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**MEDITERRANEAN ACTION PLAN (MAP)  
REGIONAL MARINE POLLUTION EMERGENCY RESPONSE CENTRE FOR THE  
MEDITERRANEAN SEA (REMPEC)**

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Regional Workshop on Ratification and Effective Implementation  
of MARPOL Annex VI

REMPEC/WG.44/INF.4/Rev.1  
Date: 7 December 2018

Valletta, Malta, 11-13 December 2018

Original: English

Agenda Item 8

**COMPILATION OF COMMENTS ON THE DRAFT TECHNICAL AND FEASIBILITY STUDY TO  
EXAMINE THE POSSIBILITY OF DESIGNATING THE MEDITERRANEAN SEA, OR PARTS  
THEREOF, AS SOx ECA(S) UNDER MARPOL ANNEX VI**

**Note by the Secretariat**

**SUMMARY**

**Executive Summary:** This document provides a compilation of comments on the draft technical and feasibility study to examine the possibility of designating the Mediterranean Sea, or parts thereof, as SOx ECA(s) under MARPOL Annex VI, received through the SOx ECA(s) Technical Committee of Experts.

**Action to be taken:** Paragraph 4

**Related documents:** REMPEC/WG.44/8/Rev.1

**Background**

1 As presented in document REMPEC/WG.44/8/Rev.1, the sulphur oxides (SOx) emission control area(s) (ECA(s)) Technical Committee of Experts established pursuant to Specific Objective 15 of the Regional Strategy for Prevention of and Response to Marine Pollution from Ships (2016-2021), as adopted by the Nineteenth Ordinary Meeting of the Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean ("the Barcelona Convention") and its Protocols, which was convened in Athens, Greece from 9 to 12 February 2016, was requested on 1 October 2018 to review the draft technical and feasibility study to examine the possibility of designating the Mediterranean Sea, or parts thereof, as SOx ECA(s) under Annex VI to the International Convention for the Prevention of Pollution from Ships (MARPOL), and provide general as well as specific comments to the Secretariat by 5 November 2018.

2 The deadline for comments was extended to 15 November 2018 with a view to allowing more time for the SOx ECA(s) Technical Committee of Experts to review and provide comments accordingly.

3 As of 7 December 2018, six (6) comments were received through the SOx ECA(s) Technical Committee of Experts, which are presented as appendices to the present document, in the original language they were submitted and without being edited by the Secretariat except for formatting purposes, as follows:

- .1 **Appendix I:** comments from Mr Gordan Došen, representative of Croatia serving on the SOx ECA(s) Technical Committee of Experts;
- .2 **Appendix II:** comments from Ms Rosa Antidormi, representative of the European Union serving on the SOx ECA(s) Technical Committee of Experts;
- .3 **Appendix III:** comments from Ms Cécile Rafat, representative of France serving on the SOx ECA(s) Technical Committee of Experts;

- .4 **Appendix IV:** comments from Commander (ENG) H.C.G. Aikaterini Stamou, representative of Greece serving on the SO<sub>x</sub> ECA(s) Technical Committee of Experts;
- .5 **Appendix V:** comments from Dottor Roberto Giangreco, representative of Italy serving on the SO<sub>x</sub> ECA(s) Technical Committee of Experts; and
- .6 **Appendix VI:** comments from Mr Alaya Sagaama, representative of Tunisia serving on the SO<sub>x</sub> ECA(s) Technical Committee of Experts.

**Action requested by the Meeting**

- 4 **The Meeting is invited to take note of** the information provided in the present document.

**APPENDIX I**

**Comments from Mr Gordan Došen, representative of Croatia serving on the SO<sub>x</sub> ECA(s)  
Technical Committee of Experts**

(English only)



**Republic of Croatia, SO<sub>x</sub> Experts****05<sup>th</sup> November 2018**

**SUBJECT: Proposal a Technical and Feasibility Study to Examine the Possibility for Designating the Mediterranean Sea or Parts Thereof as a SO<sub>x</sub> Emission Control Area Under MARPOL Annex VI**

We are grateful for the submitted proposal of the Study, which we consider to be expertly and well-made, but we provide comments and recommendations to you in the best possible way and as a contribution to its even better content.

**REVIEW, COMMENTS AND RECOMENDATIONS:****Introduction:**

The Mediterranean represents 7% of global shipping. At global level, international shipping is responsible for 10% of SO<sub>2</sub> emissions that have caused human activity (anthropogenic emissions). The current average sulfur content in ship traffic is approximately 2.4% m / m (up to 3.5% allowed).

In 2020 all world shipping flows to fuels with sulfur content up to 0.5% m / m, except: SECA areas and traffic in ports that already use fuels up to 0.10% m / m sulfur.

The Adriatic Sea on all the maps shown in the REMPEC study shows lower traffic intensity, fewer emissions and fewer potential negative impacts on human health and the environment.

The draft study was based on estimates of fuel consumption and greenhouse gas emissions from ships in international vessels that have sailed to the Mediterranean Sea during 2016. The number of entries (30,000) was obtained using the AIS (Automated Identification System) system. There is no study of the number of ships per country (to which the study relates) from the study. Taking into account the data for the Republic of Croatia extracted from the Croatian Integrated Maritime Information System - CIMIS (see attach to the Excell table), it is apparent that nearly 1/6 of the ships that have sailed to the Mediterranean Sea (the area covered by the study) belong to ships in international voyage internal sea water and the territorial sea of the Republic of Croatia

We note that the quality of air on the Adriatic and the coastal area along the Adriatic (in the part of the Republic of Croatia) is already 1st category (with current 3.5% S) and does not exceed SO<sub>x</sub> and NO<sub>x</sub> emission limits as well as values for PM<sub>10</sub> and PM<sub>2.5</sub>. The air quality data are official and measured in accordance with the CAFFE Directive in the cities of Split, Rijeka, Pula and Dubrovnik, the islands of Vis and Dugi Otok and in Polača (background of city of Zadar), Kaštel Sućurac (background of city of Split) and Višnjan (central Istria).

**COMMENTS:**

The study starts from the 2016 fuel data with 2.4% S, and models fuel consumption, costs, impacts and fuel emission figures for 2020 with 0.5% S, and estimates (proportional sulfur ratio) are predicted further reduction of the negative impact with fuel up to 0.10% S.

