Minutes of the first meeting of the MAVI Technical Working Group (MAVI-TWG) held on 05/05/22

**Update of the CPs on recent monitoring efforts and future prospects**

1. During the tour the table, updates were given by Contracting Parties on the status of the enforcement monitoring operations on Regulation 14 (Sulphur) and Regulation 13 (NOx) covering 2021 monitoring data, long-term trends and future prospects.
2. **Belgium** was using NOx sensors and black carbon sensors since 2020 and 2021 respectively. In 2021, a total of 57 flights were performed with 88 hours. More than 1,000 ships were monitored. The compliance rate for SOx was 95% following a decrease trend for non-compliance cases. The compliance rate for NOx was 97%.

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| --- | --- | --- |
| **BELGIUM** | 2021 | From 2015 |
| Number of flight hours | 57 | 353 |
| Number of flights | 88 | 550 |
| Number of inspected ships (FSC) | 1050 | 6550 |
| Average FSC | 0.07 | 0.09 |
| Compliance rate | 95% | 91% |
| Number of alerts (FSC) | 16 | 380 |
| Fines/public statements PSC from airborne alerts | 1 | 9 |
| Number of Inspected ships (NOx) | 1004 | 1407 (from 2020) |
| Compliance rate NOx | 98% | 97% (from 2020) |

