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Origine:	Secrétariat général du Conseil
Destinataire:	Comité des représentants permanents (1 ^{re} partie)
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Objet:	Préparation d'OMI/MEPC 78 (Londres, 6-10 juin 2022) – Projet de soumission des États membres et de la Commission à la 78 ^e réunion du Comité de la protection du milieu marin de l'Organisation maritime internationale concernant une proposition pour la désignation de la mer Méditerranée dans son ensemble en tant que zone de contrôle des émissions d'oxydes de soufre – <i>Approbation</i>

I. INTRODUCTION

1. Le 13 janvier 2022, la Commission a transmis au Conseil un document informel contenant un projet de soumission à la 78^e session du Comité de la protection du milieu marin (MEPC 78) de l'Organisation maritime internationale (OMI), concernant une proposition pour la désignation de la mer Méditerranée, dans son ensemble, en tant que zone de contrôle des émissions d'oxydes de soufre. Le délai pour transmettre la soumission au secrétariat de l'OMI est le 4 février 2022.

2. La 22^e réunion (COP 22) des Parties contractantes à la Convention pour la protection du milieu marin et du littoral de la Méditerranée (Convention de Barcelone) et de ses protocoles, s'est tenue à Antalya en Turquie, du 7 au 10 décembre 2021. A cet égard, le Conseil a adopté une décision le 2 décembre 2021¹ consistant à soutenir l'adoption de la décision visant à soumettre à la 78^e session du comité de la protection du milieu marin de l'Organisation maritime internationale une proposition visant à désigner la mer Méditerranée, dans son ensemble, en tant que zone de contrôle des émissions d'oxydes de soufre (ECA SO_x Med). La conférence a adopté une décision sur la désignation de la mer Méditerranée, dans son ensemble, comme zone de contrôle des émissions d'oxydes de soufre (ECA SO_x Med) conformément à l'annexe VI de la Convention internationale pour la prévention de la pollution par les navires (MARPOL).
3. Cette décision marque l'aboutissement des discussions et des négociations ayant eu lieu pendant plusieurs années. Les bénéfices potentiels – pour l'environnement et pour la santé publique dans la région méditerranéenne et au-delà – de l'ECA SO_x Med sont considérables, compte tenu de l'ampleur des réductions d'émissions d'oxydes de soufre (SO_x) et de particules (PM 2,5) qu'il induirait.
4. La COP 22 a chargé l'Union européenne, en tant qu'une des Parties contractantes à la Convention de Barcelone, de transmettre une proposition conjointe et coordonnée sur la désignation de l'ECA SO_x Med au MEPC 78.
5. Par conséquent, la présente soumission est faite, en vertu du point 2.1 de l'appendix III de l'annexe VI de MARPOL, par tous les États membres de l'Union et la Commission ainsi que par tous les pays riverains de la Méditerranée.

¹ Décision (UE) 2022/12 du Conseil du 2 décembre 2021 relative à la position à prendre, au nom de l'Union européenne, lors de la 22^e réunion des parties contractantes à la convention sur la protection du milieu marin et du littoral de la Méditerranée (convention de Barcelone) et à ses protocoles en ce qui concerne l'adoption d'une décision de présenter une proposition en vue de désigner la mer Méditerranée, dans son ensemble, en tant que zone de contrôle des émissions d'oxydes de soufre (ECA SO_x Med) au titre de l'annexe VI de la convention internationale pour la prévention de la pollution par les navires (convention MARPOL) (JO L 4, 7.1.2022, p. 10).

