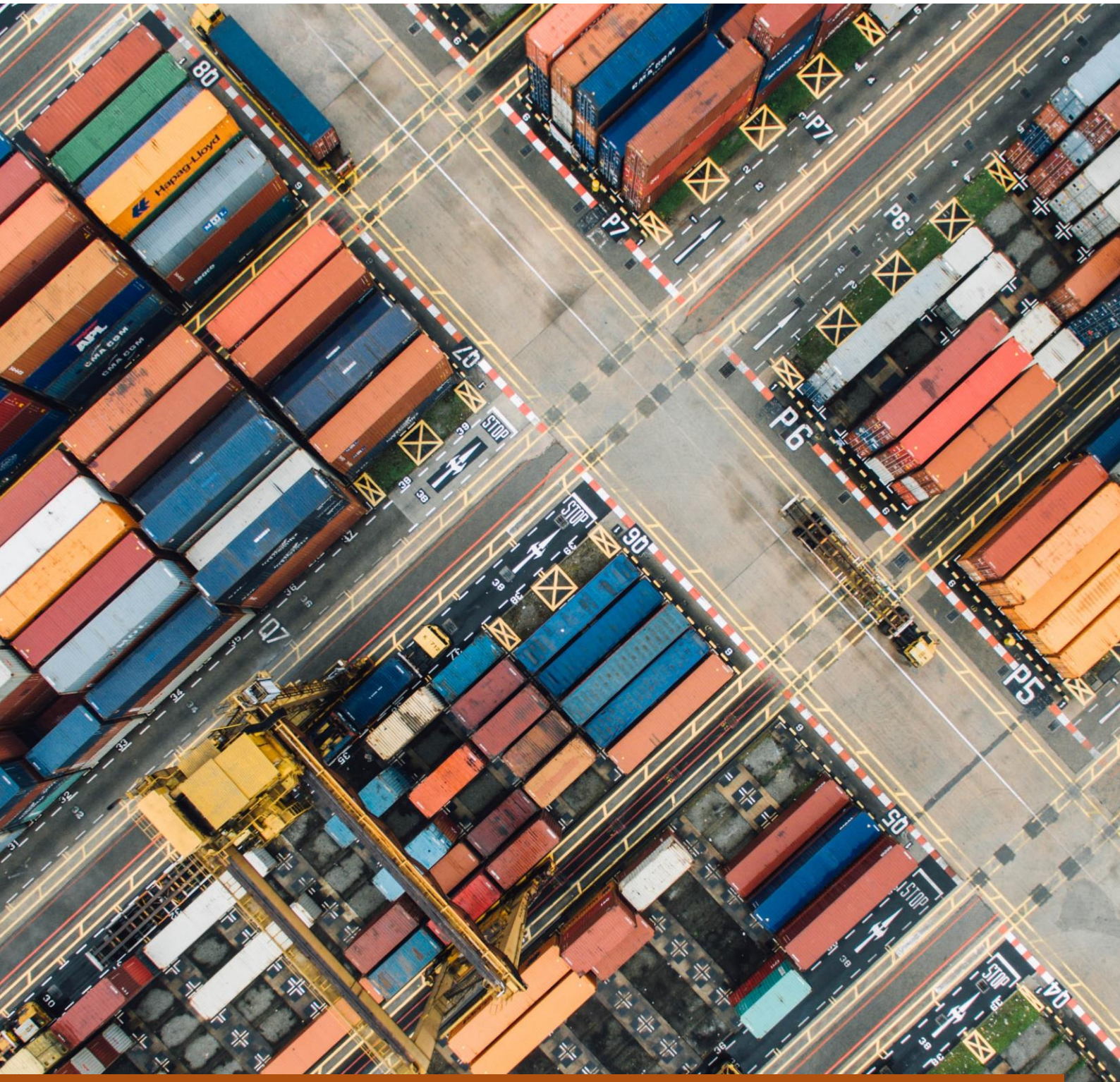
BUSINESS ENVIRONMENT COUNCIL
商界環保協會

30 -YEARS-



Decarbonising Commercial Freight Transport:

A Greenhouse Gas Emissions Blind Spot of Companies in Hong Kong

April 2022

Abstract

Commercial freight transport, whether waterborne, land-based or by air, plays an important role in the world economy and global supply chain. By estimation, freight transport also contributes about 10% of the global greenhouse gas (GHG) emissions. However, since GHG emissions from international shipping and aviation were excluded from the Kyoto Protocol and fell outside the scope of the Paris Agreement, the conventional accounting practice is that these emissions will not be allocated to the national inventories. As a result, freight transport emissions, especially the international portion, are often being overlooked.

Nonetheless, as the disruptive impact of extreme weather events on supply chain operations becomes more apparent and frequent, coupled with the growing expectation from investors towards integrating climate risks to financial decision-making and disclosures, as well as the economic opportunities associated with a decarbonised freight transport sector, more companies are beginning to switch their focus on freight transport in an attempt to engage their supply chain partners and to reduce Scope 3 emissions. Drawing from international experience, freight transport emissions can be controlled through policy and regulations, emissions accounting and disclosure, partnerships and collaborations, and research and innovation.

In Hong Kong, several steps can be taken to raise corporate awareness about freight transport emissions and to reduce them, such as the inclusion of freight transport emissions, especially from shipping and aviation, in the transport sector decarbonisation roadmap; the harmonisation of freight transport emission data collection, compilation, calculation, reporting and sharing; and the promotion of partnership in research and innovation.

Contents

1. Introduction

In mid-November 2021, the much-anticipated 26th United Nations Climate Change Conference of the Parties (COP26) was concluded in Glasgow, United Kingdom. Close to 200 countries agreed to adopt the Glasgow Climate Pact – pledging to update their nationally determined contributions (NDCs) every five years, 'phase down' the use of coal, support developing countries on climate adaptation, amongst other agreed items.[1] Regarding freight transport, the official launch of the Clydebank Declaration on the Transport Day was significant – twenty-two countries now pledged to support the establishment of at least six green maritime corridors by 2025, with signatories agreeing to address issues such as zero emission fuel supply, regulatory framework, information sharing and infrastructures.[2] [3] What makes the freight transport sector vital to the fight against climate change? What have been done over the years?

According to the Intergovernmental Panel on Climate Change (IPCC) 6th Assessment Report, global transport greenhouse gas (GHG) emissions reached 8.9 $GtCO_2$-e in 2019 and accounted for 15% of all direct and indirect emissions.[4] With other sectors stepping up in decarbonisation and electrification, transport is now the highest emitting sector in many developed countries and cities worldwide. Despite improvements in energy efficiency, heavy dependence on fossil fuels adds difficulty to further decarbonise the sector. Latest statistics from the International Energy Agency (IEA) showed that the transport sector was responsible for 60% of global oil demand, even after the sector was severely impacted by COVID-19.[5] [6] *ITF Transport Outlook 2019* stated that global freight transport grew by 68% between 2000 and 2015, and was projected to grow 3.3 times by 2050.[7]

