OCEAN SHIPPING CONSULTANTS

a company of

Royal HaskoningDHV

Enhancing Society Together

Alternative Fuels and Offshore Wind Ports: Driving Renewable Energy in ASEAN's Maritime Sector

asean Ports and Logistics 2024

The Cornerstone of Global Economy and Supply Chain Networks

ASEAN Port and Logistics 2024

23 Oct 2024

Royal HaskoningDHV is an independent international engineering and project management consultancy with a history of over 140 years. We cover a wide range of infrastructure assets, offering services that ranges from consultancy, engineering design, software and technology.

What we do

- Aviation
- Buildings
- Energy
- Industry
- Infrastructure
- Maritime
- Urban Management
- Water

Celebrating 140+ years

2nd in ENR Global Sourcebook Marine and Port Facilities - 2020

Top 5% for overall CSR-performance

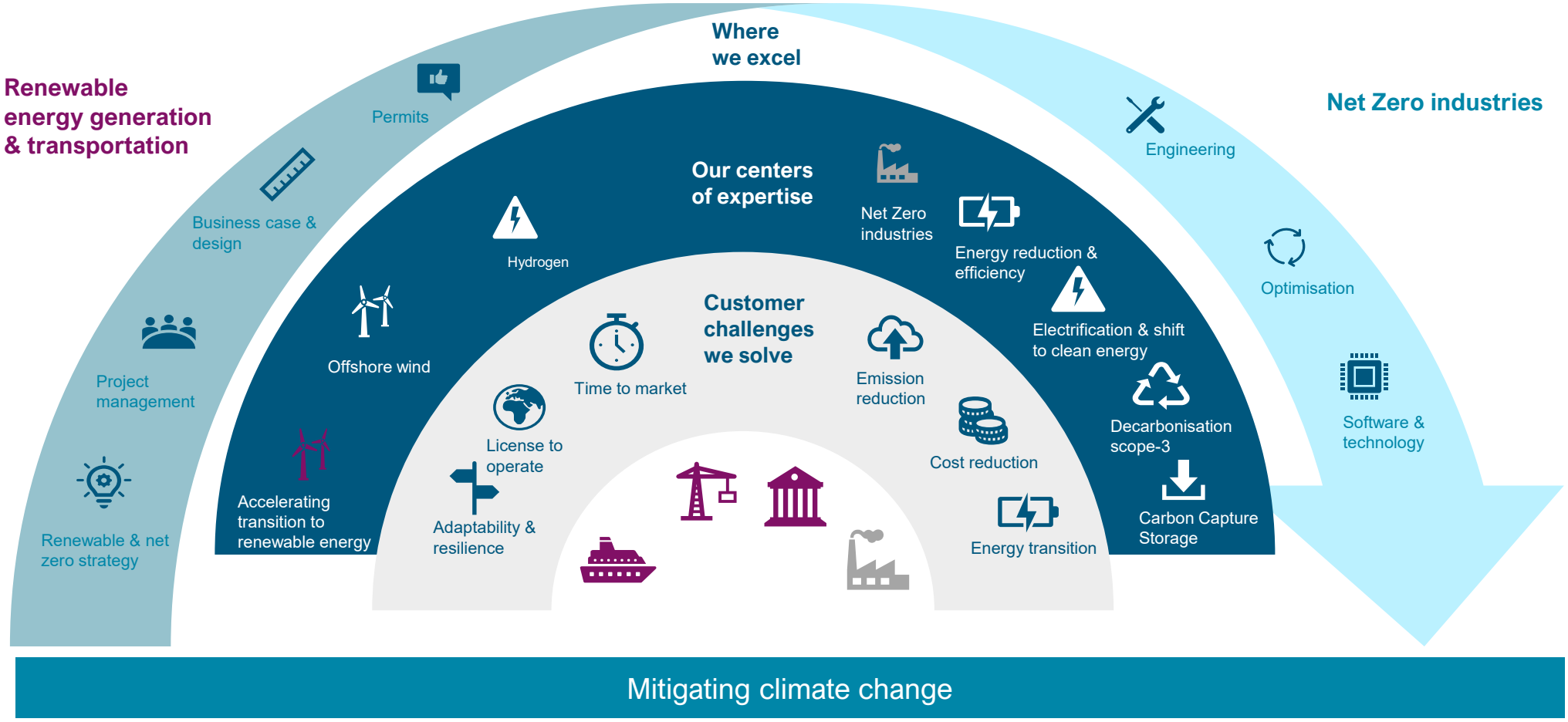
Zero-tolerance to bribery and corruption

