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Maritime Decarbonization: Future Opportunities in Smart Ports of Asia-Pacific

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Business Opportunities Outreach – Valencia | 2 December 2025



**Solving Complex
Challenges Together**

Background

Ports and maritime sector

- Move over 90% of all traded goods world-wide. Account for 3% of global greenhouse gas emissions.
- 64% global maritime trade through Asia, leading ports and ship builders
- Global initiatives for emissions reduction in maritime.

Smart port systems

- Technology cheaper, readily available.
- Digital transformation ongoing in Asia and the Pacific region, albeit with subregional variations.

Smart port systems for sustainability

- Reduce greenhouse gas emissions at/around ports.
- Increase port productivity, support trade, national supply and global value chains.

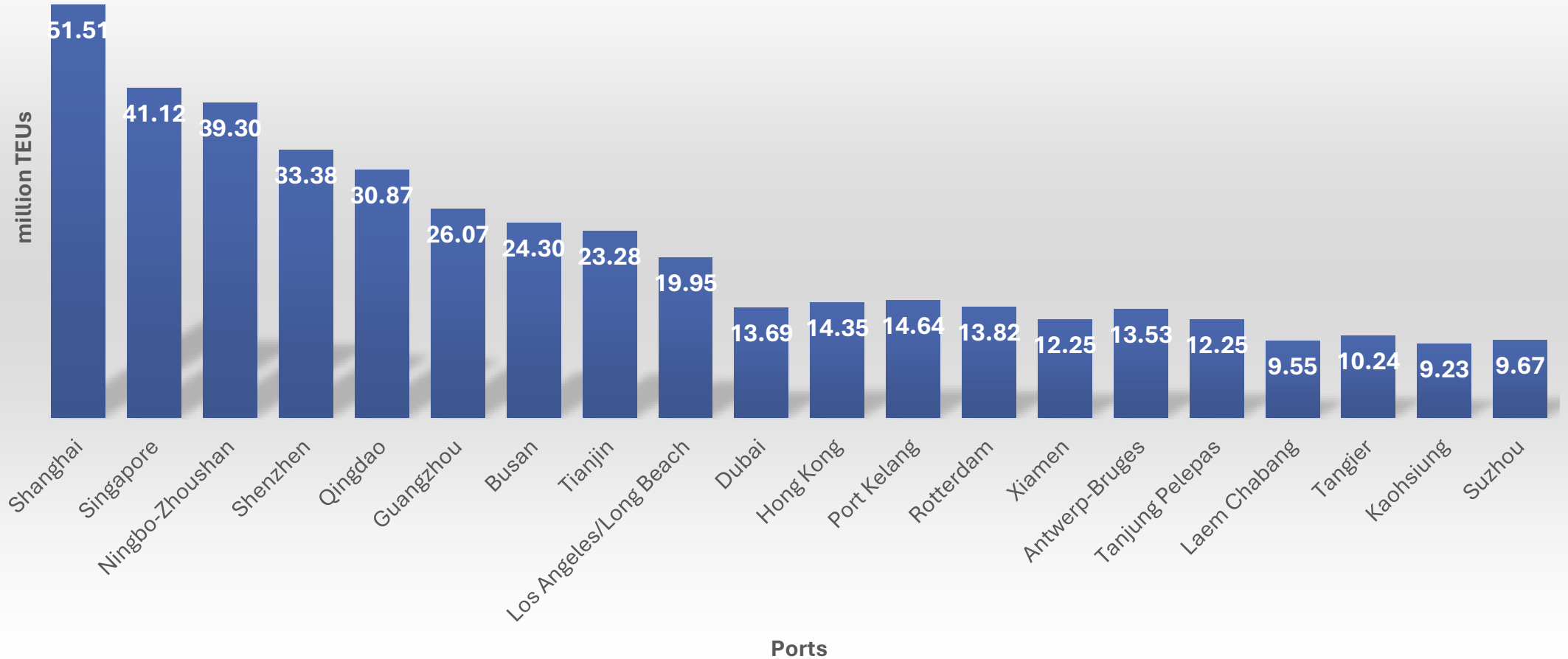
ADB Membership & Global Shipping Routes

Nonregional Members (19 countries)
Austria, Belgium, Canada, Denmark, Finland, France, Germany*, Ireland, Italy, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States*

