Air Pollution and Energy Efficiency

Proposition of the United States to enhance energy efficiency in international shipping

Submitted by the United States

**SUMMARY**

*Executive summary:* The United States is submitting a new version of its proposal for the establishment of attained energy efficiency standards for new and existing ships through a phased approach for consideration under MEPC agenda item 4. This version looks more closely at how best to design a standard that encourages technical and operational efficiency measures and includes several changes intended to simplify and improve the programme more broadly. Some of the changes made in this version include: a proposal to measure efficiency in terms of joules of fuel energy; a proposal to use "service hours" as the surrogate for "work" in the efficiency calculation; removal of the concept of attained technical efficiency; removal of the collection of data on weather conditions; inclusion of the rating system as an optional element of the programme; and addition of new details on the process for data collection, submission, and verification.

*Strategic direction:* 7.3

*High-level action:* 7.3.2

*Planned output:* 7.3.2.1

*Action to be taken:* Paragraph 28

*Related documents:* MEPC 64/23, MEPC 64/5/6; MEPC 62/5/8, MEPC 62/5/1, annex 3; MEPC 61/INF.24, MEPC 61/5/16; MEPC 60/4/12 and MEPC 59/4/48

**Introduction**

1 The United States first proposed a way forward for addressing ship energy efficiency at MEPC 59 and that proposal has been revised several times in response to comments received. In the United States' most recent submission (MEPC 64/5/6), the proposal was restructured into a phased approach and Ship Efficiency Credit Trading (SECT) became an
optional addition. The United States received significant positive feedback on that submission, as well as requests to draft a new version with more detail on the data collection system, for consideration under agenda item 4. Even though SECT could still be used with this version of the proposal, its core is the establishment of standards that encourage feasible improvements in technical and operational energy efficiency. With that in mind, and with the changes made herein, the United States is submitting this version of the proposal for consideration under agenda item 4, "Air pollution and energy efficiency".

2 In addition to having a narrower focus on the data collection system and the energy efficiency standards, this proposal also includes several changes intended to simplify and improve the programme. Some of the changes made in this version include: a proposal to measure efficiency in terms of joules of fuel energy; a proposal to use "service hours" as the surrogate for "work" in the efficiency calculation; removal of the concept of attained technical efficiency; removal of the collection of data on weather conditions; inclusion of the rating system as an optional element of the programme; and addition of new details on the data collection, submission, and verification process.

3 The basic approach of the programme has not changed. Its purpose is to drive improvements in the energy efficiency of new and existing ships, thus resulting in cost savings to shipowners and operators as well as significant reductions in air emissions. Key decisions would be made only after reliable data is collected and assessed and adjustments to the programme could be made as necessary and on the basis of expert recommendations and mandatory reviews. Such "checks" are intended to ensure that the programme is responsive to lessons learned during each phase as well as to relevant changes to the global economy and the international maritime industry. The proposal has been carefully designed to work for the environment without negatively impacting international trade or the international maritime industry.

Overview of significant changes to MEPC 64/5/6

4 Proposes new surrogate for "work". Document MEPC 64/5/6 calculated the attained efficiency of a ship by dividing tonnes of CO₂ emitted by tonne miles of cargo carried. Given the lack of a universal measure of cargo carried and concerns about the amount of effort that could be required to collect the necessary data, this version of the proposal suggests an alternative surrogate for "work" that avoids use of cargo data. While cargo has been removed from the energy efficiency calculation, cargo remains implicit in this proposal, however. Market forces lead operators to take comparably efficient strategies for a given vessel type and size. Since the standards would be expressed as a function of DWT and differentiated based on vessel type, cargo carried would be reflected.

5 The United States now proposes to express "work" in terms of hours of operation. This measure was chosen because it would be simple to track and verify. It would also reflect the impact of critical operational measures – in particular, slow steaming – more strongly than distance, which is another potential alternative surrogate for work. The data collection procedures for hours of operation could also be less burdensome than for distance. That said, the United States recommends careful consideration of both of these potential measures, as well as of any other alternative proposed.

6 Proposes to measure efficiency in terms of joules of energy. Other versions of the United States' proposal for attained energy efficiency standards have measured the efficiency of a ship by dividing tonnes of CO₂ emitted by tonne miles of cargo carried. This version proposes that the Committee consider use of joules of fuel energy instead of tonnes of CO₂. Using joules of fuel energy could have several benefits. Joules provides a uniform and technically accurate way of comparing energy use for ships in different types of service.
and using different fuels. This is particularly relevant for alternative fuels. In addition, measurement of fuel energy creates a built-in incentive for non-fuel energy efficiency measures such as solar or wind power, which supplement a ship’s power in a way that causes it to consume less fuel. Finally, the value of the energy content of the fuel could be established through simple measurement or use of a published reference value.

