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WORLD MARITIME UNIVERSITY
Malmö, Sweden

THE IMPLEMENTATION OF IMO REGULATIONS CONCERNING THE REDUCTION OF SULPHUR EMISSION IN DEVELOPING COUNTRIES

(Tunisia as case study)

By

ANIS FAYALA
Tunisia

A dissertation submitted to the World Maritime University in partial fulfilment of the requirements for the reward of the degree of

MASTER OF SCIENCE
in
MARITIME AFFAIRS

(MARITIME LAW AND POLICY)

2020

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Declaration

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

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Abstract

Title of Dissertation: The implementation of IMO regulations concerning the reduction of ship sulphur emissions in developing countries (Tunisia as a case study)

Degree: Master of Science

This research paper aims to study how to meet the IMO 2020 low-sulphur requirement for developing countries taking Tunisia as a case study. Many developing countries ratify international conventions but when it comes to the implementation phase there is a significant gap. Due to the imminence of the sulphur cap and its contribution to mitigate climate change, it is time for developing countries to go beyond the ratification phase and start incorporating these requirements in their domestic laws. For instance, Tunisia, one of the developing countries, has ratified MARPOL Annex VI but has not implemented it in its national legislation. This paper will produce a set of recommendations to support Tunisia to do so. For this purpose an overview of these requirements was elaborated, a comprehensive inventory of the existing Tunisian regulations and institutions relevant to the subject was made. Moreover, based on the analysis of collected primary and secondary data, challenges were set out. To finalize the research a SWOT analysis of this data was done followed by a TOWS analysis in order to come up with recommendations on how to implement successfully the sulphur cap requirement in Tunisia.

KEYWORDS: Sulphur cap, Implementation, Enforcement, Developing countries, Challenges, Policymaking, Tunisia.
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List of Abbreviations

ANPE National Agency for Environmental Protection (Agence Nationale de Protection de l'Environnement)

BAF Bunker Adjustment Factor

BDN Bunker Delivery Note

BDR Bunker Delivery Receipt

CPI Corruption Perceptions Index

ECA Emission Control Area

EEZ Exclusive Economic Zone

EMSA European Maritime Safety Agency

EPI Environmental Performance Index

GHG Greenhouse gases

HSFO High Sulphur Fuel Oil

HFO Heavy Fuel Oil

IAPP International Certificate of Air Pollution Prevention

ITF International Transport Workers’ Federation

IPCC Intergovernmental Panel on Climate Change

IMO International Maritime Organization

JCI Junior Chamber International

LNG Liquefied Natural Gas

LSS Low Sulfur Surcharge

LSFO Low Sulfur Fuel Oil

MEPC Marine Environment Protection Committee

MAP Mediterranean Action Plan

MARPOL The International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978

MGO Marine Gas oil

NAMA Nationally Appropriate Mitigation Actions

NGO Non-Government Organizations
OMMP The Office of the Merchant Marine and Ports
PSC Port State Control
PSCO Port State Control Officer
REMPEC Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea
ROCC Regional Oil Combating Centre
RNSQA Le Réseau National de Surveillance de la Qualité de l’Air (french)
SECA Sulphur Emission Area
SOx Sulphur Oxide
SWOT Strengths, Weaknesses, Opportunities, and Threats
UNCLOS United Nations Convention for the Law of the Sea
UNEP United Nations Environment Programme
1. Introduction

1.1 Background

Airborne toxins are a major threat to human life and are responsible for causing premature death, heart disease, and chronic respiratory illness. However, they also most commonly create harm to the ecosystem. Air pollutants include nitrogen oxide (NOx), carbon dioxide (CO2) and sulphur oxide (SOx). Sulphur oxides are composites of molecules of sulphur and oxygen. The predominant form located in the lower atmosphere is SO2, which can be converted via a chemical reaction to sulphuric acid (World Bank group, 1998). Studies show that sulphuric acid rain has been responsible for increasing acidity in inland waterways and lakes, contributing to a decline in plant growth and deforestation and the extinction of wildlife species and marine biodiversity (Birnie, Boyle, & Redgwell, 2009).

Regulations have tackled the emission levels of this air pollutant, focusing on land-based activities, as they are the most significant source of SOx. However, starting from the latter years of the 20th century, global awareness arose concerning another critical source of SOx, namely, vessels (Maritime and Coastguard Agency, 2014). Maritime transport is crucial for the global economy, offering the most cost-effective means of exchanging goods over long distances compared to rail and road. The sea conducts more than 80 percent of the volume of worldwide trade in goods, through over 90,000 merchant vessels cruising the world's oceans (UNCTAD, 2020). Furthermore, the importance of maritime transport was evident during the coronavirus pandemic and global lockdown. The benefit of vessels going around the world to sustain the supply chain of goods was obvious (Mukhisa, 2020).

However, the contribution that vessels provide to the global economy comes at a price: part of this price lies in the impacts induced by growing ship numbers and activity. Among such impacts is the harm that sulphur emitted from ships can cause to human life and the ecosystem.
The need to strike a balance between the pros and cons of shipping gave rise to specific regulations that aim at abating air pollution from ships. In its Resolution A.719 (17) on prevention of air pollution from ships adopted on 6 November 1991, the IMO Assembly asked the Marine Environment Protection Committee (MEPC) to prepare a new Annex to MARPOL to provide requirements to prevent air pollution from ships. In developing its own approach to air pollution, the IMO took into consideration existing international treaties. After several MEPC meetings, Annex VI of MARPOL was adopted in 1997 (Attard et al., 2016).

In its regulation 14, MARPOL Annex VI tackles SOx emissions by establishing requirements for the sulphur level in fuel oils used by vessels (IMO, 2008). Since 2008, revisions of Annex VI have led to a gradual decrease of allowed levels from 4.5 percent m/m to 3.5 percent m/m starting from 1 January 2012 and to 0.5 percent m/m from 1 January 2020 (IMO, 2008). However, State Parties can approve alternative approaches such as exhaust gas cleaning technology if they are successful in reducing sulphur emissions (Attard et al., 2016).

Regulation 14 of MARPOL Annex VI also provides the option of implementing stricter limits for particular zones established as SOx Emission Control Areas (SECAs) (IMO, 2008). The idea behind SECAs is that some geographical areas are more sensitive to atmospheric air pollution concentrations, and thus measures that are more rigorous should be introduced (Läähteenmäki et al., 2019). Further discussion on this subject matter will be provided in this research paper.

1.2 Problem statement

The rule on sulphur oxides in regulation 14 of MARPOL Annex VI extends to all vessels, whether on foreign journeys, between two or more States, or domestic trips (IMO, 2020a). However, the requirements of this regulation and the whole of Annex VI need commitment, adequate funds and technical capabilities of Member States Parties. It is noteworthy that State Parties are not at the same level of preparedness and motivation. The situation differs across States, depending inter alia whether the country is developed or developing.
Tunisia effected its accession to the MARPOL Convention on 2 October 1983 and to Annex VI on 19 May 2005 while the entry into force of this Annex was on 5 December 2011 (IMO, 2020e). Tunisia is a developing country (The Heritage Foundation, 2020); however, its strategic position in the Mediterranean basin gives it relevant importance in the shipping world and the marine environment. Even though Tunisia has a fleet of less than twenty merchant vessels (UNCTAD, 2019), it sees 200 ships per day, passing through its waters (ILO, 2017). This fact is sufficient to explain the importance that Tunisia implements Annex VI and the limitation of sulphur emissions from ships.

In order to achieve proper implementation, Tunisia faces many challenges on different levels and may need to follow certain steps to succeed.

1.3 Objectives

This dissertation aims to give a comprehensive approach on how to successfully implement the ship emissions sulphur cap requirements while setting out challenges to be overcome and suggested actions in the case of Tunisia. First, the dissertation will explore the international legal regime for implementing and enforcing MARPOL Annex VI, focusing on the IMO requirements. In the second part, the dissertation will review the Tunisian legal framework related to the marine environment. The dissertation will attempt to identify the main challenges facing implementation of Annex VI based on previous audit reports, investigations and interviews. Finally, this research paper will suggest some solutions to achieve the implementation of the IMO regulations.

In summary, the objectives of this research are to identify:

1. The competent authorities for implementing Annex VI of the MARPOL Convention in Tunisia.
2. The scope of responsibility for the implementation of IMO regulations and especially the sulphur reduction regulation.
3. The Tunisian national legal framework that can be linked to the topic of ship emission, more precisely sulphur reduction.
4. The interaction and its limits among different public institutions and concerned stakeholders with the sulphur cap.

The ultimate purpose is to explain and to put the spotlight on the imminent aspect of the sulphur reduction requirements and the readiness of the Tunisian government and its related institutions to comply with them. In case of large gap findings, the goal will be to participate with some thoughts and ideas to make the implementation more effective.

1.4 Research questions

To reach the proposed research objectives; this dissertation will deal with the following questions:

1. What are the steps suggested by IMO to implement MARPOL Annex VI successfully?
2. How does Tunisia go about the ratification and implementation of IMO instruments?
3. Which Tunisian institutions are responsible for applying and enforcing the regulations of MARPOL and its Annex VI?
4. What are the challenges faced by Tunisia in implementing the sulphur cap?
5. What are the possible ways to overcome these challenges?

1.5 Research methodology

This research study uses the legal-normative approach while reviewing the primary resources of law through all relevant legal instruments. These instruments range from international and regional conventions related to the subject of this dissertation through to national Tunisian texts and codes.

Furthermore, this research is based on an analysis of primary and secondary data collection. The primary data collection will be qualitative and will consist of mainly semi-structured interviews with a list of specific issues on flexible questions. The secondary data will be qualitative and extracted by scrutinizing audit reports made to
the Tunisian maritime administration, interviews, videos, official websites, books and related articles.

The critical analysis and findings will lead to defining gaps, challenges, and suggested best practices toward implementing the sulphur limitation in Tunisia successfully. Interviews were arranged with main stakeholders such as Tunisian maritime and port authorities, sea captains, chief engineers, harbor pilots and parliamentarians. These interviews were done through social media tools due to the unforeseen situation caused by Covid-19.

Procedures of the WMU Research Ethics Committee were abided by, and permission was received before data collection.

1.6 Scope and limitations
This dissertation addresses policy-making processes and the implementation at the national level of an adopted international instrument, namely, MARPOL Annex VI that includes the IMO 2020 sulphur cap. The dissertation will not address in detail the application of the IMO 2020 sulphur reduction from the shipowner's perspective or the effect of this regulation on the freight market or any commercial aspect resulting from its implementation.

The potential limits would be the challenge of obtaining relevant information on the readiness of some Tunisian governmental agencies to meet the IMO 2020 sulphur cap requirements and the inability to do on-site research due to the global pandemic.

1.7 Dissertation structure
This dissertation is organized as follows. Chapter two provides an overview of the international legal regime for implementing and enforcing MARPOL Annex VI along with best practices. Chapter three explains the general steps to follow towards implementing the IMO 2020 sulphur cap. The related Tunisian legal regime, including relevant existing legislation and institutions, is described in chapter four. Chapter five covers challenges that can impede implementation. Finally, Chapter Six concludes the work, makes suggestions to decision-makers for implementing Annex VI in Tunisia and describes areas for consideration for the future.
2. International legal regime for enforcing MARPOL Annex VI

IMO regulations are enforced and applied internationally to ships through the complementarity of compliance by the flag State and Port State power. IMO establishes guidelines designed to help State parties on various aspects of implementation (ICS, 2014). However, the Coastal State’s authority varies across the different maritime zones established by UNCLOS and customary international law starting from the shoreline and up to the high seas (Attard et al., 2016).

2.1 Flag State control

Following section 15.1 of the Code for the Implementation of Mandatory IMO instruments, 2011: To carry out their duties and obligations effectively, flag States should enact policies to assist in the implementation of and compliance with the requirements of all treaties and protocols concerning environmental protection and pollution avoidance to which they are party (IMO, 2011).

Annex VI is one of these instruments, it demands that flag State officials perform surveys of their vessels and deliver to them an International Certificate of Air Pollution Prevention (IAPP Certificate) (IMO, 2009). This certification refers to vessels over and above 400 gross tonnage. For ships of less than 400 gross tonnage, the Member States select which procedures to be set in place to guarantee that they comply with Annex VI (IMO, 2008). Designated auditors or flag State recognized organizations, also called Classification Societies, could also perform the surveys. According to regulation 5.3.1 of Annex VI, such organizations must follow IMO's guidelines (IMO, 2008). Ordinarily, governments grant authority to the Classification Societies to assess their vessels.

