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Policy Paths toward Low-emission Multimodal Transportation in APEC

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KEY MESSAGES

- The transportation sector emits one-fifth of global carbon dioxide emissions, contributing significantly to global warming and climate change. Proven and effective policy interventions are needed to ensure a low-emission and sustainable future for land, air and sea transportation.

Land transport

- *Power up on vehicle electrification.* Vehicle electrification is the quickest, most efficient policy to achieve low-emission land transport. It can be accelerated by regulations on vehicle supply, incentives for vehicle purchase and usage, expansion of charging infrastructure, and information campaigns.

- *Promote public, shared and active transport.* Low-carbon alternatives to private vehicles can be offered through public transport service and connectivity, shared mobility integration and well-designed public spaces.

- *Adopt sustainable energy sources for land transport.* Further reductions in emissions can be driven by subsidies for sustainable fuels, funding for next-generation batteries, and battery sustainability research grants.

Aviation

- *Heighten the use of sustainable aviation fuels.* Switching to sustainable aviation fuels (SAF) is the fastest and most reliable way to reduce the carbon footprint of air travel. SAF blending mandates, market-based incentives, carbon taxes and research and development (R&D) funding can help propel the use of SAF to new heights.

- *Optimise airway and airport management.* Aviation fuel is consumed not only in the air but also on the tarmac. Modernising air traffic management systems, improving the energy efficiency of ground operations, implementing industry standards and advancing R&D in aircraft design would not only reduce costs but also cut down on emissions.

- *Mobilise and monitor carbon offsetting.* Supporting market-based measures, nudging behaviour through incentives, developing a transparent and rigorous reporting system, and collaborating with industry leaders can correct market signals and help the sector attain a more sustainable flight path.

Maritime transport

- *Go full speed ahead on green maritime fuels.* Supporting research into green maritime fuels, collaborating with industry partners, supporting bunkering infrastructure and creating green maritime financing hubs can catalyse the arrival of sustainable maritime transport.

- *Call for green port systems.* Low-emission maritime transport starts on land; and environmentally differentiated port fees, green procurement processes, reduction of ship speeds near port and emission trading schemes will help start the voyage.

- *Develop green vessels and shipping hubs.* Developing low- or zero-emission ships, which includes providing tax incentives for research and establishing green shipping hubs, will help synergise efforts toward low-emission shipping from port to port.

Introduction

Climate change poses significant human and economic costs to the APEC region. The catastrophic impacts of unmitigated climate change could lead to an additional 350,000 deaths annually and economic losses equivalent to about 7.3 percent of the region's economic output.[1]

The gravity and magnitude of these losses require immediate action from APEC economies, and in their 2022 declaration, APEC Leaders affirmed their commitment to promoting strong, balanced, secure, sustainable and inclusive growth. They also recognised the need for more intensive efforts to address climate change, extreme weather and natural disasters.[2] The APEC region needs to reduce greenhouse gas (GHG) emissions quickly and sharply to effectively address climate change and mitigate its impacts.[3] Already, APEC members have committed toward reducing energy intensity by 45 percent by 2035 (relative to 2005 levels) and doubling the share of modern renewables by 2030 (relative to 2010 levels).[4]

Transport is a significant source of GHG emissions. Globally, the transport sector accounts for about a fifth of total carbon dioxide (CO_2) emissions in 2021, the large majority of which is from land transport (Figure 1).[5] Transport has also been identified as a key sector where effective public interventions and adaptation measures are necessary to reduce emissions and address vulnerabilities.[6]

This policy brief outlines the main policy interventions that can contribute to realising low-emission transport systems in a timely, feasible and inclusive manner to address climate change challenges. It condenses empirical findings and key policy recommendations for the land, aviation and maritime transportation sectors. It concludes with a discussion on the need to ensure a just transition to a low-emission transport future.

