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"Sustainable freight transport in support of the 2030 Agenda for Sustainable Development"

- Preliminary results -
What is the emissions reduction potential of short-term measures in international shipping over the period to 2030

by

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What is the emissions reduction potential of short-term measures in international shipping over the period to 2030?

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Short term measures

3. Operational carbon intensity improvements	1. **Speed regulation** *(2012 average speed / 2012 average speed -20%)*	Policy to mandate operational carbon intensity improvements
	2. **Operational efficiency standards** *(setting an AER limit: -20%, -40% or -60% below the 2008 AER average)*	
2. Further measures to increase technical efficiency	3. **Existing fleet improvement program** *(ship to invest a minimum amount in energy-efficiency technologies proportional to its fuel consumption)*	Policy to mandate technical/design efficiency improvements
	4. **Mandatory retrofit** *(only short payback measures)*	
	5. **EEDI for existing ships** *(leading to retrofits, derate engines, or scraping of non-compliant ships)*	
1. Existing measures	6. **Strengthening the EEDI for new ships** *(-30% in 2022 & -40% in 2027)*	
	7. **Further improvement of the SEEMP** *(goal setting and periodic efficiency assessment)*	Policies with no mandated stringency, that can help remove market barriers
No analysis	8. **National Action Plans**	

Assumptions & Methodology

- **Model:** UMAS GloTraM based on a profit maximisation approach (based on thorough literature review, verified by different shipping companies and regularly updated). Operational speed is a function of fuel prices, freight rates and performance.
- **Ship types analysed:** Dry (6), Gas(3), Wet crude (8), Wet chemical (3), Container(8), General Cargo (4)
- **In the Business As Usual scenario:**
  - Transport work increases (trade scenario RCP 2.6 SSP1)
  - Design efficiency increases (EEDI and market-driven)
  - Fleet profile changes (ship size, fleet renewal)
  - Profit maximisation can lead to speeding up
  - Fuel prices increase gradually
- **Quality assurance:**
  - Comparison of results with the CE Delft's emissions model and ad-hoc modelling for a number of measures

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Existing measures

- **Strengthening the EEDI for new ships** *(-30% in 2022 & -40% in 2027)*
- **Further improvement of the SEEMP** *(goal setting and periodic efficiency assessment)*

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EEDI for new ships

Background

•Many ships' attained EEDI is better than the required EEDI

•Some ship types exceed future phases on average.

•Apparently for most ship types without lowering design speeds.

•A Correspondence Group has been tasked to, amongst others:

- Recommend the implementation date for Phase 3; and
- Consider the possible introduction of Phase 4 requirements.

Design of the measure:

•The implementation of Phase 3 would commence in 2022;

•Phase 4 would be added, starting in 2027 (40% below the reference line).

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Strengthening the SEEMP: goal setting

Background

- Goal setting in the SEEMP is optional.
- Studies on environmental and energy management show that setting a goal increases the effectiveness of a strategy.

Design of the measure:

- Ships would be required to select an energy efficiency metric and to set a goal on a regular basis. Shipping companies would be free to choose an energy efficiency indicator and a goal.
- The validity of the SEEMP would need to be limited in order to require ships to regularly update goals.

Expected effect of the measure

- The policy could improve the use of cost-effective technologies.

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Strengthening the SEEMP: periodic efficiency assessment

Background

- Studies show that in many sectors, energy-efficient ships do not command higher charter rates, neither are they chartered more often.
- Studies suggest that this is partly due to incomplete information.
- A mandatory periodic assessment of efficiency would ensure that information is available in a standardised way, e.g. a speed-fuel curve.

Design of the measure

- Ships would be required to annually establish a speed-fuel curve according to a standardised method.
- This would allow charterers to take the energy-efficiency of ships into account, because they know the information is available.
- The validity of the SEEMP would need to be limited so that the assessment is made regularly.

Expected effect of the measure

- The measure would reduce the split incentive because ship owners would get higher charter rates for more energy-efficient ships.

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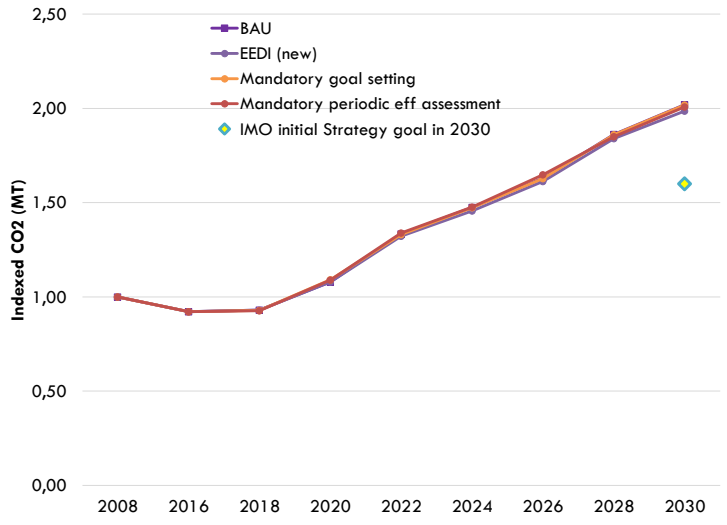

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Preliminary findings 1- existing EE measures

- **Strengthening the EEDI for new ships:** the impact of such a measure would be relatively low by 2030 (around 2% GHG emissions reduction) as it would only affects a small share of the fleet. However, its impact is expected to increase over time.