Reduction of SO<sub>2</sub> and SO<sub>4</sub> emissions is noticeable and clearly visible on the transfer of fuel to 0.5% S on all maps and tables, while all emissions, and especially PM<sub>2.5</sub> further reduction of sulfur, are not significant (Figure 11 shows the difference between fuel particles of 2.4 % S and 0.1% because the difference of 0.5% S to 0.1% S as the other maps were almost negligible for most MED areas).

We must point out that PM<sub>2.5</sub> particles are not fuel quality matters and are not regulated in MARPOL Annex VI. The study suggests that possible PM<sub>2.5</sub> emissions from fuel with 2.4% S and 0.5% S will be less by introducing fuel with 0.1% S, proportionally reducing sulfur content.

However, when health-related modeling (cardiovascular disease and cancer) and ambient PM<sub>2.5</sub>> 20 µgm<sup>-3</sup> (typical for urban entities) are taken into account, the concentration of PM<sub>2.5</sub> from marine fuels can be affected on human health is usually significantly smaller (usually 0.1 µgm<sup>-3</sup>). Dependence on asthma in the younger population also starts from the change in PM<sub>2.5</sub>> 20 µgm<sup>-3</sup> to less.

*Additionally comments: According to the study\*, Particle concentrations in urban entities originate in a small percentage (less than 10%) of fossil fuels and are slightly marine and significantly more than households, tires, dust and other economic activities. (\*Urban Air Quality Study; Concauwe report 11/2016.).*

It is also worth noting that there are no officially accepted studies that prove the link between the individual type of emission and mortality (if any, then it would be good to include or mentioned in this study). Data on disease occurrence, mortality in combined circumstances and influences was taken from WHO, but not the association (connection) of the same with the source of influence.

The REMPEC study concludes / implies that the impact on human health by reducing sulfur content in marine fuels is also felt hundreds of miles from the coast. The study does not take into account the reduction of the negative effects of the coastline \*\*emissions which should be included. Influence is counted on the total average population, not just on the one to which impact is possible. Also, data on illnesses and mortality refer to national data, not to the region's potential impact on emissions from marine fuels.

*Additionally comments: According to the Study\*\* (Study of Environmental Impact of Marine SO2 Emissions; CONCAWE report 1/2018), states that the impact of combustion emissions from ship traffic is most significant in the range of 12-25 NM from the coast, and continues to decline and is considerably weaker.*

Also, in the part of the study dealing with the issue of mortality of humans, the number of patients with cardiovascular diseases, asthma and lung cancer, written numbers (data) were obtained on the basis of the expected population growth from 2016 to 2020. However, even in one part of the text it is not emphasized the possibility of falling numbers of the population, as is the case with the Republic of Croatia (which has a decline in population in 2017 and 2018 compared to 2016, and this trend is expected further). Therefore, we suggest that the study be revised in this respect and such a case is foreseen.

For the impact of marine fuels with 0.1% S on human health, we suggest to check these effects in the now existing SECA areas, especially in the North Sea and Baltic areas, which will have real indicators of death reduction for cardiovascular disease and cancer as well as reduction of disease younger population of asthma. Real data from these regions (North Sea and Baltic), generated emissions and statistics after 9 to 10 years of implementation of the SECA area, should serve as a basis for predicting the effect on the MED region.

The study also shows the source of emissions in the Mediterranean (Figures 10 and 11) and we further point out the possible problem: where is the legal possibility of checking the use of fuel (from 0.1% S or others) on ships traveling in international waters over which inspections from countries in the Mediterranean have no jurisdiction.

When calculating costs and fuel prices, the following should be considered:

By 2020, the entire world will go to ship fuel with 0.5% S, and the result will be the replacement of fuel type where distillate fuels will be dominant. The consequence will be significantly increased demand for medium distillates / gas fuels. By 2020, the import of medium distillates will increase considerably, when the world as a whole increases.

*Additionally comments: European Union is already a major importer of diesel and jet fuels (net imports around 25 million tonnes + 18 million tonnes in 2016).*

The demand, availability and availability of marine fuels with 0.5% since 2019 (market estimates) will disrupt the price relationship, ie the fuel price will increase considerably, which is not taken into account when calculating the costs.

In addition, when switching to fuel with 0.1% S for the SECA area, we are talking almost exclusively of diesel fuels, which will significantly affect the price change on more.

*Additionally comments: The study did not mention nor did it take into account that for increased diesel production, refineries will spend more energy, need increased amounts of hydrogen and increase CO2 emissions. All this will increase production costs and the costs of resolving CO2 emissions, which will result in higher product prices, and some unforeseen damages to the closure of some refineries, which will turn out to be less profitable (mostly in the EU).*

Alternative fuels are also mentioned with the possible designation of MEDSECA. LNG is highlighted as an option, and methanol and hydrogen are mentioned. All these fuels are not an alternative to the current fleet. These fuels predict the construction of new ships (additional costs incurred by shipping companies, those with whom this cost is possible).

When calculating costs, infrastructure and availability of new fuels in the Mediterranean has not been taken into account, nor is it mentioned when national economies will build the network concerned and ensure the availability of alternative fuels (based on the Directive and the Act on Implementation of Alternative Fuels Infrastructure, period 2025-2030), if possible it would be good to include this information in the study.

Also, alternative fuels are not a solution for the entire fleet but for the smaller part.

## **CONCLUSIONS:**

**The study confirms the reasons and justification for the decision to introduce sulfur-containing fuels up to 0.5% m / m 2020.**

**All efforts to increase the quality of fuel to reduce the negative impact on the environment (air, sea, soil) and the health of people are welcome and should be supported. However, the additional cost and burden of proclaiming the Mediterranean SECA area should be proven proportional to the cost-effective effect.**

**The study did not show sufficiently clear and unambiguous reasons for the quickly proclamation of the SECA Mediterranean area, especially not in one step of 2020, which implies on p. 7 and 36.**

**The results of the study indicate the conclusion of the introduction of a SECA area with a specific delay that should relate to areas with lower traffic and lower total emission intensity, such as the Adriatic Sea.**

**For the impact of marine fuels with 0.1% S on human health, we propose to check these effects in the existing SECA areas, especially in the North Sea and Baltic area, and which will have by then (2020 or 2025) real indicators of death reduction for cardiovascular diseases and cancer, as well as reducing the disease of the younger asthmatic population. Real data from these regions (North Sea and Baltic), generated emissions and statistics after 9 to 10 years of implementation of the SECA area, should serve as a basis for predicting the effect on the MED region.**

