

## 【欧州】 【海事】

# Maritime Issues - Utilisation of drones: Spain receives EMSA' s RPAS support to monitor sulphur emissions from ships transiting the Strait of Gibraltar

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### 【概要 : Summary】

The reduction of air pollution and emissions including SO<sub>x</sub>, NO<sub>x</sub> or CO<sub>2</sub> from maritime transport has gained an increasing importance in the EU, and at global level. On 1 January 2015, a new sulphur cap of 0.1% had been introduced in emission control areas and sulphur emission control areas (ECAs/SECAs). It was followed in 2020, by a new global sulphur limit of 0.5% m/m (mass by mass) in all areas outside these ECAs/SECAs. This represented a significant reduction of the formerly applied sulphur limit of marine fuels of 3.5% m/m. The introduction of new sulphur limits led to the necessity to monitor and control the compliance with these sulphur limits and to increase the maritime surveillance capabilities of the authorities involved in Port State Control. Besides several other methods, the utilisation of remotely piloted aircraft systems (RPAS), also called UAVs (unmanned aerial vehicles) or drones, was considered as an option for detecting ships, which are non-compliant with the ECA/SECA and new global sulphur limits.

In 2019, the European Maritime Safety Agency (EMSA) announced that it has contracted an increased number of RPAS for their utilization for vessels' surveillance and emission monitoring purposes.

Under the Commission Implementing Decision (EU) 2015/253, the EU Member States authorities are requested 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. In this context, RPAS equipped with appropriate sensors can measure the amount of SO<sub>x</sub> in a plume emitted by a ship. Thereby RPAS can help in a first screening process for compliance and significantly reduce the additional burden of monitoring and sampling for the authorities.

The EMSA' s RPAS day- and night-time operation services assist the EU Member States authorities' marine surveillance operations and inspections of the vessels' compliance with sulphur limits. After the successful test of RPAS in the monitoring of sulphur emissions from ships passing the Strait of Gibraltar, RPAS services can be expected to have an increasing importance in the monitoring of the vessels' compliance with the global sulphur emission limit in European waters.

### 【記事 : Article】

#### 1. Background of the utilisation of RPAS in sulphur emission surveillance in the EU

The 2008 amendments to Annex VI of the International Maritime Organisation (IMO)' s "International Convention on the Prevention of

Pollution from Ships”, MARPOL 73/78 set a 0.1% sulphur limit for marine fuels in “(Sulphur) Emission Control Areas” ECAs/SECAs as of 2015. The Annex VI amendments were transposed into EU law by Directive 2012/33/EU. Since 2015, the 0.1% sulphur limit is applied in the EU’s SECAs of the Baltic Sea, as well as in the North Sea and English Channel. 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”. Furthermore, the IMO’s Marine Environmental Protection Committee (MEPC)’s 70th session decided to implement a global sulphur cap of 0.5% as of 1 January 2020. The new general limit of 0.5% m/m (percentage mass of sulphur dioxide gases in the total mass of the emission), reduced from the formerly applied 3.5% limit was introduced at global level for all areas outside ECAs/SECAs. The reductions of the sulphur contents in marine fuels are expected to lead to a significant reduction of SO<sub>x</sub> emissions, which will have a beneficial impact on the environment and on human health, particularly in port cities and coastal areas, not only in the existing ECAs/SECAs but also beyond. Ships can meet the requirements of sulphur limits regulations by using low-sulphur compliant fuel oil or scrubbers. The exhaust gas cleaning systems (“scrubbers”) “clean” the emissions before they are released into the atmosphere.

With the start of the introduction of the new sulphur limit of 0.1% in ECAs/SECAs as of 1 January 2015 and the global sulphur limit of 0.5% m/m at global level, the compliance with the new sulphur limits had to be controlled to prevent intentional non-compliance. In the EU, Directive 2012/33/EC transposed the limits of the sulphur provisions of the MARPOL Annex VI on the maximum sulphur content of gas oils, heavy fuel oil as well as marine fuels into EU law. The EMSA and the Commission but also the authorities in every

involved EU Member State will have to find ways how to control the enforcement of the new sulphur limits in European SECAs. One important aspect will be to increase the frequency of monitoring of ship emissions to prevent an intentional non-compliance attitude (EMSA (2018a)).

The IMO does not set fines or sanctions, because the compliance is controlled by the individual State Party (IMO 2020). Nevertheless, the consistent and effective implementation of the 2020 0.5% sulphur limit is an important task of high priority.

## 2. The introduction of the sulphur limits in the EU

The Commission implementing Decision (EU) 2015/253 lays down the rules concerning the sampling and reporting under Council Directive 1999/32/EC as regards the sulphur content of marine fuels. It 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 THETIS-S is the data system for collecting data on sulphur emissions, supporting the EU Member States in their enforcement of the Sulphur Directive (Directive 2012/33/EU, respectively Directive (EU) 2016/802 as of 2016). For those EU Member States with a high volume of shipping traffic, the fuel testing requirements add significant burden on inspection authorities.

