

Fuel, Emissions & Ships Efficiency - Data Availability and Needs

**Stakeholder Meeting on Monitoring,
Reporting and Verification (MRV) of GHG
emissions from Ships**

**European Commission (DG-CLIMA)
Brussels, 5 December**

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International Regulations/Legislation

- The Energy Efficiency Design Index (EEDI)**

$$\frac{\left(\prod_{j=1}^n f_j \right) \left(\sum_{i=1}^{nME} P_{ME(i)} \cdot C_{FME(i)} \cdot SFC_{ME(i)} \right) + (P_{AE} \cdot C_{FAE} \cdot SFC_{AE}^*) + \left(\left(\prod_{j=1}^n f_j \cdot \sum_{i=1}^{nPTI} P_{PTI(i)} - \sum_{i=1}^{neff} f_{eff(i)} \cdot P_{AE_{eff}(i)} \right) C_{FAE} \cdot SFC_{AE} \right) - \left(\sum_{i=1}^{neff} f_{eff(i)} \cdot P_{eff(i)} \cdot C_{FME} \cdot SFC_{ME}^{**} \right)}{f_i \cdot f_c \cdot Capacity \cdot f_w \cdot V_{ref}}$$

Design Data Needs - EEDI Technical File: Ships' particulars, type and relevant information for classification (inc. notations), main & auxiliary engines details, fuel type and its emission factor, reference speed, capacity, energy saving equipment, speed-power curves, electric power tables and the calculated values of both the attained EEDI and EEDI_{weather}

Note: Ships' power, speed, draught and capacity shall be consistent!

Availability - Ship Designers, Shipyards, Flag, Class, Manufacturers, etc.

Later, some of it will be available through Ships' commercial databases

International Regulations & Guidance

- **The SEEMP - aiming to provide an EE Operational Profile**

It suggests the EEOI has an example to trying to represent ships' operational performance - single or average voyages

$$\text{Average EEOI} = \frac{\sum_i \sum_j (FC_{ij} \times C_{Fj})}{\sum_i (m_{\text{cargo},i} \times D_i)}$$

Design Data Needs - Fuel Type and its Emission Factor (fuel mass to CO₂ mass conversion), Mass of consumed Fuel, Cargo carried (tonnes or gross tonnes) and Distance travelled corresponding to the cargo shifted or work done.

Also in SEEMP: Trim, ballast, speed optimisation, hull cleaning, weather routing, propeller, rudder and heading control, etc.

Availability - *Ships' side*: Owner/Operator/Manager/Charter, *Authorities side*: Ports and Maritime Authorities & Administrations, Flag State & PSC

International Regulations & Guidance

- **Energy Efficiency Operational Indicators/Performance**

Data is available through either Mandatory and Voluntary information

Fuel Type supplied and consumed

- Mandatory: Bunker Delivery Notes / Oil Record Book / Fuel Oil Sampling, kept on-board - *PSC survey and verification*
- Voluntarily but recognised as normal practice among the shipping industry: On-board monitoring fuel oil consumption - Main & Auxiliary Engines, Oil-fired Boilers and Incinerators

Note: Verifying fuel oil quality testing according to International Standards e.g. ISO 8217:2010 on Petroleum products - Fuels (class F) - Specifications of marine fuels

International Regulations & Guidance

- **Energy Efficiency Operational Indicators/Performance**

Cargo Carried

- Mandatory (SOLAS & MARPOL): Cargo/Load/Content Manifest, Cargo Record Book, kept on-board - *PSC survey and verification*
- Voluntarily: CDWT information obtained through Displacement vs Lightweight; draught measurements and stability documentation.

