

Shipping MRV for shipowners and operators: challenges and readiness

1. Biographies

Poul Woodall, Director, Environment & Sustainability, DFDS A/S

Poul Woodall has over 40 years of experience within the maritime and transport industry. The first 36 years were spent at A.P. Moller-Maersk in various positions, mainly within the container and Ro/Ro segments. His career includes 17 years overseas experience with postings in Asia, the Middle East and Europe.

Since 2010, Poul has been with DFDS A/S in Copenhagen and in June 2013 he was appointed Director for Environment and Sustainability for the DFDS Group. Poul also chairs the Groups CR Committee.

Poul Woodall has a degree from Copenhagen Business School supplemented with management education at Insead and Stanford University. Poul is on the steering committees of the Trident Alliance and Green Ship of the Future and on the advisory board of IMPA-act and an affiliate Member of IEMA. Marine environment policy work is conducted through his affiliation with Interferry and various ESSF working groups in Brussels.



Julien Dufour, CEO, Verifavia and Verifavia Shipping

Julien Dufour is a transport and environmental expert, verifier, researcher, and speaker with 20 years of experience in the transport sector and seven years' experience in carbon emissions monitoring, reporting and verification under EU Regulations. He is the Founder and CEO of Verifavia and Verifavia Shipping, the worldwide independent accredited carbon emissions verification bodies for aviation and maritime transport.

Verifavia Shipping provides carbon emissions verification guidance and services that enable shipping companies to navigate the requirements of the EU Shipping Monitoring, Reporting and Verification (MRV) Regulation efficiently and effectively.



By invitation of the European Commission, Poul and Julien are active members of the EU MRV expert groups under the umbrella of the European Sustainable Shipping Forum (ESSF). While Poul is a member of the subgroup dealing with the monitoring of cargo and monitoring methods and rules, Julien is a member of the subgroup dealing with verification rules and accreditation of verifiers.

2. Introduction

REGULATION (EU) 2015/757 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2015, also known as the “EU MRV Regulation”, requires all vessels that call at European Union ports as from January 1st 2018 to monitor and report CO₂ emissions on a per voyage basis, as well as the associated transport work. This paper aims to outline the status of the implementation of this Regulation, the key outstanding issues and also to highlight areas that could potentially cause issues relating to the implementation. The views expressed in this paper are those of the authors as individuals.

Background

In June 2013, the European Commission proposed a strategy for progressively integrating maritime emissions into the EU's policy for reducing its domestic GHG emissions. After a two-year legislative process involving all EU institutions, this strategy was adopted by the European Parliament in April 2015. The Regulation 2015/757 ('Shipping MRV Regulation') came into force on 1 July 2015.

The strategy consists of three consecutive steps:

1. Monitoring, reporting and verification of carbon emissions from ships
2. GHG reduction targets for the maritime transport sector
3. Further measures, including Market-Based Measures (MBM)

The first step of the strategy is the design of a robust Monitoring, Reporting and Verification (MRV) system of carbon emissions for ships exceeding 5,000 gross tonnage (GT) on all voyages to, from and between EU ports applicable from 2018.

What is the purpose of the Regulation?

The EU Shipping MRV system is designed to contribute to building an international system. First steps in this direction have already been taken at the IMO with active support from the EU and partner countries. By yielding further insights into the sector's potential to reduce emissions, the EU Shipping MRV system will also provide new opportunities to agree on efficiency standards for existing ships.

In addition, it will provide useful insights into the performance of individual ships, their associated operational costs and potential resale value. This will benefit ship owners, who will be better equipped to take decisions on major investments and to obtain the corresponding finance.

Which ships are concerned?

All ships exceeding 5,000 GT regardless of their flag or port of registry are concerned. Warships, naval auxiliaries and a number of very specialised ships are excluded.

Which data will be reported?

For each ship, exceeding 5,000 GT, fuel consumption and carbon emissions on all voyages to, from and between EU ports as well as specific time and consumption while at berth must be reported.

Other relevant information to be reported includes distance travelled, time spent at sea, details of the cargo carried, transport work and average energy efficiency expressed in fuel consumption or carbon emissions per distance or per transport work.

Data will be reported on an annual, as well as per-voyage basis. If all of the ship's voyages start or end in ports located in the EU and if the ship is scheduled to perform more than 300 voyages in a reporting period, a consolidated reporting scheme can be adopted.

