

## 【欧州】 【海事】

## Maritime Issues - Utilisation of drones: EMSA' s 2023 outlook towards a continuation of the utilisation of RPAS for ship emission surveillance in 2023

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## 【概要 : Summary】

In areas of dense maritime traffic, ship emissions like SO<sub>x</sub>, NO<sub>x</sub>, CO<sub>2</sub> emissions and particulate matter (PM) can be substantial and harmful to human health and the environment.

The introduction of new sulphur limits in Sulphur Emission Control Areas (SECA/ECAs) in 2015 and the new global limit of 0.5% SO<sub>x</sub> in 2020 outside SECAs/ECAs led to the necessity to monitor and control the compliance with these new limits. With the introduction of stricter legislation on the monitoring of compliance with sulphur limits, also the utilisation of RPAS has gained importance.

The European Maritime Safety Agency (EMSA) supports the EU Member States in their surveillance task of monitoring the vessels' emissions, by providing unmanned, Remotely Piloted Aircraft Systems (RPAS). These RPAS can be used as aerial platforms with gas sensors ("sniffers") to measure the amount of SO<sub>x</sub> in a ship' s plume. Based on these measurements, the sulphur content of the ship' s fuel can be estimated and compared to the legal limits in SECAs and non-ECA areas.

Under EMSA' s RPAS services, EU Member States can use RPAS free of charge for the surveillance of the SO<sub>x</sub> emission limits within their waters, in

ECAs and in non-ECAs areas. Meanwhile, EMSA confirmed in its outlook for 2023 to further extend and improve its operating RPAS services as part of its multi-purpose RPAS services to further support EU Member States in their surveillance of ship emissions. At the request of one or more Member States, RPAS equipped with gas sensors can be deployed in areas of high traffic density to fly into the plume of passing merchant vessels to measure the sulphur contents of their emissions. Thereby, also in 2023, the EMSA' s RPAS service will continue to support the EU Member States to monitoring the vessels' compliance with the SO<sub>x</sub> limits inside and outside the EU' s ECAs/SECAs.

## 【記事 : Article】

## 1. The EU SECAs and EU legislation on monitoring sulphur limits in marine fuels

In the EU, there exist two Sulphur Emission Control Areas (SECAs) with a 0.1% sulphur limit for marine fuels in the Baltic Sea and North Sea and English Channel, and since 2021, they are also NO<sub>x</sub> Emission Control Areas (NECAs).

With the introduction of the new sulphur limits of 0.1% in ECAs/SECAs as of 1 January 2015 and the new general, global sulphur limit of 0.5% m/m (percentage mass of sulphur dioxide gases in the

total mass of the emission), which replaced the 3.5% limit at global level as of 1 January 2020, compliance had to be monitored and controlled. To achieve the set limits of SO<sub>x</sub> emissions, ship owners and operators must use fuels with reduced sulphur levels or alternatively adopt an Emission Abatement Method such as an Exhaust Gas Cleaning (EGC) system (EMSA 2022b).

Regarding the legislative background of the sulphur limits applied in the EU since 2015, Directive 2012/33/EC transposed the limits of the IMO's sulphur provisions of the MARPOL Annex VI on the maximum sulphur content of marine fuels into EU law. In 2016, the Directive 2012/33/EU was repealed by "Directive (EU) 2016/802 of the European Parliament and of the Council of 11 May 2016 relating to a reduction in the sulphur content of certain liquid fuels". Article 6 of Directive (EU) 2016/802 stipulates that EU Member States shall take all necessary measures to ensure that marine fuels are not used in the areas of their territorial seas, exclusive economic zones, and pollution control zones if the sulphur content of those fuels by mass exceeds 0,50% as from 1 January 2020 and in SECAs if the sulphur content exceeds 0.10% as of 1 January 2015 (Directive (EU) 2016/802).

Since compliance is controlled by the individual State Party (IMO 2019), in case of the EU Member States, the European Maritime Safety Agency (EMSA), and the authorities in every involved EU Member State must control the enforcement of the sulphur limits and introduce surveillance methods (EMSA 2019).

Based on the introduction of the IMO's new global sulphur limit and its transposition into EU law in Directive (EU) 2016/802, the European Commission tightened the EU's inspection regime in 2016, based on Decision (EU) 2015/253 to monitor the compliance with the set limits of SO<sub>x</sub> in SECAs as well as outside SECAs ((Decision (EU) 2015/253)). The Commission Implementing Decision (EU) 2015/253 requests the EU Member States

authorities to carry out more controls and sampling regarding the compliance with the sulphur limits of 0.1% in ECAs/SECAS and 0.5% at global level. The European Commission implementing Decision (EU) 2015/253 lays down the rules concerning the sampling and reporting of the sulphur contents of marine fuels. It also includes the requirements regarding the monitoring and controlling of the sulphur limit inside and outside the SECAs in the EU (Decision (EU) 2015/253).

The EU's new control regime of sulphur limits in ECA/SECA zones based on the European Commission's implementing decision represents "a significant step change" in the demand on Port State Control (PSC), which must undertake more fuel sampling and testing compared to pre-2016 (Decision (EU) 2015/253).

