SHIP EFFICIENCY 2017
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Presentation on:

Fuel Consumption Measurement in IMO and EU Ship Fuel Consumption Monitoring, Reporting and Verification (MRV)

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Ship Efficiency Conference 2017 – EU-MRV / IMO-DCS

Purpose of this presentation.

- To explain and give a short overview about **IMO-DCS** (International Maritime Organization - Data Collection System) and **EU-MRV** (European Union - Monitoring, Reporting and Verification) regulations with special focus about data processes of applicable measurement methods for fuel consumption.

-> aim: reduction of emissions

Overview

- Two regulations with regards to emission`s coming up to shipping industry very soon.
- The regulations are totally independent – even they have coordinated some specifications`s among each other.

Content:

- IMO-DCS (definition`s, features, data`s and time-line)
- EU-MRV Legislation (who is concerned, fuel monitoring and time-line)
- Data process comparison of measurement methods of reporting and monitoring

What IMO wants to achieve.

IMO aims to reduce shipping Green House Gas (GHG) emissions.

- A potential future development is the reduction of GHG targets
- At its 70th meeting in October 2016 IMO MEPC adopted the regulations for data collection, reporting and verification.

The system will have three main elements:

1. **Data collection** by the shipping company.
2. **Data verification** by the flag State.
3. **Data reporting** to IMO and storage in a centralized database at IMO, London.

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Data collection Features of IMO-DCS

- Applicable to ships above 5.000 gross tonnage (GT)
- **All** ship`s voyages worldwide (except rescue mission)
- Energy efficiency based on fuel consumption and DWT
- Shipping company is responsible for submission of data.
- Aggregated data to be reported to IMO and stored in a IMO database.
- Enforcement / Responsibility by the Port State Control.

Data to be reported annually:

- Identification: Ship IMO number
- Reporting period - annually. Start and end dates (owner or flag may change)
- Technical character of the ship: ship type, GT, deadweight, main and auxiliary engine power (over 130 kW), EEDI and ice-class if so.
- Total **fuel consumption** by fuel type.
- Distance travelled.
- Hours underway
- Method(s) used for collecting fuel oil consumption data

Fuel consumption measurement methods

Four methods are acceptable.

1. Use of Bunker Delivery Notes (BDNs)
2. Use of flow meters
3. Use of bunker fuel tank monitoring on board
4. Indirect measurement of fuel consumption using CO_2 measurement (less relevant, because no type approved equipment available yet).

<u>Regarding all methods:</u>

- There is no requirement for the uncertainty level, but the data quality in terms of possible data gaps, as well as measures in case of data gaps must be explained in the SEEMP-DCP.

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EU Legislation.

REGULATION (EU) 2015/757 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the monitoring, reporting and verification of carbon dioxide emissions (CO_2) from maritime transport, and amending Directive 2009/16/EC.

- The European Parliament and Council (EC) of the European Union have adopted a regulation for the international maritime shipping sector.
- From 1st January 2018 on, ship owners and operators will have to monitor the CO_2 emissions of their vessels **per voyage** for all voyages calling EU ports.
  Further, monitored emissions shall be reported to the EC (reporting will take place every year on a similar cycle).

Which ships are concerned?

- Ships larger than 5.000 GT regardless of Flag or country of ownership
  Exceptions:
  - If they operate in EU ports all time, or if they have more than 300 voyages within reporting period, they do not to have to report on a voyage basis.
  - Others: war ships, fish catching or processing ships and some more.
- Calling at an EU port from 1st January 2018
- Carrying cargo or passengers for commercial purposes

!! A estimation of 12 000 to 15 000 vessels will be effected of this regulation.

Monitoring and reporting:

- Companies shall monitor emissions for each ship on a per voyage basis and aggregate data in an annual report and shall cover following parameters:

Which voyages must be reported?

- A reportable voyage is a voyage where at least one port of call is in EU
- A port of call is a port where a ship stops to load or unload cargo or to embark and disembark passengers
- A voyage is a journey between two port of calls

Fuel monitoring

- The actual fuel consumption for each voyage shall be determined and calculated using one of the following methods:
  - **Method A**: Bunker fuel delivery note (BDN) and periodic stocktakes of fuel tanks
  - **Method B**: Bunker fuel tank monitoring on-board
  - **Method C**: Flow meters for applicable combustion processes
  - **Method D**: Direct CO_2 emissions measurement (less relevant, because no type approved equipment available yet)
- Monitoring and reporting shall be complete and cover CO_2 emissions from all combustion fuels while the ships are at sea and at berth (separately reported).