[1] https://unfccc.int/sites/default/files/resource/cma3_auv_2_cover%20decision.pdf
[2] https://www.reuters.com/business/cop/countries-agree-create-green-shipping-lanes-pursuit-zero-carbon-2021-11-10/
[3] https://ukcop26.org/cop-26-clydebank-declaration-for-green-shipping-corridors/
[4] https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_FinalDraft_FullReport.pdf
[5] https://www.iea.org/reports/global-energy-review-2021/oil
[6] https://www.eea.europa.eu/publications/transport-increasing-oil-consumption-and
[7] https://www.oecd-ilibrary.org/sites/transp_outlook-en-2019-en/1/2/5/index.html?itemId=/content/publication/transp_outlook-en-2019-en&_csp_=1b3375008054c148f41fef71cd42b552&itemIGO=oecd&itemContentType=book

In Hong Kong, freight is mainly carried by water (via ocean and river channels), road and air. According to the statistics from the Transport and Housing Bureau (THB), over half (54.7%) of Hong Kong's freight movements by tonnes were seaborne, 36.7% via river, and less than 10% were carried by road and air transport combined in 2020.[8] In terms of GHG emissions, only 7,230 kg CO_2-e emissions (or 18.1% of total) were attributed to the transport sector in 2019 (passenger and freight movements combined)[9]. It is noteworthy that this number only covered GHG emissions from Hong Kong's internal transport system, as emissions from international shipping and aviation were not counted, hence despite Hong Kong being the 8th largest container port in the world and a major hub for airborne international trade, it gives the impression that transport, especially the carriage of goods, is not a major GHG emission source in Hong Kong.

Besides, limited market incentives have been major hurdles that discourage companies to consider their freight emissions. For instance, companies conducting carbon audits in accordance with the Greenhouse Gas Protocol (GHG Protocol) or related guidelines are not mandated to consider any upstream and downstream emissions. In this case, freight emissions are often ignored. [10] The absence of universal standards and calculation methodologies for freight emissions also put a brake on companies to decarbonise their value chains.

Putting the accounting and calculation difficulties aside, it remains opportunistic for Hong Kong to reduce emissions along the transport value chain. Over the years, Hong Kong has pioneered in freight transport research and regulations in the region, particularly in the maritime and shipping industry. Remarkably, the Fair Winds Charter facilitated by Civic Exchange was the first industry-led, voluntary initiative in the world to encourage fuel-switch at berth, using marine fuel with 0.5% sulphur content or below by weight.[11] Subsequently, from 1 July 2015, Hong Kong was the first jurisdiction in Asia to mandate ocean-going vessels (OGVs) to switch their marine fuels, while at berth in Hong Kong waters, replacing heavy fuel oil to its low-sulphur content alternatives. Using compliant

[8] https://www.hkmpb.gov.hk/document/summary_statistics.pdf
[9] https://www.climateready.gov.hk/files/pdf/Greenhouse%20Gas%20Emissions%20in%20Hong%20Kong%20by%20Sector.pdf
[10] https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf
[11] https://civic-exchange.org/wp-content/uploads/2018/09/FairWindsCharter_2018_REPORT.pdf

fuels under the regulation, such as low-sulphur fuel and liquefied natural gas (LNG), would also contribute to GHG reduction.[12] Such successes in mobilising industry players and policymakers to reduce shipping emissions have set the scene for Hong Kong to explore potentials to further decarbonise freight transport.

In light of the challenges and opportunities faced by the freight transport sector, this paper aims to:

- Explain the importance of freight transport emissions in decarbonising the corporate value chain;
- Provide an overview on local and international regulations and initiatives on freight transport decarbonisation;
- Give recommendations for companies in Hong Kong to tackle freight emissions; and
- Offer a forward-looking perspective of what green freight transport should be like for Hong Kong and the region.

[12] https://www.epd.gov.hk/epd/english/environmentinhk/air/prob_solutions/guide-air-pollution-control-ocean-going-vesselsfuel-berth-regulation.html

2. Why should companies care about freight emissions?

2.1 Freight transport is a blind spot of decarbonisation

Freight transport plays an important role in the world economy and global supply chain. According to *ITF Transport Outlook 2021*, 145,229 billion tonne-kilometres of freight activity took place in 2019 globally and contributed 3,233 million tonnes of CO_2 emissions, accounting for around 10% of global GHG emissions. On the one hand, it shows that global freight transport is relatively low in carbon intensity, despite the scale of operation. On the other hand, the small percentage share of global GHG emissions attributed to the transportation of goods also gives a false impression that countries and companies do not need to decarbonise freight transport as priorities should be given to other larger emission sources such as buildings and electricity generation. It is important to note that apart from the emission of CO_2, freight transport is also a major contributor to air pollution which is detrimental to human health. For instance, the smog created through continuous burning of fuel oil is responsible for over 50% of NO_X, 30% of volatile organic compounds (VOCs) and 20% of particulate matters (PM) emissions in the US.[13] As such, there are multiple benefits to address freight transport emissions.

Among the major freight transport modes, maritime movement dominates with comparatively lower operating cost and emission intensity, attributing to 70% of total freight activities and around 20% of total freight emissions. Surface movement (including rail and road) is the largest contributor (65%) to freight emissions, with the remainder attributable to air and other movements.[14] As the volume of freight movements is expected to increase with population and economic growth, emissions will also increase regardless of the transport modes adopted. For long-haul transport where renewable energy sources and full electrification are technically not feasible, many scholars claimed

[13] https://www.epa.gov/smartway/why-freight-matters-supply-chain-sustainability
[14] https://www.oecd-ilibrary.org/sites/0c13b23d-en/index.html?itemId=/content/component/0c13b23d-en#chapter-d1e21199

that it will be inevitably hard to decarbonise unless there are breakthroughs in technological advancements.[15]

In addition to misconception and technology hurdles, corporate perception, willingness and capability to change is also a major factor. First, companies as end-users of freight transport and cargo services typically have little interest in or feel that they have limited influence on fuel choice made by freight service providers. Second, while the widely adopted GHG Protocol provides guidelines for companies to account for transport-related emissions as part of Scope 3 indirect emissions, it is currently not mandated in majority of the reporting standards, not to mention the lifecycle emissions generated by the construction of transport infrastructures.[16] If companies would like to report their freight emissions, GHG Protocol suggests to consider Scope 1 direct and Scope 2 indirect (based on consumed electricity) emissions of service providers during their operations. Companies are often disincentivised to consider freight emissions due to the complexity of collecting data from cross-border, cross-service providers and the lack of standardised methodologies to calculate intermodal freight transport activities and the associated emissions.

2.2 Extreme weather events are disruptive to supply chain operations

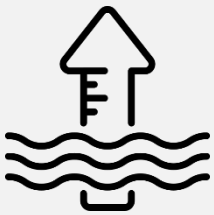
The increasing frequency and severity of extreme weather events and the potential disruption to the global supply chain is a growing concern to companies. Freight transport service disruptions will lead to increasing operational costs, freight delays, financial and reputational losses.[17] [18] For example, risks and vulnerabilities faced by the maritime transport sector have been identified as follows:[19]

- 99% maritime infrastructures are vulnerable to storm surges of seven metres or higher
- 72% port facilities are vulnerable to 122 centimetres or above relative sea level rise
- Close to 50% of intermodal connector miles and 10% rail miles worldwide are vulnerable to sea level rise

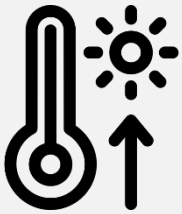
[15] https://theconversation.com/seven-reasons-global-transport-is-so-hard-to-decarbonise-170908
[16] https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf
[17] https://occ.ca/metrolinx-extreme-weather-and-transportation/
[18] https://unctad.org/news/why-transport-sector-needs-adapt-climate-change
[19] https://www.bsr.org/reports/BSR_Climate_Adaptation_Issue_Brief_Transportation.pdf

Table 1 below outlines operational and infrastructural impacts caused by major extreme weather events.

