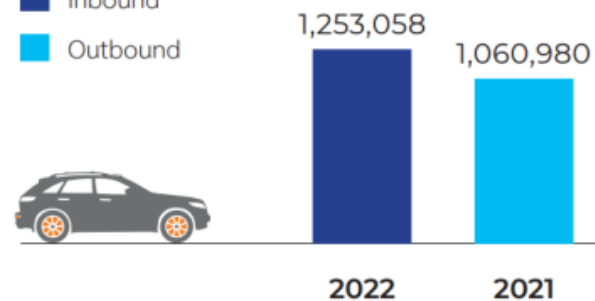
Number of Containers  
(Unit: TEUs)



### Number of Vehicles

(Unit: Units)

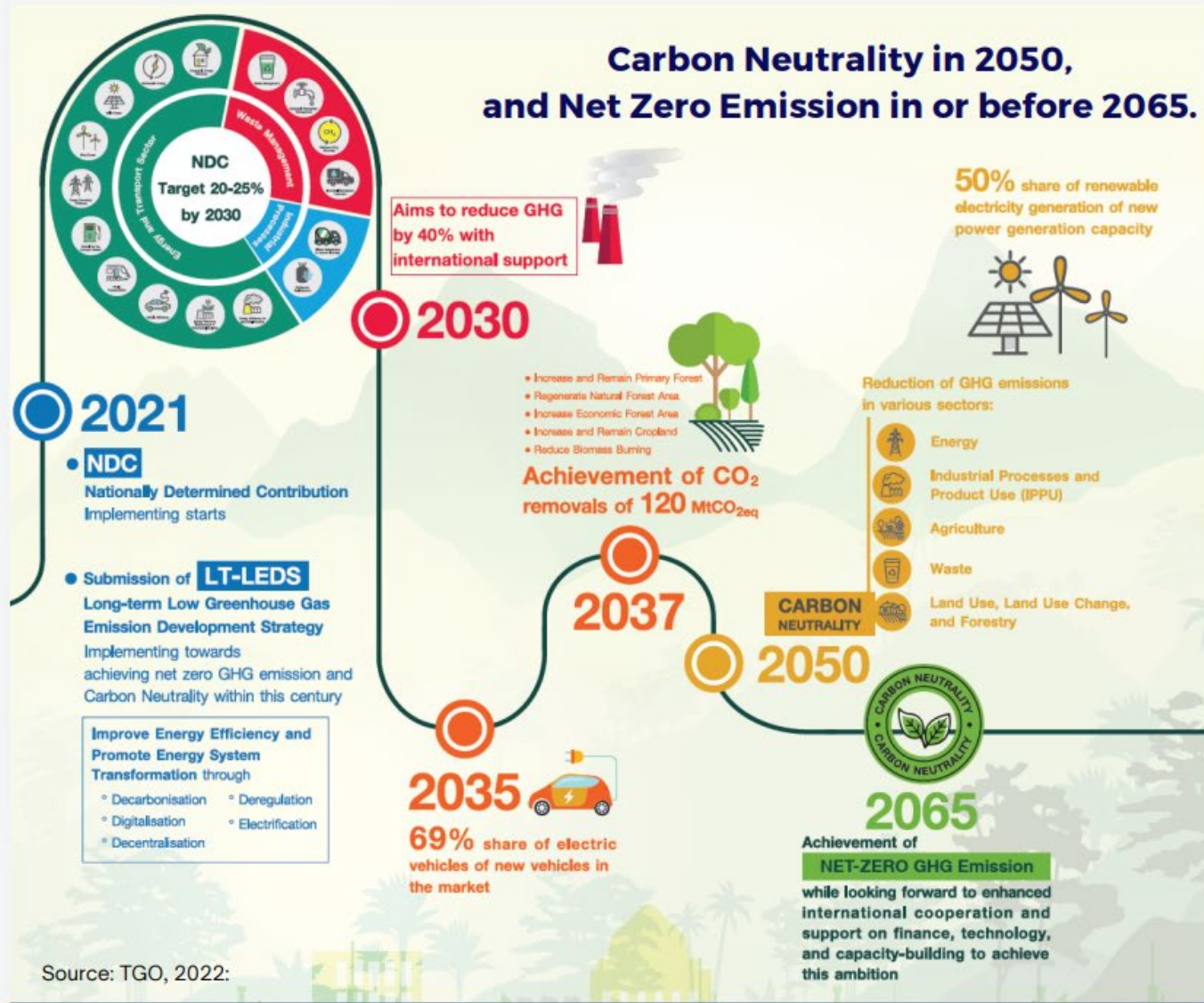
■ Inbound  
■ Outbound



**11.1 million TEUs**  
a handling capacity

# State of Play

## Thailand's Long-term GHG Emission Development Strategy



Source: TGO, 2022:



**Thailand's 20-Year National Strategy (2018-2037)**



**13th Thailand National Economic and Social Development Plan (2023-2027)**



**Thailand Transport Development Strategic Plan 2018-2037**



**PAT Environmental Policy**

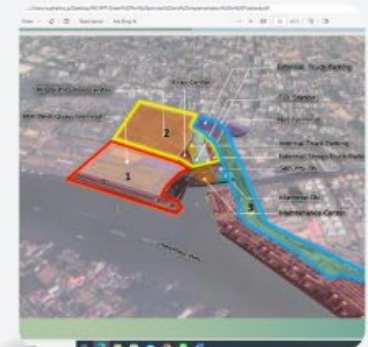
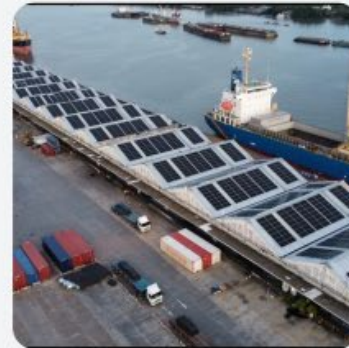


# State of Play



## GREEN PORT INITIATIVES

Decline Carbon Emissions by 10% by 2030





# State of Play



## ACHIEVEMENT



**PAT successfully reduced carbon emissions by more than 5% in 2023 and invested more than \$7 million**

## DRIVERS FOR CHANGE

- Top-down policies
- IMO 2023 GHG emission strategy
  - Zero GHG emission from international shipping by or around 2050



## PUBLIC AND STAKEHOLDER ENGAGEMENT



PAT Strategic Plan on Stakeholder Engagement and Relationship Management

## CHALLENGES

Operational barriers

- The supply of low- or non-carbon energy
- The knowledge of alternative low-carbon fuels









# PHILIPPINES

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CONFERENCE



# 01-State of Play

## *Guiding Questions:*

- 2. What notable achievements or progress has your country made with regards to Question No. 1.**
- ✓ **Participation to the Green Port Award System (GPAS) Program** where **five (5) PPA ports have been recipients of this award**, namely, the Manila International Container Terminal (MICT) operated by International Container Terminal Services Inc. (ICTSI); Manila South Harbor operated by Asian Terminals Incorporated (ATI); the Port of Batangas; Port of Cagayan de Oro; and the Port of Surigao.
  - ✓ **Establishment of Carbon Sink Areas (Tree Parks)** in the Ports of Cagayan de Oro and Surigao, among others
  - ✓ **Use of clean and renewable energy sources in ports** such as installation of Solar-powered lighting and LED lighting systems in office and terminal buildings.
  - ✓ Upgrading/Provision of **Fuel-efficient Cargo Handling Equipment and Rubber-Tired Gantries (RTGs)** of terminal operators

# 01-State of Play

## *Guiding Questions:*

### 2. What notable achievements or progress has your country made with regards to Question No. 1. (Continued)

- ✓ **Provision of Shore-Based Power Supply (SBPS) or Cold Ironing** which is currently implemented at the Port of Cagayan de Oro
- ✓ Implementation of the following digital technologies and automation of port processes:
  - Implementation of the **Internet-based Port Operations and Receipting for Terminals System (IPOINTS)**
  - Electronic Terminal Management System (ETMS)
  - e-Permit Management System
  - Terminal Appointment Booking System (TABS)
  - Transport Accreditation, Permits and Pass for Ports System (TAPPPS)
  - QR Code System



# 04-Challenges

## *Guiding Questions:*

- 1. From your perspective, what are the primary challenges and obstacles that have hindered the transition to zero-emission ports and shipping in your nation? Are there any legal, financial, technological or operational barriers that have been particularly problematic?**
  - Limited funding and resources for port infrastructure and technological investments
  - Comprehensive policy adjustments to drive the transition including incentivizing sustainable practices in the maritime industry
  - Stringent implementation of environmental policies and guidelines

# PITCH DECK

## State of Play in Asian Countries



Cheryl Rita Kaur  
Malaysia



# MALAYSIA

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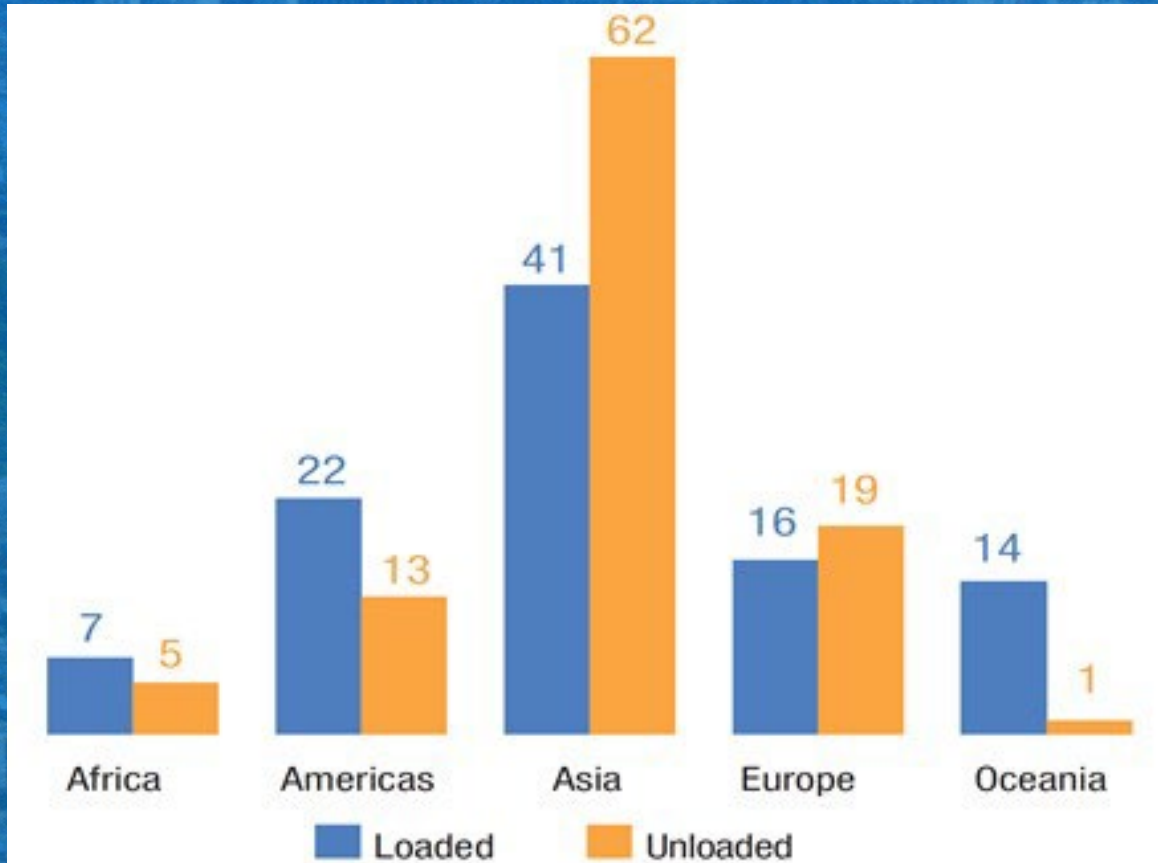




# State of play

- The **2023 IMO GHG Strategy** sets out the future vision for international shipping, the levels of ambition to reduce GHG emissions and guiding principles; and includes candidate mid- and long-term further measures with possible timelines and their impacts on States.
- The strategy identifies barriers and supportive measures including **capacity building, technical cooperation and research and development (R&D)**.
- Efforts are in line with the government's commitment to reduce the intensity of GHG emissions to 45% of the gross domestic product (GDP) in 2030, as outlined under the Nationally Determined Contributions (NDC) Roadmap and Action Plan.
- The **12<sup>th</sup> Malaysia Plan**, spanning 2021-2025, articulates the commitment to achieve net-zero GHG emissions by 2050.
- Concurrently, the **National Energy Policy 2022-2040** & the **National Energy Transition Roadmap (NETR)** lays the foundation to steer the nation from traditional fossil fuels based economy to a high-value green economy through whole-of-nation approach, encompassing federal and state governments, industry, general public, and international community.
- Reinforces Malaysia's commitment to net-zero emissions as early as 2050 despite contributing only 0.8% to global GHG.

