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### **Pursuit of decarbonisation for Singapore's Maritime Sector**

Singapore is at the forefront of environmental efforts, being both a global leader in research and development. This is attributed to Singapore's effective planning in implementing green measures including movements to natural gas, as well as our ample financial backing to pursue such goals with relative ease. Furthermore, with good reason to pledge the clothes on our back to climate protection efforts, why have we not yet attained a carbon negative utopia? [1]

For starters, pro fossil fuel zealots still exist. Some claim that this green ideology will be the end of Singapore's economy. [2] Others, believing that Singapore seems to be a David compared to other climate Goliaths, express that scrutiny on local actions is merely pointless. [3] This is a classic example of survivorship bias, noting our per capita emissions are notably higher than the global average. Furthermore, Jurong Island's petroleum and oil refining industry makes this country the world's fifth largest refinery export hub, on top of our maritime sector ranking as one of the top five largest ship registries globally. [4] Still, greenhouse gas proliferation is a transnational concern, so it is less a matter of 50 Gigagrams (our local emission), but 50 Gigatonnes (global emission) annually.



[Image A] Photo by Tom Kleindinst, Woods Hole Oceanographic Institution

What does this mean for us? Notably, acid rain and ocean acidification. When sulfur dioxide, nitrogen oxides and carbon dioxide react with rainwater, the acid rain formed can contaminate water sources. In freshwater sources, this looks like algae blooms that reduce water oxygen content and corrode physical and natural features.[5] In oceans, water becomes nearly caustic and biodiversity drops in spades. National Geographic's magazine "The Acid Sea" reveals the irreversible damage of dissolved CO<sub>2</sub> on organism reproduction and function. This is most starkly reflected in the thinning of barnacle and other molluscs' skeletons, which raises concerns over inevitable damage on coral reefs. Besides decline in fertilization, larval development and settlement, these coral reefs will soon lose their ecological functionality and disintegrate. [6] Nascently, Singapore might need to adopt a

(system) of prioritizing global responsibility over national interest. [7] At this juncture, it would take a fool to allow the gestation period for climate action to persist, even if the global shift to cleaner marine fuels could threaten Singapore's maritime dominance.

Speaking of which, Singapore does not have a flawless track record, either. A 2019 study by the International Council on Clean Transportation reveals the staggering 148 million tonnes of CO<sub>2</sub> emitted solely from bunker sales Singapore, or three times the domestic emission — without having to absorb the responsibility. [8] Although this usage of fossil fuels is necessary to enable ships to operate over long distances, the legal loophole in international frameworks not assigning this ugly, transboundary footprint should not be exploited for any party's gain.

However, Singapore has made leaps and bounds in promoting alternative marine fuels. Under the 2050 Decarbonisation Blueprint by Singapore's Maritime Port Association (MPA), the country has worked to develop Green and Digital Shipping Corridors between other nations such as Australia along sea routes, as well as greener bunkering fuels including green methanol, ammonia and hydrogen. [9] Furthermore, port terminal operators, PSA Corporation Limited and Jurong Port have adopted smart systems to enhance operational efficiency, piloting biofuel blends and electrification for equipment and vehicles. Singapore's Registry of Ships (SRS) also has not neglected Greenhouse gas emissions arising from international voyages made by ships under the SRS, incentivising green transition for shipowners. [10]



[Image B] Photo by Jason Quah of Singapore's maritime port

What's next? Positive outlooks for global freight include state-of-the-art vessels with onboard carbon capture technology, streamlined electric charging procedures and high-yield maritime renewable energy sources. [11] With noble initiatives including the Silk Alliance, the Poseidon Principles, and the Global Industry Alliance for Marine Biosafety, surely, the

vestiges of mankind's scar should dissipate? Still, the shipping industry has been tagged a 'servant of the world economy', and trade flow changes and political turbulence may mean that nations could impede decarbonisation efforts. [12] Furthermore, solutions such as the Carbon Intensity Index have received criticism over incentivising cargo optimisation, namely that it "[distorts] trading patterns" and allows shrewd manipulation of emissions "in order to chase a rating". [13] Whilst this is but a singular, disconnected issue in the greater scheme of things, it does reveal the quagmire for a one-size-fits-all solution.

Still, this nation is in the right direction. Increased spotlight on Singapore's petrochemical and refinery industry means calls for global prices on carbon and less excuse for other nations to be all bark and no bite. [14] Climate negotiators in the United Kingdom have singled out big corporations for refusing to fundamentally transform their business models and building actual systems for transition. Anyways, the traditional fossil fuel and oil industry is now vulnerable to obliteration, which means that the maritime sector is due to 'greenify' regardless. [15]

"Idealism is fine, but as it approaches reality, the costs become prohibitive." A carbon negative utopia may never exist, but our nation must maintain pragmatism to achieve tangible outcomes.

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#### Images

[Image A] Kleindinst, T. (n.d.).

[Image B] Quah, J. (2024, January 13)