Which fuel consumption methodologies are acceptable?

There are four acceptable emissions monitoring methodologies:

1. Bunker Fuel Delivery Note (BDN) and periodic stock-takes of fuel tanks
2. Bunker fuel tank monitoring on board
3. Flow meters for applicable combustion processes
4. Direct emissions measurements

Ships can use a combination of these methodologies if it results in an improvement in the accuracy of monitoring.

3. EU MRV scope and milestones

According to the EU MRV Regulation, any vessel over 5000 GT regardless of Flag or nationality which calls at an EU port on or after January 1st 2018 for commercial purposes must monitor and record its fuel consumption and CO₂ emissions. In addition to the CO₂ emissions, the associated transport work must also be recorded, which is the commercial cargo transported multiplied by the distance sailed. Ballast voyages must also be considered the same way as laden voyages.

A port of call is a port where a ship stops to load or unload cargo, or to embark or disembark passengers. A voyage is a trip between two ports of call. Stops for the sole purpose of bunkering, crew changes or maintenance, etc. is not considered to be a port of call. A reportable voyage is a voyage that involves at least one EU port. Consequently, all stops and voyages, as well as the purpose of the stops must be appropriately recorded so that reportable voyages can be correctly identified and monitored.

EMSA estimates that 9,500 vessels will be affected by this regulation in year 1¹.

For every vessel that anticipates making a commercial call in an EU port in 2018, a monitoring plan (MP) must be developed. The content of this MP is specified in article 6 of the EU MRV Regulation and must include:

- Identification of ship and shipping company / shipowner
- Identification of emissions sources
- Description of procedures for monitoring voyages, fuel consumption, and activity data
- Methodology for data gaps
- Procedures for quality control
- Description of data flows
- Identification of responsibilities

¹ European Maritime Safety agency in mail to Danish Shipowners association, 9. Sep. 2015

In particular, the MP must specify which of the four allowed emissions monitoring methodologies the shipping company intends to use as well as how transport work will be calculated.

The MP must be submitted to the verification body by 31st August 2017 and successfully assessed by 31st December 2017 before the start of the first monitoring period.

The emissions and transport work data for 2018 must then be consolidated in an annual report which must be verified by an independent accredited verifier by 30th April 2019. Once this is done, the report must be submitted to the European Commission and the Flag State.

By 30th June 2019, every vessel must carry onboard a Document of Compliance (DoC) issued by the verification body. This procedure is then repeated each calendar year.

For vessels for which a MP has not been submitted and assessed that call at an EU port after 31st August 2017, the responsible company must submit such MP within two months after the call.

4. Legal issues

Being a “Regulation”, the EU MRV does not need to be transposed into national law and its implementation will be identical for all 28 EU countries except with regard to the fines and penalties. However, it is important to note that the scope goes beyond the borders of the EU EEZ in so far as the entire voyage that ends and / or starts in an EU port needs to be monitored and reported.

Who is responsible for ensuring the MRV Regulation is adhered to?

The entity responsible for complying with the MRV regulation is “the Company” which is defined in the regulation as (Article 3, d):

“company” means the shipowner or any other organisation or person, such as the manager or the bareboat charterer, which has assumed the responsibility for the operation of the ship from the shipowner”

A vessel’s “Certificate of Nationality” will identify the legal owner. The company mentioned here may have no influence on the daily management of the vessel, neither from a technical nor a commercial point of view. Presumably for this reason the addition “*or any other organisation or person..... which has assumed the responsibility for the operation of the ship from the shipowner*”.

The problem here is initially the word “*assumed*”. This action is not clear in legal terms. The second problem relates to the word “operation”, as for most ships one works with both a technical operation and a commercial operation.

The logical way to overcome this unclear formulation of a fundamental piece of information, would be to stipulate that the responsible company, is the company named in the SOLAS Document of Compliance.

What are the competition issues related to MRV?

Another fundamental legal question that needs to be clarified is to what extent transfer of commercial information between competing companies is allowed or can be made mandatory.

“The Company” as defined being responsible for MRV reporting may not be the entity involved with the commercial operation of the vessel. Depending on the type of vessel and the method elected by the MRV reporting company to monitor transport work, the details of a vessel’s cargo may be such that the commercial operator does not wish to pass this data to the reporting company (which may be a competitor). It is also not clear to what extent the passing of such commercially sensitive data would conflict with the EU competition laws.