Table 1. Examples of extreme weather events caused by climate change affecting transportation[20]

Extreme weather events	Operational impacts	Infrastructural impacts
Heat waves 	× Increased lift-off load limits on shorter runways for airplanes × Lengthened take-off distances of airplane due to low air density	× Thermal expansion of bridge softened pavement and deformation of rail tracks delay surface transport movement
Sea level rise 	× Increased interruption frequencies of low-lying roads, rail and air routes due to storm surges	× Increased frequencies of flooding in low-lying areas × Erosions of infrastructure support
Intensified precipitation 	× Service delays due to flooding and blockage of routes × Increased chances of accidents and staff injuries during operations	× Increased maintenance and upgrading costs of harbour facilities to accommodate higher tides and storm surges

[20] https://transportgeography.org/contents/applications/climate-change-transport-infrastructure/climate-change-impacts-transportation/

More frequent hurricanes 	× Interruptions of air services × Increased frequencies of evacuations along coastal areas delays service delivery × Debris of road and road infrastructure increase maintenance and operational costs	× Damaged port infrastructures increase maintenance and operational costs
Increased arctic temperatures 	✓ Lengthened shipping season ✓ Increased ice-free ports in Northern regions ✓ Increased availability of trans-arctic shipping routes	× Thawing of the permafrost damages infrastructural facilities × Shortened season for ice-roads

Negative impacts caused by extreme weather events can be significant. A study compared the supply chain risks brought forward by hurricane Florence in Florida and super typhoon Mangkhut in South China Sea in 2018 suggested that a three- to seven-day delay were observed in both regions due to freight congestions and knock-on effects brought by back-to-back extreme weather events.[21] Translating the time delayed into monetary terms, the US Department of Transport estimated in 2017 that for every hour

[21] https://www.everstream.ai/risk-center/special-reports/a-tale-of-two-storms/

of road transport delay, an additional USD 26.7 per truckers will be incurred.[22] As for air transport, cargo flight delay costs for late deliveries is estimated to be up to USD 38,000 per flight-hour.[23]

2.3 Respond to changing investor expectations

Changing expectations from investors and financial institutions on climate change is another important driver to decarbonise freight transport. In this regard, the financial sector has expressed increasing concerns towards integrating climate risks to financial decision-making and disclosures, justified by the establishment of the Taskforce for Climate-related Financial Disclosure (TCFD) since 2016. In the case of the maritime industry, British asset management company Schroders analysed the embedded environmental impacts and material risks faced by the shipping industry. They urged investors to assess the quality of companies' responses against climate change, air pollution control, the increasingly stringent regulations and environmental requirements.[24] Subsequently, official launch of the Poseidon Principles (the Principles) illustrated consensus within the financial sector on maritime decarbonisation. In late 2017, leading shipping banks and players of the maritime industry gathered to discuss the climate risks brought forward to the sector and its implications for ship finance. In the following year, the International Maritime Organisation (IMO) released the GHG strategy, announcing the initial goal to reduce carbon intensity of international shipping by at least 40% before 2030 and 70% before 2050, using data from year 2008 as baseline.[25] After a series of engagement and discussions, the Principles was launched in New York City in June 2019, providing a framework for assessments and disclosures of the climate-related performances of ship finance portfolios.[26] To date, twenty-eight banks, jointly representing around USD 185 billion in shipping finance, have committed to the Principles. Signatories will have to comply with the Principles when making lending decisions:

[22] https://ops.fhwa.dot.gov/freight/freight_analysis/freight_story/costs.htm
[23] https://www.sciencedirect.com/science/article/abs/pii/S1366554518307142
[24] https://www.schroders.com/pl/sysglobalassets/digital/insights/pdfs/the-costly-future-of-green-shipping-schroders.pdf
[25] https://www.imo.org/en/MediaCentre/HotTopics/Pages/Reducing-greenhouse-gas-emissions-from-ships.aspx
[26] https://www.poseidonprinciples.org/finance/principles/

Principle 1: Assessment – to measure the carbon intensity of shipping portfolio, relative to the decarbonisation trajectories given by the secretariat of the Principles.

Principle 2: Accountability – to ensure unbiased information is used by adopting the IMO Data Collection System for gathering emission and fuel consumption data.

Principle 3: Enforcement – to work closely with clients and value chain partners with the provision of relevant information to calculate carbon intensity and climate alignments.

Principle 4: Transparency – to publicly acknowledge signatory to the Principles, report and disclose the overall climate alignment of its shipping portfolio to the secretariat and in relevant institutional reports, no later than 30 November, every year.

Following the Poseidon Principles, the Sea Cargo Charter was launched and mobilised twenty-three shipping companies to respond to IMO's targets and perform similar responsible environmental behaviours as to the Principles to decarbonise the maritime industry. This is a prime example which demonstrates the paradigm shift for the freight transport sector to consider climate change and decarbonisation as part their investor relationships management and financing.

2.4 The economic opportunity of decarbonised freight transport is vast

Aside from the environmental and reputational benefits, decarbonising freight transport also brings financial cost and time savings, as well as economic returns. In this respect, a recent study conducted by University College London on net-zero freight transport reiterated the short- and long-term benefits of companies switching to low-carbon transport operations.[27] Given fuel expenditure is a major cost for transportation, fuel switch and energy efficiency improvements leading to reduced energy consumption are the most direct ways to save costs in the short term. In terms of electrification, electricity provided by municipal grid tends to have higher energy conversion efficiency which presents a win-win situation, whereby energy is saved with reduced carbon emissions.[28]

[27] https://www.sustainablefinance.hsbc.com/carbon-transition/towards-net-zero-in-freight-transport
[28] https://www.adb.org/sites/default/files/publication/158166/green-freight-gms.pdf

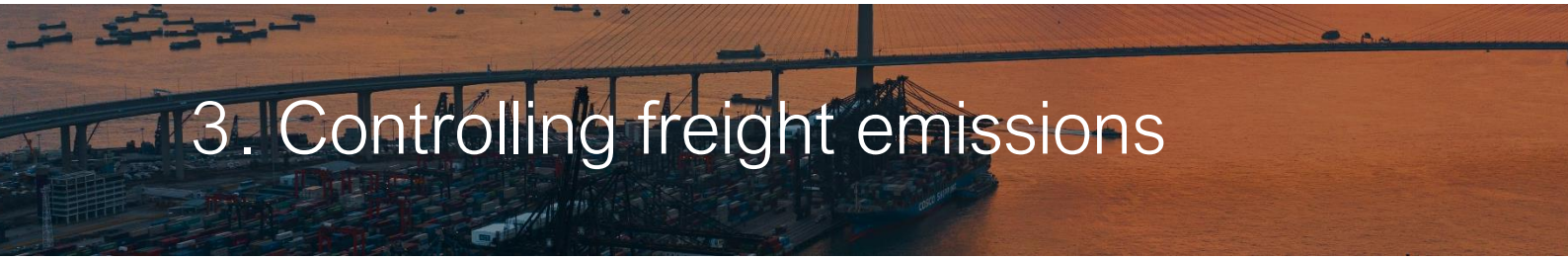
In the longer terms, paybacks are observed from the initial capital investments. For instance, the upgrade to low-emitting "Euro 6" combustion engines and improvements to tyres have reduced total fuel consumptions. Installations of vehicle tracking systems and other efforts to nudge behavioural changes among drivers have also met companies' efficiency-based KPIs. The longer service life and lower maintenance cost of electric vehicles will save operational cost and ease administrative burdens.

