

Agenda Item 5 – Cases studies. Experience and lessons learned.

Malta, 7-8 October 2026

Regional Expert Meeting on the Possible Designation of the Mediterranean, as a whole, as a NOx ECA



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Agenda Item 5 – Cases studies. Experience and lessons learned from the designation of other NECA.

- **Continuing our discussion initiated on Day 1, through a questionnaire**
 - Implementation and enforcement, experience feedback and lessons learned
- **Case studies**
 - Existing fleet / Fleet renewal
 - Yachting sector / Shipyards
- **PSC**
 - Example of items to be checked
 - PSC CIC / use of sniffers
- **Feedback received by IMO**



Discussion through Q&A – continuing Day 1

Continuing Discussion from Day 1

1 – Regulatory framework required to implement Regulation 13 and Tier III limit, and to control compliance

- Can you explain broadly the **structure of your maritime administration**?
- Which department controls what?
- Are responsibilities (Flag/Port) shared within the same departments?
- Is an adequate regulatory framework already **used to implement regulation 13**? And to **control compliance**, for your fleet and within your ports?
- Do you have national surveyors as part of your Administration employees, or do you rely mostly on contractual surveyors?
- Who is in charge of inspections during PSC?

2 – Communication channels and awareness raising

- Which tools are available to raise awareness and provide trainings within your Administration, for example for your PSCO, or employees in charge of certificate issuance or surveys?
- Are you aware of online training courses? Have you ever used any?
- Do you have access to support and assistance in terms of training, or legal drafting or technical matters? Through which mechanisms?

Continuing Discussion from Day 1

3 – Experience feedback, lessons learned

- During, and following, the implementation of the Med SECA, could you cite 2 or 3 major obstacles faced at national or international levels?
- Could you explain why the situation or the context is different for the implementation of a NECA?
- Could you give examples of possible obstacles and challenges for the implementation, and the enforcement, of NECA Tier III limit, at a national level or international level?



Case studies

What about your fleet, your industry?

Let's open a discussion centred on the industry – ship owners and operators, yachting industry, shipyards and equipment manufacturers

Guiding questions – please take some time to read the questions.

A Press Article will be handed over in paper format, to help you answering.

1 – Tier III solutions and existing fleet

Read the article from Hug Engineering (A supplier of low to zero-emission solutions)

Which relates to **workboats** operating in a new NO_x ECA (Norway)

Then answer the question:

- We understand that there is no MARPOL requirement for retrofitting an existing ship with Tier III compliance method (SCR). **But could you foresee cases/situations where retrofitting an existing ship is needed or desirable?**

Fleet replacement is the real issue. We'll cover that topic with another case study later.



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Workboats operating in a new NO_x ECA (Norway)

CASE STUDY – WORKBOAT FLEET (from HUG Engineering Website)

Workboats are being asked to make compliance work in the real operating life of a vessel: **across changing operating areas, tight machinery spaces, demanding duty cycles, short yard windows, and constant pressure to stay available.**

Newbuild first. Retrofit when there is a real driver.

This is the first point worth getting right, **because many market discussions still oversimplify it:** IMO Tier III does not automatically mean that every older workboat now needs a retrofit. Tier III applies to the specified ships and engines while operating in designated NECAs. Outside those areas, Tier II applies. **Applicability linked to ship construction date and operating area.**

That distinction matters commercially.

In workboats, **most projects are still newbuilds.** Retrofit can be relevant, but **it is usually driven by a concrete business case:** access to a tender, stronger environmental positioning, or a customer requirement that **goes beyond the legal minimum.**

Source: [imarinenews.com/Baltic Workboat AS](https://www.imarinenews.com/Baltic-Workboat-AS)



Source: Hud engineering website

Source: <https://hug-engineering.com/newsroom/imo-tier-iii-workboats-making-compliance-work-real-operations>



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Workboats operating a new NO_x ECA (Norway)

CASE STUDY – WORKBOAT FLEET

Newbuild first. Retrofit when there is a real driver.

For many workboats, Tier III is planned in from the beginning. **Space is reserved early, the SCR concept is known up front**, and the integration work can be engineered around the vessel from the start.

Retrofit is different. The challenge is rarely the regulation alone. The challenge is integrating an emissions system into a vessel that **was never designed to carry it**. Available space is tight. Service access has to be preserved. Back pressure becomes more sensitive. Tank location, electrical supply, routing, and installation timing all become more critical. Retrofit is possible, but it needs a clear technical and commercial reason.

