

Implementing a Ship Energy Efficiency Management Plan (SEEMP)

Guidance for shipowners and operators

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1. Introduction

These guidance notes provide advice to shipowners and operators who wish to implement a Ship Energy Efficiency Management Plan (SEEMP) early on a voluntary basis, or prepare themselves for its mandatory implementation from January 1st, 2013. The guidance reflects the current status of the IMO regulations and provides information on the structure of a SEEMP as well as optional SEEMP services offered by Lloyd’s Register.

2. SEEMP purpose

The SEEMP is a management tool to assist shipowners in managing the energy efficiency of their ships. It is applicable on a voluntary basis at present and is designed to provide the framework, against which, a shipowner can develop best practice and energy efficient operations. The IMO will introduce the SEEMP as a mandatory tool under MARPOL Annex VI, entering into force on January 1, 2013.

3. IMO background

The International Maritime Organisation (IMO), as the main regulatory body for shipping, has, in recent years, devoted significant time and effort in order to regulate shipping energy efficiency and thereby control the marine GHG emissions. For this purpose, IMO has developed a number of technical and operational measures that include:

- Energy Efficiency Design Index (EEDI);
- Energy Efficiency Operational Index (EEOI);
- Ship Energy Efficiency Management Plan (SEEMP).

The IMO has also been working on a number of Market-Based Measures (MBMs) for the marine industry. The MBMs development is still ongoing.

The EEDI represents one of the major technical regulations for marine CO₂ reduction and the IMO, under the banner of the Marine Environmental Protection Committee (MEPC) and its associated Energy Efficiency working group, has been finalising the regulations and guidelines for the EEDI with input from each of the various flag states and other industry bodies. Figure 1 shows the MEPC’s activity timeline.

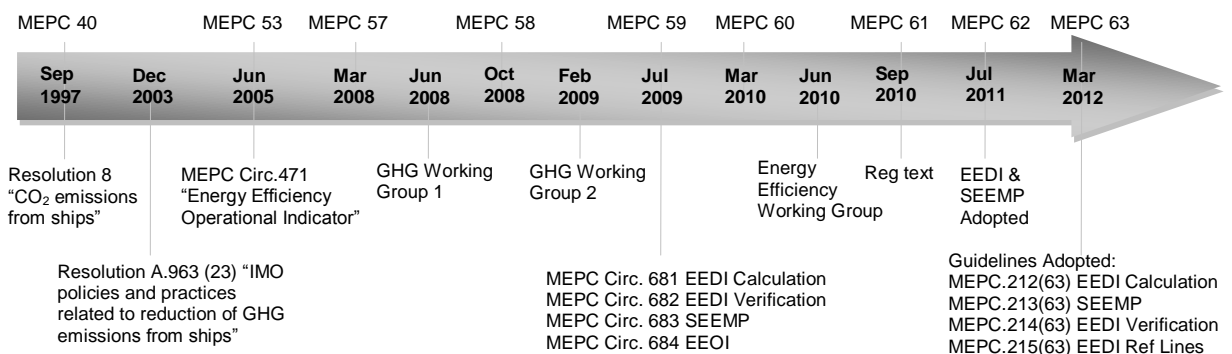


Figure 1: MEPC and Working Group Timeline

4. Current state of IMO regulation and SEEMP

At MEPC 62 in July 2011, the mandatory implementation of the EEDI and SEEMP was agreed. The SEEMP will form part of MARPOL Annex VI and the requirement will be applicable to all ships, both new and existing, of 400 gross tonnage and above, whereby each ship will be required to keep a SEEMP onboard. The proposed amendments to MARPOL Annex VI will enter into force on January 1, 2013 and they include a new chapter, “Chapter 4, Regulations on energy efficiency of ships”. The SEEMP shall be developed taking into account guidelines adopted by IMO (currently these guidelines are Resolution MEPC.213(63) – 2012 Guidelines for the Development of a Ship Energy Efficiency Management Plan (SEEMP) and they replace previous guidelines, MEPC.1/Circ.683).

