POLICY BRIEF FOR THE BLUE ECONOMY[a]

SUSTAINABLE SHIPPING AND PORTS

Setting the Scene for Shipping & Ports in East Asia

The East Asian Seas serve as a conduit of 90% of the world's trade through shipping. The demand for container shipment is expected to triple in the next 25 years, from about 100 million TEUs at present to around 350 million TEUs by 2040. The top five busiest seaports in the world are in East Asia: Shanghai, Singapore, Hong Kong, Shenzhen and Busan.[1]

At present, the depressed financial state of the shipping industry—with bulk goods shipping down and an overcapacity of ships in relation to the lesser amount of cargo—means that greater efficiencies and speedier portside management of cargo are even more critical.

This economic downturn in shipping is also affecting related industries. The largest shipbuilders are located in Asia and are now reportedly only operating at half capacity.

Issues and Risks in Need of Sound Policy to Bolster the Blue Economy

Despite the global economic downturn, East Asia is still brimming with shipping and port related activity. Considering the forecast huge market and increasing trade, East Asia as a whole is planning to invest in improving maritime transport and related port services.

Will these projected increases in shipping and port activities in the region reflect the win-win potential of growing while protecting critical ecosystem services and local communities?

Facts and Figures: Ocean Economy and Ports

1) The Organization for Economic Cooperation and Development (OECD) estimates that the global ocean economy "could double in size by 2030 [to around] USD 3 trillion following the business-as-usual scenario," and expects employment to also double by 2030 to over 40 million working in ocean-based industries.[a] The report also lists the ports sector as one area that is expected to grow faster than the world economy.

2) Every additional ton of cargo handled by a port can generate an additional US$100 of economic benefit, with 300 new jobs created for every 1 million tons of cargo volume.

For example, when holistic planning is absent, expanding port facilities can harm the environment and the people living in nearby cities and communities. During the construction stage, "damage could occur through destruction of coastal habitats, land reclamation, [and the] dredging and construction of buildings and roads to connect to the port." Once operational, "there are air and water pollutants, solid waste, noise pollution, and a higher than normal emission level of greenhouse gases (GHG)."[2] In addition, there are problems associated with the discharge of ballast water, which can pose "serious ecological, economic and health problems.[3] The economic damage associated with invasive aquatic species is estimated to be US$100 billion per year, and the projected cost to respond globally to this threat is roughly 4% of this figure.[4] The problem is rapidly becoming worse and may have yet to hit its peak,[5] calling for a unified policy response.

[a] PEMSEA's definition of blue economy is a practical ocean-based economic model using green infrastructure and technologies, innovative financing mechanisms and proactive institutional arrangements for meeting the twin goals of protecting our oceans and coasts and enhancing its potential contribution to sustainable development, including improving human well-being, and reducing environmental risks and ecological scarcities (Changwon Declaration, 2012).

Leading International Bodies Addressing Sustainable Shipping and Ports Issues

The **International Maritime Organization (IMO)** has taken the lead on issues such as the regulation of air pollution (via MARPOL Annex VI) and ballast water management (the Ballast Water Management Convention covers over 73% of the world's merchant fleet tonnage[6] and entered into force in September 2017). IMO's landmark policy instrument is MARPOL[b]—first adopted in 1973 and subject to several amendments over the years. The various annexes cover different ship-based sources of pollution—oil, liquid or harmful substances, sewage, garbage—and most recently with Annex VI (2005), air pollution.[7] Annex VI sets regulations to limit the amount of ozone depleting substances, sulphur oxide (SO_x), nitrogen oxide (NO_x) and particulate matter emitted from ships. It also has amendments with phased reductions; for example, since 2012 the global SO_x cap has been at 3.5%, but it is set to gradually decrease to 0.5% by 2020.[8] Many policy examples in this brief, from incentive-based schemes to regulatory approaches, peg their air pollution standards to the 2020 figure in order to spur innovative air pollution-reduction schemes at a swifter rate. A 2013 amendment to MARPOL Annex VI mandates that all new ships are built