1. **Denmark** was monitoring air emissions from shipping since 2015 through a fixed platform located in a bridge and a mobile platform. The former monitored 6,000 ships in 2020 and the latter 600 ships in 2021. A total of 4 alerts were generated from the fixed sniffer in 2020 and 13 from the mobile in 2021 and 2 from the drone project in 2020. Denmark was participating with EMSA in a joint project. For the non-compliance cases of 2021, 2 were being managed by the Police and 13 had created alerts in THETIS-EU. NOx was also monitored but nothing was being done yet.
2. **France** was carrying emissions monitoring since 2020 with EMSA’s support. RPAS were being used from ships. In 2021 more than 300 plumes were measured with a compliance rate of 98%. The information was included in THETIS-EU so that an inspection in the next port of call could be done. Based on the good cooperation with Belgium. Germany and Spain, 13 ships were inspected by France and 8 samples were taken. A MARPOL infringement was notified but no feedback from the legal side had been received. The trends showed that the shipping community was doing a great job regarding energy transition. Further monitoring operations were planned for 2022. In June a civil aircraft would be equipped with a hyperspectral camera, also done in cooperation with EMSA. In order to optimise the whole monitoring and inspection process, MSCC operators and PSC inspectors had access to THETIS-EU to better select targeted ships.
3. **EMSA** would provide information on their service and operations under the appropriate agenda item.
4. **Germany** operates three ship emission monitoring stations at fixed measurement sites using standard sniffer systems to monitor CO2, SO2 and NOx. In 2021 a total of 9189 plumes were measured; in 17 cases (0.19%) an elevated Sulphur concentration was indicated. The compliance rate regarding Sulphur was more than 99%, in line with previous years’ findings. Only in 2015 and 2016, after a change in the regulation, a lower compliance rate was found. Regarding the on-board inspections, in 2020 a total of 764 sulphur inspections were carried. Violations were detected in 18% of the inspections, mostly regarding documentation issues and most of them minor violations. One third of the violations was fined afterwards. Since 2018, Germany fined only 6 cases with threshold violations. The compliance rate for SOx-violations is therefore above 99%. No data regarding NOx compliance is analysed; only documentation inspections.
5. On April 20th 2022 the EMSA RPAS-Service started in the German Baltic Sea. The helicopter drone, a Schiebel S100 Camcopter, was launched from the island of Fehmarn in order to measure ship plumes in an area including the Fehmarn Belt as well as the western Kadetrenden. The RPAS flied twice a day on five days a week for 2.5 hours each flight. So far, 60 vessels were measured successfully and two of them showed an increased Sulphur content. However, both vessels were not calling German ports and therefore German authorities could not carry out on-board inspections. Nevertheless, the PSC in the next port of call was informed and the information was available in THETIS-EU for Sulphur inspectors in EU Ports. The RPAS-Service was planned to last until mid of July 2022.
6. Regarding alerts to Thetis-EU, recently Germany set up an automated reporting of alerts from their fixed measurement sites to Thetis-EU; only if the measured FSC minus the individual calculated uncertainty was above the limit an alert would be created.
7. In 2021 Germany started also with particle measurements at two of the sites. By measuring the particle size distribution from below 10 nm up to 10 µm, the particle size dependent emission factors were calculated for individual ships. Preliminary results looked promising: there were differences for different ship types and the majority of the emissions with respect to particle number was below 100 nm. Also, a significant amount of particle mass could be found at particle size below 300 nm.
8. Germany also contributed to the SCIPPER project.
9. **Ireland** actively complied with all MARPOL obligations via Port State Control for non-Irish Flag Ships entering Ireland ports and Flag State Inspections for Irish Flagged Ships. The inspections were carried out by authorised and qualified Port State and Flag State control officers. Port State Control was conducted in accordance with the relevant guidelines adopted by the IMO and the Paris MOU for port State Control. MARPOL Annex VI inspections were not exempt from port state control enforcement and were included in Port State Control Activity. In addition, Ireland complied with its obligations under the EU Sulphur Directive with trained and warranted Sulphur Inspectors conducting specific targeted inspections and the use of the Thetis-EU Data base.
10. Ireland’s Strategy was to actively engage in ensuring that there was robust capacity for the timely collection of suitable, reliable and qualitative information, providing a current and accurate overview of the country’s maritime emissions situation. This was in line with EU strategy on monitoring, reporting, and verification of emissions. To achieve measurement and monitoring of emissions Ireland would adopt three strategies:
11. A focus on training and professional development of dedicated personnel - MSO Officers, IRCG Officers, including flag and port State control officers, legal experts, legislative drafters and maritime administrators. Combined with an updated legislative program in this area this first step will be the foundation of the strategy.
12. The use of technologies for the analysis of these air samples comprising both stationary land-based measurement sites and aerial platforms.
13. Coordination, cooperation, and information exchange with national and international colleagues and agencies e.g. Within the BONN Agreement area working with Contracting Parties to develop a common strategy and operational procedures on MARPOL Annex VI monitoring activities.
14. The introduction of a National Ship Emissions Reduction Strategy (NSERS) would progress stated objectives in the Irish Maritime Directorate Strategy 2021 – 2025. In addition, it would help to transpose and implement international requirements in a national context and, it will support the achievement of international and regional goals/targets through complementary national action. The development of an NSERS would mobilise a broad range of national stakeholders to get involved in ship emissions reduction efforts, including those in shipping-related sectors that may not necessarily be covered by IMO conventions, and thereby bring in new ideas, experience, capabilities and resources This would be achieved through the monitoring of ship emissions within Irelands maritime space, and consultations with Stakeholders who use Ireland’s Economic Exclusive Zone (EEZ). A critical aspect for developing and in particular for implementing the NSERS was securing political will at the highest appropriate level. Development of an NSERS would require a significant degree of intergovernmental /agency and cross-sector coordination. This cooperation and coordination should continue throughout the development and implementation process. The aim, objectives, actions and capabilities of the NSERS would also be aligned with the broader national interest . The NSERS would support broader national strategies on air quality, climate change, economic development, and development of national infrastructure in the maritime space.
15. During 2020 and 2022 IRCG were involved with an RnD project with Business Incubator-Innovation Department Airbus Defence and Space in conjunction with Maynooth University, Irish Air Corps and Naval Service: The sensor - hyperspectral remote sensing to remotely detect and measure the fuel Sulphur content being emitted from a ship’s exhaust. The technical concept required a longer design and environmental testing process. The conclusions of discussions with EMSA showed that the accuracy of sensor did not fit with their requirements (The 0.1% SFC threshold from SECA needs to be reached). In addition, IRCG were involved with a project with Maynooth Univesity on use of sniffers on drones – both onshore and offshore. IRCG remained in discussions with both Maynooth University and Airbus to provide strategic direction/coordination and support to both stakeholders to assist in the completion of their projects.
16. **The Netherlands** referred to a very high compliance rate at the fixed station at Rotterdam. Alerts were received from Belgium, France and Spain on non-compliance measurements at sea, and the inspections were done at the Dutch ports as appropriate. In 2021 a total of 19 ships equipped with scrubbers were also monitored to check if the scrubbers were working. An update from the Satellite project of Jasper van Vliet was not available to present to the meeting.
17. **Norway** had low monitoring activities in 2020 and 2021 due to the pandemic. Some passenger ships were targeted to be inspected by drones. The 2020 and 2021 summer campaigns detected 2 infringements that resulted in administrative fines.
18. **Spain** had carried out monitoring operations in 2021 deploying EMSA’s Camcopter in the Strait of Gibraltar. A total of 1521 were carried out, with 328 fuel sample analysis and 339 plume measurements in the Strait of Gibraltar. A good compliance level had been reached, clearly over target. The trends in compliance were satisfactory: less infringements were detected and lower sulphur content on fuel was observed on fuel samplings. On future prospects, Spain would continue to fulfil the requirements as well to stay aware of future developments. In 2022 a campaign with EMSA drones would be organised by the summer. At the date of the meeting, 50% of the target inspections for 2022 had been carried out (533 of 1054) and 30% of the target fuel samples had been analysed (96 of 314).
19. The representative of the Swedish transport agency could not attend the meeting, Johan Mellqvist from Chalmers University mentioned that they monitored more than 2000 ships with the fixed station on the great Belt Bridge. The sensor could also measure NOx and methane. It had been broken and could not be repaired for a period of time because of the pandemic. They also deployed a new sensor system (see below) with this sensor system the uncertainty was reduced resulting in a lower threshold for reporting potential non-compliance. Nevertheless even with the lowered thresholds the non-compliance rate was less than 3%. had monitored 2000 ships in 2021 with a compliance rate of 97%. Using a fixed station in a bridge.
20. The **United Kingdom** was present in the meeting but did not give an update.