Under the Commission Implementing Decision (EU) 2015/253, the EU Member States authorities are also requested to carry out more sampling regarding the compliance with the sulphur limits of 0.1% in ECAs/SECAS and 0.5% at global level. Regarding the monitoring of the sulphur limits in marine fuels of vessels sailing in EU waters and based on Decision (EU) 2015/253, the EU Member States' authorities are required to carry out inspections of ships' logbooks and bunker delivery notes (BDN) on at least 10% of the total number of individual ships visiting the relevant Member State per year (Decision (EU) 2015/253). The verification of compliance should be carried out either through obtaining and analysing a fuel spot sample from the ship's fuel service system, or by analysing the relevant sealed bunker samples on board. This procedure is applied to at least 40% of cases out of the mentioned minimum 10% of ships inspected in EU Member States fully bordering SECAs, 30% in Member States partly bordering SECAs, and 20% in Member States not bordering SECAs (Decision (EU) 2015/253).

Therefore, based on the Commission Implementing Decision (EU) 2015/253, also in EU Member States

not bordering SECAs, the sulphur content of the marine fuel on board of ships needs to be inspected in at least 30% of cases of 10% of the total number of individual ships calling in the relevant Member State per year.

However, the sampling frequency can be reduced by a maximum of half, using remote sensing technologies or quick scan analysing methods to verify a possible non-compliance, such as RPAS. Therefore, the use of RPAS has become an important support of the PSC authorities.

## 2. The utilisation of EMSA' s RPAS for marine sulphur emission surveillance

The full scope of fuel testing requirements of sulphur limits in marine fuels had to be put in place and be applied by the port authorities to secure a correct enforcement of the sulphur limits in ECAs (0.1%) and beyond, in the entire EU waters for the control of the global 0.5% sulphur content limit (Directive (EU) 2016/802). The verification of compliance should be carried out either through obtaining and analysing a fuel spot sample from the ship' s fuel service system, or by analysing the relevant sealed bunker samples on board. To monitor and inspect the compliance of ships with sulphur limits in SECAs/ECAs and all other EU waters, the monitoring of emissions from a ship' s smokestack by RPAS can help to enforce the Sulphur Directive (Directive (EU) 2016/802) in the European SECAs and, in general, in the EU' s territorial seas, as the information provided can be shared among the relevant authorities (EMSA 2022b).

In this endeavour, the use of RPAS as aerial platforms with gas sensors ( "sniffers" ) to measure the amount of SO<sub>x</sub> versus the CO<sub>2</sub> in a ship' s emission plume when observing the SO<sub>x</sub> emissions inside and outside ECAs/SECAs has become an important tool of support for the PSC authorities for better managing the mandated increased frequency of the monitoring of ship emissions (EMSA 2018a). Starting from 2020, the

RPAS operations are concentrated on maritime geographical areas with common operational interest for more than one Member State or EU agencies (EMSA 2023a). RPAS services are offered for free to all EU Member States by EMSA and can operate in all seas surrounding the EU. EMSA' s RPAS service provides long endurance and long-range drones used to support the coast guard functions and to monitor pollution or control compliance with the sulphur limits. EMSA' s marine multi-purpose surveillance RPAS can be used as a complementary tool in the overall surveillance chain to verify a possible non-compliance, which allows the PSCs to reduce the sampling frequency by half (EMSA 2022a).

The EMSA RPAS sensor payload includes gas sensors for SO<sub>x</sub> and CO<sub>2</sub> and associated calibration, electro-optical cameras to record the maritime scene, e.g., photographic evidence linking the plume to vessel and/or general observing of vessel activities. Thermal infrared cameras for plume shape identification, vessel identification, fire analysis, locating people in distress, general observation of vessel activities during the day or at night, support to oil slick monitoring and pollution response operations AIS transponder to identify vessels and determine their position (EMSA 2022b, EMSA 2022c).

The advantages of using RPAS include the coverage of sea areas (incl. SECA areas), approaches to ports and anchorage areas for extended periods, rapid flight activation, depending on RPAS type. While this monitoring and control of the ship emissions does not directly confirm non-compliance, it does help the port authorities to easier screen the vessels in busy marine areas like the Strait of Gibraltar and to specifically target certain ships for a possible closer inspection to verify a suspected non-compliance and to proceed with the lab testing of the fuel (EMSA 2021).

RPAS have the enhanced capability to detect and analyse not only an oil spill at any time, but

they can also be used in the surveillance of compliance with sulphur limits. Advantages of using RPAS include large coverage, long endurance of the EU sea areas and beyond. (EMSA 2022b). Flights can take place in a broad range of conditions, i.e., variable environmental temperature, high humidity and as there is no human pilot onboard potentially dangerous environments, like flying in a plume of a vessel. Each RPAS deployment will be for a minimum of two months and the RPAS will be under the command and operational instruction of the relevant Member State authority or agency (EMSA 2022b).

