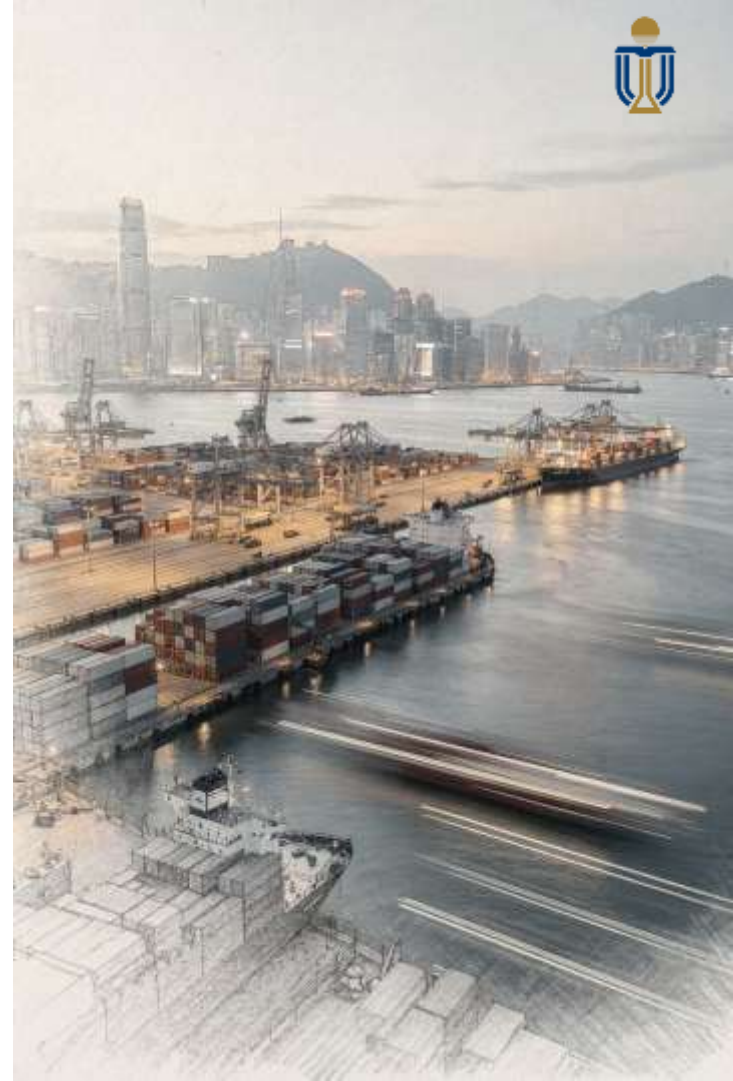




HKUST Research Update: Green Maritime Retrofitting and Marine Fuel Demand & Emissions Analysis

HKUST SHIPPING DECARBONISATION FORUM

May, 2026





Welcome Back:

Energy Efficiency, Biofuels, and Carbon Certification

Global maritime climate rules are moving forward, but unresolved carbon-cost and fuel-standard signals strengthen the case for practical, near-term energy efficiency measures.

Regulatory Context

Following MEPC 84, the IMO Net-Zero Framework remains unsettled, with key details on the GHG pricing mechanism and global marine fuel standard still subject to further negotiation.

The Opportunity

Near-term EETs reduce fuel use and emissions *now*, while longer-term fuel and regulatory pathways continue to develop.

Today's Focus

Selected energy efficiency technologies, innovative financing models, and robust measurement and verification.



Lessons from September 2025 Forum

Industry responses showed broad interest in EETs – but CAPEX stood out as the clearest concern for retrofit adoption.

Industry Interest Across EET Options

Propulsion Efficiency

Voyage Optimisation

Shore Power

Additional Adoption Barriers

Infrastructure Readiness

Technology Maturity

Policy Certainty

Vessel Downtime

The Central Challenge

CAPEX pressure is the most immediate concern. Financing models can reduce upfront investment barriers – but green finance requires reliable emissions and fuel-demand evidence to function.

What Today Connects

EET options · Financing models · Scientific emissions evidence · MRV · Data governance



Hong Kong–GBA Strengths

Hong Kong and GBA cities have complementary capabilities that, taken together, can support not only practical EET deployment, but also green finance and verification at scale.

Hong Kong

- Green finance and capital markets
- Maritime services and legal frameworks
- Certification and third-party verification

GBA Cities

- Port and shipping activity volume
- Shipbuilding and repair infrastructure
- Energy and technology deployment

Science-Based Evidence

- Where carbon emissions are concentrated
- Where fuel demand is material
- Which activities can be measured and verified



Methodology: AIS-Based Fuel Demand and Emissions Inventory

The inventory converts AIS vessel-activity data into emissions estimates, vessel-category evidence, and MRV questions — providing the quantitative foundation for all subsequent results.