— Advanced economies and/or graduated developing members.
* Field Office

As of January 2020

Largest Container Ports Worldwide by Throughput in 2024



ADB and Maritime Sector

- Principles

- Leave no-one behind
- Regional cooperation and integration
- Private sector development

- Interventions

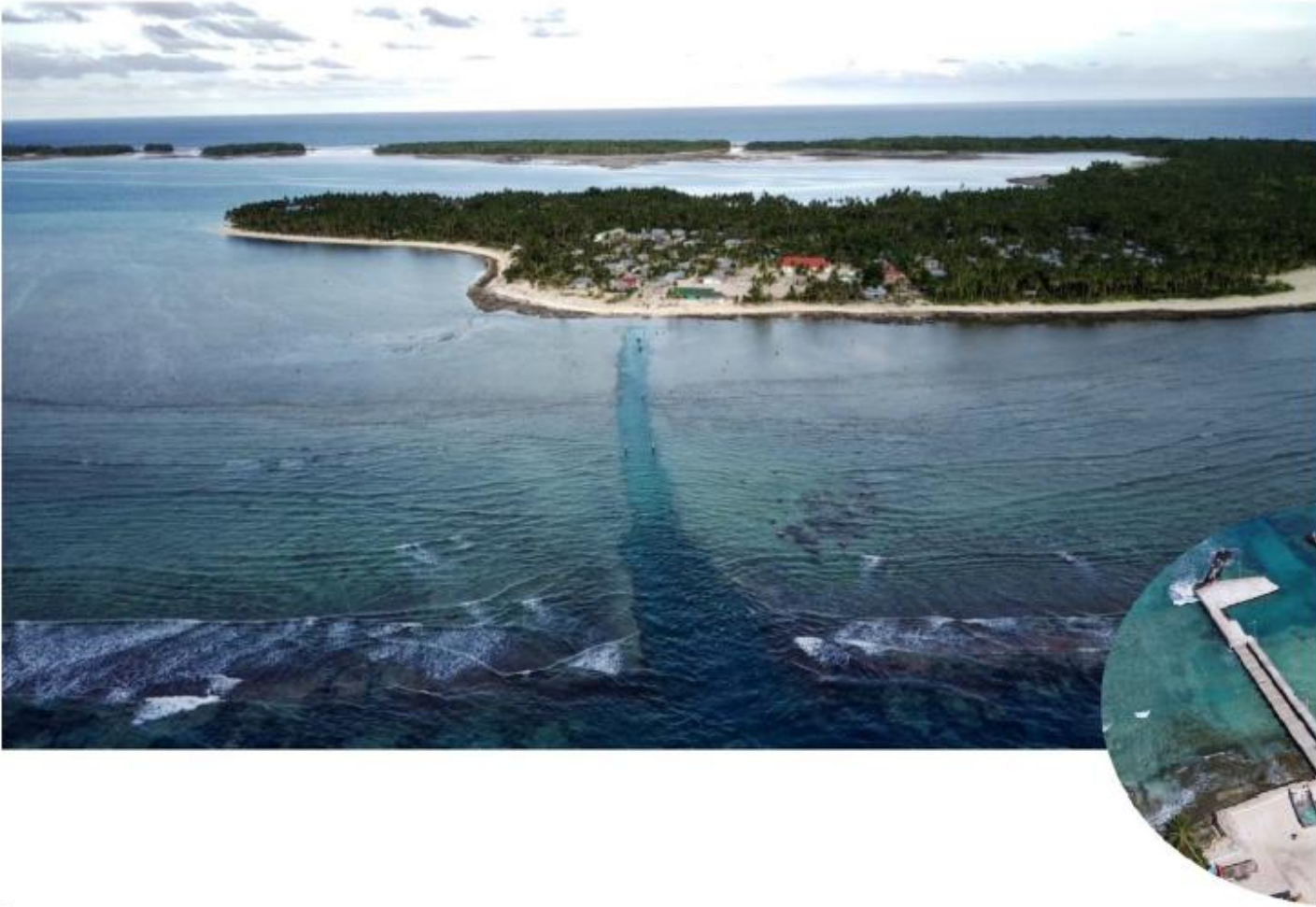
- Investments in infrastructure mobilized
- Technical assistance extended – toolkits, evidence base, pilots to inform future investment and policy decisions
- Partnerships leveraged
 - Operational and knowledge work
 - IMO, UNCTAD, WB
 - IAPH, DMA, GCMD, MMM Center for Zero-Carbon Shipping, Moffatt & Nichol

