

Decarbonizing China's coastal shipping: The role of fuel efficiency and low-carbon fuels

A new study taking a first look at China's domestic coastal shipping sector and providing recommendations for actionable long-term decarbonization pathways shows that with mandatory energy efficiency standards and low-carbon fuel regulations, CO₂ emissions from China's domestic coastal shipping could peak by 2040 and fall significantly by 2060.

Two pathways are proposed for achieving the carbon peaking and neutrality goal in China's domestic coastal shipping sector:

- » With mandatory energy efficiency standards tightened every five years between 2025 and 2045 for newbuild ships, and with low-carbon fuel regulations slowly phasing in from 2030, CO₂ emissions could peak by 2040 and decrease by 56% in 2060 relative to the 2019 baseline.
- » With more stringent mandatory energy efficiency standards to be implemented between 2025 and 2045, and with low-carbon fuel regulations phasing in five years earlier (beginning in 2025), CO₂ emissions could peak by 2035 and decrease by 83% in 2060 relative to the 2019 baseline.

The low-carbon fuel regulations should be implemented no later than 2030 to provide sufficient time for development of related industry and technologies. If delayed until 2046 after expiration of mandatory energy efficiency standards, it would be dauntingly difficult to meet the decarbonization goal of the sector.

BACKGROUND

During the 75th UN General Assembly on 22 September 2020, Chinese President Xi Jinping pledged that China would commit to a strong emissions reduction target, peak emissions before 2030, and strive to reach carbon neutrality before 2060. Shipping has been slow to adopt mandatory measures to control its climate footprint compared with other transportation modes. Yet monitoring and improving energy efficiency has been favored by both the government and industry for the past decade.

Current policies are unlikely to lead to meaningful decarbonization of China's shipping sector any time soon. But the newly announced carbon peaking and neutralization ambitions could spur the adoption of additional policies to help with the transition. A first step in development of such policies is to gain a clear understanding of the shipping sector's current activities, energy consumption, and efficiency performance;

a quantified level of ambition in line with the country's 2060 carbon neutralization pledge; and a pathway that sets a reasonable pace and defines actionable policies to reach that ambition.

METHODOLOGY

To assess the baseline CO₂ emissions of China's coastal shipping sector for 2019, we identified 507 of China's coastal ships through terrestrial and satellite Automatic Identification System (AIS) data and calculated the carbon intensity and voyage distance for each major ship type, to characterize the entire fleet. Data on annual cargo moved was collected from China's annual statistical yearbook, to estimate the total transport work.

We forecasted CO₂ emissions from 2020-2060 under three scenarios: business-as-usual (BAU), 2°C -aligned and 1.5°C -aligned scenarios. For each scenario, historical data and assumptions from latest reports were collected to estimate changes in transport demand. The future fleet composition was estimated using a fleet turnover model. The influence of natural efficiency improvements, mandatory energy efficiency standards, and low-carbon fuel regulations were considered.

To demonstrate the critical need to implement low-carbon fuel regulations sooner rather than later, we estimated the results of delayed implementation and compared it with the results of implementing the regulations from 2025/2030.

FINDINGS

We estimate that without additional policies to regulate CO₂ emissions from China's coastal fleet, fleetwide CO₂ emissions would more than triple, from 45 million tonnes in 2019 to 162 million tonnes by 2060, driven by increasing demand for transport work. By applying mandatory energy efficiency and low-carbon fuel regulations, CO₂ emissions would be 56% and 83% lower than the 2019 baseline in 2060 under 2°C -aligned and 1.5°C -aligned scenarios. For both scenarios, the *fleetwide CO₂ emissions could peak before 2040.*