**Broj posjeta brodova po vrsti u 2016. i 2017.**

Vrsta broda	Godina			Ukupno
	2016	2017	2018	
BROD (OPĆENITO)	71	46	27	144
Međunarodna	71	46	27	144
BROD (OSTALO)	32	21	23	76
Međunarodna	32	21	23	76
BROD DIZALICA	9	1	1	11
Međunarodna	9	1	1	11
BROD POSEBNE NAMJENE	6	3	1	10
Međunarodna	6	3	1	10
BROD TVORNICA			1	1
Međunarodna			1	1
BROD ZA CEMENT	182	256	239	677
Međunarodna	177	256	239	672
Nacionalna	5			5
BROD ZA MJEŠOVITI TERET	48	54	21	123
Međunarodna	48	54	21	123
BROD ZA OPĆI TERET	760	772	625	2157
Međunarodna	750	769	625	2144
Nacionalna	10	3		13
BROD ZA OPSKRBU	189	166	150	505
Međunarodna	22	13		35
Nacionalna	167	153	150	470
BROD ZA PRIJEVOZ AUTOMOBILA	1	4		5
Međunarodna	1	4		5
BROD ZA PRIJEVOZ PUTNIKA I KONTEJNERA	23	6	2	31
Međunarodna	23	6	2	31
BROD ZA RASHLAĐENI TERET	14	19	13	46
Međunarodna	14	19	13	46
BROD ZA RASUTI TERET	287	198	119	604
Međunarodna	283	194	116	593
Nacionalna	4	4	3	11
BROD ZA STOKU	48	73	67	188
Međunarodna	48	73	67	188
BROD ZA UKAPLJENE PETROLEJSKE PLINOVE	12	14	6	32
Međunarodna	12	14	6	32
BROD ZA UKAPLJENE PETROLEJSKE/PRIRODNE PLINOVE	14	12	3	29
Međunarodna	14	12	3	29
BROD ZA UKAPLJENE PRIRODNE PLINOVE		1	4	5
Međunarodna		1	4	5
BRZI PUTNIČKI BROD	712	668	619	1999
Međunarodna	711	668	618	1997
Nacionalna	1		1	2
BRZI TERETNI BROD	2	2		4



Međunarodna	2	2		4
BRZO PUTNIČKO PLOVILO (DSC KODEKS)			104	104
Međunarodna			104	104
ISTRAŽIVAČKI BROD	7	8		15
Međunarodna	7	8		15
JAHTE NA JEDRA	19	73	209	301
Međunarodna	8	8	21	37
Nacionalna	11	65	188	264
JARUŽALO		2	2	4
Međunarodna		2	2	4
KONTEJNERSKI BROD	424	440	365	1229
Međunarodna	424	440	365	1229
MAONA BEZ VLASTITOG POGONA	1	1		2
Međunarodna	1	1		2
MOTORNA JAHTA	273	1269	1829	3371
Međunarodna	151	207	251	609
Nacionalna	122	1062	1578	2762
MOTORNI BROD	3	2	1	6
Međunarodna	3	2	1	6
PLOVEĆA DIZALICA		1		1
Međunarodna		1		1
PLUTAJUĆI DOK		2		2
Nacionalna		2		2
PUTNIČKI BROD	1839	1542	1386	4767
Međunarodna	1838	1542	1373	4753
Nacionalna	1		13	14
PUTNIČKI KATAMARAN			18	18
Međunarodna			18	18
REMORKER	6	2		8
Međunarodna	6	2		8
RO-RO PUTNIČKI	122	145	116	383
Međunarodna	122	145	116	383
RO-RO TERETNI BROD	6	1	1	8
Međunarodna	6	1	1	8
TANKER	72	92	71	235
Međunarodna	72	92	71	235
TANKER ZA KEMIČALIJE	16	12	13	41
Međunarodna	16	12	13	41
TANKER ZA PRERAĐEVINE	6	4	3	13
Međunarodna	6	4	3	13
TANKER ZA PRIJEVOZ NAFTE, NAFTNIH PRERAĐEVINA I KE	18	38	12	68
Međunarodna	18	38	12	68
TANKER ZA ULJE	44	59	52	155
Međunarodna	44	59	52	155
TANKER ZA ULJE/KEMIČALIJE	95	67	81	243
Međunarodna	89	67	81	237

Nacionalna	6			6
TEGLJAČ	77	45	46	168
Međunarodna	59	45	45	149
Nacionalna	18		1	19
TEHNIČKI PLOVNI OBJEKT	1		1	2
Međunarodna	1			1
Nacionalna			1	1
TERETNI BROD	16	11	9	36
Međunarodna	16	11	9	36
VIŠENAMJENSKI BROD	27	21	8	56
Međunarodna	27	21	8	56
ŠKOLSKI BROD	1			1
Međunarodna	1			1
RIBARSKI BROD	1			1
Nacionalna	1			1
MOTORNI TERETNI BROD	1			1
Međunarodna	1			1
TEGLJENI PLOVNI OBJEKT	16			16
Nacionalna	16			16
TANKER ZA ULJE/KEMIČALIJE/PLINOVE	3			3
Međunarodna	3			3
Ukupno	5504	6153	6248	17905
<b>Ukupno</b>	<b>5133</b>	<b>6048</b>	do 26.10.2018.	

**APPENDIX II**

**Comments from Ms Rosa Antidormi, representative of the European Union serving on the SOx  
ECA(s) Technical Committee of Experts**

(English only)



## EC's Comments to REMPEC study on the feasibility of a SOx ECA in the Mediterranean Sea.

As general comment on the progress report of the REMPEC study by EERA/FMI, the EC thinks that the study is very good and professionally realized. This was expected as the contractor organization have a world renown reputation in the field and they have taken part to several previous relevant studies procured by the IMO (3<sup>rd</sup> IMO GHG study, 2016 Fuel Availability Review to mention a few).

Main results indicate that the reductions in SOx emissions and related health benefits, especially in to highly densely populated port cities and costal areas bordering the Mediterranean Sea, are significant. These results are broadly in accordance with recent/ongoing EU studies (also referred to below) on the same subject matter albeit based on slightly different assumptions on fuel consumption and treating in a different way national and international shipping.

