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Environmental Regulation Of Natural Gas Development In Greece: Traditional LNG vs FLNG

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A thesis submitted for the degree of

Master of Science (MSc) in Energy Law, Business, Regulation and Policy

February 2018

Thessaloniki – Greece

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I hereby declare that the work submitted is mine and that where I have made use of another's work, I have attributed the source(s) according to the Regulations set in the Student's Handbook.

February 2018
Thessaloniki - Greece

Abstract

This dissertation was written as part of the MSc in *Energy Law*, *Business*, *Regulation* and *Policy* at the International Hellenic University.

It stands as a modest effort to critically assess the environmental regulation of Greek natural gas resources, with a view to take the analysis a few steps further to the comparison of installations that are part of the traditional LNG supply chain with the FLNG facility that is currently in its infancy. The objective is to further understand the concept behind the existing legislation. Additionally, the present study shall be an attempt of introducing a set of proposals towards a more comprehensive legal framework that could lead to the creation of a substrate for a better environmental approach of FLNG units.

At this point, I would like to thank my supervisor, Dr. Tina Hunter, for the patient guidance, encouragement and kind advice she has provided throughout my time as her student.

Keywords: Environmental Law, Natural Gas, Greece

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February 16, 2018

Preface

Over the last decades, the global gas market has experienced a substantial growth. Advanced onshore and offshore drilling techniques have made it possible for the recoverable amount of natural gas to increase significantly. Focusing on the offshore industry, traditional offshore platforms keep sending partially processed natural gas to onshore terminals for further processing in order to be made available for distribution. Offshore drilling is an economically feasible option only where the natural gas fields are fairly close to the shore or an existing pipeline network. Nevertheless, an estimated 40% to 60% of the world's proven gas reserves are remote or stranded. With recent finds of promising reserves around the world and a global shift towards decarbonised national economies, the need for the development of new production options emerged.

A new kind of production facility, known as Floating Liquefied Natural Gas (FLNG) has been developed towards that direction. In essence, it is a floating platform that can function relatively independently, eliminating the need for expensive pipeline infrastructure as it makes the gas easily transportable by liquefying it onboard. On the other end of the natural gas chain, another innovative development is the Floating Storage and Regasification Units (FSRU) on which the LNG is regasified so that it can be supplied to final customers. The technological concept of these platforms has its roots in the land-based and offshore LNG industry and borrows from marine technology.

These alternatives present noticeable benefits not only regarding market flexibility, investment costs and speed of project realisation, but also from an environmental point of view. FLNG vessels outperform the conventional onshore LNG processing trains and the offshore platforms that they're linked with by avoiding land-take, long seabed pipelines, and coastal dredging. Their redeployability makes them even more attractive to investors. However, they are not risk-free. For that reason, there must be a very careful approach in terms of environmental law both at international and national level, in order to properly regulate their operation. The present study attempts an assessment of the environmental regulation of offshore operations in Greece, asking whether there

is an appropriate legal basis for environmental protection against the risks of FLNG units.

Contents

Introduction

The offshore exploration and exploitation of hydrocarbons offer great opportunities but also considerable risks. All aspects of hydrocarbon production, from seismological research and exploratory drillings to storage and transportation, are performed by properly equipped offshore installations whose operation is not exempt from serious environmental implications, which translate into financial losses. In the LNG industry, the emergence of FLNG units has raised hopes for the development of stranded gas reserves that would otherwise be uneconomical. The new prospects of production are accompanied by new challenges.

Environmental protection during offshore activities is heavily contingent upon regulation and economic efficiency. In order to be effective, the environmental regulation of these activities must strike a balance between comprehensive protection and requirements that may be economically unattractive to investors in the long run. Traditionally, the regulation of the sector has been focused on the identification of the negative environmental impacts of offshore petroleum exploration and production and the subsequent imposition of restrictions for their minimization. As technology evolves and the global market conditions that determine the openness to investments alter, the question arises as to whether this prescriptive approach can guarantee maximum protection taking into account the specificities of the sector.

This has given rise to a major debate across the EU and beyond regarding the legal regime of offshore units. A well-established single legal framework at international level dealing with floating production of hydrocarbons and its peculiarities has not yet come into existence. To date, the international regulatory framework under which offshore projects are granted approval identifies in a number of international conventions and the rules issued by classification societies. What is more, offshore oil and gas installations are not enshrined in the current legal regime as an autonomous concept. The international legislation in force has not adopted a uniform definition of offshore installations either. In fact, definitions vary among international legal texts as they are in line with their scope of application and do not necessarily coincide with those set out in national legislation.

In Greece, the national law applicable to offshore installations raises several issues. Besides, it is only in more recent years that Greece has become more active in the field of hydrocarbon prospecting and the progress that has been made in this regard is quite slow. Given the fact that the country has to cope with these challenges in a context of financial crisis and political instability which causes constant changes in energy policies, environmental regulation of the oil and gas industry becomes more challenging.

The recent increase in known reserves of natural gas point to a large production potential, however whether it will be able to fulfil both domestic needs and up to, allegedly, one fourth of European demand (Coats, 2013)[1] in the future remains disputable. Irrespective of whether Greece evolves into a large exporter in the region taking advantage of the concurrent field development projects in the eastern Mediterranean, the Greek economy is currently in deep recession and it will need a stable, long-term national energy planning putting aside party political game and government cycles, in order to give the sector a promising future and receive much needed revenues.

In this light, environmental approval of offshore exploration and production must be based on a clear national strategy that will favor the preservation of the natural wealth of Greece without hindering the licensing procedure. This study aims to critically appraise the coherence and effectiveness of current Greek environmental regulation of activities involved in the rapidly expanding offshore LNG sector, highlighting any obstacles to developments owing to the shortcomings and inconsistencies of the legislation in force.

First, there will be an introduction to the legal concept of offshore installations and its compatibility with the nature of FLNG units, followed by an overview of the national as well as the international legislation regarding the safety of offshore oil and gas operations including EU-wide rules that have been transposed into Greek legislation. Lastly, conclusions are drawn as per the efficacy of the legislation.

[1] Coats, C. (2013, December 12). How Real Is Greece's Oil And Gas Future? Retrieved from https://www.forbes.com/sites/christophercoats/2013/12/12/how-real-is-greeces-oil-and-gas-future/#b11288603410

1. Offshore Units And Environmental Law

This chapter analyses issues arising from the legal reasoning behind the national and international regulation of offshore units after a brief presentation of the environmental implications of their operation.

1.1. Types of Units and Imminent Risks

Offshore units that are used in offshore petroleum exploration and exploitation have conventionally been divided into categories according to their construction, mobility and character of their activities. Hence, offshore drilling structures can either be fixed or mobile drilling units (MODU) and include drillships, semi-submersible vessels and platforms with rig-jacking systems, which are most extensively used during the exploration phase. Similarly, production and storage may either be carried out by fixed platforms anchored directly onto the seabed ("Fixed platform" n.d.)[2], or dynamically positioned floating platforms, such as Floating Production Storage and Offloading (FPSO) vessels and Floating Storage and Offloading (FSO) vessels.

FPSOs in particular, are used for oil production and are specially designed for processing and offloading. Their technology offers the alternative possibility of converting an oil tanker for the same purpose. They produce and/or receive hydrocarbons from subsea templates or nearby platforms, process them and store them prior to their transportation via tankers or, less commonly, through pipelines. FSOs on the other side, are used for storage without processing.

Like FPSOs, FLNG units can carry out production, processing and storage of natural gas until it is offloaded onto tankers for transportation to the markets. The difference is that FLNG units offer the advantage of full scale processing, actually the same as an onshore terminal but at a much less environmental footprint.

The operation of these installations has an adverse impact on the environment throughout their entire life cycle. The environmental burden consists in marine pollution resulting from dredging, hydrocarbon releases during drilling or from leaking pipelines,

[2] Fixed Platform. (n.d.). In *Wikipedia*. Retrieved from https://en.wikipedia.org/wiki/Fixed_platform

and, where offshore installations demand coastal land for their onshore activities (Kindt, 1985),[3] water and air pollution.

