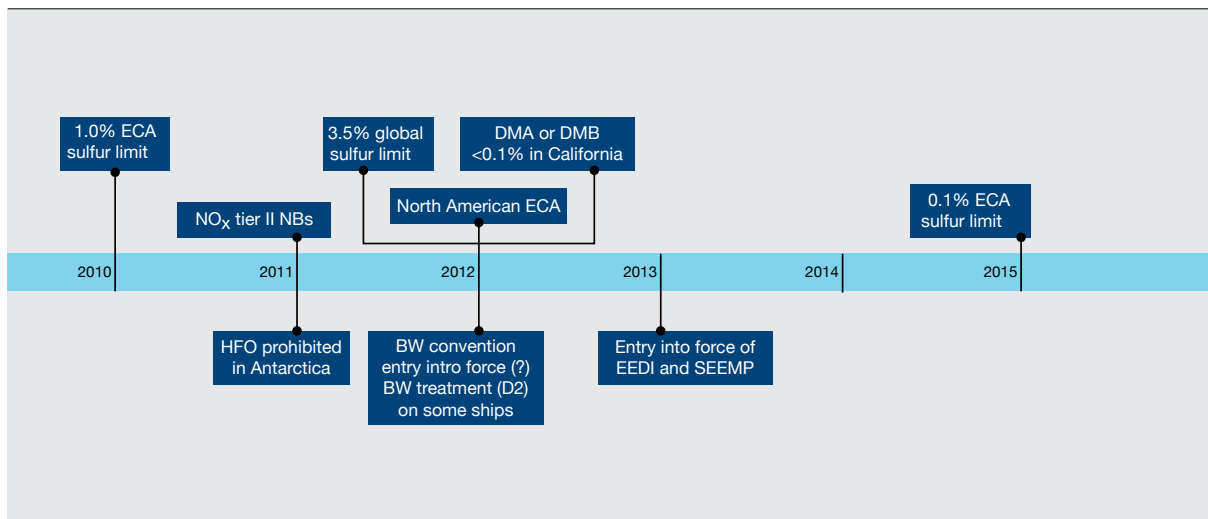




Environmental regulations towards 2020

EIRIK NYHUS – International shipping is a heavily regulated industry. Nevertheless, this decade there will be a plethora of additional regulations coming into force, with significant economic and operational implications. Managing the cumulative impact may be one of the decade's key challenges, and companies failing to make the right choices may see their long-term viability suffer.



Shipping today operates under a complex set of international and domestic regulations. Traditionally, the leaps in regulations have been driven by events and in some cases by circumstances outside the sector. Well-known examples are the *Titanic* disaster, which led ultimately to the International Convention for the Safety of Life at Sea (SOLAS), the Exxon Valdez oil spill, which resulted in Oil Pollution Act (OPA 90), and the 9/11 attacks, which resulted in the International Ship and Port Facility Security Code (ISPS Code). Environmental regulations, however, have lagged behind those of other industries. This situation is changing.

The increased focus on global and local environmental issues in general, combined with the growing realization of the actual pollution burden imposed by shipping, has led to an upsurge in both international and national regulations. Some are ready and will be entering into force in the near future, while others are still under development and will have an impact only in the intermediate term.