7 Removed the concept of "Attained Technical Efficiency". Document MEPC 64/5/6 provided two options for determining a ship’s attained efficiency. The preferred option was to measure the ship’s actual fuel consumption over time. The second option was to determine a ship’s "attained technical efficiency" on the basis of testing during a sea trial. It was intended to provide a fallback option to determine efficiency standards in the case that the data collected during Phase I does not support the establishment of energy efficiency standards derived from baseline curves.

8 The concept of attained technical efficiency has been removed from the proposal due to concerns that the tests could result in significant extra burden. While a benchmarking approach that sets standards derived from baseline curves remains the strongly preferred option, this version of the proposal now contains a new fallback. If standards derived from baseline curves prove to be unworkable, MEPC could decide to develop ship-specific energy efficiency standards. Ship-specific standards would require that each ship improve its own efficiency by a certain percentage over a given time period. Any such standard would need to account for early action in order to avoid penalizing ships that had already undertaken significant efforts to improve energy efficiency.

9 Removed data collection on weather conditions. Document MEPC 64/5/6 called for the consideration of the need to collect information on sea states, wind, water density, and currents. Some expressed concerns about the need for such data, given that the impact on efficiency of those factors is likely to average out over the course of a multi-year verification period. There were also concerns about the additional burden that such collection would entail. For those reasons, consideration of that data was removed.

10 Added new details on the process for data collection, submission, and verification. This submission includes additional details on the anticipated process for collection, submission and verification of the data necessary for the programme. It streamlines and simplifies the data required. It clarifies that verification would be undertaken during routine surveys and explains that aggregated, not voyage-specific data would be submitted by shipowners or operators directly to a centralized electronic database, thereby minimizing additional burdens on all parties. Given the aggregation of data and removal of cargo information from the calculation, this database could be made publicly accessible, making the programme fully transparent without negatively affecting market dynamics. The database would likely be funded through donor contributions, commissioned by IMO, and managed by a contracted organization.

Summary of the Proposal, as modified

Phase I: Data Collection and Analysis Phase

Data Collection, Submission, and Verification

11 Phase I would commence upon entry into force of an initial set of amendments to MARPOL Annex VI. Each ship of 400 gross tonnage and above, engaged in international voyages, would be obligated to collect data on an annual basis on (a) joules of fuel energy consumed and (b) hours in service. Hours in service would be defined as the hours the ship is underway, in cruise or maneuvering modes, whether it is carrying cargo or is in ballast. Hours of service could be documented in many ways, ranging from sophisticated computer
monitoring to basic ship logs. In any case, hours of services would need to be attested to by the ship master for verification purposes.

12 On an annual basis, the shipowner or operator would be obligated to calculate the ship's attained efficiency by dividing total fuel consumption (expressed in joules of fuel energy) by the total service hours.

13 Each year and for each ship, the shipowner or operator would be required to submit directly to a centralized database created for that purpose the following data:

- fuel energy consumed, expressed in joules (aggregated for the year);
- hours of service;
- attained efficiency (calculated as explained above); and
- basic data: ship name, IMO number, deadweight tonnage, and flag Administration.

14 The shipowner or operator would also be required to compile the information listed above in an annual report that would be required to be kept on board until the next statutory survey of that ship. During statutory surveys, the flag Administration or a recognized organization, on behalf of the flag Administration, would verify the data in the report, submit an electronic notice of verification to the centralized database, and note the ship's attained efficiency in its International Energy Efficiency Certificate (IEEC). The centralized database and shipboard records would facilitate checks of information by port States, which would be able to conduct port State control in the same manner as allowed for other MARPOL requirements.

Development of Baseline Curves
15 After two years of data had been collected from ships, MEPC, through an expert group, would conduct analysis and establish baseline curves that best reflect the data for each ship type. Two years would be long enough to allow for short-term fluctuations in operations and energy efficiency to average out. While all ship types and sizes would be required to participate in the data collection process, the development of baseline curves and attained efficiency standards may be limited to a smaller set of vessel types and sizes. At least the same ship types and sizes subject to the requirements for Energy Efficiency Design Index (EEDI) would be subject to these standards.

16 The expert group would make a recommendation to the MEPC as to whether the data supports the establishment of energy efficiency standards derived from the baseline curves. If the expert group determines that the data does not support such establishment, and the MEPC agrees, the MEPC would then shift to the consideration and development of ship-specific standards. Note: The remainder of the submission does not discuss ship-specific standards but the basic framework could still be used.

