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The MegaProject of oil & gas extraction in Greece:
Energy strategies in the era of combined climate and economic crises.

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Abstract

In the second decade of the 21st century, when the climate crisis was already threatening the human societies, an EU state designed and implemented a fossil fuel extraction megaproject in the Greek peninsula as well as the Eastern Mediterranean. While the EU claims to be at the forefront of international efforts to tackle climate change, at the same time directly or in-directly it supports hydrocarbon extraction megaprojects and the construction of pipelines, leading to an intensification of the antagonism over fossil fuels in the Eastern Mediterranean. Thus, a critical contradiction arises. How is it even possible for both climate change mitigation and fossil fuels projects to be simultaneously true? With that apparent observation as a general point of departure, the Greek extraction program is analyzed in its various dimensions. By employing an STS theoretical framework that interweaves technical systems with politics and a specific interpretation of the "black box" metaphor, together with the concepts of extractivism and oil-led development, we explore the particular conditions that allowed this program to emerge. Finally, the extractivist imaginary is hopefully dismantled in its actual objectives and parameters, while its potential impacts and exact dimensions, in the case of Greece, are presented in all of their historical paradoxicality.

Keywords: STS, extractions, fossil fuels, hydrocarbon, extractivism, oil-led development, glass box, hydrocarbons Greece.

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Abbreviations

BOP: balance of payments

CCS: carbon capture and storage

Dutch TTF: title transfer facility

E&P: exploration and production

EAP: Environmental Action Plan

ECB: European Central Bank

EEZ: exclusive economic zone

EIAR: environmental impact assessment report

ELSTAT: Hellenic Statistical Authority

ENVI: Committee on the Environment, Public Health and Food Safety

ERA: environmental risk assessment

ESM: European Stability Mechanism

ETS: emissions trading system

FDI: foreign direct investments

GDP: gross domestic product

GHG: greenhouse gas

GPFG: Government Pension Fund Global

GtC: gigatons of carbon

HELPE: Hellenic Petroleum

HHRM: Hellenic Hydrocarbon Resources Management

IEA: International Energy Agency

IMF: International Monetary Fund

IPCC: Intergovernmental Panel on Climate Change

MDCA: Mutual Defense Cooperation Agreement

MMBoe: million barrels of oil equivalent

MoU: memorandum of understanding

Mtoe: million tonnes of oil equivalent

NTUA: National Technical University of Athens

OECD: Organisation for Economic Co-operation and Development

OPEC: Organization of the Petroleum Exporting Countries

P.M.: Prime Minister

R&D: research and development

RCP: representative concentration pathways

RES: renewable energy sources

SEA: strategic environmental impact assessment

TCG: Technical Chamber of Greece

TFC: total final consumption

UN: United Nations

UNEP: United Nations Environment Programme

Chapter 1: Introduction

Introduction

Almost thirty years after the Rio de Janeiro Earth Summit, more than twenty after the Kyoto Protocol, five from the Paris Agreement, and a year before the IPCC's 6th Assessment Full Report, it is more than certain that we have already entered the era of a climate crisis. Moreover, many people have been claiming (for over ten years, by now) that we have already surpassed the tipping point regarding our ability to limit the global average temperature well below 2°C above the pre-industrial levels until the end of the century. As a result, it is quite likely that we are already moving towards the terrifying scenario of runaway climate change, which entails self-reinforcing feedbacks caused by global warming that could prevent the mitigation and stabilization of the climate—not only at low but even at an intermediate rise of temperature rises (Steffen et al., 2018; Hansen et al., 2013). Moreover, the EU constantly and intensely claims that it has been and remains at the forefront of international efforts to tackle climate change, reduce greenhouse gas emissions, decarbonize the energy sector, and move towards a low-carbon economy, aiming to become the world's first climate-neutral continent (European Counsil, 24/10/2014; European Commission, 17/09/2020; European Commission, 14/07/2021;). Therefore, given the overall framework as outlined above, in the third decade of the 21st century what emerges as a major and apparent contradiction that cannot be ignored is the energy strategy and planning on the part of an EU member state—which is not the only one—that adopts the most climate-friendly international agreements and treaties and, at the same time, schedules extensive fossil fuels[1] extractions.

Searching for new locations and fossil fuel reserves to be explored in the decades to come can only mean that those plans are undoubtedly extended well beyond the first half of the century. As a result, those plans are in sharp contrast with the dominant body of scientific knowledge about climate change and also, with every mitigation policy at the international,

[1] When we use the term "fossil fuel" we only refer to oil and natural gas.

regional, or local level. What is more, the plans regarding fossil fuels extractions, pipelines, interconnections, and a variety of crucial massive infrastructures in the Eastern Mediterranean basin do not consist of national energy plans only of a single country—namely, Greece. On the contrary, these strategies are connected with the EU energy strategies as a whole, as well as USA, Israel and, Egypt, as they require multilateral agreements and cooperation in a variety of sectors and areas (that is, in science, technology, geopolitics, national legislation, financial support, security, military forces, etc.). Furthermore, they are firmly connected with —and to a great degree originate from— the same political, scientific, state, and public institutions (i.e., among others, the European Commission, the European Parliament, universities, different state agencies that belong to the very same ministry, and state-owned enterprises—not to mention large private companies) with the aforementioned climate policies concerning an extensive reduction of greenhouse gas emissions, the decarbonization and so on. And an unforced question instantly arises: How is this even possible?

Approaching our research subject from an STS perspective, it is clear that megaprojects like these consist of major sociotechnical changes at the local, national or, even, regional level as they consist of a whole bundle of changes beyond exploration and extraction technologies (for example, geophysical surveys, drilling platforms, etc.) that range from basic infrastructures (harbors, pipelines, roads, LNG liquefied natural gas stations) to the introduction of new institutions, agencies, financial and legal mechanisms, research centers, and considerable changes in environmental regulation and spatial planning. However, the mere entry and operation of colossal multinational oil corporations next to domestic corporations in a country with certain characteristics (be they socioeconomic, geographical, demographic, or pertaining to the local ecosystems)—as well as of a certain scale and size—would be, by itself, enough of a change.

Introductory assumptions and essential hypotheses

Before we proceed, it would be essential for us to specify a number of issues that form the framework upon which this study's context and objectives will be developed. First of all, we embrace the dominant scientific views and findings of the vast majority of the scientific community—i.e., that climate crisis exists and mainly occurs as a result of the rapid rise in average

global temperature, due to the climate consequences of the current dominant social system of production during the past two and a half centuries. Furthermore, in 2014 the IPCC declared that *"*the IPCC is now 95 percent certain [in practice (or in policymaking), this means almost absolute certainty] that humans are the main cause of current global warming*"* (IPCC, 2014*. Synthesis Report.* p. v). It is indicative that in a scientific paper (Powel J., 2019) that reviewed more than 11,602 articles concerning climate change (which had been published in scientific journals during the first seven months of 2019) the consensus on anthropogenic global warming reached[2] 100%. In addition, we must point out that we regard the common terms and notions "anthropogenic global warming", "humans" etc. to be utterly reductionist in a historical, theoretical, political, and social sense, as they reduce the relevant issues almost to a biological base (human species), avoiding their obvious historical connection with specific social relations, structures, forms of social organization, modes of production and so on. In a related issue, the introduction of a deeply de-politicizing notion (in a different level and degree) also occurs, from our point of view, with the relatively newly established notion "*Anthropocene*" (for example, see Moore J. 2017; Swyngedouw E. & Ernstson H. 2018). We are referring to those crucial, for us, issues to clarify that, although we have totally different approaches for a variety of theoretical issues from those that are well-established, we will not discuss or even present those aspects in the context of this study. Instead, we will adhere to the dominant, commonly used terminology and notions.

Similarly, we have already referred to the Paris agreement, the Kyoto protocol and the EU's climate policies as if we are accepting those policies and agreements and, also, as if we consider them to be steps and efforts in the right direction, in order to confront the major issue of our societies: the climate crisis. On the contrary, we referred to those dominant policies and strategies because, apart from anything else, we would like to focus on the internal systemic contradiction that arises from the core of our theme concerning the climate crisis. In short, we maintain that the dominant, so-called climate-environmental policies, which are promoted internationally (regardless of any disagreements, antagonisms, etc.) so as to deal with the great challenges that the climate crisis poses, are in essence designed upon the same principles, structures, and material relations that led modern societies to that crisis—namely, free market

[2] The same does not occur with other forms of publications.

mechanisms, technological determinism, constant growth and accumulation, anthropocentrism, methodological individualism, etc. Above all else, our claim is based on their unprecedented failure (according to every scientific research on global warming) for more than thirty years now, during which time these policies have had a central place in the international climate agenda. As a result, we think that a variety of green development strategies, policies, technologies, etc., are, actually, greenwashing mechanisms because they have not led to any net reduction in greenhouse gas (GHG) emissions or in aggregate total fossil fuels consumption over the last thirty years. Also, carbon markets, emissions trading system (ETS), Clean Development Mechanisms, biomass and energy land use (Euractiv, 2018), as well as mechanisms like the Flexible Mechanisms that were defined in the Kyoto Protocol are perfect greenwashing examples as they: a) promote processes in favor of the big polluters, giving them the chance to grow their profits, b) pose a barrier for net reductions, as they offer the option of substitution through (to say the least) questionable "green investments" in third countries, c) maximize the environmental and climate pressure in a global scale through expansion and diffusion (i.e., GHG emissions) and d) roll over transition costs to the vast majority of the people and to the Global South, without affecting the share of private profits.

In the same way, the proliferation of technologies like, generally, carbon capture and storage (CCS), geoengineering or, even worse, the approaches that favor nuclear energy are on the same page with the aforementioned policies because, in essence, they are based on the same precondition: namely, not to challenge the systemic foundations of the current mode of production and the dominant social structures that led modern societies to the climate crisis. They consist of the type of measures and transitions that are embedded in the framework of "*business as usual*." Needless to say, the introduction of new technologies, techniques, forms of organization, cooperation, etc. are highly needed in order to deal with the climate crisis, but, at the same time, we think that they must be interconnected with radical transformations in the sphere of political economy, societal organization, ideology and so on. Similarly, to our previous remarks, the present thesis will not focus on these theoretical issues, currents, and paradigms nor on the various transition or transformation models. Still, we will try to reveal the internal

contradiction integrated into the institutional level, which, at the same time, is indicative of the prevailing scientific, technological, and political approaches, plans, ideologies, and interests.

Climate change, emissions, and extractions in a nutshell

Extending, our hypotheses, we will just outline a few fundamental scientific findings regarding climate change, as a minimum indispensable background that will be taken for granted in our study. In a recent IPCC[3] special report, it is estimated that human activities have caused approximately 1.0 ^{o}C of global warming above pre-industrial levels (IPCC.,2018. p.4). The exact estimations and facts are confirmed by the IPCC Working Group I, 6th Assessment Report. Specifically, they mention that the global surface temperature was 1.09 ^{o}C higher in 2011–2020 than in 1850–1900 and, moreover, that "it is likely that well-mixed GHGs contributed a warming of 1.0 ^{o}C to 2.0 ^{o}C, other human drivers (principally aerosols) contributes a cooling of 0.0 ^{o}C to 0,8 ^{o}C, natural drivers changed global surface temperature by -0,1 ^{o}C to 0,1 ^{o}C and internal variability change it by -0,2 ^{o}C to 0,2 ^{o}C" (IPCC, 2021, pp. 5-6).

Taking into account Greece's tender process for offshore hydrocarbons exploration in 2014, we will refer to the data as they were documented in that period. Therefore, according to the 5th IPCC report in 2014: a) "each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850", b) "the period from 1983 to 2012 was likely the warmest 30-year period of the last 1400 years in the Northern Hemisphere", c) "the globally averaged combined land and ocean surface temperature data […] show a warming of 0,85^{o} C [0.65 to 1.06] ^{o} C over the period 1880-2012", d) anthropogenic greenhouse emissions […] has led to atmospheric concentrations of carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) that are unprecedented in at least the last 800,000 year" and "exceeded the pre-industrial levels by about 40%, 150% and 20%, respectively" (IPCC., 2013. p. 5; IPCC., 2014 p. 2-4, 44). Moreover, from 1750 to 2011, the total cumulative anthropogenic emissions to the atmosphere

[3] For our indicative climate/emissions data, we will mainly refer to IPCC (Intergovernmental Panel on Climate Change) for three reasons: a) it constitutes the established scientific reference point for policymaking, b) it is the outcome of the collective effort of hundreds of scientists from all over the world and c) its reports are based on consensus, or on the lowest common denominator among scientists—a fact that, not rarely, has raised criticism even for scientifically conservative estimations.

were 555 GtC[4] and, more specifically, about 375 GtC have been released by fossil fuel combustion and cement production and 180 GtC by deforestation and other land-use change (IPCC.,2013, p. 12).

The 5th Report made its projections according to the representative concentration pathways (RCPs) based on the cumulative anthropogenic GHG emissions were used in the 5th report to make projections, describing four different pathways of GHG emissions and atmospheric concentrations. Those four scenarios include a stringent mitigation scenario (RCP2.6) that aims to mitigate global warming "likely" below 2°C above pre-industrial temperatures, two intermediate scenarios, RCP4.5 and RCP6.0, and one scenario with very high GHG emissions (RCP8.5). In reality, RCP8.5 is the "business as usual" scenario and, according to the harsh reality of emissions after that (and not the alleged efforts), it is the one which we have been following until now. The four RCPs—RCP2.6., RCP4.5, RCP6.0, and RCP8.5—correspond to average cumulative CO_2 emissions during the 2012–2100 period of, respectively, 270, 780, 1060, and 1685 GtC. Limiting total warming to 2°C until 2100, which constitutes the highest (temperature-like) scientific consensus to avoid the literary terrifying impacts and risks of runaway climate change, means that the cumulative emissions have to be limited to 800 GtC. Taking into account that 555 GtC have been already "historically" emitted, then 269 GtC "remain" in order not to surpass the cumulative carbon budget. According to Meinshausen et al., "the burning of all proven fossil fuels reserves (the fraction of fossil fuels resources that is economically recoverable with current technologies and prices […]" will result in a "[…] mid-estimate of 2800 $GtCO_2$" (Meinshausen et al. 2009, p. 1160) or 763 GtC.

Consequently, taking into account that according to RCP2.6, "only" 269 GtC "remain," that means that 65% of the proven fossil fuels reserves had to remain in the ground to keep global warming below 2°C. Hence, that directly implied that any discussion for exploring new fossil fuelreserves was utterly insane as long as we were at least serious about climate change. We will examine this case—i.e, the exploration for new fossil fuel resources in the eastern Mediterranean. Today, 12 years later, much of that carbon budget has already been covered, and proven fossil fuels reserves are way larger, including non-conventional fossil fuels (shale gas,

[4] GtC: Gigatons of carbon. 1 Gt= 10^9 t and 1 GtC=3,67$GtCO_2$

shale oil, deep-water drilling, etc.). Nonetheless, the insatiable pursuit of ever more reserves keeps going. This is the case that we will examine. Mega-projects for fossil fuels explorations in the Eastern Mediterranean and, more specifically, in the Greek peninsula.

Research object, level of abstraction, and research material

At first, trying to critically approach an issue like a national project of fossil fuel extractions in its entirety from an STS perspective entails a variety of risks and analytical drawbacks. To be more specific, it is apparent that the whole issue of fossil fuels extractions is a complex multidimensional issue that can be approached from various aspects. In fact, in an STS study, it would be much more methodologically common (and for many much more accurate) to examine, for instance, the relevant national and EU legislation or the environmental assessments, the lease agreements per se, or, even better, the technologies of ultra deep-water drilling to implement, in a sound way, the theoretical and analytical tools of an STS perspective. However, our choice is to select and try to approach the issue as a whole. To examine it from different perspectives, which after all are interconnected in all their different levels—social, economic, environmental, scientific, technological, institutional, legal, or spatial—and altogether constitute a solid body of political strategies and designs that enclose project and establish specific interests, priorities, and approaches as a dominant social ideology, imaginary and established material reality. Therefore, the level of abstraction in our study would be the one described above. Consequently, our STS approach will be developed in respect to that level and not separately in the various dimensions/areas to which we will refer in our analysis. Without resorting to a strict methodological terminology, we could say that our "ontological object" of research consists of the extraction megaproject as a whole.

Hence, the theoretical material in this study involves a wide variety of disciplines from environmental and energy policies to political economy, political ecology, regional and local development, theories of the commons, etc. Consequently, our underlying approaches in a broad range of disciplines formulate a theoretical and critical background in how we organize, present, and elaborate upon our material.

Furthermore, our material consists of a variety of primary data —i.e., official documents (e.g., governmental or administrative documents, etc.), legal agreements, pieces of legislation, environmental assessments, corporate documents, scientific papers, NGO reports, interviews, or articles from activists as well as scientists—and, of course, of secondary sources.

Objectives and Research Questions

This thesis has three main objectives. Firstly, through the case study of the Greek hydrocarbons' program, there will be an attempt to document the emergence of the crucial and highly problematic contradiction between the alleged (international, European, and national) strategies and policies (namely, "*sustainable development*", the "*green new deal*", the "*energy transition*", etc. so as to tackle climate change and decarbonize the energy sector) and the ongoing persisting planning for fossil fuels extractions for the decades to come. Secondly, by employing an interpretation of the "*black box*" metaphor, we will try to unveil the construction of a socio-technical regime during the era of the economic crisis—consisting of internal devaluation policies and an austerity strategy (economic stability and adjustment programs; MoU's)—as well as the co-construction of an ideological, political, technical and public framework through geopolitical strategies, regulatory frameworks, corporate and state strategies, new institutions, mass media campaigns, scholars, journalists, politicians, central and local authorities and lease agreements that dominate the public space and drive public opinion toward the acceptance of these megaprojects. Lastly, we will try to dismantle the multidimensional and complex social, environmental, economic, political, and geopolitical impacts and consequences that threaten to establish a "*quasi-extractivist*" regime in Greece in the decades to come.

In addition, to the aforementioned objectives, we will try to develop useful insights regarding the following four research topics. Firstly, we will try to ascertain whether the uncovered contradiction between climate change mitigation and fossil fuels extraction constitutes an actual antithesis or, on the contrary, composes a functional antithesis that (from a systemic standpoint) is "resolved" at a different level. Then, we will attempt to determine a) which aspects of fossil fuel extraction are "black-*boxed*" and in which terms and b) which are the

conditions that favor these projects to flourish. Lastly, we will examine whether the exploration of natural resources is still a sine qua non condition in mass ideology.

Structure of the thesis

In the introduction of this thesis, we hopefully provided a comprehensive framework of the hypothesis, background, and objectives that led us to study the specific issue. In the following chapter, we will present the STS-related theoretical framework and, in particular, an interpretation of the "*black box*" metaphor as well as some approaches regarding the interrelations between designs, technology, sociotechnical projects, and politics. In the third chapter, we set out a theoretical framework that has been developed precisely for the present analysis of extractive megaprojects in general and fossil fuels in particular. In Chapter 4, we continue with an analysis of the broader domestic and regional socio-economic, geopolitical, and energy policy conditions that led to the establishment of the megaproject of fossil fuel extractions in Greece during that specific historical period. The fifth chapter presents several aspects of the extraction program, from a historical flashback and the current situation to the main regulatory and legal framework. Chapter 6 focuses on the socio-economical and financial aspects of the project so as to shed some light on the significant negative external economies and, at the same time, so as to put things in perspective against the dominant propaganda. After some final remarks in the Conclusion, we state this thesis's limitations and provide suggestions for further research.

Chapter 2: STS Theoretical Framework

Let us now move on to the theoretical framework of a "case study"[5] for an STS study. From our interpretative perspective, these two (i.e., studies) are both true! From a theoretical standpoint, when approached with STS's methodological tools, a case study of that scale and level of abstraction could go full circle back to the theoretical framework, offering, hopefully, some fruitful remarks.

Regarding STS as a theoretically and interpretative flexible method, by covering a wide range of different approaches, we will outline a general point of departure. To begin with, according to Jonathan Slack, "scientific methods in a class or gendered society cannot escape social power" (Law, 2017). The notion of "situated and embodied Knowledges" against "the god trick of seeing everything from nowhere" regarding both relativism and totalization but also "[…] against various forms of unlocatable and so irresponsible, knowledge claims" (Haraway, 1988) comes from a feminist approach which emphasizes that "technoscience and society are woven together" (Law, 2017). As a result, situated knowledge and methods not only always reflect their location in space and time, reproducing social agendas, but, also, as John Law suggests: "technoscience is not simply shaped by the social but helps in turn to shape it. Indeed, many in STS argue that knowledges and methods are often shaped in ways that are gendered, racist, class-based, and/or imperialist and also that they help to reproduce such inequalities" (Law, 2017).

In addition, we could find similar approaches regarding the functions, forms, and roles of ideology in society, science, knowledge, technology, etc. in the Marxist literature—actually, a variety of approaches depending on the current. Of course, Marx's own writings also provide fundamental ideological insights. More than 150 years ago, Marx and Engels wrote in The German Ideology: "[T]he ideas of the ruling class are in every epoch the ruling ideas: i.e., the class which is the ruling material force of society is at the same time its ruling intellectual force. […] Their ideas are the ruling ideas of the epoch" (Marx & Engels, 1998, p. 67). Elsewhere in that text,

[5] Our topic might be categorized as a "case study" because, even though it does not fall into the standard, expected, and typical definition of case studies due to its level and scale, we still think that it certainly is one, as it embodies every essential element that this concept involves. Indeed, we do not examine the issue of fossil fuels extractions in an abstract theoretical basis—which would constitute a completely different research object.

they approach ideology in materialistic terms[6] as follows: "The production of ideas, of conceptions, of consciousness is at first directly interwoven with the material activity and material intercourse of men – the language of real life. Conceiving, thinking, … [the] mental production as expressed in language of the politics, laws, morality, religion, metaphysics, etc., […] what men say, imagine, conceive […] on the basis of their real life-process demonstrating the development of the ideological reflexes and echoes of this life-process" (ibid., p. 42). Another crucially important point in their method is an insistence on a specific examination of real-life in every exact epoch, location, activity, social environment, etc., which can be contrasted with an idealistic abstraction (also on empiricism) of ideas separated from everyday life empirical reality and the actions of people.

> The premises from which we begin are not arbitrary ones, not dogmas, but real premises from which abstraction can only be made in the imagination. They are the real individuals, their activity and the material conditions of their life, both those which they find already existing and those produced by their activity (ibid., p. 37).
>
> Empirical observation must in each separate instance bring out empirically, and without any mystification and speculation, the connection of the social and political structure with production. The social structure and the state are continually evolving out of the life process of definite individuals, however, of these individuals, not as they may appear in their own or others people's imagination, but as they *actually* are, i.e**.,** as the act, produce materially, and hence as they work under definite material limits, presuppositions and conditions independent of their will (ibid., p. 41, emphasis added).

Criticizing Max Stirner and his theorizing regarding natural science, they point out that he "[…] does not examine the actual relation of man to nature, determined by industry and natural

[6] We chose to refer to *The German Ideology* and to the "*Theses on Feuerbach"* because, although they were not as fully developed and "mature" as *Das Kapital*, the specific works by Marx and Engels are, undoubtedly, the most famous writings dedicated to the critique of the dominant ideology of their time.

science […]" (ibid., p. 42), which is quite revealing for their methodological approach. Finally, according to the well-known 8th Thesis for Feuerbach, *"*[a]ll social life is essentially practical. All mysteries which lead theory to mysticism find their rational solution in human practice and in the comprehension of this practice" (ibid., p. 571) which illustrates their strict commitment to the aforementioned methodological principle. Therefore, we think that there are some branches and currents in STS where we could trace elements of connections[7] with those fundamental Marxian lines of thought, methodology, and critique—ranging from the emphasis to the examination of the specific details of each phenomenon in social life—i.e., relations, conditions, space, time of each ontology, *"*science in action" (following scientists, etc.), demystification of objectified relations (for example black boxes); to the theoretical analysis (of specific currents) on ideology in science, technology, and society.