Another point to note is that with the gradual inclusion of freight emissions among various carbon pricing mechanisms in the world, it is expected that the cost of using fossil fuels will increase. A study which evaluates the socio-economic impacts brought by the Norwegian Maritime Emission Trading Scheme and other relevant policy interventions suggests that based on the current estimations, by 2030, around 80% of the total social cost of shipping containers' operations will be attributed to carbon emissions.[29] [30] This translates to roughly USD 7.62 billion globally. For companies, this implies that despite the maritime industry having a relatively low emission intensity, it is expected that the opportunity cost for not pursuing low or zero-emission fuels will continue to increase over time, and will eventually override or equate with other means of freight transport. [31]

[29] https://jshippingandtrade.springeropen.com/track/pdf/10.1186/s41072-016-0011-5.pdf

[30] "Social cost of carbon" is a monetary estimate for all economic damage resulting from emitting CO_2 into the atmosphere. It indicates net present value to avoid the projected damage in the future. It is usually derived based on the socioeconomic predictions, climate projections, costs and benefits of interventions, and the discounted rates. (Source: https://news.climate.columbia.edu/2021/04/01/social-cost-of-carbon/)

[31] https://reader.elsevier.com/reader/sd/pii/S0301421512002820?token=4FD2DE0EF1DA85BB2C0DBB2D0FD62022ECC6663E92B483255A7C522330488C1408E0DD4244E70172816CEA8473E69121&originRegion=us-east-1&originCreation=20211124012641



3. Controlling freight emissions

3.1 Policy and regulations

Public policy strategies are critical to catalyse decarbonisation efforts in the freight transport sector. Roadmaps for long-term decarbonisation, emission targets, sunset dates to phase out highly emitting fuels and fossil fuel-operated vehicles signal governments' determination to low-carbon transition. Regulatory standards on freight emissions, subsidies and other privilege policies incentivise organisational and individual behavioural changes.

The European Green Deal launched in late 2019 is probably one of the most comprehensive and progressive plans to green transformation which sets out to make Europe the first climate-neutral continent in the world by 2050, while accounting for improved public health, quality of life, nature conservation and just transition.[32] In Hong Kong, the recently released *Hong Kong's Climate Action Plan 2050*, the *Hong Kong Roadmap on Popularisation of Electric Vehicles* and the *Clean Air Plan for Hong Kong 2035* affirmed the city's commitment to carbon neutrality before 2050 and the need to address transport-related emissions for better air quality control. Table 2 compares major green freight policies worldwide.

Evaluating the NDCs of major countries across the globe, 'net-zero', 'carbon neutrality' and 'science-based targets' are the buzzwords used to commit to robust climate actions. According to the Net Zero Tracker, an online platform which tracks net-zero commitments, over 2,000 companies have now set net-zero targets.[33] However, as much as committing to net-zero demonstrates visions towards sustainable transitions, the caveat is that many of these net-zero targets have not scoped their supply chain emissions, also known as Scope 3 emissions.[34] In other words, freight emissions as part of the upstream or

[32] https://ec.europa.eu/commission/presscorner/detail/en/ip_19_6691
[33] https://zerotracker.net/
[34] https://time.com/6117635/companies-net-zero-greenwash/

downstream transportation is often neglected in GHG accounting, which is the case in Hong Kong. Absence of freight emissions in GHG accounting undermines the benefits of transitioning to alternative, zero-emission fuels.[35]

Among major transport-related emission reduction policies, it is observed that specific uptake targets, CO_2 emission standards for vehicles and plans to encourage intermodal transport are common. A study conducted by the World Resources Institute on Chinese transport policies suggested that subsidies upon purchase is by far the most attractive to incentivise the transition to low-emission transport mode.[36] However, this type of policies are currently limited to road transport. For other modes of transport such as maritime and aviation, funding and competition to encourage development of sustainable fuels are popular means to stimulate innovation.

Apart from target setting and subsidies, sunset dates for sales of fossil fuel vehicles are strong policy signals which creates market demand for zero-emission alternatives. Hong Kong may consider expanding their sunset dates to cover light goods vehicles (LGV) and heavy goods vehicles (HGV) on top of its subsidy scheme to phase out diesel-powered commercial vehicles to encourage wider adoption.

3.2 Emissions accounting and disclosure

"You can't manage what you don't measure". Although there is no universal standard available to measure, calculate and disclose freight emissions, many industry organisations have attempted to develop their own methodology to assist practitioners to estimate their freight emissions based on the transport modes adopted. For example, in air transport, the International Air Transport Association (IATA) suggested a measurement methodology in 2014 to cover emissions from fuel consumption based on revenue load.[37] Many argue that it is not comprehensive enough as it does not cover non-CO_2 emissions and other residual emissions from the upstream and handling processes.

[35] https://www.edf.org/media/imo-should-follow-icaos-approach-accounting-emissions-beyond-plane-alternative-fuels-edf-umas
[36] https://www.wri.org.cn/sites/default/files/20191202-%E4%B8%AD%E5%9B%BD%E9%81%93%E8%B7%AF%E4%BA%A4%E9%80%9A%E9%A2%86%E5%9F%9F%E6%8E%92%E6%94%BE_fin_0.pdf
[37] https://www.iata.org/contentassets/34f5341668f14157ac55896f364e3451/rp-carbon-calculation.pdf

Alternately, the EU Logistics Emissions Accounting & Reduction Network (LEARN) project developed guide books and tools to support companies to measure, report and verify emissions, including the *Guide for GHG Emissions Accounting at Logistics Sites* and the GLEC Declaration (Figure 1).