OCEAN SHIPPING CONSULTANTS

a company of

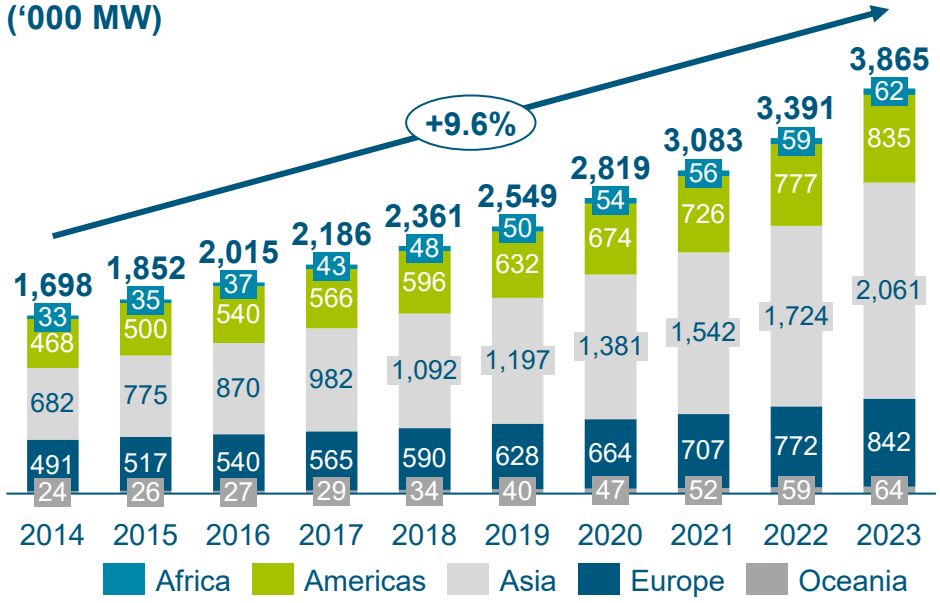
Royal HaskoningDHV
Enhancing Society Together

Royal HaskoningDHV is a major player in renewables and carbon reduction, with an initial primary focus on global offshore wind and hydrogen markets. Attaining local dominance in the NL and UK with a strong position from key accounts as we expand into APAC and Baltic.

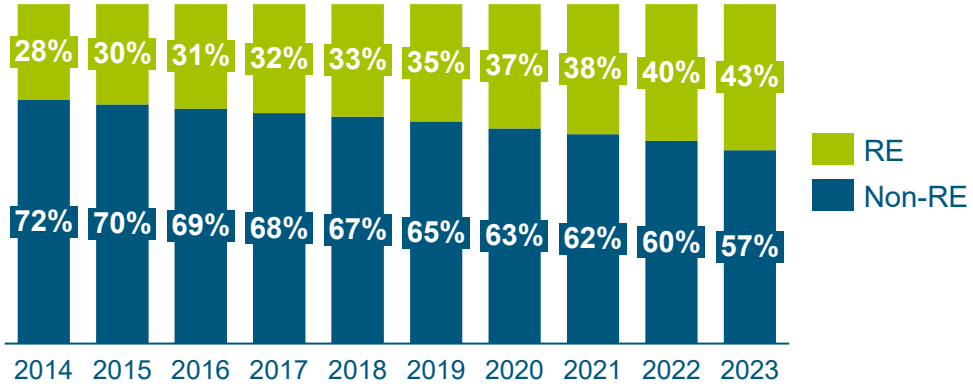


Over the past 10 years, the total installed RE capacity has grown by a 9.6% CAGR to reach 3,865 GW. Asia accounted for 53% of the total RE capacity. In 2023, renewable energy comprised 43% of the total energy capacity. Oceania had the highest proportion of renewable energy in 2023, with 53%.