Returning to STS's methodology, it is crucial to point out that "STS tells us that technoscience in its present form is part of the problem. Separated from political, it is destructive because it takes reality to be fixed" (Law, 2017). John Law, in his conclusion, makes a crucial remark for STS's orientation, limitations, and theoretical framework: "[…] we need to remind ourselves that the world is not open and that not everything is possible, this does not mean that we cannot try […]. The hope is that in this way we can avoid giving comfort to a politics that denies that it is political, and resist the claim that reality is destiny (ibid., 2017)". Our interpretation of the specific seemingly (at first sight) "anti-utopian"[8] (sic) position is not that Law puts limits in historical transformations. On the contrary, he denies the dominant liberal doctrine that we live in a world, with its current social structure, that is the realm of freedom, equality, free will and democracy, where infinite possibilities are offered, and it is only a matter of analysis, knowledge, information and collective decision to adopt one approach or another. From that point of view—which goes against Fukuyama's wishful thinking about the "the end of history" and, also, opposes approaches that tend to instrumentalize or limit STS's method to a closed

[7] Apparently, there are others that are not. In fact, there are many people who might argue that, actually, important STS programs have been developed in the opposite direction. However, our comment does not primarily refer to those who self-identify as Marxists, but to the theoretical and methodological lines of thought, apart from any political or theoretical affiliation that can be traced back to those seminal works.

[8] Of course, we do not accept the common, Manichaean distinction between realism and utopianism.

theoretical and historical horizon[9]—we will try to approach our theme from an STS perspective that also integrates other theoretical perspectives.

Thus, in Chapters 2 and 3, we will outline the core theoretical framework that constitutes the background of our approach. Our primary theoretical references have been categorized into four groups according to two main criteria: a) their correlation with STS's methodology and literature and b) their relevance to our very subject oil and gas extraction. Therefore, we will refer to a) three seminal papers that introduce politics in artifacts, designs, and, generally, in sociotechnical systems (but also offer a specific STS critique that we consider rather significant), b) Latour's seminal "*black box*" metaphor and its theoretical and methodological extensions which could be fruitful in our analysis, c) the notion of extractivism as it has been developed over the past few years, and d) the related notion of oil-led development.

Artifacts, designs, and (mega)projects do have politics

According to one of STS's key theoretical, empirical, and historical contributions, artifacts (including technological entities) and sociotechnical systems have politics. Nevertheless, it is well known that, in sociological terms, the latter issue has been examined, analyzed, and become evident, generally, ever since the 19th century. The crucial issue for STS is to investigate the different dimensions that emerge and, particularly, to examine the sociotechnical ontological objects themselves. Langdon Winner and Gabrielle Hecht have offered us essential insights that will guide us in our study of the extraction projects. Winner correlates social determination of technology and theory of technological politics specifying that, on the one hand, they consist of different contents and objects of study, but, on the other hand, they could be complementary to each other (Winner, 1980). The social determination of technology goes beyond a *"naïve technological determinism"* that is limited to the impacts of technology and does not take into account the social and economic forces, as well as the specific social circumstances where development, deployment, and the use of technology is taking place (Winner., 1980). Thus,

[9] We do not imply that every theoretical approach that deviates from ours is limited to or gravitates towards instrumentalization. Here, we are referring to the approaches that attempt to characterize specific interpretations as incompatible with STS—which, in a way, would deprive the field of its pluralism.

besides the social determination of technology, which examines the social origins of technological change, Winner also emphasizes that it is a matter of great importance to study technological things and technology in themselves and to *"*[take] technical artifacts seriously." The theory of technological politics "[…] suggests that we pay attention to the characteristics of technical objects and the meaning of those characteristics. […] this perspective identifies certain technologies as political phenomena in their own right" (Winner L. 1980, p.123).

Winner discerns between two ways in which artifacts can contain political properties. "First are instances in which the intervention, design, or arrangement of a specific technical devise or system becomes a way of settling an issue in a particular community. […]. Second are cases of what can be called inherently political technologies, man-made systems that appear to require, or to be strongly compatible with, particular kinds of political relationships" (ibid., 1980, p.123). The second "way" that is distinguished by Winner is connected with extractivism, and we will argue that it is also connected with our case study of hydrocarbons program in Greece. Winner elaborates much more on the second "way" and on the arguments which claim that technologies are "in some sense inherently political", acknowledging two versions:

> […] the adoption of a given technical system actually requires the creation and maintenance of a particular set of social conditions as the operating environment of that system. […] some kinds of technology require their social environments to be structured in a particular way […] and b) « a given king of technology is strongly compatible with, but does not strictly require social and political relationships of a particular stripe. […]. Within both versions of the argument there is a further distinction to be made between conditions that are internal to the workings of a given technical system and those that are external to it (ibid., p.130).

Winner emphasizes that by examining social patterns that constitute the environments of technical systems, we find that they are almost invariably connected with specific ways of power and authority organization. As a result, the important question arises:

> Does this state of affairs derive from an unavoidable social response to intractable properties in the things themselves, or is it instead a pattern

> imposes independently by a governing body, ruling class, or some other cultural institution to further its own purposes? (ibid., p.131).

Among others, Winner refers to the example of energy systems—i.e., the production and distribution of energy, the oil pipelines, and the refineries—as indicative technological systems for the examination of the aforementioned arguments. Of course, the atom bomb consists of the most typical example of an inherently political artifact that demands a centralized, rigidly hierarchical chain of command, an internal authoritarian social system that has to be independent of the political system. More specifically, demands the kind of regime or the character of the rules in which is embedded so as to remain unaffected of any external influence and "do not spin off or spill over into the polity as a whole" (ibid., p.131).

Hecht's study concerning the design and development of nuclear reactors in post-war France shows the multidimensional perspectives of how technological artifacts inscribe and shape the political agenda, reaching even the level of national policy for a whole era. Although Hecht's well-known paper introduced a variety of core arguments that are not related to our theme—for instance, the political agendas that inscribed in and, more importantly, are shaped through the design of the black box itself (but, also, through parts outside the black box)—we can also identify correlations and analogies with our case study. First of all, Hecht points out that de Gaulle was convinced that "a nuclear program would both elevate France's stature in international politics and accelerate its industrial and economic recovery" (Hecht, 1994, p. 660). We will later see that, in Greece, these kinds of arguments were central for the promotion of the extraction program—with their focus ranging from Greece's economic recovery and energy independence to its geopolitical role and status. In France, the different definitions of public interest among the various institutions were inscribed in the project of the nuclear reactors: "EDF as a nationalized company reflected the left-wing side […] while the CEA […] the Gaullist side. Officials in each institution, therefore, tended to have different definitions of the public interest" (ibid., p. 661). Such an analogy could also be found in the extraction program in Greece. Moreover, we could find important analogies between the role of engineers, the ideology embedded in their studies and their adoption of specific political and social objectives or interpretations as members of specific institutions. In both cases, technological determinism

plays a decisive role: in the case of France, it is technocrats who take political decisions through technology; in Greece, it is technocrats who predict and guarantee enormous economic revenues, geopolitical gains, and insignificant environmental and social impacts and risks. Finally, just like in France, in Greece there exists a common ground concerning the interpretation of public interest, which, in spite of any possibly differing perceptions, connects extended parts of the political spectrum horizontally. As a result, this constitutes a crucial factor in the adoption of such programs.

Returning to the theoretical and methodological contribution of STS to the study of technological entities or, generally, of sociotechnical change/systems, we need to refer to Winner's critical interpretation. Science and technology studies are a cross-disciplinary field. An influential school of thought is the one of *social constructivism* or *social construction of technology*. After Winner clarified the substantial aspects of that methodological and theoretical program, he presented an important critique in a comprehensive and, at the same time, concise way. First of all, he points out "the narrowness of this perspective […] a willingness to disregard important questions about technology and human experience, questions very much alive in other theoretical approaches" (Winner, 1993, p. 368). Then, he structures his critique in four main categories—namely, that: a) social constructivism is leaving out of sight the consequences of technical choice and technological change, b) the conception of relevant social actors or groups, firstly, can exclude extended social groups that have no voice and, secondly, does not examine the specific interrelation among social groups, social interests and possession of power (whether economic, social, political, cultural, institutional, state, etc.), c) social constructivism disregards deeply seated processes in society, that are structural, cultural, intellectual, economic beyond "the immediate needs, interests, problems, and solutions of specific groups and social actors" (ibid., p. 370) and finally d) lack of any evaluative stance or political and social program of principles as a guideline to judge technological alternatives. Social constructivists embrace the epistemological program of relativism or "interpretive flexibility in the new sociology of technology" that not only remains "agnostic as regards the ultimate good or ill attached to particular technical accomplishments" but also regarding to the "methodological bracketing of questions about interests and interpretations amounts to a political stance that regards the

status quo and its ills and injustices with precision equanimity" and, as a result, "soon becomes moral and political indifference" (ibid., pp. 371-373).

We emphasize the above critique because we find it a) essential for the inner workings of STS, b) similar to our line of thought regarding the specific issue, and c) relevant to our approach in this study. Specifically, our decision about our very theme (which we have already mentioned)—instead of some specific aspect of the whole issue (e.g., lease agreements)—has been made so that we have the chance to deal with a sociotechnical–developmental choice in its entirety and, as a result, be able to analyze its social, economic, environmental, political and technological consequences. In addition, we aim to examine the distribution and the concentration of power, the extended social groups that are excluded from any o informative processes, public consultation, and, of course, participation in the planning and in the decision-making process. As a result, we will extensively refer to the various multidimensional impacts of fossil fuel extractions, and, clearly, our study in no way embraces a neutral, purely descriptive stance on the issue—quite the contrary.

The "black box" metaphor and glass wall opacity

The black box metaphor is certainly one of the most common concepts/terms in the STS literature. The term "black box" was developed by Bruno Latour as an analytical tool and an interrelated methodology (i.e., opening the black box) in his seminal book *Science in Action*. Although the term was already used (as Latour informs us from the beginning) by "cyberneticians whenever a piece of machinery or a set of commands is too complex. In its place they draw a little box about which they need to know nothing but its input and output" (Latour, 1987, pp. 2-3), it did not have the content that Latour developed in his book. The crosshead of his introduction, "Opening Pandora's Black Box (emphasis added)" acts as a notifier. As Latour develops the notion of the *black box,* he formulates a definition (of sorts), on the occasion of the example of Kodak:

> The assembly of disorderly and unreliable allies is thus solely turned into something that closely resembles an organized whole. When such a cohesion is obtained, we at last have a black box. Up to now I have used this

> term both too much and too loosely to mean either a well-established fact or an unproblematic object. I could not define it properly before we had seen the final machinations that turn gathering of forced into a whole that then may be used to control the behavior of the enrolled-groups. Until it can be made into an automaton, the elements that the fact-builder want to spread in time and space is not a black box. It does not act as one. […] Now the new Kodak automatic cannot be opened without going wrong. It is made up of many more parts and it is handled by much more complex commercial network, but it acts as one piece. […] When many elements are made to act as one, this what I will now call a black box (ibid., pp. 130-131).

It is evident just from the passage above that Latour gave a new definition and a much more elaborate content to the term, which is now placed at the epicenter of an entire theoretical approach regarding the study of science and technology:

> It is now understandable why, since the beginning of this book, no distinction has been made between what is called a 'scientific' fact and what is called a 'technical' object or artifact. […] The problem of the builder of 'fact' is the same as that of the builder of 'objects': how to convince others, how to control their behavior, how to gather sufficient resources in one place, how to have the claim or the object spread out in time and space. In both cases, it is others who have the power to transform the claim or the object into a durable whole. […] the only way for a whole stable field of science to be mobilised in other fields, is for it to be turned into an automaton, a machine, one more piece of equipment in a lab, another black box (ibid., p.131).

Latour, alongside the term "black box", introduces and gradually develops — *"travel through technoscience"*— the definition of another crucial term: "technoscience". Both these concepts constitute two of the pillars of his method and his theoretical interpretation. Latour emphasizes that besides removing the wall between science and technology, as we have stressed above, it was crucial that the sheer division between science and society was abandoned and

replaced from a social process where science and technology are woven together in the production of knowledge.

> "It is fortunate that we decided from the start to study the activity of making science and not the definition given by scientists or philosophers of what science consists of. […] We would have believed in the existence of a science on the one hand, and of a society on the other, […] Here again, Janus speaks two opposite languages at once. On the left side he says that scientists are the cause that carried out all the projects of science and technology, while on the right side scientists are striving to position themselves inside projects carried out by many others. To remind us of this important distinction, I will use the word *technoscience* from now on, to describe all the elements tied to the scientific contents no matter how dirty, unexpected or foreign they seem, and the expression *'science and technology'*, in quotation marks, to designate what is kept of technoscience once all the trials of responsibility have been settled (ibid., p.174, emphasis in original).

And to be even more concrete and clear, Latour offers descriptions like these:

> We learned that in our trip through technoscience we should follow simultaneously those who stay inside the labs and those who move outside, no matter how different the two groups appear. Second, we learned that in the construction of technoscience we have to include all the people and all the elements that have been recruited or are doing the recruiting, no matter how foreign and unexpected they seem at first (ibid., p.162)

Indeed, we will not reproduce Latour's famous approach here. We simply referred to two pairs of important terms and divisions that are both essential and a source of inspiration for this thesis. So, shall we declare that we will "open the black box" of extractions? Not quite. In fact, we have to point out that, in order to be methodologically and theoretically accurate, we will not follow Latour's method, principles, and terminology as a structured scientific approach. We will not "*follow the scientists*." We will not enter the laboratory. We will not dismantle a scientific or

technological discovery, fact, artifact, or object that has been blacked-boxed. And a reasonable question arises: Why even refer to the black box at all? Firstly, the development of the concept of the black box itself as an analytical tool, the removal of the barriers (both between science and technology but, also, between science and society) and the emergence of the term technoscience constitute for us a point of departure.

Furthermore, we are employing the "black box" metaphor metaphorically, in order to take advantage of the term's versatility during its quite common usage "*in very non-Latourian ways"* (Shindell, 2020). The spectrum of this metaphor's possible interpretations is quite wide—from artifacts, facts, objects and natural black boxes to black boxes in the form of entire institutions, processes, etc. For instance, in microeconomics, an entire firm could be depicted as a black box "in which a finite number of externally purchased inputs are transformed into a finite number of outputs to be sold in the market(s)" (Andersson et al., 2018, p. 501). So, we can consider the entire extraction program as a "black box" from the perspective of public space (with respect to all the various aspects of a public space—i.e., interests, economics, policy, information, research, consultation, environment, local communities, law, etc.) that is characterized by an astonishing degree of stability and impenetrability—taking into account that we are in the third decade of the 21st century. Also is considered a developmental policy in which the Greek state plays a major role.

In our case, the megaproject of extraction, as already explained, is characterized by great stability (as a policy) and, as a result, numerous different elements act as one. To put it more precisely, as we will see in the following chapters, we can indicatively mention the various governments, state institutions, scientific and technological institutions, big corporations, local authorities, and mass media that are aligned or "convinced" about the project. However, regarding the characteristic of impenetrability in the sense of opacity, our case cannot be described as a "black box" but, rather, as a "*glass box*," where, still, the main attributes and contents of the black box as an analytical tool are preserved.

Glass-box science or glass-wall laboratories seem to be a trend in museums and exhibitions. There, scientists, technicians, and volunteers carry out their jobs before the visitors, with only a glass window separating them (Wylie, 2020).

> Glass-walled laboratories in museums out scientific workspaces, workers, and work directly before visitors' eyes. […] Thus, glass-walled labs do not destroy the black box that obscures scientific practice for nonscientists. Instead, they exemplify a glass box, a kind of black box that contains a performance of scientific work (ibid., pp.1-2).

Wylie points out that:

> […] a display lab remains an exclusive box, not an accessible public space. […] Glass enclosure- for traditional exhibits and for labs- imply that objects should be admired while also protected from the admirer. Thus, rather than destroying the black box, around how science is dome, display labs enclose it in a new box, a glass box, which makes scientific practice visible but not necessarily comprehensible to the public. (ibid., p. 6).

Glass-boxing practices have some significant consequences: i) the lab's work is not explained effectively, ii) the public, in most cases, cannot participate in the lab work, iii) signs that describe the lab's work are exclusively designed for visitors, iv) the lab's work is performed (in other words, it consists of a performance that is prepared for an audience and does not mimic the way the same tasks would executed "behind the scenes"), v) the public can observe an activity without necessarily knowing what is happening, and, finally, vi) a glass box, one could say, is more penetrable than a black box, even though it still maintains social, epistemic and physical barriers between science and public understanding (ibid., pp. 6,7,13).

But what is the importance of the aforementioned consequences for our topic? To begin with, in the 21st century, the EU member states have established several mandatory principles, mainly through directives that were transported into national laws concerning public policies, public work contracts, public consultation, publicity in governmental policies, access to environmental information, public participation in environmental decision-making (Regulation (EC) No 1367/2006. Aarhus Convention), etc. As a result, the whole legislative framework as well as the agreements, contracts, environmental and financial information, taxation, and so on are generally accessible to the public. Thus, at first glance, the "box" seems to be made of glass instead of an opaque, "black" material. At the same time, the state policies that pertain to

megaprojects like fossil fuel extractions consist of a plethora of elements that are amazingly coordinated and *act as one*. It is, indeed, almost impossible for the average citizen as a sole person who is not an expert (in fact a multi-expert while in reality demands a group of experts) to penetrate this highly complex, vast amount of legal and technical documents, reports, legislation, and governmental decisions in order to acquire, at the very least, an overview of these policies. Actually, all these sociotechnical and sociolegal entities that take the form of highly technical documents (with respect to their structure, format, terminology, size and technical language) are explicitly designed to be impenetrable to the public and, yet, *technically* transparent and accessible. Consequently, such documents are extremely performative so as to serve their objectives efficiently. They are designed to be "onstage" and accessible to the public. They have to be persuasive that they will deliver the transformation as *advertised* fulfilling every legal, social, environmental term and condition so that the inputs will be efficiently converted into outputs, while anyone can see how this happened (by virtue of to the glass wall). Onstage (that is, on the other side of the glass wall), what is presented is the finished and polished work of an assortment of technocrats, policymakers, politicians, corporate executives, engineering consultancy companies but, also, scientists, scientific institutions, and, of course, promoters and advertisers, all of whom compose a robust network of support. As a result, it is clear that, besides the crucial support of vast economic interests and the mass media promotion, projects like an extraction are supported by a shiny but highly impenetrable glass wall that, at the same time, as a glass-wall, offers political legitimization.

But, in our case, how would we have sketched an indicative black box or, more accurately, glass box? Which would have been the inputs and the outputs?

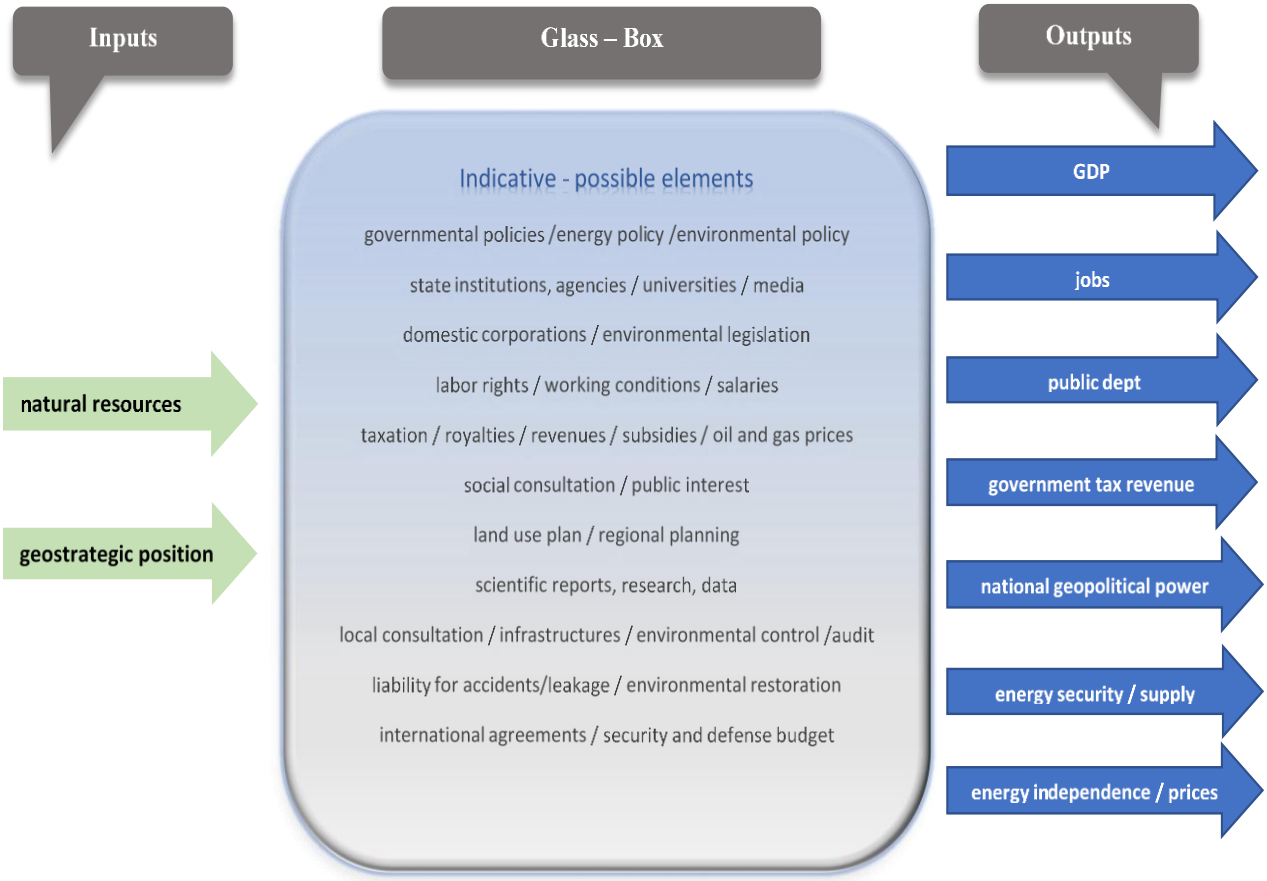

Figure 1: An indicative "glass-Box", flanked by its inputs and outputs

The figure above presents an indicative sketch of the inputs and outputs of a glass box. The outputs describe and establish the glass box as a developmental policy, a productive process and a narrative for the majority of the population. Such a narrative is still valid for the majority of the people in Greece (even though its support has been declining and, probably, to an increasing degree over the last few years, mainly in the local communities). In the interior of the glass box, a wide variety of possibly interrelated elements can be revealed. These elements perform the transformation and constitute the class-walled entity. This entity has to be destabilized and examined both as a process as well as a whole body of intercalated elements. Following Latour, the process of moving through time is one major factor that contributes to making the opening of the black box feasible.

Hence, in our case, we will employ the method of moving through time, not precisely in a Latourian way, but in a way that will reveal essential decisions, turning points, and facts that

destabilize the entire narrative. Specifically, we will mostly move in two different directions. Firstly, we will provide a short flashback of the history of hydrocarbons' extractions in Greece, and, secondly, we will deploy recent research and reports as well as opposing movements and critical sociopolitical and theoretical currents that stand against fossil fuel extractions and the whole socioeconomic narrative that supports them, along with the dominant fossil fuel multinationals complex. The latter is, nowadays, all too crucial because the entire ideology of fossil fuels is gradually being destabilized as we are, by now, in a time beyond both the stabilization and the dominance of the specific "black box." Nowadays, as Latour's Janus would probably say, in an altered expression, all the relevant people are already becoming skeptical, and they are getting more and more so as time goes by.