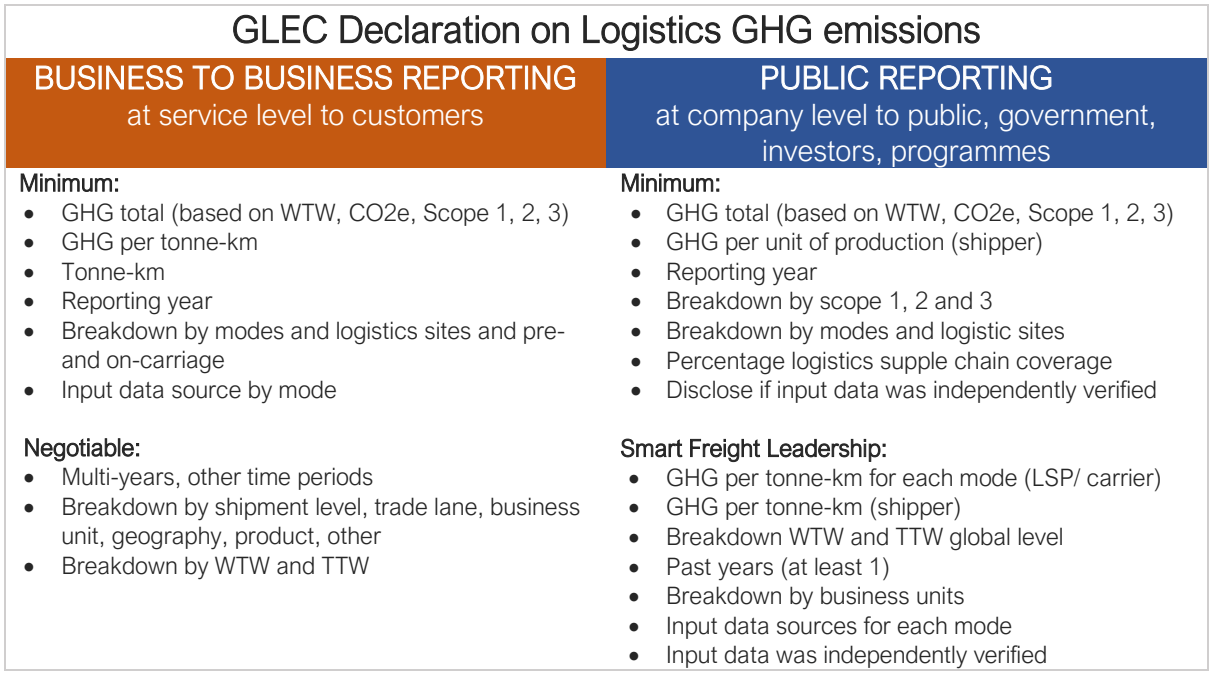


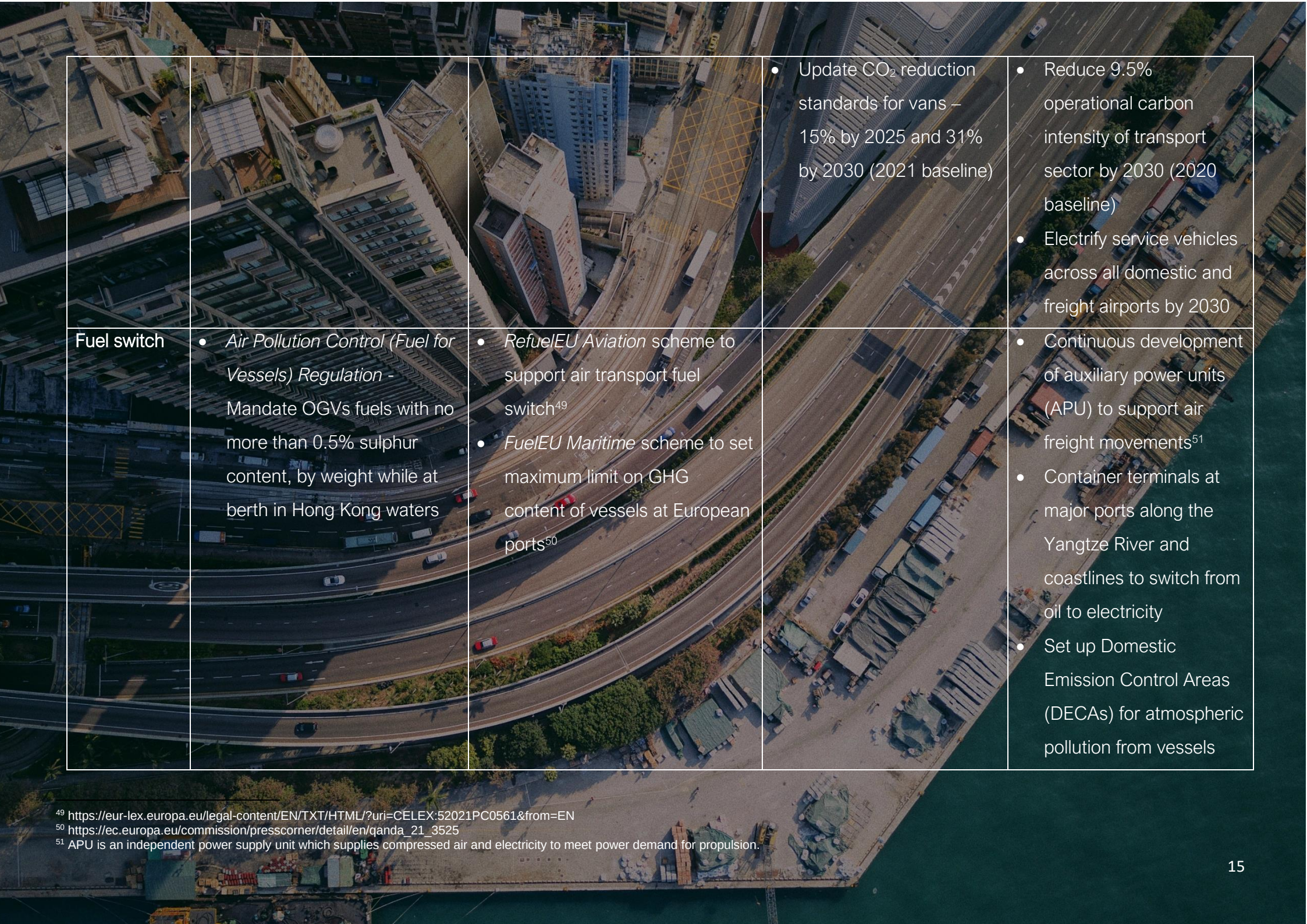
Figure 1. The Global Logistics Emissions Council (GLEC) framework proposed by LEARN recommends companies to breakdown their emissions by scope, mode and logistics sites, in CO_2-e.[38]

[38] https://learnproject.net/main/activities/support-to-companies

Table 2. Freight transport-related policies and strategies in major jurisdictions across the EU, UK, China and Hong Kong.

	Hong Kong[39]	European Union[40]	UK[41] [42] [43]	China[44] [45] [46]
Target-setting	• Zero vehicular emissions before 2050 • "Become a liveable city with air quality on par with major international cities by 2035"[47] • Align with the Air Quality Guidelines of the World Health Organisation (WHO) • Formulate regional emission reduction targets with Guangdong Province	• "To make Europe the first climate-neutral continent by 2050" • Reduce 55% GHG emissions by 2030 • Lower transport-related emissions by 90% by 2050 • Shift 75% of inland freight from road to rail and inland waterways • Doubling rail freight traffic by 2050[48]	• Net zero GHG emissions by 2050 • Reduce aviation CO_2 emissions to below 2005 level by 2050 • Update CO_2 reduction standards for heavy goods vehicles (HGVs) - 15% by 2025 and 30% by 2030 (2019 baseline) • End sales of new petrol and diesel vehicles by 2030, and HGVs by 2040	• Peak CO_2 emissions before 2030 and achieve carbon neutrality before 2060 • Lower carbon intensity by over 65% by 2030 (2005 baseline) • Increase share of non-fossil fuels in primary energy to 25% by 2030 • Newly registered clean energy-powered transport medium to reach 40% of total by 2030