How do I meet IMO Tier III requirements when operating in multiple ECAs?

In practice, this is less about complexity and more about having **the right operating concept**.

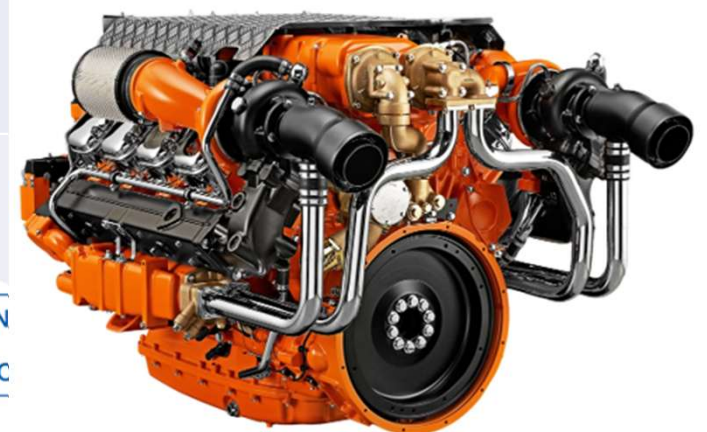
With a **switchable SCR system**, entering an ECA means switching to Tier III mode, starting urea dosing, and reducing NO_x. Leaving the ECA means the system can be switched off again.

That keeps the vessel compliant where required, while avoiding unnecessary operation outside the regulated area

Source: <https://hug-engineering.com/newsroom/imo-tier-iii-workboats-making-compliance-work-real-operations>



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Scania 16-litre Tier III marine engine

Workboats operating in a new NO_x ECA (Norway)

CASE STUDY

How do I meet IMO Tier III requirements when operating in multiple ECAs?

That also has a direct impact on operating cost and onboard design.

A system **that runs continuously will continue consuming urea continuously.**

A switchable concept reduces unnecessary reductant use outside ECAs and can support a **smaller urea tank**, as storage does not have to be sized around permanent operation.

There is also a documentation requirement. The **tier and on/off status** of engines must be recorded **at entry into and exit from a NO_x Tier III ECA**, and whenever status changes within that area, together with the date, time, and position of the ship.

In technical terms, **the vessel needs a clear operational record** showing when Tier III mode was activated, when it was deactivated, and where those changes took place.



Source: <https://hug-engineering.com/newsroom/imo-tier-iii-workboats-making-compliance-work-real-operations>

Case study – Fleet evolution over 10 years

2 – Fleet replacement – from a Shipowners/operator point of view



- A passenger ferry operator based in France: **Corsica Linea** (former SNCM)
 - *France / Corsica / Sardinia / Algeria / Tunisia*
- **In 2016**, an historical Fleet of 6 pax and ro-pax ferries: age **13, 14, 18, 22, 25 and 27** year-old.
- One ferry fully refurbished in 2023 and modernized in 2025 (by Tunisian Shipyard CMR)
- 2 newbuilt ships, delivered in 2023 and 2026
 - fitted with LNG engines (dual fuel; Tier III compliant when operating on LNG)
- Today, a fleet of 9 ships.

So what happened in 10 years?

- no replacement in the existing fleet.
- 1 conversion
- Addition of 2 new ships, built to be Tier III compliant.



© Emmanuel Bonici – Mer et Marine (ferry Le Mediterranee)

Any comment?

Has your Administration been contacted by ship owners or operators? Do you have direct information from your shipowner?

Have operators/owners considered or implemented a replacement plan? Which type of support could be provided?



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Fleet replacement

Extract for the Technical and Feasibility Study – Recalling some issues related to Fleet Replacement

5.4.2 Impacts on short sea shipping

Smaller ships, often involved in coastal traffic, which forms a significant part of short sea shipping (IMO, 2016a), will be required to adapt to the NO_x Tier III standards following the implementation of the Med NO_x ECA. This could potentially result in increased costs (CAPEX), primarily due to the higher expenses associated with compliance technologies and engines for newbuilds. There is a slightly higher density of non-Tier III compliant vessels within the Ro-Ro and Ro-Pax fleets compared to the overall Mediterranean fleet, with 71% of total Ro-Ro and Ro-Pax vessels not Tier III compliant compared to 68% in the overall fleet (see section 4.3). In addition, Ro-Ro and Ro-Pax vessels typically have 4-stroke engines and so would rely on SCR technology for compliance, which has higher operational costs than the EGR alternative, see Section 5.3.2 for more detail.

