

**The Impact of the “European Union’s ‘Zero-waste, Zero-emission’ Maritime Transport Policy” (and its related Transport/Environment regulations-*Acquis*) on the development of Environment Friendly Maritime Transportation in the World**

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**Abstract:** With its 27 member states and 4 candidate countries, the European Union is the most ambitious political and economic integration movement, which also developed a binding supranational legal framework (Acquis Communautaire) in its geography. Particularly, the EU has generated an extensive legal framework for its member and candidate countries in the Environment and Transportation related areas.

For environmental friendly maritime transportation, the EU has been trying to reduce the greenhouse gas emissions from shipping, improve the environmental quality of its marine waters, manage ship-generated waste and ship dismantling, reduce sulphur oxides and nitrogen oxides emissions from ships, and promote more ecological shipping for quite a long time. The EU has gradually developed a detailed regulatory framework in these areas and it started to screen their implementation in the member and candidate countries. The environment friendly maritime transportation policies and the regulations of the EU are briefly summarized as “Zero-waste, Zero-emission Maritime Transport Policy for Europe”.

In this context, this paper will analyse this Zero-waste, Zero-emission policy of the European Union and the relevant legal framework (acquis), which can function as catalyst for the development of similar regimes at the global level (possibly, under the framework of International Maritime Organisation (IMO), or with the extension of the UN-FCCC’s Kyoto protocol, or similar international agreements/treaties). It will also focus on the current success level of the EU policy making with regards to green shipping and environmental protection in the maritime related industries.

**Keywords:** EU Environment Policy, EU Maritime Policy, Green Shipping, Environment Friendly Maritime Transportation, IMO Environment Regulations

## 1. INTRODUCTION

The mankind has been trying to keep a balance between industrial development and environmental protection for centuries. The gradual growth of the national economies and the interconnected global economy has greatly increased the pressures on the environment. Particularly, the pollution of the world’s atmosphere and its oceans has been a major concern for all during the last decades. Furthermore, the global warming has been quite alarming for the intellectual circles around the world due to the possible ending of the circumstances which permit most human beings (and living organisms) to remain on Earth.

As a result, local authorities, national level administrations, regional integration movements’ institutions and international organizations (as well as the non-governmental organizations) have started preparing (or lobbying for) binding legislations that monitor the firms (and all other polluting actors) functioning in their respective geographies. By means of such binding legislations and the monitoring of the activities of the industrial producers and the service sector companies (as well as similar polluting actors), the policy makers have been trying to find ways for protecting the natural resources of the earth and preventing environmental pollution at local, national, regional, and global levels.

In this context, the environment friendly transportation has also been on the agenda of the policy makers for quite a long time as the global economy (industry) and the individuals are served by this important service sector (by means of different transportation modes; rail, road, air and sea-waterways). Particularly, in today’s rapidly globalizing world economy, the importance of the maritime (waterways) transportation (and the environmental risks arising from this sector) has been increasing. Today, approximately 90% of the global transportation services are done by the seas with a huge fleet of ships, which are important polluting actors (due to their gas emissions to the atmosphere, waste disposal to the seas, enormous energy/hydrocarbon consumption, possible disastrous effects of ship construction-dismantling, oil discharge, ballast water discharge, etc.) and therefore, environment friendly maritime transportation (also, environmental friendly production of ‘services and goods’ in maritime related sectors) is very important for keeping our planet clean and safe.

In this context, the European Union (as the most developed political and economic integration movement) has also been developing a legislative framework for the EU seas for quite a long time. The binding nature of the relevant *acquis communautaire* has played a key role in the EU member states and candidate countries to implement environment friendly maritime transportation policies. Indeed, this legislative framework and particularly the policy agenda of the EU with regards to green shipping can also function as a catalyst for the development of similar binding rules and regulations at the global level. In that regard, in the following section, firstly, the history of the EU integration process and the binding nature of the EU law will be briefly summarized. Subsequently, the EU’s “Zero Waste and Zero Emission Maritime Transport Policy” and its potential impact on the global maritime community (with regards to development of binding legislation and monitoring methods at the global level) will be examined.