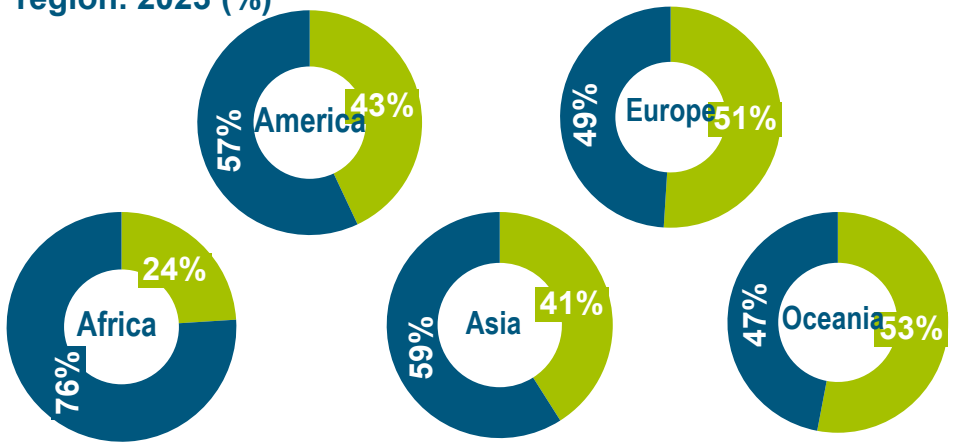
Total renewable energy (RE) installed per region, 2014-2023 ('000 MW)

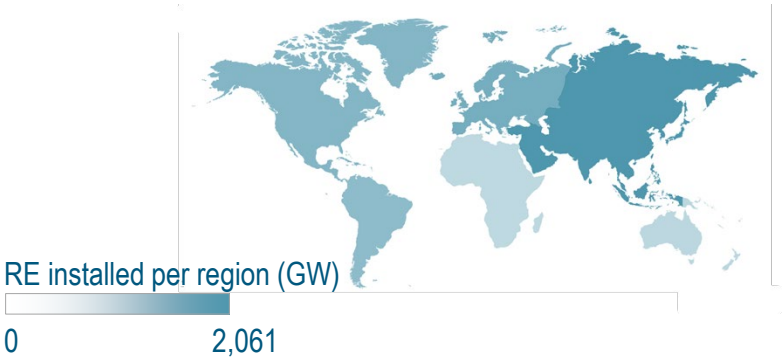


Composition of RE and Non-RE from the total energy, 2014-2023 (%)



Composition of RE and Non-RE from the total energy per region. 2023 (%)