5. Other important areas not yet clarified in legislation

In addition to the issues mentioned in the previous section, there still remains a number of areas to be clarified.

Voyages and port calls, where these are of a special nature.

A ship that departs Singapore, transits the Suez Canal, stops for bunkering in Gibraltar, makes a crew change in Rotterdam and then calls in Gothenburg for discharge. According to the Regulation, the voyage begins in Singapore and ends in Gothenburg, as these are the only ports of call according to the legal definition of a port of call.

Questions include: how to account for the port time and consumption during the bunkering and crew change calls? Assuming the port is in the EU, should the emissions at the port be reported as part of the voyage or as part of the fuel consumption at berth? Assuming the port is not in the EU but on the way to an EU port, should the emissions at the port be reported as part of the voyage or excluded from the voyage emissions?

Let us assume that this ship is a VLCC that, for operational reasons, must unload part of its cargo in Ain Sukhna (south of Suez Canal), which is sent to Sidi Kerir (Mediterranean port) through the Sumed Pipeline where it is loaded again on the ship after it has transited the Suez Canal. In Ain Sukhna and Sidi Kerir, part of the cargo was unloaded / loaded, although for operational reasons rather than commercial reasons. Should Ain Sukhan and Sidi Kerir be considered as ports of call or not?

Let us assume that this ship spends several days or weeks drifting off the border of Gothenburg waiting to load or unload its cargo, should the related emissions be accounted for?

Definition of a port

The ESSF subgroup defined a port as starting “at arrival first berth in a port” and stopping “on departure last berth in a port”.

However, it is common practice to consider the end of the sea passage (EOSP) as beginning of the voyage and start of the sea passage (SOSP) as end of the voyage. Would this be acceptable?

Definition of cargo

To correctly identify “Transport work” one first needs to agree what the “cargo” element is. For some vessel types the definition of cargo is still work in progress. However, mass of cargo is the agreed cargo parameter for most types of ships:

Ship type	Cargo parameter
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Chemical tankers, Gas carriers, Bulk carriers, Combination carriers	Mass of cargo onboard
LNG carriers	Volume of the cargo on discharge
Pax	Number of passengers
Ro-Ro ships	Occupied lane-meters * default weight OR, Nb of cargo units * default weight
Container ships	Total weight of the cargo OR, Nb of TEU * default weight
Ro-Pax	Use ISO 16258 to split fuel consumption between pax and cargo (area-based or weight-based). Passengers: number of pax Freight: Occupied lane-meters * default weight OR Nb of cargo units * default weight
Container / Ro-Ro cargo, General cargo, Reefers, vehicle carriers	TBD

There may be an issue around whether or not to include empty containers and again whether to differentiate between the operator's own empty containers (for which freight is not normally paid) and empty containers accepted as freight paying cargo.

For Ro-Ro and especially Ro-Pax vessels, a more complex set of rules will have to apply. The details of these are subject to a special task force under the ESSF MRV (Metrics) subgroup.

The templates for the MP and annual emissions report have been drafted but not yet published. According to the Regulation the use of these templates will be mandatory, therefore their availability is essential to enable companies to arrange their data collection and reporting in the appropriate format.

6. Data sensitivity / security

Much discussion has taken place around the issue of data sensitivity and to what extent publication should be available. As of March 2016 the situation is such that the annual emissions and transport work data will be stored centrally in the EU and access will be restricted to Member states and the Commission.

The Regulation states that the annual reports must be submitted to the "Flag State". This implies that these reports are submitted also to non-EU Flag States. In this connection it is worth noting that in some countries there are state-owned shipping companies that operate in direct competition with private entities. Will such state operated companies then have direct access to this commercially-sensitive data?

7. Environmental impact

The MRV regulation states:

The introduction of a Union MRV system is expected to lead to emission reductions of up to 2 % compared to business-as-usual and aggregated net costs reductions of up to EUR 1,2 billion by 2030

This statement is not well substantiated. The shipping industry has for many years been very focused on fuel consumption. Therefore the vast majority of companies already monitor their consumption on quite a detailed level. The statement that companies now have to report their measurements in a different way should lead to an automatic 2% reduction does not seem likely.

As for the anticipated net cost reduction, one must assume this was calculated based on a fuel price somewhat distant from the current levels.

