



Towards Zero Ship Emissions – Project GreenShip

The proposed abstract of a paper for presentation at IAMU Conference, 20-23 October 2020, Batumi, Georgia

Author 1^a Reza Ziarati (BSc (Eng), PhD (Eng), Cert Ed, CMechE, CElecE, CMarEng, CEng, FIMechE, FIET, FIMarEST)

Author 2^a German de Melo (PhD (Eng), MSc (Eng), MSB, CMarEng, MIMarEST, MASME)

Author 4^d Heikki Koivisto (MM, QT)

^aCentre for Factories of the Future, Warwick University Science Park, Barclay Venture Centre, Sir William Lyon Road. Coventry CV4 7EZ, United Kingdom,

^bFaculty of Nautical Studies of Barcelona, Polytechnic University of Catalunya, Pla de Palau, 18, Barcelona, 08003, Spain, tlf. +34627947688, demelo@fnb.upc.edu.

^cSatakunta University of Applied Sciences, Rauma, 26100, Finland,

Abstract

It is accepted by that 90% of world trade happens by sea; as a result it is not surprising that in 2007 the global shipping industry is estimated to have emitted 1,046 million tonnes of CO₂, 3.3 percent of global emissions, and in 2010 reached a total of 8.4 billion tonnes of goods loaded. 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. The EU 2050 objectives set some intermediate targets for Eco-Efficient Vessel Emission Reduction for key pollutants: CO₂: >80% (-30% by 2020), NO_x: 100% (-80% by 2020), SO_x: 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 will not be achieved and the 2050 goals are also unlikely to be achieved. The industry clearly needs help.

About 1000 million tonnes of CO₂ (and almost half as much NO_x) have been estimated to be emitted from the international shipping (Ziarati et al, 2018) and it is expected to grow by 200% to 300% by the end of 2050, in the absence of any meaningful regulations - IMO GHG study, Buhang et al (2009). IMO has introduced some limits but unable to monitor ship emissions. Discussions with industry (EU funded MariEMS¹ for instance) has indicated a lack of understanding as to how some reported emissions reduction measures can be implemented



by ship company managers and their crews. The Industry is taking steps to reduce its air pollution and carbon footprint due to recent and upcoming regulations; but 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. To this end, the existing crew members have to learn 'on the job' as to how to implement these related technologies and regulations as best they can. This is not an effective method of applying related technologies, often new, and the new regulations and this of course mean that the best results are not being achieved.

This paper reports on the work of a unique blend of industrial, academic and SME partners with valuable and necessary experience in ship emissions and energy efficiency, as well as national certification of learning materials including online courses to come together through an EU funded scheme (Erasmus+) to devise a job specification and training programme for the role of the 'emissions manager'. This role has been combined with the role of energy efficiency manager job that is prevalent in the shipping industry. The programme is based on the current practice as well as what is required in the managing new systems in managing emissions reduction 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

- Faber, J., Behrends, B. and Nelissen, D. (2011) "Analysis of marginal abatement cost curves", viewed 05 December 2011.
- 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.