



Energy Transition in Container Shipping and Its Implication on Ports

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Agenda

- **Energy Transition in Container Shipping**
- **Implication on Ports & Any Opportunities**
- **Summary**



Energy Transition in Container Shipping

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IMO regulations on shipping decarbonization

Roadmap for development: Initial IMO strategy for GHG reduction (2018)

Short-term measures agreed
between 2018 and 2023

Mid-term measures agreed
between 2023 and 2030

Long-term measures agreed
beyond 2030

Revised strategy 2023

- **Long term commitment:** In 2018, the IMO plans to initiate measures to
 - Reduce **CO2 emissions intensity** by at least **40% by 2030** and **70% by 2050** from the levels in 2008.
 - It also plans to introduce measures to reduce total **GHG emissions** from shipping by **50% by 2050** from the 2008 levels.
 - **Interim commitment** - Current aim is to reduce GHG emission by 11% by 2026 compared to 2019 levels.
 - **Energy Efficiency Existing Ship Index (EEXI)** is a **technical measure**, indicating the **energy efficiency** of the ship compared to a baseline.
 - **Carbon Intensity Indicator (CII)** is an **operational measure** about ship's **operational carbon intensity**. It specifies carbon intensity reduction requirements for vessels (>500 TEU).
 - EU leads the way on policy: Shipping will be included in the **EU Emissions Trading System (EU ETS)** from 2024. Ships calling from outside will be included in the EU ETS from 2027. All ship will be (as per the definition) will be required to acquire and surrender emission allowances.
- Shipping produces about **3%** of the world's man-made emissions of CO2.
 - Shipping is lagging behind on decarbonization, IMO current aim is to reduce GHG emission by **11% by 2026 compared to 2019 levels**, with two measures, i.e. EEXI and CCI.
 - EU lead the way on policy. Shipping will be included in EU ETS from 2024.

What is EEXI's impact on container ships?

- According to Drewry, 1,692 container ships, or roughly 30% in terms of numbers, and **10.5%** in terms of teu capacity is currently non-compliant. The aggregate non-compliant capacity is approximately 2.6 million teu.
- It is up to owners to decide how to best comply with EEXI; options will include:
 - **Slow steaming** > a minor reduction in operational speed will be required for ships to become compliant; Some small feeder class may have to be scrapped.
 - **Change of fuel-type,**
 - **Installation of energy saving technologies,**
 - **Demolition** > Obvious candidates > 20 years or more, with an aggregate capacity of approximately 460,000 teu.

10.5% of container shipping capacity is non-compliant, mostly small feeders.