II. TRAVAIL DES INSTANCES PRÉPARATOIRES DU CONSEIL

6. Après une première présentation du projet de soumission par la Commission le 14 janvier 2022, le groupe "Transports maritimes" a examiné celui-ci lors de ses réunions du 21 et 28 janvier 2022. À cette dernière réunion, le groupe est parvenu à un consensus sur le projet de soumission et ses annexes².
7. Le groupe a convenu que la présidence pourrait indiquer au secrétariat de l'OMI, lors de la transmission de la soumission, que celle-ci peut être rendue publique avant le MEPC 78. Par ailleurs, le groupe a décidé de permettre aux pays tiers intéressés de s'associer à la soumission en tant que coauteurs.
8. La question de savoir qui devrait transmettre le projet de soumission reste toutefois non résolue. La Commission considère que la soumission devrait être transmise par "la Commission européenne au nom de l'Union européenne", tandis que les États membres sont de l'avis qu'elle devrait être transmise au nom des États membres et de la Commission européenne.
9. Vu l'importance et l'urgence de la soumission, le groupe a décidé de suggérer qu'elle soit transmise au nom des États membres et de la Commission européenne, en prenant bonne note de la position de la Commission.

III. CONCLUSION

10. Compte tenu de ce qui précède, le Comité des représentants permanents est invité à approuver le projet de soumission en vue de sa transmission par la présidence à l'OMI le 4 février 2022 au plus tard.

² 5672/22 ADD 1-4

MARINE ENVIRONMENT PROTECTION
COMMITTEE
78th session
Agenda item 11

MEPC 78/11/xx
Xx February 2022
Original: ENGLISH

Pre-session public release:

IDENTIFICATION AND PROTECTION OF SPECIAL AREAS, ECAs AND PSSAs

Proposal to Designate the Mediterranean Sea, as a whole, as an Emission Control Area for Sulphur Oxides

Submitted by Albania, Algeria, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Egypt, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Lebanon, Latvia, Libya, Lithuania, Luxembourg, Malta, the Netherlands, Monaco, Montenegro, Morocco, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, the Syrian Arab Republic, Tunisia, and Turkey and the European Commission

SUMMARY

Executive summary: This document sets forth a proposal to designate the Mediterranean Sea, as a whole, as an Emission Control Area for Sulphur Oxides, hereinafter referred to as the proposed Med SO_x ECA, in accordance with regulation 14 and Appendix III to MARPOL Annex VI to take effect from 1 January 2025.

The document shows that the designation of the proposed Med SO_x ECA is supported by a demonstrated need to prevent, reduce, and control emissions of sulphur oxides and particulate matter from ships. Moreover, the adoption of the proposed Med SO_x ECA will result in significant reductions in ambient levels of air pollution in the Mediterranean Sea, as a whole, and in the Mediterranean coastal States, which will achieve substantial benefits to human health and the environment.

The co-sponsors invite the Committee to review this proposal at this session with a view towards the adoption by the Parties to MARPOL Annex VI, at MEPC 79, of amendments to regulation 14.3 of, and Appendix VII to MARPOL Annex VI designating the Med SO_x ECA as a new Emission Control Area.

Strategic direction, if applicable: 4

Output: 4.1

Action to be taken: Paragraph 27

Related document: MEPC 76/INF.63

Introduction

1 At the 22nd meeting of the Contracting Parties to the Barcelona Convention (COP 22), the Contracting Parties agreed to submit to the Organization a proposal for the designation of the Mediterranean Sea, as a whole, as an Emission Control Area (ECA) to prevent, reduce and control emissions of sulphur oxides (SO_x) and particulate matter (PM) from ships pursuant to regulation 14 and Appendix III to Annex VI to the International Convention for the Prevention of Pollution from Ships (MARPOL), hereinafter referred to as the proposed Med SO_x ECA. This document reflects and implements that agreement.

2 With this document, Albania, Croatia, Cyprus, France, Greece, Italy, Malta, Monaco, Montenegro, Morocco, Slovenia, Spain, the Syrian Arab Republic, Tunisia, and Turkey, which are countries bordering the Mediterranean Sea, set forth a proposal for the designation of the Med SO_x ECA.

3 Algeria, Bosnia and Herzegovina, Egypt, Israel, Lebanon, and Libya, which are also countries bordering the Mediterranean Sea, associate themselves with this proposal.