More specifically, undesirable waste discharges during all stages of offshore operations, such as produced waters, drilling fluids (also known as drilling muds), sands, residuals resulting from deck drainage, and sanitary wastes from offshore platforms that provide crew accommodations are responsible for an important part of total pollution. "Produced waters" is a term used to describe waters pumped into the wells for oil recovery, including formation waters. They contain inputs of oil and radioactive components and their management is a complex activity that is entirely dependent on the regulation governing their processing and disposal. Usually, produced waters are discarded at sea following their decontamination.

Drilling fluids that are used to facilitate production are toxic, especially if they are oil-based. A decisive factor behind the harmfulness of drilling muds is the cost of their components. These muds are usually reused into the production cycle or disposed in offshore waters following specific regulations. Residuals and other wastes are subject to the regulation of ships. Biocides used in the process, are also dangerous to marine life due to their toxicity and some are prohibited by law.

Furthermore, flaring of unusable associated gas along with combustion of fuels on platforms and onshore facilities contribute to atmospheric pollution (Patin,n.d.)[4]. Volatile organic compounds are also evaporated at all stages of hydrocarbon production. Although atmospheric emissions have not gained special attention since onshore plants, offshore platforms and vessels that support their operations (i.e. Offshore Support Vessels, etc.) are usually far from highly populated areas, their impact is not negligible, bearing in mind that the gases released can cause widespread ecological damage.

Apart from the regular impacts of offshore installations, pollution caused by accidents can irreversibly damage the marine environment and have a large impact on coastal economies. Most of the accidents are attributable to human error, such as lack of

[3] Kindt, J. W. (1985). The Law of the Sea: Offshore Installations and Marine Pollution, 12 Pepp. L. Rev. 2 Available at: http://digitalcommons.pepperdine.edu/plr/vol12/iss2/2

[4] Patin, S. (n.d.). Waste discharges during the offshore oil and gas activity . Retrieved from http://www.offshore-environment.com/discharges.html

proper risk assessment and misinterpretation of equipment readings (as in the Deepwater Horizon explosion) that lead to loss of drilling control. Among other frequent causes lie failure of explosion-proof systems, ship collisions with offshore installations and pipeline failures. Safety of offshore installations may also be jeopardised by extreme weather phenomena.

Traditional LNG activities pose an additional danger to the public and the environment. Historically, a groundbreaking achievement as the liquefaction of natural gas has not only been a blessing (BG Group, 2014).[5] Considering that the traditional LNG supply chain (Figure 1) involves pipeline networks, onshore plants for liquefaction and regasification, and LNG jetties for loading and unloading, this means that the dangers inherent in natural gas production and processing are added to the risks involved in commissioning and decommissioning of offshore platforms and onshore infrastructure and pipeline maintenance.

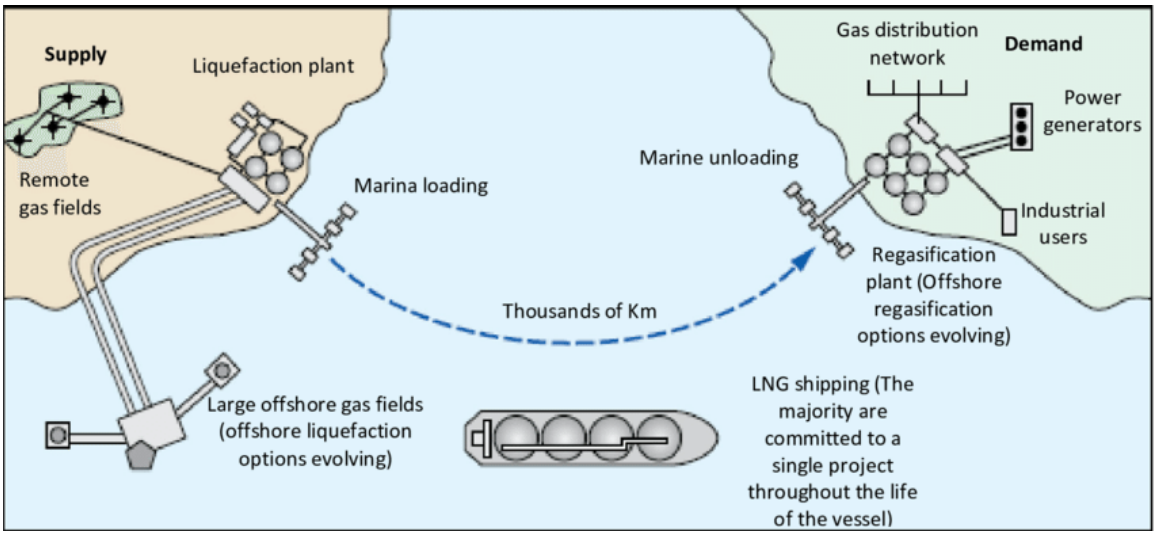

Figure 1: Key elements of traditional LNG supply chain (Mokhatab et al., 2014, p. 7)[6]

Accidental release of natural gas in large amounts and the consequent increase in the concentration of methane in the surface waters and in the air could severely affect the marine ecosystems, especially in areas that have been designated as Sensitive Areas,

[5] BG Group. (2014). *A Brief History of FLNG* [Brochure]. Author. Retrieved from http://www.britcham.org.sg/files/event_document/6/6LNG%20A5%20Booklet-FINAL.compressed.pdf

[6] Mokhatab, S., Mak, J. Y., Valappil, J. V., & Wood, D. A. (2014). *Handbook of Liquefied Natural Gas*. Elsevier Inc.

like the Mediterranean Sea. Like oil spills, the long-term consequences of immense flow of natural gas into the sea remain unknown. The exact impact on fisheries determined by the change in water temperature[7] and the fish response to natural gas, as it is instantly absorbed by their system through the grills, is undefined. The contribution of methane intoxication to the mortality of species and whether that toxicity can be assimilated in the food chain is also a grey area. Last but not least, the flammability of natural gas requires immediate action in case of an accident.

That being said, FLNGs seem to be a safer option. With all the processing done on-site, there is no need for the construction of an onshore processing plant, jetties and pipeline infrastructure or for compression units pumping the gas to shore. The disturbance during their decommissioning is comparably less. By mitigating the risk of natural gas escape from ruptured pipelines and avoiding onshore infrastructure and the associated degradation of the coastal environment due to aesthetic and noise pollution, FLNG units appear more attractive, especially for coastal states like Greece, whose economies rely largely on tourism and the prosperity of coastal regions.

The automatic reduction in CAPEX adds to that attractiveness. However, what makes FLNG a real game-changer is that it can be a strategic asset for governments worldwide, as it "is also conducive to side stepping complexities involving neighboring countries where disputes would make pipelines vulnerable or impractical" ("FLNG", n.d.),[8] like Greece and Turkey.

Nevertheless, FLNG remains a newly developed technology and environmental concerns still cast a shadow over its future. The risks of liquefaction are now transferred to the harsher environment of the seas and the risks concerning the wells have not vanished. The demand for a legal regime devoted to environmental protection during water-based LNG operations creates an obligation for the design of an effective legal architecture that will reflect a comprehensive approach.

[7] Research has shown that significant changes in water temperature may lead to migrations of marine organisms including the disappearance of indigenous species. That shift of the marine resources generates problems for the fishing community.

[8] Floating Liquefied Natural Gas. (n.d.). In Wikipedia. Retrieved from https://en.wikipedia.org/wiki/Floating_liquefied_natural_gas

1.2. Offshore Units as a Legal Concept in National and International Legislation

The fact that the offshore installations engaged in the offshore petroleum exploration and exploitation lack a uniform definition and interpretation creates legal uncertainty and inability to resolve practical issues. Instead, international and national legislation regulating offshore petroleum operations provide descriptive terms referring either to the constructional features or the activities of such installations. It is common practice for offshore installations to fall within the definition of ships. Whether offshore installations should be legally treated as "ships" or not is of high importance to the environmental concerns involved, especially where their definition determines whether they fall into the scope of international legislation safeguarding the environment or establishing liability for pollution damage.