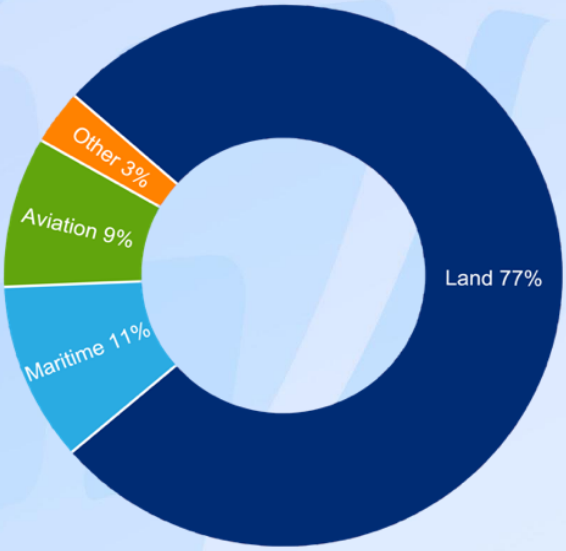
Roadmaps toward Low-emission Land Transport

With road vehicles being responsible for the largest share of emissions in the transport sector, urgent policy intervention is necessary to meet climate change targets. Low-emission land transport also offers benefits such as improved air quality and better public health.

There are three complementary routes policymakers could consider to reduce emissions from land transport (Figure 2).

1. Power up on vehicle electrification. The most effective and economically efficient solution to significantly lower GHG emissions from land transport is through widespread vehicle electrification, combined with clean energy production.[7] Switching to electric vehicles (EVs) could make a rapid and significant difference in

Figure 1. Global CO_2 emissions from transport, by mode, 2021



Note: 'Other' category includes transport by pipelines and cables. Data show direct emissions from fossil fuel combustion and exclude upstream emissions during extraction and electricity generation.
Source: "Global CO2 Emissions from Transport by Sub-sector in the Net Zero Scenario, 2000–2030," International Energy Agency (IEA), accessed 13 April 2023, https://www.iea.org/data-and-statistics/charts/global-co2-emissions-from-transport-by-sub-sector-in-the-net-zero-scenario-2000-2030

reducing GHG emissions and tackling the challenge of climate change.[8]

In comparison with traditional vehicles, EVs emit no tailpipe pollutants and demonstrate superior energy efficiency by converting over 77 percent of energy to power at the wheels compared to only 12 to 30 percent for conventional gasoline vehicles. [9] Shrinking battery costs, fuel cost savings and lower maintenance costs make the switch to EVs more feasible, which could explain the rise of the electric car sales share (Figure 3).

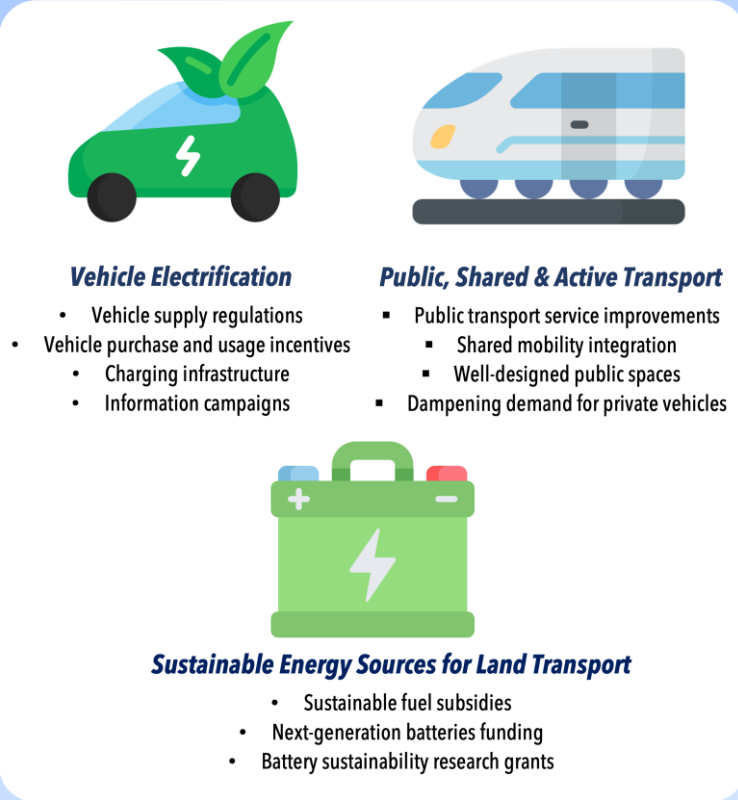
Policy interventions to accelerate the switch to EVs include vehicle supply regulations; vehicle purchase and usage incentives; charging infrastructure; and information campaigns.