4 Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Ireland, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Portugal, Romania, Slovakia and Sweden, as members of the European Union, associate themselves with this proposal as they share a common interest with the riparian States. In fact, the extension of ECAs to additional waters of the Member States of the European Union preserves the level playing field for economic operators, while maximizing health and environmental benefits in the Mediterranean basin and beyond.

5 The designation of the proposed Med SO_x ECA is necessary to protect public health and the environment in the Mediterranean Sea, regional waters, and coastlines, and in the communities of the Mediterranean coastal States by reducing exposure to harmful levels of air pollution resulting from those emissions. The designation of the proposed Med SO_x ECA provides additional needed benefits beyond those afforded by the implementation of the global fuel quality standards pursuant to MARPOL Annex VI, hereinafter referred to as MARPOL VI standards. The burden on international shipping is small compared to the improvements in air quality, the reductions in premature mortality and health incidences associated with this air pollution, and the other benefits to the environment resulting from the designation of the proposed Med SO_x ECA.

6 **Annex 1** to this proposal provides a complete analysis of how this proposal satisfies each of the eight criteria for designation of an ECA established under Appendix III to MARPOL Annex VI, as well as a comprehensive bibliography of all the information considered in preparing this proposal. **Annex 2** to this proposal sets forth a detailed description of the proposed Med SO_x ECA. **Annex 3** to this proposal presents a chart of the proposed area of application for the designation of the proposed Med SO_x ECA. The co-sponsors have also prepared draft amendments, presented in **Annex 4** to this proposal, to include the proposed Med SO_x ECA in regulation 14.3 of, and Appendix VII to MARPOL Annex VI.

Summary of Proposal

7 The designation of the proposed Med SO_x ECA will significantly reduce emissions from ships and deliver substantial benefits to large segments of the population, as well as to marine and terrestrial ecosystems. Air pollution from ships occurs not just in the Mediterranean ports and coastlines but is also carried hundreds of kilometres inland. When people breathe this polluted air, their health is adversely affected, leading to lost productivity due to increased illnesses, hospitalisations, and even premature deaths. In the Mediterranean region, 507 million people live in areas with air pollution at levels exceeding respective national ambient air quality standards, and/or levels which are unhealthy according to the World Health Organization (WHO). Moreover, scientists have not identified any ambient threshold for PM below which no damage to health is observed. Thus, air pollution below the WHO levels is still harmful and the health of millions of people in all areas can be enhanced by improving air quality further. In addition, the gains that have been made by extensive domestic regulations to control emissions from land-based sources over the last four decades could be eroded or even reversed by expected growth in human and economic activity, including shipping. To improve the protection of public health and the environment, decisive action must be taken to realise the benefits that can be gained from additional emissions reductions.

8 The co-sponsors have coordinated this proposal, in line with common interests, shared geography and interrelated economies. The co-sponsors have consulted with stakeholders, including representatives from the shipping industry, ports, master mariners, environmental interests, and representatives from state and provincial governments. This proposal takes into account the issues raised during consultations and strives to minimise the impact on the shipping community, while achieving needed environmental protection. It is believed that, by acting at the international level to reduce harmful impacts on human health and ecosystems, the designation of the proposed Med SO_x ECA will remove pressure on regional, national, and sub-national jurisdictions to consider regulatory actions to reduce ship emissions.

Populations and Areas at Risk

9 Millions of people and many important ecosystems in the Mediterranean region are exposed to harm or damage by emissions from ships and are at risk of additional harm in the future. The Mediterranean region includes a combined population of over 500 million, more than half of which reside in coastal communities. Further, because ship pollution travels great distances, much of the inland population is also affected by ship emissions and will benefit from the cleaner air made possible by ECA fuel and engine controls. These populations are at risk of increased harm from shipping, if an ECA is not designated.