Samoa: Enhancing Safety, Security, and Sustainability of Apia Port



- \$65M Grant
- Climate and disaster resilience:
 - As the existing breakwater is inadequate to withstand the impact of future climate change (sea level rise) and the 100-year storm, the project will reconstruct and strengthen the breakwater, to enhance its resilience serve as a lifeline port, to operate in the aftermath of disasters to receive vessels carrying aid and emergency supplies.
- Developed Green Ports Policy

Tuvalu: Outer Island Maritime Infrastructure Project

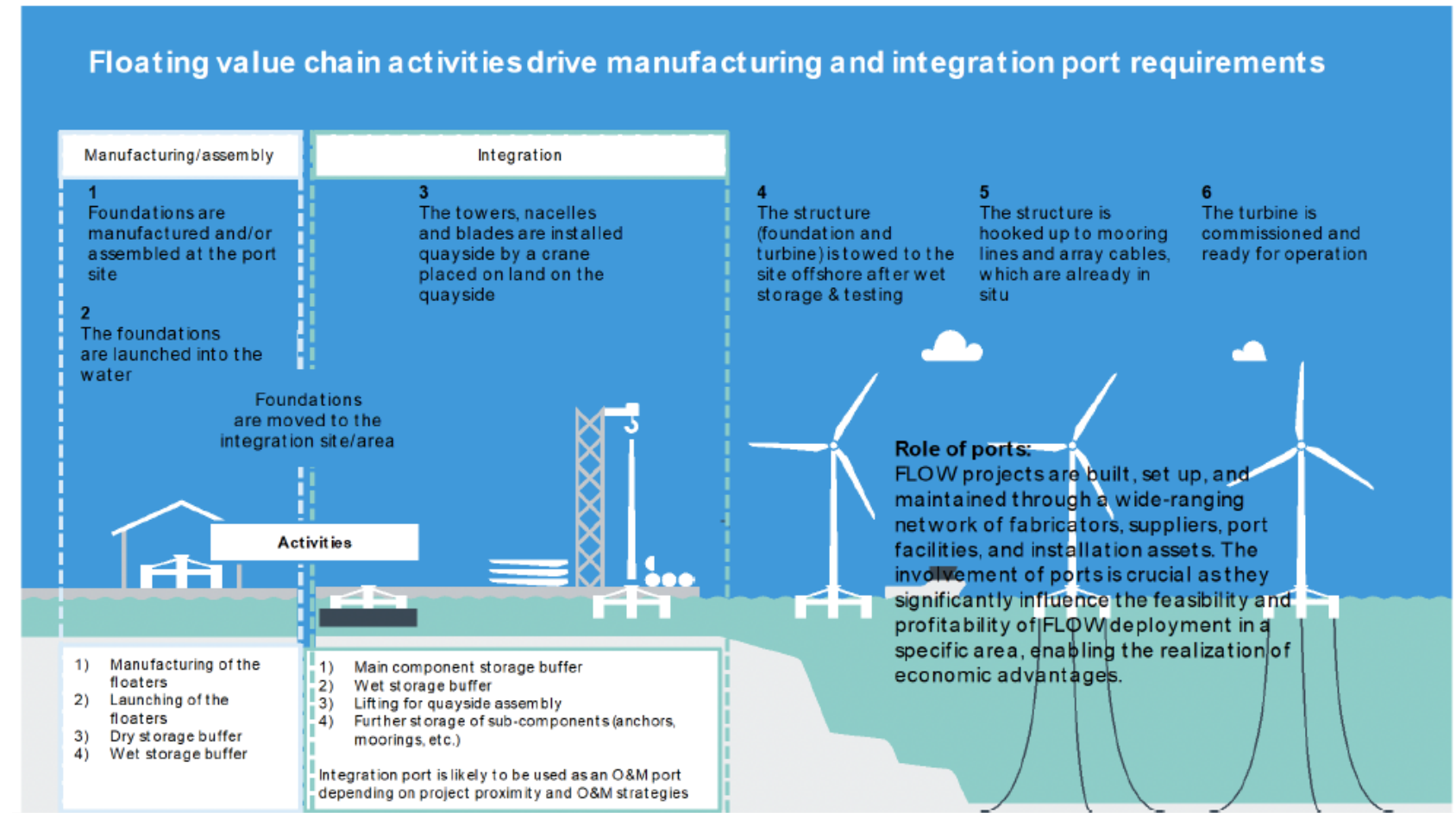


- \$50M Grant