Chapter 3: Theoretical Framework – Extractivist development

A "scent" of extractivism

The concept of extractivism, as it has been introduced over the last decades, has been formulated upon a series of structural (quantitative, and qualitative) characteristics ranging from the productive, economic, and financial level to the spatial, social, and environmental. Although relevant definitions appear, various alternative interpretations refer to specific phenomena, processes, and relations from which the term's theoretical and analytical validity as well as accuracy emerge. Consequently, in recent years extractivism has been firmly established in radical critical theory. We consider this preliminary clarification appropriate precisely because of the issue (i.e., the case study) we have chosen. We generally think that it is neither proper nor valid to use the term "extractivism" in an intensely eclectic or contrived way—that is, as a convenience that might, ultimately, weaken its analytical and theoretical potency. However, the question immediately arises: Given that the predominant parameter is the planned and promoted hydrocarbon extraction program, does the case of Greece fall into this category? Can the "production model" that is promoted in Greece be characterized as "extractivist"?

A certain contradiction permeates the question above. On the one hand, Greek social formation constitutes a developed capitalist society, which, in its historical course, was not defined by the export of raw materials and mass extractions[10]. Hence, according to qualitative and quantitative indicators, Greece cannot swiftly and unproblematically be transformed in a manner that would facilitate an extractivist model of development, either economically or socially and environmentally. Therefore, the recent examples of extractions in Greece (and, especially, the hydrocarbon extraction program and the gold mining project in northeastern Halkidiki, etc.) cannot formally and with theoretical accuracy modify the characteristics of the Greek social formation to such an extent so as to be considered exemplary of an extractive model of development. In addition, this cannot be done a priori, based on plans and announcements.

[10] Of course, this does not mean that they did not play an important role, especially in the sector of electricity production (extensive lignite mining without an export character, therefore outside the extractivist model) but, also, in the metal industry (export-related), etc.

On the other hand, some special endemic conditions have important qualitative characteristics that bear some resemblance to those of extractivist countries and could be used analytically in order to describe phenomena that evolved in Greece during the second decade of the 21st century.

Within this contradictory framework, we draw from the theoretical developments of extractivism so as to approach in detail the extraction of fossil fuel in Greece.

Extractivism and neo-extractivism

Extractivism is not just another field of sectoral development alongside everything else. It constitutes the developmental model that characterizes the countries where it is applied by overdetermining their total production and, to a large extent, the important aspects of their economic, political, and social conditions. The phenomenon that is currently being conceived through the concept of extractivism is not something new. Some of its basic elements have been observed since the period of colonialism and the expansion of the capitalist relations of production (e.g., the extraction and of natural resources in the form of raw materials, long-distance trade, monocultures, etc.). In order to provide a general definition, we quote Alberto Acosta, who states the following in an attempt at a comprehensive, general definition:

> we will use the term extractivism to refer to those activities which remove large quantities of natural resources that are not processed (or processed only to a limited degree), especially for export. Extractivism is not limited to mineral or oil (Acosta, 2013, p. 62).

Acosta notes that extraction practices extend to agriculture (with the phenomenon of monocultures), logging, and even fishing, where there are similar examples. Therefore, when we talk about extractivism, we are talking about the large-scale extraction of raw materials (natural resources) intended for export, which determines the accumulation model of a social formation. Especially in the era of neo-liberalism, the framework for the internationalization of capital, deregulation, the opening-up of international markets, and the removal of significant restrictions on the international capital mobility results in the strengthening of the role of multinational

corporations and the retreat of the regulatory and controlling role of the state in the design of developmental policies (assuming, of course, another role).

The large multinational (and, in some cases, even “semi-state”) corporations of the North played a leading role in the extraction of natural resources from the Global South, resulting in the phenomenon of extractivism taking on new forms[11]. In recent years, the term neo-extractivism[12] has also been used and is often related to the experiments of radical progressive governments in Latin America[13]. The distinction between "traditional or classical" extractivism and neo-extractivism is a matter of debate, focusing on different elements of distinction. For example, on the one hand, we have the neoliberal globalized financial (de-)regulation and the subsequent process of the assessment and valuation of the natural environment. On the other hand, we have the anti-neoliberal political “experiments” in Latin American countries. A broad definition that can deal with elements of both extractivism and neo-extractivism (in this case) is developed by Svampa and refers to the development model

[11] A debate/discusion on “extractivism” and "neo-extractivism”, apart from the literature we quote, can also be found in the eco-social magazine "Climate and Capitalism", https://climateandcapitalism.com/2014/10/30/can-latin-america-go-beyond-extractivism/

[12] During the neoliberal period, neo-extractivism is connected to, among other things, the privatization and grabbing of natural resources, which, along with the financialization process, produces the phenomenon of directing capital flows in these sectors towards the extraction of profit from these transactions themselves in the financial sector (through stock exchanges, derivatives, financial speculation, etc.).

[13] This is a rather complex issue both at a theoretical and a political level. At the same time, an international theoretical and political debate is underway within social movements and radical theoretical approaches regarding the path that was followed by the anti-neoliberal, progressive or, even, radical experiments of Latin American governments. In any case, we have to note that this issue is not amenable to conventional critiques. The overall conditions, needs, and challenges that Latin American countries with progressive or radical governments have faced in recent years are not conducive to reductions and direct comparisons, as we have to take into account the social, economic, political, and international conditions in which they emerged. Nevertheless, we should note the criticism leveled at the attachment to a model that, along with the central role of the state, envisioned strong growth rates tightly connected with the extraction model as well as high exports, in the context and with the aim of national development and productive reconstruction based on national independence and the anti-imperialist struggle to strengthen (and, in many cases, effectively create) a welfare state, reduce inequalities and extreme poverty, etc. There also are entirely different views on the definition of neo-extractivism: e.g., see Brand et al. (2016). The significance of the negative impacts and implications was such in the economic, social, and environmental level that, in the end, among other things, this model contributed to making these political attempts vulnerable, trapping them in a self-sustaining vicious circle. In any case, the “neo-extractivist” model has ended up being blamed for a significant part of the problems encountered in the various (progressive or radical) political projects developed in Latin America.

> "that is usually defined as the pattern of accumulation based on the overexploitation of generally nonrenewable natural resources, as well as the expansion of capital's frontiers toward territories previously considered nonproductive. Developmentalist neoextractivism is characterized by large-scale enterprises, a focus on exportation, and a tendency for monoproduction or monoculture" (Svampa, 2015, p. 66).

Svampa mentions several areas/sectors as emblematic of extractivism and neo-extractivism, including strip mining, exploitation of non-conventional fossil fuels, large hydroelectric dams, fishery frontiers expansion, deforestation, and, of course, large-scale agribusiness model (soy and biofuels). In addition, she identifies a transition from the notorious Washington Consensus to the commodities consensus which implies greater flexibility in the role of the state, concluding that *"[t]his* tendency toward exportation allows for the coexistence of progressive governments, which question the neoliberal consensus, with governments that continue to deepen a neoliberal, conservative political framework" (ibid., p.66). This specific point is crucial in our case because the current hydrocarbons extraction program in Greece, which will be examined and is being implemented today, has already run through five governments that ranged from a right-wing, neoliberal, or centrist to (at least, initially and declaratively) a left-radical orientation. This position of Svampa differs from earlier ones, as authors such as Eduardo Gudynas, Alberto Acosta, and Maristella Svampa (obviously we are referring to positions) distinguished extractivism from neo-extraction based on the criterion of redistributive policies upon rents and surplus value directed at the welfare state, as well as the element of nationalizations of the respective production sectors and, of course, all of the above in the context of anti-neoliberal and anti-imperialist policies from which their social and political legitimacy is derived from (Brand et al., 2016, p. 129).

> In our understanding, the distinction between progressive and liberal/classical extractivism, or between "neo" and "classical" extractivism, lies at the level of concrete societal historical formations, that is, concrete countries in specific moments. […] Nonetheless, we would like to emphasize that in spite of the fact that differences certainly do exist, commonalities among

> the different countries are becoming increasingly visible. […]. On this basis, we would like to caution against overestimating the differences between countries due to their forms of government when analyzing extractivism/neo-extractivism. […] we deliberately talk only of neo-extractivism, referring to a development model that is embedded in a specific historical phase of capitalist development where nature and its valuation in the world market play a decisive role for the realization of exchange value, and which exhibits commonalities across different political regimes (ibid., pp. 130-131).

The debate over neo-extractivism is long and complex. For our case, we think that it would be useful to add some more points. First of all, the regulatory and legitimizing role of the state at all levels is crucial even during the neoliberal period, when the role of arbitration in relations between companies, employees, and local communities was undermined by the establishment of the so-called independent regulatory authorities (Velegrakis, 2018). The extractivist economy

> "often operates as an enclave, i.e., without integrating the export activity of raw materials into the rest of the economy. Therefore, the production and development model remains vulnerable to world market fluctuations and especially to fluctuations in minerals' prices. Consequently, the countries that supply almost exclusively the world markets with raw materials through mining are completely dependent on the global demand" (ibid., p.64).

The above characteristic is crucial for the case of hydrocarbon extractions in Greece as its consequences are already seen from the exploration stage of hydrocarbons with the fall in fossil fuel prices in international markets, which was observed before the pandemic and escalated during it. As a result, there have been cases where consortia have already abandoned the concessions, plans (i.e. for exploitation) were postponed, while other companies (i.e., Energean) applied for and received state subsidies (Energean PLC in the Prinos region exploits the only producing field in Greece).

Oil-led development

An additional term that has also been used to describe that development model and the related model of capital based on the extraction and export of oil and fossil fuels in general, which is also characterized by significant economic, social, political, and environmental similarities with extractivism, is that of "oil-led development." Contrary to what is often promoted about growth stimulation, job creation, government revenue, the funding of social programs, infrastructure improvement, etc., the data show, as Terry L. Karl notes, that almost all countries that base their growth in oil exports have negative consequences in several areas:

> […] slower than expected growth, barriers to economic diversification, poor social welfare performance, and high levels of poverty, inequality, and unemployment. [and also…] exceptionally poor governance and high corruption, a culture of rent-seeking, often devastating economic health and environmental consequences at the local level, and high incidences of conflict and war. In sum, countries that depend on oil for their livelihood eventually become among the most economically troubled, the most authoritarian, and the most conflict-ridden in the world (Karl, 2007, pp. 2-3).

Karl also notes that "countries that are resource poor (without petroleum) grew four times more rapidly than resource rich (with petroleum) countries between 1970 and 1993 - despite the fact that they had half the savings" (ibid., 2007, p.5). This is what is called in the relevant literature a "resource curse."

At this point, it should be stressed that the extractive model typically refers to examples of countries in Latin America, the Middle East, and Africa. As we have already noted in our introductory remarks, what is currently being attempted in Greece has important and substantial differences with the extractive development model but, also, significant similarities in terms of the extent and severity of its potential effects.

We will briefly refer to specific structural differences and to the effects of the strategic plan "Greece *energy hub"*—along with the related extraction program—which is similar to what in the literature is defined as the extractive development model. Although, before doing that, it

would be essential to take a slight digression to stress, in short, the central role of the target/objective: "Greece Energy Hub."

The term Energy Hub, at first sight, seems to be exclusively connected with electricity and gas interconnections and pipelines, infrastructure, energy transmission, and distribution systems. This is not true, as the whole narrative of "Greece Energy Hub" is also connected with the market—deregulation, investment opportunities for the international and domestic capital, privatizations, and, of course, "Exploration and Development of hydrocarbon reserves (onshore and offshore)" as Georgios Filiopoulos, CEO of "Enterprise Greece", noted, among others, in his presentation in the Energy Forum 2021, (Filiopoulos, 2021). This specific target had been adopted before the current phase of the extraction program was introduced, which had as a point of departure the Law 4001/2011 and, subsequently, was integrated into the more general target of "Greece energy hub." The latter had undoubtedly been introduced before[14] the 2007 global financial crisis. This assertion can be easily corroborated by documents that predate the aforementioned crisis; for instance, see this 2006 assessment by the International Energy Agency: "Energy diversification has been progressing and Greece is actively increasing interconnections with *neighbouring* countries and has also played a crucial role in the Energy Community of South East Europe Treaty. Such efforts will not only contribute to security of supply but also make Greece an important energy hub[15]" (IEA. 2006. p. 9). Thus, the specific strategic plan has been followed by every government up until now and is closely related to a variety of policies that have already been introduced—and which are of an increasing intensity, especially after 2011. The first agreement that introduced an "energy triangle" was signed in 2013 among Israel, Greece, and Cyprus (Levitt, 2013; Zeiger. 2013). To this day, every Greek prime minister has declared the state's serious commitment to that strategy. Former PM Antonis Samaras "highlights Greece's role as an energy hub" (Yallouros, 2014); another former PM, Alexis Tsipras, declared in 2017

[14] We do not pinpoint the exact occasion when the target of "Greece *energy hub*" was set because, in contrast to the extraction program, this is somewhat unimportant for our purposes. We just stress that such planning came before the 2007 global financial crisis.

[15] It is worth noting that the abstract in the IEA report's webpage is even more precise: "Capitalising on its geographic position in the eastern Mediterranean and the Balkans, Greece seeks to become an energy hub in the region and is invreasing infrastgructure interconnections with its neighbours" (retrieved from: *https://www.iea.org/reports/energy-policies-of-iea-countries-greece-2006-review*).

that “the aim is to make Greece an international energy hub” (Energypress, 2017), and, of course, other Greek officials have made numerous comparable statements (Petrou, 2016; The Greek Observer, 2017). The incumbent P.M. Kyriakos Mitsotakis declared a few months ago, that he is envisioning Greece to be an energy hub even if, to be accurate, hydrocarbons’ exploration is not in the PM’s priorities these days [16]. Furthermore, the specific target of “Greece Energy Hub” acts as a vital narrative around which is organized a variety of different policies, initiatives, plans, social/scientific/governmental institutions, stakeholders, ministries, and, of course, private interests. For example, in 2017, the Technical Chamber of Greece (TCG)—where all qualified, licensed engineers in Greece are registered as members (100.000+ members)—organized the Athens Energy Gas Forum under the title “Greece as Southeastern Europe & East Med Energy Gas Hub.”[17]

After this short digression, we return to defining, on the one hand, some structural differences and, on the other, some similarities between the target “Greece energy hub”—with an emphasis on the extraction program and the extractive development model. Two of the key indicators (though not the only ones) that determine the extractivist or "oil-led development" model are the dependence of the economy on these activities that can be specified as the ratio of the total amount of oil and gas exports, either in terms of GDP or in terms of total exports, with the latter ranging from 65% to 95% (Karl, 2007, p. 4). In these cases, it is evident that public revenue, social policies, and the production system as a whole (sectors and branches of production, labor specialization, etc.) are structured around the export of raw materials, creating a vicious circle of dependence. Also, characteristic is the phenomenon that was named the "Dutch disease" in the late 1970s. It was first observed in the Netherlands after discovering sizeable natural gas deposits in 1959. In short, the phenomenon relates, firstly, to the explosive increase in natural resource exports following a major discovery, leading to a significant increase in foreign exchange reserves, with a consequent rise in the exchange rate. In turn, this makes

[16] We will mention the complicated issue of the possible erosion of the Greek Government’s ongoing interest in hydrocarbon exploration in Chapter 5. Nevertheless, the hydrocarbon extraction program is still active and, thus, constitutes a central pillar of the “Greece Energy Hub” narrative.

[17] https://ec.europa.eu/greece/sites/default/files/20170627_tee_athens_forum_agenda.pdf

several exportable industrial products expensive (valued at international prices) in relation to the competition, which results in a decrease in exports and an increase in imports. Then, this leads to the displacement and shrinking of industries (particularly, in processing and manufacturing) and, as a result, in an increase in the rate of unemployment. Secondly, "Dutch disease" is connected with the parallel process that operates cumulatively and concerns the orientation of the capital flow of investments in the sectors of activity directly or indirectly connected with extractions/mining (and, especially, in sectors of “non-internationally” tradable goods—for instance, constructions) with the corresponding withdrawal from other sectors. At the same time, the increased exchange rate further favors the import of goods over the domestically produced ones, resulting in the further displacement of activities and the even wider shrinkage of production. Furthermore, the consequences of such destabilization (which has destructuring effects on production)—namely, rising unemployment, income reduction, and the spread of poverty to broad social strata not associated with the extractive/mining industry—are not easily reversible. Especially after the end of the upward phase of the cycle (expansive and mining boom, which is always limited—either due to the depletion of the specific reserve or due to price fluctuations, a reduction in the aggregate demand, etc.), the sinking that follows is extensive, the starting point is lower, and the adjustment is socially painful.

The above structural characteristics of the extractive model (for instance, among others, the degree of economic dependence on mining, balance of payments [BOP] and financial flows dependent on mining, the destructuring/dislocation of productive activities, the attachment of a significant part of the production to extractions, welfare state dependence on extractions) are not (immediately and directly) likely to occur in Greece to the extent and degree that they typically characterize the extractivist model. Greece is a developed capitalist country (economically, socially, institutionally, politically, administratively) that participates in most transnational integrations of (capitalist) developed countries—e.g., the EU, the Eurozone and (imperialist) international organizations such as NATO—and has a multitude of developed sectors that are exposed to international competition (open economy). What is more, Greece’s currency is the euro, an international currency (which is designed to be a global reserve currency), whose

exchange rate is not determined by national economies and the Greek state but by the Eurozone and the ECB.

However, at the same time, the scale of the areas (blocks) that are under concession contracts for exploration and production (E&P) of fossil fuels—combined with a series of other characteristics which should have been prohibitive for such plans (even in the imaginary scenario that there was no urgency to decarbonize economy), to which we will refer later (ecosystems, seismic activity, etc.)—could result in economic, social, environmental and political consequences that are typical in the extractivist model, which, in addition, threaten to have a severe impact on the majority of the country's population.

In particular, the possible impacts of the extractive project as introduced in Greece can be codified in the following way:

1. the revenues and profitability from fossil fuel exports might be appropriated by large domestic or multinational corporations, while, at the same time, spreading the negative external economies of these high-impact activities (such as mining) to the local economies and society,
2. there are strong conflicts in land uses and incompatibilities with local productive activities that are displaced (tourism of all kinds, fisheries, agriculture, etc. but also several other activities—e.g., the processing of primary products and services related to local production), which directly results in the devaluation of infrastructure and, in general, of the invested capital, as well as to the specialization/skill obsolescence in many sectors (dislocation and shrinking), leading to a massive loss of jobs and incomes from the lower and middle social strata and, of course, to the increase of local unemployment,
3. fossil fuel extraction entails long-term environmental impacts that are often irreversible and associated with the degradation of ecosystems, landscape alteration, water pollution, land clearing, air and toxic pollution, the degradation of the man-made environment (elements of cultural heritage), etc., as well as with factors that pose a direct threat to the health, quality of life and livelihood of local communities,
4. fossil fuel extraction is one of the most capital-intensive activities and, therefore, has a low employment rate per unit of invested capital. Furthermore, the working positions

created under the imposed monoculture are, for the most part, highly specialized jobs that are mostly occupied by employees of multinational corporations, and, indeed, they are not addressed to the local society (except for some indirect jobs). But even these positions are temporary and often dwindle in the medium term,

5. after the end of activities with monoculture characteristics, the consequences of the drastic degradation of the natural environment, the decline of the quality of life, the deterioration of the population's health, the displacement of other productive activities, etc. have in reality “mortgaged” the future and any pre-existing development alternatives, while what often follows is an explosive rise in unemployment and poverty rates. Indicatively, in the case of Mantoudi in Evia, after the cessation of whitestone mining, the unemployment rate soared to 70% in 2000,
6. according to all the above, hydrocarbon extraction exacerbates social inequalities, drastically worsens the primary distribution of income; i.e., the locally produced GDP (even if it increases, which is highly doubtful, especially in the case of a developed economy), results in a much smaller part of the population and, primarily, to the shareholders of the mining corporations, while society bears the short-term and long-term costs,
7. monopolistic control of technology and the related methods and techniques[18], as well as external funding/financial flows (foreign direct investments [FDI]) by large multinationals,
8. constant pressure for the dismantling of the institutional framework in environmental protection, spatial planning, taxation, control mechanisms, etc., which creates a spiral of dislocation focusing on the "law of the investor" (leonine contracts/conventions/concessions whose restrictive conditions are not even applied—

[18] A typical case in Greece (in the field of mining) is that of gold extraction in Halkidiki (northern Greece). The focal point of an emblematic multi-year struggle on the part of the local socio-ecological movement is the inapplicable metallurgical method of flash smelting, which the Canadian company “Eldorado Gold” had falsely declared it would implement. Of course, the issue of open-pit gold-copper-ore mining in Halkidiki is an absolutely emblematic one on many levels: open-pit mining, severe environmental degradation, extreme neoliberal policies, the doctrine of “law and order” (that is, state violence and abuse of power), fast-track licensing, environmental violations, tax avoidance, financialization, aggressive takeovers, corruption, infringement of the public interest, etc.

so as to ensure an “attractive environment for investors”) which are then diffused throughout the public sphere and the economy as a whole,

9. entrapment of productive planning against alternatives that have not even been considered,
10. permanent source of pollution through continuous leakage (a fact that is often concealed), xi) risk for catastrophic accidents with irreversible impacts for societies and the natural environment,
11. “skyrocketing” of defense expenditures, militarization for the protection of infrastructures and intensification of geopolitical antagonism in the region with the risk of military conflicts,
12. intensification of state authoritarianism towards the local communities that oppose and suffocating political control to ensure the political and social order that will provide the unhindered exercise of the “rights of multinational corporations.”

Those threatened impacts that are either potential or an existing reality in today’s Greece, as we will see in the following chapters, are strongly connected with the extractivist model, even if not to the extent and intensity that typically characterizes the extractivist model in the countries of Latin America or Africa. In brief, the “Greece energy hub” narrative/target that includes the megaproject of hydrocarbon extraction has a relatively unambiguous “scent” of extractivism.

Chapter 4: Political framework and energy policy

It is essential to point out that our analysis will exclude the exceptional conditions (temporal or not) which the Covid-19 pandemic introduced, affecting to a great degree the world energy system as a whole and, especially, the total energy demand and fossil fuels. As it is well known, the pandemic drastically changed the total consumption as well as the fossil fuels prices and related investment projects and plans. The fluctuation in energy prices during the previous years constitutes a significant issue that requires special examination, and it would not be possible to be examined in this study. Consequently, our analysis concerning energy policies and the current condition of the extraction program will be restricted to the period ending in 2019. We think this is a necessary premise that will allow us to focus on the extraction program as it was designed and introduced in the last decade. Moreover, if we tried to incorporate the reversal of several indicators (due to the pandemic) in the general trends over the last decade, this would result in a speculation over future scenarios and, essentially, in an effacement of the past trends and data. Therefore, our analysis would follow the directions and facts as they had been formed before the pandemic. Certainly, any factual change that occurred during the last two years in relation to the Greek extraction program will be noted. Finally, we will make a short comment (in the fifth chapter's "Has something changed or not?" section) on the recent developments and the different scenarios for the future regarding the extraction program per se.

Hence, we will try to shed some light on the political and energy strategies at the international, regional, and national levels that created the appropriate conditions for the extraction program (as a possibility) to arise.

Energy policy and the State

Energy policy is one of the most critical links in the overall social capital of a capitalist formation, playing a key role in the model of accumulation. A description in the official website of the EU is quite telling: "The energy sector is one of the *pillars of growth*, competitiveness and

development for modern economies" (Publication Detail. EU energy in Figures, 2021[19], emphasis added). Its centrality is outlined by its decisive role in a wide range of different dimensions, such as in: i) imperialist rivalries, ii) the agenda of the transnational integrations (e.g., EU, BRICS etc.) iii) foreign policy (energy diplomacy), iv) its close connection with "defense" expenditure and the war industry, v) state budgets (energy subsidies, infrastructure, etc.), vi) international agreements, and vi) the international antagonism for control over resources and energy routes. The energy sector is one of the most internationalized sectors and, at the same time, (not a contradiction) one of the most crucial areas of national policy. Hence, beyond the ideology of the self-regulation of markets and, in particular, of the liberalization (de-regulation) of the energy market and the relevant policies, this is one of the "toughest" policy fields at the state's core. In other words, the overall social capital of each country needs, as a necessary condition, its "own" state, especially in the field of energy, both in the face of international competition as well as for the imposition of energy policies in its interior (often against the social majority's interests).