10 **Annex 1** to this proposal describes the ways in which air pollution from ships contributes to the impairment of various ecosystems, including deposition of acidifying sulphate and changes in visibility. SO_x emissions from ships are carried over land and their derivatives (including PM and sulphur containing compounds) are deposited on surface waters, soils, and vegetation. Importantly, air pollution can contribute to a significant portion of the sulphur loading that an ecosystem receives. Some areas are more sensitive than others, and many have multiple stressors. Mediterranean ecosystems are sensitive especially to acidification due to sulphuric acids formed from SO_x which contributes to aquatic eutrophication altering biogeochemical cycles and harming animal and plant life. Areas where ships' emissions are deposited are at risk of further damage in the future. The designation of the proposed Med SO_x ECA will help reduce the stresses on many sensitive ecosystems, including forests, grasslands, wetlands, rivers, lakes, estuaries, and coastal waters.

11 As established in MARPOL Annex VI, an ECA designation is intended to prevent and reduce the adverse impacts on human health and the environment in areas that can demonstrate a need to prevent, reduce and control emissions of SO_x and PM. The Parties to the MARPOL Annex VI chose this objective because of the known public health and environmental effects associated with SO_x and PM emissions. The designation of the proposed Med SO_x ECA directly furthers this objective by reducing the emissions of SO_x and PM from ships operating in the proposed area of application for the said designation. The proposed Med SO_x ECA is aimed at SO_x and PM controls.

Contributions from Ships to Adverse Impacts

12 In developing this proposal, the co-sponsors performed a comprehensive analysis to quantify the degree of human health risk and environmental degradation that is posed by air emissions from ships operating in the Mediterranean Sea. For gauging the risk to human populations, state-of-the-art assessment tools were used to apply widely accepted methods with advanced computer modelling techniques: such methods produced highly reliable and replicable results. Estimating impacts of shipping on human health and the environment required analyses of detailed ship traffic data, fuel use estimates, pollutant emissions estimates, detailed meteorological data, physical dispersion and photochemical reactions, deposition of pollutants to sensitive ecosystems, and epidemiologic modelling of health effects attributable to pollutant exposure levels. According to the analysis conducted for this proposal, the proposed Med SO_x ECA achieves similar cost-effective pollution reductions and health benefits as reported for previously designated SECAs. Annual benefits include more than 1,000 avoided premature deaths, more than 2,000 cases of avoided childhood asthma, and reduced harm to many sensitive ecosystems.

13 Emissions from ships contribute to substantially increase ambient concentrations of air pollutants over Mediterranean land and sea areas. The WHO reports that the “*highest ambient air pollution levels are in the Eastern Mediterranean Region..., with annual mean levels often exceeding more than 5 times WHO limits*”³. Moreover, the WHO Ambient air quality database⁴ indicates that 72.7% of cities in the Mediterranean coastal States exceed the WHO annual ambient PM with a mass median diameter less than 2.5 microns (µm) (PM_{2.5}) pollution guidelines of 10 µg/m³. **Section 3 of Annex 1** to this proposal presents a map that displays the air quality impact of shipping emissions on ambient concentrations of PM. The physical dispersion models used to create these maps account for the varying wind patterns over the course of a representative year and simulate the paths that SO_x or PM travel once emitted from the funnel of a ship operating in the Mediterranean Sea. Chemical and physical fate and transport models predict the extent to which SO_x molecules react to form very small particles, known as PM_{2.5}. These maps show that the increased ambient concentrations of PM_{2.5} due to ship emissions are largest along major shipping lanes and nearby Mediterranean coasts, where many of the most populous cities are located. The increase in particles (aerosols) also degrades visibility as measured by reduction in aerosol optical depth; this pollution may affect the clarity of vistas and views important to persons living near or tourists visiting Mediterranean historical and natural attractions. Emissions are also transported over large distances and have significant impacts well into the interior of European and North African countries.

³ <https://www.ccacoalition.org/en/news/world-health-organization-releases-new-global-air-pollution-data>.

⁴ [https://www.who.int/data/gho/data/indicators/indicator-details/GHO/concentrations-of-fine-particulate-matter-\(pm2-5\)](https://www.who.int/data/gho/data/indicators/indicator-details/GHO/concentrations-of-fine-particulate-matter-(pm2-5)).