- Small-scale harbors constructed in Nui, Niutao, and Nukulaelae, and boat ramps in Nanumaga and Niutao rehabilitated.
- transport sector master plan for future harbor development in the outer islands created, with a view to promote fisheries and tourism.
- \$30M Grant recently replaced the passenger and cargo ship Manu Folau, which was in an unserviceable state



Philippines: Feasibility Study on Port Development for Off-shore Wind

- Departments of Energy and Transport
- Prioritizing Port Investments needed to support OSW

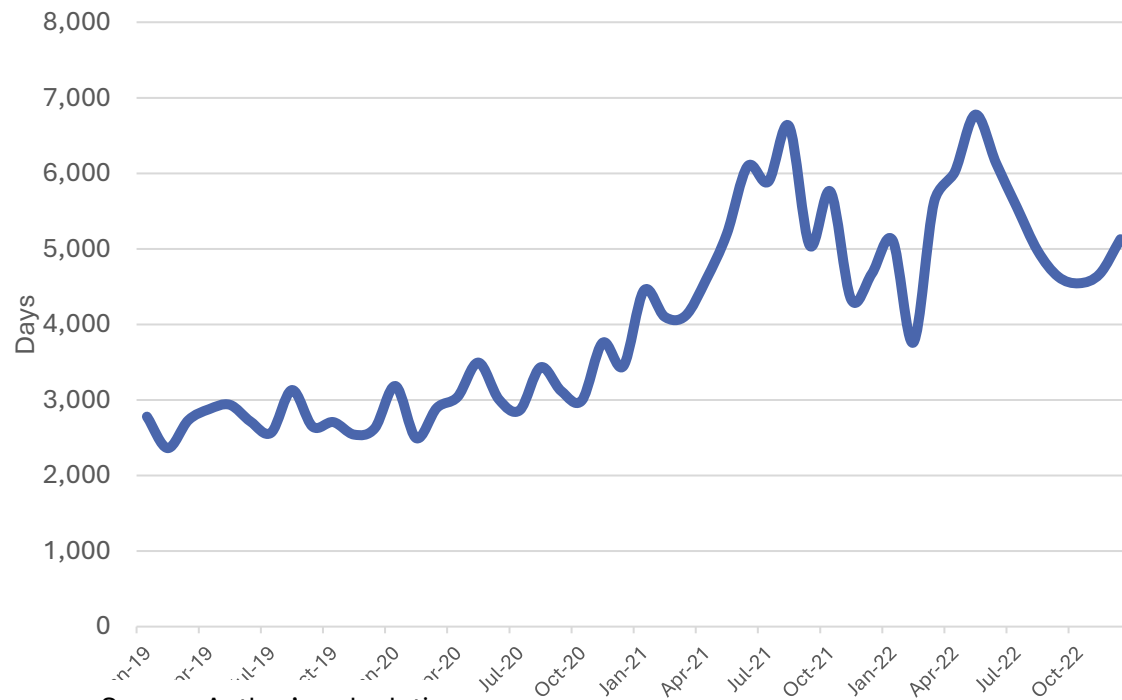


Technical Assistances (TA)