Overall, we consider the impact of EEXI on supply-demand to be very limited

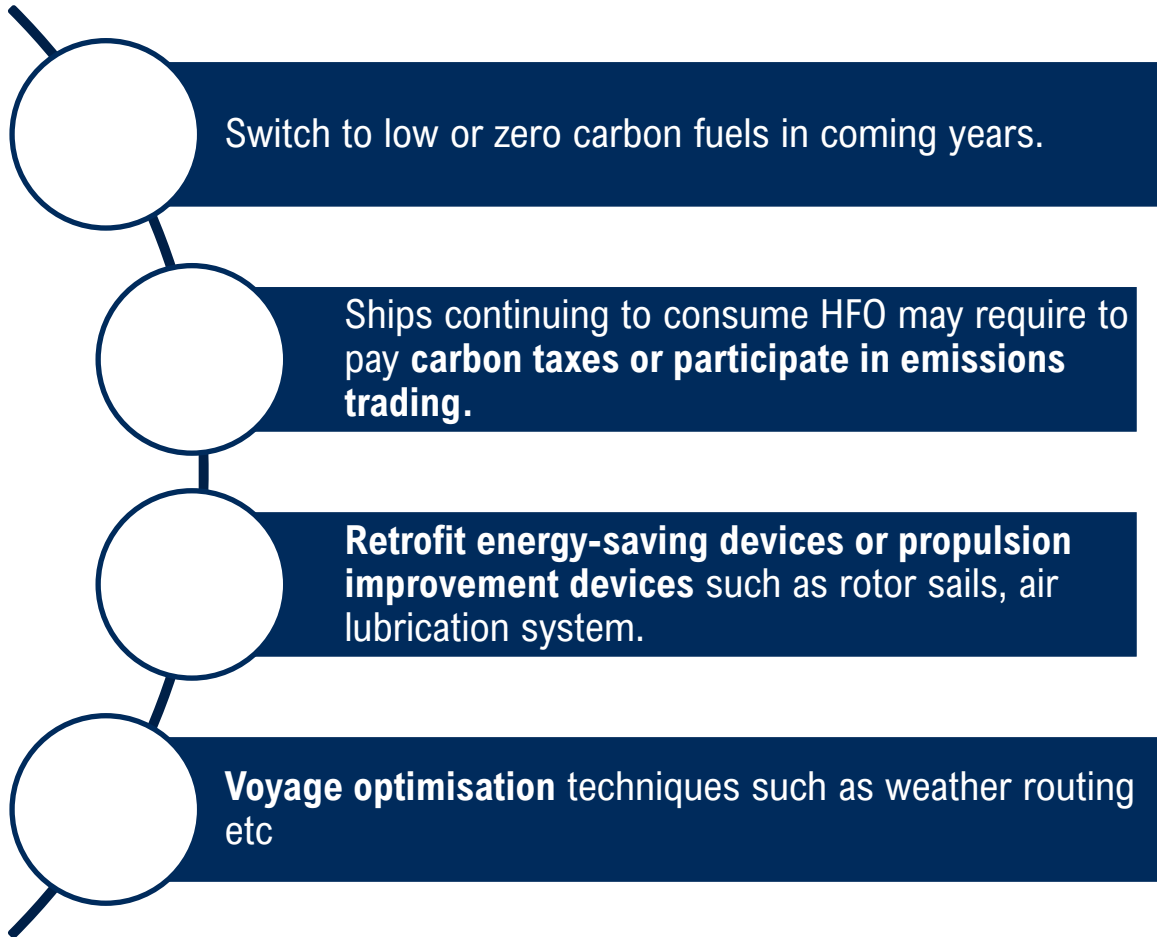
Charter/Second hand: Class system between speed-restricted and non-speed restricted ships.

EEXI analysis of container ship fleet

Drewry classification	Size range (teu)	EEXI exempt (DWT <10k)	Compliant @ 75% MCR	Compliant @ current operational speed	Total compliant	Non-compliant	% non-compliant	Ave. speed reduction required for compliance (knots)
Small Feeder	100-2,000	733	69	177	979	1,406	59.0%	2.3
Large Feeder	2,000-3,000	0	34	513	547	209	27.6%	1.1
Classic Panamax & wide beam	3,000-5,300	0	11	812	823	77	8.6%	1.0
Grand Total		733	785	2,396	3,914	1,692	30.2%	

What does this mean to ship owners/operators?

Choices for ship owners and operators?



Ships will be required to initiate a combination of initiatives in order to comply with the upcoming environmental regulation.

Alternative fuels

Ss

Container Dual-fuel Orderbook (No. of Ships)



Alternative-fuel capable containership fleet (No. of ships)

Fuel-type	Orderbook	Trading Fleet
LNG	232	55
LNG-Ready	60	-
LPG	-	-
Ethane	-	-
Ammonia- Ready	27	-
Methanol	61	-
Total	380	55

* 'Ready' denotes ships that have a strengthened deck, a reserved space on the deck for fuel tanks and have space in the engine room for extra machinery components

Dual-fuel and efficient newbuilding orders (week ending 03.02.23)

Type	Size (TEU)	No. vessels	Reported Buyer	Shipbuilder	Delivery	Reported Price	Comments
Containership	13,100	12	CMA CGM	Hundai Sambo	2025/2026	US\$171.00 m	Methanol DF

Key takeaway

- About 1% current fleet is alternative fuel ready.
- Container Orderbook: 380 vessels compared with 55 existing alternative fuel vessels. (About 40% of the container vessel orderbook is demanding vessel specifications with the capability of using alternative fuel.)
- **LNG (292 vsl), Methanol (61 vsl) + Ammonia (27 vsl)** is the shipowner preferred in orderbook.
- Zero-carbon vessels capable of deep-sea, trans-ocean travel will need to be in use by 2030.



Implications to ports

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Pressures to port industry > Port's challenges or opportunities?

