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Cooperative Approaches to Blue Economy: Regional Maritime Emission Control Areas (ECAs)

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Introduction

The 'Blue Economy' endorses sustainable development of the seas and oceans and attempts to balance social, environmental and economic goals while promoting exploration and utilization of oceanic resources. The concept has found widespread acceptance amongst coastal countries and island states and Prime Minister Modi has called for regional cooperation to support India's vision of the blue economy.

Shipping is a central pillar of the blue economy and growth in shipping is a prerequisite for enhanced maritime trade. The blue economy promotes shipping which is the cheapest and the most energy efficient mode for transportation of goods especially over long distances. Shipping also has the least CO_2 emission intensity (emissions per distance travelled) as compared to other modes of transport such as rail, road and air and a modal shift to coastal shipping has been suggested for reducing emissions from the transport sector. The shipping sector employs a large number of seafarers directly and the livelihood of many people is indirectly dependent on shipping which contributes to the social dimension of the blue economy.

Impact of Shipping on Air Pollution

Most ships use Heavy Fuel Oil (HFO) which is a residual fuel left after the distillation of crude oil. Use of HFO onboard ships results in emission of air pollutants like oxides of

sulphur (SOx) and oxides of nitrates (NOx), Particulate Matter (PM) and other greenhouse gases (GHG) such as methane, carbon monoxide (CO), carbon dioxide (CO_2) and non-methane volatile organic compounds (NMVOC).Emissions from combustion of HFO especially near the coastline and in ports contributes to local air pollution in coastal areas leading to reduced visibility, acid rain, damage to plants and have severe effects such as respiratory problems and eye irritation in humans contributing to premature deaths. Apart from emitting 796 million tons of CO_2 (yearly average in period 2007-2012) which contributed to 3.1% of global CO_2 emissions, the shipping sector also emitted 10 million tons of SOx[1] and 18 million tons of NOx emissions (equivalent to 13% and 15% of global SOx and NOx emissions respectively)[2]. The weak environmental performance of the shipping industry is detrimental to the goal of the blue economy and needs to be addressed.

ECAs and limits of sulfur in fuel used onboard ships

While growth of the shipping industry is essential for continued growth of the world economy, it is equally important to control air emissions from the sector. With this aim, the International Maritime Organisation (IMO) adopted certain agreements under the International Convention for the Prevention of Pollution from ships (MARPOL) Annex VI[3]. Under this Annex various regulations to lower CO_2 emissions by improving energy efficiency onboard ships and to lower NOx and SOx emissions were adopted.

In order to minimize airborne emissions, specific areas in the Baltic Sea and North Sea were designated as Emission Control Areas (ECAs) in 2005 where stringent control on use of sulfur in fuel was exercised. In 2010, these areas were expanded to the North American ECA, which included most of US and Canadian coast and to the US Caribbean. IMO regulations were also framed to lower the use of sulfur in fuel used onboard ships globally and different limits inside and outside the ECAs, which are have been enforced are shown in Table 1.

Table 1: Permissible limits of sulfur in fuel used onboard ships[4]

Outside ECA	Inside ECA
4.50% m/m prior to 1 January 2012	1.50% m/m prior to 1 July 2010
3.50% m/m on and after 1 January 2012	1.00% m/m on and after 1 July 2010
0.50% m/m on and after 1 January 2020®	0.10% m/m on and after 1 January 2015
®This date will be finalised in 2018 and could be deferred to 1 January 2025 Note: % m/m has to be multiplied by 10,000 to convert to ppm	

Prior to 01 Jan 2012, there were no regulations and ships used HFO with a sulfur content which could be higher than 4.5 per cent m/m (by weight). This is equivalent to 45,000 ppm (parts per million) as against a permitted level of 10 ppm in diesel (Euro V standard) for cars!! This was lowered to 3.5 per cent m/m after 01 Jan 2012 and is scheduled to be limited to 0.50% m/m after 1 January 2020®. More stringent limits are applicable inside the ECAs (shown in column 2 of Table 1), which has resulted in the lowering of local pollution in port cities located inside the ECAs in Europe and the US.