However, passenger (non-freight) vessels have higher average ages and slower replacement rates compared to freight vessels and the overall fleet. Globally, the average age of all ships

was 22.2 years in 2023, whilst passenger ship types²³ had an average age of 24.2 years (UNCTAD, 2024). Moreover, 47% of passenger ship vessels had an average age over 20 years, compared to 41.8% for all ship types. Therefore, longer replacement rates for passenger vessels may result in slower uptake of additional compliance costs for this vessel segment.

As such, small passenger ships will likely transition to Tier III compliant engine systems at a slower rate than the overall fleet, but with higher cost implications on fleet operators due to SCR technology and high energy consumption. Any additional OPEX investment in the near-to medium-term potentially passed on to passengers through elevated travel costs.

Yachting industry / Shipyards / Engine manufacturers

3- Yachting industry / Shipyards and engine manufacturers

What about the **yachting** industry?

- It this sector relevant for your country?
- Does your Flag Administration implement a specific Code or set of regulations for large Yachts?

Shipyards; ship repair; engine manufacturers

- Relevance of those activities for your country? Have you got data to evaluate the status of those sectors?
- Any (large) marine engine manufacturers established in your country?
- Do you communicate, as a maritime Administration or else, with those sectors?

Remember!

Stakeholder consultations can help identify the specific challenges faced by different sectors and develop tailored solutions.

- Are there any sector association/professional groups established in your country?
- For ex, ICOMIA at the international level; FIN Federation des Industries Nautiques in France; Greek Yachting Association in Greece; etc...



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Yachting industry

A special case. Purely Recreational boats/yachts are out of scope. But yachts are getting bigger...

- Remember, if the yacht is recreational + less than 24 m = exemption to Tier III
- Since 1 January 2021, Tier III is applicable for yachts > 24 m

2020 – A first step



CRN Ferretti Group - 62m Voice, delivered in July 2020 - **THE FIRST** megayacht built in **Italy** to receive IMO Tier III certification. Compliance by fitting the engine exhausts with SCR auxiliary system.



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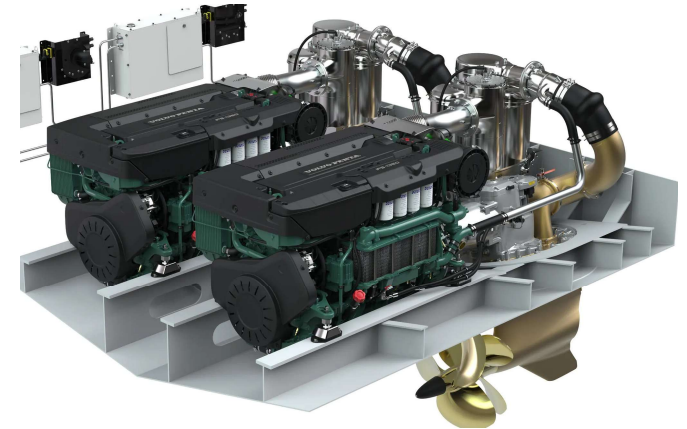


2022 – Solutions are available

VOLVO PENTA – IMO tier III range expands with new D13 solutions

Source:

Volvo Penta



The SCR system can be installed in either a vertical or horizontal position, thanks to the brand-new seamlessly rotating outlet. Able to fulfill IMO Tier III targets while reducing fuel consumption.

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Engine manufacturers

Engine manufacturers

Marine Engine manufacturers based in Mediterranean countries are already exposed to competition and covering an international market, where **Tier III engines have been in demand for + 10 years**. Similarly, engineering firms or service providers have already developed solutions for Tier III compliance.