The Directive 2013/30/EU on safety of offshore oil and gas operations, provides in Article 2 a detailed definition of offshore installations that addresses every stage of their lifecycle, but excludes the transportation of hydrocarbons. Another interesting definition is provided for under the Convention on Civil Liability for Oil Pollution Damage resulting from Exploration for and Exploitation of Seabed Mineral Resources (CLEE,1977),[9] the only legal text establishing civil liability exclusively for pollution from offshore installations, that finally did not come into force. According to Article 1,2 (a), installation means "*any well or facility, whether fixed or mobile, which is used for the purpose of exploring for, producing, treating, storing, transmitting or regaining control of the flow of crude oil from the seabed or its subsoil.*" As well as including the wells, CLEE also dissociated offshore installations from ships, according to Article 1,2 (e) (ii) stating that a ship as defined in International Convention on Civil Liability for Oil Pollution Damage (henceforth CLC), 1969, renewed in 1992 shall not be considered an installation.

The Offshore Pollution Liability (OPOL) Agreement[10] of operators of offshore installations defines the term "offshore facility" as any well or installation, mobile or fixed, that is used for the offshore hydrocarbon operations specified in Clause I(8), even

[9] See CLEE, available at http://folk.uio.no/erikro/WWW/HNS/Civil%20Liability%20offshore.pdf
[10] See OPOL, available at http://www.opol.org.uk/downloads/OPOL%20Agreement%20-%2021%20June%202017.pdf

where that installation has been removed from its operational site, except for "*any Offshore Facility located in the Baltic Sea or Mediterranean Sea to the extent that it and, in the case of any well, any installation from which it is drilled, are both to seaward of the low-water line along the coast as marked on large scale charts officially recognised by the Government of such Designated State.*"

According to international jurisprudence, offshore installations shall be deemed as ships despite the fact that they are not used for maritime trade. Their regulation as ships generates difficulties as well, since there is no single definition of ships either. CLC[11] that governs the liability of shipowners for damage caused from oil pollution defines ship as "*any sea-going vessel and seaborne craft of any type whatsoever constructed or adapted for the carriage of oil in bulk as cargo, provided that a ship capable of carrying oil and other cargoes shall be regarded as a ship only when it is actually carrying oil in bulk as cargo and during any voyage following such carriage unless it is proved that it has no residues of such carriage of oil in bulk aboard"* (Article 1, paragraph 1).

Since offshore oil and gas operations are aided by vessels configured to provide ancillary services and ships, including converted tankers, that carry out exploration and exploitation activities, the introduction of a regime regarding offshore installations and their separation from ships is rendered difficult. Admittedly, the factors that determine how the law treats offshore installations are summed up in the ability of the latter to navigate on a particular course, even not independently (given that pollution may be caused by towage too), and whether they are destined to remain static on the production site or equipped to fully realize their potential for transportation of hydrocarbons and crew.

Logic dictates that since the essential purpose of ships is the carriage of goods which presupposes their constant motion whereas offshore installations are intended to perform exploration and production activities in the course of which they remain on the production site, offshore installations including converted tankers should not be treated as ships. Nevertheless, their ability for transportation of hydrocarbons (regardless if they are self-propelled or not), even though it does not serve trade and it is not their primary

[11] See CLC, available at http://www.iopcfunds.org/fileadmin/IOPC_Upload/Downloads/English/Text_of_Conventions_e.pdf

purpose, and the adoption of an enlarged concept of "navigation" by some countries bring them within the scope of ship regulations.

As per the Greek legislation, Article 1 of the Legislative Decree No 117/1974 (OGG A 310/1974) on the designation of seaborne crafts as ships and their subjection to the respective provisions, stipulates that floating drilling rigs that have a gross tonnage of more than 5000 tons as well as floating refinery plants and floating storage units with a gross tonnage of more than 15000 registered tons, that are purpose-built or converted for exploration and drillings, extraction, processing and storage of oil or gas are classified as ships and therefore, specific provisions are applicable (such as provisions regarding registration, etc.).

In addition, according to the Greek Code of Private Maritime Law,[12] ship is any vessel with a minimum tonnage of 10 registered tons, able to *navigate independently* at sea. Offshore rigs are considered to be neither ships nor floating crafts under the abovementioned Code. Moreover, Ministerial Decision No 3231/8/89/28.7.1989 defines

"floating facility" as a vessel or seaborne craft that is purpose-built or converted for receiving, separating and storing oil residuals from ships, including oil tankers.

Apparently, the national regulatory framework reflects and interacts with the definitional problem of the international legislation. In this respect it should be noted that it was in response to a ruling from the Supreme Court of Greece[13] that the International Oil Pollution Compensation Funds (IOPC) proceeded to further guidance clarifying the definition of a "ship" (Marsh Ltd. 2016).[14] The guidance came out in 2015 and excluded vessels or crafts involved in the exploration, production or processing of oil (FDPSOs, FPSOs) from the CLC definition of a "ship".[15] Accordingly, these units would have no liability and the field operator would not maintain the right to limitation under the CLC. Nonetheless, the guidance does not constitute a valid interpretation of the

[12] See Article 1 of Law 3816/1958 (OGG A 32).
[13] Slops Case, 2006.
[14] Marsh Ltd. (Ed.). (2016). International Oil Pollution Compensation Funds' Guidance Clarifying the Definition of a "Ship". Retrieved from https://www.marsh.com/uk/insights/research/international-oil-pollution-compensation-funds-guidance-definition-of-ship.html
[15] The definition includes vessels that can be used as storage units and carry hydrocarbons in bulk, and ships converted to FSOs while maintaining the ability to navigate by their own power and undertake voyages, except for when they are moving away from the production site.

relevant international conventions and the option to take its advice remains within the competence of National Courts.

This obscurity creates legal gaps and inefficiencies, especially considering the environmental safety of the existing offshore installations, let alone the FLNGs. According to Aronsson, "*Regulations and rules based on previous experience within respective field could become too conservative or not conservative enough when applied to a floating LNG offshore unit. According to Det Norske Veritas (DNV) an LNG FPSO could be considered as an offshore installation and would therefore follow offshore classification practice. An FSRU could follow classification according to offshore or ship classification practice depending on the mode of operation. Alignment with rules for conventional LNG carriers would be an advantage as this would increase the transparency and possibility for standardisation in the building of floating LNG production vessels*. (Aronsson, 2012)."[16]

As promising as this alignment may sound, it may give rise to disputes with respect to coastal state jurisdictions. In other words, international law requires that every ship is registered to a country, namely the flag state. The flag state carries out certain obligations (i.e. determine the conditions for the ship's nationality, standards for seaworthiness, pollution liabilities, etc.) laid down under international law, in order to effectively exercise its jurisdiction on that ship. In the meantime, rights are granted to coastal states in relation to the treatment of ships or units that enter their national maritime space, including their exclusive sovereign rights regarding the exploration and exploitation of their natural resources.

In order to prevent any conflict of interests, and given that accidents related to offshore installations can have a transboundary effect, there must be a sound legislation with clear provisions governing these installations as a separate concept. The sophisticated technology of such installations and their ability to perform diverse activities should not lead to overcomplexity, as their nature may resemble to that of ships but their function is totally different and is subject to significantly more requirements compared to ships.

[16] Aronsson, E. (2012). FLNG compared to LNG carriers. Requirements and recommendations for LNG production facilities and re-gas units (Master of Science thesis). Retrieved from: Chalmers University of Technology Database. (Report No. X-12/279)

By way of illustration, it must be mentioned that classification societies and agencies assessing compliance with international conventions like Det Norske Veritas (DNV)[17] and Lloyd's Register (both are familiar with the registration practice), gather experience from the construction of LNG carriers and oil FPSOs and issue rules regarding the safety of offshore units including FLNGs. Vessels that are classed as LNG ships, for instance, follow specific rules in order to meet the safety requirements laid down in the relevant Codes issued by the IMO[18] addressing a set of risks (i.e. cryogenic release, etc.). The Codes are not mandatory, although they remain a preferable practice for most flag states. IMO leaves room for domestic jurisdiction of flag states.

Another example, is that in its Rules and Regulations for the Classification of Offshore Units,[19] Lloyd's Register classes fixed and mobile platforms under different notations, recognizes the operator of the unit concerned as solely accountable for its operation under the provided standards and lays down the operator's responsibility to ensure that the standards comply with the all requirements of the National Administration. In case the National Administration has not prescribed standards for these units, the Rules shall apply, however it rests with the national authorities to amplify the regulations. The Classification Committee also requires that units comply with all requirements of all applicable mandatory international IMO and ILO Conventions and Codes (including Amendments thereto).