The report, in the EC's view, shows a clear and robust preliminary cost-benefit case which would duly inform a potential decision by relevant littoral states to the Mediterranean Sea to engage in a joint collaboration and proceed, possibly jointly, with a timely request to the IMO for a SOx ECA designation at the very least.

The Commission welcomes any such regional initiative of relevant riparian states, preferably all of them to ensure uniformity of health and environmental benefit while preserving the level playing field. The Commission also believes that such an initiative should be realized under the IMO legal framework. For the sake of joint recollection, the effective entering into force date of such a protected area would have to be discussed among IMO parties after the submission of the request in question, namely between the date of the request of such designation and the formal adoption by the IMO, as indicated in the relevant REMPEC action plan which would give ample time to discuss pending aspects.

The EC would like to inform the experts of the SOx technical Group about a study procured to a consortium of EU research organisations headed by IIASA including ERMIC and the Norwegian Meteorological Institute (and with cooperation with FMI), assessing the feasibility of additional ECAs in all EU waters (for both SOx and NOx) due for imminent publication and which will be 'tentatively' be presented in the December REMPEC meeting in Malta if deemed useful to make even more robust the underlining technical basis. Of course the EC is supported by the technical assistance of IIASA experts in carrying out the assessment and formulating the views expressed in this document on the general quality of the present preliminary study.

The EC study was launched early this year to fulfil regular obligation as an EU institution to update of own data and technical knowledge<sup>1</sup> (at least every 3-5 years) in order to monitor compliance with existing EU legislation on air quality -in this case- and also to inform consideration of future legislative initiative.

The mentioned obligation is reflected in a Commission report published in April 2018<sup>2</sup> on the implementation of the EU sulphur directive (including the reduction from 1% down to 0.1% of the ECA requirement in the North Sea and Baltic sea as of 2015) and call for such an update as indicated in reference <sup>1</sup>. It is important to note that the report highlights the significant success of SOx-ECAs in EU waters in terms of achieving lower concentrations of sulphur dioxide measured in the area<sup>3</sup> - and the

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<sup>1</sup> An earlier ECA feasibility study for EU water was carried in 2012, as part of the 2013 Impact Assessment carried accompanying the revision of the EU National Emission Ceiling Directive subsequently adopted in 2016. An updated was launched this is year by the EC to reflects latest development in maritime inventories and energy consumption data bases also used in UN GHGs studies.

<sup>2</sup> Commission report to the European Parliament and the Council on implementation and compliance with the stricter sulphur standards for marine fuels set out in Directive (EU) 2016/802; COM(2018) 188 final, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2018:188:FIN>>

<sup>3</sup> So far the mandatory use of marine fuels with a sulphur content of 0,10% in the European SOx-ECAs as from January 2015 has proven to effectively contribute to achieving the Directive's purpose of reducing harmful effects of sulphur dioxide emissions from ships on humans and the environment. Over 93% of the inspected ships in the SOx-ECAs respected the stricter sulphur concentrations which lead to a significant reduction of sulphur dioxides concentrations in ambient air in regions bordering the SOx-ECAs (e.g. up to 60% in Denmark<sup>8</sup>, to 50% reduction at the German North Sea island 'Neuwerk'<sup>9</sup> and the Swedish islands of Öland (Ottenby) and Gotland (Hoburgen)<sup>10</sup>, and over 20% reduction in the Rotterdam-Rijnmond region<sup>11</sup>).

<sup>8</sup> Danish Ministry of Environment and Food, November 2016, 'Sulphur content in the air halved since 2014', see: <http://en.mfvm.dk/news/news/nyhed/sulphur-content-in-the-air-halved-since-2014/>

consequent reduction of harmful impact to health in the area projected by the sulphur legislation, as well as in terms of intensification enforcement of the legal requirements and consequent compliance rates which was key to address potential fears of distortion of competition and that the EU experience in SO<sub>x</sub>-ECAs showed its value in preserving the economic level playing field. Several studies monitoring the competitiveness of trade carried out by industry associations in the area showed no relevant impacts and no occurrence of modal shift. Additionally, the report also shows no records of accidents due to the operational transition from the use of heavy fuel oils to distillate fuel products. The recent experience with this SO<sub>x</sub> ECA is an encouraging precedent in view of the introduction of the global 0.50% sulphur limit -as well as of future new ECAs (let's recall the previous ECA requirement was 1%), indicating that experience exists in the industry and timely preparation can ensure a smooth transition to the new limit while avoiding negative economic repercussions for the sector and minimizing any impacts at operational level.

In light of the above, we suggest also REMPEC study should highlight such success in the EU or similar success in the US (*perhaps you may consider introducing Com report in reference list, notably in relation to section 6 on comparison with different studies on ECAs even if the report; any US study to flag in this respect?*) as examples. Furthermore the Commission is engaging in international collaboration to raise awareness about sulphur regulation in general and also about this initiative in shared sea areas such as the Mediterranean Sea.

Furthermore the Commission's report stresses the need to equally protect the health citizens also in the West and South of Europe, and of course in countries neighbours of the EU and sharing sea areas with, as it is case for the Mediterranean Sea, while ensuring firm action to preserve the level playing field across the EU to economic operators. Furthermore, the EC calls upon the technical assistance of EMSA both in EU and non EU countries EMSA provides capacity building activities, like dedicated trainings on EU environmental legislation including on air emissions from ships to maritime administrations and inspectors of Candidate, potential Candidate countries and countries falling under the European Neighbourhood Instrument with the objective of enhancing enforcement of sulphur standards and approximating legislation to the Union acquis. This is for example taking place in countries of the Energy Community (Albania, Bosnia and Herzegovina, Georgia, the former Yugoslav Republic of Macedonia, Kosovo, Moldova, Montenegro, Serbia and Ukraine) as since 2016 the Ministerial Council of the Energy Community decided to incorporating the Sulphur Directive in the relevant Treaty to ensure regulatory alignment will help further reducing SO<sub>x</sub> emissions in neighbouring regions. Other EU instruments dedicated to are available in similar support to 'other categories' of non EU countries and in particular in the Mediterranean basin.