S. Damman and M. Steen

Transportation Research Part D 91 (2021) 102691

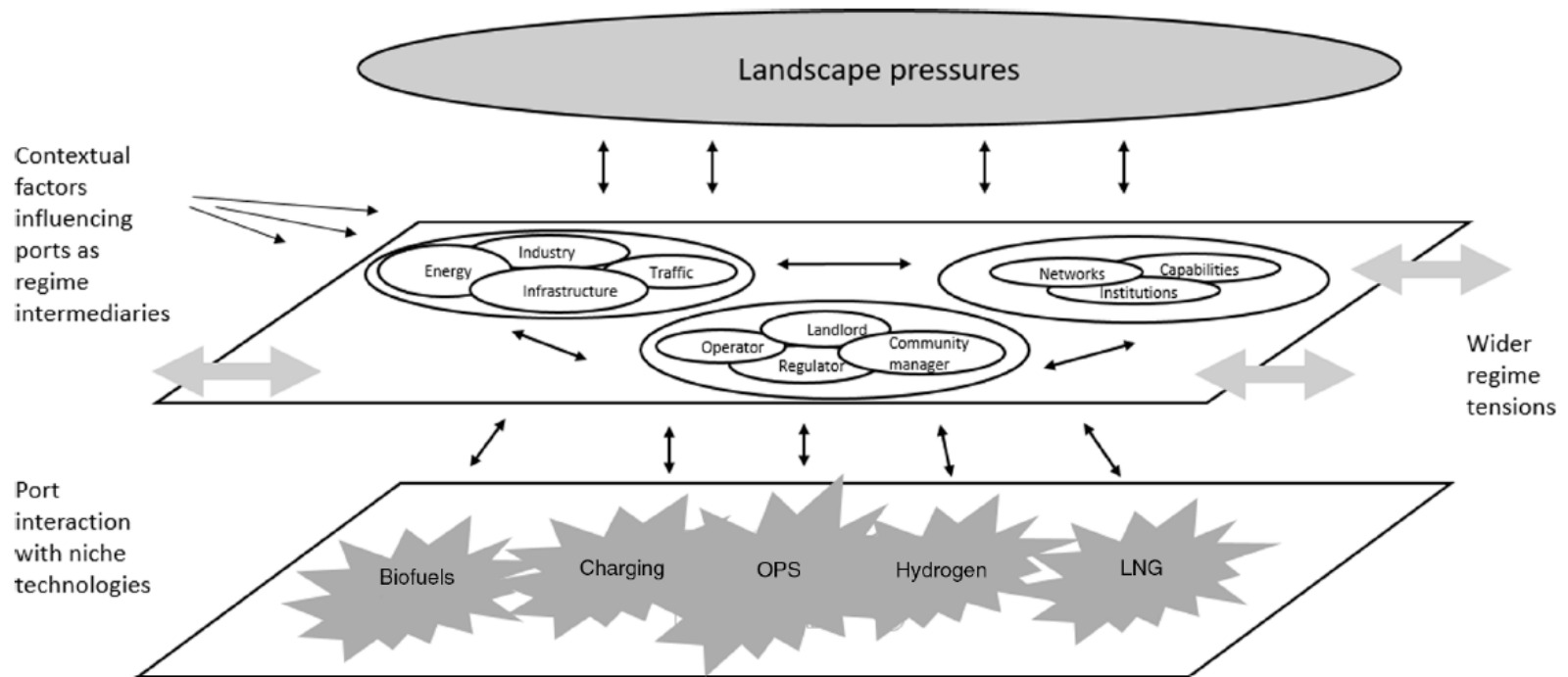


Fig. 6. Schematic illustration of contextual factors shaping ports' role as regime intermediaries.