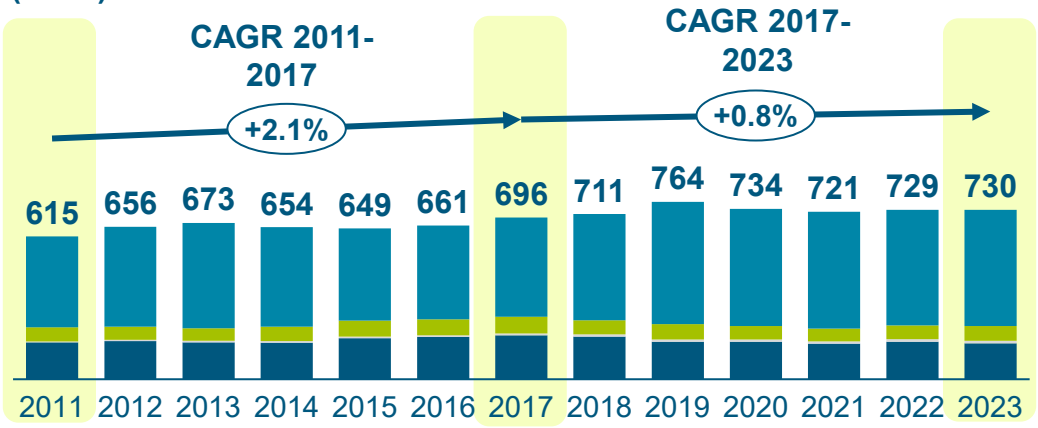




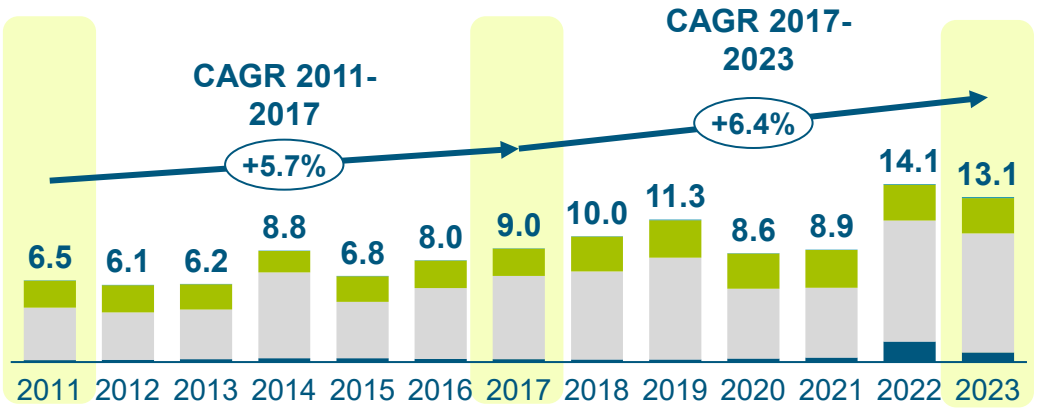
Source: IRENA, RHDHV-OSC's desktop resarch

Riding the momentum of COP21 Paris Agreement, the trade volumes for renewable energy sources in ASEAN countries have surged at a CAGR 6.4% between 2017-2023, faster than those of conventional non-renewables at 0.8%. Despite downturns during COVID-19, trades are recovering.

Conventional non-renewable energy sources, 2010 – 2023 (MMT)



Renewable energy sources, 2010 – 2023 (MMT)



Commodity	Trade volumes (MMT) 2011	2017	2023	CAGR 2011 – 2017	CAGR 2017 - 2023
Coal	391.1	427.8	500.6	1.5%	2.7%
LNG	60.1	70.7	63.1	2.7%	-1.9%
LPG	5.1	8.2	11.2	8.3%	5.3%
Crude oil[1]	158.3	189.8	155.0	3.1%	-3.3%
Total	**614.7**	**696.5**	**729.8**	**2.1%**	**0.8%**

Commodity	Trade volumes (MMT) 2011	2017	2023	CAGR 2011 – 2017	CAGR 2017 - 2023
Hydrogen[2]	0.002	0.001	0.083	28.7%	41.1%
Ammonia	2.1	2.2	2.8	0.2%	4.4%
Methanol	4.2	6.6	9.4	7.9%	6.1%
PV cells[3]	0.1	0.2	0.8	7.3%	22.2%
Total	**6.4**	**9.0**	**13.0**	**5.7%**	**6.4%**

Sources: Trade Map, UN Climate Change Conference (COP21), RHDHV-OSC's desktop research

Notes:

1- Assumed 1 m3 of crude oil = 0.8581 MT.

2- Assumed hydrogen is transported in liquified state at -259.16°C, with density of 70.8 kg/3.

3- PV (photovoltaic) cells include photosensitive conductor devices such as PV cells & modules (assembled & non-assembled), LED.

The energy transition will transform ports by altering land use, client service needs, and required equipment and infrastructure, while new industries and processes will demand different port services and facilities.