**Action 9.1: Consider the recent sensor developments, also for drones (e.g. optical/laser sensors)**

1. In this section 3 speakers presented the latest sensor developments for the remote monitoring of ship emissions.
2. **Inspection Team**, introduced their Optical UV sensor which is still in development. The ultimate goal is to use this sensor on an aircraft or drone, but technically this system could also be used in a fixed sensor setup. For the moment the accuracy of the sensor is insufficient for compliance monitoring, but they hope to provide a solution in the short run. Due to their unwillingness to undisclosed technical details not much was learned about the working mechanism, accuracy and technical details. The MUDP Project was a collaboration between leading companies from across the Atlantic and Danish specialists to create better methods documenting emission in the ship industry, create stationary mounted sensors in narrow waters and harbours, and validating the measuring methods using drone mounted camera for plume concentration in the marine environment. MUDP project was supported by the Danish Government, for developing new environmental technologies. Additional information about the MUDP-project was available at <https://ecoinnovation.dk/english/>. The camera was under development and could only be used at daytime. The aim was to visualize the plume during the flight.
3. **Telops**, has been involved in the development of hyperspectral sensors since 2005. With more than 100kg, the first sensor was very heavy. In recent years they were able to reduce this weight dramatically. The latest sensor (Hypercam-mini) weighted only 25 kg. This sensor was used during the Scipper campaign and showed to be useful for the detection of the smoke plumes. Sulfur content could be quantized, nevertheless the accuracy was still too low. The advantage is the long range of the sensor (500m-3 km). The sensor is furthermore useful for the measurement of methane, VOCs and other gas species. An even smaller hyperspectral sensor is now in development (nano-hypercam). More campaigns are needed to provide information about the accuracy of the system. It was expected to have the results in 2 minutes time. It was clarified that in order to only measure the target gases in the plume, a discrimination was done considering the temperature of the chimney.
4. **Chalmers University (Sweden)** presented laser sensors (p0901\_03). The laser spectrometer was efficient in capturing also small ship plumes, thanks to low detection limits (approx 0.06 ppb for SO2 and short time response, i.e. 1 s ). A comparison between the laser and the standard sensor showed a good correlation between the two systems while relatively large negative bias and more variability for the standard system. A comparison of measurements against on board/fuel samples showed a dependence on relative humidity (RH) of above 75%, that uncorrected laser data had a negative bias of about 0.02 FSC units and relatively large variability and that the RH Filtered data had a small negative bias in the median value of 0.01 FSC units and a variability of +-0.02 FSC units.
5. On the impact of the relative humidity, it was suggested that the atmospheric conditions might affect the plume. Belgium also detected lower values with high humidity. Chalmers Universitywas studying whether the dependence of RH was inside or outside the system.