The first years of reporting will give very interesting information about the approximate volume of consumed marine fuel that is covered by the EU Regulation. The global consumption is around 300 mill. tons and the authors estimate that 50 mill. tons of these will come under the MRV reporting.

A 2 per cent CO₂ reduction would thus equate to about 3.2 mill. ts. of CO₂ p.a. or the same amount as produced by 640,000 average UK households.²

8. Uncertainties / information accuracy

Article 1 of the MRV Regulation states:

“This Regulation lays down rules for the accurate monitoring, reporting and verification of carbon dioxide (CO₂) emissions.....”

“Accurate” is not further defined and it is therefore relevant to look at the industry standard and procedures for monitoring fuel and its consumption and then see how this related to the CO₂ emissions.

When one burns fossil fuels, one generates CO₂ and the IMO has issued a conversion table showing the calculated amount of CO₂ emitted for each fuel type. It has been agreed that this IMO conversion table will be the standard used for MRV reporting.

The regulation does allow for the option of measuring the actual CO₂ emitted through the stack, however the practical use of such measuring devices is currently not available. Therefore for the foreseeable future, CO₂ will be a calculated figure based on fuel burned.

Therefore, to ascertain the accuracy level obtainable, one needs to look at the accuracy of each element in the chain. Starting from the quantity of actually delivered onboard fuel compared with the Bunker Delivery Note (BDN), via the accuracy and placement of flowmeters, tank soundings, volume loss through the purifying process and factoring in the significant difference in temperature the fuel may undergo from delivery to consumption.

In addition, the MRV Regulation requires recordings taken at very specific times. The actual process of such readings may not correspond with the required process. For instance, a measuring point is “on arrival”. Crew will typically be busy with tasks related to the safe handling of the vessel as this precise time and then reading tanks or flowmeters will be performed once more pressing activities are concluded. This and the risk of errors due to the “human element” can be avoided in vessels that have remote monitoring, but these represent a fraction of the vessels involved. Taking

²https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/201167/uk_housing_fact_file_2012.pdf

all the uncertainly elements in to account, if an accuracy level of 95% is achieved, this must be considered to be very good.

For some vessels there will also be an inaccuracy with respect to the “transport work”. Take as example a container vessel. The transport work for this type of vessel is allowed to be calculated using the number of TEU multiplied by a default gross weight (likely 10ts). This measure was no doubt introduced to take into account that the container trade historically relied on a shipper declared weight. However the IMO's Maritime Safety Committee (MSC) at its 93rd session (May 2014) approved changes to the Safety of Life at Sea (SOLAS) convention regarding a mandatory container weight verification requirement on shippers. This weighing must utilize calibrated and verified equipment. The actual weights of each and every container is thus already available to the operator when the MRV system kicks in.

9. Cost

The EU MRV is not the EU Emissions Trading Scheme (ETS), which is an MRV-S system (S for surrendering allowances). Consequently, the minimum cost burden on shipping companies will be limited to the cost of verification. In addition to the cost of verification, shipping companies may use consulting companies to develop their MP or take care of the preparation of the emissions report. Shipping companies may also purchase dedicated EU MRV IT systems to facilitate the collection of data and the generation of the emission report. Finally, some shipping companies may have to develop in-house tools to allow the collection of the required data.

10. Company / verifier relationship

The verifier has a dual role: the verification role (assessment of the MP and verification of the emissions report) and the administrative role (issuance of the DoC).

The first role of the verifier is to check the conformity of the MP against the requirements laid out in the Regulation. The MP must not only conform to the Regulation but it should also be a true reflection of the existing implemented procedures. This assessment must be completed before the end of 2017 so that the shipping company can start monitoring the relevant data from January 2018 according to its assessed MP.

The purpose of verification is to reach a verification opinion with reasonable assurance that:

- the procedures followed to prepare the emissions report conform to the assessed MP and to the requirements of the Regulation and are free from material non-conformities; and
- the data is fairly stated, i.e. free from material misstatements.

The verification process involves a site visit at the head office of the company, interviews, observation of key processes and IT systems used, interview of people in charge of the data collection and transformation procedures, data sampling, audit trails, etc. This process must be completed before 30 April following the monitoring year.

Finally, it is the responsibility of the verifier to submit to the company a DoC that must be carried on board each ship starting from 30 June 2019.