[39] https://www.climateready.gov.hk/files/pdf/CAP2050_booklet_en.pdf
[40] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0789
[41] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/228752/9780108508394.pdf
[42] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932122/decarbonising-transport-setting-the-challenge.pdf
[43] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1009448/decarbonising-transport-a-better-greener-britain.pdf
[44] http://www.scio.gov.cn/zfbps/32832/Document/1715506/1715506.htm
[45] http://www.gov.cn/zhengce/zhengceku/2021-10/26/content_5644984.htm
[46] http://www.scio.gov.cn/zfbps/32832/Document/1695320/1695320.htm
[47] https://www.enb.gov.hk/sites/default/files/pdf/Clean_Air_Plan_2035_eng.pdf
[48] https://transport.ec.europa.eu/transport-themes/mobility-strategy_en



			• Update CO_2 reduction standards for vans – 15% by 2025 and 31% by 2030 (2021 baseline)	• Reduce 9.5% operational carbon intensity of transport sector by 2030 (2020 baseline) • Electrify service vehicles across all domestic and freight airports by 2030
Fuel switch	• *Air Pollution Control (Fuel for Vessels) Regulation* - Mandate OGVs fuels with no more than 0.5% sulphur content, by weight while at berth in Hong Kong waters	• *RefuelEU Aviation* scheme to support air transport fuel switch[49] • *FuelEU Maritime* scheme to set maximum limit on GHG content of vessels at European ports[50]		• Continuous development of auxiliary power units (APU) to support air freight movements[51] • Container terminals at major ports along the Yangtze River and coastlines to switch from oil to electricity • Set up Domestic Emission Control Areas (DECAs) for atmospheric pollution from vessels

[49] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021PC0561&from=EN
[50] https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3525
[51] APU is an independent power supply unit which supplies compressed air and electricity to meet power demand for propulsion.

				and limit the sulphur content, VOCs and PMs due to burning of fuel oil used by international vessels entering Chinese waters
Transport infrastructure		• Revise *Eurovignette Directive* to provide distance-based charging facilities with varying rates based on vehicle types and time-of-use	• £235 million investment to improve rail network for freight	• Promote adoption of LNG in maritime freight through installation of LNG refilling station at ports and berths • Build LNG-derived ships and new energy-derived vehicles for cargo delivery • Expand electronic toll collection (ETC) systems across all highways to improve air quality and reduce fuel consumption[52]

[52] http://www.mee.gov.cn/ywgz/ydqhbh/syqhbh/202107/t20210713_846491.shtml

Subsidies and incentives	• HKD 200 million Green Tech Fund to fund R&D of green technologies, including electric vehicles (EV) projects[53] • HKD 1.1 billion New Energy Transport Fund to subsidise trials and application of e-commercial vehicles, including goods vehicles • Full first registration tax (FRT) waiver and profits tax deduction for environmentally friendly e-commercial vehicles • *Air Pollution Control (Air Pollutant Emission) (Controlled Vehicles) Regulation* – subsidy-cum-regulation scheme to phase out Euro IV diesel	• Propose to extend the EU emission trading scheme (ETS) to the maritime transport and aviation sector • Revise *Energy Taxation Directive* and end fossil-fuel subsidies • Update CO_2 standards for vehicles to favour zero-emission mobility[54]	• Include all flights from EU airport in the EU ETS • £20 million *Low Emission Freight and Logistics Trial* to support industry-led projects on low-emission freight technologies • *Plug-in Van Grant (PIVG)* to provide 20% subsidy (threshold £8,000) or £20,000 for the first 200 large vans or trucks • Seed funding to establish MarRI-UK on clean maritime innovation • *Future Fuels for Flight and Freight Competition (F4C)* to develop low carbon	• Utilise vehicles purchase tax funds to support construction of freight hubs, port railways and coordinated multimodal forms of transport networks • Three-year action plan to phase out commercial diesel trucks at or below China III emission standards. The plan will be reviewed and updated every three years

[53] https://www.enb.gov.hk/sites/default/files/pdf/EV_roadmap_eng.pdf
[54] https://eur-lex.europa.eu/resource.html?uri=cellar:870b365e-eecc-11eb-a71c-01aa75ed71a1.0001.01/DOC_1&format=PDF

	commercial vehicles by end of 2027		waste-based fuels with capital funding £20 million • UK ETS, covering power, heavy industry and aviation sector	
Others	• Explore use of LNG in OGVs, formulate technical requirements and safety regulation for LNG bunkering	• Revamp intermodal transport framework via the *Combined Transport Directive* • Establish European framework for harmonised measurement of transport and logistics emissions	• Set up *UK Shipping Office for Reducing Emissions* • *Jet Zero Council* to promote new technologies to cut aviation emissions	• Promote intermodal transport (road to rail; road to maritime), increase 19% rail freight (baseline 2017) and 23% seaborne freight[55] • *Blue Sea Action* – mandatory standards for water pollutant discharge from vessel

[55] https://www.mee.gov.cn/zcwj/gwywj/202110/t20211027_958030.shtml

In 2015, a BSR collaborative initiative, Clean Cargo published the Clean Cargo methodology to help freight carriers track and benchmark their emission performances. They separate dry and refrigerated containers, with a calculation formula for vessel-specific emission factor based on IMO carbon conversion factor, fuel consumption, distance travelled and container capacity.[56]

Looking into the Hong Kong context, freight emissions are largely ignored by companies. There is a lack of guidelines or standards to measure operational emissions. The existing guidelines published by the Electrical and Mechanical Services Department (EMSD) and the Environmental Protection Department (EPD) only covers buildings related GHG emissions. The suggested Scope 3 emission (optional) reporting only covers paper waste, water and wastewater processing.[57]

3.3 Partnerships and collaborations

Industry partnership forms important information- and knowledge-exchange networks for practitioners to co-learn and co-design a decarbonisation approach that is both aggressive and technically feasible. These initiatives operating regionally and globally pull together major industry players and lobby local and international governments for robust policy changes. As an example, Smart Freight Centre (SFC) is a global non-profit organisation dedicated to an efficient and zero-emissions global logistics sector. SFC provides guidelines and training for multinational corporations and their suppliers, advocates governments and organisations to scale up industry actions, as well as raises awareness through events to demonstrate thought leadership on sustainable freight. Specifically, the Global Logistics Emissions Council (GLEC) partnership is an industry-led initiative to drive emission reduction and efficiency enhancements across global supply chains. Apart from the GLEC framework[58] and the Sea Cargo Charter mentioned previously, SFC also provides regular updates on emissions factors for accounting and is currently developing a protocol to support data collection on logistics emissions.[59]

---

[56] https://static1.squarespace.com/static/5b3f37f489c17230345b5f15/t/5b466d888a922d7fcfb5b89e/1531342218580/BSR_CCWG_Carbon_Emissions_Methodology_2015.pdf

[57] https://www.emsd.gov.hk/filemanager/en/content_2/CAGuidelines_Eng.pdf

[58] https://www.smartfreightcentre.org/en/news/smart-freight-centre-and-bsr-pleased-to-announce-historic-collaboration-for-maritime-shipping-decarbonization-finds-new-home/61477/

[59] https://www.smartfreightcentre.org/en/data-access-for-logistics-emissions-accounting-and-reporting/

Voluntary charter committing to decarbonise freight transport is another effective means to call for collective action within the industry. In the maritime sector, the Getting to Zero Coalition was developed by the Global Maritime Forum, the Friends of Ocean Action, and World Economic Forum (WEF). Participating organisations pledged to have commercially viable zero-emission vessels operating along deep-sea trade routes by 2030.[60] [61] In the aviation sector, the Sustainable Air Freight Alliance works closely with GLEC, IATA, International Civil Aviation Organisation (ICAO) and individual airlines in shaping international standards, credibly measuring and reporting freight performance through industry-agreed methodologies and KPIs.[62]

Regionally, in Asia, Green Freight Asia is a non-profit association for industry players to collaborate and decarbonise the freight transport supply chains.[63] They provide measurement, reporting and verification (MRV) services on transport-related footprints. Voluntary certification and carbon offsetting programmes are also put in place to recognise green freight practices and verify Renewable Energy Certificates (RECs), respectively.