Areas of change for ports due to energy transition

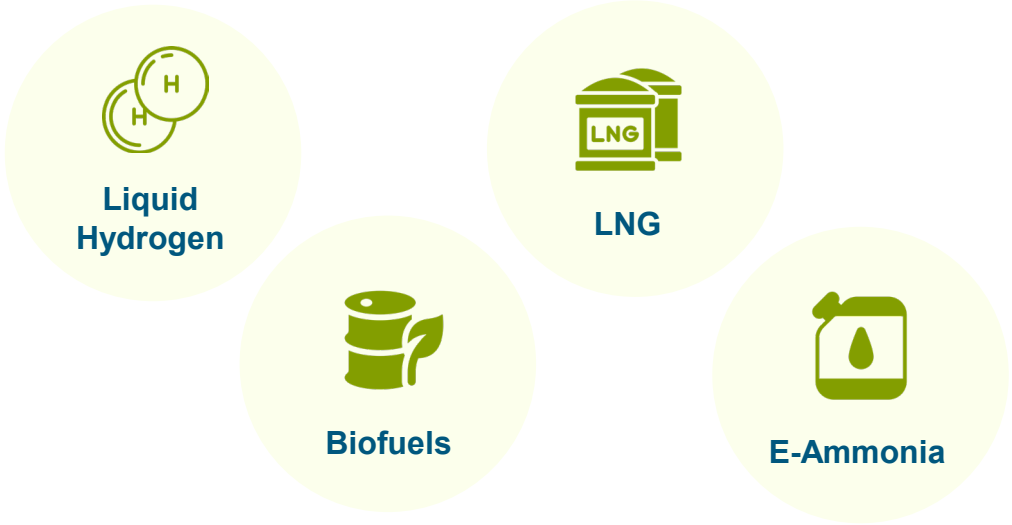
Space Land-use trade-off	Facilities Land-use trade-off	Infrastructure Enable new energy	Cargo flows New energy flows & processes	Industry New technology and clusters	Hubs Connectivity and alliances
• Land availability • Transition of current layout • Modal shift • Spatial planning	• Handling equipment • Port transport • New charging and fuel bunker facilities • Onshore power • Energy transport • Floating facilities	• Dedicated terminal and quays • New on/off loading facilities • Power connection • Energy conversion and storage	• LNG growth • Renewable power integration • New fuel import and production • Emission flows and storage	• Industry energy demand change • Technology and process innovation • Change in players • New industry and local production	• Hinterland and multi-modality • Production and storage hubs • Urban area energy connection • Value chain clusters

Source: RHDHV-OSC's desktop resarch

As the maritime industry moves toward decarbonization, ports must evolve to accommodate alternative fuels like hydrogen, biofuels, and LNG. These fuels are pivotal in reducing emissions, and ports will be at the forefront of this transformation.

Intro to alternative fuels in port

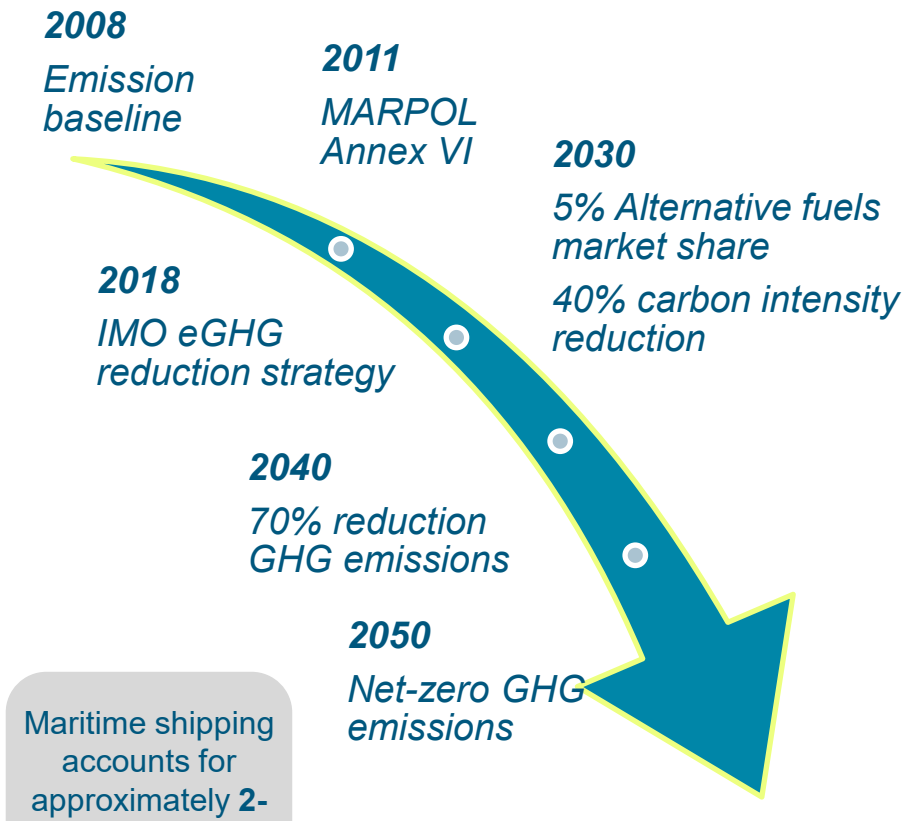
- Alternative are emerging as clean alternatives to traditional fossil fuels used in maritime shipping which aim to reduce GHG emissions and offer sustainable energy solutions for port operations.