The "2009 guidelines for Port State Control under the revised MARPOL Annex VI" in its section 2.3 stipulate that the IAPP Certificate should guarantee that the ship uses fuel oil containing a sulphur level that does not surpass the relevant maximum value, as Stated by the delivery notes of the bunker (IMO, 2009). Otherwise, the ship has to demonstrate it is utilizing an authorized alternative. Furthermore, from 1 March 2020,
the IAPP Certificate must also include a paragraph that states the sulphur value of the transported fuel to be used on-board the ship does not outstrip 0.5% (IMO, 2009). The IAPP certificate shall be granted for no more than five years and yearly audits shall be carried out to verify conformity (IMO, 2009). That implies that the supervision demanded under MARPOL Annex VI by flag States is far from enough to maintain accordance with the sulphur requirement. There must be monitoring of air pollution where the ships are functioning. That is why the compliance needed for the sulphur is dependent on the control of Coastal States.

2.2 Coastal State control

Under the United Nations Convention for the Law of the Sea (UNCLOS), there are jurisdictional restrictions on controlling vessels that pass territorial waters. Article 220 of this convention provides regulations on enforcement by Coastal States (UN, 1982). The article distinguishes between ships inside the Exclusive Economic Zone (EEZ) and within territorial sea. Regarding Enforcement authority, it is the same over ships entering inland waters and in port. If the vessel is in the EEZ, Article 220(3) provides that, where there are substantial grounds for believing that a violation has occurred, the State may request that the ship commit the offense to furnish specific details. Probably these details will decide whether a breach has occurred. Article 220(5) stipulates that a Coastal State can conduct direct inspections, but only if it has indeed identified that an infringement has happened and that it has ended in a significant spill that causes or threatens considerable marine pollution (UN, 1982).

In the territorial sea, the same Article 220(2) allows for the privilege of the Coastal State to conduct a vessel's physical inspection in condition there are «strong reasons to believe" that the vessel has "infringed rules and regulations" like those in MARPOL Annex VI during its passage into the territorial sea. However, this privilege would be without detriment to the applicable provisions under Part II, Section 3 of UNCLOS, known as the right of innocent passage.

To overcome the right of innocent passage granted by UNCLOS, Coastal States can also take additional measures to control vessels without interfering with their journey.
Among these measures, which have already been tested are "sulphur sniffer" attached to planes, drones that can fly over ships during their transit. The sulphur sniffer can detect if the ship's exhaust has the correct sulphur content. Besides, navy and coast guard vessels patrolling coastal areas and the territorial sea may develop visual inspections first and more direct checks if necessary if there are good reasons to do so. If a Coastal State notices a ship in breach of the sulphur requirement set out in Annex VI, the Port State will have full compliance authority if the ship reaches port when the infringement occurs within or probably outside territorial waters, because Article 218 of UNCLOS applies. For vessels that transit territorial waters or EEZ, the right to innocent passage (Article 18 of UNCLOS) will override the right of coastal authority to physically investigate ships and will restrict the ability for the Coastal State to implement Annex VI. Furthermore, ships that breach the sulphur provision on their route off from territorial waters will be hard to "stop" in reality in the high sea. To face this fact, the need to cooperate and exchange information between countries is essential, which explains the Port State Control Memorandum of Understanding.

2.3 Port State control

2.3.1 Inspection of ships

Port State Control serves to help flag State supervision and back it up. Regulations 10 and 11 of Annex VI include clauses for inspecting foreign ships (IMO, 2008), to which Annex VI applies, entering their terminals. Regulation 10 also refers to Port State control measures specified in Article 5 of MARPOL. Moreover, as set out in paragraph 4 of Article 5, the Parties should assure that "no more preferential treatment is granted" to non-convention Parties. It implies that all vessels reaching the Port of an Annex VI States must conform to the requirements and be ready for inspection.

Port State control is achieved mainly by a necessary preliminary inspection of the vessel by the party's designated or approved officers (IMO, 2008). The examination "shall be limited to checking that a valid certificate is on board the ship." (MARPOL Art. 5(2)). Any certificate issued by a party to Annex VI must be recognized as long as it complies with the Convention criteria (MARPOL Art.5(1)).
A closer review of whether the ship complies with operating specifications can only be carried out if there are "strong reasons" to assume differently (Annex VI Reg. 10(1) and Resolution MEPC.181 (59) 2.1.6 and 2.1.7). This inspection would probably be achieved by sampling the fuel used on-board, then testing whether the scrubber systems, if there is any, operate correctly. Besides, starting from March 2020, The Port State Control Officer (PSCO) should verify the compliance of the ship with the "Carriage Ban." This ban consists of prohibiting the transportation of non-compliant fuel oil for burning Reasons for propulsion or service on board a ship - unless the vessel is fitted with a scrubber (IMO, 2020b).

However, in compliance with the Port State Control Rules, the documents must first show a violation either by lacking one of them or being "definitely erroneous" (IMO, 2009). Other proof may also satisfy the criteria of "strong reasons" such as Statements or facts that the vessel tends to be inadequate. Foreseeably, such details may originate from one of the crew, coast guards or other similar sources.

If there is no reason to elaborate such rigorous inspection, a basic inspection of the IAPP can be sufficient but not enough to be sure the vessel did not go beyond the sulphur cap after surveying by the flag State (IMO, 2009). Moreover, Regulation 11 does not specify how the inspector can check if the ship has released any of the compounds specified by this Annex and violet it. That is why the MEPC recommendations on Port State Control stipulate that, as a phase of the initial inspection, the Bunker delivery Note and the specimen relating to it be also tested (IMO, 2009).

2.3.2 Bunker Delivery Note

Bunker Delivery Note (BDN) is an essential element in monitoring sulphur requirement conformity. The inspected ships (400 gross tonnage or over) must present the fuel provider's BDN verifying the fuel bunkered (Annex VI Regulation 18.5). The BDN must be archived on-board three years beyond the delivery of the fuel (Annex VI Regulation 18.6).

If the fuel is found not to conform to the bunker delivery note, the Port State must notify the country from which the BDN was supplied to take the corrective actions
(Annex VI Regulation 18.10.2). Besides, data about non-compliant fuel incidents will be circulated with the IMO and other stakeholders. Ships would be hesitant to purchase fuel from a distributor that supplied non-compliant fuel beforehand. From the viewpoint of a supplier, the BDN serves as an essential invitation to provide fuel consistent with Annex VI.

With everything that has already been developed as a means of control, the vessel may not meet the sulphur requirements even if the BDN and accompanying sample shows compliance. In addition to the recent carriage ban discussed in the previous paragraph, there is another tool to get a full inspection: the log-book.

2.3.3 Log-books

When operating inside and outside Sulphur Emission Control Areas (SECA), ships utilizing different fuel oils must ensure that they switched to authorized fuel before entering or after leaving. The logbook must display the amount of low sulphur fuel oils inside each tanker, the time, date and location of the vessel when the switch was made before entering the tank (Annex VI Regulation 14(6)). If no such protocols are in effect or the logbooks do not make sense, there would be "strong grounds" for further inquiry into whether the ship meets operating requirements.

Failure to do so can lead to the arrest of the crew, captain and large fines for the ship-owner. This what happened in the case of cruising company "Carnival" with their vessels sailing across the USA designated Emission Control Areas (ECA) with fraudulent logs and other environmental breaches (Kalosh, 2019).

Thus, it is essential to explain the meaning of the ECA and the SECA, which will be done further.

2.4 Sulphur Emission Control Area (SECA)

The creation of the Emission Control Area (ECA) is based on the principle of section 5 (article 212) and part XII of UNCLOS. MARPOL describes such maritime zones as particular areas where, for conceptual interest relating to their geological and environmental conditions and navigational flow, it is appropriate to follow special
compulsory measures to prevent marine pollution. Almost all MARPOL annexes, except Annex III, set up such areas concerning their relative topics (IMO, 2020c). The ECAs established under Regulation 14 of Annex VI are known as “sulphur emission control areas” (SECA). As long as the vessels are operating in a SECA, the sulphur content of the fuel oil used on the vessels must not exceed 0.1% m/m.

Figure 1. The timeline of the sulphur limitation in marine fuel oil by area

As figure 1. shows, the sulphur limit in the SECA is 0.1% mass by mass since 2015, while it has become 0.5% globally since January 2020 (IMO, 2016). The SECAs defined under the MARPOL Annex VI with exact coordinates are situated in the North Sea area, the North American area (some U.S coastal zones and Canada), the Caribbean Sea region (Puerto Rico and U.S Virgin Islands) and the Baltic Sea zone (IMO, 2020d).

Furthermore, the difference between a worldwide ceiling and limits within ECAs also refers to the restrictions in NOx emissions specified under Regulation 13. ECAs are built along some coastlines because of the adverse effects NOx has, and SOx has communities near to the sources of pollution. Unlike NOx emissions that can be
minimized by engine technology, SOx emissions depend solely on the fuel's nature and its sulphur content, unless the vessel is fitted with an alternative solution.

2.5 Most common technical solution to meet the sulphur emission limits

In order to meet the requirements of the sulphur cap regulations, there are three leading technical solutions to be followed by ship-owners and flag States, which are the switch to the low-sulphur fuels (LSFO), the installation of scrubbers and the use of liquefied natural gas.

2.5.1 Low-sulphur fuel

The great majority of bunker fuel consumed in the maritime domain is heavy fuel oil (HFO), which has a higher sulphur value than Annex VI requires and is permitted in ECAs. Therefore, to fulfill compliance with these criteria, technological options include using fuels with lower sulphur content. However, the availability of this low sulphur fuel worldwide is contested. Annex VI in Rule 18 addresses this availability issue by compelling States parties to consider all appropriate steps to encourage fuel oil supply. Nevertheless, availability depends on the market, based on the supply-demand relation. States are also expected to inform the IMO about the availability of compliant fuel in their terminals.

2.5.2 Scrubbers

Scrubbers are used as a cleaning mechanism for eliminating sulphur from the exhaust, allowing vessels to use heavy fuel oil (Stripple & Zhang, 2019). Thus, scrubbers are also defined as exhaust gas cleaning devices for ships. Essentially, there are two main types: wet scrubbers with water-absorbing sulphur oxides or dry scrubbers where chemical interactions with a solid material diminish sulphur. Regarding the wet scrubbers, there are three types: the open loop, the closed-loop and the hybrid scrubbers (mixing the two previous features).

The open loop relies on natural alkaline marine water properties, which are determinant to neutralize acid exhaust gases. Once the seawater dissolves the SOx molecules, the water is then released back to sea after the collection and the storage of the related sludge from cleaning (Stripple & Zhang, 2019).
The closed-loop requires that caustic soda be added to react and ingest the release of sulphur gases. This kind of scrubbing is allowed in marine areas where the normal alkalinity of seawater is not adequate to deal with sulphuric compounds by itself (Stripple & Zhang, 2019).

Whatever is open-loop or closed-loop scrubber, the subsequent sludge needs to be preserved on board before being transported to a shore collection station as it is recommended in section 10.4.1 of the “2015 Guidelines for Exhaust Gas Cleaning” (IMO, 2015).

Hybrid scrubbers consolidate the two techniques and allow shifting between seawater and freshwater based on the water’s alkaline properties. Once the ship works in the open sea, dual scrubbers will be employed with an open-loop process, and as a closed-loop mechanism while sailing in SECA.

2.5.3 Liquefied Natural Gas

Liquefied natural gas (LNG) is commonly seen as a potential maritime fuel source in the near and coming future. While the cost of LNG is lower than that of Marine gas oil (MGO) and heavy fuel oil, the expense of supplying LNG to terminals and vessels is very significant (OECD & ITF, 2016). Furthermore, the LNG tanks, necessary to avoid evaporation of the compressed gas, require a large space that is more beneficial for carrying goods.

Another alternative with similar molecule structure and characteristics as natural gas is Methanol. It can be used for vessels after retrofitting them. The positive side of Methanol is that despite the similar outcome on reducing emission, it does not have side effects like the LNG. In comparison with the heavy fuel oil, it can reduce SOx emission by 99%, NOx by 60% and PM by 95% (OECD & ITF, 2016).

There is no mainstream alternative. These choices come with benefits, drawbacks and restrictions. Therefore, making an optimal decision should consider many variable facts, such as the bunkering price and static factors such as the financial resources of the ship-owners and the economic balances of the State.
To conclude, each of those options and others should be chosen following the specificity of the fleet, the shipping routes they serve and the cost benefits for ship-owners.