For example: **BAUDOUIN** in Marseilles (Cassis), France

FILTER Reset

kW

HP

RPM

Duty ▼

Certifications ▲

- ☐ EPA 3
- ☐ EPA 4
- ☐ IMO II
- ☒ IMO III



6M21.3 SCR

Power: HP: 500 - 600
kW: 368 - 441

RPM: 1800 - 2100

Duty: Continuous Duty (P1),
Heavy Duty (P2),
Intermittent Duty (P3)



6M26.3 + SCR

Power: HP: 601 - 814
kW: 442 - 599

RPM: 1800 - 2100

Duty: Continuous Duty (P1),
Heavy Duty (P2),
Intermittent Duty (P3)



12M26.3 + SCR

Power: HP: 1200 - 1650
kW: 883 - 1214

RPM: 1800 - 2300

Duty: Continuous Duty (P1),
Heavy Duty (P2),
Intermittent Duty (P3)



Source and Credit: @BAUDOUIN <https://baudouin.com/engine-product-category/marine-propulsion-engines/>



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From Engine manufacturers and Class Societies

A short selection of technical Information and case studies from trusted sources

• Technical advice from Engine manufacturer WARTSILA	https://www.wartsila.com/insights/article/ship-spares-five-top-tips-to-help-keep-your-operations-compliant
• Technical explanation on Tier III, including retrofit cases MAN ES / Everllence	https://www.everllence.com/applications/projectguides/2stroke/content/special_pg/PG_7020-0145.pdf
• The specific case of Yachts Class society guidance	https://ww2.eagle.org/content/dam/eagle/advisories-and-debriefs/marine-yachts-nox-tier-III-may2020-20089.pdf
ICOMIA (Marine Industry Association) - Technical Guidance Note – Application of Tier III – Ed. 2	https://www.icomia.org/product/icomia-technical-guidance-note-application-of-marpol-annex-vi-tier-iii-regulation-13-edn-2/



Port State Control

2025 PSC Procedures - resolution A.1206(34)

APPENDIX 18 - GUIDELINES FOR PSC UNDER MARPOL ANNEX VI

Chapter 2 – INSPECTIONS OF SHIPS REQUIRED TO CARRY THE IAPP CERTIFICATE AND/OR THE IEE CERTIFICATE

2.1 Initial inspections

2.2 Initial inspection on ships equipped with
equivalent means of SOx compliance

2.3 Initial inspection **within an Emission Control Area
(ECA)**

2.4 Initial inspection outside an ECA **or at the first
port after transiting an ECA**

2.5 Outcome of initial inspection

2.6 More detailed inspections

2.7 Detainable deficiencies

APPENDIX 2 - GUIDELINES FOR THE DETENTION OF SHIPS

Section 5 Detainable deficiencies

Areas under MARPOL Annex VI

List of inspection items

In practice, possible actions by PSCO

PSCO will examine and verify that **all diesel engines have certificates**.

- Any engine used on-board, other than for emergency power generation or life saving, is subject to **certification**.
 - Check that **Emergency engines** are being used **solely** for emergency purposes.
- Check if **any additional engines** may have been installed

PSCO looks at the records of **Tiers and ON/OFF status** (engine room logbooks or ship record books, may be electronic)

- Each log entry must include the **tier level**, the **ON/OFF status** of each engine/emissions control system, the date, the time, and the geographic position **when entering/leaving ECA**.

In practice, possible actions by PSCO

Engine subjected to a major conversion: Verification that it has been approved by the Administration.

- Check documents delivered by Administration (and Class)
- Spare parts and records of maintenance should be available and could be checked.

When NO_x Reduction technologies are used to achieve Tier III

When a Selective Catalytic Reduction system or Exhaust Gas Recirculation is used for Tier III compliance, it must be recorded on the EIAPP certificate.

PSCO should obtain **confirmation of maintenance of engines** through examination of:

- **Engine NO_x Technical File to confirm that no unapproved modifications**, which may affect on NO_x emission, were made to the diesel engines
- **Spare parts** – IMO number available on all critical parts
- **Maintenance records / class records / etc.**

Case study – PSC focus on NO_x Technical File

Class society DNV warns its Member regarding recent PSC focus on NO_x technical files and machinery components (Dec.2024)
<https://www.dnv.com/news/2024/psc-focus-on-nox-technical-files-and-machinery-components/>

GHG regulations and focus for PSC

Different PSC areas are currently scrutinizing the NO_x Technical Files and the Record Book of Engine Parameters in detail to ensure the records align with the on-board installations.

During the last months, several detainable deficiencies were issued by Port State Control Officers (PSCOs) during regular PSC inspections.

PSCOs may also check available spare parts to verify if their IMO IDs match the Technical Files. Any non-compliance might trigger a more detailed PSC inspection. In case of doubt, PSCOs might also request partial disassembly of diesel generators for more thorough inspection.