# Share of global maritime trade



- In 2019, Asia accounted for 41% of goods loaded and 62% of goods unloaded.
- **The region has strengthened its position as a maritime hub that brings together more than 50% of global maritime trade volumes**
- Developing countries in Asia accounted for 76% of all maritime trade loaded and unloaded in developing regions

Source: UNCTAD - Review of Maritime Transport 2020



# Strategic geographical location



Shipping traffic on the 3<sup>rd</sup> June 2023





## The GreenVoyage2050 Project;

- a partnership project between the **Government of Norway and IMO**
- launched in **May 2019**
- aiming to transform the shipping industry towards **a lower carbon future.**



**GREEN VOYAGE  
2050**

## The IMO-Norway GreenVoyage2050 Project is supporting shipping's transition towards a low carbon future.

Working with selected developing countries around the world, including Small Island Developing States (SIDS) and Least Developed Countries (LDCs), and partnering with maritime-related international associations, other UN organizations, and the industry, this global project is supporting the reduction of Greenhouse Gas (GHG) emissions from shipping, in line with the levels of ambition set out in the Initial IMO GHG Strategy.

[Discover more on the project](#)



[Discover more on the project](#)

levels of ambition set out in the Initial IMO GHG Strategy.



# Main Component

## COMPONENT 1

Developing global tools to support implementation of the Initial IMO GHG Strategy

---

## COMPONENT 3

Strategic partnership development

---



## COMPONENT 2

Capacity building, policy and NAP development

---

## COMPONENT 4

Technology cooperation, innovation and pilot demonstrations

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## Project Countries



## Project Data

<b>Title</b>	Reducing Maritime Transport Emissions in East and Southeast Asian Countries - including ships, ports and hinterland transport -
<b>Duration</b>	5 Years (2022 - 2027)
<b>Donor</b>	International Climate Initiative (IKI); German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)
<b>Implementing Partners</b>	IMO and PEMSEA



# Decarbonising Maritime Transport Sector in East Asia – Blue Solution

## Decarbonizing Maritime Transport Sector in East Asia

**Intl & Domestic shipping**



**Ports**



**Hinterland Transport**



**Operational energy efficiency**

**Low carbon infrastructure/carriers**

**Low or zero carbon fuels**

**Policies & regulations**

**Optimized logistics**

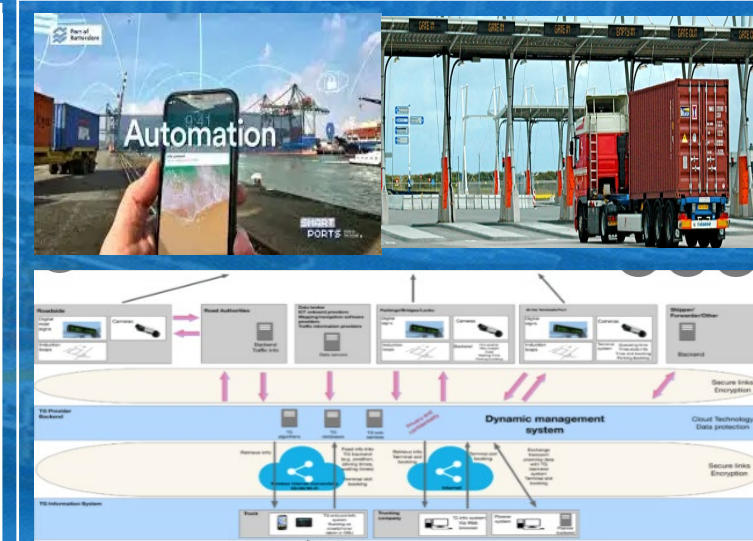
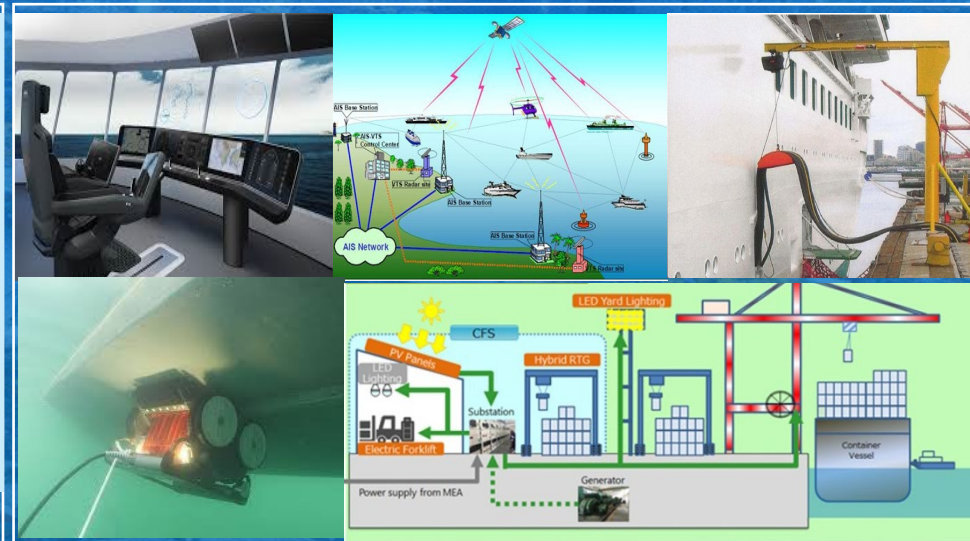
**Technology solutions**

**Investments**

**Access to fuel**



# Demonstration of chosen solutions that can support national roadmap





# PITCH DECK

## State of Play in Asian Countries



Rituraj Misra  
India  
*(remotely)*



# Q & A



Raden Bonnyswara  
Indonesia



Sung Ho Jung  
South Korea



Renjie Wang  
PRC



Giang Hoang Hong  
Viet Nam



Mayuree Deeroop  
Thailand



Nino Biscocho  
Philippines



Cheryl Rita Kaur  
Malaysia



Rituraj Misra  
India (remotely)





## PART 1 – CLOSING

# Accelerating Green Ports and Shipping Development in Asia





# Accelerating Green Ports and Shipping Development in Asia





# Part 2: Green Ports and Shipping Development in Asia: Opportunities and Solutions



Bert Fabian  
Coordinator  
EANET, UN



# Part 2: Green Ports and Shipping Development in Asia: Opportunities and Solutions

## RECAP PART 1



Bert Fabian  
Coordinator  
EANET, UN

# Part 2: Green Ports and Shipping Development in Asia: Opportunities and Solutions

QUESTIONNAIRE



Please scan the QR code to provide  
your valuable contribution



# Part 2: Green Ports and Shipping Development in Asia: Opportunities and Solutions

## KEYNOTE PRESENTATION



Huihui Cheng  
Transport Program Manager  
Clean Air Asia

# Fostering Collaboration: Ports and Shipping Sectors Collaborate for Sustainable Growth



CLEAN AIR  
ASIA  
亚洲清洁空气中心



# Background

Shipping decarbonization is important for port cities' clean air, health benefits and global climate goals



55%-72%

Proportion of NO<sub>x</sub> emissions attributed to transport vessels in the overall NO<sub>x</sub> emission from ports (example of emission inventory from ports)

# Ports and Shipping Sector can Work Together Towards:

Promoting the application of onshore power and alternative fuels



**OnShore Power**



**Alternative Fuels**



# Onshore Power Application: Drivers

Shore power is gaining momentum around the world

The United States

California: At-berth Regulation  
(2007, and updated on 2020)

From 2014, required a certain percentage of a fleet's vessels to plug into shore power while berth.

PR China

Multiple regulations

vessels equipped with shore power receiving facilities (except for tankers) should use shore power when berthing for more than 2 hours (for inland ports) and 3 hours (for coastal ports)

European Union

FuelEU Maritime

From 1 January 2030, a ship at berth in a port of call under the jurisdiction of a Member State shall connect to on-shore power supply. (containerships, passenger ships)

Others

Developing

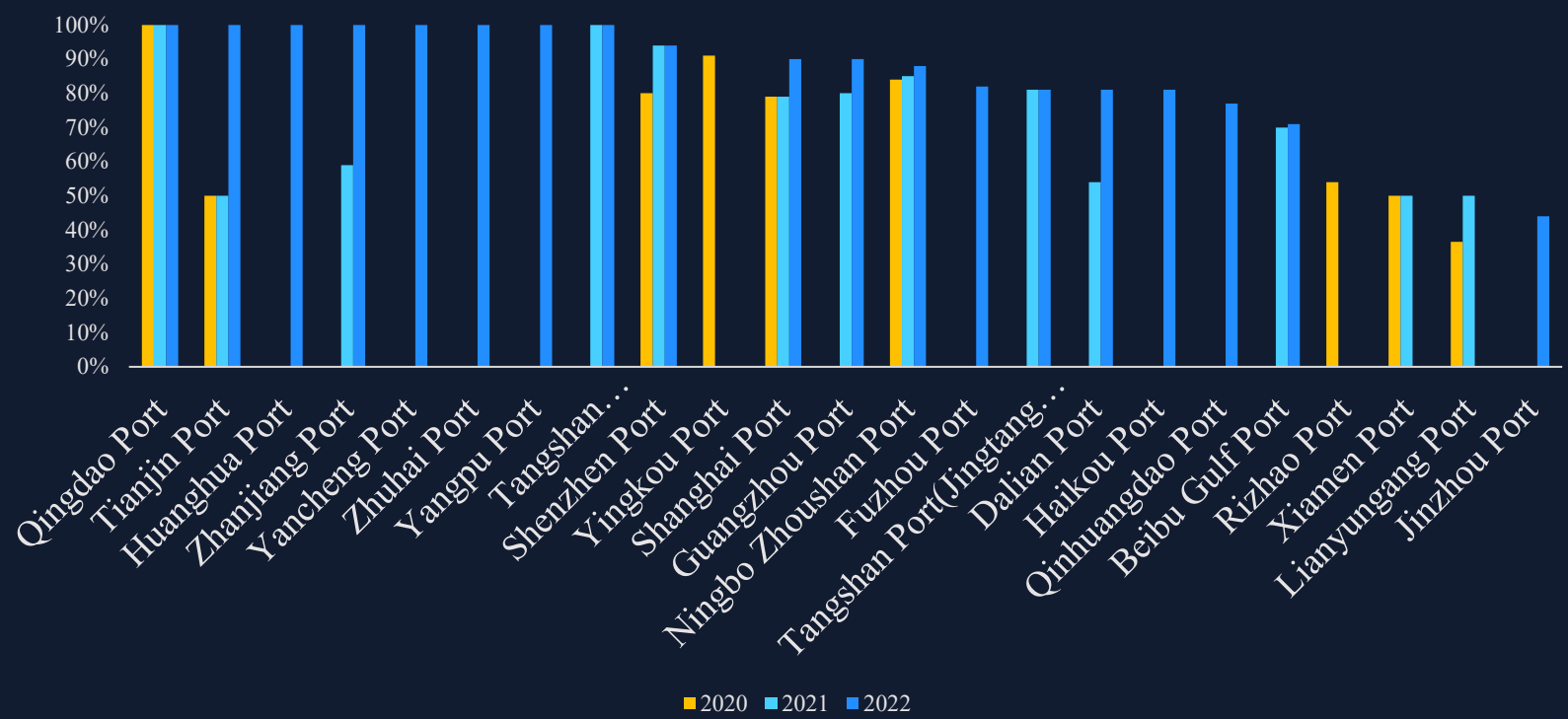
Asian countries such as South Korea, Indonesia, Thailand and Viet Nam, etc. are developing shore power in ports.

