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REDUCTION OF GHG EMISSIONS FROM SHIPS

The role of Onshore Power Supply (OPS) in the future maritime energy mix

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SUMMARY

Executive summary:	This document informs the Committee of the positive role of Onshore Power Supply (OPS) in the future maritime energy mix and provides key recommendations on how to accelerate the development of OPS infrastructure globally.
Strategic direction, if applicable:	3
Output:	3.2
Action to be taken:	Paragraph 20
Related documents:	Resolutions MEPC.323(74) and MEPC.366(79)

Introduction

1 Resolution MEPC.323(74) of 17 May 2019 invites Member States to encourage voluntary cooperation between the port and shipping sectors to contribute to reducing GHG emissions from ships. Within the identified port actions to be promoted and facilitated is the provision of Onshore Power Supply (OPS) from renewable sources. MEPC 79 agreed on a revised resolution MEPC.366(79) that retains the promotion of OPS within its key elements.

2 This document discusses the positive role of OPS in the future maritime energy mix and argues in favour of the viability and sustainability of OPS development projects. It further draws key recommendations to both Member States and the Organization on how to accelerate the development of OPS infrastructure globally.

Discussion

3 OPS, also widely known as shoreside electricity (SSE), aims to reduce emissions from ships while at berth by replacing onboard-generated power from auxiliary engines with electricity generated onshore. The primary motivation for installing OPS facilities in ports is the reduction of ship exhaust emissions (NO_x, SO_x, PM) and ship-generated noise, thus improving the local air quality and quality of living in urban areas surrounding ports. Depending on the energy source used, the implementation of OPS also provides an opportunity to significantly reduce GHG emissions.

4 OPS contributes to complying with IMO GHG reduction instruments such as the Carbon Intensity Indicator (CII) rating and could potentially reduce the cost of a future GHG economic measure. Fuel consumption savings at berth could contribute to obtaining a better CII rating and, in some cases, a better CII label. A higher CII rating or label may imply a higher market value of the ship. In addition, OPS offers the opportunity to mitigate the negative impact of long port stay durations on the overall CII rating. Early analyses indicate that OPS has an especially positive impact on smaller ships operating in regional markets where long port durations are more common.

5 Despite the maturity of OPS technology, the deployment of OPS globally is still progressing slower than desirable. The main cause is that OPS requires significant initially unprofitable capital investments, both at the port and on board ships. Another barrier is the perceived uncertainty about the role of OPS during and after the transition towards low- and zero-carbon maritime fuels.

6 Other challenges that delay investments in OPS include the lack of accurate power consumption data of ships at berth and limited standardization for certain ship types and low voltage installations. It is also imperative to mention electricity grid-related considerations in terms of capacity, stability and energy source profile that all need to be sufficiently addressed as preconditions to the deployment of OPS facilities.

The role of OPS in the future maritime energy mix

7 OPS for maritime shipping is not yet an accepted and widely supported practice worldwide. Ports, terminals and shipowners are often hesitating to invest in shore power infrastructure due to the high costs involved and the lack of a revenue model or uncertainties surrounding it. Looking globally at successful examples of shore power use by maritime shipping, almost all involve one or more of the following:

.1 public (partial) financing of OPS infrastructure;

.2 regulation for ports/terminals that make the provision of OPS mandatory; and

.3 regulation for ocean-going ships that make the use of OPS mandatory.

8 To harness the potential of OPS and accelerate its uptake, regulation and financing is required both onshore and on ships. In the absence of an international mandate to regulate the provision of OPS, (supra-)national and regional governments around the world are taking respective initiatives. Prominent examples can already be found in China, Europe and the West Coast of the United States.

9 A major factor that hampers the broader development of OPS infrastructure is the perceived uncertainty over the long-term viability of OPS. There are concerns that once emissions-free ships become available at scale, OPS infrastructure will become less and less utilized and rapidly depreciate in value (stranded assets). To address these concerns, the World Ports Climate Action Program[1] (WPCAP) commissioned a study to CE Delft to investigate and assess the long-term viability of OPS facilities.