**Action 9.2: Take into account national experience, ongoing operations and their recommendations, and the outcome of previous projects such as SCIPPER and COMPMON**

1. **Prof. Leonidas Ntziachristos (Greece),** SCIPPER project coordinator, gave a presentation on the technical possibilities to monitor vessel emissions explored in the SCIPPER project (p0902\_01). The consortium of the project included 18 partners. The aim of the project was to test the different kind of monitoring techniques including airborne, on board funnel & plume, sniffer and optical remote sensing, plume to city dispersion in chemistry modelling and satellite monitoring in 5 campaigns in the Atlantic and the Mediterranean. The SCIPPER project would end in January 2023 and the deliverables would be published by the end of 2022. The meeting was asked not to disseminate the conclusions presented as they still had not been discussed in the consortium.
2. It was confirmed that fuel samples were used to compare the measurements. The absolute deviation was dependant on the environmental conditions. One of the working packages addressed the uncertainty quantification. Having a harmonised method to report confidence or uncertainty would provide transparency to the monitoring.

**SOWG Action 9.4: Consider using EMSA sniffer drones in joint campaigns under the Bonn Agreement and sharing experience on the drone deployments among CPs to increase knowledge**

1. **EMSA (EU)** gave a presentation on the status and future technical developments of RPAS (p0904\_01). Under the RPAS Emission Monitoring Service, more than 1,000 SOX measurements have been collected and transferred to THETIS-EU. In 2021, a total of 11 RPAS operations were performed with more than 1,700 operational days, of which there were 3 operations dedicated to emission monitoring in Lithuania, France and Spain.

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| **Observations in SECA areas** (Lithuania, France) |  |
| * Measurements compliant with the limits (<0.1%) | 72% |
| * Measurements above the national alert level (>0.13%) | 15% |
| **Observations in non-SECA areas** (Spain) |  |
| * Measurements compliant with the limits (<0.5%) | 62% |
| * Measurements above the national alert level (>0.58%) | 9% |

In 2022 operations for emission monitoring are ongoing in France and Germany. EMSA highlighted that users already assumed a deterrence effect.

The following future challenges were mentioned: a harmonised approach in alerting for non-compliant vessel, developing procedures for NOx and analysing technologies which allowed an simplified procedure to measure the plumes, e.g. with remote sensors.