On the other hand, "*several jurisdictions with offshore production have no, inadequate or limited petroleum and maritime legislation to address the associated challenges. Foreign flag registration may therefore be justified by the underdevelopment of the coastal state's petroleum and maritime regime. By subjecting the unit to the commonly used flag state's rules, yards, owners, users and lenders can gain access to a familiar legal environment of technical standards ensuring the seaworthiness of the unit, which international lenders in particular may wish to rely on when establishing collateral*

[17] See DNV-OSS-103, Rules for Classification of LNG/LPG Floating Production and Storage Units or Installations, available at https://rules.dnvgl.com/docs/pdf/DNV/codes/docs/2011-06/Oss-103.pdf

[18] See the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC).

[19] Lloyd's Register (2017). Rules and Regulations for the Classification of Offshore Units.

security over the floating unit itself (Leerberg, 2017)."[20] However, the legal risks arising from the conflicting jurisdictions regarding environmental protection are huge, considering that an FLNG unit will stay around for 25 years or more.

In light of the above, Greece as a coastal state should actively pursue the establishment of a single jurisdiction through international collaboration with more experienced states with long-established legislation and supervisory authorities.

[20] Leerberg, B. (2017, April 3). FLNG – 'ship' or 'offshore installation'? Common pitfalls for investors, operators and regulators . Retrieved from www.internationallawoffice.com

2. Overview Of The National And International Environmental Regulation

In this chapter, the national practice of Greece is discussed in relation to international environmental regulation of offshore and seabed activities.

2.1. National Environmental Legislation Governing The Offshore Activities

As far as upstream gas operations are concerned, Greece is too far from being a "mature jurisdiction". In Greece there are only three producing fields so far. The "Prinos", "North Prinos" and "South Kavala" oil and natural gas deposits, collectively referred to as the Prinos Basin, are located offshore in the Gulf of Kavala, in the North Aegean Sea. They were discovered in the early 1970s and started production a decade later. Since 1981, production is carried out by three platforms, namely the Alpha, Beta and Kappa. The produced hydrocarbons are transported via subsea pipelines to a fourth platform (Delta) for initial processing, and then to an onshore processing plant (Sigma) for complete processing. Currently, the Prinos Basin is in decline, with the total daily production amounting to 2000 barrels. The entire amount of the natural gas produced is internally consumed by the field operator for the production of steam, which is injected back into the wells to facilitate production (LDK Consultants, ERM Ltd, 2016).[21]

In order to increase production, the field operator (i.e. Energean Oil & Gas) has undertaken projects for further development of the existing deposits including the installation of new unmanned platforms for the development of proved and probable reserves in the region. The North Prinos deposit currently producing hydrocarbons in small volumes is going to be fully developed whereas the South Kavala deposit is close to depletion and will therefore be used for gas storage. Meanwhile, almost half of the Prinos deposit output capacity has already been reached. Prinos will continue to produce sour gas and the new platforms could be used in satellite fields (Epsilon, Kazaviti) as well, if their development is economically viable in the future. The ongoing

[21] LDK Consultants, & ERM Ltd. (2016, March 4). *Non-technical Summary of the Environmental and Social Impact Assessment for Project Development in the Prinos region.* (Tech.). Retrieved from www.ebrd.com/documents/environment/47822-nontechnical-summary-greek.pdf
The summary was published in Greek.

projects are expected to double the production to 4000 bpd (Offshore Technology, n.d.) [22] and may contribute to the operator's financial soundness.

In terms of CAPEX, the amount of the investment is $277m. The fact that the Prinos Basin eventually produced twice as much hydrocarbons as it was originally anticipated in spite of initial estimates, led to the purchase and refurbishment of a new drilling rig in order to re-enter the existing wells. The ambitious project runs counter to a global trend of decreasing budgets in the upstream industry in response to depressed oil prices.

During its thirty years of production, the Prinos Basin has not encountered any environmental problems whatsoever. According to Joint Ministerial Decision 1958/ 13-01-2012 on the Classification of Projects and Activities, the current project is part of "Exploitation activities", and classified in the subgroup "Hydrocarbon extraction and exploratory drillings for hydrocarbon prospecting" requiring an Environmental Impact Assessment (EIA). Environmental licensing is stipulated by Law 4014/2011. The content of the EIA is set out in Joint Ministerial Decision No 170225/2014 depending on the project classification. The process and conditions for EIA are in line with the EIA Directive.[23]

Following consultation with the Greek Authorities, it was agreed that an EIA would be drafted so as to cover the operation of the existing facilities in the offshore area of Prinos, since current and future facilities will be interconnected. Facilities associated with the depleted South Kavala natural gas deposit are included, as the operator is seeking methods to increase gas production while there are plans for its conversion to a strategic gas storage field. Onshore facilities are covered by a detailed EIA which was re-approved by the General Secretariat for the Environment in 2013. EIA meets both licensing and financing requirements, and it includes social impacts while ensuring stakeholder engagement.

[22] Prinos Offshore Development Project, North Aegean Sea, Gulf of Kavala. (n.d.). Retrieved from https://www.offshore-technology.com/projects/prinos-offshore-development-project-north-aegean-sea-gulf-of-kavala/

[23] See Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, available at http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0052

General Legislation

Specific regulations regarding the prevention of environmental pollution from petroleum activities and the protection of the biota of the contract area, as referred to in Law 2289/1995, have not been enacted yet. Consequently, the general environmental legislation is applicable. That means that all operations must be conducted following environmental approval by the national competent authority. Apart from submitting a Strategic Environmental Assessment, operators are obliged to comply with the applicable legislation on the management of petroleum residues and waste[24] and must meet specific requirements regarding safety and the drafting of contingency plans. They must also take all the necessary measures to minimise the environmental impact of the activities in question, and maintain insurance for financing corrective measures.

As far as offshore operations are concerned, the Directive 2013/30/EU that is analysed in the following chapter is applicable.

[24] Thorough presentation and evaluation of the European and national legislation on the management of Petroleum Residues and Waste was undertaken in the context of the program Life + Environment Policy and Governance LIFE 10ENV/GR/000606 by Greek experts in 2013. As per the national legislation, the report concluded that: "Domestic legislation on the management of petroleum residues and wastes is divided into two categories, depending on the source of these waste streams. In particular, these categories relate to lubricating oil wastes and petroleum residues deriving from ship-generated waste and on-shore installations (eg. industrial plants). With regard to ship-generated waste, domestic legislation has been fully harmonized with what is defined in International Law, notably as regards the International Marpol 73/78 Convention on the Prevention of Pollution from Ships, including the relevant Protocols raised by this Treaty."

2.2. Environmental Protection And Liability Under International Law

More than half of Europe's natural gas is produced offshore (Kritikos, 2015).[25] Therefore, offshore operations are extremely important when it comes to the energy security of the region. Additionally, more and more offshore drillings are taking place in more complex and harsher environments as production moves from depleted fields to less exploitable ones to meet the growing energy demands while the EU seeks alternative sources to limit its reliance on Russian gas.

The need for specific measures dealing with the new safety challenges of riskier operations and the environmental footprint thereof has led to the revision of previous legislation concerning the offshore oil and gas industry. In fact, the revisiting of EU legislation was part of a global reaction to preceding accidents, particularly the Deepwater Horizon disaster (2010). More specifically, the drafting of the legislation currently in force was the result of an inter-institutional dialogue between the European Commission, the Council of Ministers and the European Parliament, which unanimously acknowledged the importance of the adoption of common rules for the prevention of major accidents and the response to hazards associated with offshore extraction of hydrocarbons. Towards that direction, particular focus was placed on the licensing requirements so that maximum harmonisation of national safety standards could be attained, and the EU acquired a more integrated approach to the operational specifications of the related structures including modern technology. These issues are reflected in the text of Directive 2013/30/EU which came into force in July 2013 and was recently transposed into Greek legislation, by virtue of Law 4409/2016 (OGG 136/A/2016).[26] The Directive 2013/30/EU (hereinafter the "Directive") will be fully effective in July of this year (2018) and seeks to ensure a two-level environmental

[25] Kritikos, M. (2015). Ενωσιακοί κανόνες ασφάλειας για τις υπεράκτιες δραστηριότητες εκμετάλλευσης κοιτασμάτων πετρελαίου και φυσικού αερίου: νέες κανονιστικές προκλήσεις σε αχαρτογράφητα ύδατα [EU safety rules for offshore oil and gas activities: new regulatory challenges in uncharted waters]. In *Δίκαιο Υδρογονανθάκων [Hydrocarbon Law]* (pp. 73-111). Athens, Greece: Νομική Βιβλιοθήκη.