Compliance with the proposed MARPOL Annex VI Regulation 22 (SEEMP) will be demonstrated in the International Energy Efficiency (IEE) Certificate, which also forms part of the proposed MARPOL amendments, and will be subject to the usual MAPROL surveys (initial, renewal, intermediate, annual etc.).

5. SEEMP main features

Shipping is a relatively efficient mode of transport compared to land and air when you consider the CO₂ emissions produced per mile that each tonne of cargo is transported. However, shipping is also coming under increased scrutiny to lower its GHG by the international community and, under its remit, the IMO is looking at promoting measures to control these by improving ship efficiency through better management and implementation of best practice. The SEEMP provides a means to formally capture processes by which a shipowner can seek to improve the environmental efficiency aspects of their operations both onboard each of their ships as well as company-wide.

The SEEMP is a ‘live’ document, containing energy improvement measures identified by the ship owner, that will be kept onboard each ship. The document will be reviewed regularly to establish the relevance and impact of each measure on ship and fleet operations. Each SEEMP will be ship specific but should be linked to a broader corporate energy management policy of the shipowner.

In some cases, the SEEMP may form part of the ship’s Safety Management System (SMS) and many shipowners will already have an Environmental Management System (EMS) under ISO 14001 which contains relevant practices for environmental improvement that may augment the SEEMP.

There are four key processes that the SEEMP must address and describe and together they form a continuous improvement process as shown in Figure 2. Each process, taken from the SEEMP Guidelines (MEPC.213(63)), has been summarised in the following sections.

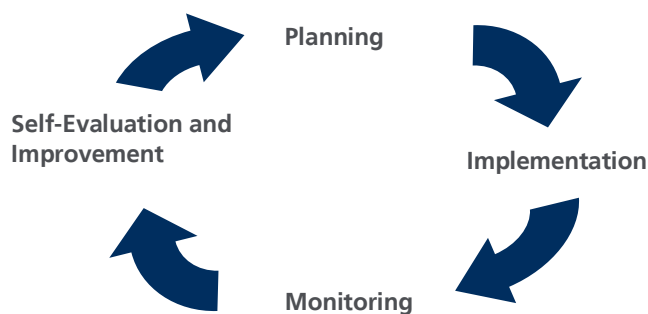


Figure 2: SEEMP processes

5.1 Planning

As part of each SEEMP, the ship owner is required to review current practices and energy usage onboard each ship with a view to determining any shortfalls or areas for improvement of energy efficiency. This is a crucial first step to developing an effective management plan and should identify various aspects relating to:

- **Ship-specific measures**
For example: speed optimisation, weather routing, hull maintenance, machinery operation.
- **Company-specific measures**
For example: improved communication and interaction with other stakeholders, such as charterers in order to assess feasibility of 'just in time' operation or traffic management services for availability of berth etc.
- **Human resource development**
Awareness and training of personnel is critical in ensuring successful implementation of any measures.
- **Goal setting**
This aspect is voluntary but serves as a means for a shipowner to provide incentive for energy reduction both at ship level but also at corporate level. This is not subject to external inspection.

5.2 Implementation

Upon completion of the planning stage, a system of how each energy improvement measure is to be implemented needs to be developed. The development of the system can be considered under the planning stage and should set out the tasks required to achieve each measure along with who is assigned to them.

The implementation itself needs to be in accordance with the implementation system and should involve a system of record-keeping.

5.3 Monitoring

The only way to assess whether the energy improvement measures are working is to quantitatively monitor each one. A shipowner may have existing systems in place to do this although monitoring should be carried out using established methods, preferably by an international standard.