14 Ship emissions contribute to adverse human health impacts in the Mediterranean coastal States, especially in densely populated coastal areas. Ships generate emissions that lead to elevated ambient concentrations of PM_{2.5} that contribute to avoidable disease and premature death. **Table 1** presents the annual reduction of ship-related adverse health impacts in 2020 that would result from applying the SECA standards. The figures in this table clearly illustrate the health benefits of the designation of the proposed Med SO_x ECA. The analysis conducted for this proposal shows that over 1,000 annual premature deaths and over 2,000 cases of childhood asthma will be avoided. Independent studies considering all-cause disease and death indicate that estimates reported here under-estimate the total benefits of the Med SO_x ECA.

15 The co-sponsors have also determined that damage to sensitive ecosystems that is attributable to emissions from ships will be reduced by the designation of the proposed Med SO_x ECA. Different ecosystems can be sensitive to and harmed by different pollutants, including acidification or eutrophication. The sensitivity of an ecosystem to acidification depends on the ability of the soils and waters to neutralise (or buffer) the deposited acidic pollutants formed from SO_x (see **Table 2**). Modelling in support of the designation of the proposed Med SO_x ECA predicts that improving ship emissions from current performance to SECA standards will significantly reduce the amount of sulphur deposition in sensitive ecosystems. The designation of the proposed Med SO_x ECA will help the Contracting Parties to the Barcelona Convention to meet their goals under the Mediterranean Action Plan (MAP) of the United Nations Environment Programme (UNEP).

Description of the Proposed Area of Application

16 The proposed area of application for the designation of the proposed Med SO_x ECA is illustrated in **Section 2 of Annex 1** to this proposal. A detailed description of the proposed area of application, including select coordinates, is provided in **Annex 2** to this proposal, and a chart is presented in **Annex 3** thereto. The proposed area of application follows the International Hydrographic Organization (IHO) definition of the Mediterranean Sea⁵ as being bounded on the southeast by the entrance to the Suez Canal, with the exception of the waiting area of the Suez Canal in its determined coordinates, according to the map set out in point c of **Annex 2**, on the northeast by the entrance to the Dardanelles, delineated as a line joining Mehmetcik and Kumkale lighthouses, and to the west by the meridian passing through Cap Spartel lighthouse, also defining the western boundary of the Straits of Gibraltar. The proposed area of application is identical to the geographic area described in Article 1.1 of the Barcelona Convention, which is hereinafter referred to as the Mediterranean Sea area. The waters of the proposed Med SO_x ECA involve the twenty-two (22) Contracting Parties to the Barcelona Convention, namely Albania, Algeria, Bosnia and Herzegovina, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Slovenia, Spain, the Syrian Arab Republic, Tunisia, Turkey, and the European Union.

⁵ https://iho.int/uploads/user/pubs/standards/s-23/S-23_Ed3_1953_EN.pdf.

Table 1. Summary of health benefits evaluated for the proposed Med SO_x ECA (model year 2020)

Scenario Results (Linear C-R Model)	Reduced Mortality (annual premature adult deaths)		Avoided Childhood Asthma (annual avoided incidents)	
Health benefits of the proposed Med SO _x ECA	Reduced Mortality		Reduced Asthma Morbidity	
	CV Mortality Avoided	969 (CI 95% 551; 1,412)	Avoided Childhood Asthma	2,314 (CI 95% 1,211; 3,406)
	LC Mortality Avoided	149 (CI 95% 32; 270)		
	Combined Avoided Mortality	1,118 (CI 95% 583; 1,682)		

Table 2. Summary of proxies for other benefits associated with the proposed Med SO_x ECA

Environmental Benefit Proxy	Relative Range of Change (%)	Areas of greater benefit shown:
Wet sulphate deposition	1 to 15% reduction	Percent decrease in annual wet sulphate deposition between MARPOL VI and Med SO _x ECA
Dry sulphate deposition	1 to 50% reduction	Percent decrease in annual dry sulphate deposition between MARPOL VI and Med SO _x ECA
Wet PM _{Total} deposition	0.5 to 5% reduction	Percent decrease in annual wet PM _{Total} deposition between MARPOL VI and Med SO _x ECA
Dry PM _{Total} deposition	0 to 10% reduction	Percent change in annual dry PM _{Total} deposition between MARPOL VI and Med SO _x ECA
Aerosol optical depth (PM-related)	1 to 6% increase	Percent Change in aerosol optical depth (PM species) between MARPOL VI and Med SO _x ECA