At the time of the introduction of the new sulphur limits in ECAs in 2015, the Danish Ship-owners’ Association (DSA) had expressed its concerns regarding the unfair competition advantage that some ship-owners might have due to their non-compliance with the low-sulphur rules (EMSA 2019). Ships can meet the requirement by using low-sulphur compliant fuel oil or they can also use approved exhaust gas cleaning systems or “scrubbers”.

Denmark was already active in supporting strict enforcement measures to increase the awareness of

and compliance with the new ECAs/SECAs sulphur limit of 0.1% in 2015. Based on the lessons learnt, Denmark made significant efforts to ensure the enhanced international focus on enforcement of the global 0.5% sulphur content limit of marine fuels in 2020 (Danish Maritime Authority 2019). As of 1 March 2020, ships without scrubbers will not even be allowed to carry fuel exceeding 0.50% in their fuel tanks. This will make enforcement significantly more straightforward as authorities, including Port State Control officers, only need to prove that the ship is carrying non-compliant fuel. Furthermore, in 2016, the European Commission tightened the EU's inspection regime to ensure compliance with the new sulphur limit, based on the Commission Implementing Decision (EU) 2015/253. This Decision (EU) 2015/253 lays down the rules concerning the sampling and reporting under Council Directive 1999/32/EC as regards the sulphur contents of marine fuels.

### 3. Surveillance methods to control the sulphur limits in the EU

Decision 2015/253 is aimed at clarifying the criteria to be used for the sampling and reporting by EU Member States. As from 1 January 2016, the sulphur content of the marine fuel being used on board shall also be checked by sampling or analysis, or both.

The rationale of the Decision 2015/253 is that for the implementation of the Directive, the EU Member States 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. Furthermore, a sufficiently frequent and accurate physical sampling of marine fuels delivered to ships or used on board ships needs to be ensured. 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 is applied at least in 40% of cases out of the mentioned minimum 10% of ships in EU Member States fully bordering SO<sub>x</sub> Emission Control Areas (SECAs), 30% in Member States partly bordering SECAs and 20% in Member States not bordering SECAs.

Regarding the control of sulphur limits in ECA/SECA zones, this new control regime based on the European Commission's implementing decision represents "a significant step change" in the demand on PSC to undertake fuel sampling and testing compared to pre-2016 (Decision (EU) 2015/253). There is no doubt that for countries with a high volume of shipping traffic, the new fuel testing requirements add a significant burden on inspection authorities.

Furthermore, the introduction of the global sulphur cap of 0.5% has put all coastal states under the obligation to enforce the new global sulphur limit as from 1 January 2020. In EU Member States not bordering SECAs, the sulphur content of the marine fuel being used on board is also checked of at least 30% of the inspected ships of the 10% of the total number of individual ships calling in the relevant Member State per year, based on the Commission Implementing Decision (EU) 2015/253. Accordingly, the full scope of fuel testing requirements had to be put in place and being used by the port authorities to secure a correct enforcement of the sulphur limits in ECAs (0.1%) and beyond, including in the entire EU waters for the control of the global 0.5% sulphur content cap (Directive (EU) 2016/802).

However, since the sampling frequency may be reduced by not more than half, using remote sensing technologies or quick scan analysing methods to verify a possible non-compliance. This is where the RPAS enter the picture as a means of inspection the compliance, as it allows remote sensing of sulphur levels in the smoke of ships.

### 4. RPAS SO<sub>x</sub> emission surveillance in EU waters

The unmanned, remotely piloted aircraft systems (RPAS) offer a wide range of possible benefits and utilisation purposes also to monitoring shipping traffic for the compliance with the ECAs/SECAs and the global sulphur limit. They allow for a reduction of the sampling frequency at least by half for inspecting the ships' compliance with the sulphur limits inside and outside ECAs/SECAs, as it allows remote sensing of sulphur levels in the smoke of ships.

Since the EMSA is closely involved in the air pollution work within the EU, the agency has also RPAS drones at its service to operate them in maritime transport related situations to assist in maritime surveillance operations and ship emission monitoring. The RPAS services offered by EMSA have been developed for operations in all seas surrounding the EU, and the RPAS services are free of charge for all EU Member States. They are part of EMSA's regional RPAS strategy, which allows multiple coast guard functions in several EU Member States to be supported by one or more RPAS services (EMSA 2021). The EMSA and the EU Member States use the RPAS for the surveillance of compliance with regulations on the SO<sub>x</sub> emission limits within ECAs but also non-ECAS areas by measuring the sulphur content in the plume of a vessel. Based on the percentage of sulphur identified by the RPAS sensors, the sulphur contents of the fuel burnt by the vessel can be estimated. This allows EU Member States to possibly target inspections to see if further follow-up is required (EMSA 2021).