- Shipping lines drive the adoption of specific alternative fuels, but ports can play a key role by using, servicing, and promoting these fuels. Alternative fuel bunkering not only reduces carbon emissions but also prevents air pollution and improves local air quality.

Source: IMO, RHDHV-OSC's desktop resarch

Extensive strategy to reduce emissions of the worldwide fleet



Maritime shipping accounts for approximately **2-3%** of global emissions.

We conducted a study for Fiji on transitioning its domestic fleet to clean energy. The study focused on the feasibility and financial viability of various clean fuel options, aiming to reduce the maritime sector's significant GHG emissions.

Results on the fuel option screening

Fuel option	Reduction in GHG (2030 target)	Compatible with Net Zero (2050 target)	Option can be implemented in Fiji	Shortlist
Diesel (current)	Nil	No	Current option	Current
Biofuels	High	No	Near-term	Yes
Diesel-electric Hybrid	Low-medium	No	Near-term	Yes
LPG	Low	No	Near-term	No
LNG	Low	No	Near-term	No
H2	High	Yes	Medium to long term	Yes
Ammonia	High	Yes	Medium to long term	Yes
Methanol	High	Yes	Medium to long term	Yes
Battery-Electric	High	Yes	Medium to long term	Yes

- **Project objective**: Feasibility of clean energy propulsion for Fiji's domestic fleet, focusing on the government shipping fleet and assessing the financial and commercial viability of this transition to the blue economy.
- **Key facts:**
  - Fiji's maritime sector contributes 8% of the country's total GHG emissions (the global average is 2%). The higher proportion is due to Fiji being an archipelagic country.
  - Emission levels are expected to grow over the next 50 years.
- **Country targets**
  - 2030: 40% reduction in the use of fossil fuels in the maritime sector
  - 2050: Net-zero carbon emissions

Source: RHDHV-OSC's desktop research

Southeast Asia is making efforts in adopting alternative fuels. While these efforts present opportunities for ports to reduce carbon emissions, enhance competitiveness, and achieve energy independence, the adoption of these fuels in ASEAN is still limited.