3. IMO requirements for implementing the sulphur cap 2020

If a new or revised compulsory IMO instrument comes into effect for a Member State, that State should implement and enforce its regulations via adequate domestic law and provide the required infrastructure for implementation and enforcement. To achieve this, the State Government should have:

- Capacity to pass laws allowing sufficient authority and control concerning administrative, technological and social matters concerning ships flying their flag. Specifically, it should provide legal grounds for the general requirements such as ship audit, health and environmental damage-prevention regulations applicable to such vessels and the establishment of related rules.

- A legal framework for applying the existing laws and regulations including the relevant disciplinary and criminal proceedings; and the appropriate personnel with the maritime experience to support the implementation of the requisite national laws and to carry out all the State's obligations, as provided by the respective treaties (IMO, 2011).

However, each State has its specificities. According to the code for implementing mandatory IMO instruments adopted on 30 November 2011( IMO, 2011), different administrations shall be responsible solely for the application of the IMO compulsory instruments under which they are contracting governments or parties such as MARPOL 73/78 and the protocol of 1997 amending this convention. It is evident that by geography and circumstances, several maritime administrations can play a more significant role as a flag State rather than as a Port State or as a Coastal State or vice versa (IMO, 2011).
Regarding the protocol 1997 of MARPOL Annex VI, Project Coordination Unit under the IMO (GloMEEP) suggest several steps to implement Annex VI successfully. Those steps start with an evaluation of ship emission in the national context, after that, incorporating the requirement of Annex VI into the national law of the State and finally develop a national strategy based on reducing the SOx emission from ships and in ports (GEF-UNDP-IMO GloMEEP Project & IMarEST, 2018).

3.1 Assessment of ship emission in a national context

3.1.1 Legislative situation

First of all, identifying whether the State has joined MARPOL Annex VI and whether it has adopted national laws to provide force to MARPOL Annex VI, or not yet. Indeed, countries may be at very different levels in the adoption of Annex VI to MARPOL. Some of them may not have consented to it, but they plan to. Certain countries may also have endorsed or acceded to it but have not yet integrated the MARPOL Annex VI rules into national regulations.

In general, before adhering to the 1997 Protocol, the government will determine if it is ready to adopt and apply the provisions of MARPOL Annex VI. The advantages of accession would have to be balanced in opposition to the country and industry's available resources and financial consequences. It is advised that an intergovernmental body which has oversight at an acceptable level of authority perform the evaluation because legal and management responsibilities related to the implementation of MARPOL Annex VI could concern many departments of State, including Transportation, Energy, Ecology, Maritime Safety, Commerce, National strategic development and other stakeholders.

Concerning stakeholders, their support and involvement is primordial to the success of the evaluation of the actual situation and then the creation and adoption of a national plan to counter vessel emissions. The most important stakeholders related to the implementation phase and enforcement are listed in Table 1, as suggested by the GloMEEP Project Coordination unit.
Table 1. The main stakeholders and their pertinent roles in the implementation phase of Annex VI

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Pertinent roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>National maritime authority (Ministry of Transport or other agency, e.g. Navy, Coast Guard)</td>
<td>Cooperation and monitoring of shipping involving matters of maritime safety and environmental protection. Represent the task force of the Flag and the Port State. Are part of the Development and compliance process of treaties and legislation relevant to the shipping.</td>
</tr>
<tr>
<td>Shipowners &amp; agencies</td>
<td>Assume responsibility for the guidelines and practices on vessels. Accountable for notifying ship masters of the coming ports regulatory requirements.</td>
</tr>
<tr>
<td>Naval designers, shipbuilders, shipyards,</td>
<td>Outfitting actual ships and constructing new vessels, in line with globally agreed requirements to reduce air emissions from ships and improve their energy consumption.</td>
</tr>
<tr>
<td>NGOs</td>
<td>Conduct a monitoring position and put pressure to bear on policymakers to adopt policies to minimize air pollution and mitigate climate change.</td>
</tr>
</tbody>
</table>

Source: (GEF-UNDP-IMO GloMEEP Project & IMarEST, 2018)

These segments all connected represent a comprehensive and practical chain of implementation of Annex VI.

The second step consists of a comprehensive overview of the existing rules and codes that can be related to the matter of sulphur emission reduction to avoid repetition, regulations conflict, and preparation of the list of articles that need to be amended. If there are no existing regulations, a project of law should be drafted to incorporate Annex VI requirements in the national legislation.

3.1.2 Evaluation of the enforcement section

Each Member to the MARPOL may impose enforcement authority to guarantee conformity with the Treaty towards any vessels that enter its ports.

When certain characteristics of a ship do not meet relevant regulatory specifications, faults are recorded. The quantity and extent of defects must be assessed to determine the corrective actions to be taken by the vessel and the time required to execute them.
If a ship is determined to be unsafe for seaworthiness or if the defects of the ship are considered to be too large, it may be seized (IMO, 2019a). These steps are part of the Port State rights. They are clearly defined in the IMO guides related to Port State Control Procedures and in the relevant Appendix 18 titled “2019 Guidelines for Port State Control under MARPOL Annex VI Chapter 3” of the latest Resolution A.1138 (31) adopted on 4 December 2019.

The assessment of the enforcement section should be based on making an inventory between the procedures in force of Port State control and the new requests to apply the regulations of Annex VI of MARPOL. This evaluation should consider the material, personnel, and technical needs to accomplish the inspection tasks and meet the compliance.

For example, the inspection of ships that require the International Air Pollution Prevention Certificate (IAPP certificate) should be carried out by the PSCO. He first checks the date of shipbuilding and the date of placement on board of the apparatus under the conditions of Annex VI to ensure the applicability of the Annex’ regulations. After that, he has to check the existence of the IAPP Certificate, with its Supplement. By inspecting the IAPP Certificate, the PSCO can determine how well the vessel is fitted to deter air pollution.

When the vessel is equipped with the corresponding equipment compliant with the reduction of SOx, the PSCO will seek proof that the ship has obtained sufficient authorization for such installations and will check their status if they are already authorized or under experimentation. (IMO, 2019b).

Regarding the fuel oil, the PSCO has to check the Bunker Delivery Note (BDN) that developed out of the Bunker Delivery Receipt (BDR). BDR was initially used as a way of recording the amount supplied to a client by a provider and providing proof of reception of the commodity. MARPOL Annex VI requires some information in the BDN now, as defined in MEPC.176 (58) ‘the revised MARPOL Annex VI’ (IMO, 2008), such as the rate of sulphur in the delivered fuel oil. The BDN can also be used to provide evidence of compliance issues in association with the bunker specimens.
Specimen seal codes of bunkers are recorded on the BDN to provide a reference database for that specific fuel supply.

With all these enforcement regulations, more equipment and more effort have to be done by the country as a Port State. For Tunisia, meeting the IMO enforcement requirement on reducing sulphur emission will be a tremendous task, as developed in chapter 5.

The next paragraph will elaborate on the assessment of ship emissions from the flag State side.

3.1.3 Evaluation of the fleet composition

To better understand the issue of ship emissions, it is best to classify ships, which are assumed to be especially important sources of air pollution for the country concerned. To complete this approach, five separate divisions of the fleet has to be considered and analysed:

1. **Registered fleet**: includes ships licensed in the State, independently of whether or not they transact effectively in the waters of the nation. This part would probably involve ships whose owners are foreigners (e.g., Panama, Liberia).

2. **Vessels doing internal cabotage**: are based on the port of origin and the harbour of destination and not the flag of the vessel. This classification can issue some challenges due to internal and overseas sailing convergence, and policymakers may find it challenging to separate local shipping policies from international ones. Besides, local shipping can play a key role in the degradation of air quality in marine, industrial, and metropolitan regions through SOX, NOX, and black carbon emissions. National shipping falls generally within the State authority and domestic pollution inventory. This kind of fleet is of high significance in countries with long coastlines or large internal watercourses and archipelagic countries. In Tunisia, there are six ferryboats connecting the island of Kerkennah to the city of Sfax (SONOTRAK, 2017) and several ferries serving Djerba island.

3. **Ships supplying the country's international transport demands**: Include ships that carry passengers and merchandise between countries. This fleet may be of particular interest for States with large trade flows by sea and big terminals.
4. Fleet crossing the territorial waters of the country: comprises ships having the right of freedom of navigation across the territorial sea (UNCLOS Article 17), like ships traveling in sovereign waters but not stopping in that State's harbour. This fleet can be of specific interest to countries having important coastlines and nations near major international trade routes or a traffic separation device like the case of Tunisia where approximately there are 200 ships sailing through its waters per day (ILO, 2017).

3.2 Incorporation of Annex VI into the national law of the State

Once the assessment of ship emission is done, MARPOL articles that refer to Annex VI also have to be checked to verify if they exist in the national law and to determine if the statutory regulations require to be revised or not. Such articles cover descriptions (Article 2), infringement (Article 4), unnecessary postponement of vessel departure (Article 7), exchange of data (Article 11) and offenses to vessels (Article 12).

The assessment will also determine whether there are compliance and implementation processes and whether they ought to be updated or not. Some countries' regulatory regime requires rules to be made straightforwardly under the authorizing legislation, through a defined process of drafting, review, and entry into effect. For other States, a government-approved 'call' (e.g., parliament, legislative assembly or congress) must put into force subordinate laws (Mukherjee, 2002).

In other situations, the legislature can also choose, in some specific issues, to subordinate its power to legislate on particular topics to some entities and organizations in the shape of designated, subsidiary, or complementary regulations.

Thus, the first stage in preparing the integrating law is to review the convention, clause by clause, to decide which one of those needs should be taken for incorporation into the law. The next phase is to create a framework to arrange those clauses. The third stage involves the vocabulary and design of drafting, i.e., the structure of the law. In the first place, the draftsman will stick to the treaty terminology as accurately as feasibly possible to ensure universal conformity (Mukherjee, 2002). Special care should be given to preserving the meaning of technical terms while using different languages or translating from the international convention to the national language.
The following figure displays a general framework about the steps to follow to put annex VI rules into effect.

Figure 2. Steps to integrate MARPOL Annex VI into national legislation

Source: (GEF-UNDP-IMO GloMEEP Project & IMarEST, 2018)

First, it starts with a political choice taken by the executive branch, most commonly by the ministry of transportation and adopted further by the head of the government. The next step will be to prepare the law or renovation of current legislation and its deposit for debate, and later approval in the Senate or parliament is made. The law takes effect when it is appropriately announced to the public via a national gazette release. If only the rules have to be updated, then the State's procedure must be followed.

In conclusion, a convention may be integrated into the domestic legal system by enacting some sort of implementing statute according to which the treaty will be law in effect in the State. Under this form, the treaty script is generally attached to the law as an appendix. This method is also gradually being applied in certain dualistic regimes, such as the United Kingdom, even though it is not the standard. However, it is acknowledged that this approach is not effective when dealing with technical
treaties, like MARPOL Annex VI that is normally not self-executing irrespective of if the national jurisdiction is monistic or dualistic (Xu, 2014).

In order to strengthen the incorporation process it is necessary to develop a national strategy englobing the reduction of sulphur emission from vessels.

3.3 Developing a national strategy for reducing the sulphur emission

States, especially the developing ones such as Tunisia, would find it beneficial to formulate a comprehensive strategic plan to address shipping air pollution linked to other broader air pollution reforms (including GHG) or renewable energy regulations due to many challenges, which will be explained in chapter 5.

The strategy structure's objectives may vary from one country to another, depending on the specific prerequisites. Not all ship emissions are produced from merchant vessels involved in international commerce. Other pollution sources are ships active in national journeys, such as harbor tugs, packet boats and fishing vessels. Terminals may also be air pollution contributors, although MARPOL Annex VI does not address them (IMO, 2008).

Therefore, to reach the optimal compliance with this annex VI, the first step should be to decide which department or entity will be responsible for implementing and executing regulations that would give legitimacy to Annex VI clauses. It is the minister in charge of marine transportation in most countries. Instead, the port authority, navy, customs and coast guard may be liable and could be involved in the enforcement side. There is possibly mostly an agency or entity in charge of the Port State management of IMO measures and all the flag State obligations, however minor they could be. For several nations, the maritime administration is the kind of that entity as it is under the authority of the ministry concerned with maritime transport (Mukherjee et al., 2013). Nonetheless, the Ministry of Environment could also have total power to regulate air pollution from different forms of transportation.