Vehicle supply regulations can encourage EV adoption and directly reduce emissions. Examples include fuel performance mandates that require minimum miles per gallon and CO_2 emissions limits that specify maximum emissions per mile driven. Zero-emission vehicle (ZEV) mandates may oblige automakers to make a specific proportion of their sales be of ZEVs. Examples of such regulations include the US federal Corporate Average Fuel Economy standards and the European CO_2 emission performance standards.[10]

Vehicle purchase and usage incentives are important in inducing demand for EVs given that consumers rarely make vehicle decisions based on the total cost of ownership. Point-of-sale subsidies are more effective because they deliver a greater value to consumers.[11] In addition to subsidies, purchase tax exemptions reduce EV upfront costs and encourage consumers to make a behavioural change.[12] Usage incentives such as bus or transit lane access, free or discounted parking, and toll waivers or discounts are other solutions that lead to greater EV market share, especially in the nascent stage.

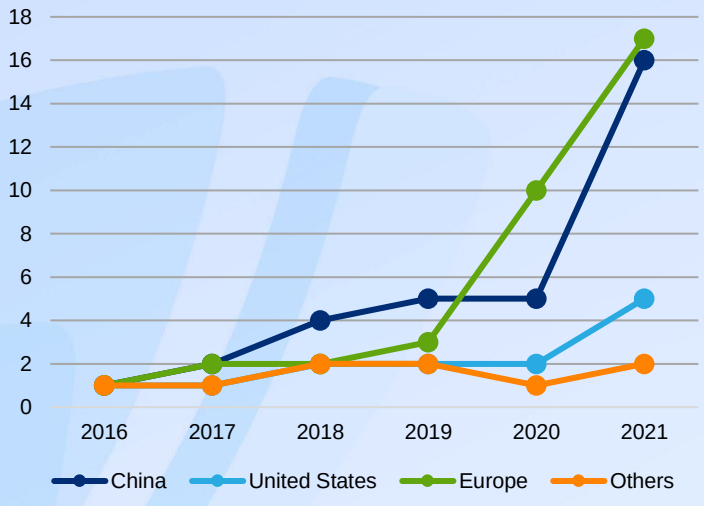
Charging infrastructure must be rolled out in public areas as its absence could be a barrier to EV purchase and use. Substantial investments in public charging stations are necessary in places where people mostly live in multi-unit

Figure 2. Policies for land transport



Source: Authors.

Figure 3. Electric car sales share (%), 2016–2021



Source: "Global EV Data Explorer," International Energy Agency (IEA), accessed 19 April 2023, https://www.iea.org/data-and-statistics/data-tools/global-ev-data-explorer

buildings and during market expansion.[13] Public charging stations speed up EV adoption when they are available at strategic locations such as commercial spaces, highway corridors and densely populated areas.[14]

Information campaigns promote consumer awareness, and dispel misperceptions about EV features and benefits as well as available incentives, creating the necessary preconditions for potential buys.[15] These information schemes help accelerate the shift toward vehicle electrification.

2. Promote public, shared and active transport. Complementing the switch to EVs are improving public transport and promoting shared and active mobility. Public transport systems, such as buses and trains, move a large number of people while reducing carbon emissions per passenger.[16] Taking public transport is associated with 45 percent lower CO_2 emissions relative to driving internal combustion engine (ICE) vehicles.[17] Shared transportation such as ridesharing and carpooling can also decrease carbon footprints while serving last-mile transportation needs.[18] And, active mobility such as walking and cycling provides low-carbon alternatives, promotes physical activity and helps improve air quality.[19]

Public transport service improvements are essential to increasing the uptake of public transport. Service improvements could include increasing average speeds, scheduling more frequent services and enhancing service integration for easier transfers and fare payments.[20] Expanding the coverage area of public transport services, as well as ensuring safety, reliability and cleanliness, is essential to ensuring wider accessibility of public transport.

Shared mobility integration with mainstream transport networks improves accessibility and convenience for users, leading to greater efficiency of the overall road transport system, fewer private vehicles and lower carbon emissions while addressing last-mile transportation needs. The integration could be achieved through extensive deployment of shared mobility services, increase of licenses for ridesharing activities, and designation of urban spaces for shared–active modes.[21] Widespread and equitable access to digital technology and infrastructure would be a key enabler of shared mobility integration.[22]

Well-designed public spaces promote active mobility such as cycling and walking by providing safe and convenient infrastructure for cyclists and pedestrians. These include high-quality footpaths, bike lanes, pedestrian crossings and sidewalks, and well-designed roads and streets that allow safe coexistence of multiple modes in the same area.[23] Public spaces must ensure a pedestrian- and cycling-friendly environment with adequate levels of accessibility, proximity, safety and comfort as well as integration with public transport.