Addressing GHG Emissions from Ships

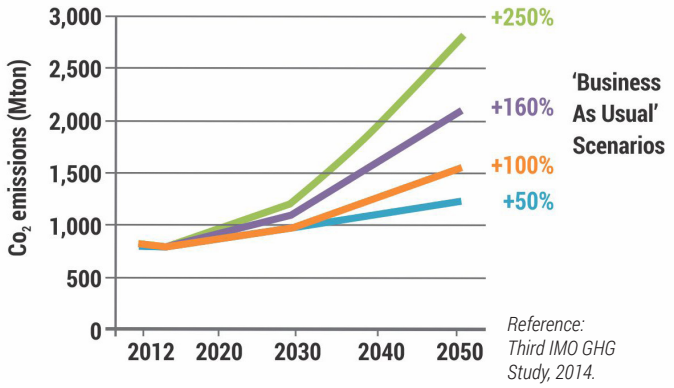
Maritime CO_2 emissions are projected to increase significantly. The international shipping emits around 800 million tonnes[9,10] CO_2 per year and accounts for about 2.2% of global CO_2 and GHG emissions. Depending on future economic and energy developments, scenarios project an increase of between 50% and 250% in the period up to 2050[11] (figure on the right). Further action on efficiency and emissions could mitigate emissions growth. Shipping is the only major industry in the world that is not subject to climate targets set by the Paris Climate Agreement. To ensure that shipping is cleaner and greener, IMO is engaging in a two-pronged approach towards addressing GHG emissions from international shipping: through regulatory work, supported by capacity-building initiatives.

IMO has adopted regulations to address the emission of air pollutants from ships as well as mandatory energy-efficiency measures to reduce emissions of greenhouse gases from international shipping, under Annex VI of IMO's pollution prevention treaty (MARPOL).

IMO is also engaging in global capacity-building projects to support the implementation of those regulations and to encourage innovation and technology transfer, including:[12]

- Global Maritime Energy E iciency Partnerships (GloMEEP) project—a GEF-UNDP-IMO initiative, supporting the uptake and implementation of energy efficiency measures for shipping, thereby reducing the industry's greenhouse gas emissions. The project involves 10 lead pilot countries, including China, Malaysia and the Philippines.

CO_2 emissions from shipping forecast



Reference: Third IMO GHG Study, 2014.

- Shipping CO_2 emissions are projected to increase by 50% to 250% in the period to 2050, despite fleet average efficiency improvements of about 40% and in the absence of further regulations
- Demand is the primary driver
- Technical and operational efficiency measures can provide significant improvements but will not be able to provide total net reductions if demand continues

- The IMO-European Union Maritime Technology Cooperation Centres Network (MTTC-N) Project, unites technology centres—Maritime Technologies Cooperation Centres (MTCCs)—in targeted regions into a global network. Together, they are promoting technologies and operations to improve energy efficiency in the maritime sector and help navigate shipping into a low-carbon future. One of host institutions is the Shanghai Maritime University, China.[13]

[b] The International Convention for the Prevention of Pollution from Ships

according to the IMO's Energy Efficiency Design Index (EEDI), and that all ships follow the Ship Energy Efficiency Management Plan (SEEMP).[14]

Another beneficial and recent contribution of IMO is The International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWMC), adopted in 2004 and entered into force until September 2017. While it is too early to assess its impacts, the immediate and future impacts look promising. All ships are immediately required to exchange their ballast water in the open seas, away from coastal areas.[15] This lessens the chance that country A's coastal marine organisms will take hold and invade country B's coastal marine ecosystem. The second requirement applies to all new ships, and is a performance metric that caps the maximum amount of viable organisms in the ballast water a ship discharges; to date, more than 60 ballast water treatment programs have been approved by the IMO for ships to consider.[16]

Private Sector Perspectives on Energy Efficiency in Shipping

The Global Industry Alliance for Maritime Energy Efficiency (GIA) is a public-private partnership initiative launched in June 2017 under the framework of the GloMEEP Project. GIA aims to bring together maritime industry leaders to support an energy efficient and low carbon maritime transport system. Leading shipowners and operators, classification societies, engine and technology builders and suppliers, big data providers, and oil companies have joined hands under the GIA.[17] Focusing on a number of priority areas including energy efficiency technologies and operational best practices, alternative fuels, and digitalization, activities likely to be undertaken or promoted by the Alliance will include, inter alia: research and development; showcasing of advances in technology development and positive initiatives by the maritime sector; industry fora to encourage a global industry dialogue; and the implementation of capacity building and information exchange activities.

