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POTENTIAL PATHWAYS FOR DECARBONIZING CHINA'S INLAND WATERWAY SHIPPING

Although Chinese President Xi Jinping pledged in September 2020 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 slower to adopt mandatory measures to control its climate footprint compared with other transportation modes. Current policies are unlikely to lead to meaningful decarbonization of China's shipping sector any time soon, but the newly announced carbon peaking and carbon neutrality ambitions could spur the adoption of additional policies to help with the transition. A first step in the development of such policies is to gain a clear understanding of the shipping sector's current activities, energy consumption, and efficiency performance. After that, what is needed is a quantified level of ambition in line with the country's 2060 pledge and a pathway that sets a reasonable pace and defines actionable policies to reach that ambition.

To help, a new study commissioned by the ICCT analyzes China's inland waterway shipping sector and serves as a complement to a recent ICCT study that focused on coastal shipping in the country. In the inland shipping paper, the authors at the Center for Environmental Protection and Energy-saving Technology Research at the China Waterborne Transport Research Institute evaluated the greenhouse gas (GHG) emissions reduction potential of energy efficiency measures and the penetration of alternative fuels and propulsion technology. Their work also provides recommendations for actionable long-term decarbonization pathways for inland waterway shipping to align with China's carbon peaking and carbon neutrality targets. This fact sheet summarizes the study.

METHODS

To establish a baseline, the study estimated carbon dioxide (CO_2) emissions of China's inland waterway shipping sector for 2020 in terms of two key metrics: total transport work for cargo moved by the inland waterway fleet in tonne-km and carbon intensity of the fleet in gCO_2/tonne-km. Total transport work was collected from the industry's statistical yearbook and carbon intensity was linearly interpolated from historical carbon intensity values, which were available for the years 2008, 2017, and 2021.

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The authors then forecasted CO_2 emissions from the inland fleet from 2020 to 2060 under a business-as-usual (BAU) scenario, a 2°C-aligned scenario, and 1.5°C-aligned scenario. BAU assumed no additional policies to limit the energy use and CO_2 emissions from inland waterway shipping. Additional and tightened policies considered for in varying degrees for the other two scenarios included: (1) fleet early retirement and fleet standardization; (2) ship enlargement; (3) low-carbon fuels and use of shore power; and (4) operational efficiency improvements. Demand for transport work from China's inland waterway fleet would grow steadily under all three scenarios. However, it would not grow as fast after 2035. In the 2°C-aligned and 1.5°C-aligned scenarios, the growth rate would stabilize after 2045. Carbon intensity would keep decreasing under all three scenarios and the additional CO_2 abatement policies in the 2°C-aligned and 1.5°C-aligned scenarios would drive it down further and faster.

RESULTS

The carbon intensity of China's inland waterway fleet in 2020 was estimated to be 9.32 gCO_2/tonne-km.[1] The sector emitted about 15 million tonnes of CO_2 in 2020, or approximately 1.5% of CO_2 emissions from the country's entire transportation sector that year. Combining the future trajectories of demand for transport work and carbon intensity, total CO_2 emissions of the sector would keep growing under the BAU scenario, would peak under the 2°C-aligned and 1.5°C-aligned scenarios, and would only see meaningful reduction compared with the 2020 baseline under the 1.5°C-aligned scenario (Figure 1).

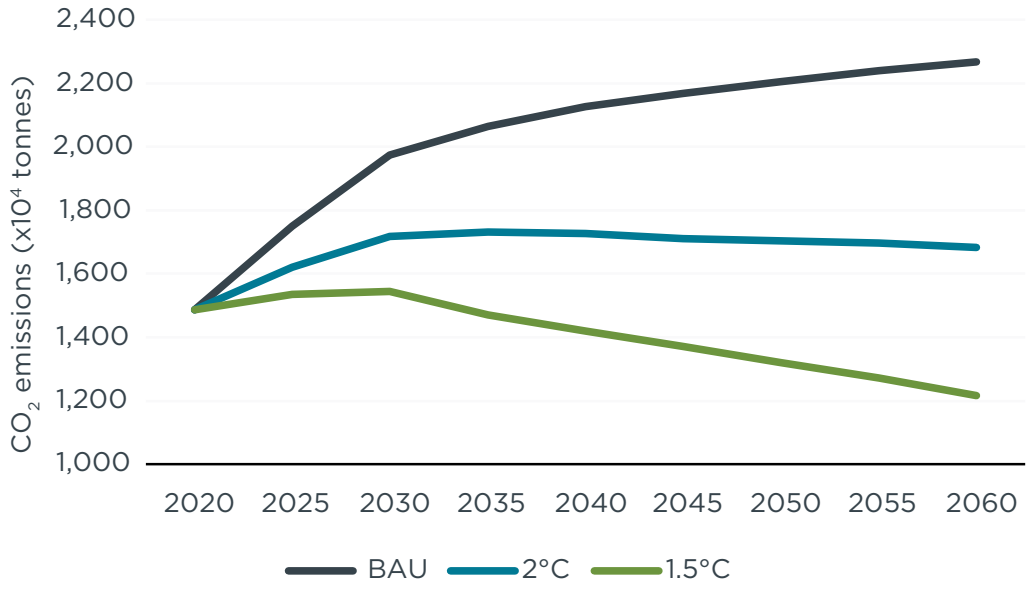

Figure 1. Projection of fleet-wide CO2 emissions of China's inland waterway shipping sector, 2020–2060.