In the light of what was elaborated in this chapter, the next chapters will be applying the suggested approach by IMO to implement Annex VI in Tunisia. The process will start by an assessment of the existing Tunisian legal system and institutional
framework related to the topic (chapter 4), after that, a detailed explanation of the potential challenges that will face this implementation (chapter 5) and finally, a conclusion with findings on how those challenges can be overcome.

4. Tunisian legal system in connection with MARPOL Annex VI Sulphur regulations

Tunisia is a flag, coastal and Port State. It is a flag State with a gross tonnage of 313000 DWT as at 2018 (UNCTAD, 2019). It is a Coastal State with a coastline of 1148 km, and a sea space comprising a 12nm territorial sea and 12nm of EEZ. Tunisia has seven commercial harbours, seven marinas, 41 fishing ports. Through the seven commercial ports, 30.7 million tons of goods, 493.000 TEU and 717790 passengers transit yearly (OMMP, 2019). On 19 May 2005, Tunisia acceded to the 1997 Protocol and it came into force in that country on 05 December 2011 (IMO, 2020e).

The maritime sector in Tunisia is regulated through different codes, as will be explained in the following. Furthermore, Tunisia is part of several international agreements and has national policies that can engage in tackling ship emission issues (see paragraph 4.3). In paragraph 4.4 of this paper, the concerned ministries will be listed, including their relevant component to the topic of the sulphur emission reduction. Before that, some elucidation needs to be done concerning the adoption and incorporation of the Treaties into Tunisian laws.

4.1 Adoption and application of the Treaties into the laws of Tunisia

According to Article 62 of the Tunisian Constitution, the Head of Government is the only official entitled to submit draft laws relating to the endorsement of treaties. As a first stage, the Ministry of International Affairs and the Ministry concerned for the Convention should work closely to prepare an informative report for the Council of Ministers. The introductory notice and a copy of the Convention should be sent to the Head of Government.
Following consultation with all ministers, the Head of Government presents a bill and submits it to the Assembly of People's Representatives.

Under Article 64 of the Tunisian Constitution, and as a second move, the Assembly of People's Representatives should adopt by an overwhelming majority of all the delegates of the Assembly the draft legislation related to the Convention, which is deemed organic legislation in compliance with Article 65 of the Tunisian Constitution. The proposed Organic Law should be submitted for discussion at the Plenary Session of the Assembly of People's Representatives at least 15 days after its presentation to the appropriate parliamentary committee.

The treaties relating to international organizations should be forwarded for endorsement to the Assembly of People's Representatives according to Article 67 of the Tunisian Constitution. Once a treaty has been ratified, it will enter into force. The treaties, duly approved, have a higher rank than the laws and lower than that of the Constitution (UNDP & IDEA, 2020).

Regarding the publication, the President of the Republic should pass the legislative, ordinary and organic laws and guarantee that they are released in the Official Gazette of the Republic of Tunisia within a set time of four days from the date of receiving them from the President of the Parliament (UNDP & IDEA, 2020).

4.2 Existing national legislation related to the sulphur reduction

Reducing emissions from ships is a complex issue spanning different policy areas such as maritime transport, marine environment, energy and human health. Therefore, it involves various institutions and national codes. In the absence of domestic legislation related to the implementation of the protocol 1997 of MARPOL, this chapter will go through some national codes that can be useful to implement and enforce the requirement of MARPOL Annex VI.

4.2.1 Law 2007-34 dated 4 June 2007, on air quality

The goal of this 2007 legislation is to deter, regulate and minimize air pollution and its harmful impacts on human health and the climate, and to establish the appropriate protocols for air quality surveillance; thus safeguarding citizens' right to a healthy
environment and ensuring sustainable growth. The legislation mandates the National Environment Protection Agency to track air pollution and its effect on the atmosphere and set up a nationwide air quality control network in collaboration with State agencies, competent municipal institutions and local authorities. Chapter III of this text of law sets measures to prevent air pollution from mobile sources (Law n°2007-34, 2007). According to article 8 of this chapter III, the limit values at emission sources for air pollutants are set by decree. Specific mechanisms and procedures may be established to prevent and promote the restriction and reduction of air pollution generated by movable sources.

4.2.2 Seaports Code
This code came into force under the promulgating law number 2009-48 of 8 July 2009 and replaced the old version of the code titled “Commercial Maritime Ports Code” promulgated in 1999 and modified in 2002 and 2005. It sets the conditions to which are subject the creation of seaports and the management of the public domain ports, its operation, its protection, its conservation as well as the general rules for ensuring safety, security, health, cleanliness and preservation of the environment (Law n°.2009-48, 2009). According to articles 1 and 4 of this code, its regulations do not apply to military ports, military ships, national security services ships or customs ships. Article 6 of the Seaports code defines the port authority while Article 7 stipulates that this port authority is in charge of participating in the drafting of a legislative proposal and regulations on protection, security, health and sanitation and the conservation of the environment in ports and track its application against pollution (Law n°2009-48, 2009).
According to Article 27 of the seaports code, the entrance into harbours for ships is allowed only if they comply with the requirements set out in the legislation in force and referring to identification, safety at sea and the protection of the environment and health (Law n°2009-48, 2009). In addition, article 43 of the same code prohibits the cleaning of boilers, chimneys and gas tubes on-board vessels in seaports. So the awareness of the necessity of banning intrusion of pollutants in the atmosphere is there but not connected with regards to the MARPOL Annex VI.
Article 46 binds the captain of the ship and any intervener to protect the safety, hygiene and environment of the port. In the case of violation of the provisions of paragraph 1 of this Article, the port authority should, by whatever means, give formal notice to the defendant, leaving a written record. In the case of non-compliance with this official warning, the port authority is required to make necessary provisions for prevention and cleaning at the expense of the perpetrator.

4.2.3 Code of administrative police of maritime shipping

This code was adopted on 11 June 1976 and annexed in 2010 by the presidential decree number 2010-2475 on the composition and functioning of the central maritime safety commission. It represents a procedural guide for the agents of the maritime authority in executing their duties concerning the enforcement of laws in the maritime field. Among the regulations of this code, there are:

4.2.3.1 Safety inspections and commission

Title III of the Tunisian Code of Administrative Police of Maritime Shipping set up the rules and regulations of inspections and commission related to safety (Law n°1976-59, 1976).

Under this title and according to article 55, the Tunisian coast is divided into regions and maritime districts. These regions are called the maritime region of Bizerte, Tunis, Sousse, Monastir, Sfax, Gabes and Djerba. Each maritime Area has a Regional Maritime Safety Service (OMMP, 2016).

Regarding the prerogatives of the flag State, article 41 of this code stipulates that a security inspection committee is created in each maritime region. This committee has to examine whether a ship is to be brought into service under the Tunisian flag if it satisfies the requirements of that code. In case the vessel is performing international voyages, this committee has to ensure that vessel responds to the provisions of international conventions ratified by Tunisia, including ship security requirements (Law n°1976-59, 1976)). It can be added to this commission the duty of issuing the IAPP certificate explained in chapter 2.

The security inspection committee is empowered to proceed to the visits provided for in articles 34, 35, 36 and 37 of this code, which are commissioning visits, periodic
visits, exceptional visits, departure visits. According to the recommendations of this committee, the Maritime Authority may prevent or postpone the departure of any ship that, due to its obsolescence, its lack of stability, and the conditions of its loading or for any other purpose provided for in this code or the regulations in force, until the execution of the prescriptions (Law n°1976-59, 1976).

This section was about flag State jurisdiction and the same is applicable as a Port State control where foreign vessels are subject to outbound visits under the same conditions as Tunisian ships.

4.2.3.2 Enforcement under the Code of administrative police of maritime shipping

Title VII of this code, “Penal Provisions”, sets the list of who may record, by minutes, infringements of provisions of this code (Law n°1976-59, 1976). Chapter III “Penalties” of title VII set up the procedures and the amount of fine to pay in case of infractions to regulations of this code and especially in relation to non-respect to safety rules prescribed in title II of the same code.

That was about the existing national legislation related to the implementation of Annex VI of MARPOL and the reduction of sulphur emission from vessels. The next paragraph will explore the national policies already existing in Tunisia that can be related to the topic of this research.

4.3 National policies related to the reduction of emission from ships

The existing national policies related to the reduction of emission from ships can be divided into two parts according to the scope that they are treating, the first scope is climate change globally and the second is on the regional level.

4.3.1 National policies in relation with the climate change

Tunisia has implemented both a mitigation and adaptation approach to tackle climate change. Therefore, consciously conforming to the international dynamics of fighting climate change since 1993 and the 2002 Kyoto Protocol, Tunisia has adopted numerous projects/programs and initiatives for responding to climate change with the help of development partners.
Those initiatives were done in compliance with USDG 13 target number 13.2 and by developing Tunisian climatic scenarios 2050 and 2100 based on The Intergovernmental Panel on Climate Change (IPCC) models (IPCC, 2020; UNDP Tunisia, 2020).

Tunisia embarked early on this new process of Nationally Appropriate Mitigation Actions NAMAs to incorporate climate change into the different sectors of the economy and profit from international assistance for Greenhouse gas mitigation. With the help of donors (UNDP, GEF, German cooperation), several NAMA projects have been initiated in Tunisia and are at different stages of growth (GIZ, 2013).

Mitigation strategies may be beneficial for Tunisia, not only in the sense of climate change, but also in terms of reducing the reliance on fossil fuels and as a way to engage in the global transition towards more effective and sustainable technologies.

4.3.2 Regional cooperation

4.3.2.1 Mediterranean Action Plan

The Mediterranean Action Plan (MAP) is a forum for international collaboration to protect and improve the aquatic and maritime ecosystem while supporting sustainable growth in the Mediterranean region (UNEP/MAP, n.d.). Among its outcomes, the Barcelona Convention and its protocols, which is the main multilateral environmental agreement in the Mediterranean region (UNEPP, n.d.).

According to Gaetano Leone, Coordinator of the UNEP/MAP-Barcelona Convention Secretariat, "The execution of the Work Plan of the 2020-2021 biennium was seriously undertaken with the activation of a significant phase, including the introduction of the Roadmap "Proposal for the future naming of the Med SOx ECA" (Gaetano, 2020).

Indeed, the IMO launched on the 2d of June 2020, a request of proposals by eligible companies for the delivery of consultancy services regarding Mediterranean Sea SOx Emission Control Area as set out in Annex VI to MARPOL (IMO, 2020).

In addition to that, Tunisia is part of the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC), formerly called the Regional Oil Combating Center (ROCC). Founded in 1976; it aimed to facilitate better cooperation between contracting parties in the management of vast marine pollution
from oil spills and to develop national policies to manage oil pollution, and to establish a regional data system that would be able to handle the marine pollution crisis effectively and quickly (REMPEC, 2019). REMPEC is conducted by IMO in coordination with the United Nations Environment Program/Mediterranean Action Plan (UNEP/MAP) (UNEP(DEP)/MED, 2009).

Over the years, the role of REMPEC expanded, allowing to tackle the requisite emerging concerns in the level of regional strategy and setting new overall goals based on Preventing pollution from ships, preventing marine accidents and preparing for reaction to significant pollution incidents. The REMPEC adopted the Regional Strategy for Prevention of and Response to Marine Pollution from Ships (2016-2021), which lays out concrete goals and a timeline for the execution of the twenty-two priorities to be accomplished by 2021 (REMPEC, 2019)

- Ensuring successful maritime administration
- Strengthening the Mediterranean MoU
- Enhancing maritime traffic control
- Designating particularly sensitive marine areas (PSSAs)

- Exploring the prospect of designating the Mediterranean Sea or portions of the SOx emission control area in compliance with Annex VI to MARPOL and fully enforcing current energy conservation initiatives (REMPEC, 2019).

This regional strategy also includes the key elements of other sectoral or inter-cutting policy initiatives of the MAP, such as revising the Mediterranean Strategy for Sustainable Development (MSSD) and the implementation of the Ecosystem Approach (EcAp).

Tunisia is a party to this regional agreement, which gives another aspect relating to the obligation of Tunisia to meet the requirement of Annex VI and to participate effectively in the strategic plan for the Mediterranean region.

4.3.2.2 Mediterranean Memorandum of Understanding

Port State Control (PSC) is the inspection in domestic ports of foreign vessels to check that the State of the vessel and its equipment comply with the specifications of
international regulations and that the vessel is managed and operated following those regulations (IMO, 2020d). After the implementation of the first Memorandum of Understanding (MoU) on PSC in the early 1980s, the purpose of these kinds of agreements was to establish coherent protocols for checking and detaining ships to curb the spread of under-standard shipping inside a given region.