The combination of real time on-site data from an RPAS together with the maritime information available through EMSA, and the availability of Member State sulphur inspectors can be considered a cost-effective solution for emissions monitoring as well as a possible deterrent (EMSA 2022b). So far, the main barrier identified for the deployment of RPAS in the maritime domain is the current lack of a mature pan-European legal framework with respect to the regulatory aspects to achieve flight approval for RPAS and operating RPAS in non-segregated airspace, but legislation is in preparation (EMSA 2023a).

### 3. The EMSA' s 2023 outlook on RPAS services to support the EU Member States' sulphur emissions monitoring

In 2022, EMSA' s RPAS were used for a wide range of tasks, including pollution detection, monitoring whale sanctuaries and fisheries control areas, detection of risks to navigation, support to search and rescue operations and exercises, and for the detection of illegal activities or certain behaviours of ships at sea. Regarding the monitoring of sulphur emissions of vessels in the European SECAs, the sulphur content of the ship' s fuel can be estimated and compared to the legal limits by using the RPAS' gas sensors to measure the sulphur contents of the ship' s fuel (EMSA 2022b). Information on the

ships' identity and emission monitoring by Member State authorities can ensure that all vessels in transit in European waters comply with the legal requirements (EMSA 2022b).

The combination of Near-Real-Time delivery of satellite radar images to a Member State authority with subsequent RPAS overflight can also provide operational information like confirmation of an oil spill or non-compliance with sulphur limits in efficient marine monitoring (EMSA 2018b).

Regarding emissions monitoring services, in 2022, RPAS equipped with SO<sub>x</sub> sensors were used for emission monitoring in the Baltic Sea in the region of Finland, Estonia and Latvia, the English Channel from the French coast, as well as the Strait of Gibraltar from the Spanish coast and the Mediterranean Sea in the area of the French port of Marseille (EMSA 2023b). The data flows generated by the service are provided free of charge to any requesting authority belonging to EU Member States, Iceland, Norway, and the European Commission, i.e., there are no contractual costs for the user and the service supports the execution of EU coast guard functions (EMSA 2022b).

The several EMSA RPAS services were deployed for a total of 1305 days in 2022. Furthermore, EMSA' s RPAS service is scalable so that it can be provided to several Member States in parallel (EMSA 2022b). EMSA supported maritime authorities in 14 Member States (both EU and EFT) (EMSA 2023b). To facilitate operational efficiency and effectiveness, the relevant Member State authority should provide an appropriate take-off/landing area, onsite facilities (e.g., internet, water, etc.) as well as support in obtaining the RPAS permit to fly from the national aviation authority for the deployment concerned. In 2023, EMSA intends to continue the provision of the RPAS services to the EU and the Member States' maritime authorities to complement their surveillance means and to further enlarge the

RPAS services, as stated by EMSA in its Single Programming Document 2023–2025 and its 2023 outlook (EMSA 2022d, 2022e). In fact, EMSA Outlook 2023 presents the main steps EMSA plans to take in 2023 to deliver its annual work programme in line with the multi-annual strategic objectives and based on the information contained in the Single Programming Document (2023–2025) as adopted by EMSA’s Administrative Board (EMSA 2022d, 2022e). Also in 2023, each deployment will be for a minimum of two months and the RPAS will be under the command (operational instruction) of the relevant Member State authority or agency. Actual flight control/management will be undertaken by qualified pilots from the service provider. These operations consist of providing, for target areas, a full-scale service including aircraft provision, piloting services, communication means, and data dissemination combined with the integrated maritime data available in the other EMSA systems (EMSA 2022d). At the request of Member States, RPAS equipped with gas sensors can also be deployed in areas of high traffic density to fly in the plume of passing vessels to take measurements of their air emissions, to determine whether the vessel is compliant with SECAs or non-SECA sulphur limits (EMSA 2022e). Furthermore, local coastal authorities are alerted and can request an inspection at the next port of call, after these alerts are recorded in the THETIS-EU system, in case a vessel is found exceeding the permitted sulphur limits (EMSA 2022e).

Finally, the plan is to extend the emission measurements also to nitrous oxide to further support Member States as they implement the relevant rules in this regard (EMSA 2022e).

#### 4. Conclusion

EMSA’s provision of RPAS services to the EU, its Member States and their maritime authorities is intended to assist the authorities in their surveillance and operations in a wide area of

tasks, which also include the monitoring of sulphur emissions from ships and the ships’ compliance with sulphur limits based on the EU’s and the IMO’s legislation. Following the introduction of rules to limit the sulphur content in ship fuels in 2015 within SECAs and in 2020 for non-SECA areas, EMSA made RPAS available, which can fly in the plume of a passing ship to measure the amount of sulphur being released into the air and thereby giving an indication of the sulphur content burnt by the vessel observed. Thereby, the non-compliant vessels can be detected, and coastal authorities can be alerted to request and inspection at the next port of call of the suspected vessel.

In 2023, EMSA intends to continue the provision of its RPAS services to the EU and the Member States’ maritime authorities to complement their surveillance means and to further enlarge the RPAS services. The idea is to also extend the emission monitoring to include the monitoring of NO<sub>x</sub> to further support Member States in their endeavour to monitor the compliance of ships with the new NECA rules in the North Sea, English Channel and Baltic Sea after the introduction in 2021 (EMSA 2022e).

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