We could support the above argument from various aspects, such as warfare, armaments, international competition, OPEC, pipelines, domestic energy legislation (nuclear, fracking, spatial planning, environmental legislation), etc. However, we chose to focus on the field of subsidies and state aid.

Below, we quote some indicative data from official institutions, which reflect the dependence of the energy sector on fossil fuels, but, mainly, the system's expressive "viewpoint" and choices regarding climate change and the implementation of state policies from the perspective of the dominant socioeconomic system and the needs or threats it faces regarding its reproduction and not, of course, for the restoration of ecological balance and the satisfaction of collective social needs.

According to a 2008 survey: a) for every dollar directed by the US government to the development of climate change technologies, there were 20$ for the development of weapons systems, while b) the international armaments funding was 50 times more—$9.5 billion—than

[19] The quoted passage can be found in the web description of the publication details of "European Commission, *Energy in figures. Statistical Pocketbook 2021",* whose hyperlink is provided in the relevant reference.

those directed towards tackling climate change—$212 million— (Pemberton, 2008. p. 6). A UN report, which cannot be accused of a radical approach, stresses that:

> during the last two decades, much capital was poured into property, fossil fuels, structured financial assets with embedded derivatives, but relatively little in comparison was invested in renewable energy, energy efficiency, public transportation, sustainable agriculture, ecosystem and biodiversity protection, and land and water conservation (UNEP, 2011.)

The World Energy Outlook 2012 report also states: "[…] fossil fuels remain dominant in the global energy mix, supported by subsidies that amounted to $523 billion in 2011, up almost 30% on 2010 and six times more than the subsidies to renewables" (IEA, 2012, p. 23). According to a 2013 study, multinational fossil fuel companies spent $674 billion in 2012 to find more new reserves and, also, new ways of extracting them (R&D budget), while the value of the 200 largest fossil fuels companies had a market value that was estimated at $4.0 trillion (Carbon Tracker, 2013). In 2017, the International Energy Agency (IEA) was foreseeing a 30% increase in energy demand by 2040 (i.e., demand equal with the demand of “another” China plus “one” India!), while developments in domestic production in the USA were particularly important. The so-called “shale gas revolution” that had taken place the previous decade resulted in transforming the USA into a net exporter of natural gas, while the same is expected to happen with oil by the end of the next decade (IEA, 2017)!

The 2017 report "Fossil Fuel Subsidies" of the European Parliament’s ENVI committee is particularly revealing. The report begins by noting that estimates for combined fossil fuel subsidies in the EU vary from €39 to €200 billion per year, taking into account a variety of research and studies. This significant fluctuation is mainly due to the different assumptions (subsidies on consumption/production and external economies) and the models used, whose adoption corresponds to the respective perspectives, policies, and other interests. Indicatively, we will refer to some estimates. Subsidies in the EU rose from €603 per person in 2013 to €673 in 2015, recording an increase of 11.6% in just two years. The IEA estimated the annual consumption subsidies for 40 developing countries at $548 billion in 2013 or 5% of those countries' GDP. According to the IMF, total global fossil fuel subsidies amounted to $2.0 trillion in 2011,

accounting for 2.9% of world GDP or 8.5% of government revenue. Finally, an IMF study notes that if the subsidies had included the costs (of negative external economies) of climate change, air pollution, etc., the global social cost would amount to $5.3 trillion for 2015 (European Parliament, 2017).

International Crisis (2007), energy and fossil fuels trends

Exponential growth, investments, efficiency, and energy policies

The constant trend of exponential growth of energy demand in every study and research is well known. Of course, upheavals in these projections took place during the crisis and especially in Greece[20]. These projections do not comprise a simple, neutral assessment of future social energy needs but reflect the characteristics and interrelations between central sectors and branches of capitalist production and the energy sector. In order for the extended reproduction of capital (accumulation) to take place, more and more immediately available and cheap energy is constantly required. At the same time, this forecast directs investments and even more funds to the energy sector for the self-fulfillment of the "prophesy." In essence, these projections operate as a discounting method for the future (i.e., as an indicator that attracts capital investments in infrastructure, production or R&D).

Moreover, research in the United States in the 1980s identified the capital-energy relationship as complementary—that is, the process of capital accumulation to the uninterrupted and increasing supply of energy (Tietenberg 1998 p. 329). The former, in turn, is connected and reproduce a whole model of production and, therefore, of consumption (the arrow of causality has a direction that starts from the production and not from the consumption—i.e., individual-consumer—like the orthodox theory of methodological individualism and neoclassical economics promotes) which, in turn, is associated with large-scale forms of capital concentration and the corresponding production techniques and technologies, while land dispossession and grabbing

[20] In spite of several predictions (before the 2007 crisis) that foresaw an exponential increase in Greece's energy consumption, the total final consumption (TFC) typically decreased by 30% between 2007 and 2013—from 21,8 to 15,3 Mtoe—and increased anew to 16,4 Mtoe in 2016.

to control resource ownership and raw materials (mainly mineral resources) result in the degradation of ecosystems and, not uncommonly, in military conflicts.

Thus, over time, accumulated investments in a number of sectors and industries require returns on invested capital and, at the same time, expanded reproduction on a constantly larger scale (in order for these returns to become "sustainable" in the future, which implies new investments while the never-ending cycle of accumulation keeps going). Core sectors and branches that are organically linked to the current energy model include—in addition to oil—coal, gas, and nuclear companies, the automotive industry, the metal industry, the petrochemical industry, refineries, transportations, and, of course, the military-industrial complex. All these together constitute an integrated complex with enormous political and economic power. In addition, according to neoclassic environmental economics, the substitution of fossil fuels in energy production (through the implementation of RES technologies), in economic terms, is directly related to the cost (research, extraction, etc.) of adding a unit of the mineral resource to the stock (reserves). Consequently, it is understood that the accumulated investments in technologies and mining over time often make it cheaper (and, indeed, in most cases rather preferable) for capital to seek new deposits rather than substitute them. In other words, the volume of long-term investments directed and accumulated in each sector (research and development of technology—in our case mining, exploration, etc.—means of production) plays a decisive role in the degree of the so-called economic efficiency of each technology/source.

According to recent data from the IEA, global energy consumption in 2018 increased at a rate double (2.3% year-on-year) than the average growth rate since 2010. Its main reason was the expansion (growth) of the global economy by 3.7% in 2018, which was an increased rate compared to an average of 3.5% for the previous eight years (2010–2017). Fossil fuels were responsible for 70% of the increase for the second consecutive year, with natural gas first on the list (45% of this increase). The US recorded the largest increase in demand for petroleum products and natural gas globally. Only the annual increase in consumption in the US amounted to the equivalent of the current consumption of gas in Britain! Global CO^2 emissions associated with energy production increased in 2018 by 1.7%, reaching a record high of 33.1 Gt CO^2, marking the highest growth rate since 2013, 70% above the average increase from 2010 (IEA, 2018).

At this point, it is worth emphasizing that (in terms of the impact on ecosystems, climate change, etc.) absolute sizes are decisive—i.e., GHG emissions, material waste discharges, etc. (and not, of course, the relative reduction in energy consumption per unit of GDP produced and so on). This is why, inter alia, the term "net reductions" in emissions, energy, etc. is used internationally. The Weight of Nations study has shown that the so-called relative dematerialization of modern capitalist production is over-compensated by the continuous capitalist growth, resulting in a constant increase in the total absolute quantities of material inputs and outputs of the system (Matthews et al., 2000). Therefore, statistical indicators (such as those regarding the reduction of energy intensity, growth rates, etc.) are often used just to embellish reality. Hence, the above references to growth rates (final energy consumption, emissions) constitute a rapid deterioration of current conditions as they were applied to enormous initial absolute terms, thus implying colossal absolute increases that, at first glance, may not give this impression. As a result, global Total Primary Energy Demand rose in 2018 to 14301 Mtoe from 10035 Mtoe in 2000, recording a cumulative increase of 42.51% in just eight years (IEA, 2018). In the following table regarding the 2018 global energy mix, it is crucial to note that fossil fuels still occupied 80%!

Energy Demand (Mtoe)		**Growth Rate** (%)	**Shares** (%)	
	2018	2017-2018	2000	2018
Total Primary Energy Demand	**14 301**	**2.3%**	**100%**	**100%**
Coal	3 778	0.7%	23%	26%
Oil	4 488	1.3%	36%	31%
Gas	3 253	4.6%	21%	23%
Nuclear	710	3.3%	7%	5%
Hydro	364	3.1%	2%	3%
Biomass and waste	1 418	2.5%	10%	10%
Other renewables	289	14.0%	1%	2%

Table 1: energy demand, growth rate, shares (IEA, 2019)

International crisis and energy policies

Given the above, we will briefly examine the prevailing trends in pre-crisis energy policy (at least in the capitalist, developed North) and the adjustments that have taken place since then. The last systemic approach in the pre-crisis era, responding to the need for energy transition, was the promotion of the model of green capitalism and green growth, mainly in the EU but also in

South Korea, the US, Japan, and Canada. According to this direction and, at the same time, as the restructuring of the sector continued, the entire network of green modernization was constantly promoted with campaigns to create effective demand for green products and services, support of subsidized private investments in green technologies, emissions trading systems (carbon markets), etc. The main objective was a green transition based on market mechanisms, focusing on the individual consumer, primarily financed by society and the public sector but carried out mainly by the private sector, attempting to introduce concentrated technological innovation. The specific form of the green transition would undoubtedly have the energy sector at the center while, at the same time, would also have the goal to boost growth rates, expand internal markets, and, also, create export-oriented industries of pro-environmental technologies and goods. The famous report by Nicolas Stern back in 2006 expressed this orientation. Although starting with the well-known ascertainment that "Climate change is the greatest market failure the world has ever seen […]" (Stern, 2007, p. viii) proposed expanding, deepening, and "correct" market failures and imperfections, making the crucial assumption that constant (sustainable) economic growth and environmental protection are not mutually exclusive, but, instead, that market mechanisms already "contain" the solution.

The outbreak of the crisis in 2007-2008 resulted in the above-mentioned trend[21] retreating significantly to an adjustment corresponding to the immediate needs and priorities set by the global capitalist crisis. In particular, the urgent need for a direct and immediate assistance to the endangered sectors (such as the automotive, oil and, gas industries as well as the aforementioned industrial complex) was being stressed. Obviously, the goal was the system's stabilization and recovery (that is, the resumption of the accumulation process), while, at the same time, total demand was collapsing and economic insecurity was deepening.

In parallel, even before the crisis, the reaction of large multinational fossil fuels corporations to the rise of fossil fuel prices and the "peak oil" theory was to invest in new technologies and methods of extraction and exploitation—of course, with the support of state budgets—focusing on non-conventional forms of fossil fuels, carrying out deepwater and ultra-

[21] Of course, we do not claim that the "green growth transition" was dominant—which is why we call it a trend.

deepwater drilling (U.S. Department of Energy), developing methods of fracking (hydraulic fracturing) so as to exploit shale gas and oil as well as tar sands (oil sands), methane hydrates, etc.

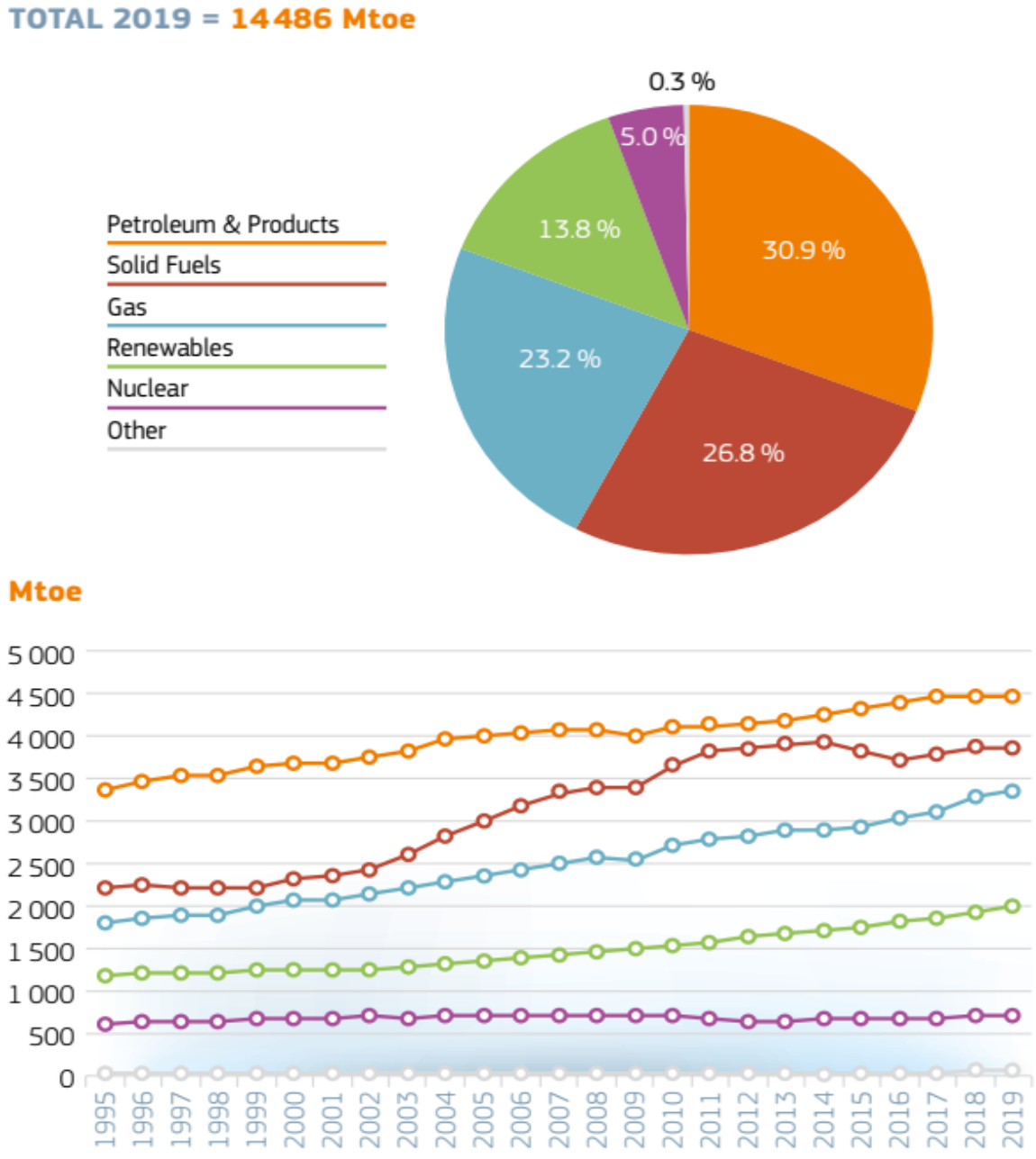

Figure 2: World total energy supply by fuel (European Commission. 2021)

The tendency to reinforce fossil fuels to the detriment of "green modernization" in order to deal with the crisis had already made its appearance in the EU since 2009, when the UN Climate

Conference in Poznan, Poland, was taking place. The essence of that tendency was captured in the European Commission's report/contribution on the May 22, 2013 Council ("Energy Challenges and Policy"), where, among others, the following were identified as key elements: a) the IEA estimated that global energy demand was expected to grow by more than 33% by 2035 with China, India, and the Middle East accounting for 60% of the increase, b) the competitiveness of the European industry in terms of energy costs in relation to that of the USA (industrial gas prices in the US were four times lower than in the EU, creating a competitive deficit; coal and lignite imports to the EU increased by 9% in the first 11 months of 2012—100% in Ireland, 38% in Portugal, 28% in England and Spain), c) Europe's energy dependence on oil and gas imports is estimated to reach 80% by 2035, d) the "right" policies for market opening and integration in order to strengthen competition (privatizations) exist and remain to be fully implemented, while household energy costs will continue to rise, d) conventional and unconventional energy sources will be exploited, also noting that "in an optimistic scenario indigenous unconventional gas could replace declining conventional production […]. Unconventional sources are already exploited in Europe: Estonia covers 90% of its power needs from shale oil mining" (European Commission 2013, emphasis added). This direction is further specified in 2014 in the "Communication from the European Commission to the European Parliament and the Council European Energy Security" in which, among others, the following points are underlined: a) there was a typical forecast for an increase in global energy consumption of 27% by 2030, b) the EU imports amount to 53% of the energy it consumes (90% of crude oil, 66% of natural gas, and 42% of solid fossil fuels), representing more than 20% of its total imports, which is equivalent to €1 billion per day or €400 billion per year (2013), and c) the significant energy dependence upon Russia was emphatically stressed because, until then, Russia exported 71% of its natural gas to Europe with the highest percentages in Germany and Italy. Among the proposed strategic axes (such as the moderation of energy demand, the completion of the integrated internal market, and the development of energy technologies), we think that the following stand out: a) the diversification of sources of external supply and the reduction of dependence on Russia, both in the supply and in the dependence of the EU refineries on Russian crude oil as well as on the increasing percentages of their ownership by Russian companies and b) the increase of energy production

in the EU from conventional and non-conventional fossil fuels, both from the old North Sea energy sources and from the new ones in the Eastern Mediterranean (European Commission. 2014). These last two central axes give a general picture of the evolving strategic plans and the intensifying geopolitical antagonisms and rivalries in the Eastern Mediterranean and the Balkans. In addition, a point that we noted in the introduction now becomes evident: the Greek extraction program and the related "energy hub" target do not stem from an exclusively national plan.

Consequently, the trends that were prevailing at least since 2009 can be summarized in the following axes: a) struggle for competitiveness to restart growth (form recovery to expansion) and strengthen profitability by enhancing the use of fossil fuels and, as a result, by supporting the entire industrial complex associated with them, b) competition of access and large-scale infrastructures (e.g., intercontinental pipelines) for the supply of fossil fuels, c) competition in the exploration of new deposits and mainly non-conventional fossil fuels and d) insistence on promoting privatizations and completing and opening up the internal markets, despite the examples of deadlocks and reversals that had already emerged.

At this point, it should be noted that the above trends did not cease to coexist (before as well as 2019) both antithetically to and cooperatively with the model of "green growth." After all, it is common for the same groups/companies to operate both in the field of fossil fuels and in that of renewable energy sources.

In the "fertile" soil of crisis and MOU's gushes oil!

The plans for oil and gas extraction in Greece are not new—rather, they are quite old. However, more than a decade ago (before 2007), they were primarily an issue of discussion among far-right political circles or domestic allies of what today are commonly characterized as "Trumpist" views and policies. Since then, however, a lot of water has gone under the bridge: the capitalist crisis, three MOUs[22], a harsh austerity regime, mass poverty, the neoliberal

[22] Memorandum of Understanding or alternative Economic Adjustment Programs or Bailouts (EU, IMF, ECB) are terms which are commonly used to depict the specific programs in Greece. The term used here is essential both from a symbolic but, also, from an interpretative perspective. We use the words "memoranda" or "MOUs" because these were the prevalent terms in the domestic public discourse. In the framework of this study, we cannot even provide a brief account of that decade. We think that the most appropriate detail to note about this decade is that

restructuring of society, the deregulation of the legal, institutional, and regulatory framework, massive unemployment, privatizations, extended internal devaluation policies, etc. as well as the strategic alliance with the USA, Israel, Egypt, and Cyprus for EastMed—but, in essence, for the exploitation and control of the Eastern Mediterranean (Exclusive Economic Zones [EEZ], hydrocarbons, pipelines, transportation, geopolitical control).

Therefore, apart from the international conditions that were significantly modified by the crisis (geopolitical antagonisms, shift to fossil fuels to enhance growth, the rise of unconventional sources of fossil fuels, etc.), the domestic conditions were even more crucial, as they have transformed society, state and economy in an unprecedented way so that the international energy adaptation to the crisis could emerge in Greece as a turning point reflected on the slogan "Greece energy hub". That slogan was promoted as a central priority both on the domestic political agenda as well as on Greece's foreign policy. Still, despite the differences and the significant impact of the international crisis, the domestic situation has analogies with many other cases. It constituted a typical example of transforming the "crisis into an opportunity" by the domestic and international ruling classes that preside over heavily indebted countries (usually under IMF programs), which become vulnerable to economic and political pressures (including the domestic ruling class's interests). In similar cases, a structural adjustment was promoted under the guidelines of international organizations such as the IMF, the World Bank, and the OECD. In Greece and, generally, in the Eurozone, we could also add the ECB, the ESM, the European Commission, the Eurogroup, etc. Adjustments of this type have as a core element the exploitation of natural resources through privatizations, financialization, and land dispossession (via land grabbing methods).

This model had been promoted in Eastern European countries, following the neoliberal example of implementing similar programs in the 1980s and 1990s in Latin America and Africa, despite the disastrous social, environmental, and economic results which marked them.

During the years of Greek crisis and the MOUs, the promotion of extractions as an essential element of the growth model emerged under various pretexts or narratives (such as

Greece is now an entirely changed country: a developed country, where the majority of the population has suffered under a massive-scale ultra-neoliberal experiment.

debt service, strengthening the pension system [National Fund of Social Solidarity] (Law. 4162/2013), economic recovery, and exports), with a monstrous estimation of public revenues, job creation, etc. To mention some moderate examples that dominated the public sphere, we will refer to the common assumption in the form of the question "Can Greece Become *the* Norway of the Mediterranean by 2030?" or, according to former PM Antonis Samaras, "the hydrocarbon fields in areas of Western Greece, Epirus and Ionian Sea could generate up to 150 billion euro in the next 25-30 years from the taxes paid by the companies that will undertake the exploitation of the deposits" (Mining Greece[23]; Ta Nea. 2014, Delevegkos, D. 2015). The aim of this "campaign" was obviously to gain social legitimacy for the promotion of these projects.

The effectiveness of this campaign was based on a necessary precondition. The dominant economic and political elites created the overall framework and conditions through the adjustment programs of internal devaluation and neoliberal restructuring policies. In short, these included: a) the dissolution of labor legislation, a rapid decline in wages and a rise in unemployment, b) the extensive devaluation of assets, land values, etc. c) privatizations (i.e., public land, mineral resources, infrastructure, state enterprises, etc.), d) the deregulation of the institutional framework (for example, spatial planning) and, in particular, of environmental legislation, with the parallel dismantling of control mechanisms and the introduction of "extraordinary" development arrangements and framework (i.e., fast track investments), e) reduced taxation, and f) taking advantage of the social conditions (impoverishment, unemployment, insecurity, fear) to depress social resistance, while employing extortion dilemmas.

[23] "Mining Greece" is a website that, according to its own description, promotes mining activities in Greece to the whole world. The articles in Greek media referring to hydrocarbons' extractions are literally in their thousands. Just from a quick indicative view of the media, we are citing a link that leads to a page with a few re-published, selected (by them) articles that they have translated, probably until 2015.

Chapter 5: Extraction program

Before we proceed to a brief description of the key moments in the history of fossil fuels in Greece, it would be helpful to sum up the fundamental parameters that contributed to reaching the current status.

As we have already analyzed, the first parameter is the international trend that emerged as a consequence of the crisis to enhance the recovery and growth process in the traditional sectors of production with conventional energy supply. The second was the EU strategy for the diversification of energy supply in the European market, the control of the energy routes, the reduction of the dependence on Russia, and the increase of the internal (EU) energy production from both conventional and non-conventional fossil fuels. To these, we must add the Ukraine crisis. The third parameter pertains to the "appropriate" conditions that have been shaped in Greece during the period of MOUs. But, the fourth is connected with major discoveries of new natural gas fields and, specifically, of the Leviathan offshore gas field in Israel, which was discovered in 2010 (with 22.000 x 10^9 ft^3 recoverable sands) and was the largest gas field discovered in the Mediterranean (at that time) as well as the largest offshore discovery of the previous decade. In 2015, a second, even larger discovery took the lead. This was the Zohr offshore natural gas field in the Egyptian EEZ, which is almost twice the size of Leviathan. These two discoveries turned the Eastern Mediterranean into a hot spot of research for natural gas deposits. The analysis of analogous geological formations and structures attracted the interest of the most significant fossil fuels multinational corporations and, of course, of the related researchers, universities, and institutes. Both Leviathan and Zohr are offshore fields that are classified as deep or ultra-deepwater fields. Finally, the fifth element, which has a dual character, is that of potential targets in ultra-deepwater in the case of Greece. The technology of planning, designing, drilling, and managing such installations in the ultra-deepwater depths (like those in offshore blocks in the Greek program) has been a process in progress over the last few years. Just a decade ago, it would be unthinkable to exploit such targets. Thus, both those targets are supposed not to be impossible thanks to the recent developments in offshore technologies. Of course, these technologies are being developed during the last few years due to the

contemporary unconventional fields in ultra-deepwater and the projected ones such as those of the Greek program.