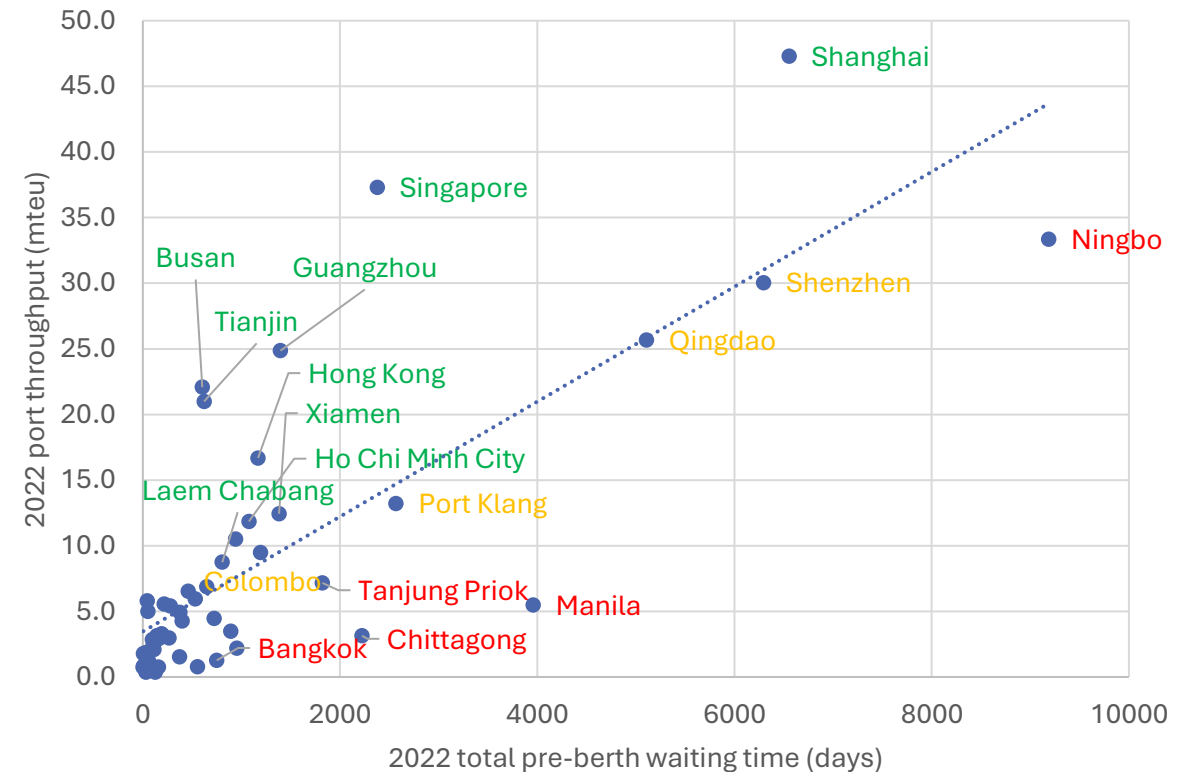
- Regional TA: *Digital Solutions For Optimizing Port Efficiency In Developing Countries*
- \$1.1 million of consulting services and procurement for port efficiency, traffic and emission reduction - commissioned
- **Ongoing pilot in Makassar New Port, Indonesia**
 - Consulting services, digital twin for selected terminals, smart port module pilot
 - Replicable and scalable
- Similar requests from **Bangladesh, India, the Philippines, Sri Lanka**; consultations ongoing
- **Additional finance in 2026 – work with other countries to be commissioned**
- Studies in Asia-Pacific region, India and Japan completed
- **5 additional studies to be commissioned in 2026 (PCS, mixed data imaging, MLM for port/vessel/truck traffic management; JIT)**