Dampening the demand for private vehicles is a positive step in promoting the substitution and switch toward collective modes of transit while also reducing GHG emissions and air pollution. Aside from incentivising the use of EVs, certain government interventions could further dampen demand for private vehicles. Examples include licence plate restrictions in Hangzhou, China,[24] the vehicle quota system in Singapore[25] and CO_2-based taxation of motor vehicles in the European Union.[26]

3. Adopt sustainable energy sources for land transport. This is another path to reduce emissions and meet climate change targets. While the use of renewable energy to power the electric grid is a task for energy policymakers, transport policymakers can influence the use of sustainable fuels for public transport systems[27] and encourage people to adopt EVs and take public transport. The durability of EV batteries and other sustainable practices can also play a key role in ensuring that emissions are reduced substantially.

Addressing these concerns could involve policy interventions such as sustainable fuel subsidies, funding for next-generation batteries, and battery sustainability research grants.

Sustainable fuel subsidies could encourage the use of alternative fuels in public transport systems. Funding and subsidies for hydrogen-powered public transport; capital expenditure and tax rebates; and subsidies for biodiesel consumption are some policy interventions to reduce emissions through the use of sustainable fuels.[28] To ensure a sustainable transition toward renewable energy, it is crucial to target biofuel subsidies toward the newer generation of biofuels. Unlike first-generation biofuels, advanced biofuels utilise non-food feedstocks, avoiding any interference with the food value chain.[29]

Next-generation batteries funding supports the development of batteries with the ability to sustainably store electricity for future use.[30] Substantial investments in research could lead to battery innovations, including improved energy density, reduced battery cost, and better durability and lifetime (longer-lasting batteries would require less frequent replacements and thus reduce waste).[31] This funding also needs to be cognisant of ethical considerations with regard to supply chains and mining activities to ensure

sustainability, inclusiveness and resilience in battery production.

Battery sustainability research grants are an essential means to develop and promote sustainable battery practices, and reduce the environmental impact of battery production and disposal.[32] The grant programmes could focus on circular supply chain research by examining practices on retrieving, recycling and recirculating raw materials from end-of-life batteries. [33] For instance, the US Department of Energy allocated nearly USD 74 million for the advancement of technologies and processes for EV battery recycling and reuse in 2022.

Flight Plans toward Low-Emission Aviation

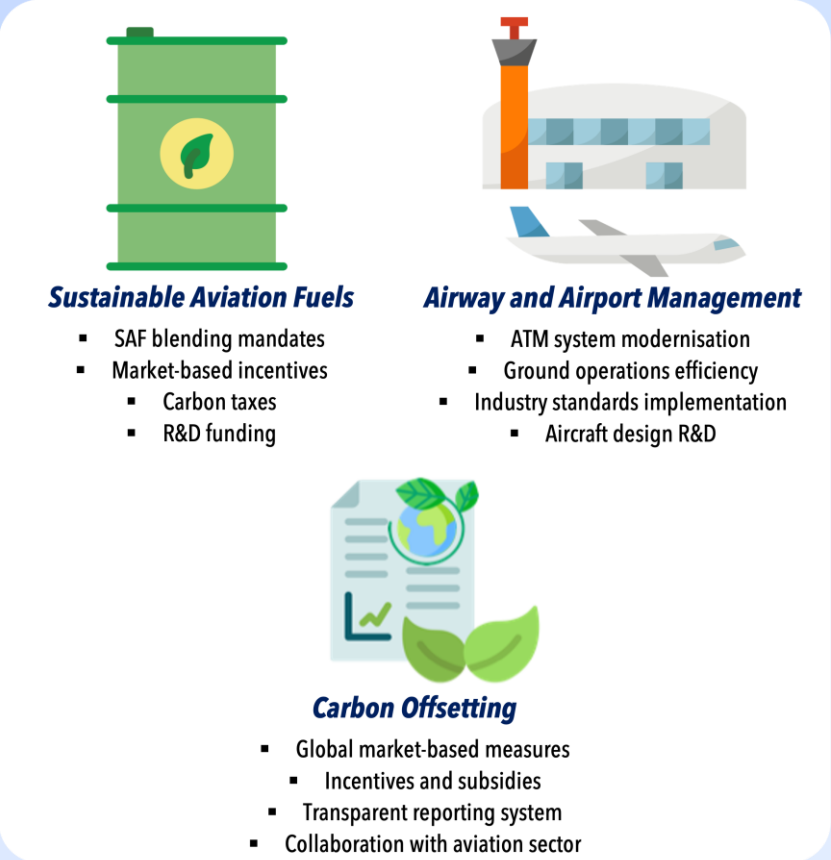
Minimising emissions from the aviation sector is pivotal to making transportation more sustainable. Aviation contributes 9 percent of transportation's CO_2 emissions, making it a key driver for the transition to net zero. Three policy areas can help launch low-emission aviation (Figure 4).