Within the scope of the international initiative to improve maritime safety and reduce pollution, and within the context of the operations of the Euro-Med summit, a collaboration project funded by the European Commission was announced in Barcelona 28th of November 1995. Under the auspices of the IMO and the ILO. The resolution was drawn up in consideration of the global community to enable the role of Port State Control within a framework agreement for the Port State Control Program for the Southern and Eastern Mediterranean States (Mediterranean MoU, 2014).

Tunisia is one of the ten Member States of this Memorandum of Understanding with ten other countries. Med MoU performance can be viewed as an acceptable tight (see Table 2), with a global detention rate of 2.85 per cent for the three years from 2016 until 2019 and an inspection deficiency of 2.62 percent for the same period.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Inspections</td>
</tr>
<tr>
<td>Deficiencies</td>
</tr>
<tr>
<td>Detentions</td>
</tr>
<tr>
<td>Inspections with deficiencies</td>
</tr>
<tr>
<td>Inspections with more than 5 deficiencies</td>
</tr>
<tr>
<td>Deficiencies per inspection (DPI)</td>
</tr>
<tr>
<td>Detention rate (DER)</td>
</tr>
<tr>
<td>Deficiency inspection rate (DIR)</td>
</tr>
<tr>
<td>Five deficiencies rate (FDR)</td>
</tr>
</tbody>
</table>

Source: (PSC Focus, 2019)
Concerning Tunisia as a flag state, it was listed recently, on 1 July 2020, by another Port State control MoU called Paris MoU (the Authorities of Paris MoU, n.d.). The Paris MoU on the PSC is an institutional arrangement reached by twenty-seven European Maritime Authorities. It spreads from North America to Europe across the waters of the European Coastal States and the North Atlantic basin. Its goal is to eradicate the operation of under norm vessels through a coherent Port State control network (the Authorities of Paris MoU, n.d.).

Table 3. The Paris MoU Black list effective from 1 July 2020

<table>
<thead>
<tr>
<th>Rank</th>
<th>Flag</th>
<th>Inspections 2017-2019</th>
<th>Detentions 2017-2019</th>
<th>Black to Grey Limit</th>
<th>Risk</th>
<th>Excess Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>58</td>
<td>Tunisia</td>
<td>39</td>
<td>6</td>
<td></td>
<td>Medium Risk</td>
<td>1.16</td>
</tr>
<tr>
<td>59</td>
<td>Cook Islands</td>
<td>379</td>
<td>38</td>
<td>35</td>
<td>1.22</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>St Kitts and Nevis</td>
<td>163</td>
<td>19</td>
<td>17</td>
<td>1.30</td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>Mongolia</td>
<td>49</td>
<td>8</td>
<td></td>
<td>1.57</td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>Sierra Leone</td>
<td>362</td>
<td>43</td>
<td>34</td>
<td>1.75</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>Belize</td>
<td>322</td>
<td>43</td>
<td>31</td>
<td>2.13</td>
<td></td>
</tr>
<tr>
<td>64</td>
<td>Palau</td>
<td>221</td>
<td>31</td>
<td>22</td>
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<td></td>
</tr>
<tr>
<td>65</td>
<td>Ukraine</td>
<td>89</td>
<td>15</td>
<td>11</td>
<td>Medium to High Risk</td>
<td>2.29</td>
</tr>
<tr>
<td>66</td>
<td>Tanzania, United Republic of</td>
<td>354</td>
<td>53</td>
<td>33</td>
<td>2.67</td>
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<tr>
<td>67</td>
<td>Moldova, Republic of</td>
<td>981</td>
<td>57</td>
<td>35</td>
<td>2.70</td>
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</tr>
<tr>
<td>68</td>
<td>Togo</td>
<td>492</td>
<td>80</td>
<td>44</td>
<td>3.21</td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>Georgia</td>
<td>74</td>
<td>16</td>
<td>9</td>
<td>High Risk</td>
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<tr>
<td>70</td>
<td>Comoros</td>
<td>380</td>
<td>69</td>
<td>35</td>
<td>3.67</td>
<td></td>
</tr>
</tbody>
</table>

Source: (The Paris MoU authority, 2020)

This section was about the Tunisian involvement with the regional agreement. Next section will elaborate on the national institutions taking part in the environmental issue.

4.4 Relevant ministries and national institutions

From a perspective of environmental issues in the maritime field, this paper will consider the Tunisian government departments: First, the Ministry of Local Affairs and the Environment with its relevant components, secondly the Ministry of Transport and Logistics and finally, the new General Secretariat for Maritime Affairs.

4.4.1 Ministry of local affairs and the environment
The key priority of the Tunisian Ministry of Local Affairs and Environment is to concentrate on the dedication of the government to sustainable development and to develop and introduce an environment protection culture. Three of its essential tasks include setting forward a general government agenda in the fields of environmental conservation, enhancing ecological standards, and reducing hazards that endanger man, the atmosphere and natural resources (UNOOSA, 2020).

Under this ministry, a unit of management by objectives was created in 2018 for the realization of a program for monitoring and coordinating activities related to the performance of the United Nations Framework Convention on Climate Change UNFCCC (Governmental Decree nº2018-263, 2018). This unit can play a key role in implementing and drafting national regulations linked to MARPOL Annex VI.

4.4.1.1 National Environmental Protection Agency (ANPE)

ANPE is an industrial and commercial public establishment, created under Law No. 88-91 of 2 August 1988, whose tutelage and initial mission have been substantially revised by Law No. 92-115 of 30 November 1992 and, consequently, by the creation of a Ministry responsible for the environment and sustainable development. This agency has the following missions:

- Contribute to the development of the general government programs in the context of pollution control and environmental protection and implement within the context of the national development plan.
- Fight against all sources of pollution and nuisance and all types of environmental degradation.
- Recommend to the competent authorities any measure of a general character or direct and planned to ensure the implementation of State policies in fighting against pollution and the safety of the atmosphere.
- Control of polluting emissions into the atmosphere and the detection of possible infringements on land (Law no.88-91, 1988).

The Organization can allocate any assistance needed, in compliance with the legislation in force, with a view to eliminating or reducing residues and the effects of

A board of directors chaired by the President and CEO of the Agency and comprise representatives from concerned Ministries (Decree n.88-1784, 1988). Therefore, this agency can be one of the gathering entities of the effort of different governmental institutions to set up the implementation of Annex VI.

4.4.1.2 National Air Quality Monitoring Network (RNSQA)

RNSQA was established in 1996 within the framework of the National Environmental Protection Agency. It is a coherent network that makes it possible to know the quality of the air every day in the areas most affected by air pollution, such as in the major cities and industrial communities. After its formation, the network has developed steadily. From an infrastructure of fixed stations for measuring ambient air quality (see figure. 3), the network has expanded to include activities to quantify pollutants at the source, inventory emissions from various sources of pollution, and simulation of air quality and dispersion of pollutants (ANPE, 2016).

These measuring stations reached 30 in 2011; they are selected based on specific and quantified parameters (Bouet et al., 2019). In addition to the above mentioned fixed stations, the RNSQA has a mobile science lab bus that allows the analysis of common pollutants (O3, NOx, SO2 and PS) and graphic parameters (temperature, atmospheric pressure, wind patterns). The mobile laboratory enables dynamic and rapid assessment of air quality in areas not yet fitted with fixed stations. It may be used, at the demand of communities or municipalities, to measure the quality of ambient air in a given area.
According to Khdira Samir, the deputy director of the Marine Pollution in the ANPE, the methodology used for predicting emissions from the maritime sector is a combination between a purely bottom-up approach relying on traffic data generated by the major ports (i.e., Radès, Zarzis, Sousse, Gabès and Bizerte) and a top-down energy usage retooling based on the national energy balance (ANPE, 2016; Khedhira, 2018).

This framework can be reinforced with new mobile stations installed in the vicinity or inside Tunisian ports, starting with the most important port, which is the port of “Rades,” to control the level of air pollution.
4.4.2 Ministry of transport and logistics

Under this Ministry there are at least two general directions, one combined port and merchant marine authority, (Decree n°2014-409, 2014) that are directly concerned with shipping and obviously the issue of sulphur emissions from vessels.

4.4.2.1 General Direction of Maritime Transport and Commercial Seaports

Under this ministry, there are several departments. One of them is the department of specific services, "Les services spécifiques," which are responsible for four general directions, one of them "the General Direction of Maritime Transport and Commercial Seaports."

According to the SWOT analysis made by Mr. Ben Romdhane, Director General of Maritime Transport and Maritime Commercial Ports, among the strongest points of the Tunisian maritime sector is the available and diversified maritime administration facilities (Ben Romdhan, 2016). From this standpoint, there is no logical reason to justify Tunisia's delay in implementing the provisions of Annex VI. Especially, according to the same SWOT analysis, when the opportunities that have the maritime sector in Tunisia are available to cooperate with the partners of Tunisia and with regional and international bodies such as IMO and the European Maritime Safety Agency (EMSA) (Ben Romdhan, 2016).

4.4.2.1.1 Direction of Maritime Transport

According to article 39 of the governmental Decree 2014-410 dated 16 January 2014, relating to the organization of the central services of the Ministry of Transport, this direction has several duties but which are relevant with this research, i.e.:

- Take part in the drafting of legislative and regulatory texts for the maritime transport sector
- Establish and track the implementation of development programs in the maritime and commercial marine transport fields, in cooperation with the systems concerned
- Maintain bilateral and multilateral cooperation records with regional and international organizations in the area of maritime transport and commercial ports
- Participate in the preparatory work and debate of the bilateral agreements agreed by Tunisia in the field of maritime transport and commercial ports
- Prepare the papers for bilateral meetings, to participate in them, if necessary, and to monitor the implementation of the recommendations made by them
- Monitor projects conducted in the context of bilateral and multilateral cooperation and with regional and international organizations in the area of maritime transport and commercial ports
- Participate, where appropriate, in seminars and conferences organized by regional and international organizations involved in the maritime and commercial transport sectors (Decree n°2014-410, 2014).

4.4.2.1.2 Direction of Commercial Seaports
According to article 40 of the decree n° 2014-410, this direction ranked below the general direction of maritime transport and commercial seaports. Part of its duties consist of the following:
- Controlling the implementation of development, organization, and operational programs for commercial seaports
- Preparing, guiding, and controlling service quality and financial performance indicators in commercial seaports
- Participating in the preparation of legal and regulatory texts relating to the activity of commercial seaports
- Tracking the implementation of laws and regulations applicable to safety, security, and environmental protection in commercial seaports (Decree n°2014-410, 2014).

In summary, this direction will have a primordial role in the drafting of the national legislation concerning the implementation of MARPOL and its annex VI. Once the draft legislation is ready, it can be transferred to The General Directorate of Legal Affairs.

4.4.2.2 General Directorate of Legal Affairs
Under the Ministry of Transportation, there is also the General Directorate of Legal Affairs, responsible for the litigation and management of documents and archives. It also ensures the role of the legal adviser of the Ministry by studying and presenting
consultations on the questions of a legal nature. It also contributes to the preparation and drafting of legislative and regulatory texts and to preparing and applying the program for the management of current documents produced or received by the departments of the Ministry (Decree n°2014-410, 2014).

4.4.2.3 Office of the Merchant Marine and Ports (OMMP)
The Office of the Merchant Marine and Ports (OMMP) was created by Law No. 65-2 of 12 February 1965, as amended by Law of 15 February 1972. Law No 98/109 of 28 December 1998 directed the OMMP to perform the functions delegated to the maritime authority and the maritime administration and the duties of the port authority, in compliance with applicable laws (OMMP, 2016).

As a port authority, the essential duty of the OMMP is to manage all ships and goods passing through the Tunisian ports under maximum conditions of waiting time, expense, and protection. Thus, as a maritime authority, the OMMP offers the services of the merchant navy, including in particular the management of vessels, seafarers, and maritime safety.

According to the voluntary audit report of 2013 (IMO, 2013), the current organization of the OMMP does not promote the exercise of the prerogatives of the maritime authority because of the concomitant with business activities that could raise internal conflicts of interest (see Appendix E).

Indeed the new reorganisation of the OMMP has taken into consideration this observation and made a separation of prerogatives between the commercial aspect and the regulatory aspect and by shifting a part of the maritime authority under the General Directorate of Maritime Transport and Commercial Seaports. However, some work has to be done mostly at the level of making regulations and policies. This point will be more elaborated in the next chapter related to the challenges of implementing the IMO sulphur cap.