Monitoring methods used
and related level of uncertainty (valid for EU-MRV)

Monitoring Method acc. Reg. EU 2015/757	overall max. uncertainty level
method A)	± 10%
method B)	± 10%
method C)	± 10%

Method A: Bunker fuel delivery note (BDN) and periodic stocktakes of fuel tanks

Method B: Bunker fuel tank monitoring on-board

Method C: Flow meters for applicable combustion processes

Source: https://ec.europa.eu/clima/events/articles/0108_en „Monitoring and reporting of fuel consumption, CO_2 emissions and other relevant parameters"

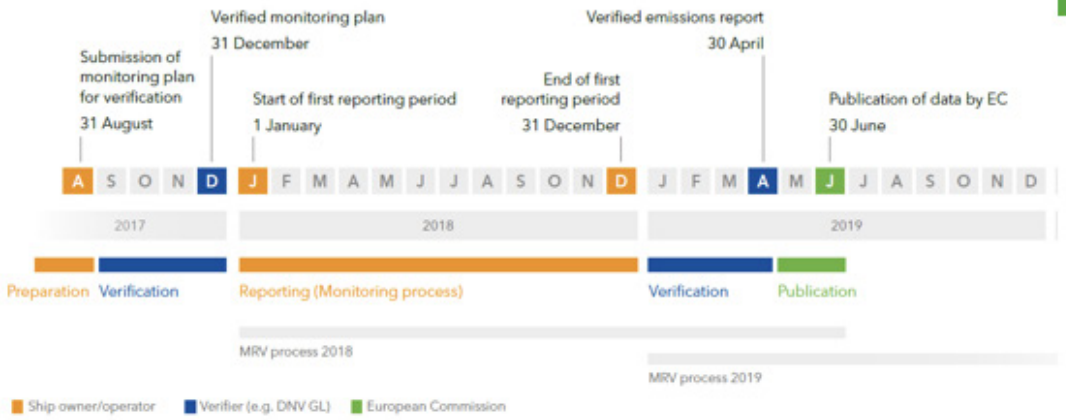
To deal comprehensively with the overall uncertainty figure with fuel monitoring on board a ship, it is to be noted that the measurement accuracy (uncertainty) of single equipment (e.g. flowmeters for receiving bunkers, density determination, storage in bunker tank,…) provide not the full picture of uncertainty levels for all processes of fuel oil handling on board.

Monitoring methods
Overall (system) uncertainty level

	flow rate			fm accuracy				
supply line	6000	l/h	x	1,00%	=>	60	l/h	
return line	4000	l/h	x	1,00%	=>	40	l/h	
						100	l/h	(abs.)
consumption	2000	l/h	/					
total failure (abs.)	100	l/h	=>	**5,0%**	total failure (rel.)			

	flow rate			fm accuracy				
supply line	6000	l/h	x	1,00%	=>	60	l/h	
return line	5000	l/h	x	1,00%	=>	50	l/h	
						110	l/h	(abs.)
consumption	1000	l/h	/					
total failure (abs.)	110	l/h	=>	**11,0%**	total failure (rel.)			

EU-MRV time line



EU-MRV vs. IMO-DCS

	EU MRV (MONITORING, REPORTING AND VERIFICATION)	IMO DCS (DATA COLLECTION SYSTEM)
Applicability	Ships >5,000 gross tonnage (GT) calling at any EU port will be covered	All ships ≥5,000 gross tonnage (GT) will be covered
First reporting period	January 2018	January 2019
Monitoring plan	Separate document, predefined format published by European Commission (EC)	Integrated as part of the Ship Energy Efficiency Management Plan (SEEMP, Part II). The data collection and reporting methodology shall be described in Part II and be subject to confirmation of compliance.

Reporting needs	▪ Amount and emission factor for each type of fuel consumed in total [...]
	▪ CO_2 emitted:
	  ▪ EU in-bound voyages
	  ▪ EU out-bound voyages
	  ▪ At berth
	  Note: differentiation of CO_2 emissions between sea and at berth
	▪ Port of departure / arrival
	▪ Distance travelled
	▪ Time spent at sea
	▪ Cargo carried
	▪ Transport work
		▪ Distance travelled
		▪ Amount and emissions factor for each type of fuel consumed in total [...]
		▪ Hours underway
		▪ DWT (as cargo proxy)

Verification	Independent accredited verifier	Flag states or recognized organizations
Reports to	Company reports to EMSA database (THETIS MRV); European Commission makes data publicly available	Flag state (or recognized organization) reports to IMO database; individual ship data is kept confidential

IMO-DCS vs. EU-MRV

- Will there be two systems running at the same time (EU/IMO) with different standards?
  There will be two schemes running in parallel at least for some limited time.
- What is the main difference between the EU MRV and IMO DCS?
  - The EU MRV requires reporting of actual cargo carried, whereas IMO DCS only requires reporting of DWT
  - EU MRV only applies to voyages to, within and from EU port, while IMO DCS will be for all voyages.
  - EU MRV requires a distinct monitoring plan in a special format, while IMO DCS requires a Part II of the SEEMP.