1. EMSA confirmed that 1 sigma for the alerting level was used recently as agreed by MS. However this can differ from MS to MS. Denmark and Germany supported changing this level to 2 sigma. The Netherlands highlighted that data was reported to trigger alerts and that the uncertainty of the instruments needed to be addressed, but different instruments had different uncertainties. EMSA clarified that THETIS-EU showed the reported value and the uncertainty for information purposes as an aid to help triggering ships for inspection. MS were free to use the data as they might consider appropriate.
2. France also mentioned that there was a case with a discrepancy between high values measured at sea (more than 2 sigma above threshold) that resulted in compliance vessels when inspected in ports; but it was reassuring to know rarely non-compliances cases in port corresponded to low values measured at sea. France also reported, that a sample taken on a ferry at the moment of the measurement taken at sea showed perfect alignment of observed vales. On the correlation between port sample and values measured, EMSA clarified that this was not an easy issue as it is not precisely known if the samples are representing the fuel, which was actually burnt while taking the measurement and samples were taken one or two days after the measurements and therefore might not be representative.
3. **ILT (the Netherlands)** presented their experiences as end-user of the EMSA RPAS Siebel Camcopter S100, an unmanned aircraft and beyond visual line of sight (BVLOS) (p0904\_02). There was a good cooperation between EMSA, Siebel and ILT. The main challenge was to choose a temporary airport for the RPAS considering the legislation for civil aviation and the obstacles. The marine base, Den Helder, was not the appropriate location because for BVLOS flights, there was a requirement of having no obstacles between the antenna and the RPAS to avoid the risk of losing connection. The Maasvlakte Fire Station within Rotterdam port was also not suitable. According to the national legislation there was a limit of 150 kg for unmanned aircrafts. The Siebel Camcopter could fly but not take off or land. There was an intention to adapt the Dutch legislation to the new developments. Drilling platforms at sea were not suitable to place the whole crew and materials for a few months. The heliport at the Pistoolhaven nearby the fire station seemed to be a feasible option but large ships were obstacles between the antenna and the RPAS in the narrow space in the harbor. Finally, it was considered flying the RPAS from a Dutch coastguard ship, The Gardian. This option did not work because the helideck on a ship could not be used as an airport for civil purposes, only for Defense reasons operated by the armed forces. Smaller drones could be used but there were limitations related to bad weather and smaller ranges. The Netherlands decided to wait for a change in the national legislation; meanwhile the inspections would be based on alerts from other countries and data from the fixed station.
4. **DGITM (France)** presented their experiences from France as end-user (p0904\_03). France supported a harmonised approach on NOx monitoring and sharing the results in THETIS-EU, in order to carry out multipurpose missions.

**SOWG Action 9.6: Exchange information on the use of Thetis EU database by CPs to improve reporting of compliant and non-compliant measurements and encourage CPs to submit this data.**

1. **RBINS (Belgium)** gave a presentation on the system that they developed for automatic data streaming of monitoring data to the EMSA Thetis-EU service (p0906\_01). The system that was designed is currently a very basic service. Monitoring data from the airborne monitoring operation are stored on a cloud service in CSV format (CSV files are automatically generated from an Excel Macro). The system will check every minute for new CSV files, as soon as a new CSV file is detected the system will first import the data in a MySQL database. After the data is checked and accepted in this internal database, the data is send to the Thetis-EU API. Thetis-EU works with clearly defined attributes and the data format is very strict, errors in the data format will result in errors during uploading. The system has been tested during 6 months on a Thetis-EU test database. Afterwards the system went in operations. Some errors were received, mostly due to incorrect IMO numbers (IMO number not known by Thetis-EU). Also some certification issues had to be solved before the system could go in full operation.
2. MUMM clarified that the measurement data provided to EMSA was accompanied with an uncertainty. As soon as the FSC value minus the uncertainty >0.1% an alert was automatically created. In a comment window the used sigma and confidence interval were provided. For yellow alerts a CI of 68% (1 sigma) was used, for orange alerts a CI of 95% was used (2 sigma) and red alerts have a CI of 99%.
3. The big advantage of sending all monitoring data to Thetis-EU was that information for compliant ships was also shared. This was important information for PSC officers who could use this information to focus on more suspect ships or ships with no information. Improving the efficiency of PSC inspections and reducing time loss for inspection of compliant ships.