Finally, in May COM communication Clean Air For all calls for an EU immediate action in order to protect its citizens and stresses the need to act urgently and more on AQ preservation in Europe from all land sectors including transport. The communication shows that more than 130 cities in the EU are in exceedances with legal requirement (and relevant member states are referred to the European Court of Justice) under the AQ legislation, many of them are port cities. As far as non EU countries are concerned, a wealth of relevant information per country can be found on the site of the European Environment Agency including addressing –also through engagement in international collaboration- the transboundary component of air pollution from other countries or due to passage of high density traffic in front of the their coasts.

**In relation to section 1.2 Primary Findings (page 3)**, the results of this very relevant summary deserve careful consideration.

It is to be noted preliminary data on the reduced health impacts are: **1100** avoided premature deaths annually and **2300** fewer children's asthma (do you have data for elderly people as well- perhaps included in the mortality figure??). I note study reference 3 found the .50 rule in **2020 will avoid btw 139000 and 396 000 premature deaths a year globally**.

These preliminary data on the reduced health impact deserve a peer review and comparison with other studies which I guess contractors and REMPEC colleagues have already duly planned after this first round of comments. For example, comparison should be carried out to relevant EU figures, such as for example to the **50 000 avoided premature deaths estimated** in the impact assessment of **2012**

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10 IVL - Swedish Environmental Research Institute, November 2015, 'Reduced sulphur content in air after tightening of ship fuel regulations', see: <http://www.ivl.se/>

11 Rotterdam Rijnmond Environmental Protection Agency (DCMR), July 2015, 'Cleaner air from cleaner shipping', see: <http://www.dcmr.nl/nieuws/nieuwsberichten/2015/07/schonere-scheepvaart.html>

(mostly due from a decrease from 1% down to 0.10 % in the 'North EU ECAs' although we think that stronger enforcement rules that followed the sulphur directive has also a positive impacts in areas where the sulphur requirement did not change but perhaps the induced compliance has been higher) revision of the EU sulphur Directive as well as with the **400 000 premature deaths yearly** (due to PM 2.5) due a whole set of air pollutants coming from all sectors or similar relevant comparisons such as with the French study or with the EU updated study to be published soon). In light of the figures above it is important that REMPEC study contains a cross discussion/comparison study should also go beyond those referred to in the text- as most of the studies in the areas are from EU existing datas and provide informed explanation of potential differences as appropriate- (*ie article in Nature Communications, reference 3 and MEPC70/inf 34 are based on the same methodology with the current study since the authors are the same, e.g the contractors*).

Recently European Commission has asked advise the consortium headed by IIASA. It appears that improvements of health indicators due to implementation of MED SOx-ECA identified by ERMIC with its ALPHA-Riskpoll model are much higher than the effects reported in the EERA/FMI study. Preliminary analysis done by ERMIC has identified possible reasons for the underestimation in the EERA/FMI study. We submit for your consideration and appropriate action our views on this matter. In particular, we believe further clarifications are needed on these preliminary results, which require direct interactions between the authors of the two studies, and as well as sharing of those detailed exchange with the expert committee.

In light of the above, we suggest the study compares with relevant literature (not only those that lead to existing ecas as in section 6 page 36) including the following:

- Existing EU analyses (from EC and France to mention a few), especially those contracted by the EC, use the same methodology as other analyses of European/EU policy initiatives, e.g. the land measures in the EU NEC Directive and the CLRTAP Gothenburg Protocol (and partly also EU climate policy). This means that relevant outputs may be directly comparable to these other EU analyses, and therefore much more applicable when for example comparing additional ship emission abatement measures with possible alternative additional abatement measures in other sectors especially from land sectors.
- It is likely that EC studies have the most up-to-date emission projections for European land-based emission sources, so when looking at the impacts (and doing a CBA) at any given future date, this could result in a better reflection of the actual situation in e.g. 2025, 2030 or 2040. Therefore, they should also be taken into account in the REMPEC study.
- Looking at reference (3) it could be perhaps clarified what are the assumptions assumed regarding land-based emissions, or how their assumptions on concentration-response health impact functions match the most recent WHO advice (however referred to in that reference).
- Finally, even if not estimated in available studies, reference should be made to the fact that additional benefits are constituted also by the avoidance of damage to cultural heritage and this, together with the avoidance bad air pollution in some coastal areas, may have a positive impact in touristic economic activities in the area.

#### **Page 1, sub-chapter. 1.1.1**

Remark on nomenclature to improve understanding: the term ECA alone should not be used since it related to NOx as well which is currently only broadly covered under relevant REMPEC action plan and the study's Terms of reference. Therefore, all ECA should be replaced with SOx-ECA.

#### **Page 2, sub-chapter. 1.1.1**

Please replace 'European Community' with 'European Commission on behalf of the EU' or simply the European Commission '- same on page 8. Please note that there are 21 countries which are party to the Barcelona Convention. Furthermore, please note that procedurally speaking the submission of a request to designate a SOx-ECA to the IMO by EU Med countries should be an EU submission with all EU countries - also those not bordering- (and the EC) plus of course the submitting non – EU countries.

**Page 2, sub-chapter. 1.1.2**

Can you please update reference (1): there is a 2017 version of ISO 8217 – suggested even if no major changes are there with reference to 2005 blend grades and the discussion on the 0.50 blends is still ongoing at the IMO/ISO. You could also refer to the planned Publicly Available Specification planned by ISO before 2020 to categorise the new 0.50% fuel blends that will appear in the market across 2020.

**Page 2, sub-chapter. 1.1.2 (and in other sections relating to LNG in the report)**

On LNG (see the typo 'advanced' instead of 'advance') we suggest the introduction of the following footnote to better reflect the actual importance of LNG as marine fuel in the EU countries littoral to the Mediterranean Sea since the EC promotes LNG as a low carbon alternative transport fuel to attract further investments in the supply chain and making it availability fuels more wide-spread both in the EU countries and with some project funding opportunities also in non EU countries. LNG deployment proved successful in existing SOx ECAs in the North sea and the Baltic sea (as described in the Commission report referred to above.

**Footnote** to LNG: EU Directive on the 'Deployment of an Alternative Fuel Infrastructure' (2014/94/EU) requires Member States to put in place the necessary infrastructure, like refuelling stations, to ensure availability of LNG for road and maritime transport. To date, the world of LNG shipping companies is dominated by 4-5 shipping companies worldwide with EU is at the forefront in LNG shipbuilding.

When referring to alternative compliance options you could refer to other renewable and zero-emission fuels like biodiesel and bio-ethanol, electric propulsion (fuel cells), and ammonia.