Implications: New fuels

Cargo mix/Cargo flow

- Impact on traditional energy trade (coal/oil) > DOWN with uncertainty

- Renewable energy trade:

- **Hydrogen and Ammonia > UP**
- **Minor bulk > UP**

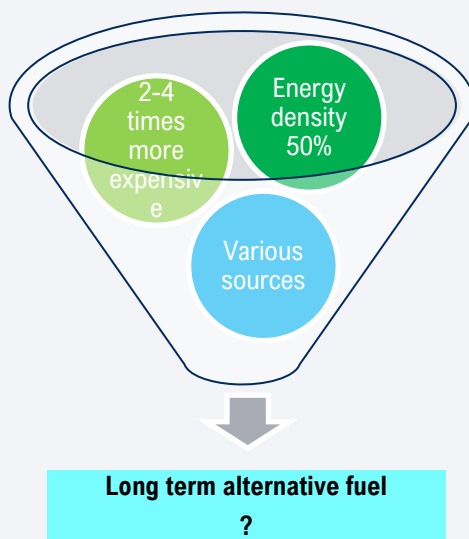
- **Offshore wind power > UP**

- **Solar board > UP**

- **Electronic vehicle > UP**

Vessel & Shipping

- Alternative fuel > Bunkering



Opportunities for port

• More diversified energy sources

- New players, New regional competition dynamics on bunkering ports > Requirement from port side:

- Brazil (Blue ammonia and hydrogen)
- India (Green ammonia and hydrogen)
- Mauritius (Green ammonia and hydrogen)
- Malaysia (Blue ammonia and hydrogen)

- More coordination with energy giants on bunkering services.

• Recent actions about Marine fuels

- Bunker supplier signs agreement with green ammonia producer
- Total Energies delivers first biofuels to Hapag-Lloyd under supply agreement
- Concept study commissioned for hydrogen bunkering on Germany's Helgoland island.

• Ports as an energy hub

- Interests to ports with energy producing capabilities, e.g. Antwerp, Singapore.
- Singapore: LNG, Ammonia, Biofuel, Methanol
- Rotterdam and Antwerp: hydrogen hub

• New port projects & ports competitiveness

Implications: New commodity. Offshore wind energy is projected to become one of the fastest growing renewable energy market.

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- **Electronic vehicle > UP**

Offshore wind energy capacity has a growth of 34.6% CAGR between 2008-2021. New offshore wind installations are forecasted to grow at 10.0% CAGR between 2021-2031.

Vessel & Shipping

- Offshore wind power:
 - Transportation of wind turbine > New vessels?
 - Installation vessels
 - Operation & Maintenance vessels

Opportunities for port

Interesting to ports close to wind farms

- Assembly port/ Instalment port
- Operation & Maintenance port
- Production port (Components of wind turbine)
- Decommissioning port
- Energy transition, storage, service port
- Energy conversion port (to Hydrogen)

Strategic recommendations:

- National policy and windfarm industry development > Windfarm plan
- Port area, land use; Energy pipeline connectivity
- Joint investment with industrial players
- Develop offshore wind farm service port cluster
- Nearshore to Deepsea:
 - Weather forecast
 - Search and rescue capability

Implications: New commodity

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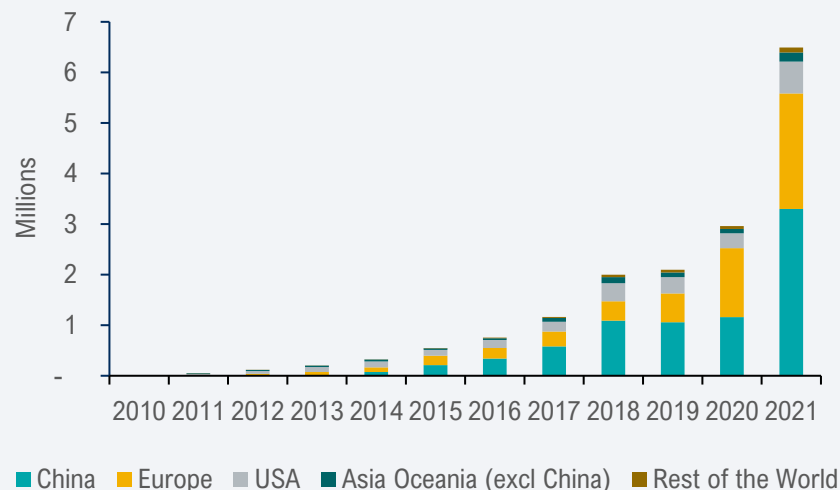
Vessel type

- Solar board: No impact to container vessels
- EV: Positive for car carriers, new cargo for container vessels