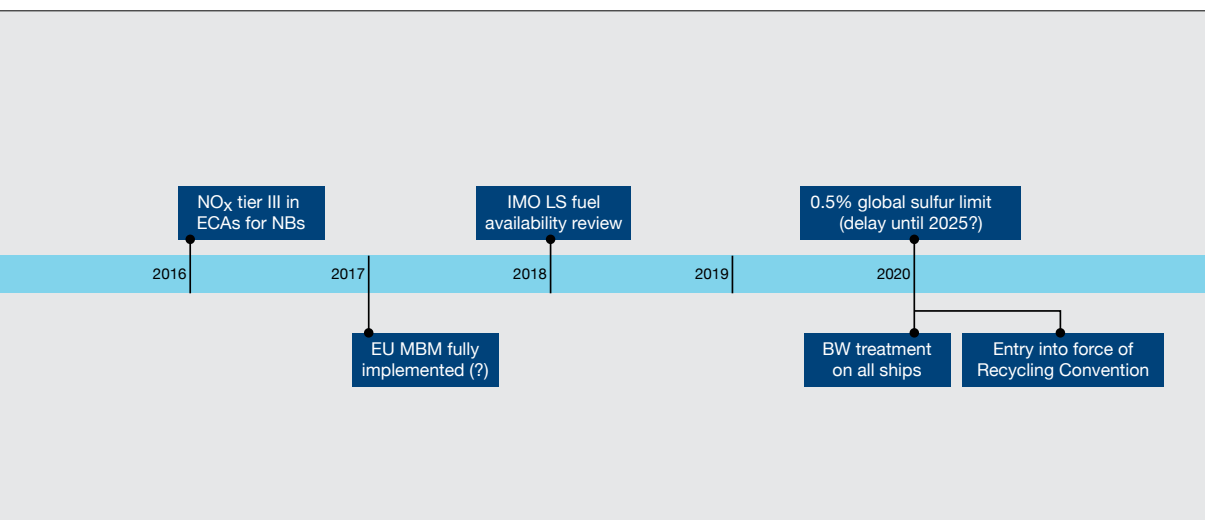
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Sulfur oxides, nitrous oxides and particles

SO_x, NO_x and PM are all emissions to air that result from the combustion of marine fuels. The local environmental effects of these are generally well-known and include acidification and eutrophication, both having potentially severe impact on the ecosystem and negative health effects on exposed populations.

The impact is generally well-understood and has in some parts of the world (eg, EU, United States) led to strict regulations of emissions from land-based sources. In recognition of shipping becoming a dominant emission source and potentially exceeding land based sources, emissions have been internationally regulated by the International Maritime Organization (IMO) through the International Convention for the Prevention of Pollution from Ships (MARPOL). This gives a combination of general maximum global emission levels and significantly more stringent levels applying to designated sea areas, generally known as Emission Control Areas (ECAs). The regulations allow for mitigating emissions through either changing fuel type or by exhaust gas cleaning. Key dates that represent crucial regulatory deadlines for shipping are:

- Jan. 1, 2015 – 0.10 percent S in ECAs
- Jan. 1, 2016 – NO_x Tier 3 in ECAs
- Jan. 1, 2020 or 2025 – 0.5 percent S global cap



Prior to 2015, operators will have to make the choice of either installing technically complicated and most likely expensive exhaust gas cleaning systems (scrubbers), or switching to low-sulfur fuel for all ships operating in an ECA. Realistically, low sulfur fuel options will be either expensive distillates or liquefied natural gas (LNG), the latter in practical terms being an option only for newbuildings. For newbuildings from 2016 onwards and operating in an ECA, the NO_x requirements add another layer of complexity due to possible technical integration issues between SO_x and NO_x solutions. Finally, in 2020 or 2025 (pending an IMO decision in 2018) the 0.5 percent S global cap will enter into force, changing the economics of the decisions made in the preceding years.

Making the right technology choice is an exceedingly complicated issue as it hinges on decision parameters with inherent huge uncertainties:

- Refinery distillate production volumes, availability and price locally and globally
- LNG fuel price versus heavy fuel oil and distillates
- Technology maturity, availability and price
- Shipyards' retrofit capacities
- General technology risks
- Likelihood of further ECAs
- Trading patterns, time in ECAs

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Complicating the decision-making process further is the fact that there are local and regional regulatory initiatives in addition to international IMO requirements. One key example is the EU where one possible outcome of the ongoing revision of legislation may be the implementation of ECA-style requirements in all EU waters. Needless to say, this can significantly affect operator considerations.

Uncertainties notwithstanding, the international regulatory deadlines are clear and the key strategic decisions need to be made. The only certainty is that all solutions are going to be costly and there is no “one size fits all” fix available.