**Page 14. Table 8 onward**

Even if we understand why the artefact does not give access to emissions in Bosnia and Monaco (the last one having recently ratified MARPOL VI and having launched a new legislation – pre SOx ECA-reducing to 0.1 the sulphur content of fuels in their territorial waters) I would recommend for the sake of an inclusive process to get that information from different sources. Same holds for table 16 on page 27.

**Page 36, Section 6**

In section 6, page 36 there is a comparison with existing study preparing for North America SOx ECA of course clarifying that there is a substantial difference due the upcoming 0.50% fuels in 2020 which was not foreseen back then. For the sake of completeness it would be worth the contractor should get an input also on the experience of the preparation of the SOx ECA designation in EU waters by a relevant Riparian state (NL, Sweden, others?) or organisation such as Helcom. Perhaps in section 6 the explanation on the lack of relevance of old CBAs ECAs on North Sea and Baltic Sea designation and reasons for it should be moved from a later section (for example from page 48).

However, this section should be considered in a broader sense and look into costs of land measures in the EU and all relevant EU studies as going for more cost effective maritime measure would make the case for ECAs much stronger for example.

Comparison in Table 27 includes the combined effects of MARPOL VI and SECA and thus is not very useful for comparing the effects of SECA on top of MARPOL VI. Nevertheless it demonstrates that the cost of avoided mortality in MED is lower than for the American ECA. Perhaps we would suggest deleting it – or rearranging- as the text sufficiently explains that the situation is slightly different from the past due to the 2020 regulation upcoming.

**On page 39** the footnote 4 on STEAM record of application is a bit dense perhaps (the consortium has been selected on the basis of prestige of relevant organisation so perhaps no need to detail this aspect too much) . Perhaps some of those documents referred to therein on EU ECAs feasibility should be part of the references at the end of the document or referred to from section 6 to rebalance the US versus EU experience and preparation on the matter. Furthermore, they refer to the NOx ECA and in that context it would also good to add, to be able to compare viable cost benefit indicators across different options even if the remit here is mostly SOx-then:



- Katarina Yaramenka, Hulda Winnes, Stefan Åström & Erik Fridell, IVL Swedish Environmental Research Institute 'Cost-benefit analysis of NOx control for ships in the Baltic Sea and the North Sea
- AIR POLLUTION AND CLIMATE SERIES 36 (AirClim) (EEB) (T&E), March 2017, Sweden, Goeteborg.
- Environmental impacts and health benefits of a NECA in the North Sea (2012)  
<http://www.pbl.nl/en/publications/2012/assessment-of-the-environmental-impacts-and-health-benefits-of-a-nitrogen-emission-control-area-in-the-north-s>
- Effectiveness of international emission control measures for North Sea shipping on Dutch air quality (2007)  
<http://www.pbl.nl/sites/default/files/cms/publicaties/500092004.pdf>
- "SECA Assessment: Impacts of 2015 SECA marine fuel sulphur limits First drawings from European experiences"  
<https://www.nabu.de/imperia/md/content/nabude/verkehr/nabu-seca-studie2016.pdf>

In the section on references, consider suggestions for additions provided above.



**APPENDIX III**

**Comments from Ms Cécile Rafat, representative of France serving on the SOx ECA(s)  
Technical Committee of Experts**

(English and French)



Projet de rapport de l'étude de faisabilité  
pour examiner la possibilité de désigner la Mer Méditerranée ou une/des parties de celle-ci  
en zone de contrôle d'émission de SOx sous MARPOL annexe VI (SECA)

*Draft report on Technical and Feasibility Study to Examine the Possibility for Designating the  
Mediterranean Sea or Parts Thereof as a SOx Emission Control Area Under MARPOL VI*

– Commentaires de la France –  
– *Comments from France* –  
(2018.12.05)

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La France remercie le REMPEC, l'EERA et le FMI pour ce projet de rapport. Les commentaires de la France sont essentiellement sous forme de questions dans le but d'aider à la compréhension de l'étude, notamment de sa méthodologie.

#### Données d'entrée

Afin d'estimer la consommation de carburant par activité et les émissions des navires en mer Méditerranée, les données AIS et le modèle STEAM ont été utilisés. Une flotte de 30 000 navires a été estimée sur la mer Méditerranée. L'année 2016 est l'année de référence retenue. Des estimations de consommation de carburants ont été faites sur plusieurs années allant de 2016 jusqu'en 2050.

- Comment le chiffre de 30 000 navires par an a-t-il été défini pour être représentatif ?
- Comment le modèle STEAM gère-t-il les écarts dans les trajectoires navires (gap-filling) ?
- Dans l'estimation des consommations, les limites fixées par la directive européenne (EU) 2016/802 relative à la teneur en soufre des carburants ont-elles été prises en compte dans l'étude ? (1,5% de soufre pour les navires à passagers en services réguliers et 0,1% de soufre pour les navires à quai plus de 2 heures)
- Les phases navires (à quai, en manœuvre, en transit) ont-elles été prises en compte dans les calculs de la consommation de carburant et des émissions, notamment au regard de la puissance des moteurs auxiliaires à quai et en manœuvre?

#### Projections

L'étude montre une baisse de la consommation annuelle de carburants entre 2020 et 2050. Cette baisse est expliquée par une augmentation de l'efficacité énergétique des navires, notamment par l'évolution des technologies.

- Cette estimation prend-elle en compte l'augmentation de trafic proposée en table 28 ? Si oui, faut-il comprendre que malgré l'augmentation du trafic, la consommation de carburants globale sur la Mer Méditerranée va diminuer ? Si non, Le Modèle STEAM pourrait-il projeter une estimation de la consommation et des émissions prenant en compte l'évolution de trafic ?
- Comment expliquer une baisse de l'utilisation GNL entre 2016 (1,3%) et 2020 avec et sans SECA (0,8%)

#### Etude économique

L'étude économique de la mise en place d'une SECA envisage une hypothèse de flotte avec 18% de navires équipés de scrubbers. L'étude économique de la mise en place d'une SECA envisage également une hypothèse de flotte avec 11% de navires au GNL.

- Pourquoi envisager un horizon si lointain pour l'option scrubbers?
- Comment expliquer ces taux dans l'étude économique par rapport aux taux retenus dans la modélisation des émissions ? (0,6% de scrubbers et 0,8% de GNL)

### **English translation**

France thanks the REMPEC, EERA and the FMI for this draft report. Comments from France are mostly addressed under questions in order to better figure out the study, in particular its methodology.

