

Flex Factor: Assessing impacts of flexibility in a GFS

Government, Business, and Analytics
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Mærsk Mc-Kinney Møller Center
for Zero Carbon Shipping

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A note on this slide deck

The following slides are from [our second Countdown newsletter on the IMO mid-term measures \(MTM\)](#) which was published on 25 September 2024.

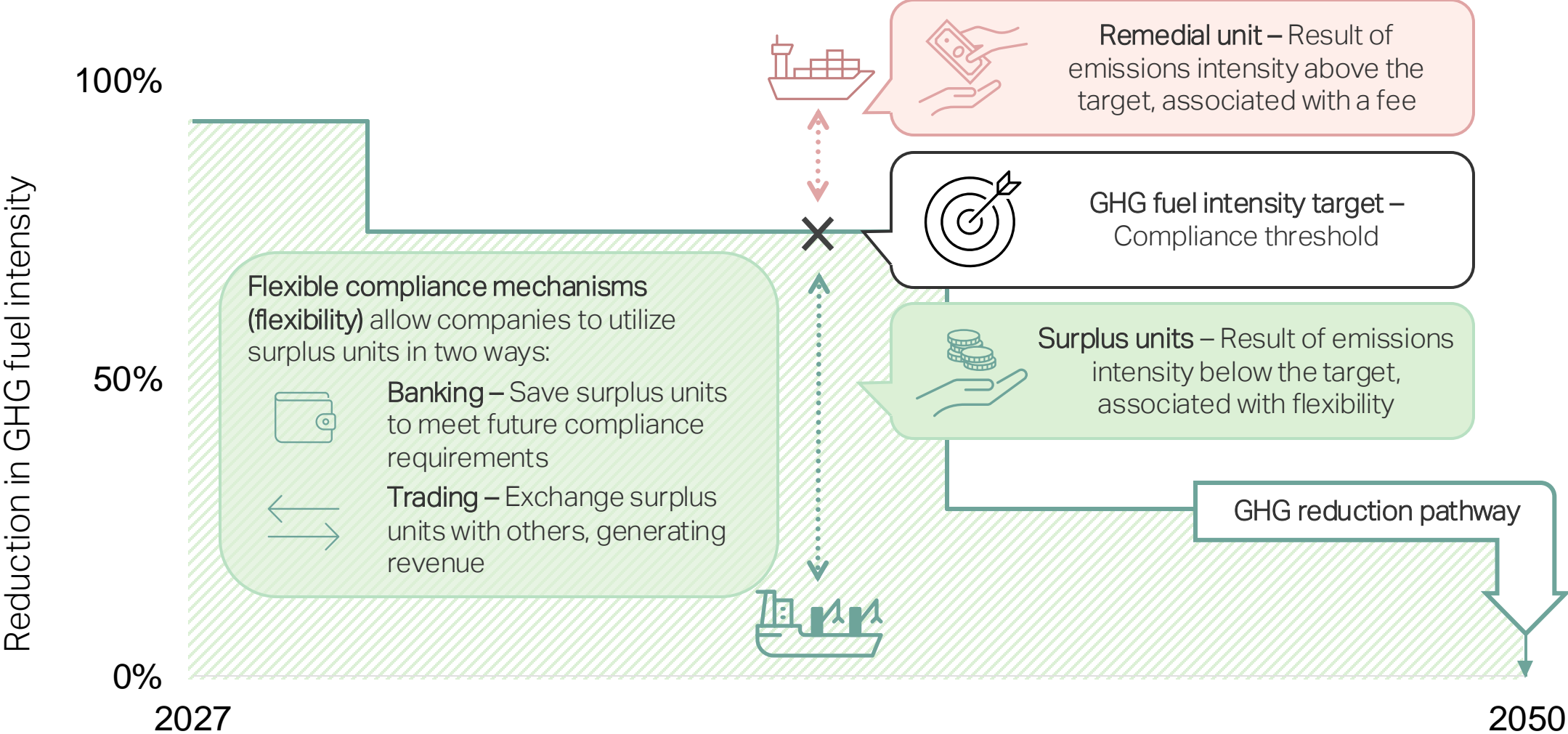
These slides are derived from our internal modeling and analysis, using a combination of public and partner data sources. Please note, however, that the results should always be tested and verified against your own internal data and standards before applying them to specific business or operational strategies.

Find more on our [IMO mid-term measures landing page](#).