OECD published a report in 2014 recommending that ports improve their competitiveness by establishing stronger local support and better connecting the port cargo to the inland parts of the country, and to "increase local benefits" by creating more than just the logistical cargo depot of the port itself by developing the city "into a leading maritime cluster, industrial complex, or waterfront."[18] OECD also recommended that ports mitigate the negative environmental impacts by "internalizing external effects and polluter-pays principles," and to "strengthen policy coherence" by making sure that policy instruments behave synergistically.[19]

International NGOs Provide Blue Economy Metrics for Policy-Makers

The NGO-run Green Award program grants a certificate to vessels with higher safety and environmental standards. The program is intended for port authorities to adopt as an incentive program; worldwide, certified vessels receive significant reductions on port dues in Europe, Canada, Oman, New Zealand and South Africa. Just this year, Yokohama announced that Green Award certified ocean-going vessels will be entitled to a 15% discount on the port's entrance fee. This ship-certification program could conceivably dovetail with APEC's green ports program, though they contrast in that here there is a monetary incentive for companies to green their vessels, instead of public recognition alone.

The **World Ports Climate Initiative (WCPI)** is well-established worldwide. It was created by the **International Association of Ports and Harbors (IAPH)**, an international trade organization with NGO consultative status at five UN agencies. Perhaps the organization's most popular contribution is the Environmental Ship Index (ESI). This evaluation tool can be used by either shipping companies or ports to identify "ships that perform better in reducing air emissions than required by the current emission standards of the [IMO]."[20] The ESI is a free, neutral and useful metric that can be implemented in a manner that the policy-maker sees fit, e.g., encouraging compliance with incentives (like Singapore) and/or via command and control (like China).

WPCI also launched a process in 2008 to develop a mechanism to assist ports in fighting climate change.[21] 55 ports signed on to the World Ports Climate Declaration, wherein the ports agreed to reduce CO_2 emissions from shipping, port operations and development, and to promote renewable energy, among other actions.[22] Today, the East Asian member ports are in **Hong Kong**, **Jakarta**, **Kobe**, **Nagoya**, **Tokyo**, **Yokohama**, **Seoul**, and the national port authorities of **Singapore** and **Thailand**.[23] IAPH announced that WPCI will extend its scope from climate action to a full range of sustainability port development challenges the industry is facing. The program will be officially launched in 2018. WCPI is not a venue wherein members must explicitly meet certain standards or targets, but is instead a forum for ports to learn how to track GHG

emissions and amass practical information on how to develop onshore power supply.[c] Again, it offers tools to *inform* sound policy.

Regional Policy Efforts to Address Obstacles to the Blue Economy

PEMSEA, in collaboration with the **GEF**, **UNDP** and the **Korean government**, established the Ports Safety, Health, and Environmental Management Code and System (PSHEMS) to provide regional port authorities and companies with a voluntary set of standards to measure and improve on performance in quality, safety and health and environmental protection.[24] Ports in **Cambodia**, **Malaysia**, the **Philippines** and **Thailand** have adopted PSHEMS to varying degrees. To teach port authorities how to implement PSHEMS, in 2016 PEMSEA partnered with the German Development Agency (GIZ) to create a Sustainable Port Development (SPD) training program for port managers. Members include the ASEAN Ports Network and the aforementioned national partners. Next steps will involve determining how to maintain the longevity of the network, including the "development of a qualification process for port workers to improve the safety, health and environmental control of the ports."[25] Countries may find low-hanging fruit by adopting such a program into national or municipal policy.

The **APEC Port Services Network (APSN)** has established a Green Port Award System (GPAS) with voluntary participation, ranking ports and encouraging them to improve their green performance through both self-evaluation and expert evaluation.[26] Currently, there are eight certified GPAS ports across the region (two in **China**, two in **Singapore**, two in **Malaysia**, one in **Thailand**, and one in the **Philippines**).[27] While the participating ports still have room for improvement in "efficiency and effectiveness,"[28] public recognition alone[29] appears to be a motivation enough to drive participation in this program.