[26] Kourniotis, Y. (2016). *Greece - The Oil and Gas Law Review - Edition 4 - The Law Reviews*. [online] Thelawreviews.co.uk. Available at: https://thelawreviews.co.uk/edition/the-oil-and-gas-law-review-edition-4/1140330/greece

protection in respect to offshore operations by introducing measures of preventive and restorative nature.

Being a product of inclusive and extensive online consultation of all stakeholders (representing adverse interests) at European and National level, including civil society, the Directive constitutes a multi-actor approach ensuring the necessary cross-fertilizing interactions between Member States, companies, national regulatory authorities, third parties and the European Institutions. It covers the entire production chain from exploration to decommissioning as regards both fixed and mobile platforms. The general philosophy is to reduce risks at a cost that does not cancel out the benefit of the reduction. In other words, the cost of risk mitigation must not outweigh the financial value thereof, while minimum standards for effective prevention and response to major accidents are met (Kritikos, 2015).[27]

Under the Directive, each actor is entitled to certain rights and carries specific obligations. The operators are obliged to draw up Major Hazard Reports that shall contain risk forecasting along with a detailed action plan in the event of an accident. The amount of the resources that the operator can mobilize in that case must also be mentioned. In case the measures for the prevention or the reduction of the impacts of an accident that are recommended in the Major Hazard Report are found to be insufficient or unfulfilled, the national competent authorities are obliged to forbid the initiation or the continuation of petroleum operations. These reports that must be regularly updated (or upon request of the competent authority) or modified responding to technical changes on infrastructure, are, therefore, not only the base of a general risk assessment and hazard identification, but also indicators of the operator's response capacity to emergencies according to the highest technological and technical standards. In addition, apart from adequate financial resources, qualified and properly trained workforce (experts as well as equipment) must always be on standby to offer their services, should there be an emergency.

[27] Kritikos, M. (2015). Ενωσιακοί κανόνες ασφάλειας για τις υπεράκτιες δραστηριότητες εκμετάλλευσης κοιτασμάτων πετρελαίου και φυσικού αερίου: νέες κανονιστικές προκλήσεις σε αχαρτογράφητα ύδατα [EU safety rules for offshore oil and gas activities: new regulatory challenges in uncharted waters]. In *Δίκαιο Υδρογονανθράκων [Hydrocarbon Law]* (pp. 73-111). Athens, Greece: Νομική Βιβλιοθήκη.

It is remarkable how the Directive spotlights the operator's performance in terms of available resources and financial guarantees with regard to the remedying of environmental damage. The companies aspiring to be engaged in offshore oil and gas production are evaluated in relation to both conduct and financial ability and their efficiency regarding environmental protection. The Major Hazard Report is essential for the documentation of a company's eligibility and unless it is approved by the competent authority any operation shall be suspended. The operators must also ensure that competent authorities are duly informed within a timely fashion if an accident occurs.

Nevertheless, equal weight has been placed on prevention since the Directive is guided by the principle of prevention so as to secure that major accidents will be avoided or, if they are not, to ensure actual remediation of damages and environmental restoration. According to Article 11 of the Directive, the operator or the owner must submit to the competent authority a set of documents, the corporate major accident prevention policy included. The policy provides, among others, for certain monitoring measures to ensure its proper implementation. The document lists the company's targets and regulations for the control of the eventuality of a major accident (for which the company is entirely liable) and describes the methods of attaining those targets.

At the same time, through cooperation the Member States exchange information and experience regarding the offshore sector, and coordinate their actions. They are obliged to draft their own contingency plans in cooperation with operators and owners taking into account their plans and reports. Moreover, the Member States must enable the establishment of financial instruments so that candidate operators can prove their financial capacity. The Directive also provides for emergency response exercises in which national competent authorities will participate. The Member States are obliged to promptly notify the European Commission about any major accidents and have the right to impose sanctions governed by the principle of proportionality in case of breaches of the obligations laid down by the Directive. They must also ensure that the EU-based operators (companies that are registered in the Member States) operating in areas outside the EU are in compliance with the best practises regarding accident prevention and that they report, if required, any serious accidents they may have been involved in, although this is beyond national jurisdiction. As a counterweight, the Member States

must timely notify all the parties in case they introduce new legal or technical barriers, following their obligations deriving from strategies adopted on EU level. Furthermore, they must achieve cross-border cooperation with other Member States or third countries that will be affected by possible damage, by sharing relevant information and jointly take appropriate measures to avert it.

The National competent authorities are complementary to other instruments such as the third parties. They are given co-responsibility for the safety of offshore production platforms. They are charged with monitoring the emergency preparedness of the platforms and associated infrastructure and have the right to shut them down and cease production in case safety standards are not met. Verifying the reliability of the reports provided by the operators and setting strict standards for the supervision of action plans, are among their other obligations. The Directive encourages the cooperation between the national regulators as well.

The Third Parties (independent regulators) are entrusted with certain tasks such as carrying out checks on safety reports and they are responsible for the effectiveness of those checks and the verification of the reports. It is noteworthy that the safety of the subsea wells that are connected to the platforms is a separate issue under this Directive, regarding the platform inspections that must be conducted by independent verifiers.

The collection of data, the coordination of accident prevention resources[28] and the emergence of best safety practices are carried out at EU level, while the Commission must draw up annual reports on offshore operations within the Union, demonstrating the sectoral trends in safety and environmental protection backed up with comparable information. The content of these reports mainly concerns the number and location of the offshore installations, the number of inspections carried out and any penalties imposed, the performance of the regulatory authorities, as well as any changes in the legislation along with the environmental protection performance.

The Directive calls on operators and Member States to exchange information (in a preventive way) that should be published within the framework of transparency (with due respect to commercially sensitive information), in an attempt to enhance public

[28] See Annex VII of the Directive. Records of the financial resources shall be kept by the Member States and must be available for the purposes of cross-border cooperation.

confidence in offshore oil and gas exploration and production. The Commission Implementing Regulation (EU) No 1112/2014[29] facilitates this effort. Public awareness and participation concerning the impacts of offshore oil and gas exploration on the environment is not only encouraged but guaranteed for areas for which concessions are granted after 18 of July 2013 (article 5 of the Directive).

People or organisations which may be affected or have an interest in this activity are entitled to information, transparency, and discussion before the exploration begins and may deliver an opinion before exploration is even allowed. The public opinion as well as feedback regarding the consequences of interference on the part of the public, must, according to the Directive, be ensured in conjunction with the provisions of the Aarhus Convention.[30] The requirements of the Directive ensure the capability of anonymously reporting any concerns about safety and environment as regards offshore exploitation and protect the anonymity of the individuals involved, as well as any natural person reporting an operator for violation of safety rules.

Meanwhile, the Member States must set out - in collaboration with the EU - common and transparent criteria as far as concessions are concerned. It goes without saying that the decision to grant an authorisation will be always preceded by the submission, examination and approval of the environmental impact assessment. The Directive also requires separation of the authorisation procedure and the process of demonstrating compliance with the essential safety requirements, in order to avoid conflicts of interest. In practical terms, that means that the national authorities dealing with economic development from offshore exploitation should be legally, administratively and financially separated from the authorities dealing with compliance with safety standards (Kritikos, 2015).[31] Control to ensure such unbundling shall be governed by the principles governing the Union (namely, the principle of proportionality).