Declaration of ECAs in Chinese ports

ECA help in improving the air quality in port cities and coastal areas. While four areas limiting the use of sulfur have been designated by the IMO, other countries such as Japan, Australia and EU are considering adoption of ECAs. More recently, China has announced its plan to lower the content of sulfur in fuel being used onboard ships entering Chinese waters[5]. Three maritime ECAs have been declared by China.[6] The Yangtze River Delta, the Zhujiang (Pearl River) Delta, and an area in the Bohai Sea. 11 key ports of Shanghai, Ningbo-Zhoushan, Suzhou, Nantong, Shenzhen, Guangzhou, Zhuhai, Tianjin, Qinhuangdao, Tangshan and Huaye are included in the ECA along with inland navigable waters under the jurisdiction of 38 major Chinese cities. The proposed regulations which were promulgated in December 2015 would be applicable to all merchant ships navigating, anchored or underway in the promulgated area but naval ships, sport ships and fishing vessels are exempted.

In the first phase of the plan, which is applicable from 01 January to 31 Dec 2016, ships entering the ECAs may be required to limit the content of sulfur in the fuel to 0.5% m/m or below[7]. Under this provision the Shanghai, Jiangsu and Zhejiang maritime safety administration (MSA) falling under the Yangtze River Delta ECA have promulgated that commencing 01 April 2016, ships berthing alongside jetties in Shanghai, Ningbo-Zhoushan, Suzhou and Nantong ports have to use low sulfur fuels or face fines and penalties.[8] This initiative is planned to be extended in a phased manner to other ports and mandatory requirements are likely to be enforced for all ports in designated areas from 01 Jan 2017[9].

A Strong Case for Promoting Regional Maritime ECAs

China's declaration of maritime ECAs is a bold initiative for cleaning the air in port cities. Such measures to include the cost of environmental externalities into the cost of shipping operations have sent a clear forward looking signal to the shipping industry. With this move China, has also demonstrated that clean environment and economic growth can be pursued simultaneously. It has also set an example to other developing countries such as India, Malaysia and Indonesia to think about solutions which balances environmental protection, economic growth and social progress in accordance with the objectives of the Blue Economy.

It is important to note that Singapore and Hong Kong ports which compete for markets in the same region have also adopted a limit of 0.5% m/m of sulfur in fuel used onboard ships through issue of local port regulations. Strict enforcement of these regulations is anticipated which will result in cleaner ships visiting these ports. As the shipping market is cost conscious, it is anticipated that ships having poor environmental performance would be attracted to ports which are not covered under these regulations in Bangladesh, India, Myanmar, Sri Lanka, Indonesia and other countries in the region.

In order to curtail this development there is a strong case for regional cooperation for voluntary adoption of maritime ECAs in South Asia, South East Asia and other littoral countries in the Indian Ocean Region. The IORA, BIMSTEC, ASEAN and other multilateral

regional institutions provides a suitable platform for discussion on these issues and for sharing the best practices and country experiences from these initiatives.

Consequences and Impacts

Promulgation of the ECA regulations reflects the intent of the governments to clean the local air in large port cities. The Chinese initiative is well structured and advances the date of enforcement of the 0.5% m/m limit for sulphur content in fuels which would be applicable from 2020 globally. The cumulative environmental benefits accrued out of these measures for port cities have also been enhanced due to advancing the dates of implementation.

In order to comply with the regulations, ships may use equivalent measures to reduce SOx emissions such as use of scrubbers and use of alternate fuels such as marine gas oil (MGO), marine diesel oil (MDO) and liquefied natural gas (LNG). This may lead to growth of ancillary industry to provide these services in port cities and would attract inflow of new technology and investment along with additional jobs.

The regulations are likely to encourage ships to use electricity from the port (cold ironing). This would give a boost to electricity demand from ships berthed alongside jetties. This power can be supplied from large scale super-efficient power plants located outside cities or from renewable energy, thereby giving a boost to these industries and local economy apart from meeting the primary objective of lowering airborne emission from ships inside harbour.