The SEEMP guidance (MEPC.213(63)) recommends one internationally established tool in particular, that can be used for monitoring; the Energy Efficiency Operational Indicator (EEOI). This has been developed by the IMO to quantify the energy efficiency of a ship in terms of CO₂ production per cargo tonne-nautical mile (g CO₂ / t.nm) and its use and calculation is given in MEPC.1/Circ.684. In addition, it suggests that, if appropriate, a Rolling Average Index of the EEOI may be used to monitor energy efficiency of the ship over time.

5.4 Self-evaluation and improvement

This is the final stage in the cycle and is the means by which each measure can be assessed and the results fed into the planning stage of the next improvement cycle. Self-evaluation and improvement not only identifies how effective each energy improvement measure is, but it also determines whether the process by which it is implemented and monitored is suitable and how it can be improved. Each measure needs to be evaluated individually on a periodic basis and the results should be used to understand the level of improvements seen for each ship.

6. Methods for energy improvement

MEPC.213(63) provides 'Guidance on Best Practices for Fuel-Efficient Operation for Ships' which details a number of energy improvement methods for potential adoption within each ship's SEEMP. These are summarised below.

Category	Improvement method	Description
Fuel Efficient Operations	Improved voyage planning	Careful planning and execution of voyages.
	Weather routeing	Potential efficiency savings using routeing tools from existing providers.
	Just in time	Optimise speed based on early communication with next port on berth availability.
	Speed optimisation	To minimise fuel consumption, taking into account engine manufacturers optimal settings and arrival times/availability of berths at port.
Optimised Ship Handling	Optimised shaft power	Efficiency can be improved by setting constant RPM.
	Optimum trim	Operating at optimum trim for specified draft and speed.
	Optimum ballast	Ballasting for optimum trim and steering conditions.
	Optimum propeller and propeller inflow considerations	Possible retrofitting of improved propeller designs and/or inflow modifiers such as fins or ducts in order to improve efficiency.
	Optimum use of rudder and heading control systems (autopilots)	Reducing distance sailed 'off track' and minimising losses caused by rudder corrections. Possible improvements through retrofitting optimised rudder designs.
Hull Maintenance		Use of advanced coating systems, better management of cleaning intervals and underwater inspection.
Propulsion System	Propulsion system maintenance	Systematic minimisation of heat and mechanical loss through routine maintenance and optimisation.
Waste Heat Recovery		Thermal heat loss from exhaust gases to generate electricity or propulsion via shaft motors.
Improved Fleet Management		Better utilisation of fleet capacity and use of 'best practise'.
Improved Cargo Handling		Cargo handling matched to ship and port requirements.
Energy Management		Review of energy usage such as electrical and HVAC systems.
Fuel Type		Potential use of emerging alternative fuels.
Other Measures		Computer software to calculate fuel consumption; use of renewable energy technology; use of shore power.

Table 1: Methods for energy improvement within SEEMP

Appendix 1 – Useful references

1. International Maritime Organisation, Marine Environment Protection Committee, 2012 Guidelines for the Development of a Ship Energy Efficiency Management Plan (SEEMP), MEPC.213(63);
2. International Maritime Organisation, Marine Environment Protection Committee 61st Session Agenda Item 5, Report of the outcome of the Intercessional Meeting of the Working Group on Energy Efficiency
3. Measures for Ships, MEPC 61/5/3, July 2010;
4. International Maritime Organisation, Marine Environment Protection Committee, Guidelines for voluntary use of the Ship Energy Efficiency Operational Indicator (EEOI), MEPC.1/Circ.684, 2009;
5. Intertanko, Guide for a Tanker Energy Efficiency Management Plan (TEEMP).
6. Oil Companies International Marine Forum (OCIMF), Energy Efficiency and Fuel Management.

Appendix 2 – Frequently asked questions

1. Do we have to have a SEEMP?

Not at present. Following MEPC 62, the SEEMP will become mandatory from January 1, 2013, when the amendments to MARPOL Annex VI enter into force.