Opportunities for port

- Nearly **54%** of new car sales and **33%** of global car fleets are expected to be electric **by 2040**. The ASEAN electric vehicle market is expected to reach USD 2,665.3 million, registering a **CAGR of 32.73%** during the forecast period. FORECASTS (2023 - 2028) (MODOR INTELLIGENCE)

Global Electric Car Sales



Implications: Green initiatives from shipping

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Shipping

- Energy effective initiatives in shipping
- Green initiatives in shipping
- **Calling pattern:**
 - CII favors **efficient ships, larger ships, fewer port calls, less frequent service.**
 - **Port operation and service:**
 - Need for shore power
 - Voyage Optimisation
- **Model shift**
- **New vessel type: Carbon carriers**

Opportunities for port

Being more sustainable:

- Battery charging facility and Battery swapping,
- **JIT** in port operation and services, e.g. Singapore creating an interconnected system for JIT
- **Being flexible and resilient**
- **More digital and smart**

- **Inland connectivity:** Which form of transport is the **most sustainable choice** and contributes to a sustainable logistics chain?

Ports in Green corridor

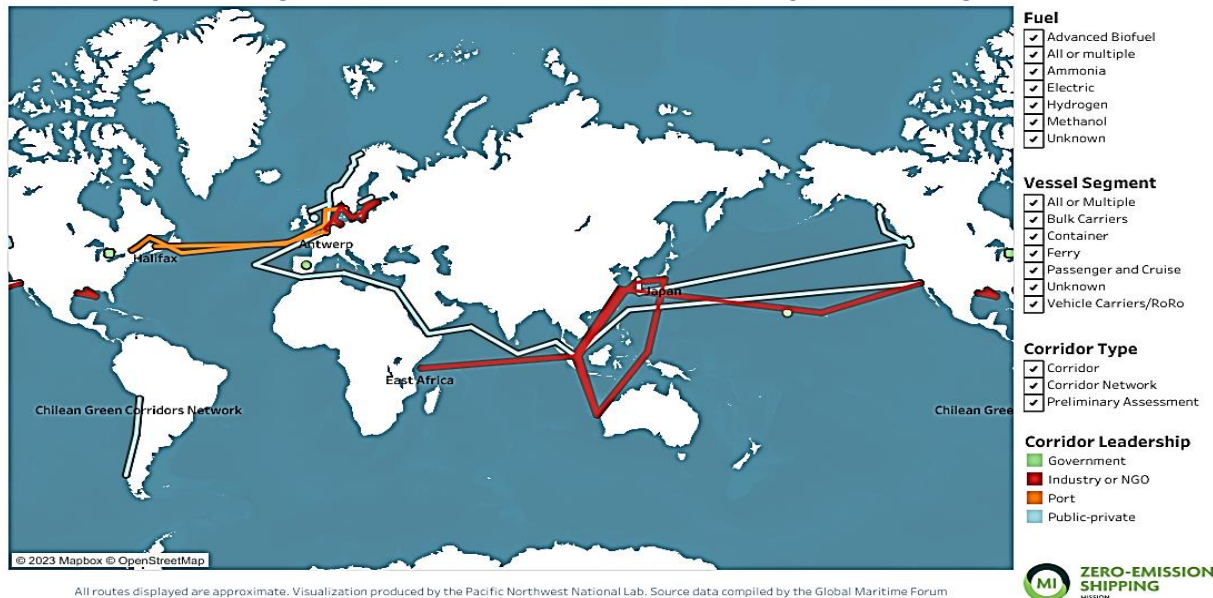
Acceleration in energy transition, increase in CCUS
CO2 disposal facility

Challenges

Implications: Green initiatives from shipping “Green Corridors”