## 2. THE HISTORICAL BACKGROUND OF THE EU AND THE EU LAW

In the post Second World War period, the Western European states took the first steps for integration in the continent. In this context, the European decision makers concentrated on the energy sources (the most valuable one being coal during those days) and raw materials (iron and steel being at the top of the list). [1] European leaders, which came to conclusion that the political integration would only be realized through technical steps and prior economic integration, thought that the single market and the integrated European economy would be the catalyst for the solutions of political problems of Europe. [2]

This integration plan was announced by the Schumann Declaration on 9 May 1950, and the European Coal and Steel Community (ECSC), the first organization of the European integration was established in 1952. Germany, France, Italy, Belgium, Luxemburg and Netherlands were the first six signatories of the Treaty. The establishment of the European Economic Community (EEC) and European Atomic Energy Community (EAEC) by Treaties of Rome took the integration idea further and expanded it to other areas. Following the economic integration theories of the period, the free movement of the goods, services, capital and labor were seen as the main tools of establishment of single market in Europe and this was clearly expressed in the EEC Treaty. [3] The Single European Act (SEA), signed in 1986, finalized the steps of forming a single market by assigning a schedule, and finally, the single market has been established in 1993. Maastricht Treaty (Treaty of European Union (TEU), signed in 1992, had played a key role in transforming EEC into EU, and additionally has founded the three important pillars – European Communities (EC), Common Foreign and Security Policy (CFSP), Justice and Home Affairs (JHA) – on which the EU is built on. By Maastricht Treaty, an economic and monetary union (transition to Euro) policy has also been established. Amsterdam Treaty, signed in 1997, merged the existing legal texts and formed a legal framework for the union. Subsequently, Nice Treaty, came to force in 2003, replaced Amsterdam Treaty as the highest legal text of the EU. A probable constitution would play a key role for the EU integration to gain a legal identity. However, because of the lacking consensus on the matter (especially due to vetoes of the France and Netherlands), it was greatly simplified and has come to life with the Lisbon Treaty in 2007. This treaty has come to force in the end of the 2009 after several referendums and debates in member states.

During this historical integration process, one sees a transformation from intergovernmental nation states relationship to the multi-level governance (local, national, supra-national levels jointly producing common policies). Today, the political power of the EU organs has greatly increased and this situation can be seen when highly developed legal framework of the EU – *acquis communautaire* – is examined.

In addition to the sui-generis “deepening axis” towards political and economic integration, the European integration has also “widened” in time. The number of the EU members reached to 9 by the memberships of United Kingdom, Ireland and Denmark in 1973 and by the full membership of Greece, the total number of the integration movement reached to 10, starting the expansion to the south-eastern Europe. The number of the EU members reached to 12 by the memberships of Spain and Portugal in 1986, and it reached to 15 by the memberships of the Finland, Sweden and Austria in 1995. After the end of the Cold War and the collapse of the Berlin Wall, the probability of the expansion of the Union towards east including Central and East European countries, and also unification of West and East Germany became a hot issue. After the unification of West and East

Germany, by the fifth enlargement wave, Poland, Check Republic, Slovenia, Slovakia, Hungary, Estonia, Latvia, Latonia, Cyprus (de facto: South Cyprus) and Malta became the members of the EU in 2004 and the number of the members reached to 25. By the memberships of the Bulgaria and Romania in 2007, the number of the EU members has reached to 27. By the future membership of the current candidate countries; Turkey, Croatia, Macedonia, Iceland and Montenegro, the number of the EU members will reach to 32 and the remaining Balkan states will be the potential candidates of the future enlargement waves.

During the above summarized deepening and widening processes, the European Union has developed a continuously evolving sui-generis supranational legal framework. [4] Briefly, the EU Law (developed on the Law of Causality, different from the Case Law) is the summation of the pieces of Community legislation published within the in the Official Journal of European Communities, which today is composed of more than 100.000 pages (forming the binding supranational regulations for the member states). The EU regulations have also started to affect the maritime industry and the maritime transportation sectors in time. For example, the single cabotage regime for EU and its related regulations has greatly influenced the maritime transportation in Europe. Also, the EU has gradually developed an extensive environmental legislative framework (for the earth, the seas and the atmosphere) which is also of binding nature for the member states and the candidate countries. As a result, particularly the maritime transportation sector has been greatly affected by these steps taken by the EU institutions and the policy makers.

