

## Towards Zero Ship Emissions II – Project GreenShip

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### Abstract

The IMO's own International Shipping Facts and Figures report 2012 stated the number of propelled sea going vessels across the globe of at least 100 Gross Tonnage was 104,304, with cargo carrying vessels being 55,138 and expressed concern about the exponential increase of CO<sub>2</sub>, NO<sub>2</sub>, CH<sub>4</sub> and so forth in recent year. The EU responded by setting targets. The EU 2050 objectives set some intermediate targets for Eco-Efficient Vessel Emission Reduction for key pollutants: CO<sub>2</sub>: >80% (-30% by 2020), NO<sub>x</sub>: 100% (-80% by 2020), SO<sub>x</sub>: 100% (-80% by 2020) and Noise Reduction: -3dB. A review of current research (Ziarati et al, 2018) clearly shows that the targets set for 2020 by both IMO and EU have not be achieved and the 2050 goals are also unlikely to be achieved. A recent account of pollution in the Air is given in a school assignment (Ziarati, 2021)

The Industry is taking steps to reduce its air pollution and carbon footprint due to recent and upcoming IMO and EU regulations; IMO GHG study, Buhang et al (2009) reports that IMO has introduced some limits but unable to monitor ship emissions. EMSA has tried satellites and drones to monitor ships which pollute the sea but unable to accurately monitor ship emissions at sea.

As the regulations and technologies governing Energy Efficiency on board ships become more complex it is been recognised by the IMO and the Industry that seafarers need to be trained to a much higher level in these fields. There needs to be a position specifically for managing, checking and controlling a ship's emissions of gases harmful to the human health and the environment, an "Emissions Manager". As this is a brand new position there is no job specification, and no training specifications for this role.



The paper give full account of IMO efforts in recent year in setting legislation for key pollutants and reports on a new job specification for the Emissions Manager and the e-course being developed by several EU member states for the training the key ship officers and crew as how to minimise and monitor harmful emissions.

The programme is based on the current practice in managing emissions as well as making ships energy efficient. The new training programme targets current cadets as well as the up-skilling of the existing seafarers.

## References

- DNV Report (2014) available on <http://www.dnv.nl/binaries/shipping%202020%20-%20final%20report>
- IMO (2008) International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78, Annex VI amendment by Resolution MEPC. 176(58). London: 2008.
- IMO (2014) MEPC 67/INF.3 Marine Environment Protection Committee 67th session. Reduction of GHG emissions from ships third IMO GHG study 2014 – final report. Londres: Julio 2014.
- Kollamthodi, S., Brannigan, C., Harfoot, M., Skinner, I., Whall, C., Lavric, L., Noden, R., Lee, D., Buhaug, O., Maritnussen, K., Skejic, R., Valberg, I., Brembo, J., Eyring, V. and Faber, J. (2008) "Greenhouse gas emissions from shipping: trends, projections and abatement potential", final report to the Shadow Committee on Climate Change, AEA Energy Didcot, September 3.
- MARPOL 73/78 Revised Annex VI.
- NOx Technical Code 2008 IMO MEPC.230(65) - <http://www.imo.org/en/ourwork/environment/pollutionprevention/airpollution/pages/imo-train-the-trainer-course.aspx>
- Sahayam, N. B. V. (2014) "Strategic Analysis of IdealShip, Masters Internship Report", MBA International Business (2013-2014), Coventry University, 2014.
- Sustainable Shipping News (2012) "Engine room 'revolution' pays off at DFDS: DFDS encourages crew to help achieve bunker fuel savings", 17th August 2012, Petromedia Ltd, London.
- Ziarati, R., Akdemir, B (2015) LEANSHIP - Design and Development of a High Fidelity Integrated Ship Management System for Matching Engine Operations to Sea and Air Conditions, AVTECH 15, 3rd International Automotive and Vehicle Technologies conference Processing, DAKAM, Istanbul, Turkey, 23-24 November 2015.
- Ziarati, R. Kaptanoglu, S.(2015) Women and the Maritime Business, Sustainable Shipping Conference, Turku University, European Maritime Day, 2015.
- Ziarati, R., Yucel Akdemir, B. (2016) MariEMS – Maritime Energy and Management System, Marifuture, 2016.
- Ziarati, R., Ziarati, M., and Koivisto, H. (2013) Ideal Ship – Proposal to develop the next generation of ship command structures. International Association of Maritime Universities (IAMU 2013).
- Ziarati et al, (2018) Maritime Energy Management System (MariEMS) Online Delivery Platform, International Association of Maritime Universities (IAMU 2018), 2018.
- Ziarati et al (2020), Towards Zero Ship Emissions – Project GreenShip, IAMU Conference, 20-23 October 2020, Batumi, Georgia
- Ziarati et al (2020), Digital Twin of an Internal Combustion Engine, Maritime Transport '20, 8<sup>th</sup> International Conference on Maritime Transport, Barcelona, Spain, 2020
- Ziarati, R., Pollution in the Air – A Local and Global Concern, School Assignment 14+, C4FF publication, MariFuture Paper, 2021.