Ballast water

There have been many cases of alien species being introduced into new environments, and ballast water is currently the dominant global transfer mechanism. Organisms carried in ballast water can establish themselves in new environments, causing dramatic shifts in food webs, outbreaks of disease and accelerated rates of species extinction. The cost of these invasions has been estimated at more than \$100 billion each year in the USA alone.

In response to this the IMO adopted the Ballast Water Management Convention, a set of regulations seeking to severely limit the number of organisms carried in ships’ ballast water. A key part of the convention is eventually making ballast water cleaning mandatory for all ships. The convention is unique in that it has

a fixed timeline and most ships in international trade must have ballast water cleaning systems installed by the end of 2019.

The convention is close to ratification and once ratified, a strong surge in system demand can be expected.

While there are numerous suppliers of approved systems in the market, all systems have had relatively limited operational experience and come with an inherent technology uncertainty. Furthermore, as system performance depends on water quality, trading pattern specifics may be a crucial determinant when deciding on type.

An important complication is the fact that US states under US law are, if they so desire, legally entitled to impose their own ballast water cleaning standards, above and beyond the IMO standards. Several states intend to do so. However, ongoing political processes and legislative work in the United States may result in unified US requirements aligned with IMO requirements.

With the relative technological novelty of the systems, the fact that the convention has not yet entered into force, regulatory uncertainty in the United States, and a price tag of systems easily running into several million dollars per ship, industry uptake has been slow. But the implication of the ratification threshold being reached in the near future is that several

thousand ships will need to have systems installed within a short time span. It remains an open question as to whether supplier, yard and engineering capacity will be sufficient to meet pent-up demand once the floodgates open.

Greenhouse gases

Greenhouse gases such as CO₂ are generally held to be the primary mechanism for anthropogenic warming of the atmosphere, with the international community working for more than 20 years to establish effective international regulations. Shipping, along with aviation, was not covered by the key pillar of these efforts, the Kyoto Protocol, primarily due to the complexity of allocating ownership of the CO₂ emissions.

With the resurgence in international concern about CO₂ emissions in the first decade of this century, the IMO committed itself to addressing ships' CO₂ emissions through a combination of technical, operational and market-based means. This commitment was further stimulated by the European Council's decision to develop regional CO₂ control mechanisms if effective international mechanisms were not in place by the end of 2011.

Painstaking negotiations at the IMO led to the adoption of the Energy Efficiency Design Index (EEDI) and the Ship Energy Efficiency Management Plan (SEEMP) in 2011, entering into force from January 2013.

The EEDI, in setting increasingly stringent requirements to the energy efficiency of new ships, is intended to stimulate development of more energy efficient ship designs, indirectly leading to reduced operational CO₂ emissions. The SEEMP is designed to directly stimulate more energy efficient operational practices.

The regulatory mechanism remaining on the table is Market Based Measures (MBM). Negotiations on MBM have encountered significantly less success than those on EEDI and SEEMP, and until fundamental political differences are resolved during international climate negotiations, there is limited likelihood of progress at the IMO.

In the absence of IMO progress, the EU will be proposing a regional mechanism for CO₂ reductions from shipping. While policy details remains unclear, three general principles will be embodied in any proposal:

- 1) an attempt at universal coverage of all vessels trading in Europe

- 2) the possibility of broadening the scope of a regional mechanism to make it truly international
- 3) the willingness to shelve EU plans if the IMO delivers. The likely implementation will be in 2017-2018 barring an IMO agreement.

Implications

Taking into consideration all these issues, it should be apparent that navigating the regulatory landscape to decide on the appropriate technical and operational solutions is not a trivial task.

Addressing SO_x, NO_x, ballast water and energy efficiency requirements more or less in the same time frame requires a careful balancing act where care must be taken so that the technology solution to one issue does not unduly constrain the choices for the others. A fine balancing act is required, in particular, when one factors in generally increasing fuel prices, high investment costs and potential lack of financing, and the likelihood of soft charter rates.

In the longer run, the ability to navigate these treacherous waters may be a key commercial differentiator where companies with the necessary analytic capabilities, the strategic vision and implementation resources are likely to outperform those trying to do business "the way it used to be done."