Indeed, these new supranational regulations prepared by Brussels are harmonious with the existing international-global regulations (for example International Maritime Organization (IMO) conventions), but they take them further for the EU member states (and candidate countries) and bring new standards and additional regional and binding rules for maritime transportation sector representatives, particularly with regards to environmental protection. (For example; prevention of marine pollution by means of EU legislation supplementing the IMO-MARPOL Convention, or, European Maritime Safety Agency (EMSA) inspecting the maritime training-education standards in the member states, in addition to STCW of IMO.)

In this context, one recent development (in 2009) has been the European Commission's call for an ambitious long-term "zero-waste, zero-emission" objective for the maritime transportation sector in Europe. With this call, the European Commission has reaffirmed its intention to table draft legislation to cut greenhouse gas emissions from ships. To achieve this long-term goal, the commission also proposed to strengthen EU legislation on ship waste disposal at port facilities and improve its implementation. The Commission also underlined the importance of a European environmental management system to monitor improvements in the maritime sector's environmental performance. According to the EU Commission, the next ten years represent a "unique opportunity" to strengthen the shipping sector's contribution to EU goals on sustainable transport. In particular, the Commission stressed that promoting short sea shipping will help reduce congestion in the road transport sector.

### 3. EUROPEAN UNION'S "ZERO-WASTE AND ZERO-EMISSION MARITIME TRANSPORT POLICY" UNTIL 2018

For Europe, shipping has been one of the key stepping stones to economic growth and prosperity throughout its history. Maritime transport services are essential in helping the European economy and European companies to compete globally. Moreover, shipping and all related maritime industries are an important source of revenues and jobs in Europe. Short-sea shipping carries 40% of intra-European freight. With more than 400 million sea passengers passing through European ports each year, maritime transport has also a direct impact on the quality of life of citizens, both as tourists and inhabitants of islands and peripheral regions.

In recent years, European maritime transport administrations and the European shipping industry have made significant efforts to improve the environmental record of maritime transport. The EU regulatory framework has been strengthened and cooperation with Member States has been increased to tackle issues including the prevention of accidents and incidents, atmospheric emissions, ballast water treatment and ship recycling. Lastly, in 2009, the European Commission has called for an ambitious long-term "zero-waste, zero-emission" objective for the maritime sector, which aims at increasing the competitiveness of the EU maritime sector and improve its environmental performance by 2018. The main priorities of the EU's proposed Zero-Waste and Zero-Emission Policy are:

- Ensuring steady progress towards a coherent and comprehensive approach to reduce greenhouse gas emissions (GHG) from international shipping, combining technical, operational and market-based measures.
- Actively working in the IMO to pursue the limitation or reduction of emissions of greenhouse gases from ships.
- Ensuring that Member States are able to achieve "good environmental status" in marine waters covered by their sovereignty or jurisdiction by 2020, as required by the new Marine Strategy Framework Directive.
- Strengthening EU legislation regarding port reception facilities for ship-generated waste and cargo residue, improving the implementation arrangements. In that regard, ensuring both the availability of adequate facilities and administrative procedures to meet the expected traffic growth.
- Ensuring the adoption of the IMO Convention on Ship Recycling and its future implementation.
- Overseeing the smooth implementation of the amendments adopted by the IMO in October 2008 to MARPOL Annex VI to reduce sulphur oxides and nitrogen oxides emissions from ships. This includes assessing which European sea areas qualify as Emission Control Areas, the availability of the adequate fuels and the impacts on short-sea shipping.
- Promoting alternative fuel solutions in ports, such as the use of shore-side electricity. (The Commission will propose a time-limited tax exemption for shore-side electricity in the forthcoming review of the Energy Taxation Directive as a first step and elaborate a comprehensive incentive and regulatory framework.)
- Re-launching the Commission's 'Quality Shipping Campaign', by means of partnership agreements with the EU maritime administrations, the maritime industries at large and the users of maritime transport services.