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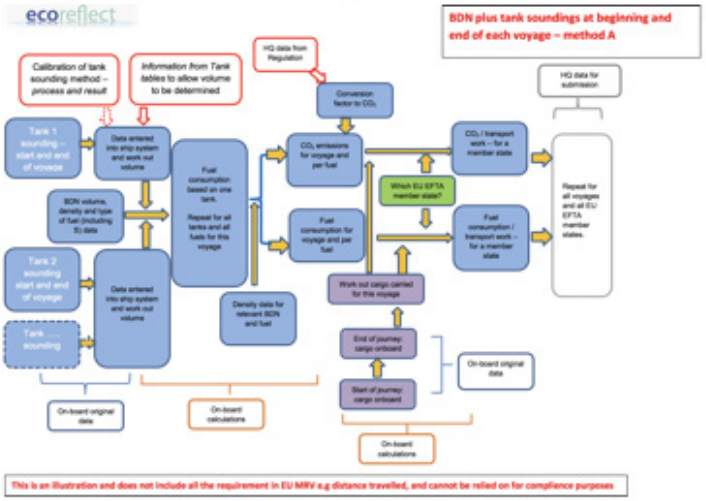
EU MRV

IMO INTERNATIONAL MARITIME ORGANIZATION

Method A: BDN and periodic stocktakes of fuel tanks



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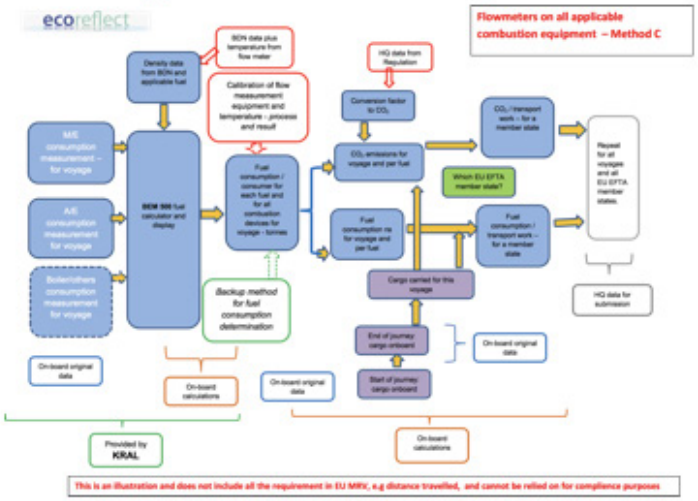
IMO INTERNATIONAL MARITIME ORGANIZATION

Method C: Flow meters for applicable combustion processes



Thank you for your attention!

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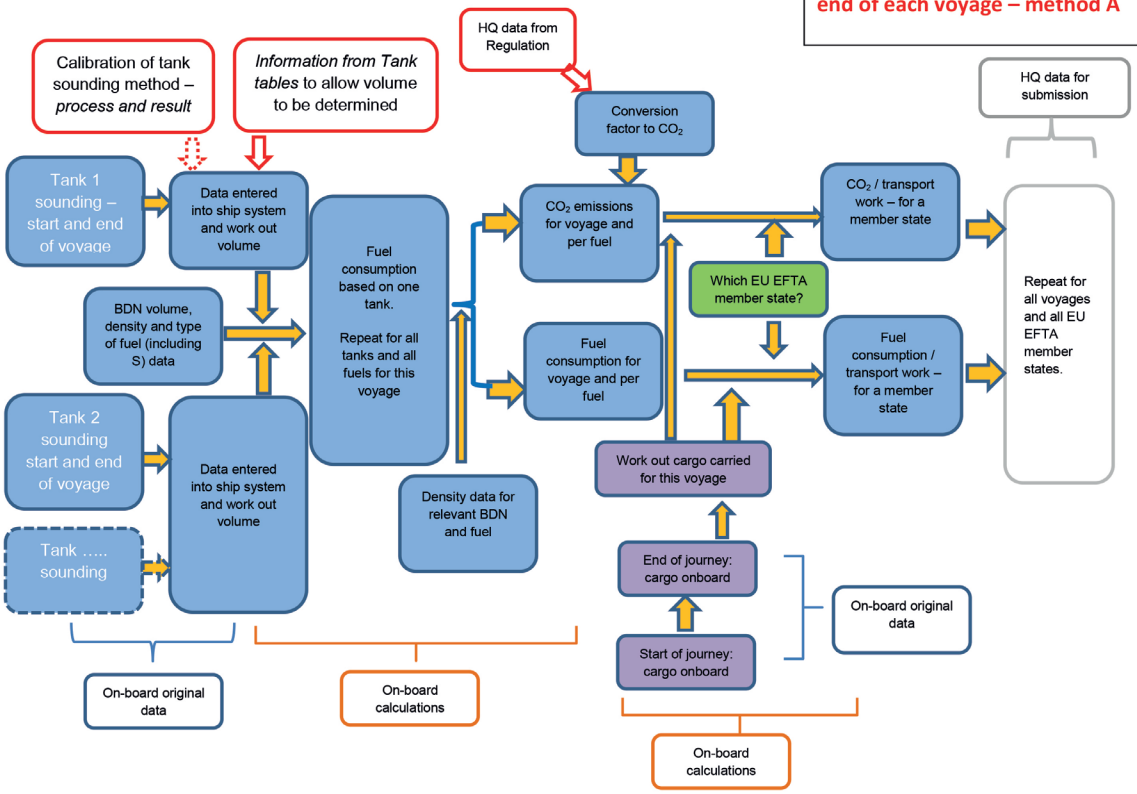
BDN plus tank soundings at beginning and end of each voyage – method A