[1] https://sustainableworldports.org/wpcap/

10 The recently published CE Delft report[2] entitled *The role of shore power in the future maritime fuel mix* concludes that it is unlikely that OPS facilities will become stranded assets and argues in favour of the long-term viability of OPS. In particular, the report finds out that:

.1 the variable costs of shore power are projected to be lower than electricity generated on board with a decarbonized fuel, at least in Europe and North America, even when the fuel is produced and bunkered in regions with very low renewable electricity prices;

.2 ships that sail on low- and zero-carbon fuels may still emit other air pollutants (e.g. NO_x emissions from internal combustion engines using green ammonia or methanol with a pilot fuel). In such cases, the use of OPS while at berth will still make sense and, in the parts of the world where mandates already apply, these may remain also in the future; and

.3 in all scenarios of decarbonization of shipping, a significant share of maritime fuels will still be fossil-based by 2040. For ships sailing on such fossil fuels, OPS will remain a viable solution while at berth.

11 Based on the above findings, the co-sponsors consider OPS to be a viable long-term solution for ships at berth offering significant air pollutants, noise and GHG emission reductions. At the same time, connecting to OPS facilities while at berth offers a way for ships to improve their CII performance. However, funding, regulation, lack of detailed and reliable power consumption data and forecasts taking into account further electrification of ships, and standardization for certain ship types and low voltage OPS connections are some of the remaining barriers that need to be addressed.

Further remaining issues to be addressed

12 A significant share of the world fleet has a lower power consumption than that specified in the IEC 80005-1 OPS standard. Currently there is only one pre-standard for low voltage connections which allows for a variety of cable configurations and connector types. Notwithstanding the fact that high voltage connections are the common practice in OPS installations, there is ambiguity regarding standardization for those smaller ships and/or terminals that would like to opt for low voltage connectors. This might potentially lead to partial incompatibility or higher costs for double investments.

13 Technical standards for OPS on board tankers remain incomplete and therefore require several design choices to be made on a case-by-case basis. This is a major barrier for OPS investments in tankers. There are safety issues associated with incorporating OPS arrangements on ships using boil-off gases as fuel.

14 Other issues include the urgent need for a standard for charging batteries on board and for an intelligent data-driven power demand-supply matching in smart e-grid solutions.

15 Information on power consumption of ships at berth is very limited with low reliability and seldom addresses power fluctuations that can be significant for some ship types. This lack of accurate data for power consumption can lead to over- or under-investments in capacity both in the OPS facilities in terminals and in the local electrical grid in and around ports. It also poses risks in the financing of respective investments due to resulting uncertainties on electricity sales forecasts. Over-investments in capacity and associated risks may in turn lead

[2] https://cedelft.eu/publications/the-role-of-shore-power-in-the-future-maritime-fuel-mix/

to higher OPS electricity prices. There are therefore mutual benefits for suppliers and users of OPS to improve the availability and quality of power consumption data including fluctuations, and forecasts.

Proposals for consideration

16 In order to address the funding needs of onshore and onboard OPS projects, the co-sponsors consider that part of the revenue generated by the economic measure to be adopted by the Organization as part of a basket of mid-term GHG reduction measures could be utilized to support investments in port OPS infrastructure, especially in developing countries, including SIDS and LDCs, and incentivize OPS and OPS-ready investments on board ships. It should be noted that potential co-funding of land-based OPS infrastructure should take into consideration the characteristics of the electricity grid, including its capacity, stability and energy source profile, and be subject to specific requirements in that regard (e.g. electricity provided by renewable sources).

17 The incomplete technical standardization of OPS for certain shipping segments and low voltage connections needs to be addressed. The co-sponsors invite the Organization to take note of the various initiatives globally addressing technical standardization and innovation and assess potential actions.

18 With regards to regional mandates introduced for OPS in the United States, Europe and China, the co-sponsors note that such initiatives should address both the provision of OPS facilities in ports and their respective utilization by visiting ships.

19 The co-sponsors recognize the need to improve the accuracy of the range of power needed for ships at berth and the need for sharing such data on a project basis between the parties involved to mutual benefit. A study for analysing and improving currently available estimates would be beneficial.

Action requested by the Committee

20 The Committee is invited to take note of the information provided in this document, especially the proposals in paragraphs 16 to 19, and take action as appropriate.