- Promoting a European Environmental Management System for Maritime Transport (EMS-MT), targeting the continuous improvement of the environmental performance of shipping; modulation of registration fees, port dues and other charges, with a view to rewarding efforts towards greener shipping. [5]

The EU’s proposed Zero-Waste and Zero-Emission policy is surely a major step in developing environmental friendly maritime transportation services in the European continent. It can be considered as a European Constitution (a binding major supranational guideline) for environment friendly maritime activities for the member states and the candidate countries. In the following years, the relevant lacking legislative documents-laws/regulations (as well as the technical infrastructure) will be prepared by the EU in line with this objective and the sectors’ activities in the European continent will be closely monitored. The EU’s Zero-Waste and Zero-Emission policy can also function as a catalyst for the development of global legislative frameworks. Particularly, it can function as a basis for the further development of IMO’s MARPOL’s Annex VI or the further strengthening of the United Nations Framework Convention on Climate Change and its related protocols.

In this context, the following pages will focus on the current environmental record of the world shipping fleet particularly with regards to gas emissions to the atmosphere, and will thus comment on the possible influence of the EU’s Zero-Waste and Zero-Emission policy on the change of this current picture.

#### **4. THE ENVIRONMENTAL RECORD OF THE WORLD SHIPPING FLEET WITH REGARDS TO THE EMISSIONS TO THE ATMOSPHERE AND THE EXISTING LEGAL FRAMEWORK AT REGIONAL AND GLOBAL LEVELS**

##### ***IMO-MARPOL CONVENTION ANNEX VI:***

Currently, the Marpol Annex VI is the only globally applicable and the most developed binding document for monitoring-controlling the shipping fleet in the world with regards to emissions to the atmosphere. As is well known, the International Maritime Organization (IMO) is a specialized United Nations agency responsible for improving maritime safety and preventing pollution from ships. And within the IMO system, the air pollution from ships is regulated by Annex VI of ‘MARPOL Convention’. The MARPOL Convention is the main binding international convention for prevention of pollution of the marine environment by ships. It is a combination of two treaties adopted in 1973 and 1978 respectively and also includes the Protocol of 1997 (namely, Annex VI). The Convention includes regulations and currently includes six technical Annexes. The SO<sub>x</sub> and NO<sub>x</sub> emissions (as well as PM Emission) from ships are limited according to the regulations in the Annex-VI. The convention also prohibits the deliberate release of ozone depleting substances. [6]

The NO<sub>x</sub> control requirements of Annex VI apply to marine diesel engines of over 130 kW output power, installed on a vessel constructed on or after 1/1/2000 and any engine that undergoes a major conversion on or after 1/1/2000, excluding engines used for emergency purposes.

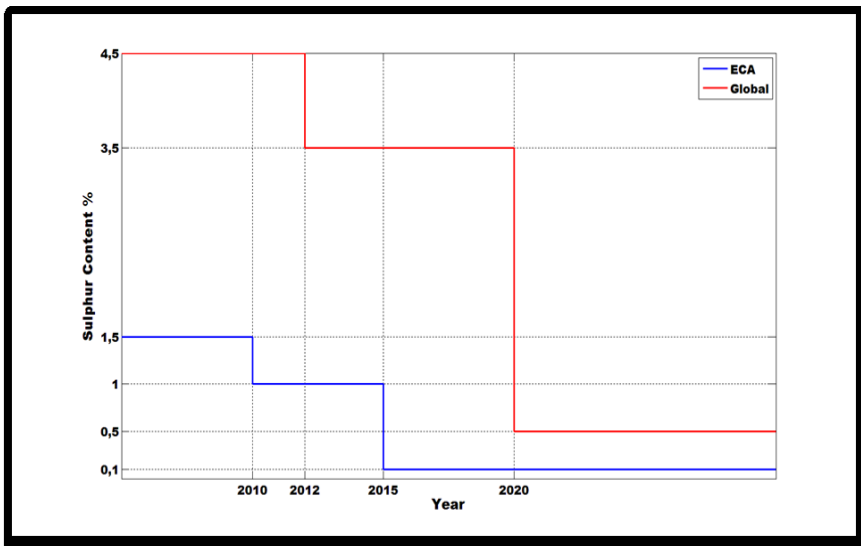
The limit values are determined from the engine's rated speed as indicated in Table 1. The emission value for a diesel engine is to be determined in accordance with the NOx Technical Code 2008 in the case of Tier II and Tier III limits.