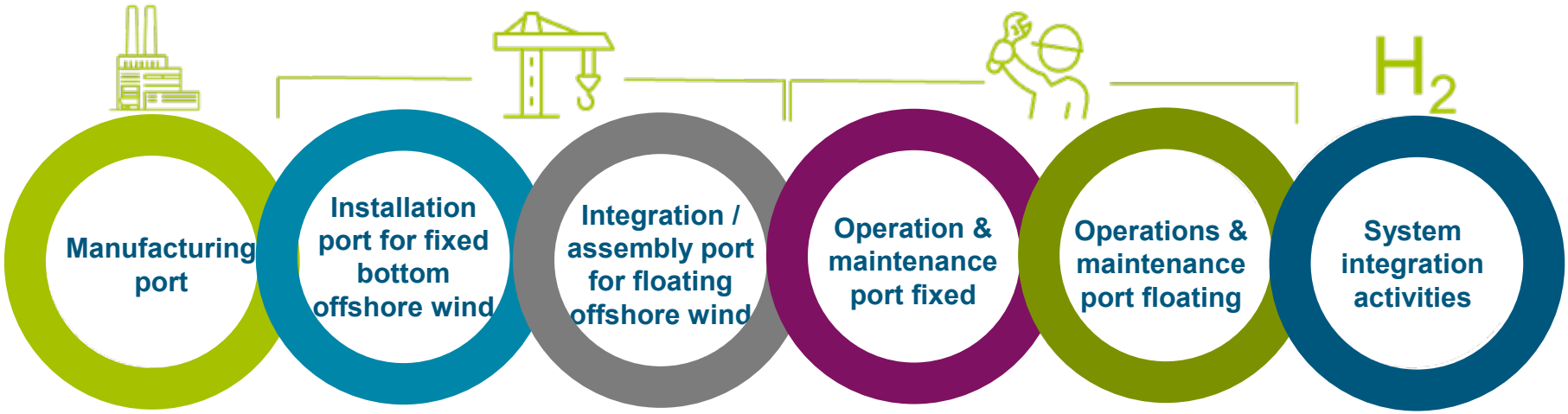
Current adoption / plans for alternative fuels in Southeast Asia

- LNG
- Biofuels
- Liquid Hydrogen
- E-Ammonia

Offshore wind energy is increasingly significant worldwide, with ports being crucial for turbine assembly, logistics, and maintenance. As this sector expands, ports must upgrade and invest in specialized infrastructure to become key players in the renewable energy supply chain.