- **SEEMP:**
  - A number of policy measures could be applied to SEEMP to reduce the market barriers that can restrict investment in energy efficiency technologies.
  - Because the measures are limited to only incentivising use of technology that would be cost-effective under the expected market conditions, they are limited in how much emission reduction is achieved, so reductions are lower (1% and 2% respectively by 2030)
  - These policy measures could help to reduce transport costs because they are incentivising investment in technologies that create cost savings under current market conditions

Further measures to increase technical/design efficiency

- **Existing fleet improvement program** *(ship to invest a minimum amount in energy-efficiency technologies proportional to its fuel consumption)*
- **Mandatory retrofit** *(only short payback measures)*
- **EEDI for existing ships** *(leading to retrofits, derate engines, or scraping of non-compliant ships)*

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EEDI for existing ships

Background

- Many existing ships have a voluntary EEDI.
- Many existing ships are likely to have EEDIs above the reference line.
- Retrofits can improve the EEDI of these ships.

Design of the measure

- Require existing ships to calculate an EEDI; and meet a specified EEDI value.
  - Use existing reference lines
- Reduction percentage
  - Start with value above reference line (e.g. reference line +10%)
  - Gradually increase stringency over time
- Obligations for ships
  - Meet EEDI requirements within a specified timeframe
- Methods to meet the obligation
  - Retrofits of e.g. energy saving devices
  - Derate engines

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Existing fleet improvement programme (EFIP)

Background

- An improvement of the fuel-efficiency of the existing fleet is an important element of a strategy to reduce the GHG emissions of ships.
- This can be done through investments in technologies for existing ships (retrofits).
- There are issues with setting operational-efficiency standards that would enable a goal-based approach.
- Hence, the WSC, IPTA and BIMCO proposed a measure that would require ships to invest specific amounts in energy-efficiency improvements.

Design of the measure

- Ships would be required to set aside a certain amount of money per year. This could be invested in Energy Efficiency Bonds (EEBs).
- The EEBs can solely be used to invest in the improvement of the energy efficiency of ships.
- Flag State will check whether sufficient EEBs have been acquired and issue a certificate of compliance.
- Flag State will check that EEBs are spent on efficiency improvements (according to MEPC guidelines that will need to be developed).

Expected effect of the measure

- Will result in faster uptake in energy-efficiency technologies by existing ships.

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Strengthening the SEEMP: mandatory retrofits

Background

- A number of energy-efficiency technologies have short payback periods yet are not widely used.

Design of the measure

- This policy would require ships to install cost-effective technologies.
- An expert group would draft a list of technologies
- Ships would be required to install them, at the next drydocking, unless they can prove that the technology is not cost-effective for the specific ship.
- The validity of the SEEMP would need to be limited.

Expected effect of the measure

- More cost-effective measures would be installed.

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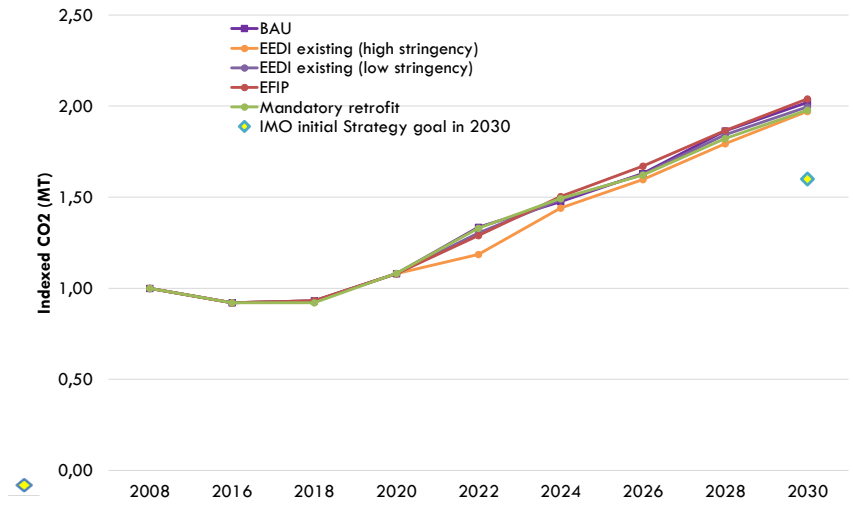

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Preliminary findings 2 – further technical efficiency measures

- The models shows that GHG reductions from **technical efficiency measures** (EEDI (existing fleet), EFIP, mandatory retrofits) are in the range of 1 to 4% of by 2030 and insufficient to meet alone the 2030 carbon intensity objective. These findings are in line with studies on the potential of retrofits.
- GHG reductions from technical efficiency measures are exposed to a possible rebound effect (through speed increase), which can reduce their effect by half.
- Their impact is also relatively low because investments in energy efficiency measures are already included in the BAU scenario and because non cost-effective investments are mostly excluded.

