TFEIP - Transport

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Shipping

- Waterborne traffic
  - National, international
  - Ocean/Inland
  - Recreational boating

- Vessel activity
  - AIS, LRIT, VMS, radar, departure/arrival times, ICOADS, AMVER…
  - Anything with timestamp, location & identity; know the strengths and weaknesses of each

- Tasks from European Sustainable Shipping Forum
  - Emission factors
  - Ship emission modeling
  - Primary/Secondary PM, especially BC
  - Impact of emission abatement

Requirements go beyond Tier 3 inventory preparation approach; Activity data affects EFs
What is ESSF

• Several subgroups
  - Air emissions from ships (Compliance monitoring, fuel switching, emission modeling)

• Round table, consists of
  - Commission: DG ENV, MOVE, CLIMA, EMSA
  - All EU member states
  - Research partners
  - Engine/Equipment manufacturers
  - NGOs
  - Shipping companies, stakeholder organisations
    - ECSA, ESPO, also national level

• Purpose: Provide a forum for exchange of information and discussion
  - May feed to IMO submissions
Emission factors

• Lot of the work still relies on emission factors from 1995 Lloyds Register campaign

• Fuel consumption modeling
  ➢ Equivalence between g/kWh and g/kg

• Load dependency of emission factors
  ➢ Not just weighted average of ISO 8178, but the values themselves
  ➢ Emphasize onboard measurement campaigns
  ➢ Continuous measurements

• HFO, MDO, MGO, LNG, biofuels
  ➢ Methane slip
    – Diesel
    – Otto

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<thead>
<tr>
<th>NOx</th>
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Emission abatement

• Repeat the same table, but include the impact of each emission abatement technique on various pollutants

• Most relevant ones: SCR, SOx scrubbers
  ➢ (DWI, HAM, DOC, WiFE, NTP…)

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• SCR temperature window; OK for 350°C, but significantly less for 270°C
  ➢ Low load operation may be a problem for SCR → Port areas

• Scrubber: Increase of fuel consumption (few %), SOx removal, impact on PM, especially on BC

• LNG
Products of incomplete combustion

- EC/OC; BC
- Black Carbon emissions from marine engines using various fuels
  - Connected to both engine operation and fuel, not necessarily to sulphur content of fuel
  - New common rail engines, electronically controlled ≠ older mechanically controlled engines
  - Scrubbing reduces BC, but only slightly
- VOC emissions much lower (1/6) with modern engines than the 1995 campaign suggests
  - VOC speciation important: volatile, non-volatile, semivolatile
    - Not available if ISO 8178 is required (THC from FID) → GC-MS?
  - Secondary PM formation needs this information, big problem for CTMs
    - Plan A: PM as non-volatile, speciation of VOCs → CTMs take care of relevant processes
    - Plan B: PM includes the condensed fraction → Emission models take care of the condensing fraction
- CO, a function of engine load, but also a function of load change
  - For old engines, transitional loads will produce peaks of CO