This is an illustration and does not include all the requirement in EU MRV e.g distance travelled, and cannot be relied on for complience purposes

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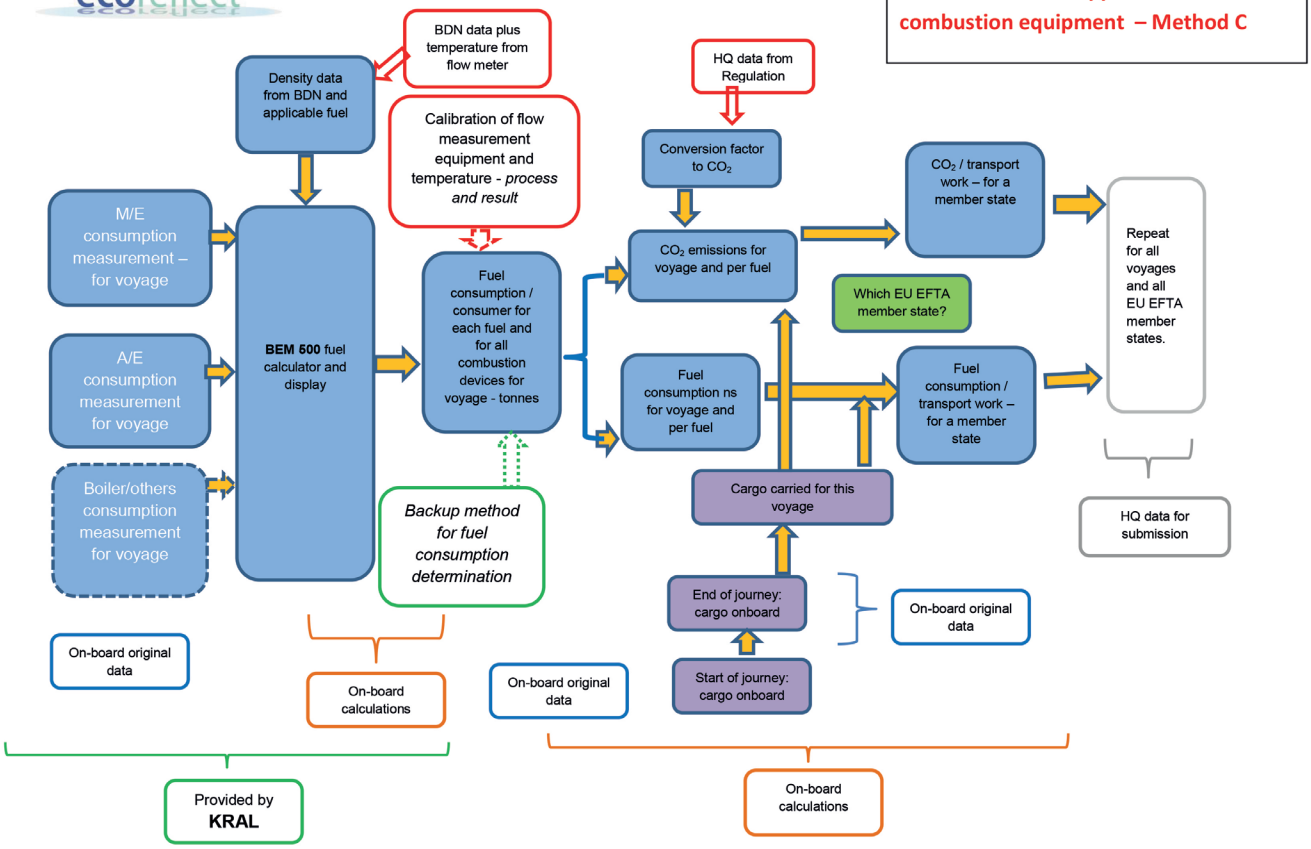
Flowmeters on all applicable combustion equipment – Method C



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