Monitoring, Recording Verification (MRV) of CO2 Emissions from Ships

In February 2014 the European Parliament endorsed a binding European Union (EU) 2030 target of a 40% reduction in greenhouse gas emissions compared to the 1990 levels. Moreover, all sectors of the economy would be required to contribute in reducing greenhouse gas emissions.

The driver behind the regulation was a study carried out by the JRC as part of its efforts to reduce greenhouse gas (GHG) emissions. There are considered to be around 1000 million tonnes of carbon dioxide (CO2) annually contributing to 2.5% of global emissions³. Based on the study it’s estimated that a 75% reduction in GHG emissions could be achieved by the application of operational measures and the implementation of existing technologies.

As a result of the studies the EU adopted Regulation 2015/757 in April 2015 to bring maritime emissions into the greenhouse gas reduction commitment. The regulation entered into force on 1 July 2015 and becomes fully effective on 1 January 2018. It requires the setting up of a system of monitoring, reporting and verification of CO2 emissions from the fuel consumed in the engines, boilers and inert gas generators of vessels.

Regulation 2015/757 applies to all ships, regardless of the flag, of 5000GT and over, calling at the ports of EU member states, and additionally Norway and Iceland. However, it is not applicable to ships that are not carrying or passengers commercially, such as dredgers, and vessels engaged in ice-breaking, pipe laying or offshore construction activities.

Exceptions to the requirements also extend to specific vessels where all voyages during the reporting period either start or end at a port under the jurisdiction of a member state and the vessel has performed more than 300 voyages during this reporting period. In such cases only the annual report of the total aggregated emission values is to be submitted.

The monitoring plan required to be considered in two parts: 1) voyage monitoring for emissions in each regulated voyage, and 2) annual monitoring for the total aggregated emission values.

The collection of data of the CO2 emission on a per voyage basis is to begin from 1 January 2018 upon successful assessment of the monitoring and collection plan by the appointed verifier. The submission of a monitoring plan to the verifier should have been completed by 31 August 2017.

A list of accredited verifiers (correct as at May 2017) includes:

- American Bureau of Shipping
- Bureau Veritas Certification Holding SAS - UK Branch
- Centre Testing International (Shenzhen) Corporation
- Class NK
- DNV-GL
- DnVon Bureau of Shipping
- EMICERT
- Lloyd’s Register Quality Assurance Ltd.
- RINA
- SGS United Kingdom Ltd.
- VERIFI AVIA (UK) Ltd.

Additionally, Lucideon CICS Ltd. has been accredited as a verifier by UKAS, the national accreditation body of the United Kingdom.

The bodies listed above have been accredited based on the EU’s delegated regulation EU 2016/2072.

According to Regulation 2015/757, four monitoring methods have been proposed for adoption. These are to be considered on a case by case basis for a fleet and each vessel and depend on the type of fuel used on board, the availability of monitoring equipment and the vessels’ operational profile:

- Method B - Bunker fuel tank monitoring on board for fuel consumption calculations in the period.
- Method C - Fuel consumption data from flow meters linked to fuel combustion and CO2 emissions.
- Method D - Direct CO2 emission measurement in the exhaust gas uptake. The fuel consumption to be calculated using the measured CO2 emission and the applicable emission factor of the fuel. The calibration methods and uncertainty associated with the devices shall be specified in the monitoring plan.

The monitoring plan is to be submitted to one of the accredited verifiers, listed above. The monitoring plan and emission reports are required to correspond with the model templates located in Annex I of EU Regulation 2016/1277. The plan and recording could be in the form of a data file such as Microsoft Excel, csv files or a web based tool to enable direct upload.