Ship Traffic and Meteorological Conditions

17 Ship traffic in the Mediterranean Sea area is substantial as it is navigated by more than thirty thousand vessels annually, with most vessels calling on Mediterranean ports and engaging in regional commerce among the Mediterranean coastal States. In addition, many vessels transit the Mediterranean Sea area near heavily populated areas collectively containing hundreds of millions of inhabitants.

18 Meteorological conditions in the Mediterranean Sea area transport to land a significant portion of emissions from ships at-sea and the resulting pollutants formed in the atmosphere. The emissions from ships of SO_x and their derivatives (including PM) can remain airborne for around five to ten days before they are removed from the atmosphere (e.g., by deposition or chemical transformation). During the time from being emitted into and removed from the air, pollutants can be transported hundreds of nautical miles over water and hundreds of kilometres inland by the winds commonly observed in the Mediterranean Sea area. The analysis conducted for this proposal indicates that winds frequently blow onshore in all areas of the Mediterranean Sea. Some wind patterns are more common than others, thus the impact of air pollution from ships at-sea is larger on some areas than on others. Further, airborne transport of SO_x and PM from ships crosses national boundaries, adversely affecting large portions of the Mediterranean coastal States.

Land-Based Emissions Controls

19 Nearly all Mediterranean coastal States have already imposed stringent restrictions on emissions of SO_x, PM, and other air pollutants from a wide range of industrial, commercial and transportation activities. Examples of industrial and commercial sources subject to emissions restrictions include large and small manufacturing plants, smelting and refining facilities, chemical and pharmaceutical companies, and combustion sources at factories and power plants. Examples of transportation sources subject to emissions restrictions and fuel quality standards include automobiles, trucks, buses, locomotives, and domestic commercial and recreational watercraft. **Figure 1** illustrates the trend in land-side SO_x emissions for Mediterranean coastal States that are Member States of the European Union and Turkey.

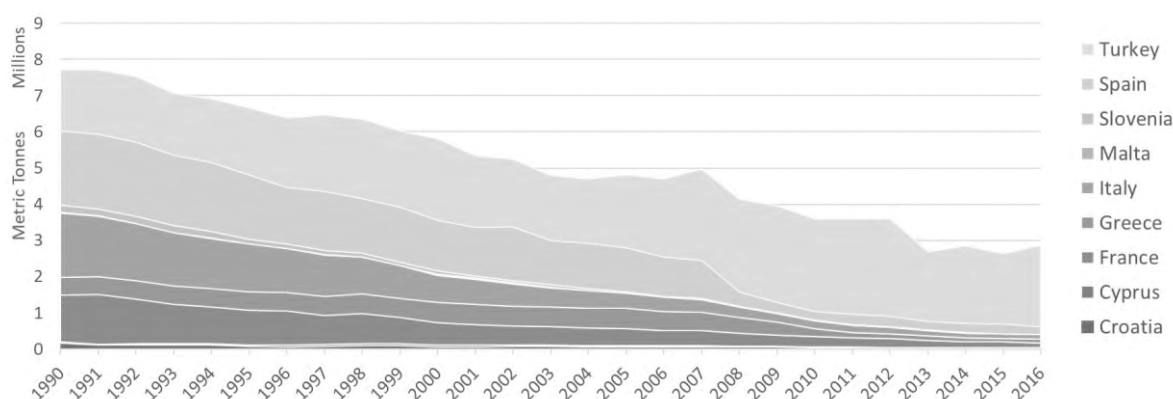


Figure 1: Trend in Land-side SO_x Emissions for Mediterranean coastal States that are Member States of the European Union and Turkey