1. Heighten the use of sustainable aviation fuels. Scaling up the use of sustainable aviation fuels (SAF) is the fastest method to lower the GHG emissions of air travel.[34] Relative to traditional jet fuels, SAF use could lead to a reduction in carbon emissions by about 80 percent, depending on production method, feedstock and supply chain.[35] SAF is widely compatible with existing jet engines, which makes it a viable solution to reduce carbon emissions without compromising the reliability and safety of air travel.

Policymakers could introduce SAF blending requirements, incentivise the production and use of SAF, impose carbon taxes and invest in R&D to promote the widespread adoption of SAF.

SAF blending mandates would require the airline industry to have a minimum percentage of SAF in their fuel mix. [36] This threshold level could be gradually increased over time.[37] Having a mandate also signals demand certainty, which would incentivise suppliers of SAF to make the necessary investments to expand output. Blending

Figure 4. Policies for aviation



Source: Authors.

requirements are already in place in France; Indonesia; Norway; and Sweden.

Market-based incentives could be leveraged to increase the production and use of SAF. Several cost-related approaches are available for policymakers, from feedstock subsidies, capital grants and loan guarantees to tax credits.[38] These policies help drive down the cost of SAF, which would in turn improve its availability and affordability.

Carbon taxes could complement cost-related SAF incentives. Carbon taxation puts a price on the release of GHG emissions and makes conventional jet fuel more expensive relative to SAF. [39] As efficiency gains are derived from scaling up production, SAF would eventually become more economically viable. As of 2022, 37 carbon tax systems are in place worldwide, with carbon prices increasing to their highest levels yet. Table 1 shows existing carbon tax systems in APEC economies.

Further, under the polluter/user pays principle, policymakers could include a carbon tax in the price of flight tickets and use the resulting revenue to subsidise the excess cost of SAF. This has been tried in Portugal in 2021, where a EUR 2 carbon tax was imposed on each chargeable passenger departing from its airports on commercial flights, with 97 percent of the revenues generated going to a fund that finances emission reduction projects.[40]

R&D funding is necessary to speed up SAF integration, particularly on improving and scaling up production and lowering costs.[41] Research on the feasibility of hydrogen-powered aviation is another policy path to consider.[42]

2. Optimise airway and airport management. Reducing emissions from the aviation sector begins on land through optimising airway and airport management. [43] More efficient airport systems require less energy to operate and allow aircraft to consume less fuel. This could be achieved by modernising the air traffic management (ATM) system, improving ground operations efficiency, implementing industry standards and investing in R&D.

Modernisation of ATM system and technologies plays a crucial role in greening aviation. Some low-hanging fruits include moving toward smoother and more efficient flightpaths; opening and harmonising international airspace and access to allow for more direct flight paths and minimise detours; and optimising aircraft descent profiles. [44] These initiatives are estimated to lead to a 5 to 10 percent reduction in aviation emissions.[45]

Table 1. Carbon tax systems in selected APEC economies, 2022

Economy	Price level USD per tCO2e	Total revenues USD million (2022)
Canada	Federal: 40 Provincial/territorial: average 35.2	7,319
Chile	5	160
Japan	2	1,800
Mexico	Upper: 4 Lower: 0.42	314
Singapore	4	153

Note: In Canada, provinces/territories can set carbon taxes with a federal backstop in place for all remaining areas. In Mexico, the tax applies to the sale and import of fossil fuels with the exception of natural gas, while carbon taxes apply on a sub-economy level.
Source: World Bank, "Carbon Pricing Dashboard," accessed 19 April 2023, https://carbonpricingdashboard.worldbank.org/map_data