A short flashback

In Greece, the first exploration activity for hydrocarbons dates back to the beginning of the 20th century (1903) and even before (1860). Until the 1960s, any research efforts were limited to terrestrial surface evidence, mainly in western Greece. A systematization of the relevant research began in the early 1960s and extended to the mid-1970s by the Greek State and the Institute Francais du Petrol -IFP. During that period and, specifically, during the 1968-1974 military dictatorship in Greece (Nikolaou, 2012), large oil companies received concessions: BP (Aitoloakarnania), Esso (NW Peloponnese, Zakynthos, Paxoi), Hunt (Thessaloniki), Texaco (Thermaikos), Chevron (Lemnos), Anschutz (Thessaloniki-Epanomi), and Oceanic-Colorado (Sea of Thrace), drilling 40 wells on land and at sea. These researches resulted in discovering the first exploitable hydrocarbons reserves: the Prinos deposit and the natural gas deposit of S. Kavala. At the same time, the oil crises of 1973 and 1979 fueled the Greek state's interest in hydrocarbon exploration and exploitation.

As a result, in 1975, Public Petroleum Corporation (DEP S.A.) was founded to manage the E&P rights of the Greek State. In 1985, a new subsidiary to DEP S.A. company was established, the Public Petroleum Corporation-Exploration and Production of Hydrocarbons (DEP-EKY S.A.), in which the Greek State granted 24 research areas on land and at sea. Thus, 73,000 km of 2D seismic surveys and 2,500 km^2 3D seismic surveys were performed, as well as 73 exploratory wells. Apart from the collection of data, the result of that research was the discovery of the oil field in the area of Katakolo (1981), the natural gas field in Epanomi, Thessaloniki (1988), and certain biogenic gas concentrations.

In 1995, we had the third phase/key date: the Greek Law 2289/95, which incorporated the European Directive 94/22/EC, reforming the licensing, exploration, and production regime so as to open the way to the first International Licencing Round, which included six areas. Finally, four areas were granted: NW Peloponnese and Aitoloakarnania to Triton Ltd and Ioannina Patraikos Gulf (west) to Enterprise Oil. Despite the € 85 million invested, the research activities

did not yield significant results. In Ioannina, the deep drilling that reached a depth of 4,000 m (with a target of 5,000 m) was abandoned in 2002 due to severe technical problems related to high pressures (Triassic evaporites structures), which also posed an increased accident risk. Finally, the companies withdrew in 2000–2001 (Ministry of the Environment and Energy. E&P Hydrocarbons; Nikolaou K. 2012).

About a decade had elapsed with no activity until the aggressive return, which has led to the current situation. The turning point was the adoption of Law 4001/2011, which redefined the framework of licensing procedures in the exploration and exploitation of hydrocarbons. With the various corporate interests already activate, in August 2011, through the legislation per se, fossil fuels corporations were granted a new opportunity to extract hydrocarbons in Greece. The key factor was the drastic reduction of the tax rate from 40% to 25%—20% plus a regional tax of 5% on the net taxable income— (L. 4001/2011, Article 161, p. 3876). At the same time, the Hellenic Hydrocarbon Resources Management S.A. (HHRM S.A.) was founded as a state-owned company that, however, operates as a private-sector economic entity. On this issue, it is important to note the crucial legislation of 2011 (L 4001/2011) that was passed in August 18, 2011 by the Government of PASOK (a social-democratic party), spearheaded by the PM, G.A. Papandreou, and the Minister for Environment, Energy, and Climate Change, G. Papakonstantinou. The specific government could be generally characterized as a pro-RES (renewable energy sources) government, as until June 2011 (two months prior) the first minister of the newly formed Ministry for Environment, Energy and Climate Change was T. Birbili, who was regarded as an advocate of environmental protection and, during her tenure, introduced and adopted the Law 3851/2010 on "Accelerating the development of Renewable Energy Sources to address climate change and other provisions on jurisdiction of the Ministry of Environment, Energy and Climate Change[24]" (Law 3851/2010). Hence, within the same government and ministry (with the specific symbolic title of a political declaration), we find two contradictory energy strategies— i.e., accelerating the development of RES and, at the same time, giving huge incentives on fossil fuel extractions. This

[24] From an environmental standpoint, the specific legislation had numerous serious problems, which, at the time, were highlighted by ecological organizations, activists, etc. However, such matters are beyond the scope of this thesis.

is the same phenomenon that we observe today in many other countries, regions, etc., where a large number of fossil fuel corporations also massively invest in RES. Although such orientations might seem contradictory, if we momentarily suspend our current fixed criteria based on a simplistic distinction i.e. green and black development or pro and against environmental protection, this may not really be so. For example, let us suppose that an actor operates according to these parameters: opportunity cost, internal rate of return (IRR), a private (or, even, social) cost–benefit analysis, export rates, geopolitical power, etc. In that case, the energy mix and the relevant technologies, the infrastructure, the scale, the energy networks, the legal forms of ownership, the rate of decentralization, and many others will be determined by profitability, investment opportunities, market mechanisms, and international antagonisms.

Has something changed or not?

In April 2021, Nikos Dendias, the Greek Minister of Foreign Affairs, signed in Riyadh an agreement to relocate an array of Patriot missiles to Saudi Arabia and, among other statements, asserted that *"*[t]his is a big step forward for our country regarding the cooperation with the Gulf countries and also a contribution to the wider security of the energy sources for the west" (Papadimas, 2021). During that visit, Minister Dendias also made a pretty bold declaration in an interview with Arab News:

> Greece believed in renewables. Greece is not going to start digging the bottom of the sea of the Mediterranean in order to find gas, in order to find oil, for a very, very simple reason. We need 10 or 20 years to find it and exploit it, and cost-wise it would be so much more expensive than, for example, in Saudi Arabia. So, economically I don't envision Greece becoming an oil-producing country. And with all due respect the Aegean (Sea), for example, is a paradise on earth. We are not planning to turn into a Gulf of Mexico (Radwan, 2021).

Back in Greece, these statements induced a political earthquake for two main reasons. Firstly, in Saudi Arabia, the ten-year preparation of a huge extraction program (spanning five consecutive governments) was seemingly nullified by the foreign minister (and not even the PM). Still, this could have just been a maneuver on the foreign minister's part, due to the occasion and

the place of the formal visit, as well as due to the pandemic and the different objectives of the period (given that the interest for explorations in the region has been drastically reduced). However, secondly, for over ten years by that point, these were the main arguments of the anti-extractivist movement and not just some form of skepticism. Right away, the Ministry of Foreign Affairs rushed to clarify that “what was said does not relate to the existing energy program of the country” (Energy Press, 2021-04-22). In any case, the official position of the Ministry of Foreign Affairs concerning its energy diplomacy and, more explicitly, concerning hydrocarbons was defined in 2020 as follows:

> In addition, an important pillar of the country's energy policy, and consequently of energy diplomacy, is the exploration and exploitation of domestic hydrocarbons, which is related to issues of both energy security and economic development. The aim is to attract the interest of international energy groups for field exploration in new blocks and in this direction the efforts of the Diplomatic Authorities of Greece abroad are directed (Ministry of Foreign Affairs, 2020).

Over the last two years, it was not a secret that the New Democracy government was sending mixed signals regarding hydrocarbon exploration. Although it never abandoned the strategy—professing its full support through numerous declarations (Baskakis, 2021), —several statements have raised doubt about the government’s commitment. During a parliamentary speech, the PM, K. Mitsotakis, has made an indicative such remark: "With the oil prices where they are today, it is extremely doubtful whether there is real business interest in new oil extractions in our country» (Provolisianos, 2020)

Another major factor that has a decisive role in exploring new fields is the price of oil and natural gas, especially in ultra-deepwater targets that have very high costs of exploitation. Of course, to conduct an economic analysis (or, even, a market assessment), besides the prices, several other factors have to be evaluated: e.g., imports, storage, sources, internal production, infrastructure, transport costs, market forms (i.e., spot), total production, OPEC policies, and many more. Hence, for reference, we are referring to natural gas and oil prices.

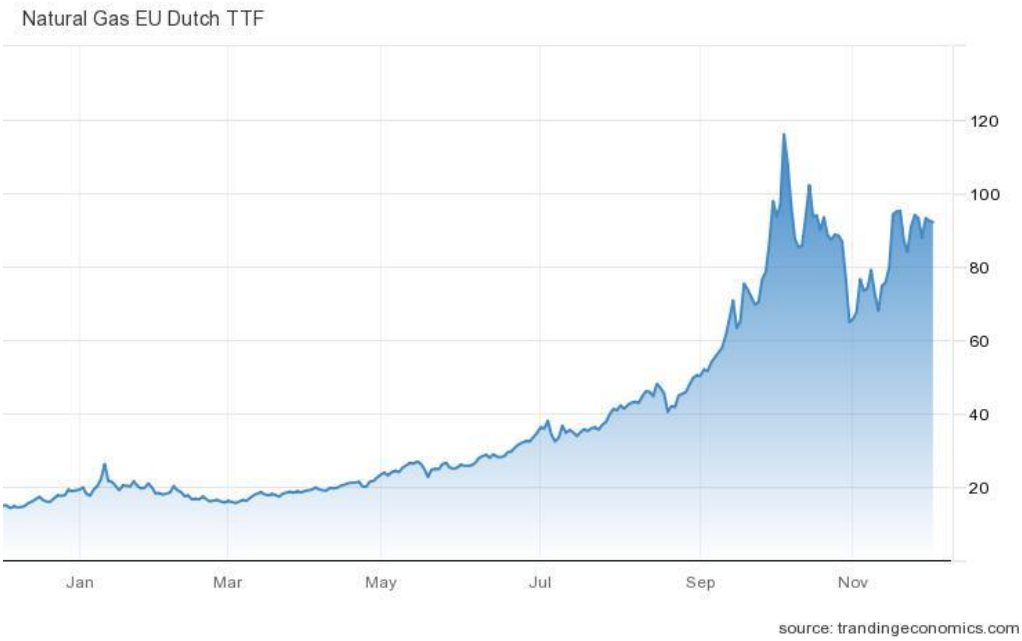

Figure 3: Natural Gas EU Dutch TTF (EUR) prices during 2021 [euros per megawatt/hour]

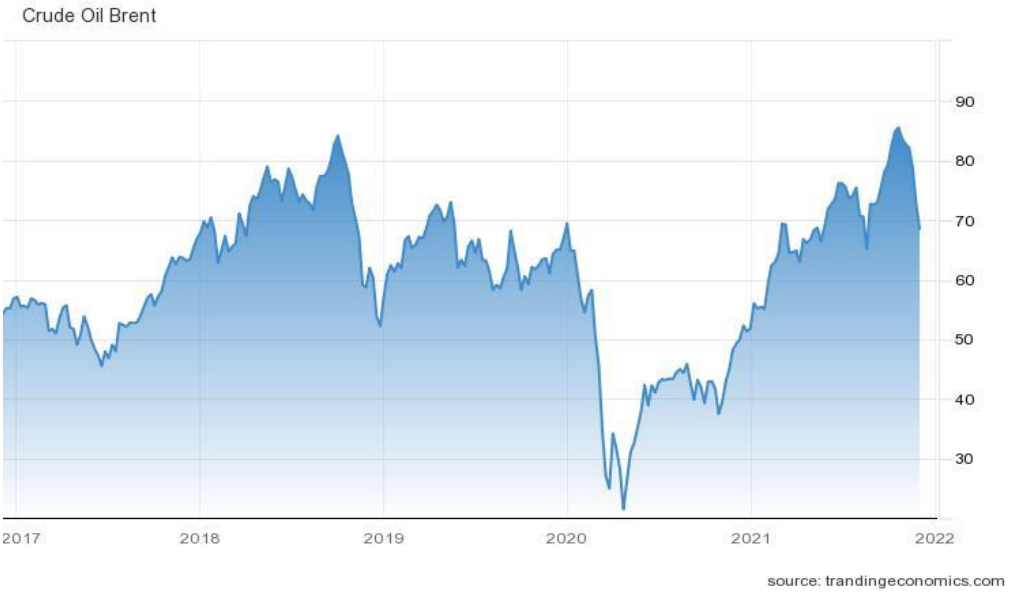

Figure 4: Crude Oil Brent price (USB/Bbl)

Besides the price of natural gas (Dutch TTF)—which skyrocketed in the EU during the third quarter of 2021—in Figure 4 we can also see that the price of Brent crude oil collapsed during

the first quarter of 2020. In reality, a decline of the price had started before the pandemic, but, without a doubt, SARS-CoV-2 had an immense impact on the subsequent collapse, whose major cause was the curtailed demand during the lockdowns, etc. Major fossil fuel multinational corporations were forced into major adjustments and cuts. For example, in April 2020, ExxonMobil announced "it is reducing its 2020 capital spending by 30 percent and lowering cash operating expenses by 15 percent in response to low commodity prices resulting from oversupply and demand weakness from the COVID-19 pandemic" (ExxonMobil, 2020). At the same time, ExxonMobil postponed two drills planned for July 2020 (in Cyprus's block 10) to September 2021 (Financial Mirror, 2020), and that example was followed by Total and Eni (Kathimerini, 2020). Today, ExxonMobil has already returned to block 10 —end of 2021— (Hazou, 2021). In 2019, the European Investment Bank decided to phase out fossil fuel financing after 2021, but there are loopholes as it will continue to finance projects that would be included in the EU's "project of common interest" before 2022 (Ambrose and Henley, 2019). However, the EIB has already invested €890 million in gas projects (since the declaration of the phaseout) during the transition period, and there are still "appropriate parameters" for gas funding after 2022 (Taylor, 2021).

It would be easy to rely on wishful thinking and assume that the extraction program in Greece has actually been canceled. Nevertheless, while there has been a serious retreat from the last decade's plans, many facts and incidents warn us that the extraction program is not aborted and that the "Greece Energy Hub" target remains a top priority. Indeed, a strategy followed by five governments cannot be that easily "discarded", as it involves lease agreements for 25 and 30 years with some of the biggest fossil fuel companies, severe institutional changes (legislation, regulation, audit structure), a new institution (HHRE), and so on. Moreover, on October 7, 2021, the Greek Parliament ratified a so-called "historic" strategic defensive agreement with France. "There is the mutual defence assistance clause, which says that if any of the two parties is attacked then the other will offer its assistance. It *symbolises* France's commitment and its interest in the region of the Eastern Mediterranean*",* said PM K. Mitsotakis (Business Daily, 2021). In addition, before the vote at the parliament, Mitsotakis noted: "And we all know who is threatening whom with casus belli (cause for war) in the Mediterranean" (Reuters, 2021). The specific agreement is based on a massive military deal, according to which Greece would

purchase three French Belharra frigates, with an option for one more and three Gowind corvettes, as well as some renovations of old frigates. The total cost would reach €5 billion (Tovima, 2021; ABC News 2021; Ta Nea, 2021; The Press Project, 2012). Greece had already agreed to buy 24 Rafale warplanes from France—i.e, an additional €3.3 billion deal—with the total current military armaments programs exceeding €10 billion (Tsaldaris, 2021; Nedos, 2021). Meanwhile, all these deals were signed during the pandemic, in a country with colossal debt and unemployment, where the majority of the population has been suffering under brutal austerity policies for over ten years by now. Of course, the analysis of these vast armaments programs includes a variety of objectives, parameters, and reasons that lead the Greek state to such decisions. Nonetheless, without any doubt, a significant motive behind these decisions has to do with the antagonisms in the Eastern Mediterranean regarding the EEZs and the control of the energy routes, pipelines, and any potential hydrocarbons fields. As a result, the Greek state spends €10 billion euros on armaments while reducing its public healthcare budget (Katsikas, 2020).

Furthermore, in October 2021, the Greek government has also renewed and strengthened the US–Greece Mutual Defence Cooperation Agreement MDCA (Blinken, 2021; Pamuk, 2021). Moreover, in June 2021, US Senators B. Menendez and M. Rubio introduced the "U.S.-Greece Defense and Interparliamentary Partnership Act of 2021" (U.S. Committee on Foreign Relations. 2021 June 09). This is an additional defense agreement that completes the Eastern Mediterranean Security and Energy Partnership Act, which was a major strategic act for the Eastern Mediterranean, as it has authorized "the establishment of a United States-Eastern Mediterranean Energy Center to facilitate energy cooperation between the U.S., Israel, Greece, and Cyprus (U.S. Committee on Foreign Relations. 2019 December 20). These two acts reflect a serious US interest in the Eastern Mediterranean and, more specifically, with respect to the energy sector, through the trilateral partnership (3+1 format) of Cyprus, Greece, Israel, and the US (Titles - S.2000 - 117th Congress. 2021-2022)—to which Egypt is also related. Moreover, strategic energy planning is also connected with these plans through several parameters (e.g., energy supply, independence and diversification, pipelines, EEZ, geopolitical control, European fossil fuels companies, etc.). A relatively recent development in that direction took place in

Athens in January 2020, when the EastMed Pipeline agreement was signed by Greece, Cyprus, and Israel (Koutantou, 2020). Although many problems occurred in the last years regarding profitability, cost, funding, developed gas fields capacity, conflicts with Turkey, and many others that often led analysts to conclude that the East Med pipeline project was "dead," the agreement was signed in 2020 even if the final decision for the investment has been postponed to 2022. In the meantime, 100 environmental organizations across Europe are campaigning to exclude EastMed from the European projects of common interest (PCI) meant to receive funding (In.gr, 2021).

Therefore, we briefly referred to some major recent developments related to the issue of the Greek extraction program so as to point out that, in the current period, there are two contradictory tendencies in action. The first leans toward the abandonment of the program, while the second, opposite tendency leans toward its partial revival after the serious retreat of the last two years, with the focus placed on the offshore blocks of Crete. In any case, for our study, the crucial issue is how in an EU country—during the second and third decades of the 21st century, i.e., in the era of climate crisis—a megaproject for fossil fuel extractions was developed and established (politically, economically, socially, technically in legal and scientific terms, etc.) in the Eastern Mediterranean region.

Current situation

According to the 2011 law (L. 4001/2011, Article 156), there were three procedures through which the concessions were made until today: a) through an open invitation of interest (open door), announced in 2012 (Patraikos Gulf, Epirus North - Ioannina, West Katakolo), b) when an interested party submits an application for a specific area, international announcement call for tenders 2014 (Northwestern Peloponnese, Aitoloakarnania, Arta-Preveza), and c) via the 2nd International Licensing Round - Call for Tenders - announcement August 2014 - (20 sea areas in Western Greece—in the Ionian Sea—and south of Crete).

Lease Agreements - Lessees - 2019							
Block - Concession	Acreage	Site	Sign of Agreement	Start Date - Official Publication	Law	Lessees - Shares - Operators	Project Stage
Patraikos Gulf	1982 Km^2	Offshore	14-May-14	3-Oct-14	v. 4299/2014	Hellenic Petroleum 50% (operator) Edison International S.p.A.* 50%	Exploration 2nd phase
Ioannina Lease	4187 Km^2	Onshore	14-May-14	3-Oct-14	v. 4300/2014	Repsol* 60% (operator) Energean Oil and Gas 40%	Exploration end of 1st phase
Katakolon	545 Km^2	Offshore	14-May-14	3-Oct-14	v. 4298/2014	Energean Oil and Gas 100%	Development pending
Aitoloakarnania*	4360,3 Km^2	Onshore	25-May-17	15 Mars 2018	v. 4524/2018	Repsol 60% (operator) Energean Oil and Gas 40%	
NW Peloponnese*	3778,3 Km^2	Onshore	25-May-17	16 Mars 2018	v. 4527/2018	Hellenic Petroleum 100%	
Arta-Preveza *	4762,9 Km^2	Onshore	25-May-17	16 Mars 2018	v. 4526/2018	Hellenic Petroleum 100%	
Block 2 - Ionian west of Corfu	2422,1 Km^2	Offshore	31-Oct-17	15 Mars 2018	v. 4525/2018	Total* 50% (operator), Edison* 25%, Hellenic Petroleum A.E.* 25%	
Southwest of Crete	19868,37 Km^2	Offshore	27-Jun-19	10-Oct-19	v. 4628/2019	Total 40% (operator), ExxonMobil 40%, Hellenic Petroleum 20%	
west of Crete	20058,4 Km^2	Offshore	27-Jun-19	10-Oct-19	v. 4631/2019	Total 40% (operator), ExxonMobil 40%, Hellenic Petroleum 20%	
Block 10 - Kyparissiakos Gulf	3420,6 Km^2	Offshore	9-Apr-19	10-Oct-19	v. 4630/2019	Hellenic Petroleum 100%	
Ionian	6671,13 Km^2	Offshore	9-Apr-19	10-Oct-19	v. 4629/2019	Repsol 50% (operator), Hellenic Petroleum 50%	
Block 1 - North of Corfu	1801,7 Km^2	Offshore				Hellenic Petroleum (preffered)	
Sea of Thrace Consession	1600 Km^2	Offshore	from 1969			Calfrac Well Services 75% (operator), Hellenic Petroleum 25%	
Prinos	153 Km^2	Offshore			v. 98/1975 v. 2159/1993 v. 2779/1999 v. 4296/2014 v. 4585/2018	Energean Oil and Gas 100%	Production

Figure 5: Lease Agreements, lessees, acreage, site, etc., in 2019. (*) Have changed

As depicted in the figure above, apart from Prinos (which has been exploited for decades), only the offshore field in Katakolo is in the development phase. The total acreage rises to 75,607 km^2 of concessions—which is a rather sizeable area of land and sea for the scale of Greece. Also, it is clear that some of the largest oil multinational corporations—ExxonMobil, (American), Repsol (Spanish), Total (French), Edison International SpA (Italian), Calfrac Well Services (Canadian)—had "land" in the country. It is worth noting that every consortium is participating in a domestic oil company and, specifically, one of the following two: HELPE SA and Energean Oil & Gas. Obviously, the lion's share went to the HELPE, which is a partly state-owned corporation (Paneuropean Oil & Industrial Holding S.A. 47,1%, Hellenic Republic Asset Development Fund 35,5%, Greek institutional investors 5,4%, foreign institutional investors 3,0%, retail investors 9,0%). In any case, the crucial parameter is that the domestic capital (that is, private companies) participates in every concession, and, of course, the interests of domestic companies are not limited to the level of consortium. On the contrary, only in the Patraikos Gulf block, about 40 contracts had been subcontracted in 2019 with Greek companies. This fact is indicative of the development of a new field of profitability for domestic companies and, therefore, for "investment and dependence" on these projects—a fact that implies the corresponding (and, usually, huge) pressure for their promotion.