Sample Knowledge Work: Port Delays in Asia and the Pacific (53 Ports)

Total pre-berth waiting time, 2019-2022



Pre-berth waiting time vs. port throughput, 2022

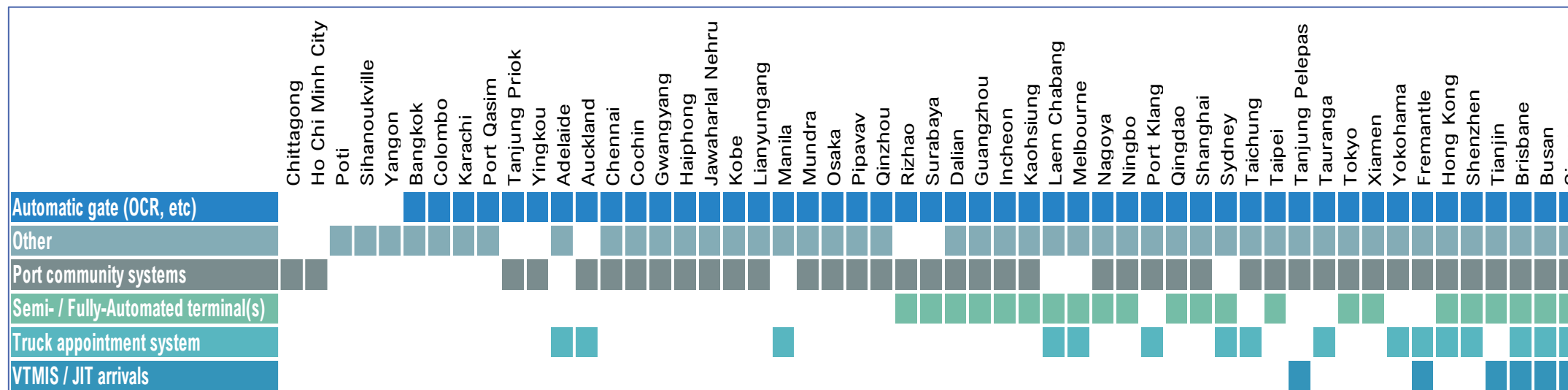


* Longer the wait, lower the throughput and higher the emissions.

Smart Port Systems in Asia and the Pacific

- Smart port – evolving definition, in tandem with technology.
- Smart system applications in ports since the 1990s.
- Progress has been robust with technology more readily available for recent adopters.
- Uptake gaining momentum among countries in Asia and the Pacific region.

Smart Port Systems in Use, Sample of 53 Ports in Asia and the Pacific



Note: OCR = optical character recognition, VTMS = vessel traffic management and information system, JIT = just in time.