While Hong Kong does not currently have any local industry partnership for freight transport, companies are encouraged to take part in these international initiatives or choose suppliers who have committed to and join the conversation on how green freight can benefit their business operations and protect the environment.

3.4 Research and innovation

Technological advancements are critical to resolve the decarbonisation challenges faced by the freight transport industry. For instance, to address the difficulties of long-haul transport which renewable energy sources or battery energy[64] are not feasible, alternative low-carbon fuel such as biofuel, green hydrogen and other renewable electrofuels (i.e. chemical fuel synthesis, methanation, etc) can maintain energy stability and reliability

[60] https://www.globalmaritimeforum.org/content/2019/09/Getting-to-Zero-Coalition-Project-outline.pdf
[61] https://www.globalmaritimeforum.org/content/2019/09/Getting-to-Zero-Coalition_Ambition-statement_230919.pdf
[62] https://www.bsr.org/en/collaboration/groups/sustainable-air-freight-alliance
[63] https://www.greenfreightasia.org/
[64] Battery energy storage systems are not practical for aviation transport at the moment, mainly because batteries are much heavier than kerosene (typical airplane fuel), and the safety issues associated with batteries make it hard for aircraft design to accommodate.

without compromising its efficiency.[65] Other energy efficiency improvement strategies such as air-traffic management (ATM), alternative propulsion (for short-haul or smaller aircrafts) using hybrid or turboelectric flying, as well as intermodal shift can minimise freight emissions.[66]

In addition to fuel switch and energy efficiency improvement through aircraft design, the use of machine learning and data analytics have led to carbon emission reductions in the road freight industry. The machine learning-based product developed an algorithm which processes shipment information and their respective destinations to work out an economically and environmentally advantageous route.[67] In the US, the "shared truckloads on less than load freight" approach is optimising energy consumption and storage capacity of each freight movement.

Strong coordination and data sharing between value chain partners are also important. In this connection, the Inter-Modal Transport Data-Sharing Program developed by the University of Hong Kong is a promising example, demonstrating the potential of smart transport to reduce carbon emissions.[68] Although the project currently focuses on passenger transport, similar concept for freight transport have been widely discussed by international organisations, such as the IATA on air transport data,[69] World Bank and World Business Council for Sustainable Development (WBCSD)[70] to assist design of low-carbon freight transport.[71]

[65] https://www.transportenvironment.org/wp-content/uploads/2021/07/2017_11_Cerulogy_study_What_role_electrofuels_final_0.pdf
[66] https://www.mckinsey.com/industries/travel-logistics-and-infrastructure/our-insights/how-airlines-can-chart-a-path-to-zero-carbon-flying
[67] https://www.forbes.com/sites/jenniferhicks/2020/09/29/using-machine-learning-to-reduce-carbon-emissions-in-the-trucking-industry/?sh=11e77084a9e6
[68] https://trpc.biz/wp-content/uploads/2021/10/Intermodal-Transport-Data-Sharing-Programme-Final-Report-Oct-27.pdf
[69] https://www.iata.org/contentassets/a1b5532e38bf4d6284c4bf4760646d4e/one_record_project_insight_multimodal_data_sharing.pdf
[70] https://www.sum4all.org/data/files/policymakingfordatasharing_pagebypage_030921.pdf
[71] https://d-nb.info/1209806495/34

4. Policy recommendations

4.1 Policy roadmap for freight transport-related decarbonisation

The publication of the *Roadmap on the Popularisation of Electric Vehicles* in March 2021 was strong indication about Hong Kong government's determination to reduce road transport emissions. However, to capitalise on the potential of achieving carbon neutrality before 2050, a more comprehensive roadmap that also focuses on freight transport emissions, including road-based, shipping and aviation, should be developed. [72] Traditionally, Hong Kong's transport policy placed more emphasis on passenger transport, including public transport and private cars, whereas policy control over freight transport has been less stringent, perhaps acknowledging the significant contribution of the movement of goods to trade and economic development. It is time to put freight transport back on the radar.

Therefore, sunset dates to phase out fossil fuel-powered commercial vehicles and other modes of transport should be set early with specific targets for transport-related emissions. Other initiatives such as developing a data sharing platform for freight emissions and GHG emission standards for vessels and airplanes should also be seriously considered. Clear policies will create market signal that would attract suppliers and dealers of low-carbon products to expand their market in Hong Kong. In the long run, enabling market conditions would increase availability of choice at a competitive price, driving significant emission reduction.

4.2 Harmonisation of corporate carbon footprints

The lack of data is one of the biggest challenges which hinders companies to report and reduce their freight emissions, but this is not the only problem. A study conducted by Nature Communications suggested that to help companies recognise their Scope 3

[72] As an example, New Zealand published a green freight paper in 2020 with GHG emission projections based on fuel types and offered options to transition road freight. https://www.transport.govt.nz/assets/Uploads/Paper/Green-Freight-Strategic-Working-Paper_FINAL-May-2020.pdf

(freight included) emissions, there is a need to harmonise corporate carbon footprints,[73] with special focus on reporting inconsistency, boundary incompleteness and activity exclusion. Companies often report different emission levels on different channels (e.g. in company report versus in CDP's Carbon Disclosure Project), fail to meet the minimum boundaries of emitting activities, or entirely omit relevant Scope 3 emission categories. Reporting inconsistency can be relatively easily addressed by synchronising emission data in different report channels. Boundary incompleteness and activity exclusion probably require binding and standardised regulations with unambiguous guidelines. In this respect, Hong Kong may recommend the use of overseas freight emission guidelines as references[74] or consider introducing local guideline to assist and improve emission reporting from companies.

4.3 Innovation and partnerships

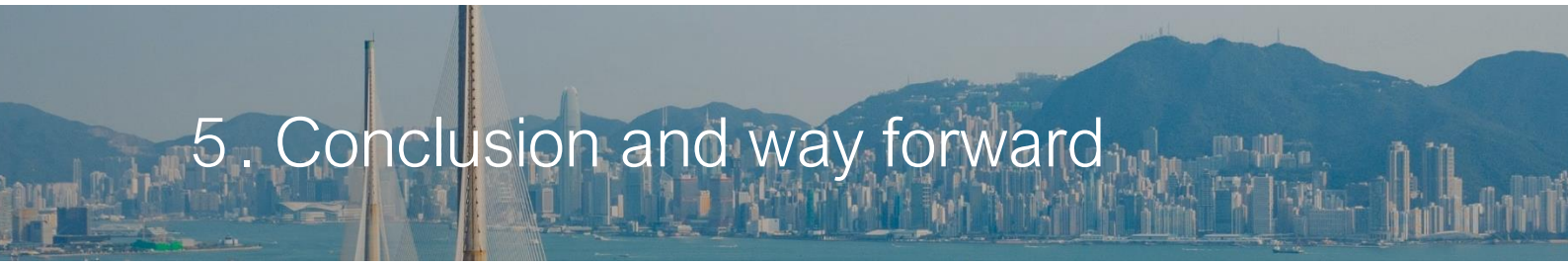
Recognising the difficulties to decarbonise long-haul transport, continuous research and development remain important to minimise the technical gap for low-carbon transition. The EU Transport Research and Innovation Monitoring and Information System (TRIMIS) and Smart Freight Transport and Logistics Research Methodologies (STORM) project are dedicated initiatives to tackle transport-related emissions at large. Through collaborations between governments, private sector and the academia, seed funding and research grants are allocated to address issues related to governance and regulations, pricing and financing, intermodality, lifecycle optimisation, operational efficiency and resilience.[75] [76]