The relationship between the company and the verifier will be of particular importance, as unlike in the EU ETS there will not be any national Competent Authority that companies can rely on to ask questions or solve problems.

11. Important monitoring issues

The definition of a Port of call according to the Regulation is different to the standard definition of a port. In addition many shipping companies consider legs between two ports rather than voyages between two ports of call. This may lead to incorrect identification of voyages according to the EU MRV definition of port of call and voyage.

The EU MRV Regulation requires companies to separately monitor fuel consumption when the ship is at berth. This requires the company to monitor fuel onboard upon arrival and at departure, which is not always the case.

Some companies do not record the actual weight of the cargo onboard, but instead record the declared weight, or even sometimes only the loaded declared weight. It is not yet clear whether the declared weight will be acceptable. In any case, the loaded weight is not enough as it must be combined with unloaded weight in order to calculate the actual (or declared) amount of cargo onboard during a voyage.

Companies must design and implement control activities to ensure that the data collected is correct and plausible, that there is no system failure, that gaps in the data are identified and corrected, and that the procedures are robust and conform to the Regulation. This represents a new challenge for many companies. Responsibilities for the data collection and transformation process must also be clearly defined.

12. Important verification issues

For many reasons, verification can be a challenge. The first task of the verifier will be to check the completeness of the list of reported voyages. The only external source of information that a verifier may use to independently cross-check the list of voyages reported by the operator is the AIS data. However, AIS data is not always perfect as the AIS may be switched off from time to time by the ship. Also, although the AIS may be able to identify that a ship is within the boundaries of a port, it does not record whether the ship actually stopped at the port and let alone the purpose of the stop (whether it is for loading or unloading cargo, embarking or disembarking passengers, bunkering, crew change, maintenance, etc.). Consequently, the AIS can certainly help the verifier in its investigations but it has to be handled with care and does not constitute a perfect source of independent data.

According to the Regulation, the verifier must ensure that the reported data is coherent in relation to estimated data that are based on ship tracking data and characteristics such as the installed engine power. This requires not only the availability of ship tracking data such as AIS, but also a robust modelling of fuel consumption based on the type of ship and the installed engine power. This modelling currently does not exist and is considered to be a challenge considering that fuel consumption varies widely from one ship to another depending on the sea conditions, draught and especially speed. Indeed if a ship is being slow steamed then the fuel consumption per day can

easily be half or even less than half of a ship's fuel consumption, which means that any relevant modelling must take into account not only the installed engine power but also the speed!

Another challenge is the verification of the raw data, e.g. the ROB³, fuel flow or density data just after it has been collected and before it is transmitted through the company's systems to be stored and manipulated to calculate fuel consumption and transport work. When the raw data is first recorded on the engine log book, deck log book or oil record book, then these documents may be used in the audit trails or data sampling performed by the verifier. However, these documents do not always record the fuel data, and when it does, the fuel data is hand written and very often difficult to read and decrypt, which makes data sampling a challenge.

The verifier is required to confirm that all of the emissions sources on the ship have been identified and considered. The emissions sources to be considered are: main engine(s), auxiliary engine(s), boiler, inert gas generator and gas turbines. It may be a challenge for the verifier to ensure that all emissions sources were appropriately identified and that the relevant data is collected with the required levels of uncertainty and without gaps.

13. How to prepare for the Regulation?

One efficient way to prepare for the Regulation is to conduct a GAP-analysis of a company's procedures and data against the requirements of the Regulation. This can be done as early as 2016. The advantages are as follows:

- Preparation for EU MRV Regulation
- Early identification of required corrective actions (adjustment of IT data collection / extraction)
- Advance on the assessment of the Monitoring Plan
- Communication / marketing advantage
- Compliance without delay

14. Policing issues

The control of compliance will be a dual responsibility between the Flag State and the Port State. One must assume that non-EU Flag States will have a limited interest in this, as it is really no concern of theirs. That leaves the EU Port States with the policing responsibility. In general the current Port State inspections as performed under the Paris MOU is there to inspect IMO regulations, so countries will have to establish a dedicated procedure for the checking of this EU Regulation. It is then up to the individual States to decide the level of sanctions for non-compliance. When doing this for the sulphur directive, compliance sanctions in the individual EU countries vary considerably, not something we would want repeated with the MRV Regulation.

³ Fuel Remaining on Board