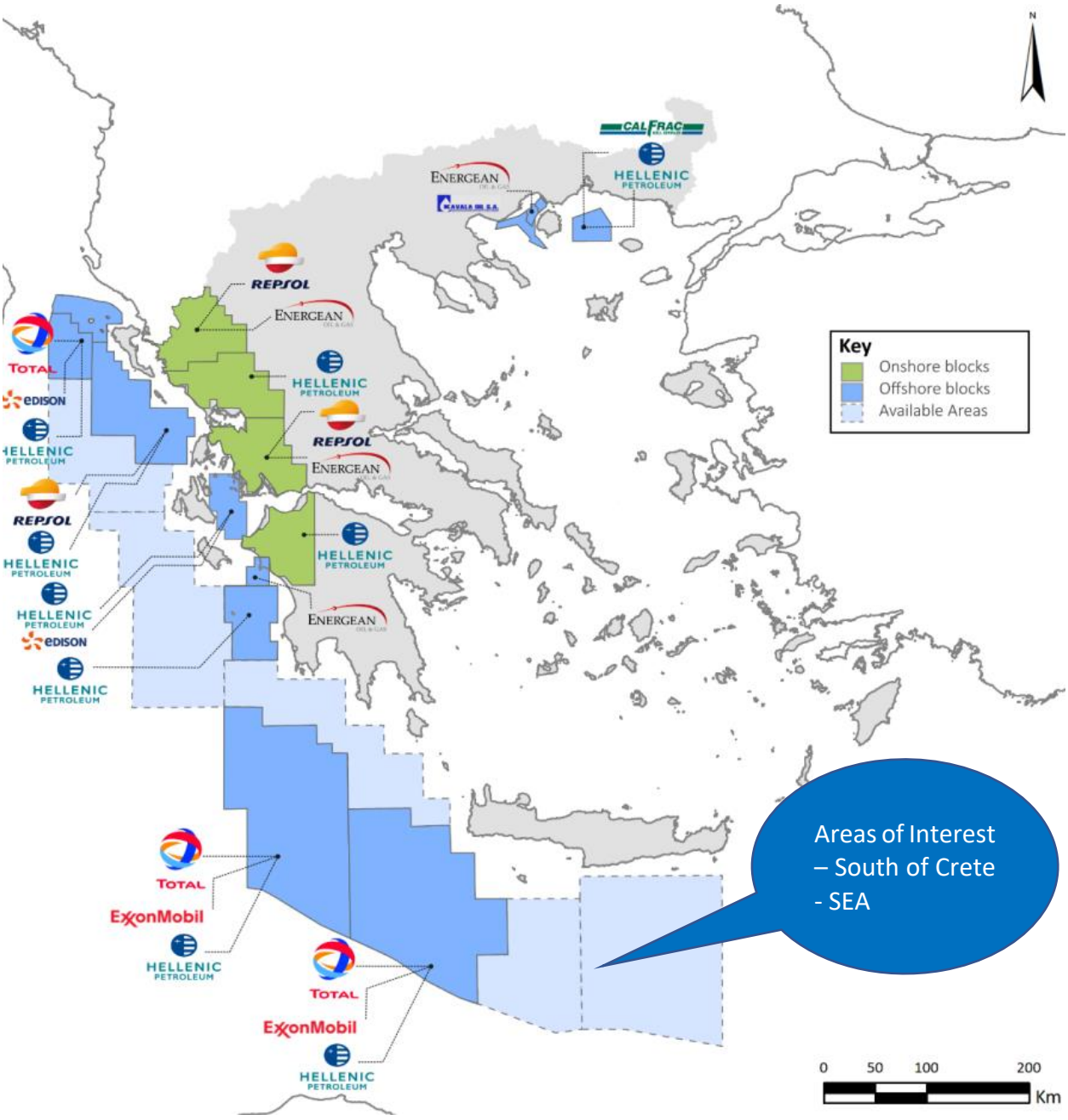

Figure 6: Awarded licenses in December 2019. Source: HHRM February 2020

As captured in Figure 3, the last two years were marked by a lot of changes in this field (due to the factors already analyzed in the previous section—i.e., the pandemic, price changes, financial difficulties, etc.). Here, we have to note that these changes underlie two other phenomena that emerged concurrently. We will start with the Ioannina lease. In 2020, the Repsol–Energean joint venture applied for an extension of the exploration phase, which expired

in October 2021. Meanwhile, Repsol decided to withdraw from the license. As a result, Energean—which has sold 60% of the shares to Repsol in 2017—reclaimed the operatorship and the remaining 60%. Today, Energean applied for a new extension regarding the next phase of the exploration and HHRM approved an extension of two and a half years until April 2024 (Grimanis, 2021).

The first issue that emerges from the Ioannina Lease is the request for extensions that are constantly asked from HHRM by the joint ventures and have to do with the contractual obligations of the phases of exploration, development, etc., as defined in the lease agreements. In particular, in the Ioannina lease, as the first phase of the exploration (seismic survey) has been completed, the potential second phase for which the extension has been asked enacts the contractual obligation for the first exploratory drilling. The second important element is the financialization of the extraction activities. In short, mining companies have held mining rights from the extraction fields for many years and present them as assets in their portfolio in order to extract profits in the stock markets. Moreover, profits are extracted from constant sales, buyouts, repurchases, and so on. Meanwhile, vast areas and the local population remain "hostages" in doubtful investments and the tactics of the companies, without even having the chance to choose alternative paths of development. In Aitoloakarnania, the joint venture withdrew from the license in 2021. Thus, the latter returned to HHRM (Filippou, 2021). The Katakolo field is the only field where the exploration phase has been completed, and there is a proven oil/gas discovery. As we will see next, this is a typical case of the mass media propagating a success story that would eventually turn out to be groundless, as the proven deposits are far smaller than the alleged ones. In 2019, Energean announced that it would proceed to the first pilot drill in 2020 and in 2020 for 2021. The media blamed excessive bureaucracy as a barrier to the extractive "success story" (Papadimitriou, 2021). In Block 2, Energean purchased Edison E&P as well as Total's share, becoming an operator. At the same time, it applied for and received an extension for the first phase of exploration until March 2023[25]. In the Patraikos Gulf, Energean acquired

[25] The HHRM's official webpage (on exploration and production) does not, as of yet, reflect the later changes in shares, lessees, operators, etc. For example, regarding block 2, one can be better informed by the webpage of Energean Oil and Gas: https://www.energean.com/operations/greece/block-2/

50%, having already purchased Edison and, lately, it has been announced that there will be a third in a row extension until January 2023, for the second phase of the exploration (exploratory drilling). Problems have also occurred in Arta–Preveza, where opposition by the local communities—Municipality of Artaion in 2019 and Municipality of central Tzoumerka (Aggeli, 2019) led to a denial of passage through municipal public land for the exploration process and, in essence, halted the explorations. The local struggle, combined with all the other reasons we have already noted, led HELPE Upstream S.A. to send in August 2021 a written notice to the HHRM concerning the discontinuation of the exploratory activities in Arta–Preveza and the NW Peloponnese. Repsol also withdrew from the license in the Ionian Sea block and left Greece (Floudopoulos, 2021).

Lease Agreements - Lessees - 2021							
Block - Concession	Acreage	Site	Sign of Agreement	Start Date - Official Publication	Law	Lessees - Shares - Operators	Project Stage
Patraikos Gulf	1982 Km^2	Offshore	14-May-14	3-Oct-14	v. 4299/2014	Hellenic Petroleum 50% (operator) Energean Oil and Gas 50%	Exploration 2nd phase - Extension January 2023
Ioannina Lease	4187 Km^2	Onshore	14-May-14	3-Oct-14	v. 4300/2014	Energean Oil and Gas	Exploration end of 2nd phase - Extension April 2024
Katakolon	545 Km^2	Offshore	14-May-14	3-Oct-14	v. 4298/2014	Energean Oil and Gas 100%	Development pending
Aitoloakarnania	4360,3 Km^2	Onshore	25-May-17	15 Mars 2018	v. 4524/2018	Withdraw - HHRM	
NW Peloponnese	3778,3 Km^2	Onshore	25-May-17	16 Mars 2018	v. 4527/2018	Withdraw - HHRM	
Arta-Preveza	4762,9 Km^2	Onshore	25-May-17	16 Mars 2018	v. 4526/2018	Withdraw - HHRM	
Block 2 - Ionian west of Corfu	2422,1 Km^2	Offshore	31-Oct-17	15 Mars 2018	v. 4525/2018	Energean Oil and Gas 75% (operator), Hellenic Petroleum A.E.* 25%	Exploration 1st Phase - extension March 2023
Southwest of Crete	19868,37 Km^2	Offshore	27-Jun-19	10-Oct-19	v. 4628/2019	Total 40% (operator), ExxonMobil 40%, Hellenic Petroleum 20%	
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Prinos	153 Km^2	Offshore			v. 98/1975 v. 2159/1993 v. 2779/1999 v. 4296/2014 v. 4585/2018	Energean Oil and Gas 100%	Production

Figure 7: Lease agreements, lessees, acreage, site, etc., in 2021

Finally, an important issue is that in 2019 HHRM launched a public consultation concerning the Strategic Environmental Impact Assessment (SEA) for two new blocks south of Crete (33.933 Km^2), as shown in Figure 4. On the basis of the SEA, K. Hatzidakis (the then Minister for the Environment and Energy) gave an environmental approval in July 16, 2020 for both blocks to proceed with the processes for the concession (Ministry of Environment and Energy, Decision, 16/07/2020). The specific potential concession of the above blocks is directly related to fierce antagonisms in the Eastern Mediterranean about the EEZs, as is also indicated by a question from members of the European Parliament to the Commission (Papadimoulis et al., 2020).

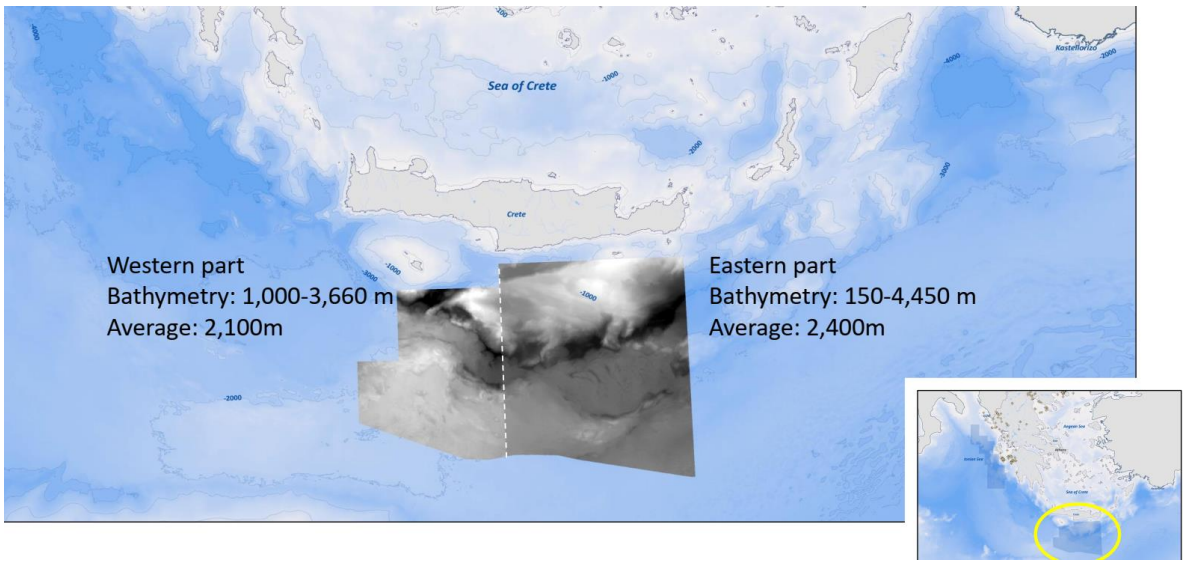


Figure 8: South of Crete offshore acreage — bathymetry. Source: Oikonomopoulos, 2019

Moreover, these two blocks are characterized by ultra-deep sea targets, as shown in a 2019 HHRM presentation (Figure 5). Moreover, the former president and CEO of HHRM, Yannis Bassias, confessed in 2018 that, at the time, the extraction technologies were not advanced enough for those targets (Deligianis, 2018).

So, which are today's plans and prospects? Following the official source of HHRM and its current representatives will summarize the main strategic guidelines for the Greek hydrocarbon program as promoted these days. Firstly, the interest of both HHRM and the remaining companies has been focused on offshore blocks and, specifically, on Crete and on the exploration of potential natural gas deposits (Stefatos, 26/10/2021). As a result, once again, despite the

withdrawals, we have a resurgence of the propaganda that speaks of enormous treasures and imaginary reserves worth €250 billion (Stefatos, 18/10/2021). Even if the first phase of the exploration (the seismic surveys) has not yet started and the lease agreements as well as the L. 4001/2011 clearly define that the exploration stage lasts between 7 and 10 years (as we will subsequently see), the CEO of HHRM, Aristofanis Stefatos, taking advantage of the vast increase in prices (250%) and the estimations for huge increases in natural gas for the following two decades (for Greece 40%), foretells huge deposits and, purportedly, hundreds of billions of value (Stefatos, 18/10/2021). The second issue is that natural gas is presented worldwide as a bridge fuel—i.e., an essential element of the energy transition toward RES. Indeed, in the recent conference "All Things Energy Forum" (held on June 2–4, 2021), the following topic was analyzed: "The role of the hydrocarbon industry in the energy transition and the contribution of energy as a pillar of stability and growth in the SE Mediterranean" (HHRM, 09/06/2021). Also, one of the main conclusions of the discussion was that: «the role of hydrocarbons in the economic development of Greece and the energy transition is crucial […], [also…] hydrocarbons are an essential component of a balanced energy transition, which will last for several decades (and after 2050) and in the meantime, gas will have to fill the energy "gap" but also provide the society with affordable energy, […] [and…] International energy companies, organizations and *"players"* of the regional market give a vote of confidence to Greece and believe that it can become an energy hub and an important transit center for the wider region"(HHRM, 09/06/2021). Finally, the third aspect that needs to be highlighted is the promotion of the fossil fuel industry's shift toward the green economy as the oil companies are rebranding themselves as energy companies. Specifically, the greening (greenwashing) of fossil fuel extractions is based on the use of RES floating wind turbines that will supply electricity, as well as on the production of blue and green hydrogen and the development of CCS processes and technologies, following the example of the Masshylia project in France (Liaggou, 2021). This "new" orientation has been promoted through interviews, press releases, and articles across the whole spectrum of political or energy press during the last months (for example, Stefatos, 28/06/2021, Energypress; Stefatos & Scoufias, 17/05/2021, Amna; Kimbouropoulos, 05/05/2021, Efsyn, interview with Stefatos; Liaggou, 16/03/2021 eKathimerini, Stefatos interview)

Lease Agreements, SEAs – the case of the Ioannina lease

We have chosen the Ioannina lease as an indicative example for the following reasons: i) it is one of the first concessions, ii) it has been extensively analyzed, iii) it is the area upon which the debate for the extraction program as a whole was focused to a large degree, iv) this is where a complete, onshore, first phase of the exploration process took place, v) it is a vast onshore area with crucial and sensitive ecosystems, and vi) a local social movement against the extractions has been developed in the entire Epirus region.

However, as we have already seen, except for Prinos and Katakolo, in every other case we cannot speak of discovered resources—let alone reserves (namely, commercial deposits; see Figure 8, petroleum classification)—but about researches for the discovery of some kind of prospective resources. However, even if discovered, it is quite possible that they will not be economically exploitable. Thus, the media narrative regarding huge revenues or total values, at best, stems from arbitrary estimations and, in most cases, from sheer propaganda.

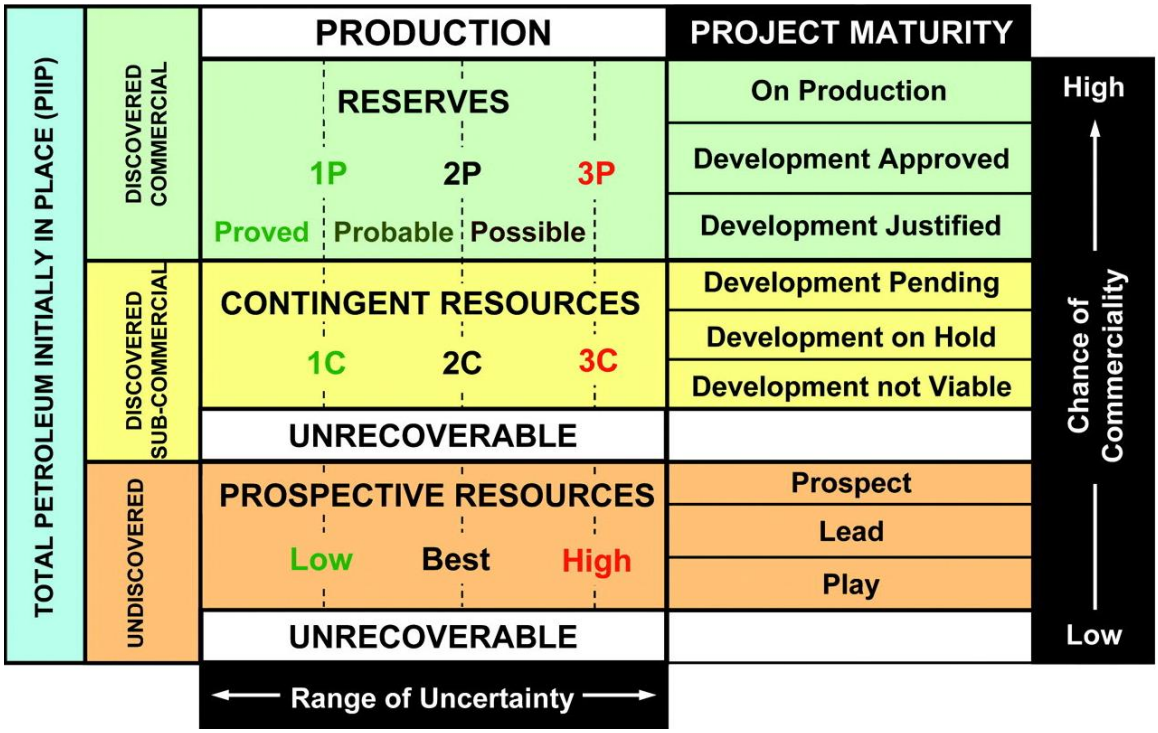


Figure 9: Resources categorization scheme, for a range of technical uncertainty and a classification scheme for different project maturities: 1P, proved reserves; 2P, proved plus probable reserves; 3P, proved plus probable plus possible reserves. The abbreviations 1C, 2C, and 3C relate to corresponding petroleum volumes for contingent resources (Worthington, 2007)

In addition, these extraction projects, if implemented, will bind and "mortgage" the future of two generations (primary, through their impacts). At the same time, the distance between the propaganda and the first mining for exploitation—assuming that commercially exploitable deposits are discovered—takes more than 10 years. Specifically, the following stages are generally prescribed: a) research (on average, for 5 years) until the first discovery, b) enclosure of the deposit (up to 2 years), c) development (2–6 years), and d) exploitation.

Specifically, according to L. 4001/2011, Art. 158, the research stage should not last longer than 7 years for onshore areas and 8 years for offshore ones. In particular, the lease agreement for the Ioannina block stipulates that the basic stage of research should last 7 years in three phases (lasting 3, 2, and 2 years, respectively) with a possible special extension of up to 7 years, while the exploitation stage is meant to last up to 35 years (25 plus two extensions of 5 years(L., 4300/2014).

But even the stage of research, although it may seem "moderate" regarding the impacts, is exactly the opposite, as the people in Epirus have experienced. We will mainly focus on the first of the three phases of research, which took place and was completed in the region. So, according to the Environmental Action Plan (EAP)[26], submitted by the consortium regarding the first phase of the exploration (namely, the geophysical [seismic] survey), we will briefly present what was stipulated by the lease and the EAP (ideally and whitewashed by the consortium) and what has taken place in Epirus.

At this point, we think it is crucial to make a short digression. In our theoretical framework, we used the metaphor of the "glass-box"—which is characterized by transparency—as a more "fertile" metaphor for our case. Nevertheless, in our framework, a certain degree of opacity is both present and "fluctuating." The unfettered access to environmental information as well as the transparency and publicity of official documents are typically safeguarded in European countries. Nonetheless, various others factors can introduce a degree of opacity, affecting, among others, the ease of access, the organization of official web sources, libraries, databases,

[26] Full citation: Enveco. (2017). «Περιβαλλοντικό Σχέδιο Δράσης (ΠΣΔ) Χερσαία Σεισμική Έρευνα (ΧΣΕ) στην περιοχή «Ιωάννινα» της Περιφέρειας Ηπείρου» [Environmental Action Plan (EAP) Land (onshore) Seismic Survey in the area "Ioannina" of Epirus Region]. Energean Oil and Gas. Pages: 304. Here we mention the full citation because, as mentioned below, it is not publicly accessible anymore.

the stability of web addresses, and so on. In the course of our study, it was not a rare phenomenon to encounter significant difficulties when attempting to find specific documents, etc. The case was even more intense as we have studied the specific issue on many occasions, in different periods, during the past ten years. As a result, many official documents that we had accessed in the past (of course, we had also downloaded the specific documents) and for which we had specific web addresses (which we used in our citations) are not valid anymore. An indicative such example is the official webpage of the HHRM, where one can find links for various official documents that existed three years ago (but not anymore) or be redirected to web addresses (for example, to the Ministry of Environment and Energy) that do not lead to the linked document. For example, in the web address "https://www.greekhydrocarbons.gr/en/IoanninaLease_en.html", the "useful links" section is supposed to give access to a series of documents, but both the links for the ratification of the SEA and for the SEA itself are not valid.

Moreover, the Environmental Action Plan for the seismic survey regarding the Ioannina lease (which was designed and composed by ENVECO S.A.) was accessible online at a single web address of a site that does not exist anymore[27]. Of course, we had downloaded the specific document. In addition, the information, data, maps, etc. that are parts of the content of the specific document to which we will refer cannot be contested, as they have also been mentioned in several articles, announcements, public speeches, etc. Indicatively, we could refer to an article in the newspaper Epohi (Kontes, 2018) regarding an informational event organized by the Panepirotic Confederation of Greece, where, among many other guest speakers, the Managing Director of Enveco S.A., Spyros Papagrigoriou, gave a speech on the specific Environmental Action Plan (Papagrigoriou, 2018). Some key points of the Environmental Action Plan were also mentioned in a joint, official request by the WWF, Greenpeace and "The Initiative Against the Research and Mining of Hydrocarbons in Epirus", which was submitted to the competent environmental verifiers (also, notifying the offices of both the minister and the deputy minister).

[27] This is the address where the document was uploaded:https://savepirus.gr/wp-content/uploads/2017/12/%CE%A0%CE%A3%CE%94_%CE%99%CF%89%CE%B1%CE%BD%CE%BD%CE%B9%CE%BD%CE%B1_FINAL.pdf.This is the first relevant result in Google when searching (in Greek) for the phrase «Περιβαλλοντικό Σχέδιο Δράσης Ιωάννινα».

The purpose of that request was the in-situ assessment of the project's legality, regarding the geophysical survey, informing of alarming reports about specific incidents (WWF et al., 2018). Finally, Dimitris Ibrahim (Climate & Energy Policy Officer at WWF Greece) has referred to the specific plan as a *"dark" Environmental Action Plan* (Ibrahim, 2019). Thus, we see that the transparency of the "glass-box" is fluctuating; there are things you can see (find) and things that you cannot see. Some elements were accessible in the past (different conditions) but not anymore (HHRM links). Thus, the glass box might seem transparent, but no two glimpses inside it will ever reveal the same picture. In this case, the details of the "performance" change over time and according to the conditions, even if they are supposed to be immutable.

Returning to the land (onshore) seismic survey in Epirus, we must point out that important elements of those that we will refer to—according to the EAP for the seismic survey—are also included in the annual Environmental Impact Assessment Report (EIAR) prepared by ENVECO (ENVECO. 2019. EIAR)[28]. The Land Seismic Survey program of the 1st phase (3 years) in the area of "Ioannina" specifies 575.5 km of two-dimensional (2D) seismic survey lines on a grid of 7 NW-SE and 8 NE-SW direction lines, with their lengths ranging from 24 to 58 km—as shown in Figure 10 (which is based on the EAP data), through which we can grasp the rather extensive spatial coverage.

[28] In (ENVECO, 2019, EIAR, p. 17), there are two citations in Enveco's EAP, the first of EAP 2017 and the second its first amendment in 2018.

Figure 10: Picture 5.1-1 of EAP–Epirus. Illustration of the potential intervention area (red-lines grid) and the wider area of research delineated in yellow.