Improved energy efficiency of ground operations at airports could also be achieved by optimising the landing and take-off cycle of aircrafts through single-engine or electric taxiing and more effective landing routing. A second option is to install fixed electrical ground power and preconditioned air at contact gates.[46] Several airports in the US have already reduced GHG emissions significantly by pursuing these low-cost energy efficiency measures.[47]

Implementation of industry standards for aircrafts is another policy path to accelerate efficiency improvements and fleet renewal. Some guidelines include requiring higher fuel efficiency for new aircrafts, retrofitting blended winglets, increasing digitalisation through sensors and calculations as well as reducing cabin weight, which all bear negative abatement costs.[48] In 2020, the International Civil Aviation Organization (ICAO) issued certifications for new aircraft designs and production based on their CO_2 performance.[49]

Aircraft design R&D speeds up innovations in radical aircraft technologies in areas such as airframe configuration, structure and materials, and solar and electric-powered propulsion technology to maximise efficiency.[50] Analysis shows that fleet upgrades accounted for 43 percent of aircraft fuel efficiency gains from 2005 to 2018.[51] Advanced aircrafts are now 15 to 20 percent more fuel efficient, and new developments, such as better engines, lighter materials and improved aerodynamics, are set to continue this trend. Collaboration between policymakers and the aviation industry is important to hasten the advancements in aircraft technologies.

3. Mobilise and monitor carbon offsetting. Carbon offsetting measures – if done properly – can play a role in reducing the carbon footprint of the aviation industry by raising the cost of producing emissions while supporting projects and initiatives that directly lower emissions in other locations or sectors.[52] This involves offsetting the emissions produced by air travel by supporting global market-based measures, offering incentives to airlines, developing a transparent reporting system and establishing partnerships with industry leaders.

Support for global market-based measures on carbon offsetting is an integral route to reducing emissions from aviation. An example is the Carbon Offsetting and Reduction Scheme for International Aviation of the ICAO intended to complement the use of SAF and the optimisation of airport management.[53] Carbon offsets allow airline companies and/or passengers to purchase carbon credits that are generated by projects to compensate for emissions released in-flight.

Incentives and subsidies can accelerate the uptake of carbon offsets while verifying that rigorous quality standards and assurance mechanisms are upheld. Administrative safeguards could also help prevent double counting of carbon offsets, where more than one party has a claim to an offset.[54]

Development of a transparent and rigorous reporting system is another important policy space to consider while promoting carbon offsetting measures. Done properly, carbon offsetting could contribute to climate change mitigation efforts; done haphazardly, it only contributes to greenwashing. Effective reporting mechanisms would ensure the traceability and accountability of the credits purchased, allowing consumers to make informed decisions and ensuring that carbon offsets have a positive impact on addressing climate change.[55]

Collaboration with the aviation sector could also be explored to increase sectoral buy-in and boost the uptake of carbon offsetting. Rather than being seen as a cost imposition, carbon offsetting could be viewed as a way to contribute to the implementation of projects that directly reduce carbon emissions.[56]

Voyages toward Low-emission Maritime Transport

The maritime sector accounts for approximately 11 percent of emissions produced by the transport sector. Achieving low-emission and clean shipping is crucial in mitigating the impacts of climate change, improving air quality particularly in port cities and coastal areas, and sustaining the blue economy. Policymakers could navigate three routes to achieve this goal of low-emission maritime transport (Figure 5).

1. Go full speed ahead on green maritime fuels. Reducing the GHG emissions of the shipping industry is anchored on the use of cleaner fuels.[57] Sustainable marine fuels have the potential to reduce well-to-wake GHG emissions by more than 70 percent, depending on feedstock and conversion process.[58] Most ships currently use heavy fuel oil (HFO) – also known as bunker fuel – which is relatively cheap but produce significant amounts of GHGs like CO_2 as well as sulphur dioxide (SO_2) and nitrogen dioxide (NO_2), the latter two of which are the main contributors to acid rain.[59] Policies such as direct government research funding, collaboration with industry partners, support for bunkering infrastructure, and green maritime financing hubs that aim to promote the use of sustainable maritime fuels could be

implemented by government authorities to hasten the transition toward low-emission maritime transport.