As shown in Figure 2, of the different CO_2 abatement policies analyzed, ship enlargement would play a major role in the next 5 years, and its impact would gradually be surpassed by ship electrification, especially under the 1.5°C-aligned scenario.

1 This is equivalent to 17.3 g CO_2/tonne-nm.

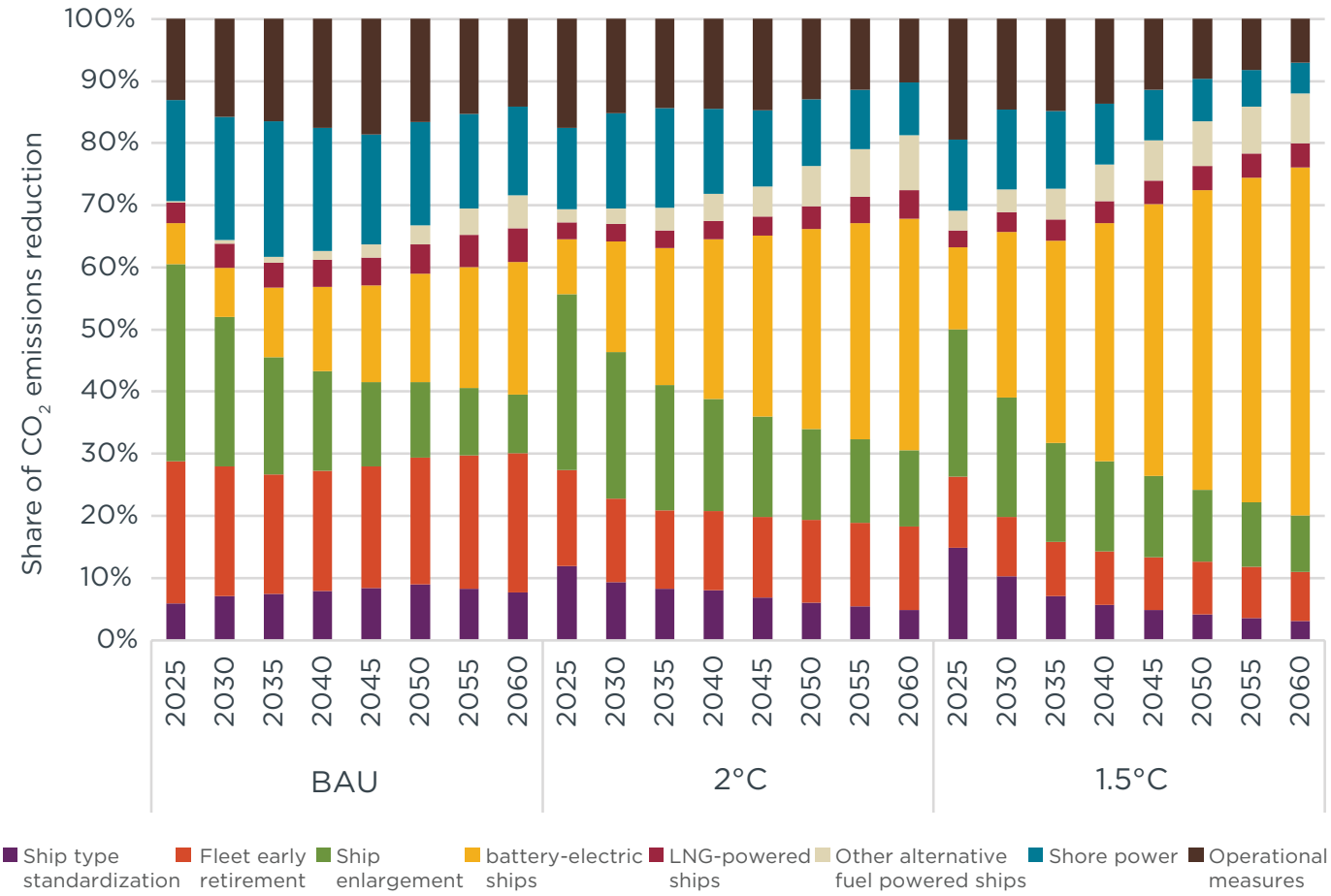

Figure 2. CO_2 emissions reduction contribution of different policy measures for three scenarios, 2020–2060.

POLICY IMPLICATIONS

The study contains several recommendations, including:

- Policy measures that promote both technological and operational solutions are needed to support the decarbonization transition of China's inland waterway shipping sector.
- Policy measures need to be introduced progressively, and each phase should prioritize different sets of solutions:
  - In the near term, policies should prioritize promoting the use of shore power and ship type standardization. At the same time, pilot projects on battery-electric ships should be accelerated.
  - In the medium term, policies should help accelerate ship type standardization and fleet early retirement and prioritize promoting market penetration of ships running on alternative fuels.
  - In the long term, policies should prioritize reducing the carbon intensity of marine fuels by accelerating the market penetration of ships running on alternative fuels, including those powered by battery electricity.

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