For these 575 km, 3-meter wide lines (roads) are provided for the low-depth drilling, the access of vehicles and machines, the disposal of equipment, etc. These corridors (roads) mainly concern forest areas that will be completely deforested (trees, shrubs, etc.). Thus, 11,500 exploratory shallow drillings (10–20 meters) will be carried out in this area, as well as 38 medium-depth drillings (80 meters) at the junctions of the axes, for which 8–14 kg of explosives are needed per each borehole. Concerning the use of helicopters, 219 temporary landing areas are needed (lifting, landing, stopping, refueling), with each of them requiring 900 m^2. A complete deforestation and land configuration will be necessary for these areas. It is also planned to open access roads to the helicopter landing areas and to deforest certain zones of the seismic survey axes for areas that cannot be supported by helicopters. Also, significant air pollution was predicted already from the first phase of the research stage: i.e., gaseous pollutants and particles that will occur from the mining activities, blasts in the boreholes, the clearing of vegetation, the transportation of equipment and workers by trucks and vehicles, and the operation of helicopters

(2-3 helicopters, 12 hours a day). Total emissions of gaseous pollutants and particulates are estimated at: a) 135.42 t of carbon monoxide (CO), b) 46.98 t of hydrocarbons (HC), c) 69.09 t of nitrogen oxides (NOx), d) 16.58 t of sulfur dioxide (SO2), and e) 38.69 t of total suspended particulate (TSP). However, as noted by Emeritus Professor of Geology of the Aristotle University of Thessaloniki, Sarantis Dimitriadis, the quantification of gases in tons always mitigates the size of the described quantity in our minds.

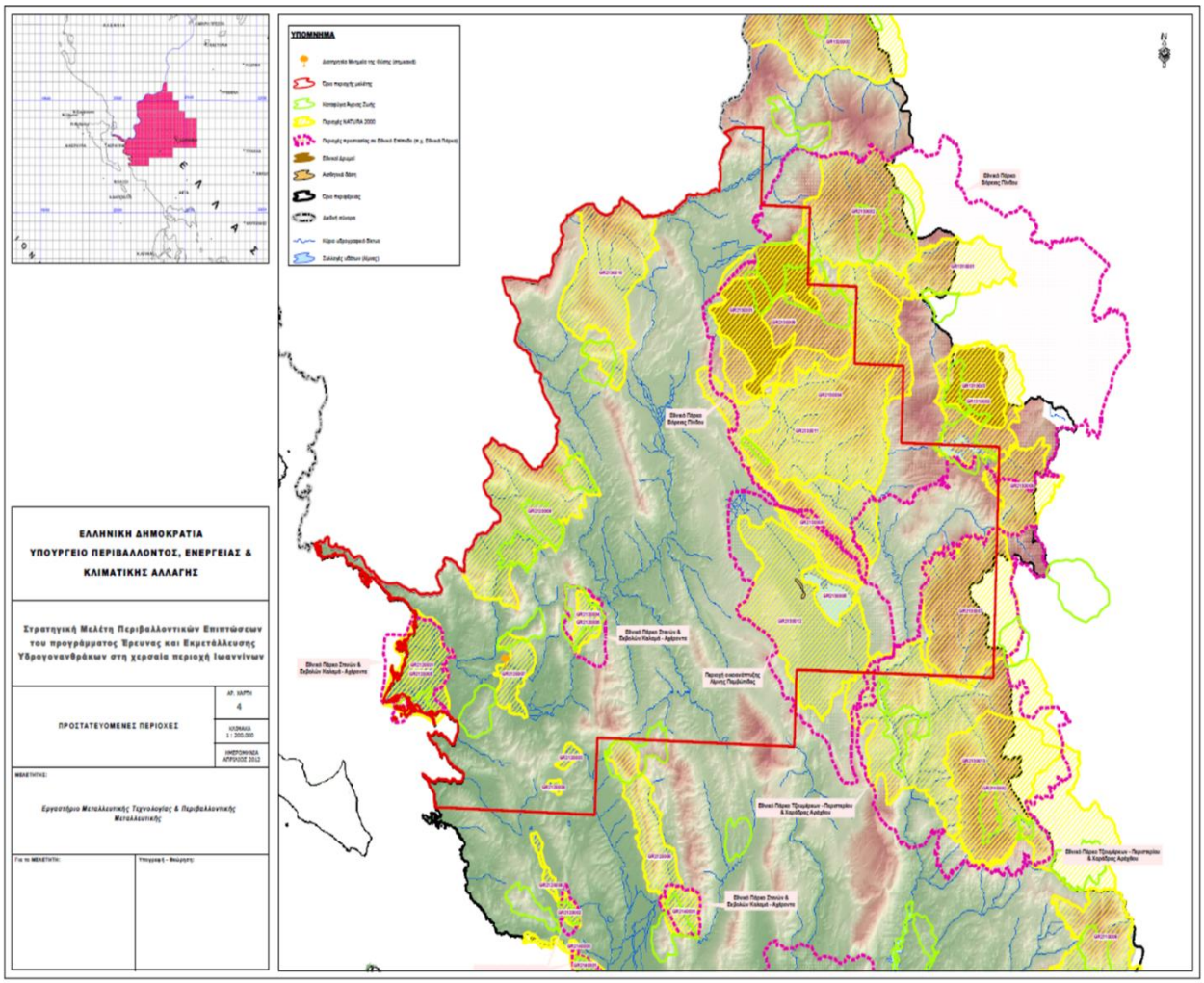
> Let's take for example sulfur dioxide, an extremely toxic to humans and especially harmful to nature gas. The 16.58 tons of sulfur dioxide corresponds to about 6,000 cubic meters of this toxic gas. And it's not just that this gas is toxic (fortunately of course it won't be released at once but divided into the 263 days of the duration of the seismic surveys). It is also the fact that a large percentage can be incorporated into the droplets of moisture and rain and become sulfuric acid. To return to the earth, afterward, as acid dew or acid rain destructive to forest vegetation and crops (Dimitriadis, 2017).

In addition, the water requirements per day of drilling are estimated at 250 liters, the requirements for fuel from the use of vehicles and drilling rigs are between 2,000 and 3,000 liters, and helicopters will require 140 to 850 liters per flight hour. In addition, the noise pollution caused by explosions, flights, drilling, and the overall operation of machinery, movement, vibrations, etc. needs to be considered.

In the first phase of the exploration, the re-entry and deepening of the Dimitra-1 drilling were also expected. Work on the drilling of this well (which had a depth target of 5,000 meters) began in 2001. At a depth of 3,996 meters, it encountered the formation of evaporites. The high pressures that occurred could not be addressed, resulting in the drilling being stopped. Then, it was decided to continue drilling with a detour starting at 2,807 m. At a depth of 3,566 m, the drilling, once again, encountered high pressures with the risk of an accident, resulting in the abandonment of this attempt in February 2002 (ENVECO. 2017. EAP. p.22). Of course, the risk was stipulated to be retaken!

All the above concern the first phase of the research stage in Epirus. In the research phases II and III (with a two-year duration each) the drilling of two additional deep boreholes had

been foreseen. All of these were specified in an area that is considered the hydrological heart of mainland Greece and, also, encloses two national parks, ten Natura areas, and 21 declared archaeological sites. The following map, attached to the SEA, depicts all kinds of protected areas within the research area. The impact on the flora and fauna, the settlements, the landscape, and the local activities are apparent. And all these impacts would burden the region even if the research phase stopped with no “positive” results—which is what actually happened.



Map 1: The red line encloses the research area, the Natura areas are outlined in yellow, the wildlife shelters are green, the areas of protection at the National level (e.g., National Parks) with a dotted pink line, the National Special Reserve with dark brown shading, and the hydrographic network as well as the lakes are depicted in blue (NTUA. 2012, SEA)

In the Lease Agreement (L 4300/2014 Art.12 p. 9) and, also, in the "Ministerial Decree Ratification of the SEA for Ioannina Contract Area" (B. II.-3),[29] it is explicitly specified that seismic surveys (under the applicable legislation) are not subject to any obligation for environmental licensing—namely, for an environmental impact assessment (EIA). Thus, despite the multiple threats and impacts of the research stage, the protection of the environment is left to a simple Environmental Action Plan (EAP) that will be prepared (designed and composed) on the consortium's own responsibility. Even more provocative is the fact that "The integrated responsibility for the prevention, mitigation, and addressing the environmental effects should be assigned to a distinct Environmental Unit. This Unit will be organized and operated under the sole responsibility of the entity to which the right to research and exploit will be granted [...]). Nonetheless, in the following paragraph it is added that *"[t]he* Environment Unit will be the liaison on all environmental issues with the local communities and the relevant administration" (Ministerial Decree Ratification of the SEA for Ioannina Contract Area" B.II 1&2.)[30]. Therefore, the study, planning, and control of the compliance to the EAP (that is, what the consortium itself essentially provided) would be done, again, by the consortium itself! In other words, the legislation and the state give a "carte blanche" for these critical functions, as they do not, at least, separating the roles of the auditor and the auditee!

Another point that needs to be highlighted (as it is indicative of the intentions and procedures that have been chosen) concerns the "lease agreements for the concession of the rights of exploration and exploitation of hydrocarbons" signed by the Greek State with every joint venture. The procedure chosen by the Greek state was not to discern the stage of exploration (research) from that of exploitation but, on the contrary, to grant with a single act (concession), directly, both the rights of exploration and exploitation. In particular, the joint ventures are

[29] The official link in the HHRM webpage for the document "MD for Ratification of Strategic Environmental Assessment (SEA) for Ioannina Contract Area [text in Greek language]" is not active anymore. It is the same problem that we have already noted. See "useful links" in this link: https://www.greekhydrocarbons.gr/en/IoanninaLease_en.html

[30] As we have already pointed out, that document is not accessible anymore. But as the legislation prescribes precisely the same for other lease agreements, in the MD for the Ratification of the corresponding SEA we could find almost the same provisions and, even, in the same paragraph. For example, see in the References the MD for the Ratification of the SEA of Southwest and West Crete (Ministry of Environment and Energy, 2019 May 6. B.II 1&3)

granted the right for exploitation before the type of deposits as well as their size, geographical location, and qualitative characteristics are identified. In other words, the exploitation rights have been granted prior to the collection of those necessary primary data that is necessary to evaluate whether those deposits (in case discovered) are exploitable with the existing technology, what risks their extraction poses, and, finally, whether it would be profitable to exploit them (based on the cost of extraction, in correlation with the current and the projected future prices). In short, the joint ventures secured exploitation rights even before it would be possible to conduct, at least, a credible Socio-Economic Impact Assessment (SEIA). Therefore, even within the given dominant framework of the market mechanisms, several fundamental parameters—such as the public consultation procedures, the principle of overriding public interest (environmental protection, etc.), the local communities, institutions, and social organizations—had been overlooked in a deliberately provocative manner. Essentially, an actual consultation with the society has never been sought. The state does not even superficially ensure the public interest, as in the aforementioned framework it is impossible to evaluate the fundamental aspects of such megaprojects (even with the market's methods—e.g., with analytical tools like a social cost–benefit analysis). The concession of the exploitation is made in advance. The arguments of well-known promoters and lobbies are based on stories about hidden treasures and other tales. It is evident that without knowing "what" will be extracted (as well as "where" and "how"), not even a fundamental cost-benefit analysis[31] can be carried out, since it is understood that the minimum condition would be the completion of the research phase and the knowledge of its results.

The above points, are noted in the very strategic assessment (SEA) for "Ioannina," while, of course, the assessment remains "positive," for the whole process of E&P. Therefore, in the SEA, it is emphasized that: "after the completion of the Exploration and before the Exploitation stage, a firm and analytical decision-making process is placed, which will take into account all the collected data. In this decision-making process, the local community should have substantial

[31] The cost–benefit analysis is a well-known and widely used method of economic valuation in decision-making for a wide variety of projects. It can include environmental, economic, and social costs in the form of negative external economies that impose (externalize) costs to a society or to certain activities. The specific valuation method is part of the orthodox environmental economics and has also received strong criticism from heterodox approaches (ecological economics) and, of course, from theoretical currents of political economy that are not part of the neo-classical school of thought.

participation and a powerful role" (NTUA, 2012, p. 54). Furthermore, it is stated that the SEA "is implemented at an early stage, resulting in ambiguity regarding to the technical and economic characteristics of the subject to be assessed, in terms of its potential environmental impact" (NTUA, 2012, pp. 52, 60). Moreover, it is emphasized “the main weakness of the SEA is the non-accurate knowledge of the characteristics of the project under implementation (size, exact geographical location, etc.)” (ibid., p. 53). At the same time, before the exploration stage, the performance of both an Environmental Impact Assessment (EIA) and an Environmental Risk Assessment (ERA) for oil spills from exploratory drilling (ibid., pp. 56-57). After the exploration and before the exploitation stage and "provided that the exploration reveals the existence of economically exploitable deposits, then the licensing of development and exploitation projects should require complete studies, which should be based on primary data” (ibid., p. 57) and not on bibliographic data or on qualitative approaches on which the SEA was based as is mentioned in the SEA (ibid., p. 55). The studies proposed, before the stage of exploitation and its licensing (i.e., "between these two distinct stages” (ibid., p. 61) a new EIA, ERA, socio-economic cost–benefit analysis (ibid., pp. 58-59), where ”[it] will be answered the critical question of the feasibility of the implementation of the project from a social point of view […] The role of the local community is crucial at all stages of the project. On this basis, it is considered a sine qua non to ensure a strong consultation process between the local community-the State-project promoter” (ibid., p. 61). As already mentioned in detail, the effects of even the first phase of the exploration stage are far from mild, but, of course, it becomes clear that the exploitation (in case it occurs) carries incomparably greater risks and impacts, respectively. As pointed out in the SEA: "the size of the exploration, in terms of the size and the corresponding environmental impact, it is a submultiple of the size of exploitation” (ibid., p. 54).

Moreover, although the "zero option" scenario is typically examined in every SEA (i.e., do nothing, non-implementation of the project)—as provided for in the standard methodology—the specific alternative is always rejected. This result is also, typically, expected, based on the usual comparative assessment (multi-criteria analysis [MCA]) given the assumptions and weightings that always (almost with mathematical precision) favor the implementation of the project.

The fossil fuel extraction framework as a pilot of lawmaking

A critical fact is the “evolution” of a series of provisions or procedures introduced via the hydrocarbon extraction program into state law. Specifically, during the first Covid-19 lockdown, the current government adopted on May 7, 2020 the Law 4685/2020 (*“*Modernisation of environmental legislation, transposition in the Greek legislation of Directives 2018/844 and 2019/692 of the European Parliament and of the Council and other provisions*”*). The government’s draft law was put up for consultation for just 15 days—March 4–18, receiving 1579 comments (a record number for such a short consultation process). In addition, the text that was put up for consultation included 66 articles with a total length of 73 pages, while the one submitted to the competent committee of the parliament contained 130 articles in 157 pages. The specific law consolidated against its provisions the broader “coalition” of social and political forces that opposed an “environmental law” over the last few decades in Greece. More than 130 movements, social organizations, local collectivities, and groups circulated a petition that gathered 25,000 signatures in favor of the law’s withdrawal (Change.Org., 2020. Petition; Callisto, 2020). Another 30,000 signatures were collected by two notable NGOs, while less prominent ones submitted many letters and resolutions. At the same time, letters with objections and decisions that the draft law should be withdrawn were sent by: the University of the Aegean, the University of Thessaly, the Agricultural University of Athens, the School of Architecture (NTUA), the Hellenic Centre for Marine Research (HCMR), the Panhellenic Association of Environmental Engineers, the Panhellenic Union of Foresters–Civil Servants, numerous trade unions, as well as 22 island municipalities.

As we have already mentioned, in the exploration stage, there is no obligation for environmental licensing; the protection of the environment was ensured through the EAP that was carried out by the company, which would have also found an *environmental unit* responsible for safeguarding the natural environment. Therefore, the extractive framework had already canceled both an environmental licensing provision and the fundamental distinction between the roles of auditor and auditee.

In 2020, through the L. 4685/2020, on the pretext of speeding up the procedures, apart from the shrinking of the licensing files, an institution of private "evaluators" (Article 7) for the

review of EIA was introduced. Furthermore, it is specified that, at the investor's request, the "certified evaluator" can be selected and remunerated by the investor!

At the same time, the L. 4685/2020 provides suffocating margins of time for the competent public services that are called upon to give their opinion. Without even being given the appropriate means to compile them, it is highly possible that they will not be capable of delivering their opinion in many of the cases. As a result, after the expiration of the deadline, the Law specifies that "if these are opinions that are not considered essential, the process proceeds to the following stages "!

Among the numerous environmentally destructive provisions of L. 4685/2020, it is provided that within Natura 2000 network areas, hydrocarbon extraction is allowed. Specifically, it is permitted to conduct “[m]ining activities (Mines and Quarries, Sand extraction, Zones for exploration and exploitation of hydrocarbons)” (L., 4685/2020, 25, Article 44). What is more, local communities, regional and local authorities, and public sector entities have no say especially regarding hydrocarbon exploration. In particular, Article 110 stipulates that for the conduct of hydrocarbon explorations in areas belonging to the State and the Local Authorities, "it is not required to obtain any license, approval or consent from the above persons in their capacity as owners, possessors or occupants of the area."

Fracking: still a threat

There were many times in the past when social movements, activists, NGOs, etc. demanded fracking to be banned, as well as many times when the officials declared they will prohibit fracking—with the last such statement being made in 2018 by the former Minister of Environment and Energy, G. Stathakis (Energypress, 21/11/2018). Here, briefly, we must note that hydraulic fracturing—or fracking—is a method for the extraction of non-conventional fossil fuels such as shale gas, shale oil, etc. According to the relevant literature, the environmental and social impacts of fracking are disastrous (European Parliament, ENVI, 2011; European Parliament, ENVI, 2012). In short, fracking is called the method of high-pressure injection of huge amounts of a liquid mixture (water mixed with sand and strong chemicals) into an underground bedrock

formation at ultra-high pressures through boreholes. As a result, fissures are created to the rock formation, and the shale gas or shale oil that is “trapped” can “escape” and be extracted.

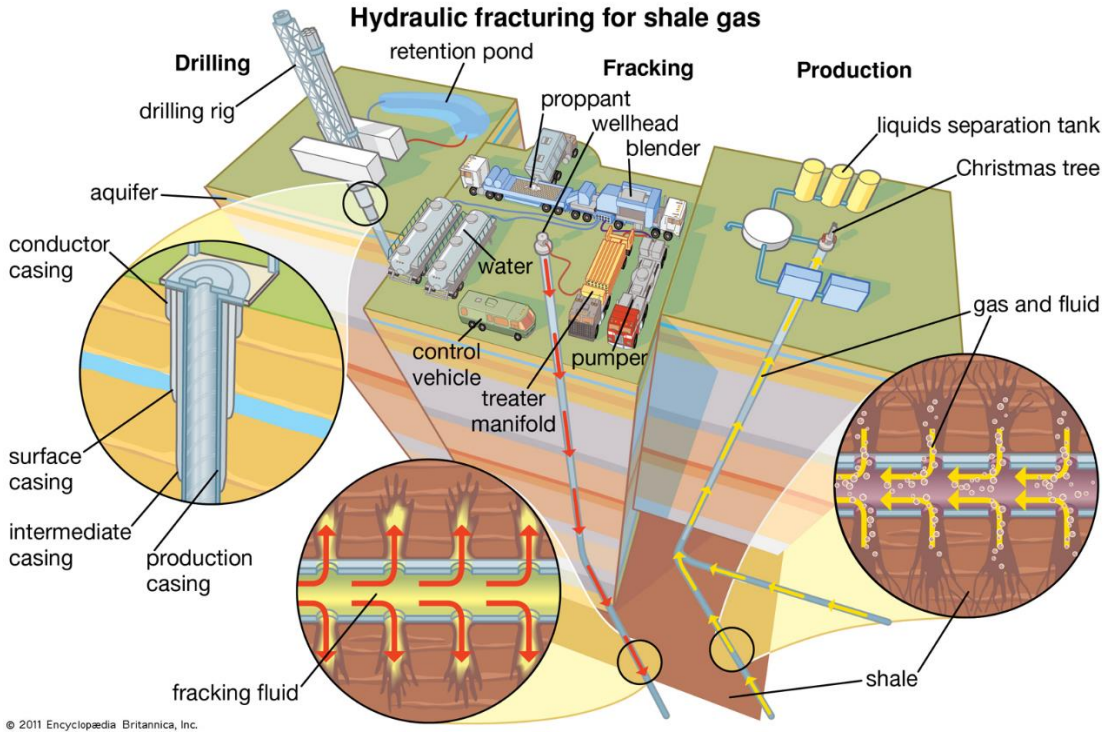


Figure 11: The three steps in the extraction of shale gas: i) drilling a borehole into the shale formation and lining it with pipe casing, ii) fracking (or fracturing) the shale by injecting fluid under pressure, and iii) producing gas that flows up the borehole, frequently accompanied by liquids. (Encyclopedia Britannica, 2021)

Hydraulic fracturing requires vast amounts of water, resulting in the depletion of natural water reserves. At the end of the process, recovered fracking water (in huge quantities) is heavily contaminated with chemicals, including heavy metals and radioactive, mutagenic, and carcinogenic substances. In other words, this is toxic, dangerous liquid waste that, even after wastewater treatment (in the best of cases), can be released into surface waters still containing contaminants. Alternatively, it can be discharged into deep wells, with the obvious consequence of the pollution of the aquifer. Finally, apart from anything else (air pollution, leaks of all kinds, noise pollution, deforestation of vast areas, etc.), this method has been shown to be associated with a rapid increase in seismicity of more than one type, as, recently, researchers discovered a new type of hybrid-frequency waveform earthquakes (EHW) (Yu et al, 2021). The areas in which fracking is implemented look like bombarded landscapes. Massive movements have developed in many countries worldwide, demanding its prohibition. Already, these movements against

fracking have brought results. For example, fracking has been banned in France, Ireland, Germany (in part), Cantabria in Spain, in the states of New York, Maryland, and in many other areas (Herrera, 2020).

We have already mentioned that domestic press articles reporting on potential unconventional resources such as shale gas are not rare. Nonetheless, we will only highlight a statement made by professor emeritus Sarantis Dimitriadis in a recent speech, regarding some scientific publications on the subject (Dimitriadis, 2018). In a paper published in 2013 by professor V. Karakitsios concerning the geotectonic "Ionian Zone", which includes the largest part of the Ioannina concession area, is stated that:

> Western Greece contains important oil and gas shale reservoirs with a potential of unconventional exploration. […] Exploration for conventional petroleum reservoirs, through the interpretation of seismic profiles and the abundant surface geologic data, will provide the subsurface geometric characteristics of the unconventional reservoirs. Their exploitation should follow that of conventional hydrocarbons to benefit from the anticipated technological advances, eliminating environmental repercussions (Karakitsios, 2013, p. 1567)

The exploitation of unconventional fossil fuel resources, oil and gas shale reservoirs are related (lead) to fracking, despite the “wishful thinking” that technological advances will eliminate the environmental impacts (technological optimism).

Dimitriadis also refers to a 2015 publication of the professor emeritus Tsirambidis, which has been acclaimed by the Academy of Athens. In its conclusion, it is stated that:

> Exploration for conventional hydrocarbon reservoirs, through the interpretation of seismic profiles and surface geological data, will simultaneously provide the subsurface geometry of the unconventional ones. Their exploration should follow that of conventional hydrocarbons. Today, because the interest of many of the major oil companies is directed to unconventional sources of energy, Greece needs re-evaluation of the data from all boreholes carried out,

> on the basis of new information, with the aim to identify possible reserves of unconventional hydrocarbons retained in highly compacted fine-grained deposits (Tsirambides, 2015, p. 489).

A point worth noting is that both publications, apart from talking about the potential of non-conventional fossil fuels and the interest of large oil companies, emphasize that research on conventional hydrocarbons will lead to data extraction for non-conventional ones. But beyond that, the crucial point that they both highlight is that the exploitation of non-conventional hydrocarbons (as a possibility) follows that of conventional ones.