**Table 1:** The NOx Limit Values [7]

Tiers	Ship construction date on and after	Emission Factors (g / kWh)		
		n = engine's rated speed (rpm)		
		n < 130	n < 130-1999	n ≥ 2000
I	1 January 2000	17.0	$45 \cdot n^{-0.2}$	9.8
II	1 January 2011	14.4	$44 \cdot n^{-0.23}$	7.7
III	1 January 2016	3.4	$9 \cdot n^{-0.2}$	2.0

MARPOL also defines certain sea areas as "*special areas*" according to their oceanographical and ecological condition as well as their sea traffic. These special areas require a higher level of protection when compared with other areas of the world seas. Annex VI Regulations for the Prevention of Air Pollution from Ships defines certain sulphur oxide (SOx) Emission Control Areas for tighter controls on sulphur emissions. [8]

SOx and PM emission controls apply to all fuel oil, combustion equipment and devices onboard and therefore include both main and all auxiliary engines together with items such boilers and inert gas generators. These controls are achieved by limiting the maximum sulphur content of the fuel oils as loaded, bunkered, and subsequently used onboard. The defined fuel sulphur limits over the years are shown in Figure 1. [9]



**Figure 1:** Fuel Sulphur Limits (Marpol Annex VI)

In terms of secondary control methods, guidelines (Marine Environment Protection Committee.184(59)) have been adopted for exhaust gas cleaning systems which operate by water washing the exhaust gas stream prior to discharge to the atmosphere, in using such arrangements there would be no constraint on the sulphur content of the fuel oils as bunkered other than that given the system’s certification. [10]

IMO also provides the criteria and procedures for the submission of proposals for the designation of Emission Control Areas. An Emission Control Area should be evaluated by IMO for adoption according to prevention, reduction and emission control needs.

“The proposal shall include:

- a clear delineation of the proposed area of application, along with a reference chart on which the area is marked;
- the type or types of emission(s) that is or are being proposed for control (i.e. Sox and particulate matter or NOx or all three types of emissions);
- a description of the human populations and environmental areas at risk from the impacts of ship emissions;
- an assessment that emissions from ships operating in the proposed area of application are contributing to ambient concentrations of air pollution or to adverse environmental impacts. Such assessment shall include a description of the impacts of the relevant emissions on human health and the environment, such as adverse impacts to terrestrial and aquatic ecosystems, areas of natural productivity, critical habitats, water quality, human health, and areas of cultural and scientific significance, if applicable. The sources of relevant data (e.g., relevant meteorological data) including methodologies used shall be identified;
- the nature of the ship traffic in the proposed Emission Control Area, including the patterns and density of such traffic;
- a description of the control measures taken by the proposing Party or Parties addressing land-based sources of SOx, NOx and particulate matter emissions affecting the human populations and environmental areas at risk that are in place and operating concurrent with the consideration of measures to be adopted in relation to provisions of regulations 13 and 14 of Annex VI;
- the relative costs of reducing emissions from ships when compared with land-based controls, and the economic impacts on shipping engaged in international trade
- an assessment of the amount of fuel that will be affected by the ECA (Emission Control Area). Where volumes affected would be significant, a fuel supply analysis and prognosis should be provided.”

“The geographical limits of an Emission Control Area will be based on the relevant criteria outlined above, including emissions and deposition from ships navigating in the proposed area, traffic patterns and density, and wind conditions.” [11]

### ***GLOBAL SHIPPING EMISSIONS:***

Shipping was responsible for the 1,046 million tons of CO<sub>2</sub> emissions in 2007 and this was equal to the 3.3% of the global emissions as of that year. Particularly, the international shipping (excluding transportation related emissions in inland waterways) produced 870 million tons of this emission, the same year, corresponding to the 2.7% of the global shipping related emissions of CO<sub>2</sub>. Again in 2007, the annual shipping emissions of NO<sub>x</sub>, SO<sub>2</sub> and PM are estimated as 25, 15 and 1.8 million tons respectively. According to the future emission scenarios, if environment friendly policies (green shipping methods) are



not implemented, the shipping emissions may increase by 150% to 250% as a consequence of the growth in shipping industry by 2050. [12]

Although, this scenario is already too alarming; the experts expect that other emissions such as NO<sub>x</sub>, SO<sub>x</sub>, HC, PM may decrease as the ships energy efficiency is continuously increasing. Furthermore, it is expected that with global implementation of the revised IMO-MARPOL Annex VI, we would see emission reductions in the long run. This reduction prospect is given in Table 2.