4.4.3 Creation of a general secretariat for maritime affairs
As part of the Code for the Implementation of Mandatory IMO Instruments (Resolution A. 1054 (27)), a voluntary IMO Member State Audit Program (VIMSAS) has been developed. Tunisia's audit took place from October 21 to 28, 2013 (IMO,
2013). Following the recommendations made in this audit’s light, the Tunisian government decided in 2019 to create a general secretariat for maritime affairs. Under the presidency of the government, this secretariat will have among its charges:

- Coordination between the multiple components performing at sea or related to maritime affairs,
- Monitoring of the Tunisian State’s obligations in the maritime sector,
- Monitoring of external relations related to the sea and the programs of regional and international agencies and organizations operating in the maritime field, in cooperation with the Foreign Affairs Ministry;
- Opinions on the draft legislative texts on maritime affairs submitted by the ministries concerned and to formulate any proposals, which might lead to their development (Governmental Decree nº2019-144, 2019).
- It seems that the newly created secretariat of maritime affairs will be the first responsible for the implementation and the coordination to enforce Annex VI of MARPOL, even if it took more than six years, since the recommendations of 2013, for this restructuring to see the light of day. However, it remains only a written decision that must be applied in the field.

This latency gives the taste of one of the difficulties facing implementing the IMO sulphur cap 2020 in Tunisia. The other challenges are exposed in the following chapter.

5. Challenges facing the implementation of the sulphur cap 2020 in Tunisia

The MARPOL and numerous other IMO instruments are reactive treaties. They have been developed and modified mostly in the aftermath of significant cases of pollution occurring in the industrialized world, giving emerging nations the illusion that the emphasis of such treaties is only on the developed countries (Karim, 2015). In several ways, global marine environment conventions do not succeed in taking care of the requirements of emerging nations.
Developing countries, coastal or port nations are experiencing compliance with the IMO international instruments troublesome. The key reasons behind such compliance issues are the absence of advanced technology and resources and a significant deficit of political commitment. Furthermore, relative to their modern equivalents, most developing nations have little science, technical and economic resources, so the initial step is often quite challenging and unfavorable (Karim, 2015).

In general, countries may be reluctant to implement Annex VI due to other policy priorities, the lack of a national regulatory framework; limitations of assets and budget for drafting or adopting legislation; the ambiguity of Annex VI provisions and insufficient political commitment. For Tunisia, there are some common reasons with those cited previously, challenging the Annex VI implementation and there are others specific to the Tunisian situation.

5.1 Legislative challenges

The legal consequence for a State of being a member of a Treaty, whether by adopting it by ratification or accreditation or endorsement, is that the Treaty constraints this State. Thus, it is bound to enforce it by integrating it into its domestic legislation. If the country declines to adopt the convention in one of these ways, it is still subject to it concerning other Member States (The no more favorable treatment principle). However, it cannot impose the Treaty on other countries until that Treaty is part of national legislation (Mukherjee, 2002).

In connexion with the case study of this research, the accession of the Republic of Tunisia to the protocol of 1997 was ratified on the 30th of June 2011 by decree number 2011-833 signed by the interim President of Tunisia.

It is worth noting that the period of 2011 was marked by the revolution of the Arab spring and one of the legislative impacts was the cancelation of the former Tunisian constitution of 1959 on 23 March 2011 and the usage of presidential decrees instead of the constitution statues (Decree-law n°2011-14, 2011). Until the entry into force of the new constitution of 2014 according to the constituent law, No 2011-6 dated on 16 December 2011 (Constituent Law n°2011-6, 2011). That explains that a provisional
decree proclaimed the approval to join Annex VI of MARPOL, but no legislative action has followed concerning this subject.

On the other hand, article 1(1) of MARPOL includes that the Parties to the MARPOL Convention agree to ensure the proper functioning of this Convention and its Annexes, so failure to implement Annex VI will lead to a non-respect of that convention. However, the necessity for lawmaking intervention depends on if the convention in question is self-fulfilling, which would be subject to the State interpretation. If the convention were not self-executing, then this would take national laws making the convention to come into force.

The 1997 Protocol is procedural and not self-executing. Hence, it would be appropriate to take any legislative measures, regardless of the legal method used by the State (dualistic or monistic), to provide legal authority to protocol instruments (GEF-UNDP-IMO GloMEEP Project & IMarEST, 2018).

Unfortunately, despite the absence of a procedural obstacle to the adoption of the requirements of Annex VI into Tunisian national legislation, audit summary n° 50112 pointed out that the maritime administration was not even in a position to illustrate that domestic law contained legislation authorizing the implementation of the MARPOL Convention (See appendix B).

In the same scope, with regard to the implementation of MARPOL, Annex VI, the Maritime Administration was unable to confirm the presence of regulations in domestic law, such as the implementation of the specifications of Rule 13 for all marine diesel motors with a capacity exceeding 130KW mounted on board a vessel (see appendix D).

These observations and others cited in the Voluntary IMO Member State Audit Scheme (VIMSAS) report pointed out the gap between the legislative procedures and the ratification of the accession of IMO instruments by the Tunisian State.

5.2 Economic challenges

Because of the non-compliance between countries at different levels, Annex VI had some latitude to enable the regulatory regime to change at varying paces based on
individual air pollution dissimilarities (Attard et al., 2016). This versatility may be a sort of obstacle in terms of harmonizing or establishing a regionally controlled field such as SECA in the Mediterranean Sea.

Starting from 1 January 2020, the first impact of the entry to force the new limits of sulphur emission of Annex VI was the increase of freight charges. This increase is due to the additional cost to bunkering prices, called Low Sulphur Surcharge (LSS) (CMA-CGM, 2019). The LLS apply for short-term contracts of affreightment and Bunker Adjustment Factor (BAF) for the customers aiming to make shipping contracts for more than three months (CMA-CGM, 2019).

Revision of freight charges results from the rise of expenses for shipping companies due to the increase in demand on the low sulphur fuel oil. One of these shipping companies is CMA-CGM, which introduced such a decision for its customer. CMA-CGM is one of the important companies dealing with the shipping industry in Tunisia and the fourth one in the world (UNCTAD, 2020). CMA-CGM’s decision will eventually affect the prices of goods exchanged in trade in Tunisia.

The previous example of CMA-CGM leads to discuss another issue facing developing countries such as Tunisia and the respect of the IMO 2020 sulphur regulation, which is the loss of competitiveness. CMA-CGM is a result of a fusion finalised in 1999 between the Shipping Company (CMA) and the Maritime Compagnie Générale (CGM) and other companies later (CMA-CGM, n.d.). The regroupings and the steady rise in ship size culminated in the formation of oligopolies on different trade routes (UNCTAD, 2018) results in less competitiveness and more economic troubles for small shipping companies and national companies of developing countries such as Tunisia. Furthermore, this burden will be emphasized by the compliance of the regulations of Annex VI of MARPOL, whatever it will be the abatement choice (LNG, LSFO, scrubbers).

From the side of the State, Tunisia has to fulfill several tasks to meet the Annex VI requirement. Some of these tasks are:

- Ensuring conformity with the requirements defined as a flag State by IMO regulations
• To provide an appropriate Emission Control System structure.
• To give the adequate formation to Port State control and coast guard officers to apply the enforcement requirements and carry out optimally the monitoring of vessels.
• Enhance seaport reception facilities (to collect wastewaters used in scrubbers) and provide accurate knowledge about them (Karim, 2010).

All these steps are necessary to comply with MARPOL and its Annex VI and require significant funds to put them in place. Such actions could be seen as a luxury and not as an obligation for countries struggling to provide the necessities of life. Indeed some countries may find IMO international standards as values to aim for, but not requirements that can be reasonably met (Karim, 2010).

Furthermore, the former Transport Minister Hisham ben Ahmed said that: “Tunisia, which will begin enforcing the MARPOL Annex VI on the prevention of sea pollution from ships, has preferred to shift the form of fuel (LSFO) with investing approximately 1.5 million EUR on machinery, refining and facing Additional costs of 13 million per year for the procurement of fuel”. The minister mentioned that he proposed to Tunisia to place a purifying system for all vessels, which would charge about 50 million euros. Still, the aging of the Tunisian fleet favored the choice of whether to change the fuel (The National Tunisian Radio, 2019).

Yet Tunisia is not a country that struggles too much. However, it seems that after one decade since the Arab spring occurred, the economic and political situation is not that flourishing. Thus, to put into effect the ambitions of the former Tunisian minister Tunisian government needs to find adequate funds and have to establish some economic and political stability.

5.3 Political challenges
With a current growth rate of -21.6 percent and a 19.5 percent decrease in exports and 23.2 percent in imports compared to the same timeframe in the first seven months of 2019 (National Institute of Statistics, n.d.), the Tunisian State appears to be struggling. It needs to find swift solutions to this troubling economic scoreboard.
To achieve this, an environment of social, economic and, above all, political consensus must be created.

However, sadly, the proliferation of political parties meant to bring stability and prosperity to this country, which suffered from dictatorship, has not resulted in stable and sound governments. In addition, the emerging political environment is not very productive.

The following two examples will enlighten the political interaction with the environmental issue in Tunisia.

On June 02, 2020, a plenary session concerning a draft fundamental law on the approval of Tunisia's accession to the protocol on the Barcelona Convention on the environment took place at the Assembly of People's Representatives, the legislative branch of government (Assembly of People's Representatives, 2020).

The signing of the protocol mentioned above and the proposal for its approval is part of implementing the commitments made by the Tunisian State under the Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention). This convention was adopted on February 16, 1976, by Tunisia and ratified by law n° 29 of the year 1977 on May 25, 1977.

The Tunisian State signed the protocol on January 22, 2008, and it was proposed for parliamentary approval in June 2020 by the fundamental bill n° 007/2020 after having followed all the legislative steps. However, the approval was postponed for scrutiny by vote because of the policy bickering (Assembly of the Representatives of the People, 2020).

Furthermore, in its latest report, the World Health Organization (WHO) ranked Tunisia among the ten most polluted African countries, based on data collected in the four major Tunisian cities of Tunis, Sousse, Gabes, and Bizerte (Hortense, 2019). Even though its data are based on terrestrial sources, it is worth noting that in these cities, there are the four major ports of Tunisia. This report was contested by the ANPE, the Tunisian agency responsible for monitoring the land-based emissions (Hortense, 2019).
These two examples were a snapshot of the political challenges that could face the implementation of the IMO sulphur cap, especially in case of suggesting a draft law of national regulations related to Annex VI. Nevertheless, before arriving at the suggestion of these laws to the parliament, someone must draft them first, which leads directly to the following paragraph dealing with the organizational challenges.

5.4 Organizational challenges

Bureaucracy and delays in decision-making remain one of the main characteristics of developing countries. Indeed, Tunisia's 2013 VIMSAS audit report highlighted some of these organizational issues in the maritime administration related to this failure. However, as confirmation of this latency, the Tunisian government has taken at least four additional years, compared to the deadlines suggested in this report, to start implementing certain recommendations of this audit. For example, after noting the absence of a systematic strategy targeting all the general duties and responsibilities required by the IMO, it was decided to correct this defect that the Tunisian State should create a ministerial committee responsible for implementing the national maritime affairs strategy (IMO, 2013). In this same recommendation, it was planned to create a secretariat for maritime affairs, under the auspices of the governmental authority, which will be responsible, among other things, for ensuring coordination between the various actors of the maritime sector and for monitoring how The State assumes its responsibilities in the maritime domain.

The proposed implementation date was December 2014 (see Appendix C). Still, the publication of the government decree relating to the creation of this secretariat was in 2019, and until now, it is only a written decision (Governmental Decree n°2019-144, 2019). Besides, the organization of the Maritime Merchant and Ports Office (OMMP) violated the prerogatives of exercising maritime authority because of the role of this latest within the OMMP and its active involvement in potentially commercial practices (see Appendix E). The date of correcting this failure should not exceed 2015. However, like the previous example, the reorganization of the OMMP was only put in place in 2019 (Governmental Decree n°623-2019, 2019) and it is not yet activated.
Finally, the performance of the ports was also very poorly evaluated compared to other regions of the world. ITF statistics indicate that in 2015, the average handling time for container ships on Tunisian docks was 2.8 days, compared to one day as a worldwide average. The approximate average dwell time for cargo in 2015 was 12 days, much longer than that reported in global seaports (OECD, 2019). This situation affects this research in whether ships wait a long time in the bay or in the port, which adds time to exposure to air emissions from ships.

