

***Outcome of the EFCA session on emissions from
shipping held at***

***12 th CROATIAN SCIENTIFIC and PROFESSIONAL CONFERENCE, Medulin
(Istria), 15-17 September 2021 and***

***presented for 7 th TFTEI Annual Meeting (virtual)
on 29 th of October 2021***

by

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Environmental Protection Associations

About CAPPAA, the Conference and the role of EFCA

- CAPPAA>the Croatian Air Protection Association=Member of EFCA
- Biannual conference devoted to the main challenging air pollution problems in Croatia, including monitoring and control (inspection) with international participation mainly from EFCA and IUPPA
- EFCA session at „Air Protection 2021” devoted to shipping/ships as an aggressive sector of UfP emissions
- Content of the session>sources of air emissions from shipping/ships and their control techniques, impact of shipping/ships on climate change and air pollution, spatial mitigation measures, importance of environmentally friendly harbour infrastructure and how to evaluate it and finally developing a policy for controlling ship emissions
- Conduct of the session>introductory presentation along the session by the President of EFCA interrupted, where appropriate in order to provide the details by the invited speakers.

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Shipping an aggressive sector of UfP emissions (1)

- More than 100.000 ships cruising the oceans and seas, of which 70 % are oil tankers and 13 % container ships;
- International ship transport which accounts for 80 % of global trade volume;
- The total marine fuel consumption (the dirtiest types) is estimated for more than 300 Mt and grows constantly;
- Almost 4 billion tons of goods are currently transported only throughout EU harbours;
- Annual global carbon dioxide (CO₂) emissions from fossil fuels and industry is now about 36 billion metric tons, of what international shipping accounts only for 3 %;
- But the fifteen biggest mega-ships emission alone is equal to that of 760 million cars;
- 25 % of the nitrogen oxide emissions (NO_x) and 9% of the sulphur oxides emissions (SO_x) come globally from shipping>the precursors of UfPs;
- PM annual emissions from ships is around 2 million metric tons.

Shipping an aggressive sector of UfP emissions (2)

- SO_x emissions from ships are already twice higher than that from all on-road vehicles when NO_x and PM ship emissions account for roughly half;
- But due to continued progress in reducing land-based emissions from stationary and mobile sources, the share of pollution caused by maritime vessels is expected to rise considerably in the coming future ;
- 85% of all ship pollution is in the northern hemisphere, the geographical area of UNECE and its Air Convention;
- According to IMO between 70-80 % of maritime emissions occur along heavily frequented trading routes connecting ports and are less than 400 km from the land;
- In general most ships spend only 20 % of the time at sea and far from land, while during 80 % of the time they are harboured (55 %) or close to the coast (25%);
- Thus local, regional and global impact of shipping/ships on air quality.

Presentations at the EFCA session

- Nadine Allemand, Gregoire Bongrand (France): ***Maritime shipping emissions, reduction techniques and their cost***
- Ana Alebic-Juretc (Croatia): ***Characterisation of maritime impact on air quality in the port cities of Rijeka and Venice***
- Zdenko Franic (Croatia): ***System of monitoring, reporting and verification of CO2 emissions in maritime transport***
- Matja Siroka and all: ***Port environmental index***
- Sari Repka and Maximilian Posch and all: ***Assessing the cost and environmental benefits of IMO regulations of ship-originated Sox and NOx emissions in the Baltic Sea***
- ***Panel discussion on policy development and during the session***
- ***Introductory report by the Chairman fragmented according to the topic and concluded accordingly.***

Some conclusions from the presentations (1)

- The ship emissions of SO₂, NO_x, VOC, PM₁₀, PM_{2.5} and BC (PAH) at global level is constantly rising, except in so called „Emission Control Areas“;
- 85% of all ship pollution is in the northern hemisphere, the geographical area of UNECE and its Air Convention;
- In general most ships spend only 20 % of the time at sea and far from land, while during 80 % of the time they are harboured (55 %) or close to the coast (25%);
- Its impact is primarily on port areas due to high operating temperatures and pressures when maneuvering (higher fuel consumption) and increase that coming directly from the port infrastructure as such;
- A part exhaust pollution, fugitive emissions from shipping is quite important related to loading and unloading activities of bulk liquid cargoes and include mainly emissions of VOC;
- Because the ship and port infrastructure emissions, remain so far poorly regulated, these sources are among the world's most polluting combustion sources per ton of fuel consumed.

Some conclusions from the presentations (2)

- On sea S deposition is the greatest along the shipping lines because SO₂ is highly water soluble, especially in alkaline sea water why on land, the largest contribution from shipping to the total S deposition is along the coasts, where some SO₂ has already been oxidized and the deposition consists also of secondary pollutants (sulphates);
- Most of the emitted NO₂ first undergo oxidation in the atmosphere before it is deposited, primarily as particulate nitrate, which are less soluble than sulphates in water or rain droplets causing the highest deposition of oxidised N along the coasts;
- SECA and NECA are very effective measures to lower ecosystem impacts from shipping and can be subject to monetary valuation, but effects on eutrophication will come around 2040 only;
- Monitoring, reporting and verification system (MRV) for CO₂ (ETS for ships in 2022), already in place can be extended on classic air pollutants;
- Port environmental index (air, water, waste and noise) is a useful tool to green its activities (electrification, LNG infrastructure and hydrogen)

Developing a policy for controlling ship emissions

- The ongoing revision of the Amended Gothenburg Protocol (AGP) under the Air Convention offers a perfect occasion to prepare an annex on control techniques for ship emissions (85 % of ship pollution in UNECE area);
- Draft TFTEI informal technical document as of November 2020 prepared by CITEPA can be seen as important step in the proces and pave the way to extend AGP on ships;
- Statement to manage UfPs with the revised WHO Air Quality Guidelines, may include ship-oriented measures but the related input is still needed;
- Shipping is a global business then IMO/MARPOL Convention and its Annex VI should be used as much as possible to establish SECA and NECA;
- But the initiatives to do so must come pimarily from the Governing Bodies of the regional sea conventions (the Helsinki Convention (HELCOM) for the Baltic Sea.DONE!) like the OSPAR Convention for the North Sea, the Barcelona Convention for the Medditeraenean Sea and the Danube Convention for the Black Sea.\;
- MRV system should be extended on classic pollutants emitted from ships.

Thank you for listening to EFCA

We welcome your questions and comments

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