National Policies providing "carrots and sticks"

Using National Policy to Incentivize Companies to Engage in the Blue Economy

Singapore's Maritime and Port Authority (MPA) is well-regarded as the best in Asia. Its policy seeks to move past the notion of simply having the largest port in the world to

becoming a true global hub for shipping, trade and finance. Its policy tools include (1) fiscal incentives,[d] (2) a shipping registry with associated tax benefits and (3) training, education and innovation programs, such as the Maritime Innovation and Technology Fund (MITF) and the Maritime Cluster Fund (MCF).[30]

Among these, Singapore has implemented several policy tools directly related to environmental protection, and in 2011 it invested SG$100 million to support "Green Initiative" programs for five years. It has been so successful that the program was renewed until 2019.[31] The program focuses on pricing policy to incentivize uptake. For example, MPA's Green Port Program (2011) offers a 25% reduction on port dues for all ships that switch to low sulphur fuels far below the MARPOL threshold.[32] A substantial "number of shipping companies are participating in [this program] to comply with green policy, to save costs, and to keep friendly relations with the incentive giver."[33] Next, the Green Ship Program encourages Singapore-flagged ships to reduce carbon dioxide and sulphur oxide emissions by adopting energy efficient ship designs and/or adopting approved SO_x scrubber technology in order to avail of substantially reduced registration fees and a major tax break. Third, the Green Technology Program provides grants to local maritime companies to develop and adopt green technologies,[e] a targeted effort to support the local population in capturing a share of the wealth generated by port activities in an environmentally-protective manner.

In **Malaysia**, the **Johor Port Authority (JPA)** is the government's regulatory agency in charge of two major shipping ports—Pasir Gudang Port and Port of Tanjung Pelepas. In 2016, the JPA released its Green Port Policy[34] to address air quality (reducing ship emissions), water quality, the aquatic ecosystem

[c] Onshore power supply provides ships with the option to dock and tap into the local electrical grid, instead of idling their pollution-generating engines to power loading/unloading and other dockside maintenance activities.

[d] Examples include the Approved International Shipping Enterprise (AISE) scheme, the Approved Shipping Logistics Enterprise (ASLE) scheme, and several environmental programs under its Maritime Singapore Green Initiative.

[e] Maritime and Port Authority of Singapore

and marine habitats (addressing ballast water management and restoring mangroves), waste management and improved efficiency for customers. It also has a community engagement component and an incentive program to encourage compliance among port operators. The program is heralded as "a holistic and cohesive development plan, which would see Malaysia transform into a competitive transportation hub in the region… helping Malaysia achieve its pledge to reduce GHG emissions by 45% by 2030."[35] Malaysia has not stopped at just greening its ports. Partnering with Singapore, it has also created a joint emergency response plan (including practice exercises) to address potential chemical spills.[36] Acknowledging the very real possibility of chemical accidents given the numerous vessels transporting hazardous chemicals along the Straits of Johor, these two nations are seeking to mitigate the ecological and economic consequences of such a risk.

Onshore power, where ships berth and tap into the local electrical grid instead of idling their engines, is a clean technology that is typically more common in North America and Europe. **Japan**'s Kitakyushu Port provides onshore power connected to renewable energy sources sited right on the waterfront, and boasts one of the fastest vessel turnaround times in the world.[37] **India**'s Ministry of Shipping created solar-powered onshore power as part of a holistic "Project Green Ports" at Chidambaranar Port in Tuticorin.[38] Its onshore power facilities are expected to reduce 5% of the annual CO_2 emissions and save port users an average of $1,150 a day on fuel costs.[39]

Command and Control National Policies Paired with Modern Technology Can Affordably Spur the Blue Economy

In 2017, **China** took substantial steps in reducing sulphur oxide emissions from ships that dock at its ports by increasing the number of ports enforcing newer standards from five to eleven.[40] These emission control areas (ECAs) now require that berthed ships burn fuel that has 80% less sulphur than standard marine fuels.[41] China has been busy enforcing these rules, with 55 violations identified in 2015 alone. However, there is concern that as coverage spreads to more ports, enforcement will be more challenging. In response, China is looking towards the experience of other countries for more efficient ways to enforce regulation of air pollution from ships.