Green fuel R&D investment is necessary to fill in the gaps in the R&D activities of the private sector and lay the foundation for future innovations. Direct government funding could cover analyses of sustainable marine fuels to examine the costs, emissions and resource constraints as well as combustion and engine testing to assess how new marine fuels can affect the performance and longevity of vessels.[60] For instance, the Bioenergy Technologies Office of the US Department of Energy directly invests in net-zero-carbon sustainable marine fuels research.

Collaboration with industry partners is essential in conducting feasibility studies of future fuels as partnerships bring together the expertise and resources of multiple organisations. Pilot trials could catalyse innovation and assess the commercial and operational viability of fuel solutions such as ammonia, methanol, next-generation biofuels, bio-liquefied natural gas (LNG) and hydrogen.[61] Feasibility studies on alternative fuels such as LNG could also help ensure that investments in vessels and port facilities are future-proofed to accommodate new innovations.[62] The adoption of alternative fuel sources for maritime transport is important as they could potentially reduce emissions by as much as 80 percent, according to the International Chamber of Shipping.[63] The International Chamber of Shipping has suggested that that new ships under the Fourth Propulsion Revolution of shipping could be powered by alternative fuel sources such as methanol, ammonia, hydrogen, e-fuel and biofuel, among other options.

Support for bunkering infrastructure for green fuels is a vital route to ensure widespread adoption of sustainable fuels. This could be implemented through co-investing in assets and launching pilot programmes to gain operational experience and test operation protocols.[64] Legislation could also be put in place to speed up the transition to alternative fuels as well as drive demand for such fuels.[65]

Figure 5. Policies for maritime transport

Source: Authors.

Green maritime financing hubs spearheaded by port authorities address the funding gap for sustainable maritime projects and help in expanding the suite of green financing options available. Port authorities could explore collaborations with industry partners and financial institutions to improve the accessibility to sustainably linked financing for the development of green maritime fuel solutions. The collaboration between Singapore's Maritime and Port Authority, the Monetary Authority of Singapore and industry leaders stands as an example.[66]

2. Establish green port systems. A key policy area to reduce emissions in the shipping industry is in greening port systems and improving energy efficiency. This involves introducing port-based incentives such as reducing port fees for environmentally friendly ships, employing a green procurement process and establishing emission trading schemes. [67] Support for energy requirements set by international organisations could aid also in cutting emissions from maritime transport.

Environmentally differentiated port fees are charges levied on ships based on their environmental performance. The aim is to incentivise and reward ships that are more environmentally friendly. Less polluting ships are charged lower fees, either through a proportional deduction or a fixed amount. This form of green financial incentive is already in place in some APEC economies, such as Canada; China; Japan; Korea; Singapore; and the US.[68]

Green procurement is the incorporation of environmental standards into the selection process for port service contracts. For instance, European ports frequently consider environmental factors when granting concessions to terminal operators. The International Transport Forum finds that this approach could extend to covering other services that contribute to shipping emissions, such as dredging and towage. [69]

Vessel speed reductions could also be considered because ship speed is directly linked to ship emissions. Policy interventions could take the form of incentive programmes for vessels that slow down as they approach ports, as is being done in the US. A 2008 study by the Port of Long Beach estimated that its speed reduction scheme reduced GHG emissions by 26,000 tCO_2e.[70]

Emission trading schemes are another effective tool to mitigate carbon emissions from sea transport by making shippers internalise the negative externalities of pollution. For example, Shanghai, China has an emission trading scheme that includes both airports and seaports and covers international and domestic shipping. It sets an inclusion threshold of 100,000 tCO_2/year for shipping and imposes penalties for non-reporting. The scheme aims to reduce CO_2 emissions by 20.5 percent relative to 2015 levels.[71]

Support for energy efficiency requirements set by international organisations such as the International Maritime Organization [72] is vital in promoting international cooperation and standardisation in the industry. By adopting and implementing these efficiency standards, the shipping industry could work together toward reducing emissions and meeting environmental targets.