**TWG Action 9.3: Sharing best practices on NOx measurements and reporting**

1. **MUMM (Belgium)** gave a presentation on NOx measurement methodology for airborne compliance monitoring (p0903\_01). The NOx sensor was installed in 2020 in the Belgian aircraft. A standard SFC value of 0.2 kg/kWh was considered, and ships were contacted when exceeding the NOx limit and requested to report some engine parameters (a.o. fuel consumption, power of the main engine and RPM) in order to calculate the exact engine consumption to correct the measurement. NOx measurement was dependant on the vessel engine load, ships sailing with an engine load under 25% are considered to be off cycle, no limits are in place for this engine loads and can therefore not be reporting when breaching a threshold. A minimum speed of 10 knots was used as threshold, ships sailing lower than this speed were assumed to have a low engine load. In case of violations, communication with the vessel was done to acquire the actual engine load. There was a negative bias due to the difference between Brake power and Engine indicated power (10-25%) temperature and humidity. At first it was assumed that most ships have an RPM <130, analysis has showed that certain ship types (ROROs, passenger ships, ships <160m) have often higher RPMS, therefore Belgium will be using 2 threshold lists for 130 and 500 RPM. For the 2020-2021 period 38 violations were detected.
2. **Explicit (Denmark)** gave a presentation on reanalysing historic NOx data to assess general NOx compliance (p0903\_02). A study based in 2,249 observations on NOx emission factors adjusted for engine load and assumptions on SFC was available in mst.dk. It was suggested that further guidance on how the NOx technical code can be interpreted under operational conditions was needed.
3. Belgium was developing technical guidance to endorse the NOx monitoring methodology for its use as evidence in court and impose administrative fines for red flags cases.

**Views of MAVI TWG technical experts on way ahead with MAVI-SOWG**

1. It was considered appropriate to include external experts (universities, companies…) as participants of MAVI WGs when invited by Contracting Parties and Co-convenors. For MAVI TWG, the experts were necessary to give the technical knowledge to the group.
2. Some Contracting Parties preferred to merge both MAVI WGs; others supported keeping them separated so that MAVI TWG could focus on the technical details. There was a lack of resources to take up the leading role for MAVI SOWG, but there could be some nominations at OTSOPA or BONN 2022. The decision of keeping both MAVI WGs needed to be agreed at OTSOPA level.

**Views of MAVI TWG on project outline**

1. There were some discussions about whether MAVI TWG could develop a project proposal on its own considering only the technical side and in line with the SCIPPER project. France supported waiting to the outcome of the ongoing projects on technical issues. EMSA was expecting the outcomes of the MAVI TWG in regard to quick wins such as the harmonisation of the alerts reporting.

**Way forward with TWG**

1. While no activity was ongoing for the MAVI SOWG, the frequency of the meetings of the MAVI TWG should be lower, probably twice a year. The ToR needed to be updated to reflect that. The meetings should focus on the quick win actions and have just 1 or 2 presentations for inspiration leaving enough time for discussions. It was suggested to have intersessional work to achieve the quick win actions. The next meeting would be organised after the summer.

Annex I Agenda MAVI TWG (1) 2022

**Online Sessions**

TO: Participants of the TWG and SOWG

**Date: 5/5/2022**

**Time: 9:00-13:00 (CEST) with two breaks**

**Co-lead: Belgium (Ward Van Roy), Denmark (Nils Nordholm)**

**Meeting Chairman: Nils Nordholm**

**Join by web**

https://ospar.webex.com/ospar/j.php?MTID=m7856f9675e587e07652bb38c6eb9b341

Meeting number: 2364 846 5682

Password: Annex6

**Join by video system**

Dial 23648465682@ospar.webex.com

You can also dial 62.109.219.4 and enter your meeting number.

**Join by phone**

+44-203-478-5289 United Kingdom toll

Access code: 236 484 65682

**Background**

The participants of the Bonn Agreement MARPOL Annex VI Experts Workshop 21 (MAVIEWS21) recommended to create two working groups on Marpol Annex VI, the Strategic Operational Working Group (SOWG) and the Technical Working Group (TWG). For every WG a list of follow-up actions was defined. These follow up actions points for the two WGs were further divided in quick win actions (in-kind actions) and actions requiring additional funding (project-based actions). The recommendations of MAVIEWS21 were presented and endorsed at OTSOPA 21 (OTSOPA 21/2/4).