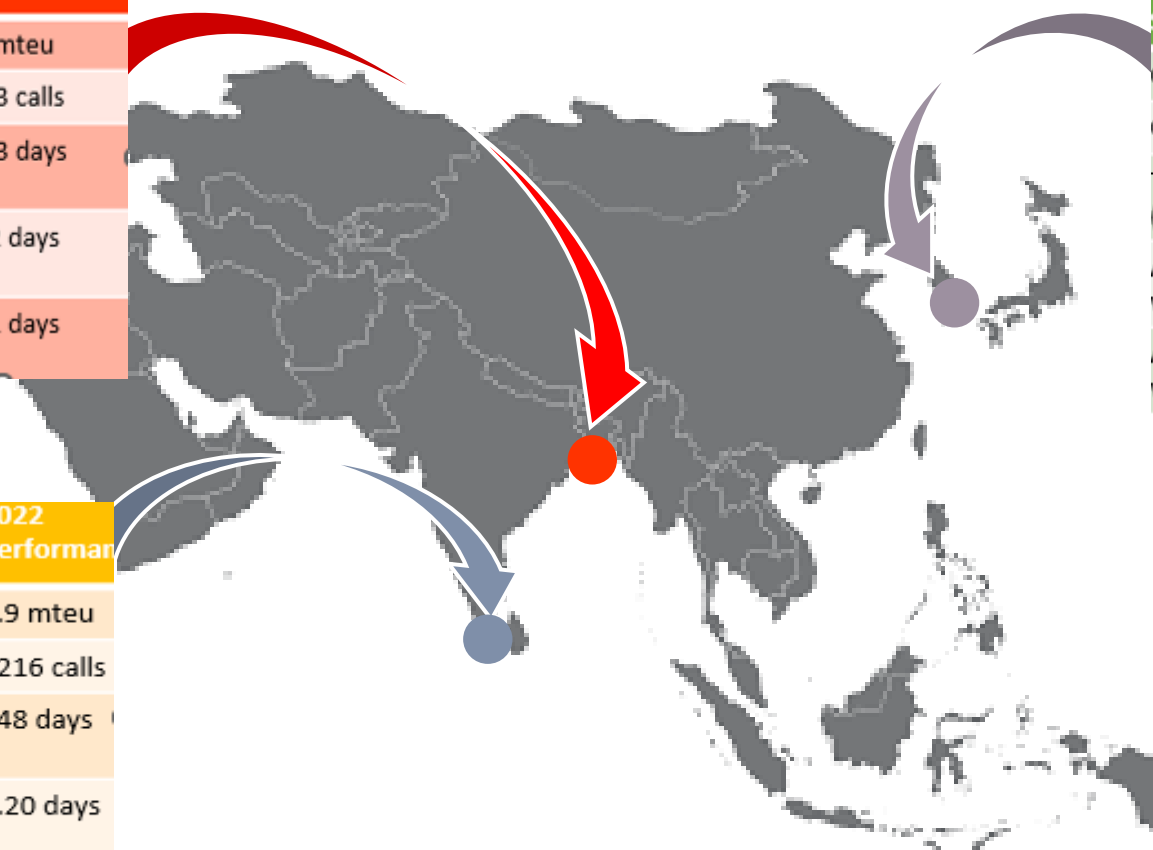
Source: Author's compilation from respective port authorities.

Assessing the Emissions Saving Potential (2022 baseline)

Chittagong Smart port score 17%	2022 performance
Container throughput	3.1 mteu
Container vessel calls	1293 calls
Total waiting time (days)	2223 days
Average pre-berth waiting per call	1.72 days
Average pre-berth waiting per 1kteu	0.71 days

Colombo Smart Port Score 33%	2022 performance
Container throughput	6.9 mteu
Container vessel calls	3216 calls
Total waiting time (days)	648 days
Average pre-berth waiting per call	0.20 days
Average pre-berth waiting per 1kteu	0.09 days

Busan Smart Port Score 100%	2022 performance
Container throughput	22.1 mteu
Container vessel calls	10756 calls
Total waiting time (days)	603 days
Average pre-berth waiting per call	0.06 days
Average pre-berth waiting per 1kteu	0.03 days



Can “Just in Time” Arrival System Generate Emissions Savings?

		Busan	Colombo	Chittagong
Reduce average inbound speed to 12 knots	Total time saving	47 days	76 days	466 days
	% reduction	4%	13%	21%
Reduce average inbound speed to 10 knots	Total time saving	128 days	169 days	946 days
	% reduction	11%	29%	43%

		Busan	Colombo	Chittagong
2022 Baseline	Emissions in anchorage (CO _{2eq} tonnes)	39,467	20,365	76,355
Reduce average inbound speed to 12 knots	Total saving (CO _{2eq} tonnes)	1599	2615	16,008
	% reduction	4%	13%	21%
Reduce average inbound speed to 10 knots	Total saving (CO _{2eq} tonnes)	4,397	5,806	32,461
	% reduction	11%	29%	43%

Note: Assumes 1.43 tonnes CO_{2eq} per hour of waiting.

Source: Author's analysis.

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Conclusion

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- Asia is a big market with diverse needs
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- Maritime is an interconnected sector – multiple benefits from efficiency and emission improvements in Asia
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- Immense know-how in European consultancy and engineering companies; vibrant start-up ecosystems in Europe
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- Let's make a difference together!

Thank you

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Event Contact

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