AIS Activity

Vessel Classification

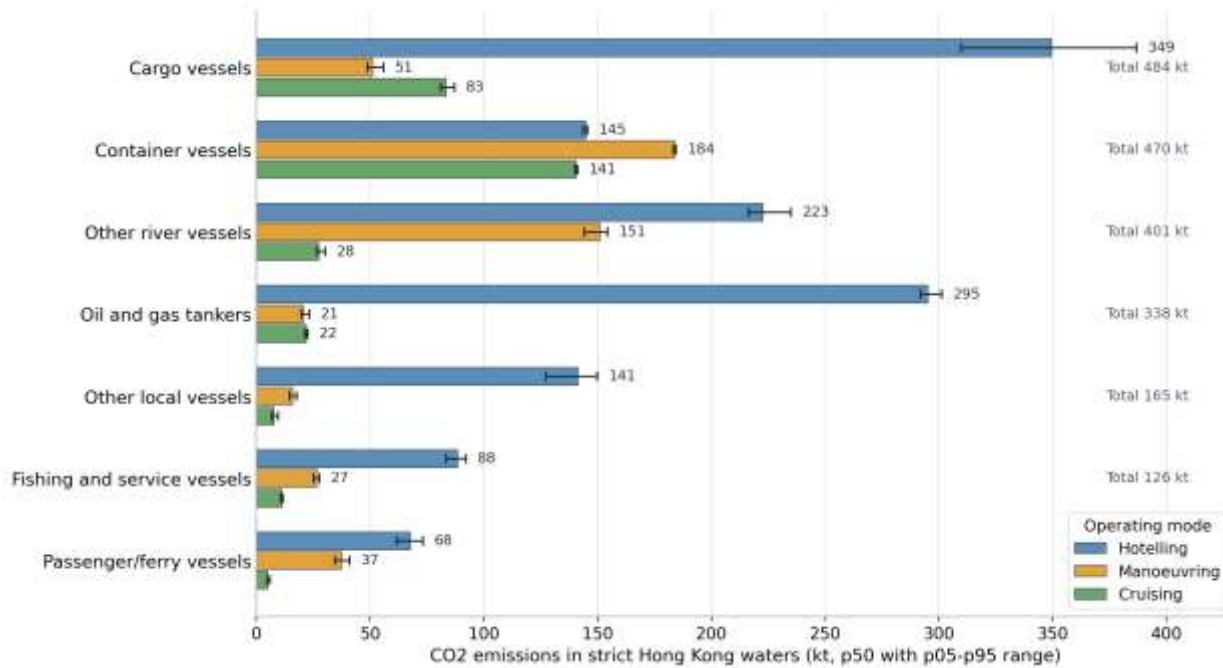
Fuel & Emissions

MRV Evidence





Carbon Emissions and Mode Mix Differs by Vessel Group



Hotelling-Heavy

- Oil & gas tankers, cargo, other local vessels
- Shore power, auxiliary-load reduction, berth management, MRV around port stay

Balanced/Moving

- Container and cargo vessels
Port-call efficiency, propulsion EETs, manoeuvring, arrival and voyage optimisation

Service-Pattern

- Other service/passenger, ferry, fishing
Scheduling, hybridisation, low-speed efficiency, etc.

- Unidentified vessels account for around 20% of the overall carbon emissions
- Other river vessels: Vessels with unknown specific type, but with most of their annual activity observed within broader Greater Bay Area waters.
- Other local vessels: Vessels with unknown specific type, but with at least 80% of their annual activity observed within Hong Kong waters.



The emissions science result opens a wider set of practical questions for deeper discussion

- Unidentified vessels highlight the need for **trusted data and verification**
- High hoteling emissions point to **port-side measures** (OPS etc.)
- **Hong Kong-GBA** activity suggests collaboration potentials
- Different vessel operating patterns support **tailored** implementation design and policy intervention

Enhancing Hong Kong's Status as a Green Maritime Hub: An Integrated Study of Strategic Green Port Measures



***T**ranslates Hong Kong's green shipping and green bunkering policy vision into a concrete, implementable strategy*

**Supported by the Chief Executive's Policy Unit of HKSAR*



Chief Executive's Policy Unit
The Government of the Hong Kong Special Administrative Region
of the People's Republic of China





Project Design



- **WP1 Green Fuel Bunkering Demand Estimations**
- **WP2 Green Measures**
 - Green Shipping Corridors (GSCs)
 - Onshore Power Supply (OPS)
- **WP3 Life-cycle Credibility**
 - Life-cycle GHG emissions
 - Certification Governance Framework
- **WP4 Competitive Strategy**