# Case Study: Onshore Power Application in Sea Ports

Shore-side power coverage rate has increased significantly, driven by multiple policies and regulations and self-motivation of port operators.

✔ For coastal ports, the average shore power coverage rate of five types of special-purpose berths of 21 ports reached 84%, with 7 of them achieving 100%.

Shore Power Coverage Rate at the Special-Purpose Berths of Coastal Ports in PRC (2020-2022)



Note: These mainly include the special-purpose berths for container terminals, ro-ro passenger ship terminals, cruise terminals, passenger terminals of 3,000 t and above, and dry bulk terminals of 50,000 t and above.

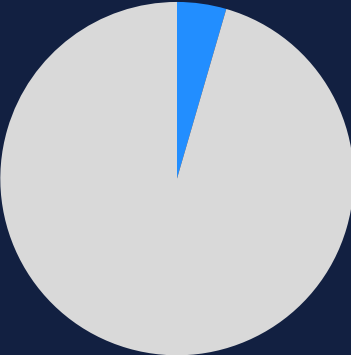


# Case Study: Onshore Power Application in Sea Ports

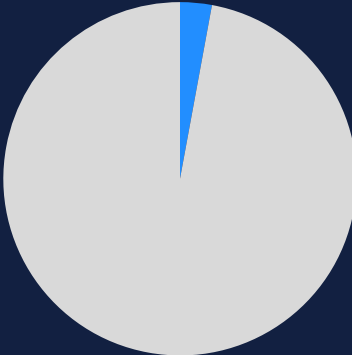
However, the use rate keeps low due to limited installation rate on ship-side

✔ Coastal ports have shown low shore power utilization

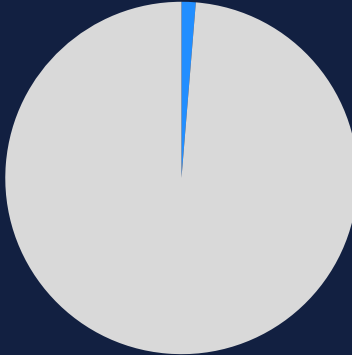
**X Port in  
South PRC**  
**4.5%**



**X Port in  
YRD Region**  
**2.9%**



**X Port in  
Southeast PRC**  
**1.3%**



**X Port in  
North PRC**  
**0.5%**



*Note: this is the shore power utilization rate of ocean-going vessels*

Note: The definition of utilization rate in this slides refers to proportion of all ships calling at shore power berths that use shore power

Source: Green Port Operators 2023, Clean Air Asia

# Onshore Power Application: **Challenges**

Shore power application in sea ports are hindered by multiple factors

Supply infrastructure  
on port side

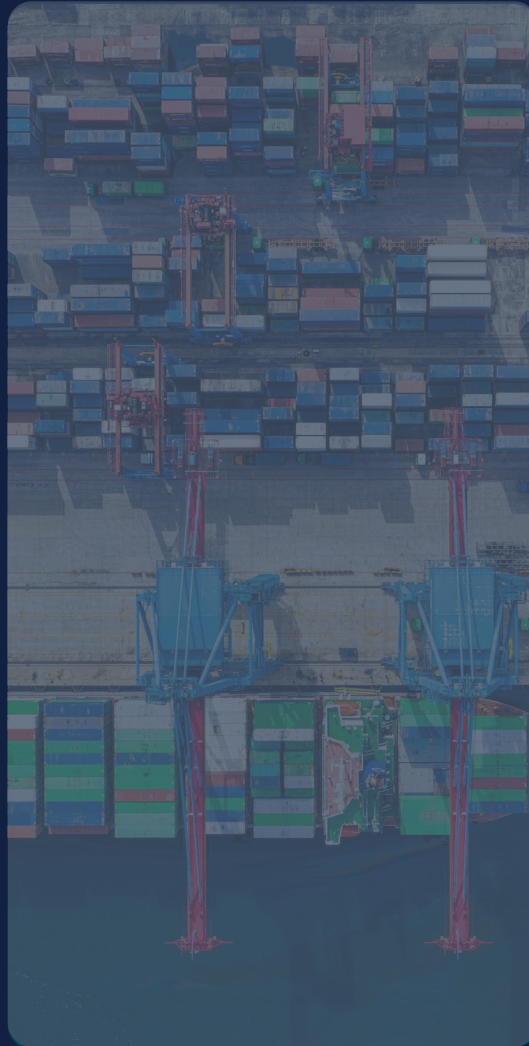
01

Port service

03

Compatibility /  
Technical Specification

06



02

Available Capacity  
that port can produce

04

**Receiving facilities on  
ship side**

*Containership: 7.6%*  
*Bulkers: 3.7%*

07

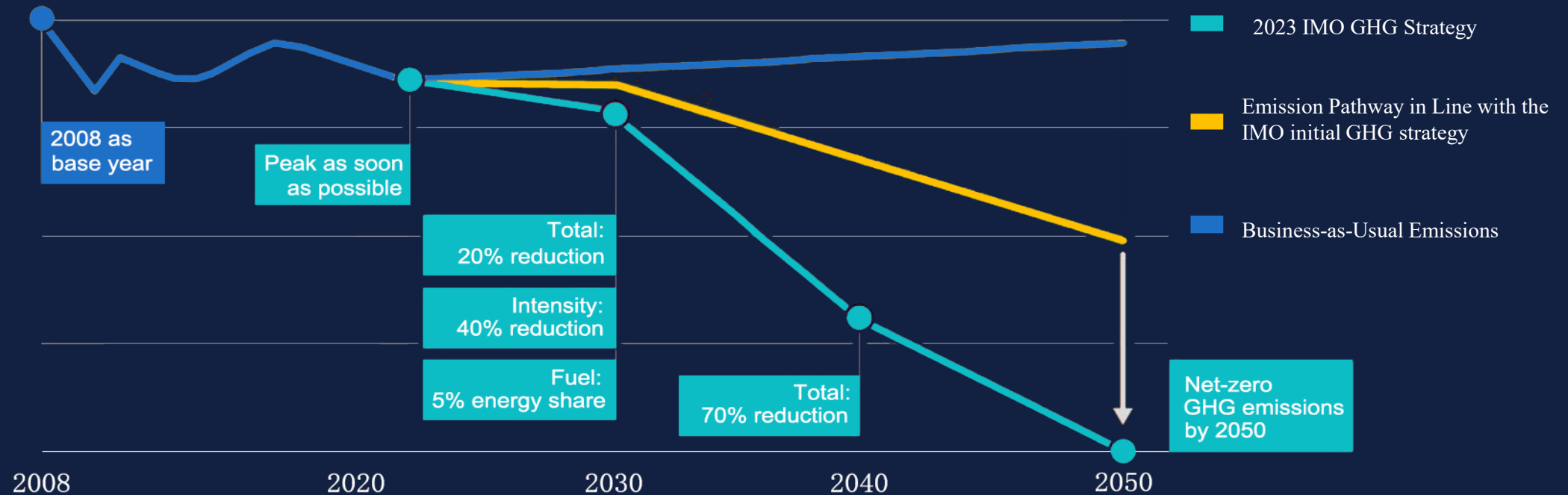
Cost of installing  
facilities and usage



# Alternative Fuels: Drivers

2023 IMO Strategy: uptake of zero or near-zero GHG emission technologies, fuels and/or energy sources at least 5% (striving for 10%) of the energy used by international shipping by 2030.

Unit: GHG emissions



Total: well-to-wake GHG emissions

Intensity: CO<sub>2</sub> emitted per transport work

Fuel: uptake of zero or near-zero GHG technologies, fuels and/or energy sources

Source: DNV

# Case Study: Alternative Fuels in Global in-Service Fleets and Orderbook

Conventional fuel dominates the fleet.

## Proportion of Alternative Fuel Pathways in Global in-Service Fleets (as of June 2023)

Fleet Type	Conventional Fuel	LNG	LNG Ready	Methanol	Methanol Ready	Ammonia Ready
Bulk Carriers	98.48%	0.53%	2.89%			0.09%
Containerships	99.32%	2.15%	6.45%		0.04%	0.05%
Oil Tankers	99.59%	1.44%	2.52%	0.14%		0.92%

## Proportion of Alternative Fuel Pathways in Global Orderbook (as of June 2023)

Fleet Type	Conventional fuel	LNG	LNG Ready	Methanol	Methanol Ready	Ammonia Ready	Hydrogen
Bulk Carriers	82.51%	8.98%	1.61%	0.33%	0.41%	8.52%	
Containerships	42.00%	30.80%	6.98%	13.86%	5.86%	12.50%	0.02%
Oil Tankers	63.38%	24.65%	11.00%	0.18%	1.86%	5.22%	



# Alternative Fuels: Challenges

No “one-fit-for-all” solution ?



## total cost of ownership

Construction/retrofitting costs of alternative fuel vessels, additional supply infrastructure construction costs, alternative fuel production costs, etc



## non-CO<sub>2</sub> GHG emission control

LNG (methane escape, GWP 100: 28)  
Ammonia (N<sub>2</sub>O, GWP 100: 265)



## Green Fuel Availability

The supply chain of green fuels, like Bio-fuel, e-fuel, etc.



## Security

safety of ships using ammonia as fuel

Global production of alternative fuels and the proportion of renewable sources

	Global Production Capacity		Of which renewable sources
Hydrogen	70 million ton	V.S.	7,000 ton
Ammonia	250 million ton	V.S.	20,000 ton
Methanol	100 million ton	V.S.	0.2 million ton

Data source: KPMG Green Ammonia Industry Overview and Outlook; Xing Hui, Li Xiang, "Progress in the application of Marine Alternative Fuels", World Shipping.