Bonn 21 adopted the Terms of Reference of the working groups, SOWG and TWG. Belgium and Denmark volunteered to co-lead the TWG. No co-leads were found for the SOWG. Bonn 2021 agreed on a project outline as the basis to develop a future proposal in coordination with the two WGs: no Contracting Parties (CPs) volunteered to coordinate the potential project. According to the Terms of Reference, the WGs should have frequent meetings prior to OTSOPA22. As no co-leads were found for the SOWG and as both WGs need a close collaboration, no meetings from neither the SOWG nor the TWG have been organised so far.

**Aim of the meeting**

The aim of the first session of the TWG is to address the in-kind actions from the ToR of the TWG (BONN 21/3/6 Add.2) and the technical aspects of some in-kind actions of the ToR of the SOWG (OTSOPA 21/13/01-Annex 06). In addition, a discussion on the way forward for the project proposal and the SOWG will be held. The findings will be presented and further discussed at OTSOPA22.

**Agenda**

9:00 Tour de table

Every CP will be given the opportunity to introduce its participants of the TWG meeting, followed by a short (maximum 5 min) verbal presentation of the CP on the status of the enforcement monitoring operations on Regulation 14 (Sulphur) and Regulation 13 (NOx). For inspiration regarding the verbal presentation the following information could be included:

1. **Monitoring data 2021**
   1. Means (sensors, platforms,…)
   2. Inspection efforts (flight hours, number of inspected ships, …)
   3. Results (compliance)
2. **Long term trends**
   1. Longer term monitoring efforts
   2. Trends in compliance
3. **Future prospects**
   1. Planned Monitoring efforts for 2022
   2. Potential future resources (sensors, platforms,…)

**TWG Action 9.1: Consider the recent sensor developments, also for drones (e.g. optical/laser sensors)**

09:45 Providing monitoring services by Inspection Team (DK) (10 min + 5 min questions)

10:00 Optical sensors for sulphur monitoring by TELOPS (FR) (10 min + 5 min questions)

10:15 Laser sensors by Chalmers university (SE) (10 min + 5 min questions)

**TWG Action 9.2: Take into account national experience, ongoing operations and their recommendations, and the outcome of previous projects such as SCIPPER and COMPMON**

10:30 SCIPPER project Leonidas Ntziachristos (project coordinator) (20 min + 5 min questions)

*Break (15 min)*

**SOWG Action 9.4: Consider using EMSA sniffer drones in joint campaigns under the Bonn Agreement and sharing experience on the drone deployments among CPs to increase knowledge**

11:10 Status and future technical developments of RPAS by EMSA (EU) (10 min)

11:20 Experiences from the Netherlands as end-user by ILT (NL) NL (10 min)

11:30 Experiences from France as end-user by DGITM (FR) FR (10 min)

11:40 Questions on RPAS (5 min)

**SOWG Action 9.6: Exchange information on the use of Thetis EU database by CPs to improve reporting of compliant and non-compliant measurements and encourage CPs to submit this data.**

11:45 Implementation of automatic Thetis-EU feed by MUMM (BE) (10 min)

**TWG Action 9.3: Sharing best practices on NOx measurements and reporting**

11:55 NOx measurement methodology for airborne compliance monitoring by MUMM (BE) (10 min)

12:05 Reanalysing historic NOx data to asses general NOx compliance by Explicit (DK) (10 min)

12:15 Questions on NOx (5 min)

*Break (10 min)*

**12:30 Discussion (30 min) CPs only**

* **Way forward with SOWG**
* Assignment of Co-leads, views of TWG participants
* **Way forward with Project**
* Assignment of project coordinator
* Exchange information on potential funding programs and calls (update) or projects
* Alternative: Should we for the time being only focus on a part of the project
* **Way forward with TWG**
* Next meeting and agenda items

13:00 Closing of the meeting

Annex II ToR MAVI TWG

Agenda Item 3.6 BONN 21/3/6 Add.2

Agreement for Cooperation in Dealing with Pollution of the North Sea by Oil and Other Harmful Substances, 1983