Examples of common deficiencies identified during inspections include:

PSC code	Defective item	Additional comments by PSCOs
14601	Technical Files and, if applicable, monitoring manual	NO _x Technical File for main engine and generators is not available on board.
14602	Record Book of Engine Parameters	Record Book of Engine Parameters properly filled in, but information related to the replacement of injection pump cylinder no. 1 as per the NO _x Technical File is missing.
14606	Diesel engine air pollution control	Charge air cooler of M/E is without the IMO ID number as required by the NO _x Technical File.

Case study – PSC focus on NO_x Technical File

<https://www.dnv.com/news/2024/psc-focus-on-nox-technical-files-and-machinery-components/>

The main grounds for past detentions were **missing** Technical Files or Record Books of Engine Parameters, and **engine parts lacking the IMO identification number** as per the Technical File on board. During follow-up on detainable deficiencies, DNV experts noted that misunderstandings and **missing instructions** on board were often the reasons for deficiencies, which could lead to vessel detention.

Prepare for PSC inspections

Based on the above, DNV would like to provide some guidance:

NO_x Technical Files and Engine International Air Pollution Prevention (EIAPP) certificates must be available on board in their original form. Please note that for documents issued digitally, the PDF files represent the originals.

When there is a **change of shipowner**, care should be taken to ensure that these documents are handed over. If NO_x Technical Files are missing, the owner should **contact the engine manufacturer to** obtain new documents. Missing certificates may be reissued by DNV.

The form and content of the record book is not defined. Some technical files contain templates. However, at a minimum, the date, component and old and new ID numbers should be entered, as well as changes or verifications of settings.

In case of missing or incorrect ID numbers, the shipowner should initiate corrective measures. A reasonable period should be allowed for this. In case of incorrect ID numbers, the shipowner should contact the engine manufacturer to check if approved amendments to the NO_x Technical File allow the use of the components.



A turbocharger with IMO ID number as per the Technical File.

PSC CIC on MARPOL Annex VI

Report of the 2018 Concentrated Inspection Campaign (CIC) on
MARPOL Annex VI

The Paris MoU and Tokyo MoU led in 2018 a joint
Concentrated Inspection Campaign (CIC) on



MARPOL Annex VI, focusing on the prevention of air pollution from ships

Objective: provide indications as to the industry's level of compliance with specific aspects of MARPOL Annex VI.

PSCOs used a standardized **11-question checklist** during regular inspections.

Focused on SOx and SECA

Only **1 aspect** directly related to Reg.13

For the PARIS MoU:

- **4,021** inspections carried out

The CIC-topic detention rate was **0.2%**
(7 ships detained)

7	Where an Approved Method in accordance with Annex VI, regulations 13.7.1-13.7.5 (refer to the supplement to the IAPP Certificate, item 2.2.1) is installed, has such an installation been confirmed by a survey using the verification procedure specified in the Approved Method File, including appropriate notation on the ship's International Air Pollution Prevention Certificate of the presence of the Approved Method?
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Annex VI, regulation 13.7.1.1



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Enforcement – Use of sniffers by Portl State

<https://emsa.europa.eu/greening-operations/item/5196-remote-measurements-for-sox-and-nox-monitoring-belgium.html>

Sometimes, **portside inspections** alone cannot determine whether a vessel has been **burning the correct fuel** while at sea. **Aerial solutions**, like drones and aircraft, are used for **offshore measurements**.

For this reason, the Royal Belgian Institute of Natural Sciences (...) has equipped the Belgian coastguard aircraft with a **sniffer sensor** to measure ship emissions of ocean-going vessels at sea.

Remote measurements for SO_x and NO_x monitoring
Belgium



Enforcement - Use of sniffers by Port/Coastal State

<https://emsa.europa.eu/greening-operations/item/5196-remote-measurements-for-sox-and-nox-monitoring-belgium.html>

The aircraft now monitors for **CO₂, SO₂, NO_x and black carbon**.

Sniffer operations mean that PSC inspection **efficiency has improved by over 50%**.

All **fin**es imposed for MARPOL Annex VI violations in the past 2 years were triggered by alerts from the coastguard aircraft.



Since the programme began in 2015

- **+ 7,000 ships** have been monitored for sulphur emissions - 460 **violations** for sulphur
- **3,000 for NO_x - 115 violation for NO_x**.