#### Input datas

In order to estimate activity-based shipping fuel consumption and ships emissions related to in the Mediterranean Sea, AIS data and the STEAM model have been used. 30 000 vessels have been considered on a base year of 2016. Fuel consumption estimates have been done from 2016 to 2050.

- How the figure of 30 000 vessels by year has been chosen to be representative?
- How does gap filling in trajectories are managed?
- Are european sulphur limitations requiered by the european directive 2016/802 relating to a reduction in the sulphur content of certain liquid fuels taken into account in the study? (1,5% of sulphur content for passengers ships operating on regular services and 0,1% of sulphur content for ships at beth (more than two hours)
- How navigation phases (by manoeuvring, at bet, in transit) have been taking into account in fuel consumption and emissions modeling, in particular regarding power of auxiliary engines at beth and by manoeuvring?

#### Projections

The study shows that annual fuel consumption decreases from 2020 to 2050. This decrease would be due to an increase of energy efficiency from ships, in particular with technology improvements.

- Does this estimate take into account count growth as proposed in table 28? If yes, should we understand global fuel consumption into the Mediterranean Sea is going to decrease despite of the forecasted traffic increase? If no, Could STEAM model modelise fuel consumption and emissions taking into account evolution of traffic?
- - How explain decrease in using LNG from 2016 (1,3%) to 2020( 0,8%) (with or without SECA)?

#### Economic assessment

The economic assessment assumes 18% of vessels would be equipped with scrubbers under conservative 100-year investment horizon and 11% of vessels would use LNG in the Mediterranean.

- Why a so far horizon has been chosen ?
- How explain those rates(18% and 11%) in the economic assessment while rates chosen in emissions modeling are 0,6% for scrubbers and 0,8 for LNG?

**APPENDIX IV**

**Comments from Commander (ENG) H.C.G. Aikaterini Stamou, representative of Greece serving  
on the SO<sub>x</sub> ECA(s) Technical Committee of Experts**

(English only)





**Draft Technical and Feasibility Study to Examine the Possibility for Designating the Mediterranean Sea or Parts Thereof as a SO<sub>x</sub> Emission Control Area Under MARPOL Annex VI.**

**Comments by Greece.**

Dear Mr Lauwers ,

Following assessment of the draft study on the possible designation of the Mediterranean Sea or parts thereof as SECA, together with involved national stakeholders, kindly note the following:

As a general comment I would like to state that potential proposals for designating an area as ECA according to the provisions of MARPOL ANNEX VI should strictly follow the provisions contained in Regulation 14.3 and Annex III therein.

I would explicitly like to emphasize on the fact that such a proposal apart from the adverse impacts of SO<sub>x</sub> emissions on human health should also, inter alia, address the impacts of SO<sub>x</sub> emissions on land and aquatic biodiversity as well as on areas of cultural and scientific significance. The underlying data and facts provided should be evidence-based and identify the sources of the methodologies used. A description of the equivalent measures in place for land-based emitters surrounding the same area is also necessary. This analysis should also be accompanied by a cost-comparison analysis between measures implemented on land and the relative costs incurred by ships' reduction emissions. The economic impacts on shipping engaged in international trade whether transiting only or calling at least at one Mediterranean port should be also taken into account.

In view of the above the study provided does not seem to cover all the above mentioned.

Furthermore according to section 5.2 "Exhaust Gas Cleaning Adoption Analysis" data provided only 39 scrubbers are installed on ships sailing in the Mediterranean area and this number is not subject to change under a 1-year investment horizon. Surprisingly, on the basis of 100-year investment horizon and 15% investment rate and the assumption that all those ships are eventually going to install scrubbers (*some 18% of the fleet operating in the Mediterranean Sea Area, could adopt scrubbers* p.29 ), the consultants conclude that those ships might benefit over \$260 million of savings. At the same time, they admit that the majority of the fleet (82%) may determine that fuel switching remains the least costly option.

The analysis described in this section is in our view based on arbitrary assumptions and won't yield credible and accurate results. A more robust process has to be adopted in order provide concrete conclusions. As a last remark on this section, I would like to add that the added value and the cost effectiveness of using scrubbers in the long term is not adequately proven. Further it is also noted that facts which confirm the net environmental benefit of using this technology are missing.

On section 5.3 "Alternative Fuels" we would appreciate an explanation on the reasoning behind the assumption that 3900 vessels which are feasible candidates for alternative fuels (p. 32) as this number seems rather arbitrary.

Nevertheless the use of LNG as a fuel might be an environmental friendly measure for reducing ship's emissions, but when assessing its potential adoption and use, one needs also to keep in mind that a large financial cost of ship retro fitting (if this is feasible) is required for the existing ships to comply with, especially the ones engaged in bulk/trump shipping. We would suggest that in order for this measure to be cost-effective, it can only be adopted by new ships.

On section 7.4.3.1 "Cost-effectiveness Evaluation" we would seek further clarification on the method for calculation of VSL indicators.

On section 7.5 "Uncertainty and Limitations" slow steaming is considered as an energy efficiency improvement measure governed by continuing behavioural adaptation (p.51). Taking into account that a. speed management in general is amongst the set of candidate short term measures of the IMO initial strategy which can deliver direct emission reductions currently being discussed in IMO under the implementation of the initial strategy and b. there are significant technological developments between the 3<sup>rd</sup> IMO study and nowadays doubts are expressed on the fact that the consultants trust the STEAM model assumption on slow steaming as an optimistic model.

To conclude I would also like to note the following general comments:

For Greece, when considering potential designation of the Mediterranean Sea as a SECA area, it is of major importance to strike proper balance between all affected stakeholders. Special attention is drawn to the fact that stricter rules will create disproportionate financial impacts to the shipping industry, shifting eventually the total cost to the end-user and adversely affect short sea shipping activity, as well as social and economic development for insular and remote areas. In the case of Greece for instance, the maritime connections and seaborne trade to and from Greek islands, where there is no alternative to be connected with the hinterland, might be severely affected, not only in terms of transportation costs to be potentially transferred to the end-user, but also in terms of disproportionate financial burden to the public budget which covers the costs of public service contracts for securing the country's social and territorial cohesion.