Intro to offshore wind

Port roles

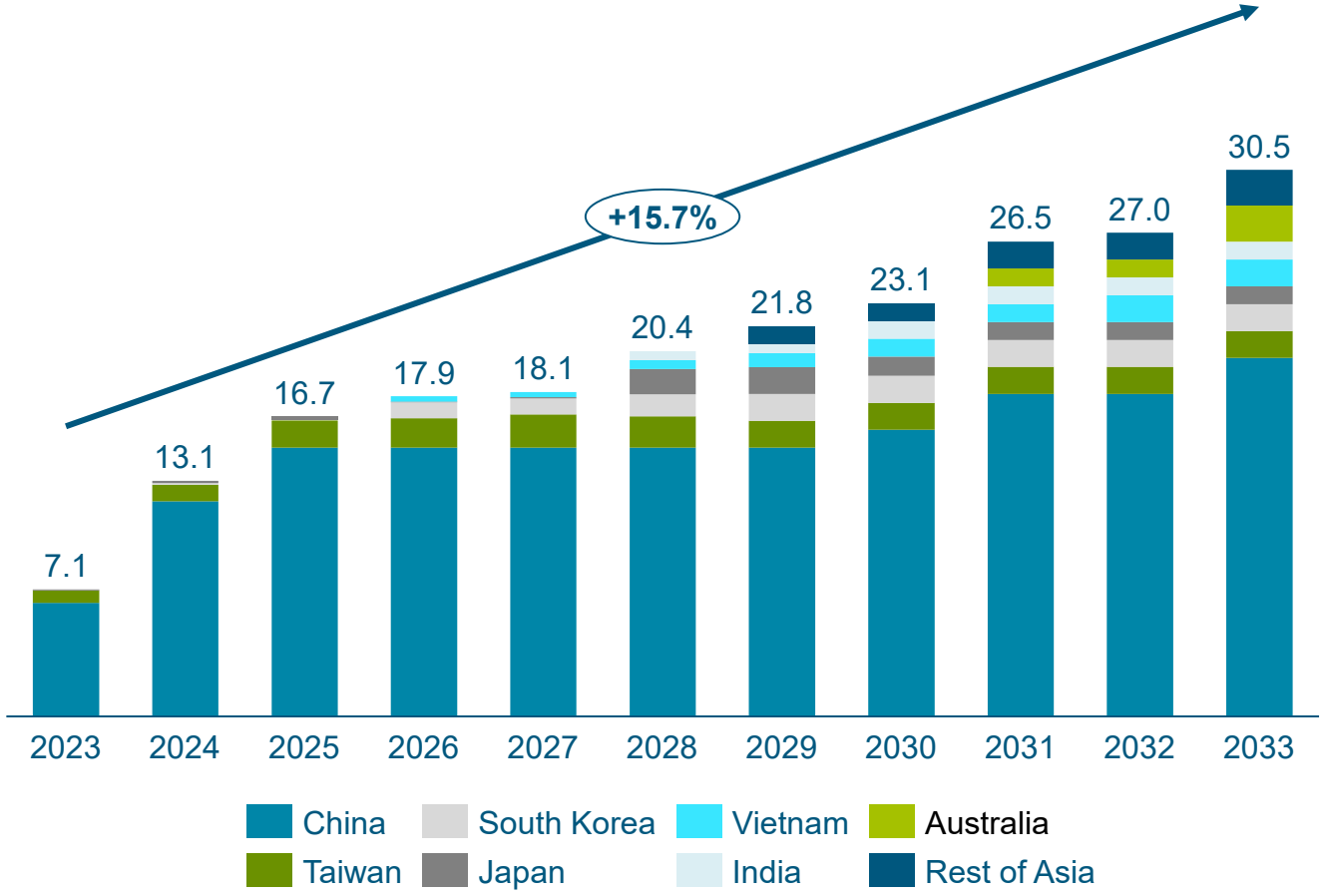


Key criteria

Source: RHDHV-OSC's desktop resarch

The Asia Pacific region, is set to dominate the global offshore wind market, accounting for 52% of installations by 2033.

Forecasted offshore wind projects in Asia Pacific, 2023-2033 (GW)



- The Asia Pacific region is poised to dominate the global offshore wind market, propelled by substantial growth in China and emerging markets such as Japan, South Korea, Vietnam, India, the Philippines, and Australia.
- By 2033, the Asia Pacific region is expected to contribute 52% of the global offshore wind installations, which will total 66.2 GW worldwide.
- Southeast Asia is also becoming a key player in the offshore wind sector, with Vietnam and the Philippines at the forefront. Vietnam has set a target of 6 GW of offshore wind capacity by 2030, while the Philippines has approved 63 offshore wind sites and plans to conduct its first auction in 2025.

Source: Global Wind Energy Council (GWEC)

We acknowledge there are five key obstacles delaying offshore wind port development. Despite these challenges, ports in Southeast Asia have significant opportunities to capitalize on the growing demand for renewable energy, diversify energy sources, and attract investments.

Key obstacles delaying offshore wind port development.

Source: RHDHV-OSC's desktop resarch

Ports face significant challenges in the energy transition, requiring investment, expertise, and collaboration to support new energy demands, attract businesses, and reduce emissions.

Requirements for turning ports into sustainable energy hubs

Investment and funding	• Reserve, secure, and arrange (co)funding • Find financial and business partners
Expertise	• Built and hire energy and project development related skills and expertise • Right balance between own skills/responsibility and third-party hiring
Planning & land use	• Create integrated spatial plan for port and energy infrastructure • Upgrade of port infrastructure and creation of space • Improve hinterland connections with dedicated corridors and multi-modal solutions
Technology uncertainty	• Ensure a secure supply and demand for alternative energy services, as well as energy and cargo flows. • Stimulate technology choices, adoption, and standardisation in and between ports
Collaboration	• Collaboration between ports, with clients, and stimulate stakeholder engagement • Increased role in connecting and collaborating with energy suppliers and users
Societal impact & political climate	• Mission-driven, combines commercial interests with societal goals • Policy advice and support on consequent policy-making to stimulate energy transition efforts
Governance & port organisation	• Role is expanding, requiring more strategic, business development, and alliance building skills • Change from a pure landlord to investor and developer

Source: RHDHV-OSC's desktop resarch

OCEAN SHIPPING CONSULTANTS

a company of

Royal HaskoningDHV

Enhancing Society Together

Thank you

Q&A