Thetis MRV is a web based application developed and maintained by the European Maritime Safety Agency for companies to submit and generate emission reports and for the verifiers to assess and issue a Document of Compliance (DoC) all in one location. It is also possible to create monitoring plans on the Thetis MRV. The system has been available since 7 August 2017 and can be used after setting up an account. Access to the web application is only available to shipping companies, verifiers and Flag States. Thetis MRV can be accessed at:


The first submission of the emission results is to be made by 30 April 2019 after being successfully verified by the nominated verifier. The submission of data is through the EU Thetis MRV system.

On satisfactory verification the verifier is to issue a DoC with a validity of 18 months after the end of the reporting period and inform the European Commission and the Flag State. The DoC is to be issued by the verifier from 30 June 2018 and will be subject to inspection by the relevant.
Regulation 2015/757 also requires Member States to carry out inspection on vessels entering their ports for compliance and to penalise those in the case of non-compliance. There is the possibility of expulsion or detention if a vessel fails to comply for two or more reporting periods when a reasonable time for rectification has passed.

In the case of a vessel calling at an EU port for the first time after 31 August 2017 the company is required to submit a monitoring plan to the verifier no later than two months after vessel’s first call at a port under the jurisdiction of an EU member state or Norway and Iceland.

As a global initiative in monitoring and control of GHG the IMO, at the 70th MEPC session, also adopted a requirement for the mandatory collection of data on CO2 emissions from the fuel oil consumed on vessels. MARPOL Annex VI was amended in 2016 with the addition of Regulation 22A, applicable from 1 March 2018, that is similar to the EU MRV and is applicable to vessels of 5000 gross tonnage and above.

The methodology for collection and processes for submission of data is to be included in the Ship Energy Efficiency Management Plan (SEEMP) which has been a requirement as per MARPOL Annex VI Regulation 22 since 1 January 2013. The guidelines for the development of the revised SEEMP are included in IMO resolution MEPC 282(70).

Collected data is to be submitted to the Flag State annually and within three months after the end of each calendar year. The Flag State, upon verification of the submitted data, will issue a Statement of Compliance to the vessel. Owners are required to contact the respective flag administration to determine the extent of that state’s delegation of compliance procedures to the verifiers.

The Flag State is required to subsequently submit the collected data to a “Ship Fuel Oil Consumption Database” administered by the IMO. In turn, the IMO will analyse the collected data for, among other things, the adoption and implementation of revised strategies on GHG emission controls.

It is noted that there are certain differences in the data collection systems of the EU and IMO; for example the EU MRV requires the transport work data and annual aggregate values to be submitted in addition to the per voyage figures. Moreover, collected data EU MRV will be publicly available along with the details of the vessel it refers to, whereas only the emission figures submitted to the IMO will be available in the public domain with no specific vessel references. Other differences relate to the verifiers carrying out the initial plan assessment and data verification.

Given that there will be two data reporting systems required for vessels operating from/to and within the EU, and based on representation from the wider shipping community, the EU MRV is currently under review ‘with the aim to align the EU MRV with the global data collection system to the extent considered feasible while ensuring its effectiveness and efficiency”. This is covered under the impact assessment initiative Ref. Ares (2017) 3112562 dated 21 June 2017. It is to include a twelve week public consultation with stakeholders (ship owners, operators, ports, logistic companies, public authorities, accreditation bodies, verifiers, subject experts) and civil society in general.

Such a review is required as per the provisions of EU Regulation 2016/757 Article 22 para. 3: “In the event that an international agreement on global monitoring, reporting and verification system for greenhouse gas emissions or on global measures to reduce greenhouse gas emission from maritime transport is reached, the Commission shall review this Regulation (EU MRV) and shall, if appropriate, propose amendments to this Regulation in order to ensure alignment with that international agreement”.

The Club recommends a common system of data collection and monitoring, one that will comply with the existing EU MRV regulation and also include the IMO global data collection system requirements, to be considered. Further, with a provision for revising the system in anticipation of a revision to the EU MRV regulation in due course when the IMO data collection system is operational.

1IMO, GHG3 Executive Summary and Report

Article by Vijay Rao
Loss Prevention Department