In Hong Kong, the Government encourages research activities on transport-related decarbonisation via the Innovation and Technology Fund and the Green Tech Fund. It is suggested that on top of the promotion of electric vehicles (EVs) and giving second life to EV batteries, [77] other transport-related research such as alternative electrofuels, propulsion method and aircraft design; machine learning and data sharing tools for

[73] https://www.nature.com/articles/s41467-021-26349-x.pdf
[74] For example, the UK *Guidance on measuring and reporting Greenhouse Gas (GHG) emissions from freight transport operations* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/218574/ghg-freight-guide.pdf
[75] https://project-storm.eu/info/
[76] http://www.bv.transports.gouv.qc.ca/mono/1238338.pdf
[77] https://www.gtf.gov.hk/en/about_the_fund/priority_themes.html#Green_Transport

intermodal transport should also be encouraged and prioritised to foster innovative solutions for green freight in Hong Kong and the Greater Bay Area.

Coupled with research and innovation, industry partnership is another critical factor to scale up new technologies and push for policy change. Companies in Hong Kong are encouraged to take part in regional and international initiatives on green freight. Hong Kong may also consider organising its own alliance to share experiences and expertise, particularly on freight emission reporting, as part of the dialogue and action items on Scope 3 and upfront carbon accounting. The idea is to gather market interests and gradually create a new normal for freight emissions as an important piece in decarbonisation and/or Environmental, Social and Governance (ESG) consideration.



5. Conclusion and way forward

Freight emissions is a critical component of Hong Kong's carbon footprint. Current estimates from government statistics do not fully reflect the emission trajectory, as such many companies have shown little awareness about freight transport and their emission contribution to the supply chain. This paper highlights the corporate's growing interest in the topic and identifies the main hurdles faced by companies to measure and reduce their freight emissions, primarily due to little data availability, the absence of standardised calculation methodologies, as well as limited scalable technologies for long-haul freight transport vehicles. However, with increasing severity and frequency of extreme weather conditions, changing investor expectations and more stringent local and international policies and regulations, companies need to respond to the challenge of estimating, disclosing and reducing freight transport emissions in a timely manner to minimise any operational or reputational losses.

Large scale policy programmes such as the European Green Deal is a prime example of tackling the multifaceted concerns of decarbonisation. From sectoral emission reduction targets to market incentives, research and industry partnership programmes, freight transport requires collective effort from multiple stakeholders to decarbonise. This paper recommends Hong Kong to broaden its climate strategy on the transport sector by covering both passenger and freight transport, as well as considering the international movements of freight. Industry associations should also play a role in promoting the harmonisation of corporate carbon footprint and provide support for companies to start their decarbonisation journey. Research on electrofuels, intermodal transport systems and supply chain management technologies will make promising contribution to carbon reduction.

Looking forward, the vision of achieving zero-emission freight transport remains positive but challenging. Low-hanging options such as the phasing out of fossil fuel in freight transport and the switch to low- and zero-emission alternative should be prioritised.

However, as the demand for and the volume of freight movements will almost certainly rebound post-pandemic, bolder government policies and deeper and accelerated actions are much needed to support transport decarbonisation without affecting economic and social recovery. To this end, other opportunities such as advanced technology to optimise logistics, innovative solutions in distribution and supply chain management, industry partnership, regional collaboration and international harmonisation in data collection and reporting will all play a part in enabling the transition to a green and resilient freight transport system in Hong Kong and the region.

Glossary

APU	Auxiliary Power Units
ATM	Air-Traffic Management
DECAs	Domestic Emission Control Areas
EMSD	Electrical and Mechanical Services Department
EPD	Environmental Protection Department
ESG	Environmental, Social and Governance
ETC	Electronic Toll Collection
EV	Electric Vehicle
GHG	Greenhouse Gas
GLEC	Global Logistics Emissions Council
HGV	Heavy Goods Vehicles
IATA	International Air Transport Association
IEA	International Energy Agency
IMO	International Maritime Organisation
IPCC	Intergovernmental Panel on Climate Change
LEARN	Logistics Emissions Accounting & Reduction Network
LGV	Light Goods Vehicles
LNG	Liquefied Natural Gas
METS	Maritime Emission Trading Scheme
MRV	Monitoring, Reporting and Verification
NDCs	Nationally Determined Contributions
OGVs	Ocean Going Vessels
PM	Particulate Matters
RECs	Renewable Energy Certificates
SFC	Smart Freight Centre
STORM	Smart Freight Transport and Logistics Research Methodologies
TCFD	Taskforce for Climate-related Financial Disclosure
THB	Transport and Housing Bureau
TRIMIS	Transport Research and Innovation Monitoring and Information System
VOCs	Volatile Organic Compounds
WBCSD	World Business Council for Sustainable Development
WEF	World Economic Forum
WRI	World Resources Institute

Credits

Photo by CHUTTERSNAP on Unsplash (cover)
Photo by Joshua Rawson-Harris on Unsplash (p ii, p 14-18)
Photo by William William on Unsplash (p 1)
Photo by Florian Wehde (p iii)
Photo by Olga Subach (p 4, 22)
Photo by Manson Yim (p 11, 25)

About BEC

Business Environment Council Limited ("BEC") is an independent, charitable membership organisation, established by the business sector in Hong Kong. Since its establishment in 1992, BEC has been at the forefront of promoting environmental excellence by advocating the uptake of clean technologies and practices which reduce waste, conserve resources, prevent pollution and improve corporate environmental and social responsibility. BEC offers sustainable solutions and professional services covering advisory, research, assessment, training and award programs for government, business and the community, thus enabling environmental protection and contributing to the transition to a low carbon economy.

Disclaimer

This publication has been prepared by BEC on the basis of information available at the date of publication without any independent verification. The information contained herein is of a general nature; it is not intended to address the circumstances of any particular company or entity and BEC is not, by means of this publication, rendering any business, financial, legal, or other professional advice or services in any form. BEC does not guarantee or warrant the accuracy, reliability, completeness, or currency of the information in this publication nor its usefulness in achieving any purpose. BEC shall not be liable for any loss, damage, cost, or expense incurred or arising by reason of any person or entity using or relying on the information in this publication. Please be aware that the websites referred to in this publication may be changed, suspended, or removed without prior notice.

BUSINESS ENVIRONMENT COUNCIL 商界環保協會

Business Environment Council Limited

2/F, 77 Tat Chee Avenue,
Kowloon Tong, Hong Kong
T: (852) 2784 3900
F: (852) 2784 6699
E: enquiry@bec.org.hk
https://www.bec.org.hk

Copyright

This project is funded by:

British Consulate-General Hong Kong