# 1. Voluntary Initiative between Port Operators and Ship Operators

Demonstration Action Plan on Promoting the Use of Shore Power by container ships and cruise ships on International Routes (2023-2025)



14 container port operators (90% of the cargo-carrying capacity entering and leaving China) and 10 container ship operators



Installation Rate of Shore Power Facilities in 2022 and Their Targets

## Targets



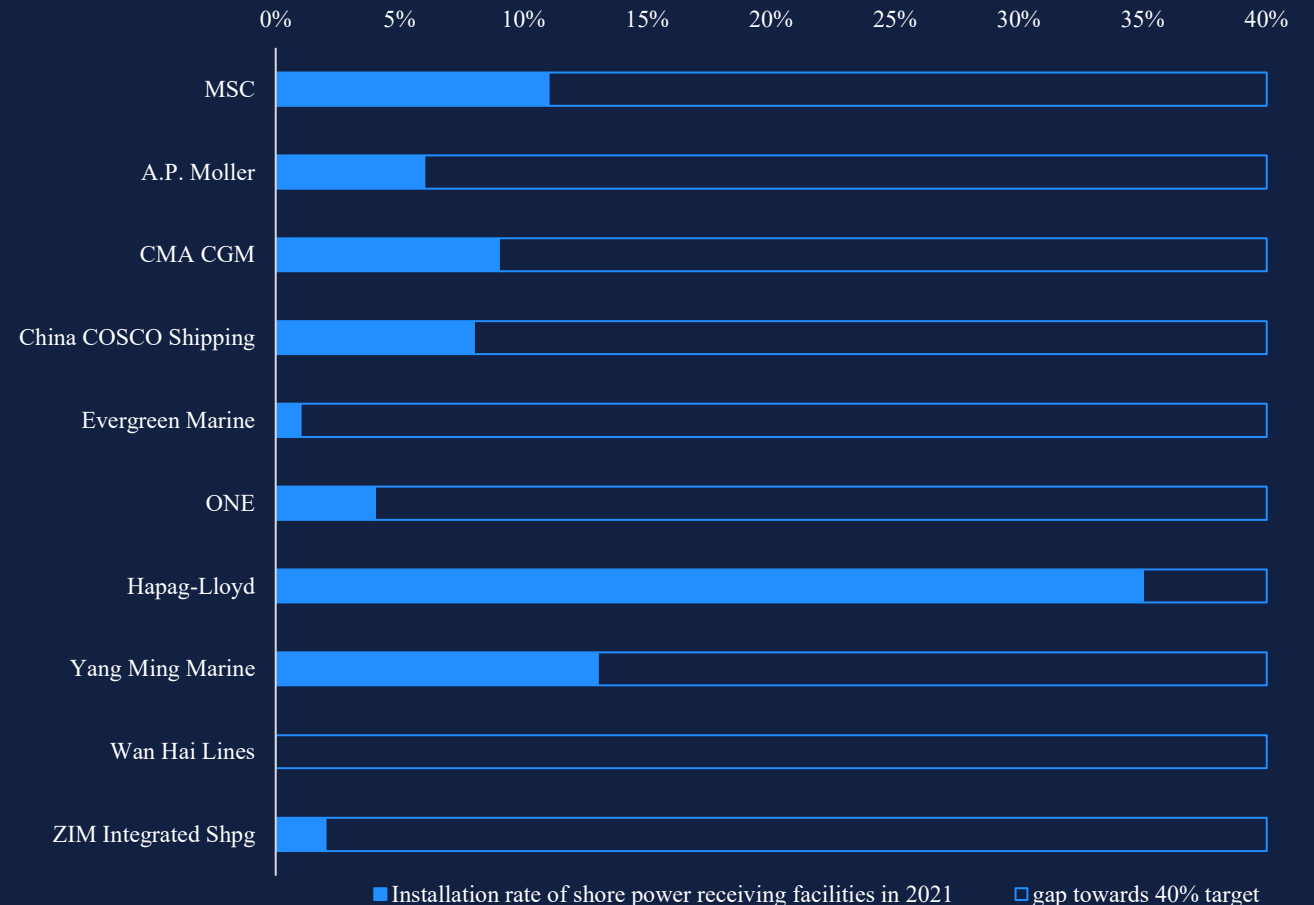
### Shore power receiving facilities

By 2025, 40% of container ships for each shipping companies



### Shore power coverage rate in ports

By 2025, 90% of container terminals covered with high-voltage shore power for each shipping companies



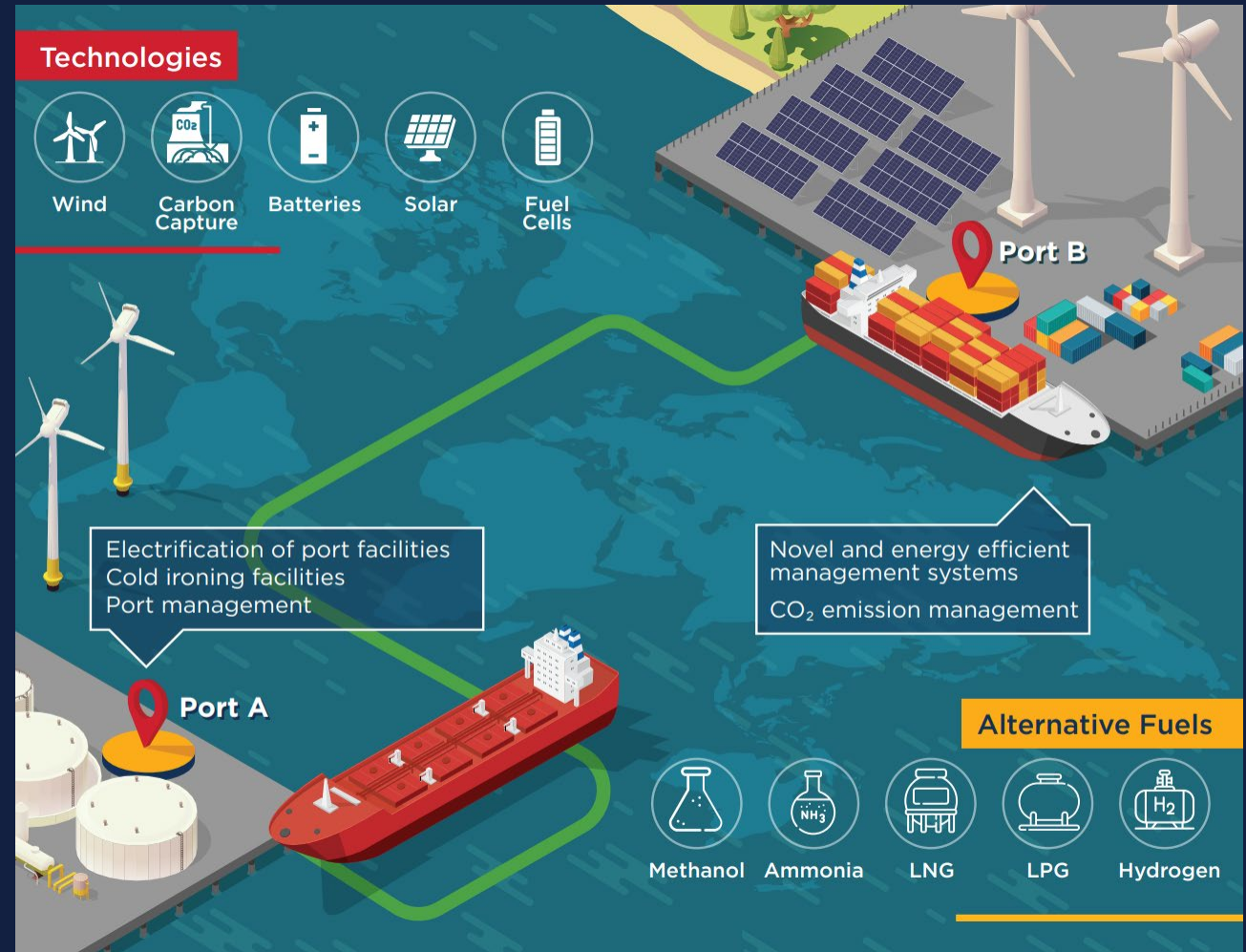


# 2. Green Shipping Corridors

Scale up near/zero carbon alternative fuels

-  Cargo Owners
-  Ship Operators
-  Port Operators
-  Government agencies
-  Fuel Provider
-  Research Institutes
-  NGO

## Green shipping corridor vision



Source :

ABS, AN APPROACH TO GREEN SHIPPING CORRIDOR MODELING AND OPTIMIZATION

## 2. Green Shipping Corridors

Scale up near/zero carbon alternative fuels

- 1. Shanghai- LA
- 16. Rotterdam- Singapore
- 17. SILK Alliance
- 18. Australia-Asia Iron Ore
- 21. Los Angeles-Long Beach-Singapore
- Most recent Tokyo Port and Yokohama-Los Angeles
- Most recent Gothenburg and Shenzhen sister port agreement
- Most recent New: Guangzhou-Los Angeles



Figure source:  
Global Maritime Forum, 2022, Annual Progress Report on Green Shipping Corridors

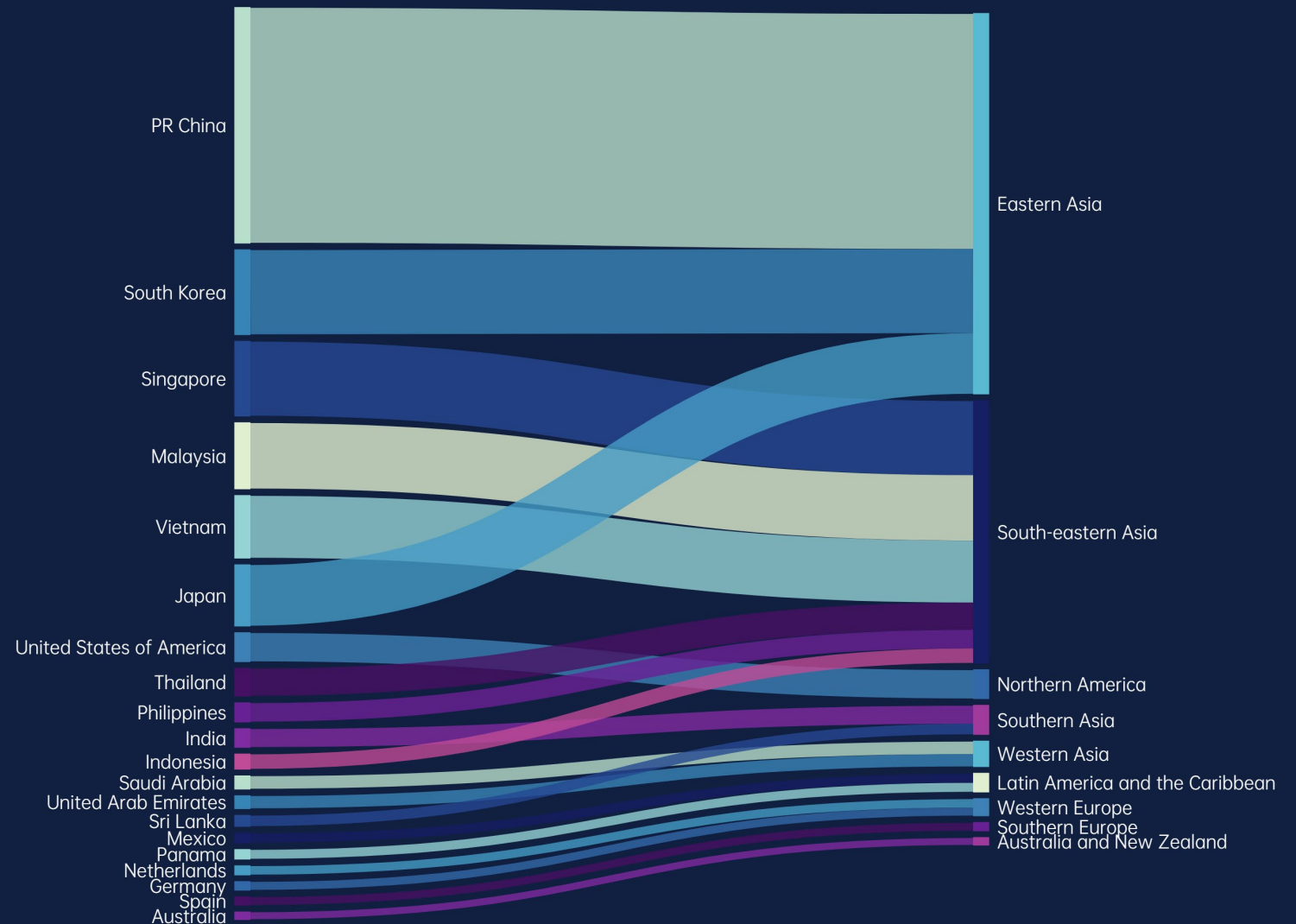


## 2. Green Shipping Corridors

Scale up near/zero carbon alternative fuels

Container ships calling at PRC in 2022:

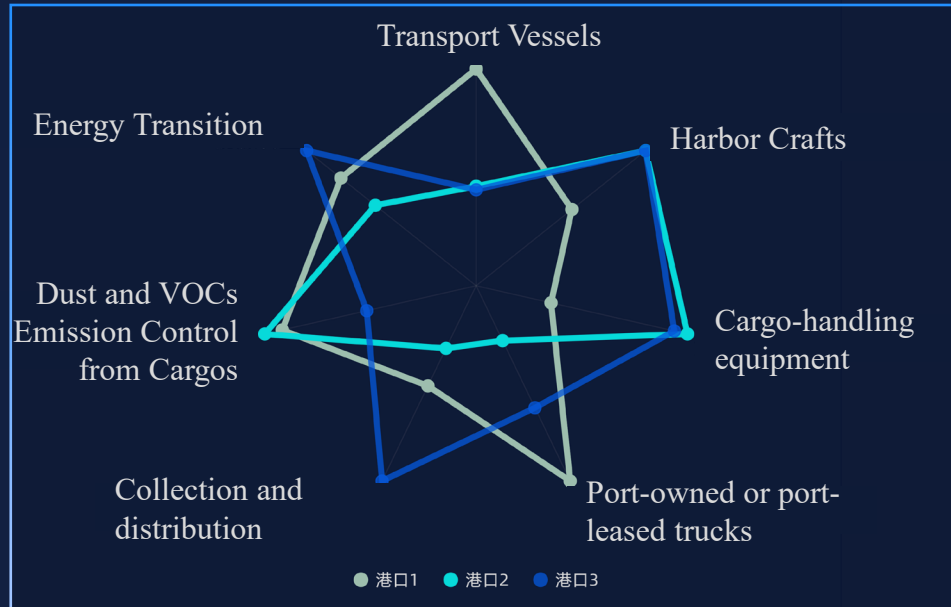
The share of port calls in East and South-East Asia is 74%.



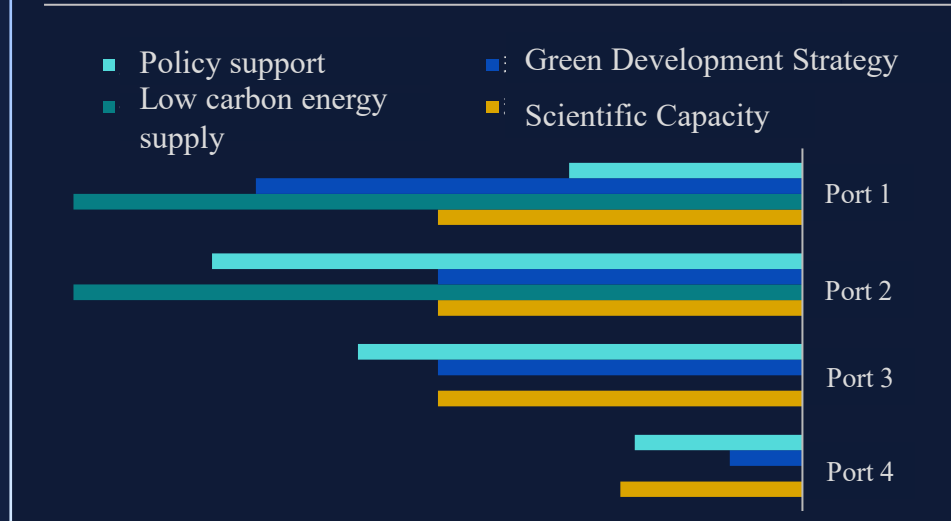
Analyzed by Clean Air Asia

# 3. Incentives to Top-Runners

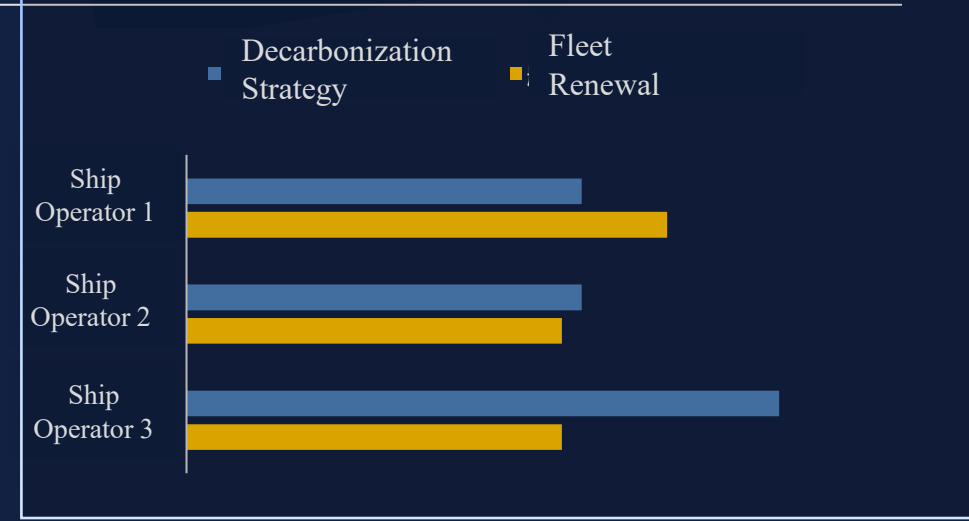
Identify the green port pioneers and green shipping pioneers in clean air and decarbonization efforts



Technological Emission Reduction



Management Measures





# More Information

Download Reports (English Version Available from 2022)



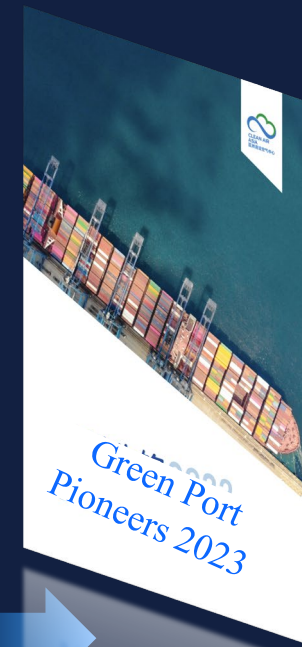
2020



2021



2022



2023





## Clean Air Asia

Green Shipping Pioneers



Green Port Pioneers



Email address: [china@cleanairasia.org](mailto:china@cleanairasia.org)

# Part 1: Green Ports and Shipping Development in Asia: Status

Ask your questions at  
**[www.pigeonhole.at](http://www.pigeonhole.at)**

输入会议代码

**BAQ2023**

session code

**Please feel free to ask questions**





# Part 2: Green Ports and Shipping Development in Asia: Opportunities and Solutions

## KEYNOTE PRESENTATION



**Ninan Biju Oommen**  
Senior Port & Maritime  
Transport Specialist  
The World Bank



# Green energy transition in Ports & Shipping sector

Ninan Oommen Biju, Senior Port & Maritime Transport Specialist

Better Air Quality Conference, Manila  
16 November 2023



# World Bank programmatic approach





# Agenda



**1 Development opportunities** – major opportunities for countries and ports in decarbonizing shipping




**2 Regulatory framework** – certainty is key to unlocking investments



**3 Carbon revenues from international shipping** – to enable an equitable energy transition

# Realignment of the fuel market



 Country with no or insignificant oil reserves, but large renewable energy resources



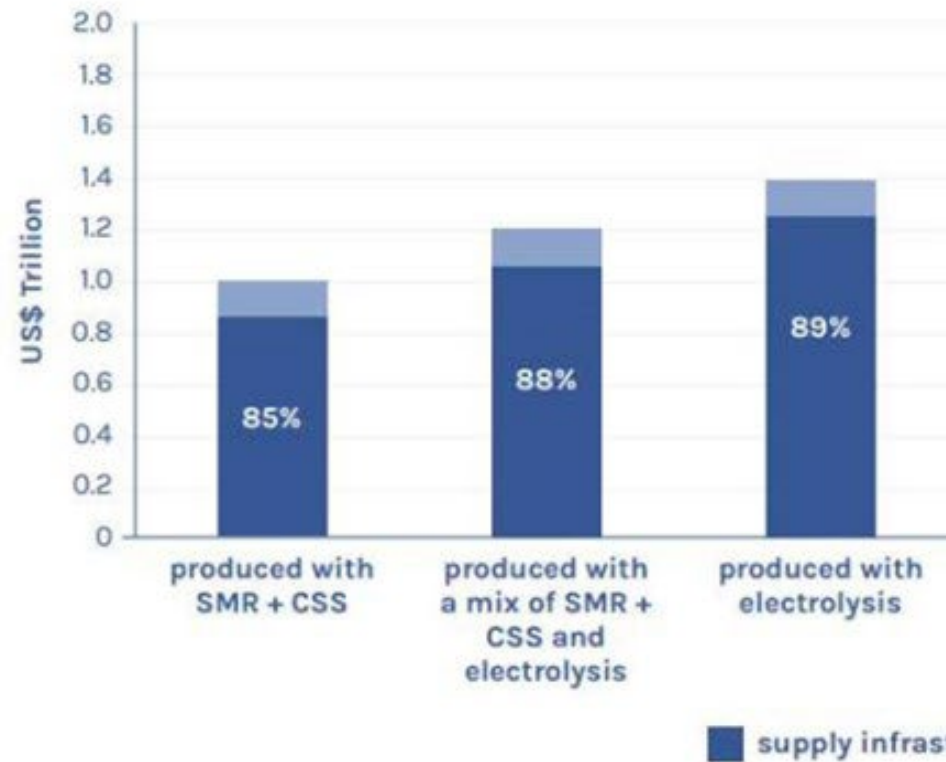
# The potential for zero-carbon bunker fuel production



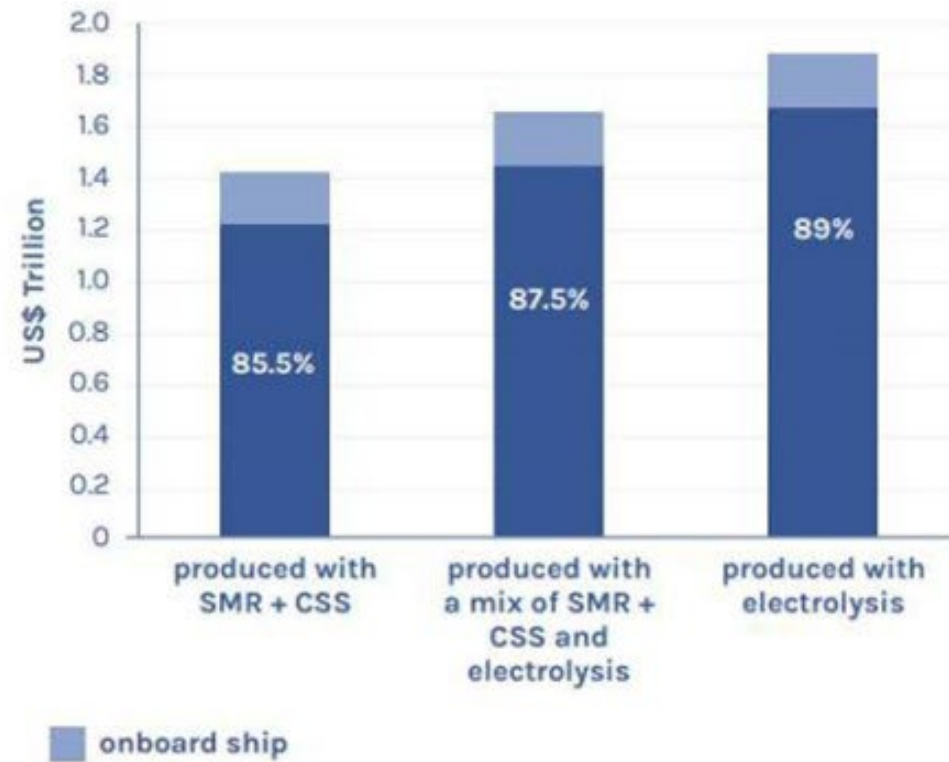


# Investment needs

## Decarbonization by 2070



## Decarbonization by 2050





# Investment barriers



Investment barriers include **uncertainty** regarding:

- future **demand** for and **supply** of clean fuels
- evolution of policy and regulatory environment.