While adopting low sulphur, fuels would lead to significant reduction in emissions of SOx in port cities, it will come at a cost. Alternate fuels such as MDO and MGO are approximately 40% more costly than HFO (spot price at Singapore) which will directly lead to increase in the cost of ship charter. However, this is a small price to pay for cleaning the air and it is anticipated that the health benefits will be much higher than the cost of implementation of these measures.

Challenges

The success of the ECA depends critically on three aspects: legal backing for the regulations, enforcement and monitoring capability and availability of specific fuel and appropriate technology for retro fitment onboard ships. In this regard, there are a few challenges which need to be overcome. As the governments, have promulgated these regulations in their areas of jurisdiction, both foreign vessels and vessels registered in the country have to follow the promulgated rules when in the declared zones. However, the implementation and enforcement of the regulation would entail a large administrative cost for monitoring ships. Further, while ships are mandated to maintain bunker delivery notes and preserving oil samples for one year under these regulations, checking these would involve a significant amount of time and effort from the maritime agencies.

The availability of requisite amount of fuel with low sulfur content is also an area of concern and refineries have to make significant investments to produce a higher quantity of low sulfur HFO. This is also a cause of concern for global refineries and the uncertainty over the growth in demand of low sulfur HFO may reduce once a decision is taken (in 2018) on the final date of implementation of the 0.50% m/m limit in non ECA areas. If the date of implementing of the global regulation is retained as 1 January 2020, it would lead to substantial investments and modifications by refineries to enhance the production of low sulfur HFO to meet the anticipated demand of the shipping industry, albeit at a higher cost. But availability of low sulfur HFO in the short term continues to remain a challenge.

Conclusion

Voluntary adoption of clean fuels used onboard ships is now showing an increasing trend. While global adoption of such regulations is difficult due to the different capabilities of countries, a regional approach may be an intermediate step towards a global adoption. It is therefore appropriate that a cooperative approach to lower sulfur content in fuels is supported by India under the Blue Economy agenda. The success of the scheme however, would critically depend on the strict enforcement of the ECA among all countries and the availability of requisite quality of fuel at low prices.

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Notes and References

[1] The high SOx emission are primarily due to the high sulphur content in HFO.

[2] Smith, T.W.P. et al., 2014. MEPC 67/INF.3, Third IMO GHG Study 2014-Final Report. Marine Environment Protection Committee. http://www.lowcarbonshipping.co.uk/files/ucl_admin/MEPC_67-INF_3_-_Third_IMO_GHG_Study_2014_-_Final_Report_Secretariat.pdf(accessed Sep 20, 2016)

[3]International Maritime Organisation, Prevention of Air Pollution from Ships. http://www.imo.org/en/OurWork/environment/pollutionprevention/airpollution/pages/air-pollution.aspx (accessed Sep 25, 2016)

[4]Dieselnet. "Emission standards: - International: IMO Marine Engine Regulations". https://www.dieselnet.com/standards/inter/imo.php (accessed Sep 27, 2016)

[5]GARD. "China's emission control areas". http://www.gard.no/web/updates/content/20923234/gard-alert-china-emission-control-areas-update (accessed Sep 27, 2016)

[6]The International Bunker Industry Association. "China announces new Emission Control Areas (ECAs)". http://ibia.net/china-announce-new-emission-control-areas-ecas/ (accessed Sep 27, 2016)

[7]Green4sea. "Sulphur content of fuel oil within Chinese ECAs".http://www.green4sea.com/sulphur-content-of-fuel-oil-within-chinese-ecas-overview/ (accessed Sep 27, 2016)

[8]Fines between 10,000-100,000 RMB may be levied if the vessel does not comply with these regulations.

[9]DNV-GL, "China introduces sulphur requirements for marine fuels", https://www.dnvgl.com/news/china-introduces-sulphur-requirements-for-marine-fuels-50359. (accessed Sep 27, 2016)