Development of Attained Efficiency Standards
17 If the expert group determines that the data supports development of standards derived from baseline curves, then it would make recommendations for the initial standards, which would be percentage improvements from the baseline curves. Based on data analysis, the expert group would recommend whether the required improvements would be the same for all ship types or differentiated by ship type. The expert group would also consider available technical and operational measures in order to develop a plan to increase the stringency of the standards over time. The stringency should be revised at no less than five-year intervals, in accordance with the typical schedule for drydock exams and shipyard availability.
Verifying Achievement of the Standard

18 The time between increases in stringency would be divided into "verification periods". The purpose of the verification period would be to periodically verify achievement of the standard. The expert group would make recommendations regarding the length of verification periods. They should be long enough to even out fluctuations in energy efficiency caused by various factors, including varying weather and load, and to provide flexibility to shipowners and operators to occasionally run their ships at a lower efficiency when needed for commercial or logistical reasons. The United States expects that verification periods would be no less than two and no more than five years long. The MEPC would review the work of the expert group and take a decision to establish, on a preliminary basis, baseline curves, initial standards, a plan for increasing the stringency of the standards over time, and the length of verification periods.

Phase II: Pilot Phase

19 Following preliminary approval of the attained efficiency standards by MEPC, the pilot phase would begin. Ships would be evaluated against the standards during Phase II, but they would not be required to achieve them. In this way, Phase II would be a "test-run" of the standards that gives MEPC the chance to evaluate the standards in practice and make adjustments as necessary. It would also provide shipowners and operators with an extra cushion of time to improve the energy efficiency of their ships.

Data Submission

20 During Phases II and III, shipowners and operators would be required to continue to submit data on an annual basis, as required in Phase I. At the end of the first – and every subsequent – verification period, shipowners and operators would be required to calculate the cumulative attained efficiency value for the whole verification period, for each ship. This value would be compared to the standard applicable for each ship in order to determine if the ship met the standard.

21 Following the completion of the first verification period in the pilot phase, MEPC would begin conducting a general review of the programme. MEPC would consider whether it is necessary to recalculate the baseline curves (e.g. if global economic conditions changed substantially), adjust the standards (e.g. if they were too stringent), or to make any other necessary changes. MEPC would then develop and adopt another set of amendments to MARPOL Annex VI to codify the programme, including all changes resulting from the review, and to make achievement of the standards mandatory.

Flexibility

22 Initially, there may be some ships that fail to meet the standard by a large margin. Various flexibility mechanisms could be permitted, such as allowing "outlier" ships additional time to achieve the applicable standards or providing exemptions for ships that are to be removed from service shortly after the establishment of the standards.

Rating System

23 In order to provide a simple indicator of the ship's energy efficiency, MEPC could also put in place an energy efficiency rating system. The rating system could be used by shipowners and operators to communicate the energy efficiency of their fleet to potential clients. The rating could be noted on the ship's IEEC and in the centralized database. The ratings could potentially be assigned as follows:

- "A" ratings could be given to ships that exceed the standard by at least [x%];
- "B" ratings could be given to ships that exceed the standard by less than [x%];
- "C" ratings could be given to ships that miss the standard by less than [x%]; and
- "D" ratings could be given to ships that miss the standard by more than [x%].
Phase III: Full implementation

Phase III would commence upon entry into force of the amendments to codify the programme and make achievement of the attained efficiency standards mandatory. If a ship did not meet its applicable standard (or take advantage of an available flexibility measure) the ship would be subject to existing enforcement and control, as for other mandatory requirements under MARPOL Annex VI.

For Further Consideration

Expectations of EEDI-compliant ships

This proposal would apply to both new and existing ships. If EEDI-compliant ships operate in an efficient manner, they should exceed the applicable standard. If they do not, the review in Phase II provides an opportunity to look closely at their performance and make adjustments to the attained energy efficiency programme, if necessary.

Further Reviews

While the review at the end of Phase II provides an opportunity to make adjustments to the regulations before achievement of the standards becomes mandatory, the United States recognizes that there may be a need to make further adjustments after Phase III begins, perhaps to take into consideration the impacts of a global economic recovery. To prepare for such a situation, there could also be reviews after every [x] number of verification periods. Such reviews would, for example, allow the MEPC to recalculate the baseline curves to reflect changing economic circumstances, if necessary.

Next Steps

The United States believes that the MEPC should begin a discussion on attained energy efficiency standards based on the approach laid out in this proposal. Many elements of the proposal, including the proposed energy efficiency metric and the choice of the measure of "work," could benefit from further consideration and refinement by the Committee. Regardless of what MEPC decides with respect to the details of the energy efficiency programme, however, the foundation of the proposal is the establishment of a strong data collection, submission, and verification system.

Action requested of the Committee

The Committee is requested to consider the proposal and to take action, as appropriate.