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[29] Commission Implementing Regulation (EU) No 1112/2014, Oct. 13, 2014. Retrieved from http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014R1112

[30] Convention on access to information, public participation and access to justice in environmental matters (Århus Convention), June 25, 1998. Retrieved from http://ec.europa.eu/environment/aarhus/

[31] Kritikos, M. (2015). Ενωσιακοί κανόνες ασφάλειας για τις υπεράκτιες δραστηριότητες εκμετάλλευσης κοιτασμάτων πετρελαίου και φυσικού αερίου: νέες κανονιστικές προκλήσεις σε αχαρτογράφητα ύδατα [EU safety rules for offshore oil and gas activities: new regulatory challenges in uncharted waters]. In *Δίκαιο Υδρογονανθράκων [Hydrocarbon Law]* (pp. 73-111). Athens, Greece: Νομική Βιβλιοθήκη.

Regional cooperation, open access to information regarding the hazards, and respect of other directives by ensuring that their implementation is not hereby compromised are considered of utmost importance under the Directive 2013/30/EU. Hence, the latter becomes an essential environmental tool that challenges the effectiveness of all actors involved and urges them to strengthen their cooperation. By pressurising operators to follow the best safety practices, that are already followed in northwest Europe, to secure a sustainable financial framework so that they can draw resources and to increase their environmental performance, the Directive enhances competition in the industry. Although it introduces further corporate costs for environmental protection based on the "polluter pays" principle, which can be seen as implied barrier to competition, these costs are more preferable than the expenses in the event of a major accident and its overall impact on the operator's credibility. Any damage to the operator's credibility becomes more international in scale in the level of transparency across EU markets. That way operators increase their efficiency regarding extraction techniques and awareness of the dangers to the marine environment is growing.

More importantly, the Directive is a far-reaching instrument with a broad scope of application. It covers all installations ("production" and "non-production installations", "stationary", "fixed or mobile") and connected infrastructure as well as all offshore oil and gas operations relating to the exploration and production of oil and gas situated in the territorial sea, the Exclusive Economic Zone or the continental shelf where the coastal State exercises jurisdiction. By not being restricted to the territorial waters, the Directive broadens the geographical area where the Directive 2004/35/EC[32] is implemented, and covers all European waters with due regard to the Directive 2008/56/EC.[33] Consequently, the marine waters are included in the scope of the Water Framework Directive (Directive 2000/60/EC) for the good status of EU water bodies as far as «water damage» is concerned.

[32] *Directive* 2004/35/CE of the European Parliament and of the Council, April 21, 2004. Retrieved from http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1516922477803&uri=CELEX:32004L0035

[33] Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive). Available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0056:en:NOT

However, the substantial value of the Directive 2013/30/EU should be estimated without ignoring its inadequacies. For instance, though it provides exhaustive definitions of terms that would otherwise be disputed, it is important to take a step back and reflect on the fact that it excludes conveyance of oil and gas from one coast to another (Article 2) from its definition of offshore oil and gas operations. Of course, this falls under different legislation that this Directive respects, but which kind of law should be applied supposing that there are installations also capable of conveying hydrocarbons remains obscure. That shortsightedness is not repeated, however, neither in the Directive's definition of production, which includes offshore processing of oil and gas nor in that of "installation". In the latter, it is expressly provided that "*installations include mobile offshore drilling units only when they are stationed in offshore waters for drilling, production or other activities."* Another advantage is that the definition of "combined operation" is set out in a direct link with the protection of the environment.

As already mentioned, the Directive contains an amendment to the Directive 2004/35/EC by extending the scope of "damage" to marine waters. Besides that, the Directive makes a key contribution to the determination of the environmental liability as regards the offshore oil and gas activities. Article 7 of the Directive 2013/30/EU stipulates that in the field of offshore activities the Directive 2004/35/EC , also known as Environmental Liability Directive, is applicable.[34]

Environmental Liability Directive

On this point, it is necessary to define clearly the concept of «environmental liability». It must be made very clear that «Environmental liability contrasts to the concept of *civil liability for environmental pollution*, in that the relevant provisions do not aim at protecting private rights following environmental damage, but they are intended to protect the environment itself as a good of intrinsic value.[35] As this is -in the manner that it is laid down- a sui generis liability, consisting of the operator's obligation to adopt measures with regard to the prevention and remedying of environmental damage and

[34] Oil and gas operations are included in the scope of Directive 2004/35/EC. (See Annex III).

[35] Greek law makes use of the term "legal good". The context of the term is equivalent to the German ''Rechtsgut". The Anglo-Saxon equivalent is "legal right". In this sense, "private rights" means rights of natural or legal persons. Also, "good of intrinsic value" is used here to describe a legally protected good that has a value in its own right and resembles to the concept of "original right".

to reimburse the expenditure incurred by the competent authority when the latter takes on the task of adopting such measures (an obligation supported by means of public law), there can not be an interpretation of environmental liability as a "traditional" obligation to compensate private individuals» (Chasapis, Kosmides 2015).[36] In other words, the Directive 2004/35/EC offers an administrative approach to the pure environmental damage, based on the "polluter pays" principle set out in the Treaty of the Functioning of the European Union,[37] and on the power of public authorities in a way that is differentiated from civil liability for traditional damage (i.e harm to health and property, economic losses).

It is a fact that Greece failed to meet the deadlines for transposition of the Directive 2004/35/EC, leading to the Commission's action against the Hellenic Republic on the grounds of failure to fulfil obligations (Commission v Hellenic Republic, 2008).[38] Finally, in 2009, the provisions of the aforementioned Directive were incorporated into Greek laws by implementation of the Presidential Decree 148/2009.[39] The Decree applies to land-based oil and gas installations as well as offshore fixed platforms but not to vessels performing transport or by which extraction and storage of oil and gas is carried out. Those ships fall under the scope of international conventions (Chasapis, 2015).[40] Marine pollution from oil/gas tankers is not caught by the Directive 2004/35/EC either.

The environmental liability established in the above Directive does not hinder the application of other national provisions laying down liability. In addition, Member States are free to expand the scope of liability if necessary. Likewise, the Presidential Decree

[36] Kosmides, T., & Chasapis, Ch. (2015). Αστική ευθύνη κατά την εκμετάλλευση υδρογονανθράκων και άλλες συνδεδεμένες δραστηριότητες [Civil liability in the context of hydrocarbons exploitation and related activities]. In *Δίκαιο Υδρογονανθράκων [Hydrocarbon Law]* (pp. 407-503). Athens, Greece: Νομική Βιβλιοθήκη.

[37] Article 191 TFEU.

[38] Commission of the European Communities v Hellenic Republic. Failure of a Member State to fulfill obligations-Directive 2004/35/EC. Remedying of environmental damage- "Polluter pays" principle. Case C-368/08.

[39] Presidential Decree No. 148/2009 'on environmental liability for the prevention and remedying of environmental damage – Harmonization to the Directive 2004/35/CE of the European Parliament and of the Council of the 21 of April 2004, as applicable'.

[40] Chasapis, Ch. (2015). Περιβαλλοντική ευθύνη και Προστασία του περιβάλλοντος κατά την εκμετάλλευση υδρογονανθράκων και άλλες συνδεδεμένες δραστηριότητες [Environmental liability and Environmental protection in hydrocarbons exploitation and other related activities]. In *Δίκαιο Υδρογονανθράκων [Hydrocarbon Law]* (pp. 505-573). Athens, Greece: Νομική Βιβλιοθήκη.

does not preclude the application of more stringent rules laid down in the Greek Legislation or in the Union Legislation (article 3 of the P.D.).

The Environmental Liability Directive establishes strict liability for economic operators carrying out activities listed in Annex III that cause or might cause environmental damage. This means that for the damage borne by those activities the operator is held liable without there being further need to prove intention or negligence. On the contrary, for activities not listed in Annex III, liability incurs pursuant proof of fault or negligence. But not in Greece. According to the Presidential Decree 148/2009, operators pursuing activities that cause or might cause environmental damage, are rendered liable without proof of fault, regardless of whether the activities are listed or not in Annex III. Therefore, in Greece in order for an operator to be held responsible, three preconditions need to be met: identification of the operator, specification of the environmental damage (not necessarily valuation) and a «causal link» between the operator's activity and the environmental damage that is caused or that is possible to be caused.