5.5 Technical challenges
Considering the updated Annex VI, IMO was inviting Member States to update their Port State control methods via the resolution MEPC.181 (59) to afford consistency on the conduct of inspections. These methods, exposed in the section of this paper, need a high level of knowledge in oil for the PSC officer and technology to analyse fuel sampling. It could not be easy to realise when a detailed inspection is required.

Furthermore, national laws such as the Tunisian hydrocarbons code governing the regulation of fuel oil suppliers (Law n°99-93, 1999) do not have to explicitly implement all aspects as set out in MEPC.181(59) guidelines, as these guidelines are only suggestions to the supervisory authority (IMO, 2009). Thus, in Tunisia, the lack of related laboratories and qualified Port State control officers will handicap the success of the fuel sampling in case of inspection.

From another side, as a Flag State, Tunisia, with his fleet almost serving the line to and from Europe have the challenge to meet the more strict EU directives related to the sulphur emission reduction.

Indeed in Europe directive (EU) 2016/802, known as the ‘Sulphur Directive’, controls SOx releases from vehicles. It imposes limitations on the maximum sulphur content of gas oils, heavy fuel oil in land use operations and marine fuels (EMSA, 2020). On 1 January 2015, more restrictive marine fuel sulphur levels were introduced in SECAs (0.1%). Furthermore, from 1 January 2010, a 0.1 percent maximum sulphur standard was adopted for fuels used by vessels at berth in European ports (Directive (EU) 2016/802, 2016).
To meet these needs, Tunisian shipping companies have to update their equipment and improve the knowledge and competency of their crew. However, all these enhancements rely on budget, connected to economic stability and the flourishing of shipping.

Unfortunately, it is not the case of Tunisia and one of the consequences of the degradation of the technical level of Tunisian vessels is that the Paris MoU ranked the Tunisian flag under the blacklist this year (The Paris MoU authority, 2020).

5.6 Corruption

Corruption is the abuse for private benefits of public power (Yale University, 2018). Stiglitz (2002) asserts, "The government is meant to behave in the interests of the people, not to use its immense power to support its members or private businesses at the detriment of the wider public." (Sapir, 2002).

Corruption is a worldwide issue that affects all nations and all areas of operation around the world. The African countries in specific are often marked by weak governance while dealing with this issue. Statistics on the Corruption Perceptions Index (CPI) between 2004 and 2011 reveal that as a mean value: four to five African States are within the ten ones considered as the world's most corrupted. The CPI rating for Tunisia dropped significantly to 79th in 2014, whereas it was 59th in 2010 (Sekrafi & Sghaier, 2018).

In Tunisia, the high level of corruption correlates with lousy behaviour in environmental sustainability. The Environmental Performance Index (EPI) reports that Tunisia was classified 58th out of the world's 180 nations, and fourth in Africa, with a performance of 662.35 out of 100. Corruption, therefore, impacts environmental legislation by incorporating prejudice, not only in the adoption phase but also in the implementation and compliance of these rules (Yale University, 2018). In a country labelled by corrupt practices, polluters can avoid environmental regulations by promising bribes to the environmental regulatory bodies.
Chapter 6: Recommendations and conclusion

Tunisia is among the Mediterranean countries most vulnerable to climate change (UNDP Tunisia, 2020) to face it; it must invest more in human, material, and technical resources. It requires a large budget, which will only be allocated after having guaranteed the interest of public opinion and decision-makers on the importance of reducing pollutant emissions. More challenging to do is to have their consent to invest in improving techniques and controlling the levels of their emissions. To achieve such improvement, a global strategy will have to be implemented, including reducing sulphur emissions from ships, subject of this research. The following is an elaboration of what was found during this study on Tunisia, followed by an attempt to set up a roadmap to be followed to implement the sulfur cap 2020 successfully. This essay will be based on some techniques for establishing the policies taught at the World Maritime University.

6.1 SWOT/TOWS analysis
This combined SWOT/TOWS analysis will try to discover out the strategic plan to reach the success of implementing the sulphur emission reduction from ships. Based on the data collected from different sources, both primary and secondary, the following table summarizes on the one hand, the strengths and weaknesses of the Tunisian framework related to the topic of this research. On the other hand, it shows the opportunity and threats that can affect Tunisia.
Table 4. SWOT analysis

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1: Tunisia is a member of regional collaborations (Med MoU, REMPEC).</td>
<td>W1: Lack of awareness about the environmental issue from the public.</td>
</tr>
<tr>
<td>S2: A variety of codes regulating maritime traffic in Tunisia.</td>
<td>W2: Poor coordination between the different agencies involved.</td>
</tr>
<tr>
<td>S3: Diversified maritime administrative services.</td>
<td>W3: Bureaucracy and slow decision-making.</td>
</tr>
<tr>
<td>S4: The existence of several institutions concerned by the reduction of sulfur emissions.</td>
<td></td>
</tr>
<tr>
<td>S5: The establishment of a new general secretariat for maritime affairs.</td>
<td>W4: Lack of budget and technical means for enforcing the regulations.</td>
</tr>
<tr>
<td>S6: The Tunisian Strategic Action Programme (SAP) is focusing on reducing emissions from land-based sources.</td>
<td>W5: Lack of qualified personnel to enforce Annex VI</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPPORTUNITIES</th>
<th>THREATS</th>
</tr>
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<tbody>
<tr>
<td>O1: The emergence of necessity to tackle climate change on a global scale.</td>
<td>T1: Entry of substandard ships into Tunisian territorial waters and ports.</td>
</tr>
<tr>
<td>O2: The regional cooperation with EU countries.</td>
<td>T2: The loss of the confidence of the global shipping community (Tunisia is listed this year on the Paris MoU blacklist).</td>
</tr>
<tr>
<td>O3: European countries pressure to designate the Mediterranean sea as a SECA.</td>
<td>T3: Failure of control of ships navigating in Tunisian waters or entering its ports.</td>
</tr>
<tr>
<td>O4: EMSA provides technical training for Tunisian Maritime Authority personnel.</td>
<td>T4: The reduction in competitiveness compared to the ports of neighboring countries i.e. Algeria and Morocco.</td>
</tr>
<tr>
<td>O5: The Green Voyage project 2050 (IMO and Norway) will enhance skills in emerging countries.</td>
<td>T5: Deterioration of the marine environment in Tunisia.</td>
</tr>
<tr>
<td></td>
<td>T6: Risk of Tunisian waters becoming a discharge site for shi;e from scrubbers in the event of non-enforcement of Annex VI</td>
</tr>
</tbody>
</table>

From this table some strategic options can be elaborated according to the TOWS analysis.
Table 5. TOWS analysis

<table>
<thead>
<tr>
<th>Internal factors</th>
<th>Strengths (S)</th>
<th>Weakness (W)</th>
</tr>
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<tbody>
<tr>
<td>S1</td>
<td></td>
<td></td>
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<td>S2</td>
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<td>S3</td>
<td></td>
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<td>S4</td>
<td></td>
<td></td>
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<tr>
<td>S5</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>External factors</th>
<th>Opportunities (O)</th>
<th>Threats (T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>O1</td>
<td>S3/02/03: Being part of the Med MoU will facilitate Tunisia's admission into the regulatory framework of the future SECA in the Mediterranean sea. This accession will strengthen national legislation relating to the implementation of Annex VI.</td>
<td>T1/T2/T3: Through the Med MoU, Tunisia can have information about the deficiencies of the vessels sailing in the Mediterranean sea. However, it is not enough if Tunisia does not put stringent rule and implement Annex VI.</td>
</tr>
<tr>
<td>O2</td>
<td>S2/01: The need to mitigate climate change will be the guide to amend existing national legislation relevant to the sulphur cap.</td>
<td>T3/T4/T5/T6: Establishment of a general secretariat of maritime affairs will give positive impact and can bring back the trust of shipping companies.</td>
</tr>
<tr>
<td>O3</td>
<td>S6/01a: Based on the Tunisian SAP of 2016-2022, the issue of annex VI can be evoked under the national plan to reduce air emission.</td>
<td></td>
</tr>
<tr>
<td>O4</td>
<td>W1/01: The rise of public awareness about the danger of environmental issues on human life will encourage the introduction of a reduction of sulphur emission.</td>
<td>W2/03/04/05: The cooperation with EU countries that are pushing to generalize more stringent regulation in the Mediterranean region will drive the Tunisian government to take further steps to mitigate environmental issues.</td>
</tr>
<tr>
<td>O5</td>
<td>W3/02/03: The cooperation with EU countries that are pushing to generalize more stringent regulation in the Mediterranean region will drive the Tunisian government to take further steps to mitigate environmental issues.</td>
<td>W4/05/06: Taking advantage of the future opportunities of the green voyage project 2050 and the EMSA training sessions will improve capacity building and technical level.</td>
</tr>
<tr>
<td></td>
<td>W4/05/06: Taking advantage of the future opportunities of the green voyage project 2050 and the EMSA training sessions will improve capacity building and technical level.</td>
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</table>

From this table, some strategic steps can be deduced to attract the attention of decision-makers, ministers, and parliamentarians, on the significance of implementing Annex VI. These steps are listed not in a specific order:
• The fact that the Tunisian fleet was recently ranked in the blacklist of Paris MoU can be used to put the light on the degradation of the reputation of Tunisia in the Mediterranean region.

• Focus on the incentive that global cooperation offers to tackle the air emissions from ships issues such as the green voyage 2050. However, this project is dealing with the abatement of Greenhouse Gases GHG (IMO, 2019b), but it offers an opportunity to encourage further steps in reducing air pollution from ships.

• Explain to the decision-makers that in case of persistence of the actual obstacles facing implementing Annex VI, the environmental situation will worsen.

• Connect the awareness of the reduction of air emission from land-based sources established in the Tunisian national plan (European Environment Agency, 2014) with air pollution from ships and target the sulphur emission.

• Explain the importance of following international treaties and insist on gathering the legal monitoring of IMO instruments tasks under one agency. This agency can be the new general secretariat of maritime affairs, to avoid redundancy and lack of effectiveness.

These strategic directions can be used while establishing an implementation policy for the sulphur cap IMO 2020. Regarding making this policy, this dissertation suggests the following recommendations.

6.2 Recommendations

When the public attention is drawn to the importance of preserving the atmosphere, climate change, and the effect of ship pollution (sulphuric rains and so on), then the advantage of using policy advocacy appears. Policy advocacy is known as the method of influencing and facilitating a discussion in which robust networks, opinion influencers and eventually decision-makers borrow your thoughts, facts, and proposals, and then act accordingly (Young & Quinn, 2012).
Based on this research work that has been done to develop this dissertation, a policy advocacy could be recommended to the Tunisian stakeholders and institutions responsible for the implementation of the Sulphur Cap 2020. This policy advocacy is as follows:

**Advising:** Through think tanks or academics appointed to study the environmental effects of sulphur pollution in Tunisia. Typically, this means collaborating with those in government and creating new scientific analysis to help them make a policy decision. This action could begin with the new general maritime affairs secretariat, which will bring the case to the surface and put its print on the governmental agenda.

**Media campaigning:** Having the environmental issue as a public State of matter gives the feeling that some pressure is on decision-makers and needed to achieve results. It can be done through social media and in cooperation with civil society and NGOs.

**Lobbying:** Through talks and direct discussions with politicians or influential people to convince them of the vital issue of sulphur emission on the environment and convince them of the benefits that Tunisia can have by implementing the Annex VI.

**Activism:** It is a way to put pressure on politicians who seem unaware of the emergency of the issue. In Tunisia, there are many organizations of youth who are very open to any action that helps them to protect their future and their country like the Junior Chamber International (JCI). Additionally, there are almost 75 NGOs in Tunisia divided into 15 interested in biodiversity and 51 interested in conserving the environment (arab.org, 2020).

This policy advocacy would also capitalize on the monetary contribution that will result in the enforcement of regulations and access to larger trade opportunities and avoid low standard vessels coming to Tunisian ports.

Wright and Gen suggested a rational model that applies policy advocacy (Gen & Wright, 2015). The logic model defines at least two different advocacy goals, and possibly five advocacy approaches. Among these five approaches, the two most relevant to this research are illustrated in Figure 4 and Figure 5.
Figure 4. Policy advocacy logic model with “Direct reform” choice

Source (Gen & Wright, 2015)

Note: (Links between components of the logic model are from left to right, as the time frame above the logic model indicates)
This logic model will be practical to apply to achieve the goal of drawing attention to the importance of reducing sulphur emissions and facilitating access to implement Annex VI.