**Table 2:** Expected Reductions of Emissions (Due to Revised IMO-MARPOL Annex VI) [13]

	<b>Global</b>	<b>ECA</b>
<b>NO<sub>x</sub> (g / kW-h)</b>	15-20 %	80 %
<b>SO<sub>2</sub> (g / kW-h)</b>	80 %	96 %
<b>Pm (g / kW-h)</b>	73 %	83 %

-ECA: Emission Control Areas

For the year 2000, the total emissions of the five pollutants (NO<sub>x</sub>, SO<sub>2</sub>, CO<sub>2</sub>, HC and PM-in ports) from shipping movements (EMEP domain) are estimated as 3617, 2578, 157298, 134 and 21 kt. [14] A detailed database of shipping emission inventory for the Mediterranean Sea (for the year 2005) shows that, annual shipping emissions of NO<sub>x</sub>, SO<sub>2</sub>, CO<sub>2</sub> and PM (from all ships more than 500 grt are) 1,447 kt, 863 kt, 64,836 kt and 98 kt based on 50x50 grid cells. Also, these ships consumed 20,426 kt of fuel in that year. [15]

### ***THE CURRENT SITUATION IN (AND THE POLICIES OF) THE USA:***

The U.S. Environmental Protection Agency (EPA) is a member of the U.S. delegation to the IMO and its Marine Environment Protection Committee (MEPC). The U.S. Environmental Protection Agency's (EPA) emission control program for marine engines consists of several sets of standards, which vary based on the type of engine (gasoline or diesel powered) and engine size. These standards apply to new manufacture of engines after the effective date of entry into force of the standards. Code of Federal Regulations (CFR) for the current regulations applies to marine diesel engines.

Also, the United States and Canada submitted a proposal to IMO to designate the coast of both countries as ECA. IMO approved the proposal and this ECA is the third such geographical area following the Baltic Sea and North Sea. (California has its own state restrictions that will be operational until the North American ECA comes into force.)

The USA and Canada governments expect that the sulphur fuel restriction starting from 2015 will reduce SO<sub>x</sub> and PM emissions by more than 85%, as well as the NO<sub>x</sub> emissions controls on engines leading to an expected 80% reduction. (A recent study by the IMO estimated that fuel consumption within the ECAs accounted for 8% of global fuel consumption.)

Ships will have the alternative to fit an 'exhaust gas cleaning device', such as a scrubber, if equivalent reductions can be achieved. Additionally, the EPA has also proposed a ban on high-sulphur bunker fuel to be sold in the US for use in the ECA. If there is no exemption, the EPA's proposed law change would appear to prevent ships buying high-sulphur fuel oil in the US for use in the ECA despite having a scrubber fitted.

From the proposal to the IMO, the outer boundary of the proposed North American ECA is 200 nautical miles from the territorial sea baseline, except that it will not extend into the marine areas subject to the sovereignty, sovereign rights, or jurisdiction of any State other than the United States or Canada consistent with international law and that is without prejudice to any un-delimited maritime boundaries. The US and Canada proposal says that the two countries account for more than 20 percent of goods shipped via ocean going vessels. The US typically sees over 64,000 vessel calls at its ports annually, and Canada’s ports can see up to 29,000 vessel calls.

EPA revealed new fuel standards for marine fuels in the US from 2014. Beginning from June 1, 2014; to produce, import, sell, offer for sale, dispense, supply, offer for supply, store or transport any fuel with a sulphur content above 0.10% for use in an ECA or US internal waters is prohibited. Any distillate or fuel oil grade fuel not intended for use in the ECA must be clearly marked during its transportation and documentation available to identify that it is in non-conformity with the sulphur standard.