In essence, environmental liability is based on the triptych of polluting activity, environmental damage (or sufficient likelihood of that damage) and prevention and remediation costs, as well as the causation between them.[41] Environmental liability arises first and foremost from the existence of damage to the environment or the imminent threat of such damage and does not require unlawful conduct as a prerequisite, as the activities carried out by the operator stand alone as possible source of pollution and, therefore, ecological damage.[42] Consequently, liability of the operator is twofold: The operator is obliged to take preventive as well as restorative measures in the event of actual damage. If the operator delays or fails to take the appropriate measures, then they are adopted by a public authority and the operator is, in this case, obliged to reimburse the costs attributed to the adoption of these measures.

In the case of Greece, according to the Presidential Decree 148/2009, the role of the public authority shall be taken up by government agencies, local authorities and legal persons governed by public and private law at national or regional level. More

[41] *Id.* at 510.

[42] In the sense that without the contribution of these activities the damage would not have occurred.

specifically, when the damage or the imminent threat of damage a) affects national natural resources that are protected by public authorities or agencies that are subject to more than one Regions (administrative districts), or b) occurs in the territory of a neighbouring Member State, then the Ministry of the Environment, Energy and Climate Change acts as a competent authority. Similarly, when the damage affects natural resources within their administrative boundaries, the Regional Units act as a competent authority.

In the occurrence of damage the competent authority in cooperation with the operator lays down the measures to be taken, in accordance with article 10 of the Presidential Decree 148/2009. The measures are approved by the Environment Minister upon the proposal of the *Independent Coordination Office for the Implementation for the Environmental Liability*[43] or by the Secretary-General of the Region concerned upon the Region's proposal. Article 11 provides that the operator bears at all times the costs of adopting preventive and remedial measures.[44] Where the Greek State (through the competent or other public authorities), the Region or a third party (natural or legal person) undertakes the measures in question at its own expense, the operator must cover the relevant costs.

The operator's liability to reimburse the competent authority, which has taken these measures, is also established independently of the question whether the damage (or the possibility of damage) exists by operator's fault or through negligence. The competent authority has the right to recover the costs via insurance over property or other guarantees from the operator.

The costs are determined by joint decision of the Minister of Economy and the Minister of the Environment whereas the competent authority credits the planned expenditure to the State budget.[45] There is also provision for compulsory recovery of costs in accordance with the provisions of the Code for the Collection of Public Revenues.

[43] The Independent Coordination Office for the Implementation for the Environmental Liability is another structure established through P.D. 148/2009 and is directly subordinate to the Minister.

[44] Exemptions are provided in Article 11 (paragraph 4,5) of the P.D. 148/2009. In the event of force majeure, the P.D. is not applicable.

[45] The Environmental Liability Directive also provides for apportionment of liability among multiple operators (Article 9).

Nevertheless, where the operator is not identified, the cost shall be borne by the Greek State. The importance of the identification of the operator is, thus, underlined.

Connection with the Directive 2013/30/EU

The Directive 2013/30/EU defines the "operator" (article 2 (5)) as also the "licensee" (article 2 (11)). It also devotes attention to identifying the liable person before the initiation of the operations. Since the liable entity is primarily the licensee, it is made clear that the liability is not transferable to third persons. In interpreting the Environmental Liability Directive, the competent authority needs not to establish fault or negligence of the operator whose activities are deemed responsible for the damage. [46]

Yet, it is regarded as the authority's responsibility to conduct a research using all available means in order to identify the polluter and to establish a link between the polluting activity and the damage in question. Recognition of the damage consists in the evident worsening of the initial state of the environment of the area concerned. Subsequently, the restoration of the damage is defined as the recovery of the initial state.

Apparently, a description of the initial state depends on the availability and quality of the relevant information at national level. Although between 2001 and 2011 there was no research activity in Greece,[47] an extensive record of technical reports, geophysical and seismic data and hydrocarbon-related geological maps is available in digital format thanks to the Public Petroleum Corporation (the first public body oriented to hydrocarbon prospecting, established in 1975).[48] An additional national database integrating reliable environmental data would also prove very useful. Going beyond that, the need for environmental reports could directly or indirectly create jobs for Greece (and Europe) that is already hard hit by unemployment.

[46] Chasapis, Ch. (2015). Περιβαλλοντική ευθύνη και Προστασία του περιβάλλοντος κατά την εκμετάλλευση υδρογονανθράκων και άλλες συνδεδεμένες δραστηριότητες [Environmental liability and Environmental protection in hydrocarbons exploitation and other related activities]. In *Δίκαιο Υδρογονανθράκων [Hydrocarbon Law]* (pp. 505-573). Athens, Greece: Νομική Βιβλιοθήκη.

[47] That was before the reform of the Greek legal framework governing the exploration and exploitation of oil and gas.

[48] A brief retrospective of the evolution of the industry in Greece is available at http://www.ypeka.gr/Default.aspx?tabid=765&locale=en-US

Finally, Article 17 of the Environmental Liability Directive sets a timeframe for damages that fall within its scope of application. If the environmental pollution in question is not a subject matter of the Directive or it is caught by article 17, then it is regulated under National Legislation without prejudice to the rules set out in the Treaty for the Functioning of the European Union. Besides that, the ELD does not apply to environmental pollution that is due to an incident for which liability falls within the scope of application of certain international conventions listed in Article 4.

International Conventions

I. United Nations Convention on the Law of the Sea

Perhaps the most important instrument at international level along with the Convention on the Continental Shelf[49] is the United Nations Convention on the Law of the Sea (UNCLOS), particularly its provisions for the protection of the marine environment with regard to offshore activities. Greece ratified and transposed the Convention by Law No 2321/1995 (Official Government Gazette I 136 of 23 June 1995).[50] UNCLOS contains innovative provisions on the Exclusive Economic Zone (Part V) and the continental shelf (Part VI) as well as the protection and preservation of the marine environment (Part XII).

Considering the number of Greek islands and given that Greece is the EU State with the most extensive coastline (16.300 km) and among the first ten in the world, the contribution of UNCLOS to the acknowledgement of sovereign rights and jurisdiction to the coastal States with regard to «exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its sunsoil» (article 56)[51] in the Exclusive Economic Zone was huge. The coastal State has the exclusive right to authorize and regulate the

[49] The treaty entered into force in 10 June 1964 and was the only one Greece ratified (Legislative Decree 1182/1972) out of three agreements reached at UNCLOS I. It established sovereign rights of States over their continental shelves. For more information, see Convention on the Continental Shelf. (December, 8, 2017). In *Wikipedia*. Retrieved from https://en.wikipedia.org/wiki/Convention_on_the_Continental_Shelf

[50] *Law 2321* of 22/23 June *1995*, on the ratification of the United Nations Convention on the Law of the Sea concerning the application of Part XI of the Convention. Retrieved from https://www.yen.gr/documents/20182/68447/2321_1995_unclos/c675ceeb-fecd-45bc-a5b7-b7f756cfae1b

[51] United Nations Convention on the Law of the Sea, Dec. 10, 1982. Retrieved from http://www.un.org/depts/los/convention_agreements/texts/unclos/UNCLOS-TOC.htm

construction, operation and use of installations and structures for that purpose in the Exclusive Economic Zone (article 60) and, according to article 60(2) «the coastal State shall have exclusive jurisdiction over such artificial islands, installations and structures including jurisdiction with regard to customs, fiscal, health safety and immigration laws and regulations» and «the presence of artificial islands, installations and structures does not affect the delimitation of the territorial sea, the EEZ or the continental shelf», according to paragraph 8.

Article 60 also provides for the removal of abandoned or disused installations or structures stressing that such removal should comply with any international standards set out on this subject while protection of the marine environment, among others, must be ensured. The establishment of safety zones around installations is another possibility granted to the coastal State, which is under article 81, exclusively entitled to authorize and regulate drilling on the continental shelf for all purposes.

Protection of the marine environment constitutes an explicit obligation of the States,[52] especially as regards pollution from installations used in exploration and exploitation of the natural resources (article 194 paragraph 3(c)) and the preservation of marine life including the habitat of endangered species and fragile ecosystems (paragraph 5). The States shall also make endeavours to monitor the risks of pollution of the marine environment (article 204). Harmonization of national policies regarding pollution arising from seabed activities, that are subject to the jurisdiction of the coastal State, at the «appropriate regional level» is required according to Article 208 (4). Paragraph 5 of the same Article sets out the need for a coherent global and regional policy with the establishment of global rules and standards for the prevention, control and reduction of pollution of sea environment, which shall be regularly re-examined. The Directive 2013/30/EU strives to satisfy this provision at European level.