Designating the Mediterranean Sea or splitting parts thereof entails also an extremely high risk of trade modal shift outside the Mediterranean. This is true not only for international shipping (one should not ignore that the land-transport alternative for EU-Asia cargo transportation Europe is not inconceivable as in the case of other European or American SECAs) but also for short-sea shipping. This consideration may also have a bearing in maritime trade patterns, where bigger ships would be inclined to unload their cargo outside the Mediterranean (or in a non-SECA part thereof), to be subsequently transported to the final destination either by trucks or by smaller ships. The significant costs incurred will undoubtedly lead to an increase of transport costs and jeopardize economic growth of Mediterranean countries and/or other countries of final destination of goods.

Negative impacts may also be expected on Mediterranean ports eligibility, if not sustainability. Distortion of competition between Mediterranean and non-Mediterranean ports seems unavoidable, but also between Mediterranean ports themselves, bearing in mind that not all Med countries are parties to MARPOL Annex VI.

Unfortunately, we were not able to find answers to the above concerns in the draft study.

Concluding, while we do recognize the conduct of this study as good starting point in view of our deliberations on the feasibility of a submission to IMO to designate the Mediterranean Sea or parts thereof as a SECA area, however further elaboration and assessment of several aspects is necessary in order for it to reflect and justify a complete and well documented outcome enabling informed further decisions on the issue.

**APPENDIX V**

**Comments from Dottor Roberto Giangreco, representative of Italy serving on the SO<sub>x</sub> ECA(s)  
Technical Committee of Experts**

(English only)



**Draft Technical and Feasibility Study to Examine the Possibility for Designating the Mediterranean Sea or Parts Thereof as a SO<sub>x</sub> Emission Control Area Under MARPOL Annex VI**

**Comments by Italy**

Dear colleagues, first of all I would like to thank REMPEC for the work done and information provided.

I found the study very well done and complete, which performs a good cost-benefit analysis and clearly illustrates the advantages deriving from the establishment of a Sulphur Emission Control Area in the Mediterranean.

I therefore believe that the study will be very useful to help us decide to proceed with a request to the IMO for a SO<sub>x</sub> ECA designation as indicated in the REMPEC action plan, Designation on which, Italy's position remains strongly in favor.



**APPENDIX VI**

**Comments from Mr Alaya Sagaama, representative of Tunisia serving on the SO<sub>x</sub> ECA(s)  
Technical Committee of Experts**

(French only)





**Etude des émissions des navires et choix des zones ECA( PHASE 2) :**

Mes remarques sont les suivants :

1-l'impact des réductions de la composition en soufre du fuel sur le volet changement climatique et effets de serre : comme nous savons l'obtention d'un joule, unité de mesure du travail mécanique nécessite une quantité bien déterminé d'énergie primaire du carburant fossile que ce soit gaz ou liquide, donc la quantité de travail obtenue est généralement proportionnelle à la quantité d'énergie primaire consommée et par conséquent à la quantité de CO<sub>2</sub> émises de ce fait la diminution de la composition en soufre de 2.5 à .5 ou .1 % influe peu sur la quantité de CO<sub>2</sub> émise d'où l'influence non considérable sur les effets de serre et par suite sur le changement climatique.

2-On doit faire la nuance entre la pollution émise par les bateaux en arrêt dans les ports et dont d'une part la dispersion atteint rapidement les riverains du port et d'autre part des solutions spécifiques et immédiats liés à des installations fixes aux ports sont réalisables et la pollution des navires en navigation au large dont la dispersion est plus complexe qui est soumis à plusieurs facteurs ( vent , distance, humidité, température, pression...) avant d'atteindre le littoral.

3-L'émission total du SO<sub>x</sub> est de 681.000 (mmt) qui correspond à une teneur en soufre de 2.5 %, théoriquement pour chercher la quantité émise qui correspond aux autres teneurs on fera qui suit :

Pour la teneur de .5 % on a : $681.000/2.5*.5=136.200$  inférieure à 168.000 chiffre avancé par l'étude.

Pour la teneur de .1 % on a : $681.000/2.5*.1=27.240$  inférieure à 35.800 chiffre avancé par l'étude.

La quantité de soufre du fuel lourd de haute teneur est largement émise dans l'atmosphère avec un degré inférieur pour les fuels de teneurs inférieurs est à expliquer.

4-La répartition de la quantité totale émise en SO<sub>x</sub> par pays a été conçu selon la superficie ou la longueur de la littoral ou l'activité économique ou son rapprochement par rapport au parcours dominant de la navigation en méditerranée, en effet c'est un peu difficile d'expliquer la quantité allouée à l'Algérie et l'Italie qui sont respectivement trois fois et Cinq fois celle de la Tunisie.

5-La quantité de soufre à réduire en zone ECA est de 95% càd  $681.000*.95/2.5*100=258.78*10^5$  MMT de fuel est inutilisable en l'état et ce pour seulement 7% de la navigation mondiale, donc on devra penser ou bien à traiter ce nouveau résidu du raffinage de pétrole pour le rendre utilisable sans effets néfastes ou bien à chercher un issu pour en débarrasser comme les puits de pétrole perdues et dans les deux cas un coût supplémentaire à prévoir et à payer par la communauté internationale.

6-On aurait aimé savoir si la quantité de soufre allouée à la Tunisie est éparpillée sur tout le pays ou sur une région bien déterminée et par sommation avec la quantité terrestre émise et en divisant au volume allouée on trouve bien la concentration en mg/l qu'on comparera à la norme du milieu ambiant pour en tirer les conclusions adéquats concernant surtout les impacts néfastes sanitaires.

7-si on suppose que le coût est linéaire en fonction de la quantité de soufre éliminée, le coût calculé de la zone ECA relativement à l'annexe VI du REMPEC, on aura 4 billion de \$/an  $/.75*.2= 1.4$  billion au lieu de 1.8 billion/an avec un écart de 28% expliqué par le fait que le coût augmente avec le taux à réduire.

8-On doit veiller à ne pas laisser le grand choix entre appliquer le nouveau règlement avec ses impacts financiers énormes et continuer à le déroger par les anciens pratiques avec des actes de camouflages et surtout que la grande part d'émission se fait au large avec absence de contrôle étroit.

**FAIT PAR SAGAAMA ALAYA**

(EXPERT Agence Nationale de Protection de l'Environnement-0021697421555)