Even the incentive-oriented **Singapore** ports rely on command and control policy as well. In addition to motivating compliance and driving innovation in the private sector, Singapore's port authority also tracks its CO_2 emissions and overall carbon footprint. Its Environmental Management System (EMS)[f] ensures compliance with environmental laws and improves performance; it monitors, evaluates, audits and corrects any problems in the areas of air quality, energy consumption, waste and transport.[42]

"Sniffing" Air Pollutants

The EU is currently experimenting with ways of remotely pinpointing air pollution violations; it recently finished a test flight of a small plane that "sniffed" over 1,300 ships in the North Sea, averaging 10 ships monitored per flight hour and finding 100 non-compliant ships. While this technology looks promising, currently there is a lack of affordably reliable technology that can effectively measure NO_x and SO_x at regional ports. This calls for an even greater need for best practices and recommendations on the part of ports that are already effectively measuring these pollutants.

Lessons in Blue Economy Technology and Human Impact

The **Port of Rotterdam (Netherlands)** recently built a new extension that prioritizes automation. *The Economist* describes the "eerily quiet" scene as: "Crane-drivers have been replaced by 'remote crane operators,' who sit in a distant office in front of computer screens, using joysticks to control as many as three cranes at once. The cranes lift containers onto self-driving, battery-powered automated guided vehicles (AGVs), which deliver them to stacks to be distributed by truck, train or barge."[43] Crane-drivers in the older sections of the port, sensing that they may be replaced by robots in the near future, went on strike and paralyzed large parts of the otherwise world-class port for the first time in 13 years.[44] While providing an exciting example of modern, efficient port operation, this is an instructive snapshot into how blue economy-driven policies need to seriously consider the human impact of planned port development—particularly for those already working there.

[f] It incorporates ISO 140001. See https://www.iso.org/iso-14001-environmental-management.html

Exploring a Policy Framework for the Blue Economy for the Ports/Shipping sector in East Asia

The aforementioned examples of policy innovations can be a foundation upon which to build a regional blue economy plan for East Asian shipping and ports. This plan could consider the following elements:

Ports

- Consider adopting a uniform set of blue economy standards covering air quality, water quality, the aquatic ecosystem and marine habitats, waste management, building standards, safety (emergency response for an oil spill) and efficiency. The standards may **be applied equally to all ports**, but allowing for **flexibility in how they are achieved**. For example, one port may address air quality by installing solar-powered onshore power systems (e.g., India/Japan), whereas another may do so via command and control regulation (e.g., China), or even engaging in a massive tree-replanting effort to mitigate pollutants.

- **PEMSEA could facilitate a coalition of national governments and representative port cities** (ideally at least one port from each country),[g] to explore the challenges each port city faces, as well as the consideration of adopting or modifying pre-existing certification schemes to apply to East Asian ports. Each national government should consider how this ports project would fit into a greater, holistic plan to promote the blue economy.

Ships

- Consider adoption of a green ships **certification** program (such as the Green Award program or a program that incorporates WCPI's Environmental Ship Index metric).

For regional green ports to have a broader impact, the ports must incentivize eco-innovations in the shipping sector, with a future eye towards prohibiting certain vessels that do not meet a certain minimum threshold standard.

- Regional shipping companies and shipbuilders could in turn **insist on minimum port standards** in the areas of efficiency and cost reduction, such as systems/technology that allow them to load/unload cargo swiftly and plug in to onshore power to save fuel.

Linking Ports & Shipping

- Consider a **harmonized** set of standards, akin to the EU, that all East Asian ports and shipping companies operating in the region should achieve. The **standards need to have teeth**. There could be material repercussions or rewards for meeting the standards. Countries may want to consider using **both regulatory and incentive-based policies** to set a floor and drive upward innovation, respectively.

- **Capacity building** and **political will are key**. Once there is a blue economy plan for ports and shipping, there must be a willingness and ability among members to enact these changes. While entities such as PEMSEA and the IMO can facilitate in-person and virtual training programs to improve regional expertise, there must be buy-in by leaders at the national level to ensure that port staff and the environment and transportation sectors will have a plan to meet the relevant goals in the shipping and ports sector to bolster the blue economy.

[g] This is to reflect the diversity in structure. For example, Thailand coordinates all port-related activities at the national level, whereas Malaysia has a more decentralized, port-by-port approach.

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