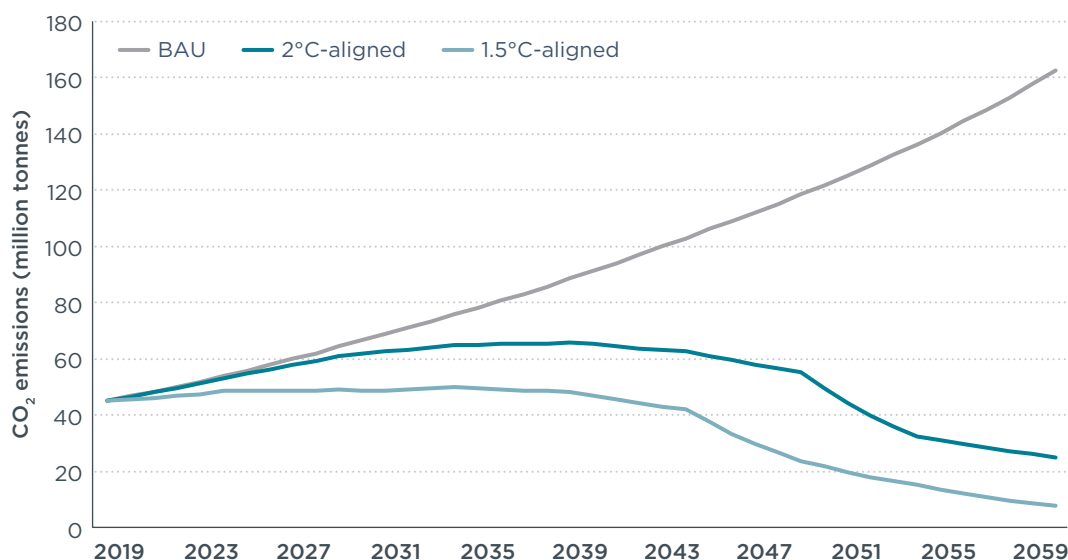


Figure 1. Combined projection of CO₂ emissions with pathways to decarbonization by 2060

We found that delaying the low-carbon fuel regulations until 2046 would pose a major challenge to industry. We modeled a delay in the low-carbon fuel regulations until 2046, essentially giving it 15 years to help the sector achieve its 2060 targets. For

both scenarios, the sector's CO₂ emission peaking would thus be delayed to around 2045. In the 2°C-delayed scenario, the industry would need to cut the carbon intensity of shipping fuel by 71% cumulatively for 15 years relative to the 2019 baseline. For the 1.5°C-delayed scenario, industry would have to cut the carbon intensity of shipping fuel by 88% cumulatively over 15 years relative to 2019 baseline. These are dauntingly high reductions that would pose a major challenge to industry.

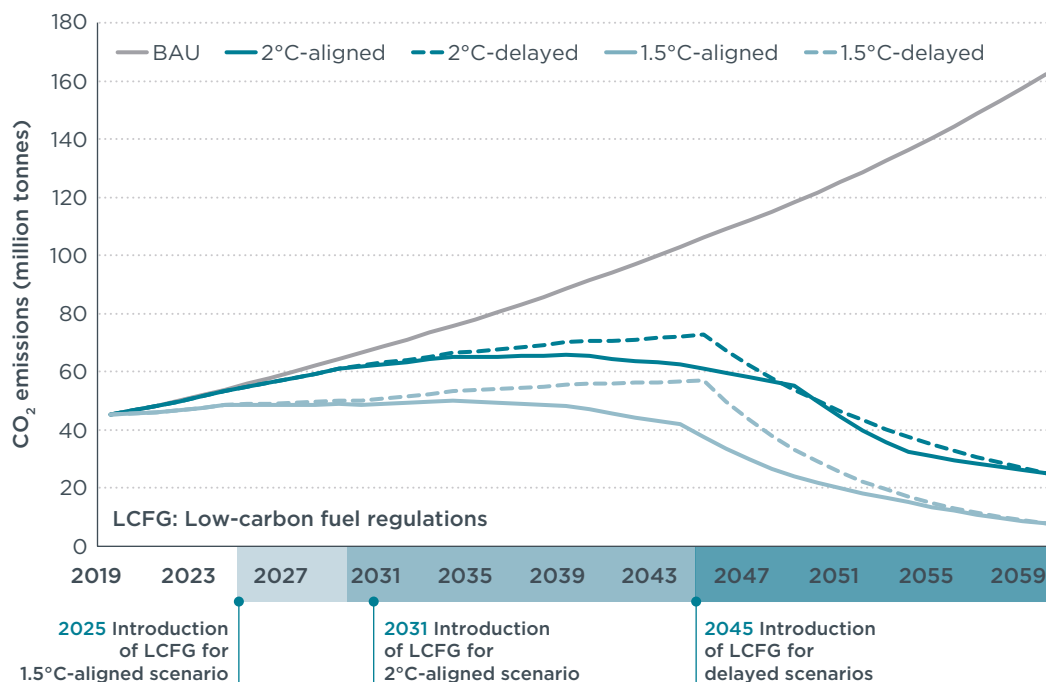


Figure 2. Impact of delayed implementation of low-carbon fuel regulations for 2°C -aligned and 1.5°C -aligned scenarios

POLICY RECOMMENDATIONS

To achieve the decarbonization goal of China's domestic coastal vessel fleet, mandatory energy efficiency standards as well as low-carbon fuel regulations are essential. Low-carbon fuel regulations should be implemented no later than 2030 to provide sufficient time for development of related industry and technologies. If delayed until 2046 after expiration of mandatory energy efficiency standards, it would be dauntingly difficult to meet the decarbonization goal of the sector.

PUBLICATION DETAILS

Title: Decarbonizing China's coastal shipping: The role of fuel efficiency and low carbon fuels

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Download: theicct.org/publication/china/decarbonizing-china's-coastal-shipping-jun22

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