20 The European and North African national air pollution control programmes for sources of air pollution other than ships have been highly successful. European countries reduced their SO_x emissions by nearly two-thirds since 1990, by more than half since 2000, and an additional 20% since 2010, without direct economic impact on net growth and cyclic recession recovery. According to the United Nations National Baseline Pollution Budgets (NBB), countries like Israel “*will be reducing indirect atmospheric emissions to the marine environment of NO_x and SO_x by 90% due to the planned installation of scrubbers in 6 coal powered units of the main coastal power stations as well as the closure of 4 coal power units*”, by 2022, relative to the 2012 baseline. The Egypt State of the Environment Reports for 2012 and 2016 indicate that SO_x emissions have reduced more than 75% since 1999. Even so, the WHO indicates the Egyptian Delta Region exceeds its PM_{2.5} guidelines and Annex indicates that SO_x emissions from ships contribute to PM_{2.5} in that region. The Mediterranean coastal States continue to find cost-effective reductions that can be achieved from additional controls on the remaining sources. Most importantly, as land-side sectors control emissions, the relative contribution of ship emissions to national air quality problems increases the need for SECA controls. The designation of the proposed Med SO_x ECA will greatly reduce emissions from the increasingly significant ocean transportation sector.

Estimated Costs, Benefits, and Cost-effectiveness

21 As marginal costs for next-step measures typically increases for land-side emissions sources, cost-effective control of ship emissions appears both technically feasible and cost-effective. The costs of implementing and complying with the proposed Med SO_x ECA are expected to be small both absolutely and compared to the costs of achieving similar emissions reductions through additional controls on land-based sources. The co-sponsors estimate the total costs of improving ship emissions from current performance to SECA standards will be approximately US\$ 1.7 billion in 2020; along with global MARPOL VI standards, this achieves a 95% net reduction in SO_x and a 62% net reduction in PM_{2.5} from ships operating in the proposed Med SO_x ECA. If equivalent or greater reductions can be achieved using abatement technologies and/or advanced fuels – and if these technologies can save money for some vessels – then total compliance costs may be less. Consistent with prior experience in other SECA regions and following the insights and findings of the final report of the Assessment of fuel oil availability (MEPC 70/INF.6) (IMO Secretariat, 2016), hereinafter referred to as the IMO Fuel Availability Study, appropriate fuels and technologies will be available in sufficient quantities to meet the agreed-to SECA emission limit implementation dates.

22 The monetary value of small changes in mortality risks using SECA compliant fuels can be considered in terms of an economic term called the “value of a statistical life” or VSL. Formally, VSL is the monetary value of small changes in mortality risks, scaled up to reflect the value associated with one expected fatality in a large population. The value of avoided impacts may be considered to include the monetised sum of:

Value of avoided impacts

$$\begin{aligned} &= \text{Avoided Mortality } (\$V_{\text{Mortality}}) + \text{Avoided Morbidity } (\$V_{\text{Illness+ Care}}) \\ &+ \text{Avoided Deposition Damages } (\$V_{\text{Acidification}}) + \text{Improved Visibility } (\$V_{\text{Haze}}) \\ &+ \text{etc.} \end{aligned}$$

23 While the value of all these benefits has been estimated in other studies using European monetary values (as presented in a model called Alpha RiskPol), this proposal presents a more conservative estimate limited only to the monetised benefits of avoided mortality associated with cardiovascular disease and lung cancer. Moreover, this proposal calibrates the VSL to the economies of the Mediterranean coastal States. Therefore, these under-estimated benefits are presented in terms of their potential sufficiency for the designation of the proposed Med SO_x ECA, acknowledging that additional benefits described above remain non-monetised. **Table 3** presents results of that analysis, indicating that the monetised benefits of avoided mortality singly exceed the total costs of implementing the proposed Med SO_x ECA.