Policies to mandate operational carbon intensity improvement

- **Speed regulation** *(2012 average speed / 2012 average speed -20%)*
- **Operational efficiency standards** *(setting an AER limit: -20%, -40% or -60% below the 2008 AER average)*

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Operational efficiency standards

Background

- Proposals have been made to MEPC to develop operational efficiency standards for ships, based on data collected in the Data Collection System.
- One example of how this could be implemented is:
  - Operational energy efficiency reference lines could be calculated.
  - Ships would be required to meet or exceed a minimal operational energy efficiency, defined as a distance to the reference line.
- The metric for an operational efficiency standard we have focused on is AER, but this does not presume this would be the optimal metric

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Speed regulation

Background

- Much of the improvement in energy efficiency between 2008 and 2012 has been caused by voluntary slow steaming.
- There are indications that ships are speeding up again on average, which would make it harder to reach the goals of the Initial Strategy.
- Further reductions in speed are technically possible. They yield emission reductions, even when taking into account that more ships are needed to meet transport demand.

Design of the measure

- Ships would need to keep their speed below a limit value which depends on the ship type and size.
- Ships report their speed to the Flag State, e.g. on the basis of AIS records, and the Flag State checks whether the ship has complied.
- In addition, Port States can require ships to submit evidence that they have complied on the voyage to the port.

Expected effect of the measure

- More ships, sailing slower, collectively emitting less.

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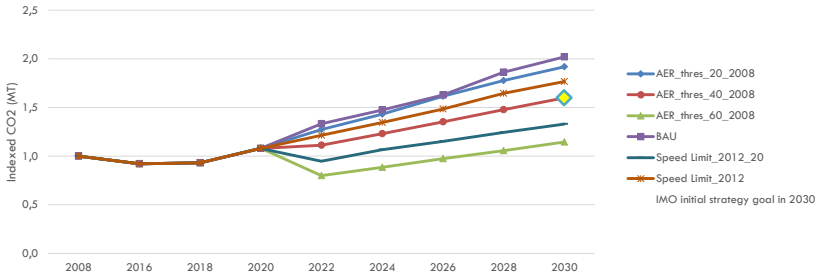
Preliminary findings 1 - speed limits and op eff.



	Measures assessed	% difference in cumulative emissions reduction up to 2030	% difference in 2030 relative to the BAU scenario
mandate operational carbon intensity improvements	AER_thres_20_2008	**3%**	**5%**
	AER_thres_40_2008	**14%**	**20%**
	AER_thres_60_2008	**31%**	**43%**
	Speed Limit_2012_20	**23%**	Up to **34%**
	Speed Limit_2012	**8%**	Up to **13%**

Preliminary findings 1 - speed limits and op eff.

- **Operational efficiency standards and speed regulation** have a large potential for GHG emission reduction across the fleet in the 2020-2030 period.
- Why?
  - Large scope: measures applicable to all ships.
  - High reduction potential: power is proportionate to the cube of speed
  - Prevent possible future speed increase
  - Low additional CO2 emissions from the increased size of fleets needed to meet transport demand.
- Only the operational efficiency standards and speed regulation scenarios modelled have the potential to ensure that Objective 2 of the IMO Initial Strategy is achieved (at least 40% Reduction in carbon intensity by 2030).
- Operational efficiency standards of 40% below 2008 levels achieve similar emission reduction to limiting speeds to 2012 levels, but with higher average speeds in 2030 - because the policy also incentivises technical efficiency which contributes to the emission reduction. However, it requires the availability of politically acceptable indicators.

Key findings

Key findings

- Existing policy instruments have only a small impact on emissions and carbon intensity on the short-term because the EEDI only applies to new ships and the SEEMP currently does not mandate changes in design or operations.
- Measures that mandate technical changes have a larger impact on emissions and carbon intensity. Depending on how many cost-effective measures have already been taken, the impact on emissions is at least twice as large as the EEDI and SEEMP, but could be larger. Still, these measures would not meet the 2030 ambition by themselves.
- Policies that change operational practices are able to meet the 2030 ambition. These can be speed regulation or operational efficiency standards.

Main caveats

- BAU projections indicate strong improvements in technical (design) efficiency between 2012 and 2020 because many measures are cost-effective (efficiency devices, hull coating, et cetera). If the BAU projections are off, the relative impact of technical measures increases.
- BAU projections in the UMAS model show an increase in operational speed. Other models show different trends. If speeds would not increase, the relative impact of speed- and operational measures would be smaller.
- Model results depend on the technologies included in the MACC curve and their parametrisation. If new, cheap, effective technologies emerge, measures may have larger results. If the parametrisation is too optimistic, some measures may have smaller impacts.

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Thank you for your attention

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