Although an RPAS has fewer sensors than a surveillance aircraft, its operating costs are much lower. Regarding the monitoring and response support of marine pollution situations, which require day- and night-time operations, long endurance RPAS are used with appropriate sensors that allow an automatic observation pattern, navigation for target tracking and identification of potential polluters. The currently available RPAS have an endurance ranging from 6 to 12 hours,

and weight from 25kg to 235kg. While EMSA has already been providing RPAS services since 2017, in 2018, it employed new RPAS in direct response to increased user demand for night and day maritime surveillance, oil spill detection, and gas sensors ("sniffers") to detect the amount of SO<sub>x</sub> in a plume emitted by ships. All information is transmitted to the THETIS-EU database where alerts and outcome of the Port State Control inspections are recorded (EMSA 2018b). Additionally, all RPAS are equipped with AIS (automatic identification system) sensors to have a complete picture of vessel movements and distress sensors to be able to react in emergencies. In the past years, several EU Member States have been trialling RPAS and other technologies to take samples of ship exhausts to ensure that vessels in the North European ECAs are compliant with sulphur emissions regulations and since 2020, the global cap of 0.5% SO<sub>x</sub> level needs to be controlled in all EU waters outside ECAs/SECAs.

## 5. RPAS for monitoring and controlling marine pollution in the Strait of Gibraltar

Although the IMO regulations on the 2020 global sulphur limit were announced more than three years ago, some shipping companies still remain undecided on how best to comply with them. In the EU, the monitoring, compliance, and enforcement of the 2020 sulphur limit is the task of the respective national authorities of EU Member States that are Parties to the MARPOL Annex VI. Already with the introduction of the 0.1% sulphur cap in ECAs/SECAs in 2015, the compliancy of ship operators and owners had to be monitored and controlled. However, the Commission Implementing Decision (EU) 2015/253 had set stricter requirements for the sampling frequency, thereby adding a significant burden on the EU Member States' inspection authorities.

There is a requirement for EU Member States to monitor and sample a certain number of vessels

for regulatory compliance, and to set suitable penalties where non-compliance is detected. The surveillance with remotely piloted aircraft systems (RPAS) is considered being an efficient option to reduce the authorities' burden for individualising non-compliant ships in EU waters. It allows the authorities to reduce the frequency of physical sampling by the maximum of half, using remote sensing technologies or quick scan analysing methods to verify a possible non-compliance. However, since the compliance levels with the 0.10% sulphur limit in EU ports and ECAs has been good, it is expected that also in the non-ECA areas of the EU, the compliance with the IMO 2020 sulphur limit will be carried out in a rule-compliant way.

However, there are concerns that the enforcement will probably be weak in some parts, or port State control (PSC) lacks resources such as testing equipment, personnel, and training to enforce effectively the Commission Implementing Decision (EU) 2015/253. Therefore, the RPAS services offered by EMSA free of charge to EU Member States, Candidate Countries and EFTA Member States, or Member State Authorities through the European Agencies FRONTEX and EFCA, will help to control ships in such heavy traffic regions like the Strait of Gibraltar, one of the world's busiest shipping lanes.

Over the summer 2021, EMSA's remotely piloted aircraft have been monitoring the level of SO<sub>x</sub> released by ships transiting the Strait of Gibraltar. The operation carried out by the Spanish General Directorate of Merchant Marine under the direction of the Spanish Ministry of Transport, Mobility and Urban Agenda (MITMA) marks the first time the SO<sub>x</sub> emissions have been monitored by drones outside the special designated SECAs of Northern Europe. The RPAS have been in operation since 12 July 2021 from a base in Tarifa, Spain and continued until the end of October 2021. This project was designed to

test the effectiveness of drones in measuring pollutant emissions from ships.

By using EMSA's RPAS, the goal was to detect cases of non-compliance with the International Convention on Maritime Pollution (MARPOL - Annex VI) of SO<sub>x</sub> emissions above the allowed level of 0.5% SO<sub>x</sub> in the fuels used by a vessels.

The RPAS aircraft used in the Strait of Gibraltar test was a CAMCOPTER® S100 and it is under contract to EMSA from the consortium of Nordic Unmanned, Norce and UMS Skeldar (EMSA 2021). This CAMCOPTER® S100 has several features, including the ability to take off and land vertically from an area of less than 25 square meters. It has a flight endurance of over six hours and a range of more than 100 km. To help detect the SO<sub>x</sub> emissions levels in the fuel combustion exhaust of ships, the aircraft is equipped with gas sensors and cameras that cover both optical and infrared spectral ranges (EMSA 2021). The RPAS has been carrying out daily two flights with an average of ten inspections per day. According to the results of these inspections, out of the 294 vessels controlled, some 27 were found in possible breach of the limits of sulphur content in their fuel. The measurements and records are automatically encoded in the information exchange system which triggers an alert in the EMSA THETIS-EU database (EMSA 2021).

While this monitoring and control does not directly confirm non-compliance, it does help the port authorities to easier screen the vessels in the busy Strait of Gibraltar and to specifically target certain ships for closer inspection, which are suspected of non-compliance, to proceed with the lab testing of the fuel, which could face eventual sanctions (EMSA 2021).

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