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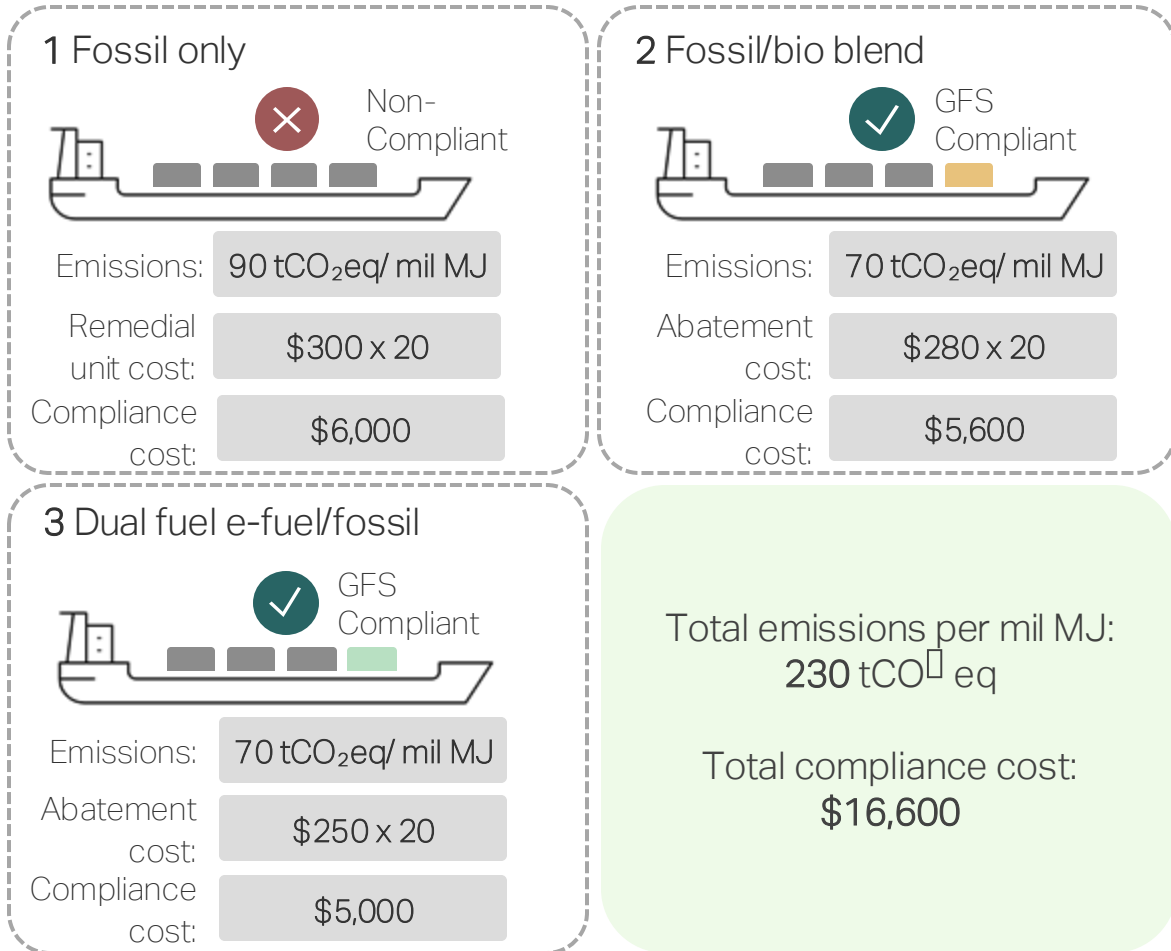