2. If the SEEMP is incorporated into the SMS, will this mean it falls under ISM legislation even before the SEEMP is made mandatory?

Not at present. Following MEPC 62, the SEEMP will become mandatory from January 1, 2013, when the amendments to MARPOL Annex VI enter into force.

3. Will the SEEMP be subject to public scrutiny?

No. The reporting aspect of a SEEMP is purely voluntary. There may be some benefits in reporting information on the efficiency impacts due to the SEEMP in that some national administrations, ports or partnerships may wish to recognise the efforts of some shipowners/operators through, for example, environmentally differentiated harbour fees and other rewards. Also, some consumer product companies are increasingly utilising only verifiably green transportation options in moving their products to the market.

4. Do SEEMPs have to be produced both for each ship and the company overall?

No. The SEEMP should be ship-specific but it should also relate to a broader corporate energy strategy which may be defined as part of the ISO14001 process.

5. Is there a standard form or template that will need to be used for the SEEMP?

No. It is up to each company to develop their own SEEMP in conformity with the Guidance provided in MEPC.213(63). There is a sample template that each SEEMP can be based upon, contained within this guidance. Lloyd's Register can also provide a template that can be used and is in accordance with MEPC.213(63).

6. Our EMS already addresses many key areas that are described by the SEEMP; can this be used in its place?

No. The SEEMP should be a separate ship-specific document to be kept onboard each ship.

7. When it comes to selling the ship, do we need to pass on the SEEMP to the new owner as it contains commercial information relating to our company?

No. It is the responsibility of the company who owns/operates the vessel to develop their own SEEMP for each ship, noting the requirement to incorporate the broader corporate energy strategy that relates to that company.

8. Do we have to use the EEOI as the monitoring tool?

No. The Guidance in MEPC.213(63) states that it '...can be used for this purpose.' It suggests that the method used is preferably an international standard, however there is nothing to say that other tools or Key Performance Indicators (KPIs) cannot be used.

9. How often should the SEEMP be reviewed?

This is at the discretion of the shipowner/operator. In order to ensure that the SEEMP remains relevant and have a positive effect on onboard energy efficiency, it is important to review the SEEMP regularly and to feedback the results of each review into the next planning phase of the SEEMP. The SEEMP should be considered as a 'live' document in this regard.

10. Can we just create a generic SEEMP for each of our ships?

The whole purpose of the SEEMP is to be ship-specific. The risk of having a generic SEEMP is that some of the EEMs may not apply to other ships or may be too generic and impractical to implement. It should be noted that the SEEMP should contain only those EEMs which can be effectively implemented for each ship.

11. What does it mean when the SEEMP becomes a mandatory requirement?

From January 1, 2013 when SEEMP becomes mandatory it will be adopted within MARPOL Annex VI. The SEEMP shall be developed taking into account guidelines adopted by IMO (currently these guidelines are MEPC.213(63)). Compliance with the proposed MARPOL Annex VI Regulation 22 (SEEMP) will be demonstrated in the International Energy Efficiency (IEE) Certificate, which will be subject to the usual MARPOL surveys (initial, renewal, intermediate, annual etc.).

12. What are the differences between the previous SEEMP Guidelines – MEPC.1/Circ.683 and the 2012 ones - MEPC.213(63)?

There are only minor differences between the two documents:

- A section on search and rescue operations has been added and advises that performance data collected during these operations do not need to be used for energy efficiency monitoring purposes.
- The section on voluntary reporting has been removed.

Appendix 3 – Glossary

Term	Definition
COP	Conference Of Parties
EEDI	Energy Efficiency Design Index
EEOI	Energy Efficiency Operational Indicator
GHG	Greenhouse Gas
IMO	International Maritime Organisation
ISM	International Safety Management (code)
MEPC	Marine Environmental Protection Committee
RO	Recognised Organisation
SEEMP	Ship Energy Efficiency Management Plan
SMS	Safety Management System

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