Thirty-third Meeting of Bonn Agreement Contracting Parties

Videoconference: 22-23 September 2021

Draft terms of reference for a Working Group on technical aspects related to MARPOL Annex VI monitoring activities (MAVI-TWG)

**Background**

1. The MARPOL Annex VI Experts Workshop 2021 (MAVIEWS 21) was held on 2 – 5 February 2021 to develop a common strategy and operational procedures on MARPOL Annex VI monitoring activities in the Bonn Agreement area. The Workshop concluded on a set of recommendations to be further explored through two working groups (WG) dealing with (1) strategic and operational aspects (MAVI-SOWG) and (2) technical aspects (MAVI-TWG) under the umbrella of OTSOPA.
2. As a follow up of the Workshop, Contracting Parties were invited to submit the national representatives of the WGs and the Co-convenors made a first attempt to subdivide the MAVIEWS 21 recommendations for both WG into a subset of actions that, on the one hand, are quick wins and in-kind actions (mainly on info exchange, regular tasks and national operations) that would require limited additional effort, and, on the other hand, actions that would need more resources and therefore a project with external funding.
3. OTSOPA 2021 agreed to establish a WG technical aspects related to MARPOL Annex VI monitoring activities (MAVI-TWG) under the Terms of Reference as in Annex 7 of OTSOPA 2021 Summary Record.

**Objective**

1. To address the quick win or in-kind actions on technical aspects related to MARPOL Annex VI monitoring activities in the Bonn Agreement area listed under §9, distributing the workload among the Contracting Parties.
2. To support the potential project coordinator in delivering the actions which might require external funding listed under §10.
3. To liaise with MAVI-SOWG to address those recommended actions which are both a strategic/operational, and a technical question or challenge (e.g. use of a threshold; standardised reporting; intercomparison and validation efforts, etc.), and imply some degree of coordination.

**Participants**

1. The ICG will be co-convened by Ward Van Roy (Belgium) and Nils Nordholm (Denmark), with participation from the EU (EMSA), Germany, Ireland and Spain and the co-convenors of the MAVI-SOWG. Participants are listed in Annex 1.

**Work arrangements**

1. The WG will work via correspondence and hold the following meetings:
   1. monthly online WG meetings in the startup phase and bimonthly afterwards;
   2. an annual physical inter WG meeting (e.g. prior or back to back to OTSOPA) (Belgium is of the opinion that this coordination between both WGs could even be further optimized when needed, by for example bimonthly online inter WG-leader meetings): and
   3. semestrial meetings between the OTSOPA Chair, WG leaders and the (potential) project coordinator.

**Quick wins and in-kind actions**

1. The WG will address the following Quick wins and in-kind actions:
   1. Consider the recent sensor developments, also for drones (e.g. optical/laser sensors).
   2. Take into account national experience, ongoing operations and their recommendations, and the outcome of previous projects such as SCIPPER and COMPMON.
   3. Sharing best practices on NOx measurements and reporting (building upon the experience of Belgium and Germany).

**Actions for which external funding might need to be considered (possible project-based actions)**

1. The WG will support the project coordinator in the delivery of the following actions:
   1. Consider certification/standardization for SOx and NOx measurements (e.g. creation of CEN[[1]](#footnote-1) WG).
   2. Agree on a common methodology for the qualification of errors in measurements:
   * Qualitative approach (flags including the degree of confidence);
   * Quantitative approach (values including uncertainties) .
   1. Define a common approach to calibrate sniffers.
   2. Agree on alert thresholds: Start from IMO thresholds 0,1% and 0,5% plus an additional margin.
   3. Run (regular) validation campaigns combining different sensors at BA level (for both, SOx and NOx) to facilitate sharing of data and methodologies which will help identify commonalities in order to check uncertainties between sensors.
   4. Promote taking NOx remote measurements, building upon the experience of Belgium and Germany.
   5. Define operational procedures to make NOx measurements more reliable (contacting the vessel to get information on type of fuel, specific consumption rate, and power; taking several measurements as for SOx, comparison of measurement results with emission test results).

1. European Committee for Standardization [↑](#footnote-ref-1)