On July 1, 2009 the California Air Resources Board (ARB) revealed new rules that require ocean-going vessels operating within 24 nautical miles of California's coastline to use either MGO with a maximum of 1.5% sulphur, or marine diesel oil (MDO) with a maximum of 0.5% sulphur in their main engines, auxiliary engines and auxiliary boilers. The sulphur limit under the ARB regulation will reduce to 0.10% for both MDO and MGO beginning from January 1, 2012. [16]

The United States has also proposed the specific portions of the coastal waters around Puerto Rico and the U.S. Virgin Islands for the designation of an ECA. This action would control the emission of nitrogen oxides (NOx), sulfur oxides (SOx), and particulate matter (PM) from ships operating in the area. The ECA is expected to reduce emissions of NOx by 11,000 tons, PM2.5 by 3,300 tons, and SOx by 31,000 tons per year, which is 27 percent, 86 percent, and 96 percent, respectively, below levels in 2020 absent the ECA. The overall cost of the ECA is estimated at \$70 million. [17]

## **5. GENERAL CONCLUSIONS: THE EUROPEAN UNION’S ‘ZERO WASTE-ZERO EMISSION POLICY’ AND ITS POTENTIAL IMPACT ON THE DEVELOPMENT OF SIMILAR BINDING LEGISLATION IN THE WORLD**

For reducing the greenhouse gas (climate change) emissions from shipping and ship waste disposal, the IMO has gradually specified and put into practice several technical, operational and market-based measures. Therefore one can say that, at first sight, the EU’s proposed zero waste and zero emission policy is not such a novel approach to an already existing problem.

However, the EU’s supranational policy decisions are surely more binding for the member states and candidate countries when compared with the IMO regulations. A country that does not approve MARPOL Annex VI is not obliged to follow this agreement in its territorial waters (although its fleet will have to abide by it during their international trade activities); however, the EU member states and candidate countries are directly influenced by the binding nature of the EU law, and therefore, they will have to strictly implement the newly developing zero waste and zero emission policy in their maritime activities.

Without doubt, the most important outcome of this newly emerging policy will be the increasing environmental standards in the EU ports, and thus, the fleet of the non-EU countries which has lower environmental standards (as well as the new member states that are still struggling in aligning with -and implementing- the EU *acquis*; such as Bulgaria and Romania) will have difficulties in trading with these geographies and their ports.

Furthermore, in the coming years, the EU's zero-waste and zero emission policy (as well as newly developing, alternative, legislation and monitoring methods in the USA) may function as a catalyst for further development and strengthening of existing IMO regulations which are today controlling the environmental standards in international shipping (and maritime activities).

The EU's proposed zero waste and zero emission policy does not indeed bring new 'limit values', which exist in MARPOL Convention and the related legislative frameworks in the USA. Instead, it focuses on (and develops) more broad environmental rules (and guidelines), which are strongly binding for the actors in the shipping sectors. This also shows that the technical infrastructure for the implementation of this policy and the clear details of the implementation mechanisms (such as the NO<sub>x</sub> Technical Code in MARPOL Annex VI) are not yet finalized at the EU level. Yet, the EU may also have an intention to use (or lobby for the further revision of) some of the existing technical procedures, limits and methods of the IMO's relevant conventions in implementing this extensive policy. Indeed, today, as the EU and the USA are the most influential shipping actors in the world, the IMO's MARPOL Convention is also generally revised in line with the wishes of these two important actors. For example, the IMO has managed to pass the relevant legislation about the sulphur limits in marine fuels (both in and outside Emission Control Areas) only after the EU and USA declared that they will implement these in their territorial waters.

Today, the cost of shipping related emissions is much higher in the ports due to high population density in these areas. In this context, one important environment friendly method to decrease the emissions in the ports is 'cold ironing' (the process of providing shore-side electrical power to a ship at berth, while its main and auxiliary engines are turned off) and this method is for the first time included into a governmental policy (although it is suggested by several scientific studies in the past, and currently being tested in California) with the EU's 'zero-waste and zero emission' proposal.

Furthermore, the proposed coordinated improvement of the waste disposal facilities in the ports is also a novel approach when compared with other parts of the world; as the policy aims for this, for the first time in such a massive scale, in the ports of the 27 EU member and 5 EU candidate states.

In conclusion, one can clearly say that the EU's zero-waste and zero emission policy is a major step forward for green shipping in Europe. Furthermore, in the coming years, it will also function as a benchmark for the developed countries in the world and may force the international organizations such as the IMO to take similar measures at the global level. Hence, the EU's success in implementing this broad policy agenda until 2018 at the regional level is going to be crucial for repeating the similar steps at a larger scale, possibly under the UN (IMO, UNFCCC, etc.) framework.

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