The issue of liability is covered in Part XII, Section 9. States are considered liable in accordance with international law with respect to to their international obligations regarding the protection of the marine environment. They must ensure that their legal systems enable recourse for prompt and adequate compensation or other relief in connection with the damage resulting of pollution of the marine environment, as

[52] See Articles 192. 193.

provided under Article 235(2). The criteria for adequate compensation remain under the responsibility of the State. Liability of the contractor for damages caused by wrongful acts that is provided in Annex III refers exclusively to minerals and not hydrocarbons (Chasapis, 2015).[53]

In this context, it would be appropriate to recall that the Directive 2013/30/EU and the Directive 2004/35/EC do not grant rights to compensation for damage to injured parties. Their legal character is more of an administrative law regime. Simply put, civil liability of the operator/licensee is not provided. For that there are national legal solutions. In Greece the provisions of the Civil Code (article 914) and of Law 1650/1986 and Law 4042/2012 (transposing the Directive 2008/98) are applicable to civil liability. In this light, UNCLOS is not satisfactory, as it provides general provisions addressed clearly to the States, which in turn must establish obligations for the operators.

II. Rio Declaration on Environment and Development

The Rio Declaration,[54] a product the 1992 UN Conference on Environment and Development (UNCED), laid down significant principles with reference to the exploitation of resources while respecting the environment. The key ones are Principle 2 recognising the sovereign rights of the States over their natural resources and their responsibility to protect their environment, Principle 11 for the need of effective national environmental legislation , Principle 13 on the enactment of national legislation establishing liability, Principle 15 on the wide application of precautionary approach towards environmental protection and Principle 17 regarding the importance of Environmental Impact Assessment.

III. International Convention for the Prevention of Pollution from Ships (MARPOL)

The critical Convention for the prevention of pollution of the seas was ratified by Greece (Law 1269/1982, Official Government Gazette I 89 of 21 July 1982) along with a

[53]Minerals are defined as inorganic substances whereas hydrocarbons are organic compounds. See: Chasapis, Ch. (2015). Περιβαλλοντική ευθύνη και Προστασία του περιβάλλοντος κατά την εκμετάλλευση υδρογονανθράκων και άλλες συνδεδεμένες δραστηριότητες [Environmental liability and Environmental protection in hydrocarbons exploitation and other related activities]. In *Δίκαιο Υδρογονανθράκων [Hydrocarbon Law]* (pp. 539).

[54] Rio Declaration on Environment and Development, 1992. Retrieved from http://www.unesco.org/education/pdf/RIO_E.PDF

series of amendments which Greece has ratified through Presidential Decrees and Ministerial Decisions. Although it is a detailed text meticulously designed to cover not only pollution from petroleum in any form,[55] but also discharge of other harmful substances and materials along with air pollution from ships, MARPOL becomes complex and contradictory.

On the one hand, MARPOL offers a broad definition of "ship" that covers fixed and floating platforms (article 4), along with a comprehensive definition of what consists a "harmful substance" (article 2). It also stipulates that discharge of oil is prohibited in environmentally sensitive areas such as the Mediterranean Sea. On the other hand, discharge in relation to harmful substances does not include «release of harmful substances directly arising from the exploration, exploitation and associated offshore processing of seabed mineral resources» (article 2, paragraph 3(b)). In consequence, MARPOL does not apply to spillings from hydrocarbon extraction.

However, MARPOL applies to wastes and residuals from coastal installations that are not arising directly from the aforementioned activities. The same applies to fixed or floating offshore platforms by which the discharge of any kind of wastes into the sea is prohibited, or is subject to strict conditions.

MARPOL does not provide for civil liability of the polluter. Nevertheless, infringement of the provisions of MARPOL can constitute legal ground for liability in accordance with the Greek Civil Code.

IV. The London Convention

Another Convention within the framework of the International Maritime Organisation (IMO) promoting the control of all sources of marine pollution is the International Convention on the Prevention of Marine Pollution by the Dumping of Wastes or Other Matter, known as the London Convention.[56] Greece ratified the LC by Law 1147/1981. The LC does not cover the disposal of wastes deriving from the normal operations of vessels, platforms or other man-made structures at sea (article III, paragraph 1).

[55] See Regulation 1, Annex I of MARPOL.

[56] Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Nov. 13, 1972. Retrieved from http://www.imo.org/en/OurWork/Environment/LCLP/Documents/PROTOCOLAmended2006.pdf

Moreover, the LC does not apply to dumping directly associated with the exploration, exploitation and offshore processing of mineral resources of the seabed. Thus, vessels and offshore installations related to the exploration and exploitation of oil and gas fall outside the scope of its provisions. It should be noted in this respect that other matter like wastes produced by the staff working at offshore facilities falls within the scope of LC.

V. International Convention on Oil Pollution Preparedness, Response and Cooperation[57]

Following the Exxon Valdez oil spill, the OPRC, ratified by law 2252/1994 (OGG 192/A'/1994), summarises the work of IMO to prevent and respond to this kind of disaster. OPRC applies to offshore units (namely, fixed and floating installations engaged in gas or oil exploration and production) and provides for the drafting of contingency plans by the operator and the States, as well as preventive and restorative measures.

In relation to this Convention, the Greek law extends application including marine pollution control vessels and clean up systems on offshore installations or ships. Lastly, in the absence of any provision concerning civil liability, the same reasoning as mentioned in the context of MARPOL applies.

VI. International Convention on Salvage

The Salvage Convention excludes fixed or floating platforms from its scope of application on the condition that these platforms are carrying out one of the activities of exploration, exploitation or production on site. By contrast, when they are not performing any of these activities and are on the move, these platforms fall within the scope of Salvage Convention. Greece ratified the Convention in 1996 (Law 2391/1996).

It would be worth noting that the opposite applies under the Directive 2013/30/EU. When performing activities related to oil and gas production, mobile offshore drilling units (MODU) are caught by the provisions of the Directive. Otherwise, they are legally

[57] Greece has also ratified by Law 3100/2003, the Protocol on Preparedness, Response and Cooperation to Pollution Incidents by Hazardous and Noxious Substances, that covers pollution from substances other than petroleum and is effective since 14 June 2007. As per offshore installations carrying out oil exploration and production the Law 3100/2003 is applicable.

treated as ships and, therefore, are subject to MODU Codes, EU law on port control, and the obligation of flag states laid down in MARPOL.

VII. Other Conventions

Greece has also ratified the AFS Convention[58] (Law 3394/2005) which includes fixed or floating platforms, FSUs and FPSOs, and the Espoo Convention,[59] a product of UNECE for the transboundary effects of activities (Law 2540/1997). The latter includes hydrocarbon production at sea, transportation via pipelines and storage. However, it is only applicable between parties. For that reason, the Espoo Convention applies to the Ionian Sea but not to the Aegean.

[58] International Convention on the Control of Harmful Anti-Fouling Systems in Ships, Oct. 5, 2001. Retrieved from http://www.imo.org/en/About/conventions/listofconventions/pages/international-convention-on-the-control-of-harmful-anti-fouling-systems-on-ships-(afs).aspx

[59] Convention on Environmental Impact Assessment In A Transboundary Context, 1991. Retrieved from https://www.unece.org/fileadmin/DAM/env/eia/documents/legaltexts/Espoo_Convention_authentic_ENG.pdf

Conclusions

Both the international and national environmental regulation regarding offshore petroleum activities appear fragmented and incomplete. In a capital intensive market as the LNG, where upstream capital is increasing, the expression of interests for states like Greece should not be reversed by legal uncertainty. Recently Greece reinitiated the process of domestic exploration, however, environmental approval stalls the authorization procedure.

A generally applicable national environmental legislation providing for natural gas operations in a separate manner, so that they are not overshadowed by the increasing interest for oil, and for no-go zones regarding sensitive areas (since Greece has not declared EEZ) would be a first step towards the resolution of the issues analysed in this study.

As per the emerging technology of FLNG, Greece has to consider it as a very real option other than a future fantasy and needs to establish regulation accordingly.

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