The measurement results provide important insights on **real-world ship emission factors** and compliance levels at sea.



Enforcement – Use of sniffers by Port/Coastal State

A similar conclusion was provided in **Plan Bleu 2025 Technical report**

Towards a Mediterranean NECA: Contextual Foundations and Sectoral Implications for Fisheries and Tourism –REMPEC/WG.62/INF.5

Monitoring and enforcement mechanisms are critical to ensuring compliance. Governments and port authorities play a central role in conducting inspections, monitoring emissions, and imposing penalties for non-compliance. Technologies like remote sensing and real-time emissions monitoring systems are increasingly employed to detect violations and maintain regulatory oversight. Additionally, harmonized reporting standards across Mediterranean countries facilitate transparency and data sharing, enabling coordinated enforcement efforts. However, significant obstacles to effective emissions control remain. Lessons from the United States segment of the North American Emission Control Area (ECA) highlight persistent challenges, including inconsistent enforcement capacity, limited technical expertise in some ports, and difficulties in verifying compliance for vessels using alternative compliance methods (IMO 2023). These experiences underscore the need for the Mediterranean region to invest not only in monitoring technologies, but also in institutional capacity-building, training, and interagency cooperation to ensure robust enforcement⁴⁸.



Feedback from other States

Feedback sent to IMO

Projects and scientific outcomes of NO_x ship emission measurement campaigns

PPR 11/INF.2/Rev.1 - November 2023. Submitted by Belgium, Denmark, France, Germany, Ireland, Netherlands (Kingdom of the), Spain and Sweden.

The document raised awareness about the **issues observed during the measurement campaigns**:

- **higher NO_x emissions** from ships (mainly Tier III and Tier II), compared to the respective emission limits
 - partly attributed to **real world sailing conditions which are different than those assumed in the regulations**;
- a **gap between the keel laying and construction dates**, which explains
 - the low number of Tier III ships, and as a consequence, the delayed implementation of the Tier III regime.

The document questions the effectiveness of reg. 13 of MARPOL Annex VI and the NTC (note that MEPC 80 had called for any relevant information on in-service engine NO_x emission measurement campaigns).



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Feedback sent to IMO

PPR 11/INF.2/Rev.1 - Projects and scientific outcomes of NOX ship emission measurement campaigns

Introduction of Tier III ships within the merchant fleet is moving at a very slow pace due to the use of keel laying in the definition of ship construction date. It was discovered that only 21% of the merchant ships larger than 5,000 GT, built in 2021 and 2022, had a keel laying date in or after 2021 and were certified as Tier III.^{1, 13} The European Maritime Safety Agency (EMSA) and the European Environment Agency (EEA) also mentioned the slow uptake of Tier III.¹⁴ This phenomenon is also recognized in the North American and the United States Caribbean Sea ECA after 2016.

Problem sorted now with the drafting style used for Norway ECA (adding a delivery date)

While Port State Control duly enforces Regulation 13 based on documentation checks, there is a general lack of enforcement tools for following up on high NO_x alerts from measurement of emissions during remote sensing.^{1, 10, 15}



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Industry feedback to IMO – in the Med SECA context

One comment regarding the lack of consultations with the refiners

MEPC 78/17/Add.1

Annex 28 - Statements

IPIECA is an oil and gas industry association.

- **Comments on this?**
- How to avoid similar issue with the NECA implementation?

Statement by the observer from IPIECA

"We thank the co-sponsors of document MEPC 78/11 to designate the Mediterranean Sea, as a whole, as an Emission Control Area for Sulphur Oxides, a SECA. Our contribution to highlight an observation and a request:

1. While the co-sponsors of document MEPC 78/11 coordinated several consultations with stakeholders, including representatives from the shipping industry, ports, master mariners, environmental interests, state and provincial governments, we noted the refiners were not involved, which we regret: the petroleum industry is committed to advance protection of the natural environment, minimize and mitigate risks and impacts from operations and products, as evidenced during the implementation of the global Sulphur cap in 2020. The refining industry is a key stakeholder which will make the change happen in the Mediterranean Sea.



Conclusion

**Any question or
clarification,
please ask!**

End of

**Training sessions (agenda
items 2, 3, 5)**

And now

**Review of the draft MEPC
submissions (item 6)**



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