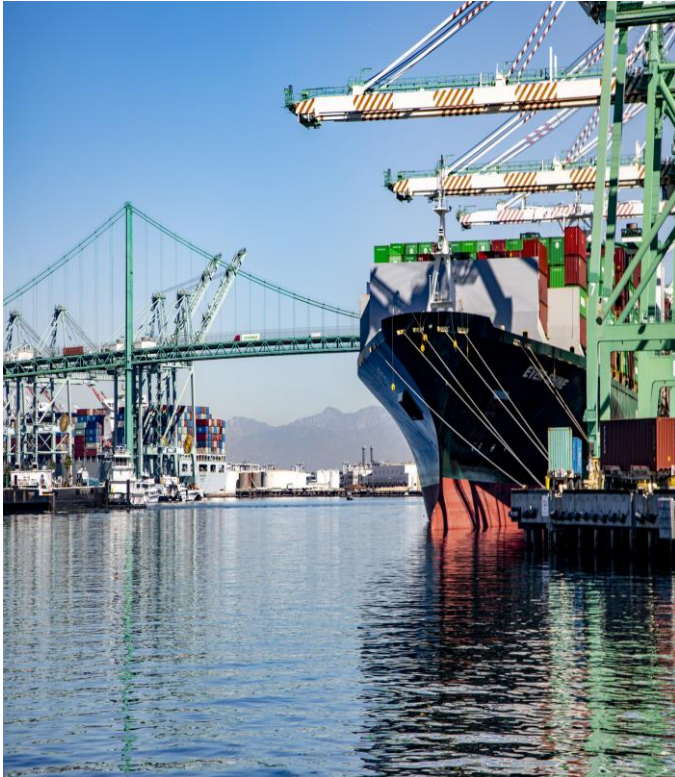
As we start transitioning towards alternative fuels, the **availability of fuels, their acceptability,** etc. is expected to be challenging. Therefore, major stakeholders have **joined forces** to establish green corridors in some selected trade routes. In these green corridors, alternative fuel will be available, thereby encouraging ship owners to deploy alternative fuelled vessels.

Development of green corridors around the world led, by different organisations.



- Heavy investments is being made by stakeholders in developing the **technology** and the **ecosystems for use of zero-carbon fuels onboard ships.**
- Set to leverage **set standards** in terms of **regulatory measures, financial incentives, and safety regulations.** Later these routes will facilitate the expansion of the green corridor ecosystem to other routes.
- A great emphasis on green corridors was seen in COP 26 and 19 countries signed a declaration known as the **‘Clydebank Declaration’** for the establishment of **‘green shipping corridors’** and aim to establish **at least 6 green corridors, by 2050.**

Implications: Green initiatives fm ports



Bunkering

Ship service: Shore power to vessels

Service boats: Tugboats propelled by alternative fuels

Operation: Just In Time arrival

Emission reductions

Decarbonise cargo handling facilities, Usage of solar power

Information sharing platforms

Implications: Renewable energy projects in ASEAN

The rapid economic and population growth of ASEAN is leading to a huge demand for energy. Governments are responding accordingly by continuing their focus on power projects with a new focus on renewables.

Official and unofficial installed renewables capacity targets

Country	Solar (MW)	Wind (MW)	Biomass (MW)	Geothermal (MW)	Others (MW)	Total (MW)	Target (Year)
Cambodia	*	*	*	*	*	100	NA
Indonesia	444	640	488	6,150	-	7,722	2025
Lao PDR	33	58	58	-	87	636	2025
Malaysia	854	-	1,340	-	800	2,994	2030
Philippines	285	2,378	316	3,461	71	6,510	2030
Singapore	350	*	*	*	*	350	2020
Thailand	6,000	3,002	5,570	-	1,780	16,352	2036
Vietnam	*	*	*	*	*	27,195	2030

- Note: Data is outdated.



Summary

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What's your port's role?

- Shipping produces about **3%** of the world's man-made emissions of CO2. IMO current aim is to reduce GHG emission by 11% [2019-2026].
- Container vessels with alternative fuel is 1% of current container fleet, Container Orderbook with alternative fuel is presently **380 vessels** compared with **55 existing alternative fuel vessels**. (**About 40%** of the container OB in terms of no of vessels is capable of using alternative fuel.)
- LNG (292 vsl), Methanol(61 vsl) + Ammonia (27 vsl) is the shipowner preferred.
- **New commodities**, new cargo mix: Wind farms, EVs.
- Inland transportation **model shifts**.
- Energy will be more diversified from different sources. >> What is the role of your port? **Energy hub?**
- Ports role in “**Green corridor**”
- **Regulatory, design, land use, safety and security, green initiatives**, etc.

The Sustainable Port

Previous energy transition – from coal to oil – took place for 50 years. Are you ready for the next energy transition?



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