INTERNATIONAL SHIPPING IN THE ARCTIC: THE KEY ROLE OF LNG

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An aspect of the Arctic that is attracting increased international attention is the potential for increased utilization of Arctic shipping lanes. Future estimates indicate that the reduction of Arctic ice cap will open up new areas and increase the viability of the region to be increasingly used for international shipping [5]. According to Sakhuja [6], the two most practical Arctic shipping routes are the Northern Sea Route and the Northwest Passage. Via the Arctic, large bulk carriers can significantly reduce the distance between Asia, Europe, and North America by navigating the Northern Sea Route or the Northwest Passage and the increased melting of Arctic sea ice poses the potential for an expanded navigation season along the routes [4].

Within this context, shipping companies are increasingly adopting the strategy of utilizing LNG as a fuel for maritime transport, instead of the current status quo strategy of using heavy fuel oil. The key benefits are considered to be the abatement of NO_x, SO_x, and PM as a result of adopting the use of LNG as a strategy instead of the continuing to utilize the more highly polluting heavy fuel oil for maritime transportation. Lessons from the transition from organic sources of energy to coal demonstrate the importance of sound environmental policy and regulation with effective enforcement and compliance mechanisms that are administered in a fair and just manner. International trade is a fundamental aspect of the transition towards LNG as a maritime propulsion fuel, particularly within the Arctic region, where the prospect of potential increases in trade and related development activity taking place within the region present the potential for significant impacts not only for the Arctic region but also well beyond.

The prospect of increased shipping activity along Arctic routes presents a collection of concerns and considerations that must be addressed. Ho [3] lists increased infrastructure investments and the establishment of expanded marine services focused on safety and environmental responsibility throughout the region, as steps that are necessary before the Arctic sea routes can be reliably used on a large scale. Liu and Kronbak [5] discuss various construction and equipment standards such as hull thickness and structural support requirements that are necessary for ships to be qualified as an ice class vessel. These issues must be taken into consideration among others factors by the maritime community and determine how quickly the utilization of Arctic sea routes increases in the future.

The discharge of air pollution resulting from international shipping has serious negative effects that are harmful to both health and the environment. As the impact of these detrimental effects become more clearly understood, efforts aimed at the abatement of these emissions have received increased attention, particularly in the form of recent regulatory actions. Until recent regulatory efforts began inciting the need for a viable alternative, most large vessels engaged in international shipping burned heavy fuel oil which is a residual by-product of the refining process [1].

The emissions generated from the use of heavy fuel oil by the shipping sector discharge into the air large volumes of SO_x and NO_x, which have been shown to be extremely harmful to

crops, forests and the ocean as a result of acidification, and also fine particulate matter which has been shown to be a cause of serious health issues such as lung disease and coronary illness [1]). Despite maritime transport having a favorable emissions performance, in comparison to that of land and air transport, ocean going shipping is still responsible for an estimated 15% of anthropogenic NO_X emissions and 5-8% of SO_x emissions globally [7]. The emission of these harmful substances by ships therefore has a serious impact on world health; with one study by Corbett et al. [2] estimating that emissions from shipping were contributed to 64,000 premature deaths worldwide in 2002 [1].

The development of the Arctic region itself presents, therefore, an opportunity to encourage an energy transition in shipping fuel. Its unique environment, both physical and political, can lead to environmental, economic and social imperatives which may drive the adoption of LNG. Future research should quantitatively investigate both the costs and benefits of such a transition.

References

1. Bloor, M., Sampson, H., Baker, S. & Dahlgren, K. 2014 *The instrumental use of technical doubts: Technological controversies, investment decisions and air pollution controls in the global shipping industry*. Science and Public Policy. vol. 41, no. 2, pp. 234-244.
2. Corbett, J.J., Winebrake, J.J., Green, E.H., Kasibhatla, P., Eyring, V. & Lauer, A. 2007. *Mortality from ship emissions: a global assessment*. Environmental science & technology. vol. 41, no. 24, pp. 8512-8518.
3. Guliev I., Litvinyuk I., Mekhdiev E. *The Newest Tendencies of the World Market Condensed Natural Gas: Preconditions Expansions of Export Potential Australia, Canada, Russia and the USA* // SOCAR Proceedings. 2016. № 2.
4. Ho, J. 2010. *The implications of Arctic sea ice decline on shipping*. Marine Policy, vol. 34, no. 3, pp. 713-715.
5. Hong, N. 2012. *The melting Arctic and its impact on China's maritime transport*. Research in Transportation Economics. vol. 35, no. 1, pp. 50-57.
6. Liu, M. & Kronbak, J. 2010. *The potential economic viability of using the Northern Sea Route (NSR) as an alternative route between Asia and Europe*. Journal of Transport Geography. vol. 18, no. 3, pp. 434-444.
7. Sakhuja, V. 2014. *The Polar Code and Arctic Navigation*. Strategic Analysis. vol. 38, no. 6, pp. 803-811.
8. Viana, M., Hammingh, P., Colette, A., Querol, X., Degraeuwe, B., Vlieger, I.d. & van Aardenne, J. 2014. *Impact of maritime transport emissions on coastal air quality in Europe*. Atmospheric Environment. vol. 90, pp. 96-105.