**Climate policy uncertainty** is associated with significant decreases in investment.

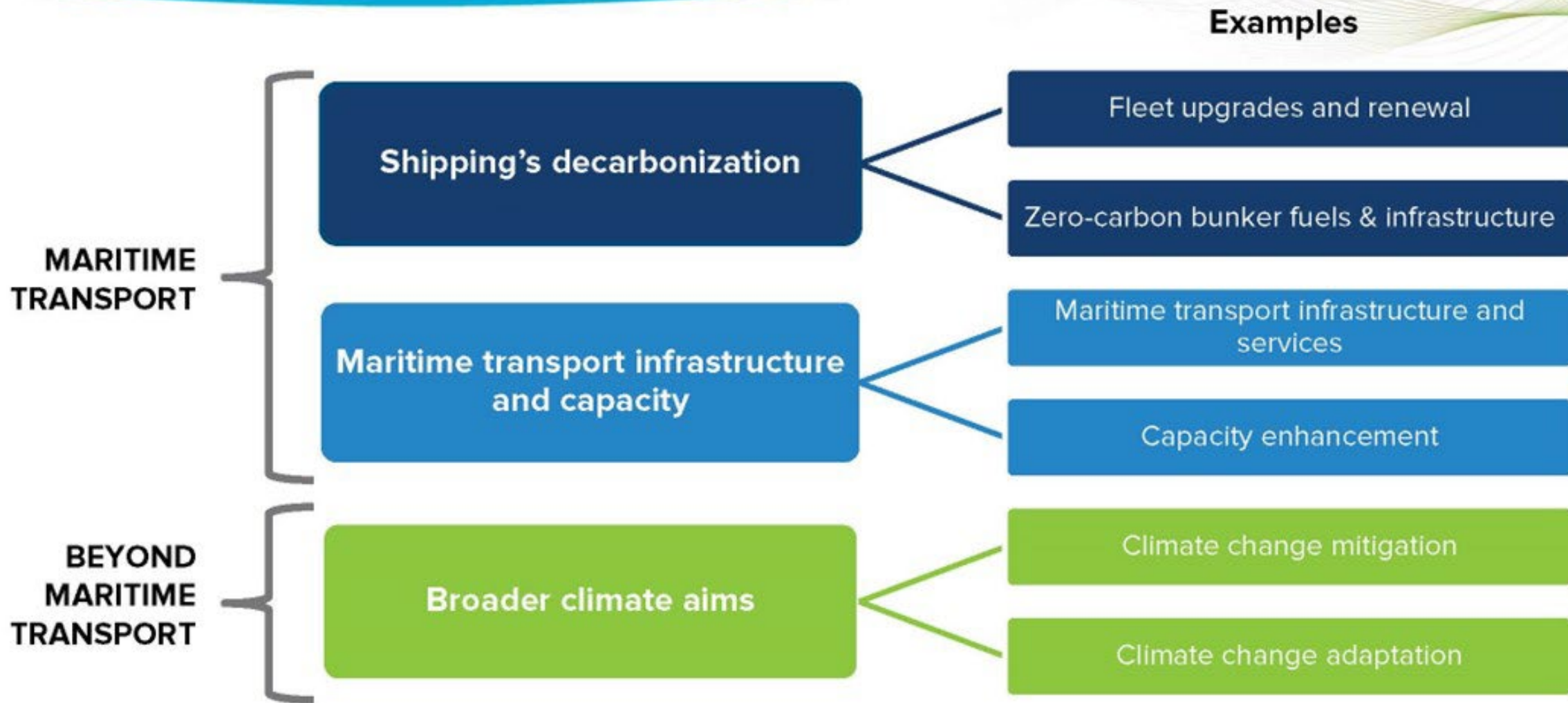
Uncertainty is a fundamental barrier to increasing climate finance. **Political leadership and policy interventions** are central to addressing this uncertainty.

# Where are we now?





# Potential carbon revenue use options



# Key implications for policymakers and industry



Development opportunities in shipping's energy transition



Stringent policy at global level needed to drive the transition



Carbon revenues from shipping can enable an equitable transition

**Main findings:** (1) Significant opportunities - (2) Policies needed- (3) Revenues as enablers



# Thank you.

**Contact**

Ninan Oommen Biju, [nbiju@worldbank.org](mailto:nbiju@worldbank.org)



# Part 2: Green Ports and Shipping Development in Asia: Opportunities and Solutions

## KEYNOTE PRESENTATION



Shane Balani  
Director of Research & Projects  
Global Centre for Maritime  
Decarbonization





## **Feasibility and Approach to Green Shipping Strategies**

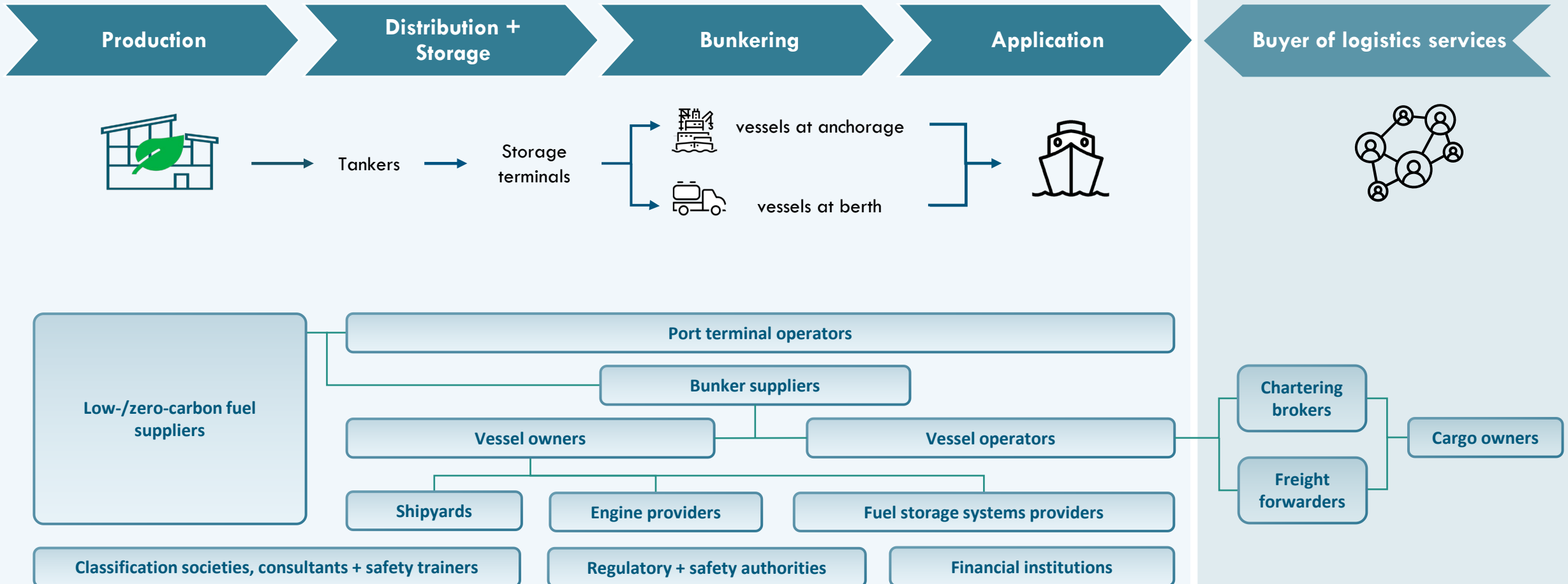
*Shane Balani*

*Director, Research & Projects*

*Better Air Quality Conference, 16 November 2023*

# Green maritime supply chains require end-to-end stakeholder involvement

## Stakeholders in the fuel supply chain

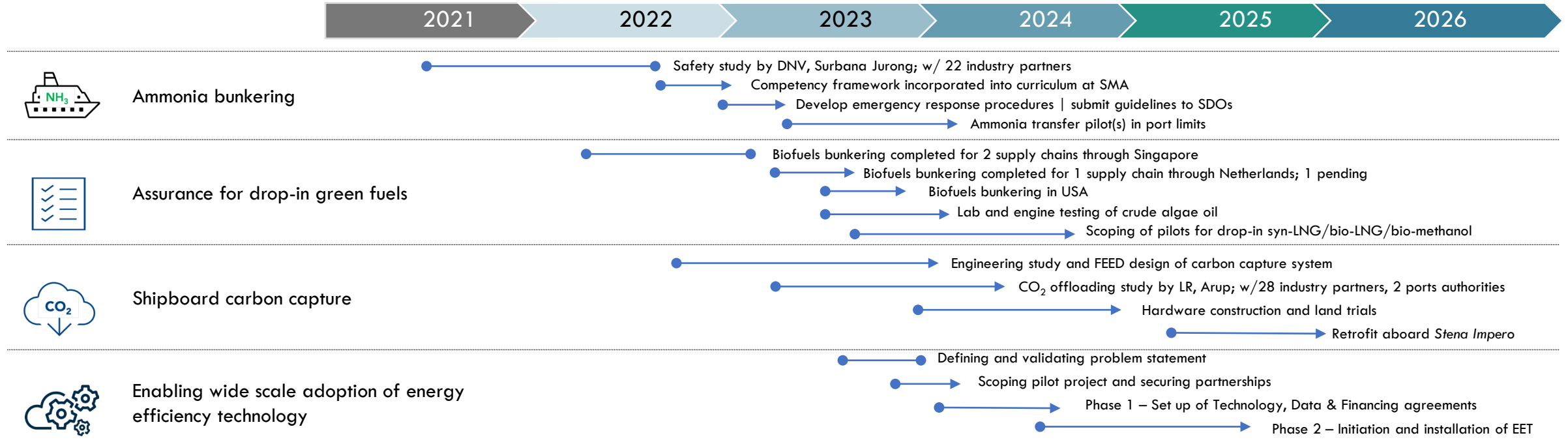




# GCMD's efforts to help accelerate decarbonisation



Our mission is to help the maritime industry eliminate GHG emissions by **shaping** standards, **deploying** solutions, **financing** projects, and **fostering** collaboration across sectors