In Tunisia, the choice of direct reform, through a presidential decision (see Figure 4), would be exploitable with the presidential regime, which was before the revolution of 2011. However, after the revolution and the change towards a semi-presidential regime and the rise of pluralism in politics (Schäfer, 2015), it is evident that the choice of decision-makers (see Figure 5) will be adequate and feasible if the necessary efforts are met.
Following the time frame displayed in figure 5 and applying the four essential components of the policy advocacy (advising, media campaigning, lobbying, and activism), the first step will be to have the requirements to go through this process. Such conditions are to have a strong relationship with the people working in the maritime and environmental fields, get good knowledge and specialized skills about the sulphur emission matter, having a sense of agency and the necessary material resources. After that, establish activities aiming to engage the public through information campaigns and build coalitions. The proximal results will consist of a rise of awareness of the people and decision-maker about the necessity of implementing the IMO sulphur cap 2020. Once the access to implementation is granted after attracting the public and political opinion interest, called the proximal outcome in Figure 5, the next step will be the distal outcome. It consists of the adoption by the parliament of Annex VI regulations in the Tunisian domestic law. Once that occurs, the new enforcement law will be performed by the government, the maritime and legal agencies, ship-owners and port authorities. These stakeholders are listed and their roles are explained in Table 1.

When it comes to reducing the sulphur emission, regulation 14 of Annex VI of MARPOL should be incorporated in national law. This regulation lays down measures for regulating sulphur oxides and emission levels of particulates and extends to all fuels for use on-board ships. Incorporating regulation 14 should consider previous domestic law and should have an exception for sections 14.2 and 14.8 to 14.10 relating to the functions to be performed by IMO and not by the Member State (IMO, 2008); thus, they are not pertinent to be included in the Tunisian national law.

Regarding the technical aspect, Tunisia can do the following to meet the implementation of Annex VI:

- Use alternative energy sources such as solar energy (in ports), but this relies on the political will, collecting the necessary funds and technical knowledge.
- Suggest cooperating with EMSA, which has this technology, about drones equipped with snifffers flying over vessels while sailing in Tunisian waters. The
so-called “sniffer technology” has been tested over the waters of the Great Belt in Denmark (Safety4sea, 2020).

- Install recipient facilities to collect sludge from scrubbers.
- Reinforce the framework of the RNSQA, explained in paragraph 4.4.1.2, by installing more stations in the port areas.
- Reduce latency in decision-making and get the right funds to develop the technical installations on board to enforce and implement the Annex VI requirements.

6.3 Conclusion

It appears from the institutional framework established in chapter 4 that Tunisia already has the infrastructure to implement Annex VI well. Still, the central gap is the lack of political will and financial resources. With some cooperation between different agencies in all departments and ministers related to mitigating air pollution and law enforcement, implementing the sulphur cap can be solved.

Besides, the legal framework already exists but needs some updates and revisions to incorporate sulphur cap requirements in the domestic law. After that, a continuous up to date to follow the new amendments is required. This revision can be done by establishing a department in the latest general secretariat of maritime affairs, cited in chapter 4, responsible for the regulatory watch of conventions.

Finally, a comprehensive approach must tackle all environmental issues in the Mediterranean Sea, including sulphur emission reduction. Tunisia and neighboring countries from both sides of the Mediterranean Sea were aware of that fact and they already started together in several bilateral agreements and cooperation to exploit the complete capacity of the region’s Blue Economy and guarantee a safer, and effectively governed maritime area (WestMED blue economy initiative, 2019). Considering the national level, the Tunisian government is aware of the necessity of tackling air pollution only from land-based sources (European Environment Agency, 2014). Thus, to connect this awareness to sulphur emission from ships, some actions need to be taken.
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Appendices

Appendix A

Formulaire A-06-08

<table>
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<tr>
<th>CONCLUSIONS</th>
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<tr>
<td>État Membre : TUNISIE</td>
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<tr>
<td>Département ou service : DGMM</td>
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<tr>
<td>Défaut de conformité No :</td>
</tr>
<tr>
<td>CONCLUSION : Constatation :</td>
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Il n’a pas été démontré que l’Administration assure une veille réglementaire systématique et en communique les résultats à l’ensemble du personnel concerné.

<table>
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<tr>
<th>DISPOSITION APPLICABLE DE LA NORME RELATIVE À L’AUDIT :</th>
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<tbody>
<tr>
<td>Code, partie 2, paragraphe 16.1 - L’État du pavillon devrait mettre en place les moyens et les procédures</td>
</tr>
<tr>
<td>1    instructions administratives pour appliquer les règles et normes internationales applicables et diffuser la réglementation nationale.</td>
</tr>
</tbody>
</table>

Auditeur : P. MITTON  
Date : 25/10/2013

Responsable de l’équipe : P. MITTON  
Date : 28/10/2013

État Membre : (Signature)  
Date à laquelle le formulaire a été reçu : 28/10/2013
Appendix B

Formulaire A-OB-11

CONCLUSIONS

État Membre : TUNISIE  
Période visée par l’audit :  
21-28 OCTOBRE 2013  
Département ou service : DGMM  
Dossier No : infraction Marpol  
Défaut de conformité No :  
Constatation No : 11  

CONCLUSION :  
Constatation :

L’Administration n’a pas démontré que les infractions nécessaires à l’application de la convention MARPOL entre autres celle relative à la prévention de la pollution de l’atmosphère par les navires sont incorporées à la législation nationale.

DISPOSITION APPLICABLE DE LA NORME RELATIVE À L’AUDIT :

*Code, partie 1, paragraphe 7 - L’Administration doit s’assurer que chaque fois qu’un instrument obligatoire de l’OMI, nouveau ou modifié, entre en vigueur à l’égard d’un État, le gouvernement de cet État doit être en mesure d’en appliquer et d’en faire respecter les dispositions en adoptant la législation nationale appropriée et de mettre en place l’infrastructure requise pour son application et le contrôle de son respect.*

Cela signifie que le gouvernement de l’État en question doit pouvoir promulguer des lois qui lui permettent d’exercer effectivement sa juridiction et son contrôle dans les domaines administratif, technique et social sur les navires battant son pavillon et qui, en particulier, offrent le cadre juridique pour les prescriptions générales relatives aux registres maritimes, l’inspection des navires, l’adoption de lois en matière de sécurité et de prévention de la pollution applicables à ces navires et l’élaboration de la réglementation connexe.

auditeur : B. DUGUAY  
Date : 24/10/2013  

Responsable de l’équipe : P. MITTON  
Date : 28/10/2013  

État Membre : (Signature)  
Date à laquelle le formulaire a été reçu : 28/10/2013
# Appendix C

## Narrative

The State was audited under VIMSAS, with the Code for the implementation of mandatory IMO instruments (resolution A.1054(27)) as the audit standard.

During the audit, the following were established:

1. four observations were revealed on General;
2. eight non-conformities and eight observations were revealed on the flag State activities; and
3. two non-conformities were revealed related to port State activities.

There were a number of areas of good practices revealed, as well as areas where improvements were possible; Details of the foregoing are as shown below.

## General

**Observation (OB)**

It was established that the State had not adopted an overall strategy covering all its general obligations and responsibilities under the mandatory IMO instruments to which it is a Party.

This finding was based on the exchanges with the Minister of Transport and the Director-General of the Merchant Marine, who outlined the Ministry’s strategy in detail. The strategy did not, however, cover all obligations under the mandatory IMO instruments to which the State is a Party (Code, part 1, paragraph 3).

**Corrective action**

The draft maritime strategy seen by the audit team will be supplemented to cover coastal State obligations and submitted to various departments for validation. Once validated in this way, the strategy will be communicated for application by the various parties concerned.

A draft decree establishing a ministerial committee charged with drafting national strategy on maritime affairs and considering matters relating to maritime activities and maritime spaces under the State’s jurisdiction is being finalized. This project will establish a secretariat for maritime affairs within the government, with responsibilities, including coordination among the various maritime stakeholders and monitoring the enforcement of the State’s obligations in the maritime sphere.

**Proposed implementation date:** December 2014.

**Root cause**

The drafting and validation of a national maritime strategy covering all flag, port and coastal State obligations call for coordination among several departments (ministries of the interior, defence and the environment). The lack of a national...
## Appendix D

### Formulaire A-NC-10

#### CONCLUSIONS

<table>
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<th>État Membre : TUNISIE</th>
<th>Période visée par l’audit : 21-28 OCTOBRE 2013</th>
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<tbody>
<tr>
<td>Département ou service : DGMM</td>
<td>Dossier No : marpol annexe VI</td>
</tr>
<tr>
<td>Défaut de conformité No : 10</td>
<td>Constatation No :</td>
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**CONCLUSION : Défaut de conformité :**

L’Administration n’a pas démontré que les prescriptions relative à la Règle 13 de l’Annexe VI de la convention MARPOL sont imposées à chaque moteur diesel marin d’une puissance de sortie supérieure à 130 kW installé à bord d’un navire.

**DISPOSITION APPLICABLE DE LA NORME RELATIVE À L’AUDIT :**

**MARPOL, Annexe VI, règle 13 ; Code, partie 2, paragraphes 15.1 et 16.1**
- Oxydes d’azote (NOx) - Oxydes d’azote (NOx) l’Administration doit s’assurer que l’application de la règle 13 de l’Annexe VI est imposée à bord de tous les navires,

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<tr>
<th>auditeur : B. DUGUAY</th>
<th>Date : 25/10/2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsable de l’équipe : P MITTON</td>
<td>Date : 28/10/2013</td>
</tr>
<tr>
<td>État Membre : (Signature)</td>
<td>Date à laquelle le formulaire a été reçu : 28/10/2013</td>
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</table>
body responsible for an overall approach and the coordination and harmonization of each stakeholder’s plan of action is at the root of the delay in developing an overall maritime strategy.

OB

The way in which the Merchant Marine and Ports office was organized is detrimental to the maritime authority’s use of its powers, owing to close involvement in commercial activities which could give rise to internal conflicts of interest (Code, part 1, paragraph 3.4).

Corrective action

As a first step, the reorganized Merchant Marine and Ports office has separated the maritime authority’s powers from those of the port authority and services by setting up a body within the Merchant Marine under the responsibility of a central director.

As a second step, a reorganization of the maritime administration and maritime authority in the State will be proposed and introduced in the framework of a maritime twinning arrangement with the regional organization which is currently being set up.

The new organization will enable better governance of the maritime sector and assist the maritime administration to fulfill its obligations. Proposed implementation date for selection of model maritime administration is December 2014 for introduction in 2015.

Root cause

In 1996 the Ministry of Transport reorganized its central services by transferring powers from the Administration and the maritime authority to the Merchant Marine and Ports office. This reorganization was intended to consolidate the maritime authority and the port authority, withdraw the Merchant Marine and Ports office from commercial activities and improve the quality of the services provided by the maritime authority.

The delay in implementing these objectives and the involvement of the Merchant Marine and Ports office in commercial activities are the cause of the interference of powers of the maritime authority in port operations.

OB

The maritime administration had not adopted a procedure for evaluating its performance, on a regular basis, in relation to the implementation of administrative processes, procedures and resources necessary to meet its obligations in accordance with the requirements of the conventions to which the State is a Party (Code, part 2, paragraphs 42 to 44).
Appendix F

Interview questions

Questions to personnel working in the maritime industry:

1) What is your actual position, and how many years have you been in the Maritime industry?

2) How can your work be related to the IMO Sulphur emission reduction?

3) According to your knowledge, what are the procedures to apply the IMO Sulphur emission reduction?

4) There are any cases of ship detention or due to not observance to fulfill MARPOL annex 6 requirements since 1 January 2020? Yes/no

5) If yes, what were the steps taken to punish the offender?

6) If yes, it was based on which rule?

7) As a flag State, which choice you have made: scrubbers or low Sulphur oil?

8) If no yet, what are the main obstacles to do so?

9) What do you suggest as regulatory steps to implement the IMO Sulphur cap comprehensively at the national level?

10) What do you suggest to implement and respect this Sulphur emission reduction?

11) According to your opinion: is Tunisia ready to be part of a large SECA englobing the Mediterranean Sea?

Questions to parliamentarians:

1) Who are the official providers of marine fuel in Tunisia?

2) Do they comply with the required quality of low Sulphur fuel?

3) Does this provider face any obstacles? If yes, which are these obstacles?
4) From the side of legislation, is there a global awareness among the parliamentarians about the impact of implementing the IMO instrument about the sox reduction in the national legal framework?

   i) If yes, so why this delay in taking a step further in implementing?

   ii) If no, what are the main reasons for this lack of awareness?

5) How do you see the procedural steps to get full implementation of the IMO Sulphur emission reduction in the Tunisian law?