Goal-based Fuel Standard (GFS) limits the amount of GHG per unit energy

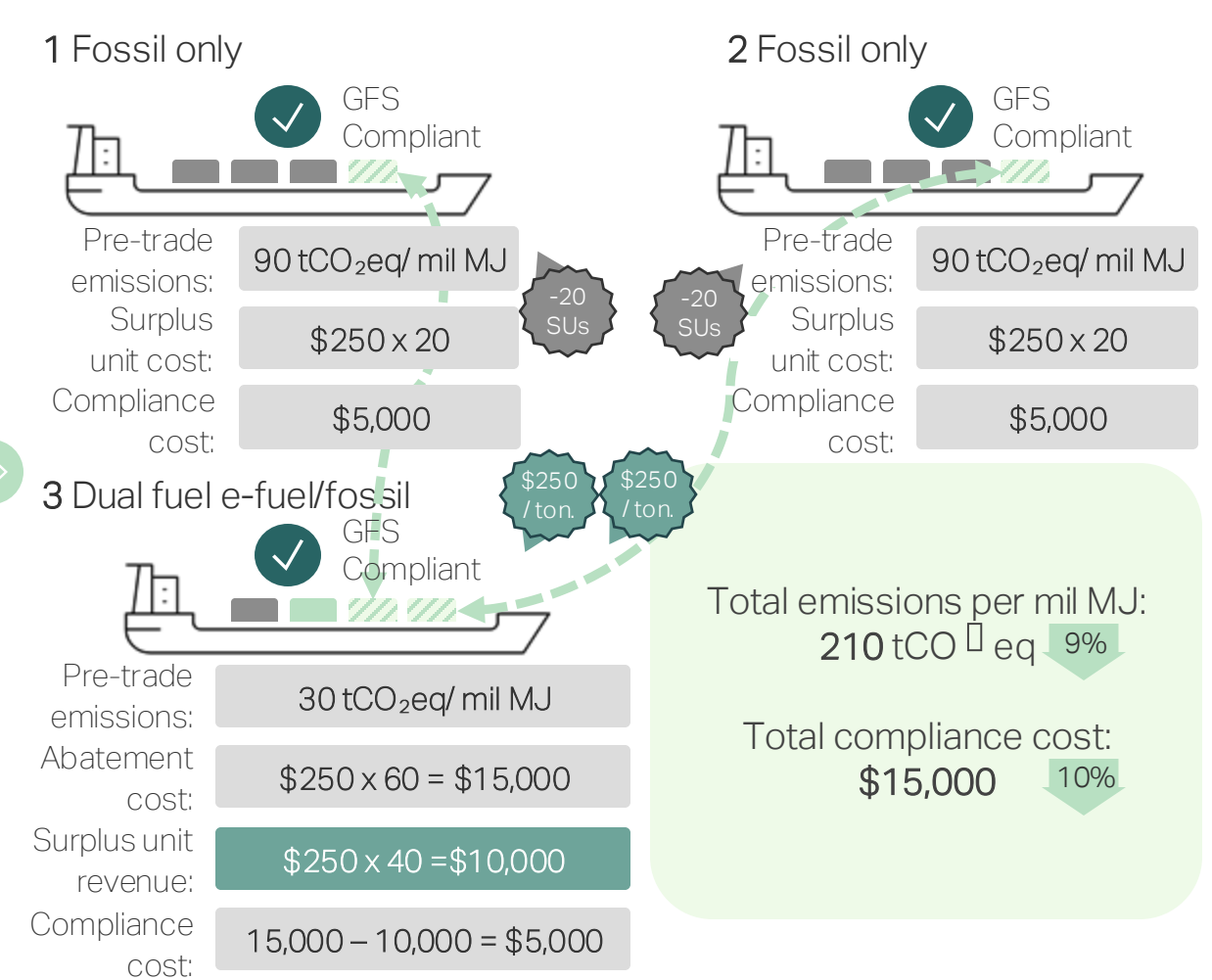


Trading Surplus Units can lower costs & incentivize sustainable fuels

GFS without trading






GFS with trading



We assume there is enough supply of the e-fuel so the price of surplus units (SUs) converges to the abatement cost. Costs are based on Fuel Cost Calculator 2030 values for e-ammonia, and biodiesel is from LR & UMAS 2020 forecast. Abatement cost includes the full range of additional costs including bunkering, OpEx, and CapEx. For simplicity, each ship uses one million MJs.

GFS with trading can build on the experience of other fuel standards

Program	Year	Country	How are compliance units generated?	Trading mechanism and platform	Impact
California Low Carbon Fuel Standard	2011		Credits are generated when transport fuel sold in the state has a GHG intensity below the annual target.	Credits can be traded between parties. A state agency manages the system for reporting transactions, generating credits, and executing trades.	Increased the volume of renewable fuels by roughly four times between 2011 and 2023 ¹ .
Dutch Renewable energy units (HBEs: <i>Hernieuwbare Brandstofeenheden</i>)	2015		HBEs are tradeable units to meet EU quotas. They are created by producing or importing renewable energy, such as biofuels, biogas, or renewable electricity.	HBEs can be bought and sold between energy suppliers. Companies use the Dutch authorities' digital portal to report data, generate HBEs, and facilitate trades.	Increased use of renewable fuels in the transportation sector, to 16% in 2020 ² .
Brazilian RenovaBio	2019		Decarbonization credits are generated by biofuel producers producing fuels with a lower carbon footprint than emissions quotas.	Distributors are required to meet targets or purchase credits traded through an authorized broker as assets on the Brazilian stock exchange (B3).	It's still early days, but a robust market for credits is already emerging. Promising early results show a boost in the share of biofuels in transportation ³ .



1. Data from Aaron Smith of the University of California Davis on the Low Carbon Fuel Standard (<https://asmith.ucdavis.edu/data/LCFS>); 2. Data from the latest available Dutch Emissions Authority's report in 2020 (<https://www.emissionsauthority.nl/topics/reports---energy-for-transport/summary-yearly-report-energy-for-transport-2020>); 3. Journal article from Ribeiro and Pereira da Cunha on economic and environmental impacts of Brazilian National Biofuel Policy from 2021 (<https://doi.org/10.1002/bbb.2326>)

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