## Founding + strategic partners



## Impact partners



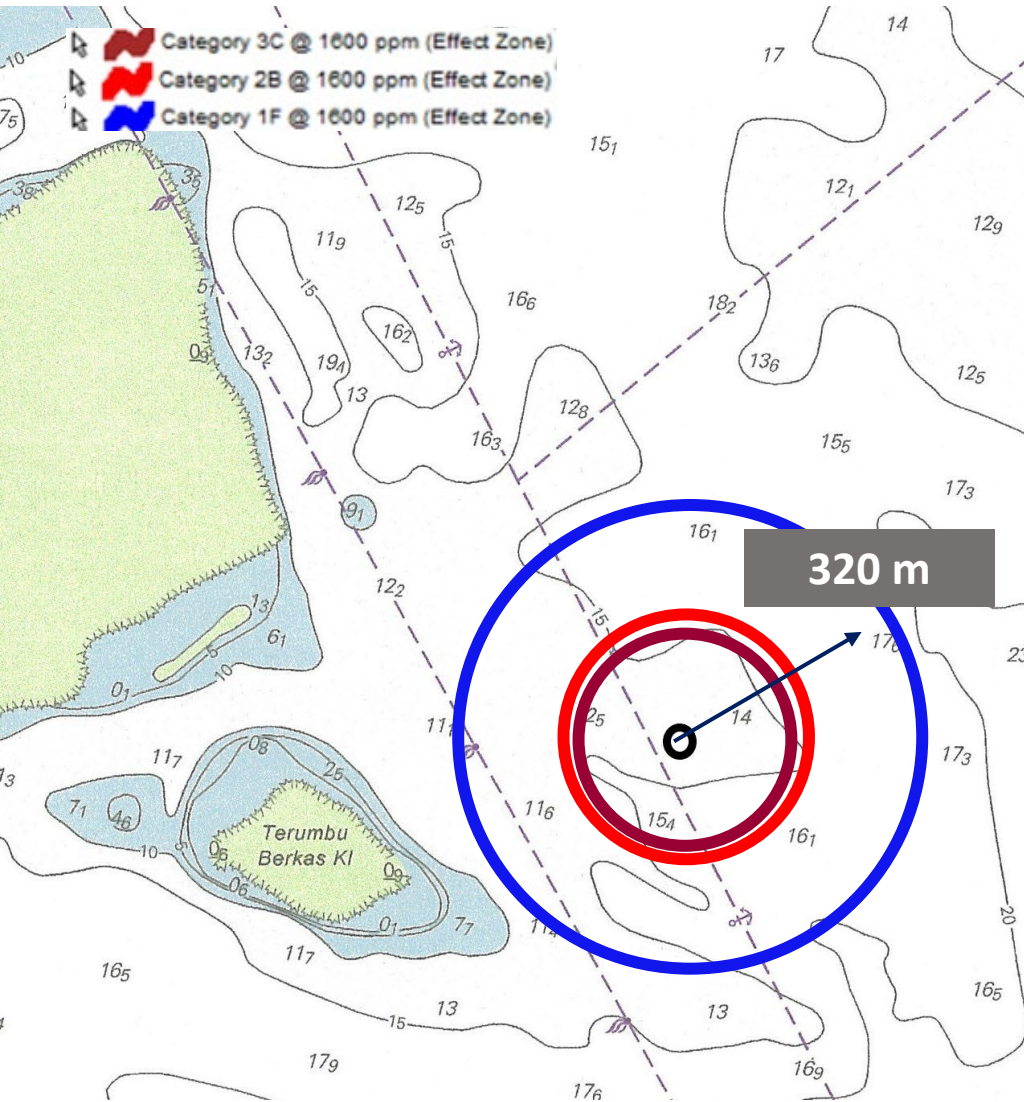
## Coalition partners



## Knowledge partners



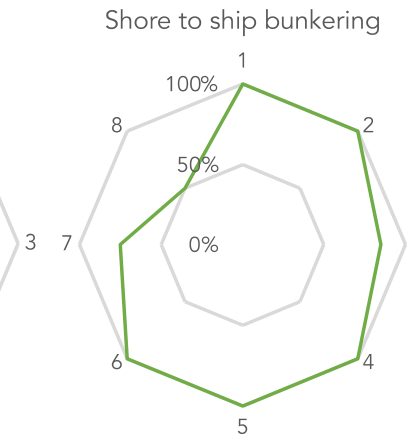
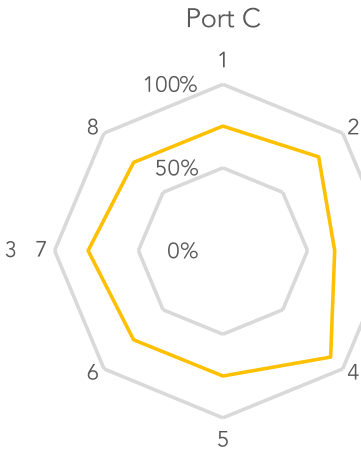
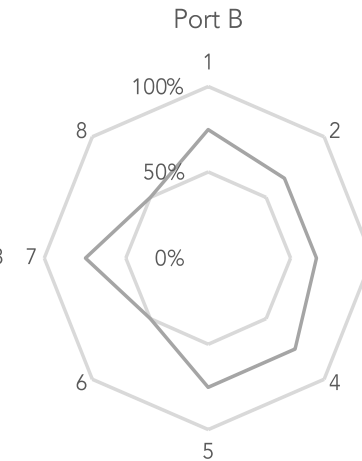
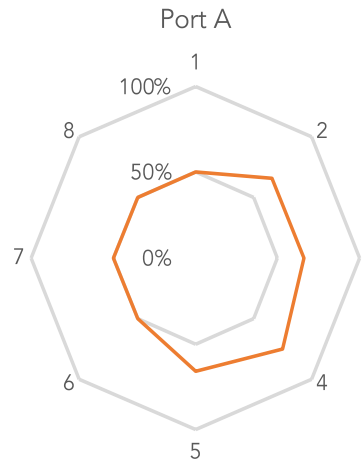
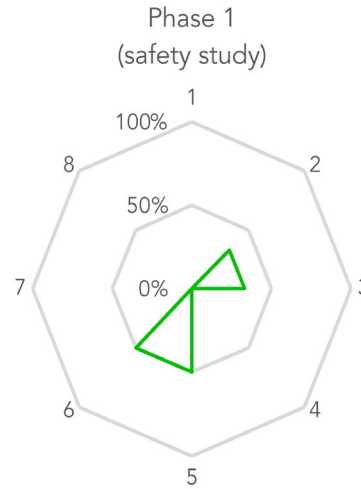
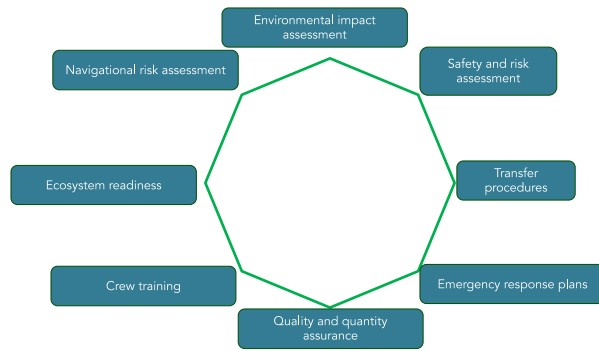
# Ammonia bunkering pilot safety study released



- + Singapore ammonia bunker demand projected to take off mid-2030's; about **2 MTPA** by **2035**
- + 400 operational and locational risks identified across 4 concept designs and three locations; all considered **low** or **mitigable**
- + Guidebook incorporated into curriculum at SMA; first course offered in March 2023
- + Learnings will be submitted to standards development organisations to shape standards domestically and internationally
- + Working with OSRL to develop emergency response procedures
- + Ready for first STS transfer of ammonia in Singapore waters to gain confidence and competence



# Developing a port network for ammonia bunkering readiness



- + Identified 8 key drivers for port readiness for ammonia bunkering
- + Each driver will have unique nuances for individual port operations
- + Outcomes from each pilot will address partnering port's needs and be elevated for general applicability across ports for ammonia bunkering

- + GMCD's Phase 1 safety study addresses 4 of the 8 drivers
- + Study led by DNV, SJ & SMA with 22 study partners, >130 industry panel & consulted regulators

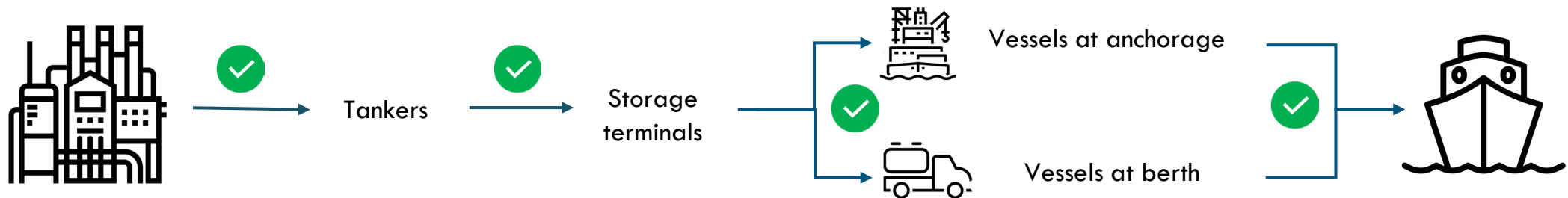
- + GMCD Phase 2 pilot will build from Phase 1 and address remaining drivers i.e., emergency response plans, navigational assessment, environmental impact, & ecosystem readiness

- + Additional pilots at other ports will close remaining gaps each building on past experience either by adopting, adapting, refining existing knowledge
- + Pilots will be designed and executed to close specific gaps both unique to the port and general applicability to other port

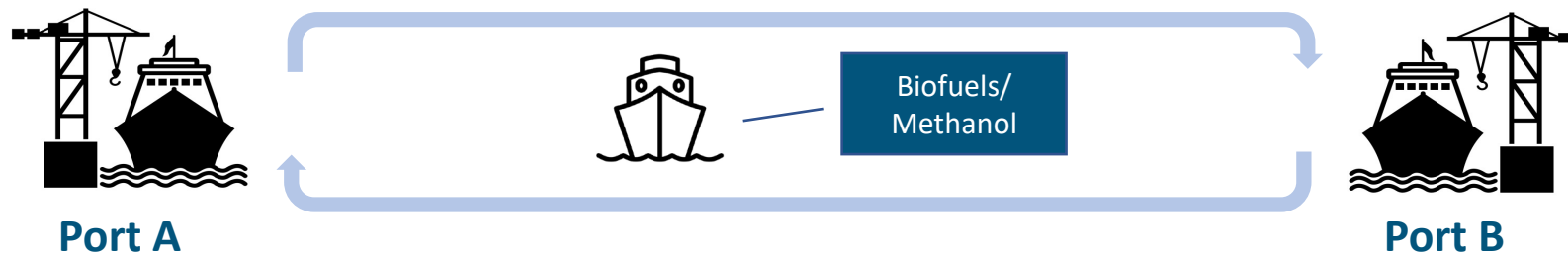
- + GCMD will identify specific port(s) to demonstrate ammonia Shore-to-ship bunkering which is relevant to the port and translate lesson to for general port applicability

# Drop-in fuels assurance framework

- + Developing a framework to trace and assure the Quality, Quantity and GHG abatement of drop-in green fuels, such as biofuels, bio methanol or green ammonia
- + Working across the fuel producers, supply chain logistics, and fuel consumers to drive change on a pilot-basis.