Distance travelled

- Mandatory (SOLAS): Navigation Log Book, Nautical Charts, ECDIS, Positioning Systems like AIS, LRIT, records on-board - *PSC survey and verification*

EMSA's Research/Studies

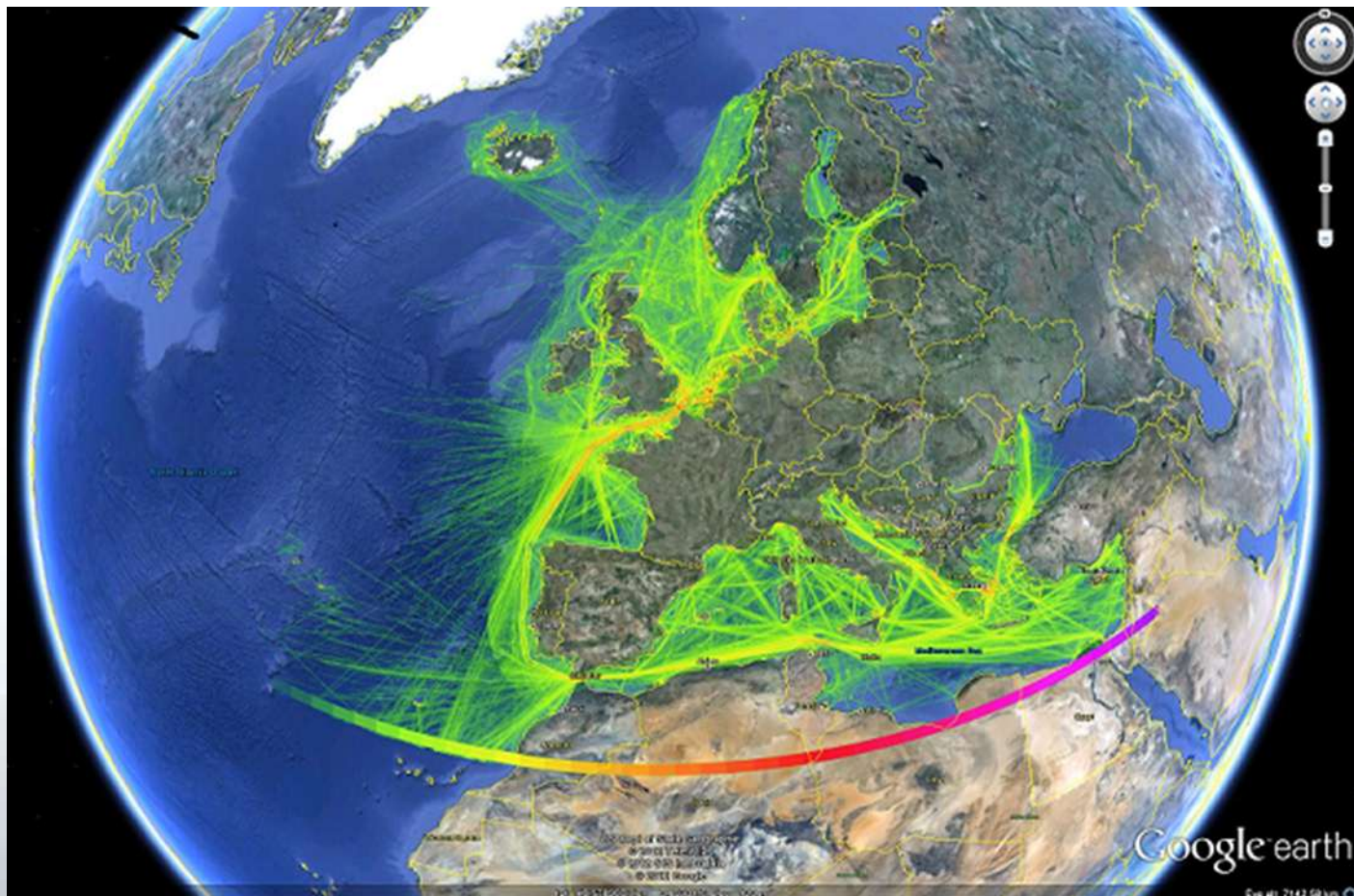


Illustration output of the whole SSN area CO2 emissions calculated by STEAM

Final Considerations

- MRV can work in many different ways, aiming to reduce the burden on both the port/flag state authorities and ships' crew
- The use of ships' commercial data bases together with a MR system (e.g. sort of simplified VDR) is possible; basic equipment could comprise: Ships' positioning system, fuel flow meters, propeller shaft torsion meter, speed log, RPM counter, trim and ballast, all gathered into a multi-channel data receiver/analyser computer-based tool. It shall also be type approved/certified for on-board use
- Data could be secured to preserve its confidentiality and access could be restricted Port/Flag State Authorities to verify compliance and monitor progress within regular time periods