Table 3. Mortality-weighted VSL for Mediterranean coastal States

Policy Regime	Mortality-weighted VSL for Mediterranean coastal States (\$ Millions)
No Action	2.157
MARPOL VI	1.094
Med SO _x ECA	1.818

24 Cost-effectiveness also indicates support for the designation of the proposed Med SO_x ECA, as illustrated in **Table 4**. The costs for each tonne of SO_x and PM avoided are estimated at US\$ 13,400 and US\$ 155,000, respectively. These costs per tonne are a measure of cost-effectiveness and are comparable or favourable to the cost-effectiveness of the controls imposed on many land-based sources. When compared with prior SECA proposals, such as the North American ECA, the net cost-effectiveness to achieve 0.10% Sulphur (S) m/m fuel limits from pre-2020 IMO standards is very similar. Improving current ship emission levels to SECA standards is one of the most cost-effective measures available to obtain necessary improvements to the air quality in the proposed Med SO_x ECA and for the Mediterranean coastal States individually.

Table 4. Cost-effectiveness comparison with North American ECA⁶

Benefit Type	U.S. estimates for North American ECA	North American ECA results with adjusted fuel prices ⁷	Med SO _x ECA combining MARPOL VI and SECA results
Control Target			
Abated SO _x emissions	\$4,500 /MT SO _x	\$14,000 /MT SO _x	\$8,900 /MT SO _x
Abated PM _{2.5} emissions	\$43,000 /MT PM _{2.5}	\$128,000 /MT PM _{2.5}	\$94,000 /MT PM _{2.5}
Health Outcome			
Avoided mortality ⁸	\$0.410 M/Δ Mortality	\$1.229 M/Δ Mortality	\$0.353 M/Δ Mortality
Avoided asthma illnesses ⁹	\$16 k/Δ Morbidity	\$49 k/Δ Morbidity	\$21 k/Δ Morbidity

25 The economic impacts of complying with the program on ships engaged in international trade are expected to be modest. As in other SECA regions, ship operators are expected to be

⁶ Combined MARPOL VI and the proposed Med SO_x ECA costs for the analysis conducted for this proposal compared with United States (U.S.) NO_x and PM data to reduce ship fuel from pre-MARPOL VI conditions to 0.10% S m/m Med SO_x ECA conditions.

⁷ Given that the 2009 North American proposal to designate an ECA used a fuel price difference of \$145/MT to shift from HFO to SECA compliant fuel, and the analysis conducted for this proposal uses a fuel price difference of ~\$434/MT, the U.S. cost-effectiveness estimates (column 2, above) was multiplied by the ratio of these price differences to match with fuel price changes used for the analysis conducted for this proposal.

⁸ North American mortality methods are similar to those used here, although they may use a health risk equation similar to the log-linear equation discussed and compared in Sofiev et al, Nature Communications 2018 (1).

⁹ For comparison purposes with the childhood asthma illness results of the analysis conducted for this proposal, the set of childhood asthma related diseases reported separately by the U.S. was summed.

able to pass additional costs associated with complying with the SECA fuel sulphur control measures to the purchasers of marine transportation services. Transportation costs ultimately are embedded in prices for the goods being shipped. Potential price impacts are expected to be small because transportation is only a small share of total production costs for finished goods.

Conclusion

26 Ship emissions contribute significantly to air pollution, adverse human health outcomes and ecosystem damage in the Mediterranean Sea area. The designation of the proposed Med SO_x ECA will reduce these effects and improve public health and the environment within the Mediterranean coastal States. The Mediterranean coastal States have already implemented emission controls on land-based sources of air pollution. Applying SECA standards to vessels engaged in international shipping in the Mediterranean Sea area will achieve substantial benefits at comparable, and reasonable, costs.

Action requested of the Committee

27 The Committee is invited to consider the information presented in this document and to approve the proposed Med SO_x ECA, with a view towards the adoption by the Parties to MARPOL Annex VI, at MEPC 79, of amendments to regulation 14.3 of, and Appendix VII to MARPOL Annex VI, as shown in **Annex 4**, to formally designate the Mediterranean Sea, as a whole, as an Emission Control Area for Sulphur Oxides, taking effect on 1 January 2025.