Route-based pilots involving port pairs:



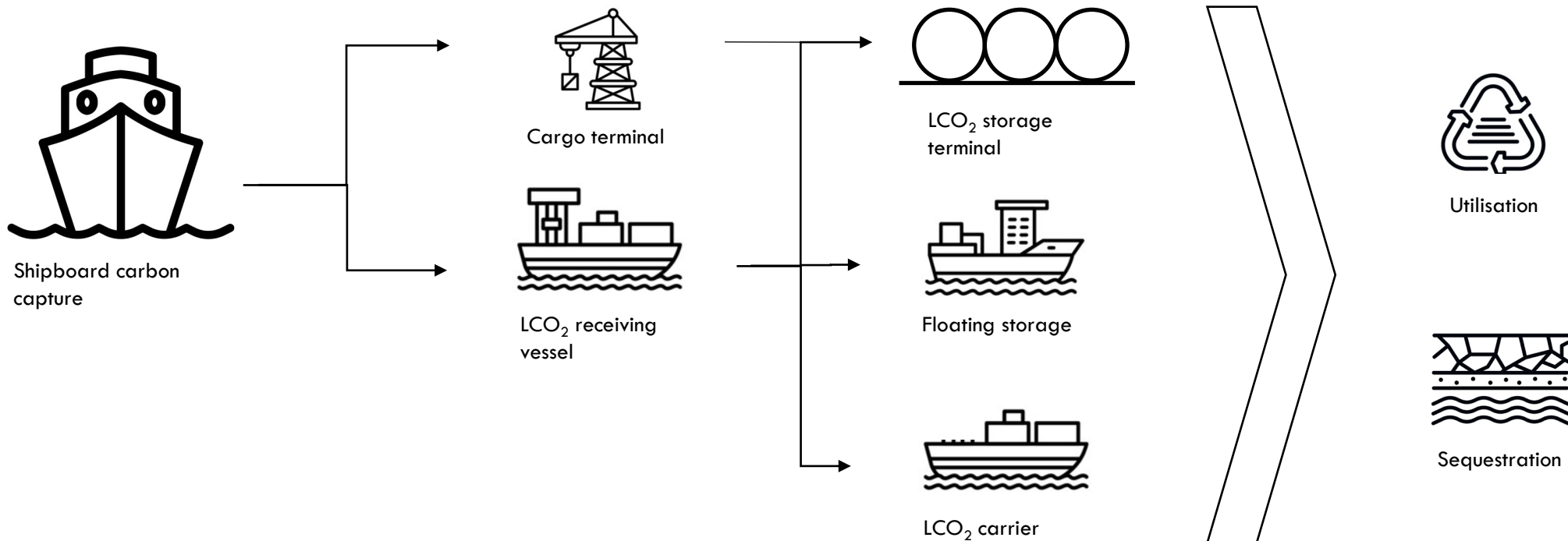
# Shipboard Carbon Capture pilot and LCO<sub>2</sub> offloading study

- + An end-to-end full scale demonstration of shipboard carbon capture, offloading and eventual utilisation or sequestration for pilot vessels
- + In combination with a study to understand the offloading requirements to enable large scale capture and storage systems in ports around the world.

Project REMARCCABLE

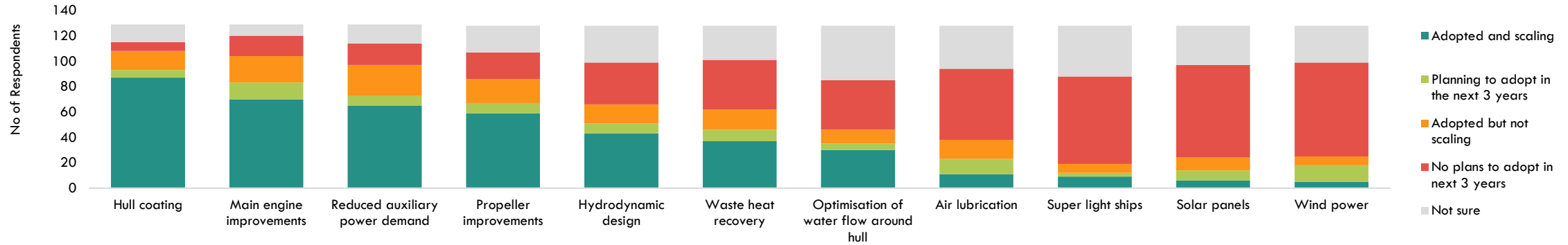
+

Concept study to offload shipboard captured CO<sub>2</sub>



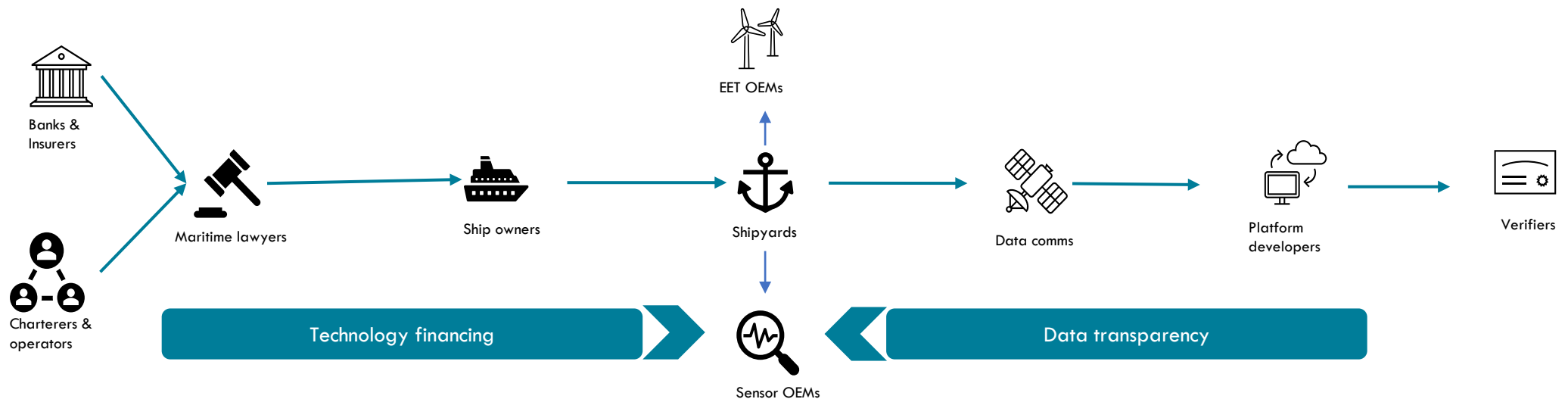


# Accelerating energy efficiency technology (EET) by closing the data-financing gap



+ EET installation costs must be reconciled through OPEX fuel savings, however fuel savings are hard to measure, and split incentives occur between who invests and who saves fuel.

+ Generating high quality data for a foundation to alternative business models can mobilise affordable capital dedicated to decarbonising shipping






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# STAKEHOLDER DIALOGUE: How Asia countries can collaborate to accelerate decarbonization?



Ninan Biju Oommen  
The World Bank



Shane Balani  
Global Centre for  
Maritime Decarbonization



Chris Chatterton  
Methanol Institute

MODERATOR



Bert Fabian  
EANET, UN






Ahila Karan  
Lloyd's Register  
*(remotely)*



Freda Fung  
Climate Works  
Foundation



**FIGURE 19** Shipping emissions in Hong Kong in 2015

	Ocean going vessels 	River vessels 	Local vessels 	TOTAL
<b>SO<sub>2</sub></b> Total: <b>11,460 (59%)</b>	11,100 (57%)	210 (1%)	150 (1%)	<b>11,460 (59%)</b>
<b>NO<sub>x</sub></b> Total: <b>33,900 (37%)</b>	14,650 (16%)	9,170 (10%)	10,090 (11%)	<b>33,900 (37%)</b>
<b>PM<sub>10</sub></b> Total: <b>1,860 (34%)</b>	1,390 (26%)	140 (3%)	330 (6%)	<b>1,860 (34%)</b>

Source: Clean Air Plan for Hong Kong – 2013-2017 Progress Report



# STAKEHOLDER DIALOGUE: How Asia countries can collaborate to accelerate decarbonization?



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EANET, UN



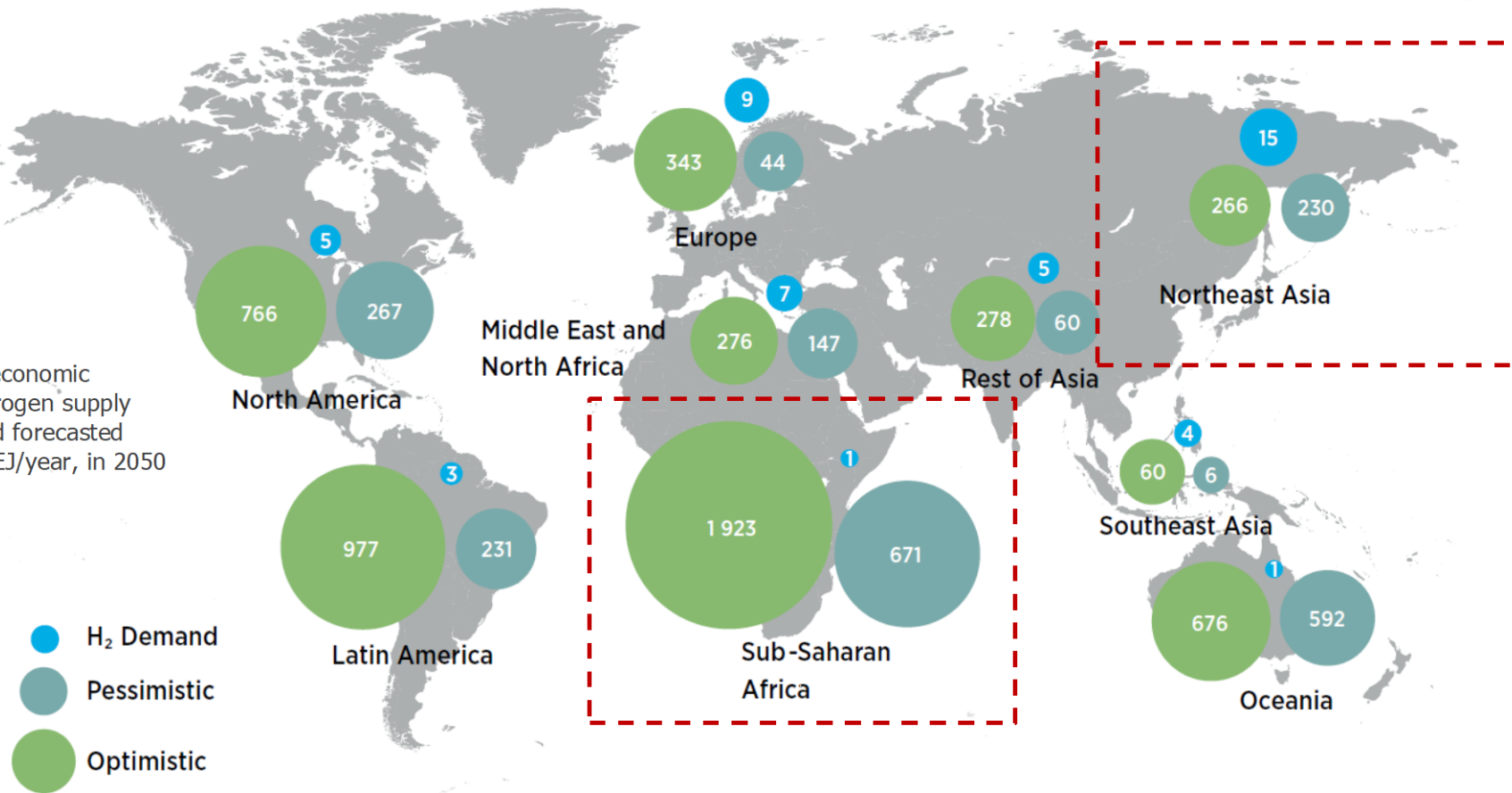
Ahila Karan  
Lloyd's Register  
*(remotely)*



Freda Fung  
Climate Works  
Foundation

# Potential of Green Hydrogen Supply Far Exceeds Demand

Comparison between economic potential of green hydrogen supply below USD 2/kgH<sub>2</sub> and forecasted hydrogen demand, in EJ/year, in 2050





# Part 2: Green Ports and Shipping Development in Asia: Opportunities and Solutions

## Q & A





## PART 2 – CLOSING

# Accelerating Green Ports and Shipping Development in Asia