3. Develop green vessels and shipping hubs. The development and use of green vessels is a policy area that could lead toward a low-emission sea transport,[73] while establishing green shipping hubs could synergise efforts by ships and ports to reduce GHG emissions.[74]

Development of eco-friendly ships that use alternative power sources could significantly reduce emissions from the shipping industry. Government funding could be directed toward the construction of eco-friendly ships with advanced LNG, electricity and hybrid core technologies, which could then be applied to commercial shipping. [75] For example, the ocean and trade ministries of Korea have committed USD 870 million toward eco-friendly shipping from 2022 to 2031. [76] Collaboration with industry leaders that have a deep understanding of the maritime industry and possess technological expertise enables governments to gain insights and accelerate the deployment of electric vessels.[77]

Green shipping hubs could complement the development of green vessels and ports in achieving low-emission maritime transport. Such hubs ensure that sustainable policies and practices are implemented from port to port and throughout the route connecting them. They are specific trade routes connecting important port centres where low-emission policies and solutions are implemented. [78] This leads to synergies in the efficiency of vessel operations, reduced fuel consumption and minimised ecological footprint of shipping. [79] The establishment of green shipping corridors has gained traction in APEC economies such as Chile; Korea; and the US.[80]

Connecting Nodes for a Just Transition

The transition toward low-emission transport systems requires effective government policies that address market failures, incentivise private sector

participation and accelerate research on alternative energy sources and technological advancements. The significant contribution of the transport sector to total GHG emissions as well as the rising severity of the negative externalities of climate change prompt the urgent development and implementation of policy interventions. To achieve low-emission transport systems, it is crucial to consider all modes of transport through land, air and sea.

While each mode has its own policy paths to tread, there are also cross-cutting issues that could be addressed through coordinated government intervention. For instance, supporting sustainability research that simulates and evaluates the impact of low-emission policies across different modes of transport could aid in identifying best practices and better inform policymaking. Simulations on the effectivity and feasibility of low-emission policies are vital in finding the optimal mix of policy measures that maximise the synergies and minimise trade-offs. [81] Working with industry leaders and leveraging on their expertise and experience could be beneficial in promoting sustainable practices and accelerating the adoption of low-emission technologies.[82]

However, it is also vital to ensure that the transition toward low-emission transport is just and equitable. A just transition framework (Figure 6), which considers the potential impact of low-emission policies on under-represented and vulnerable groups, must be at the heart of policy formulation and implementation.[83] A just transition requires the involvement and empowerment of all stakeholders, including workers, communities, businesses, and marginalised and vulnerable groups. Social dialogues ensure that the perspectives and welfare of all are taken into account in the policymaking process. This could be achieved through inclusive and participatory policy development processes, which could aid in building trust and support for the transition.

As with any change in technology, the implementation of low-emission technologies and practices for transport would have an impact on the workforce.[84] It will lead to job losses and income precariousness for workers in transportation modes that currently generate high levels of emissions or sectors that depend on them. On the other hand, there will be more opportunities for green jobs that may require new skills in low-emission technology or renewable energy.[85]

Figure 6. Just transition framework

Source: Authors.

Measures that ensure inclusive mobility, social protection and food security are essential. Education, training, reskilling and upskilling, complemented with active labour market policies, will make the reallocation to green jobs more efficient. Efforts could also be taken to identify the skills in carbon-intensive and low-emission jobs to map out opportunities for affected workers while making the green transition smoother.[86]

Moreover, it is important to consider and mitigate the indirect impacts of low-emission transportation policies. A repeat of the food-vs-fuel price crisis of the late 2000s – where a policy emphasis on bioethanol eventually contributed to high food prices and food insecurity – should be avoided.[87] Likewise, consideration should be given to the impact of low-emission policies on people's access to transportation services as well as other sectors that rely on the movement of people or goods. In this regard, facilitating cross-sectoral stakeholder consultation[88] and securing sustainable financing – both public and private [89] – will be key to implementing a just transition in the transportation sector.

In the APEC forum, this is a call and opportunity for cross-fora collaboration. The Transportation Working Group can work closely with the Human Resources Development Working Group as well as the Economic Committee to address issues related to social protection, labour and skills, and efficient reallocation to green sectors. Collaboration with the Finance Ministers' Process and the Policy Partnership on Food Security will be needed to address issues related to financing the just transition and ensuring food security. And insights from the Policy Partnership on Women and the Economy are needed to ensure that the low-emission transition is also gender-inclusive.

As with other efforts to address climate change, low-emission transport policies should have people at its centre. This means securing a habitable planet for humanity well into the future while ensuring the well-being of all people – especially the poorest and most vulnerable – today. This is at the heart of APEC Putrajaya Vision 2040 and this is how the transportation sector could contribute toward strong, balanced, secure, sustainable and inclusive growth.

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