Chapter 6: Treasure hunt in the Mediterranean

Oftentimes, the advocates of fossil fuel extraction in Greece seem to refer to the allocated areas as if they are similar to the deserts of Africa or of the Middle East or, even, to the remote areas of the North Sea (without in any way suggesting that mining should continue to take place there). Hence, apart from the characteristics of the natural environment, we have to point out that millions of people live and work in these areas in Greece. Their living, working, and livelihood conditions are based on an environment (economic, natural, social) that does not include activities that threaten to violently subvert the local reality. In particular, in all the concession areas—either onshore or offshore (neighboring islands)—a series of developed productive activities are directly affected—even to the point of displacement. First, tourist sector it is greatly affected, in all its forms, from all-inclusive clubs and big hotel groups to agrotourism and the plethora of related activities and professions, (travel agencies, transportation, restaurants, retail and shopping, cultural industries, leisure, recreation, and sports).It is worth noting that after a decade of crisis small scale tourist activities are involving former unemployed people who have returned to their home towns, villages and islands leaving mainly Athens. But it is not only tourism. Critically important productive activities are well developed in all these areas—from the local and small to large, industrial scales, like fish farming and fishing, agriculture, livestock farming, forestry, and many others. The associated industrial sector of the processing of agricultural and livestock products (even organic and PDOs) can also be added to the affected activities. In all these productive sectors and branches, as well as in many others, huge total investments (from very small to large) have been made over the years. These are now running the risk of severe depreciation. At the same time, mining activities cause a significant decrease in land values, buildings, housing stock, and, in general, (apart from large properties) to the small property of the vast social majority, worsening its economic position. All the above are described by the phenomenon called negative external economies.

In a capitalist economy, one of the most vital elements for the majority of the population is the primary income distribution and its diffusion throughout society—and not just the aggregate amount in terms of domestic or local GDP. Therefore, the debate on whether extractions will increase the GDP or create new jobs (directly and indirectly), or how much the

effect of the multiplier of autonomous demand (i.e., investment in the extractive industry) will be, has to take into account the counter-effects of job losses, of the multiplier of disinvestment from several sectors and their cumulative effect, along with the depreciation in the local economy that, as we have described, will take place. This former aspect is rarely mentioned, even though it often concerns the vast majority of society and its future due to its many consequences (e.g., loss of jobs and incomes, depreciation, disinvestment, environmental degradation, etc.), which usually significantly exceed the financial "contribution" of mining (if there is any). And this is undoubtedly not being valuated.

Prinos: "Huge bomb at the heart of the Aegean Sea"

Energean Oil & Gas is an indicative case of how foreign policy, geopolitical alliances, and the role of the Greek state in the Eastern Mediterranean are linked to the objectives and activities of domestic capital interests through the alliance of Greece, Israel, and Cyprus as a vanguard of NATO and EU plans in the region. In particular, Energean Oil & Gas is an international company of Greek interests (founded by Mathios Rigas and Stathis Topouzoglou) that is listed on the London Stock Exchange. It was founded in 2007, purchasing the shares of Eurotech, which had the majority of the shares of Kavala Oil S.A. and, therefore, the licenses of Prinos. Today, it is a company operating in the Eastern Mediterranean, self-promoted as “the leading independent gas-focused energy company in the Mediterranean,” with 80 leases and licenses in its portfolio, located in 9 countries, with the bulk of its deposits located in Israel. Energean purchased Edison E&P in 2020. Energean is a typical example of what we have mentioned as the financialization of extractions and mining activities by accumulating extraction rights and licenses (and, also, through buyouts, purchases, etc.), presenting them as assets in their portfolios in order to extract profits in the stock markets.

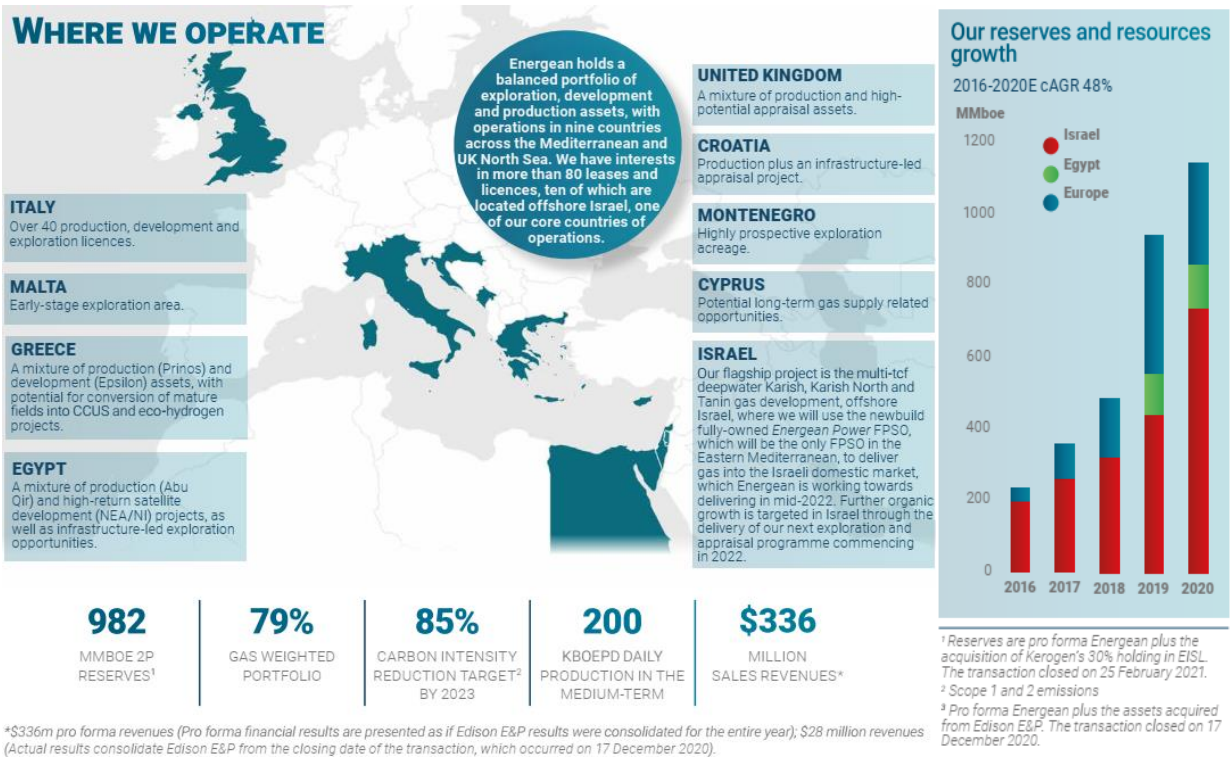


Figure 12: Reserves and resources growth and portfolio of 80 leases and licenses in 9 countries (Energean PLC., 2020)

The Prinos concession is the only example of active oil exploitation in Greece, and many times in the past it was used as a "success story." So, it would be helpful to emphasize some key facts. Let us also look at some data from the Financial Report of Kavala Oil S.A., which was approved by the Board of Directors in May 2017. In 2015, it seemed that the amount of €170,000 had been paid as income tax to the Greek State, while, in 2016, the company declared losses and, therefore, did not pay income tax. The most interesting point mentioned in the report was the following:

> During the fiscal year ended on December 31st, 2014, the regular audit of income tax and other tax items carried out on the Company by the K.E.ME.EP [note: K.E.ME.EP Control Center for Large Enterprises] for the fiscal years 2006-2011 was completed, and the relevant Final Audit Sheet was notified to the Company. Based on the relevant Final Decisions for the Imposition of Fines, a total amount of € 7,344,124 was charged against the Company, of which €5,375,035 relates to an intra-group transaction fine. Also, based on the Final Acts of Corrective Income Determination, the audit corrected the Transferred

Tax Losses of the Company from €28,917,454 to €1,356,225 (Kavala Oil, 2017, p. 37).

Of course, the company typically appealed against the Final Acts of Corrective Determination of Income Tax and certain Decisions of Imposition of Fines. However, the above clearly outlines the international and domestic situation regarding the public's tax revenues from large companies in general and from such activities in particular.

Certainly, tax avoidance on the part of large enterprises and multinational corporations—and, especially, mining companies—is a huge international issue. In any case, the concealment, through various methods, of the taxable income (profits), the constant presentation of losses, the intra-group transactions, the offshore companies, mailbox companies and many other such schemes that have been developed mainly during the neoliberal period result in the obliteration of the expected tax revenues for the states. A 2015 statement to the Kathimerini newspaper by Eldorado Gold's CEO, Paul Wright, was quite revealing. When asked about a survey by the Centre for Research on Multinational Corporations (SOMO) regarding the tax avoidance methods used by the company (SOMO. 2015), he unequivocally replied that: "regarding *our tax strategy* and the use of Dutch companies, we do what most multinational companies do and it is perfectly legal. We try, like every business and every natural person, to legally minimize the taxes that we will be called upon to pay" (Palaiologos, 2015).

Let us now see what Energean Oil & Gas officially stated about its payments to the Greek state. For 2016, it declared $11,316,000, of which $9,851,000 were related to the income tax and the social contributions for its employees!

	Amounts in '000 US$[1]	
	2016	**2015**
Employee income tax & social contribution	9.851	9.032
Contractors tax	721	245
Other taxes	744	9.506
Total payments for the period	**11.316**	**18.783**

Figure 13: Energean Oil & Gas: Taxes & social contributions paid in Greece (Energean Oil & Gas. 2016)

For the last two years (2019 and 2020), Energean Oil & Gas announced net losses of €52,5 and €57,1 million, respectively (Energean Oil & Gas, 2021, p. 4). One "success story" that these days is in the front pages has to do with the trade union's long struggle against the company's plans in Prinos regarding a radical transformation towards a so-called "Green Prinos" (that is, developing CCS from local and more remote emitters and also eco-hydrogen projects), which can be directly translated into a restructuring strategy against workers' rights (dismissal, termination of service scheme), working conditions and safety, etc. The trade union was forced to occupy the facilities in order to strengthen its protest. This issue received nationwide attention, and it has already reached the Greek Parliament (KavalaNews, 2021; Efsyn, 12/21/2021; Tovima, 12/21/2021.)

More than a year ago (2020), Energean threatened to stop its activities in the Prinos concession as the decrease in oil prices and oil production resulted in €120 million of losses for the years 2019 and 2020, while, only in 2020, the operating losses amounted to €83,4 million (Energean, 2021 April 19, Press Release). The vice president of Energean Greece, Dr. K. Nikolaou, presented Prinos as the victim of the pandemic and threatened that the only producing fields in Greece would stop production. That was the first line of pressure. The second line, of course, was the 270 workers/employees that would lose their jobs, and the third and most outrageous was that in the Prinos concession, the infrastructure is 40 years old. There exist 24 oil wells which are public property (they are leased, so Energean will abandon them), and require about €3 million each to be restored. Otherwise, in case they would stay six months without maintenance, that would be a "huge bomb in the heart of Aegean Sea" (Insider, 2020; Adamopoulos, 2020)! The former speaks for itself; any further comment is utterly unnecessary. So, these were the main arguments of Energean to the Greek government in their demand for public funds to save the production of a private company during the pandemic era. And this was a "success story" as in March 2021, "the European Commission approved €100 million of support […], consisting of a public guarantee on a commercial loan of around €90.5 million to be constructed by Energean with its commercial banks and a €9.5 million subordinated loan from the Greek State" (Energean, 2020, p.38).

Greece, the "Norway" of the 21st century?

Norway is the only example that is often employed to show how a fossil fuel extraction model can significantly contribute to government revenues and the GDP, reducing, at the same time, the public debt and assisting in the creation of a strong welfare state. The example of Norway's fossil fuel extraction model is a unique case coming from a different era (Ryggvik, 2010; Ryggvik, 2015; Norwegian petroleum, No. 2021[32]). In 1962, in the post-war development period, when the dominant political trend in Europe was strengthening the welfare state through social democratic governments (in this case, it was the Norwegian Labor Party), the American company Phillips Petroleum applied for exploration rights in the North Sea. Thus began the process of defining the zone rights and the continental shelf as well as resolving disputes with the five neighboring countries (Britain, Denmark, Greenland, Iceland, and the Soviet Union), which ended in 1965. The first round of concessions followed in the same year. In 1969, the Ekofisk deposit was discovered, and, in 1970, it was confirmed that it was a massive deposit. In June 1972, the Norwegian Parliament decided to establish a 100% state-owned oil company, Statoil, which would determine the development of a new industrial sector: hydrocarbon extraction. At this point, it is crucial to stress that more than 50% of state participation in each production license had been secured. Methods of protectionism were applied mainly in the first decades, until the sector's internationalization in 1990—public-private partnerships—and the beginning of privatization and "deregulation" in 2001. Due to the massive deposits, the Norwegian economy became extractive. In 2012, 86 % of total exports were related to petroleum products. The taxation of oil profits since 1975 reached 78% (with an additional special tax of 56% atop a 22% business tax). However, since then, a lot has happened—for instance, provisions of tax exemptions, subsidies, etc. The so-called "Dutch disease" was avoided due to several policies, with the most important of them being the foundation of two funds: the Government Pension Fund of Norway (GPFN) and the Oil Fund (Government Pension Fund Global – GPFG). Today, these are the largest in the world, and, through them, there were several investments made in international stock markets so as to avoid an increase in the exchange rate of Krone.

[32] As our mention of Norway's oil history is relatively brief, focusing on its main parameters and its major differences with the Greek hydrocarbon program, we cite our main sources together.

In any case, the main parameters that ultimately differentiate the Norwegian example (making it impossible to repeat in any form in the 21st century) are: a) that it took place at a radically different era, 50 years ago (when climate change had just been introduced on the global agenda), b) that is located in the North Sea and not in the Mediterranean, c) that it was carried out in a Scandinavian-type social-democratic context of public control, state industries, welfare state, protectionist financial policies, domestic industry, and d) that there was a massive amount of deposits. To grasp the magnitude of the historical changes, in 2019, the Government Pension Fund Global (GPFG), the largest state investment fund in the world, has started to sell its shares in oil and gas companies, announcing that it is gradually withdrawing from investments in hydrocarbon E&P (Davis, 2019). Today, it has already sold them (Arvin, 2021).

Lease agreements: economic terms and public revenues

Next, we will refer to the commitments of the lease agreements regarding potential public revenues. We use the Lease Agreements of Ioannina (L., 4300/2014) and Arta–Preveza (L., 4526/2018)[33] as indicative examples.

To begin with, we must point out that both the type and the amount of revenues produced for the state are connected with the stage of the contract execution—namely, the exploration and exploitation stage. So, in the exploration stage, the revenues come from signature bonuses, training, and surface fees. At the exploitation stage, the flat income tax and the regional tax, royalties, and the production bonuses are added.

As described in Article 13 of both contracts, we will start with the royalties. Royalties can be either in kind or in money or even in a combination of the two, depending on the choice of the lessor (public). Regarding the selection of the type of royalties, if the lessor chooses cash, the lessees immediately acquire the right of complete ownership over the extracted hydrocarbons. On the contrary, if the choice is royalties in kind, the lessor and lessees become co-owners of the quantities extracted (in proportion to the “rent” right) until the “rent” is delivered. The "Royalties" are determined based on the R Factor. The R for each period is calculated as the result

[33] As we have already mentioned regarding Arta–Preveza, the license was returned from HELPE to HHRM.

of dividing the cumulative gross inflows by the cumulative total outflows. Cumulative gross inflows are translated into the cumulative gross value: a) of produced and salvaged hydrocarbons and by-products, b) of sales of assets, c) of net transaction income, such as utility charges, fees for the use of hydrocarbon transport facilities, insurance contracts, etc. Cumulative total outflows are the sum of all research, operating, and other deductible expenses. Among other things, the deductible expenses include amounts deposited in the special reserve for dismantling, removal of facilities, restoration of the Conventional Area, and additional restoration expenses that are not included in the special reserve. Royalties are also included in the cumulative outflows.

Hence, royalties will be calculated as a percentage of the produced and saved hydrocarbons and by-products, depending on the factor R. Thus, for an R of: a) less than or equal to 0.5, the royalty percentage will be 2% (for Arta–Preveza 5%), b) between 0.5 and 1.0, it will be 5% (Arta–Preveza 10%), c) between 1.0 and 1.5, it will be 8% (Arta–Preveza 15%), d) between 1.5 and 2.0, it will be 11% (Arta–Preveza 20%), e) between 2.0 and 2.5, it will be 14% (for Arta–Preveza, greater than 2.0 will be 25%), f) between 2.5 and 3.0, it will be 17%, and g) when greater than 3.0, it will be 20%.

Between the two contracts, there is a difference in the percentage of royalties. Beyond that, however, the reality lies in the fact that the way royalties are calculated and delivered to the state, and the policies and tactics followed by many extraction companies, make it highly doubtful, as we have already seen, whether any royalties will be delivered at all.

Taxation is regulated in both contracts by article 14. According to this, the lessee or each joint-venture member is subjected to a special income tax of 20% and a regional tax of 5% on the net taxable income. The article describes how taxable income is determined based on income and expense accounts, depreciation of research expenses, operating facilities, etc. We have already explained what the international and domestic reality is for taxable income as it appears and, therefore, for the ultimately paid amounts. Even so, let us consider that, in Greece, the minimum tax rate for employees is 22%!

Also, a provision is made for so-called additional revenues. The contract of Ioannina provides the amount of €500,000 (for Arta–Preveza, this is €1,300,000) as a signature bonus and

productions bonuses, in scales—for example, for the first ten million barrels, €1,500,000 and so on.

Finally, surface fees are specified. We firstly mention those for the region of Ioannina, mentioning in parentheses those defined for the Arta–Preveza region. These are defined as follows: a) for the first phase of the exploration stage, €10 (€ 50) per square kilometer of the Conventional Area per year, b) for the second phase of the exploration, €15 (€100) km^2, c) for the third phase, 20 € (200 €) km^2 and d) in all phases of the exploitation stage will be delivered, in addition to the above, 200 € (1000 €) per km^2!

An additional argument that is often used in the relevant campaigns is that the country will meet its energy needs through hydrocarbon extractions. First of all, we should note that any quantities extracted belong to the companies (except for the percentage of royalties in kind if selected and existed) and are intended not to cover domestic energy needs but to be exported. Moreover, as it is well known, the prices of hydrocarbons, especially oil, are formed on the international markets and in international organizations (OPEC). Therefore, domestic demand will be met in the same way and at the same prices as has been the case until now. The only case where the aforementioned condition is altered concerns article 18 of both the lease agreements of Ioannina and Arta–Preveza, which concerns the case of war, or another state of emergency, when, at the request of the state, the lessee is obliged to “sell” (in the contract of Ioannina) or “provide” (in that of Arta–Preveza) the whole or a specific share of the production. Article 18 is titled "Satisfaction of Domestic Needs" and, in practice, covers only the case of war.

What is more is that regarding the resources/deposits for which there is a size estimation by the companies themselves—namely, Patraikos (140 MMBoe), Katakolo (10.7 MMboe), and in the case of the Ioannina lease (for which there are no data) only an expectation of 50–80 MMboe—it is obvious that even if, in a hypothetical scenario, the technical means to extract them almost immediately existed (instead of the 25 and more years required), they would not even be sufficient to cover, cumulatively, the domestic consumption for three years—as, in 2016, the later was over 90 million MMboe per year.

Putting things in perspective

As we have already noted from the first chapter, Greece is a developed capitalist country. As a result, it would be revealing to refer to some figures and data, in comparison, to put things in perspective. According to the most recent data of ELSTAT, in the first quarter of 2019: 466,000 or 12.2% of all workers worked in agriculture, forestry, fisheries, 11,500 or 0.3% in mining and quarries, and 27,700 or 0.7% of all employees in electricity, natural gas, steam, and air conditioning supply (ELSTAT, 2019). According to the World Travel and Tourism Council (WTTC), tourism's direct and indirect contribution to the GDP for 2019 amounted to €37.5 billion and 988,600 jobs (over 25%), while its growth rates reached 6.9% (GTP., 2019). Obviously, due to the pandemic, all the above have changed. Still, for our analysis, as we have already highlighted, the crucial factor was the situation as it appeared when the decisions were made. Moreover, tourism has a decisive impact on the current account balance as the spending of international visitors has the characteristics of an export activity. At the same time, during the 2009–2016 period, its contribution to tax revenues amounted to €53 billion, cumulatively (Karavitis, 2018).

In the SEA of Ioannina, it was explicitly mentioned that the research does not concern deposits of the size of Saudi Arabia but smaller than those of Prinos: "based on the existing data, the deposit of the "Ioannina" area that is under research is smaller than that of Prinos, but of the same order of magnitude," (NTUA, 2012, SEA, p.5). It was also mentioned that "Prinos has produced almost 120 million barrels, within 30 years" (ibid., p.5), while for the Ioannina lease, if the indications are verified, 50-80 million barrels are expected—i.e., half those of Prinos.

Therefore, for the areas where there is a deposits estimation, these are in a totally different order of magnitude compared to the propaganda of trillions of dollars—for example, "$5.42 trillion in Crete if the hypotheses are confirmed by the research, export for 190 years" (Foskolos, 2019), namely, beyond 2200! Specifically, for the Patraikos Gulf, the former CEO of HELPE Upstream estimated that the geological target to be explored by drilling in early 2020 was about 140 million barrels of oil equivalent (MMBoe) (Grigoriou, 2019), i.e., the same size as Prinos. He had also estimated that—provided that the forecasts were verified, international crude oil prices were at a certain level, and the pumping reaches 30,000 barrels per day, etc.—then the public revenues will reach €200 million per year (Filippou, 2018). Yet, as we will see in

the next paragraph, the amounts paid from today's oil extraction of a similar size (Prinos) are nowhere near that. As for Katakolo, the deposits are estimated at 10.7 MMBoe—i.e., 1/10 of Prinos.

According to the State Budget of 2019, the revenues from the mobile subscriber fees reached €195,000,000 per year, the revenues from the pay-TV fees were €21,000,000, from the environmental fee on plastic bag €11,000,000, from the provision of services by consulates €39,000,000, and from the European Maritime and Fisheries Fund (EMFF) €43,000,000. Is it possible for the public revenues from hydrocarbon extractions to reach the amount of mobile phone charges, or will they fall below the plastic bag fee?

Thus, as the discovered resources are too small, the question that arises is this: Why are large multinational corporation showing interest? The answer, from our point of view, lies in a variety of parameters. Firstly, as their obligations are minimum (see crisis, MoU's), they try to grasp every possibility of economically exploitable deposit, even with minimum preexisted data. Secondly, the broader geopolitical plans and strategies, in the competition for energy sources and routes and also the hybrid character of energy policies, lead them to develop investment planning simultaneously towards black and green growth. Thirdly, and most importantly, in order to protect their portfolios and capital returns, multinational groups carry out research in every possible location to secure exploration and exploitation rights and expand their portfolio of proven deposits. In this way, they present rights, licenses, and deposits in their annual account reports that affect the market value of their shares. In other words, even if exploitation is economically unacceptable and does not occur, the discovery of deposits directly affects, in the short term, the companies' financial figures and results. The above, combined with the accumulated investments in exploration and extraction technologies in conventional and non-conventional hydrocarbons and, at the same time, the prohibitions, prevention and/or depletion of resources in their countries of origin, lead them to explore any land available (of course with a minimum of signs and data) in other areas of the world.

The Mediterranean Sea, Greece, and deep sea…

We have already mentioned that in the case of Greece, several characteristics should make hydrocarbon extraction absolutely prohibitive. We will briefly refer to 3 crucial aspects concerning the spatial dimension—namely, its geographical position. The Mediterranean is a semi-enclosed sea surrounded by 22 countries. Over 150 million people (projected to reach 200 million by 2030) live in the coastal areas of the Mediterranean. About 1,600 cities of more than 10,000 inhabitants are located on its shores. The Mediterranean is the world's first tourist destination, with 300 million international arrivals (30% of the world for 2014), with 50% of them in coastal areas. One third of the world's merchant shipping crosses the Mediterranean. In addition, it is characterized as a "hotspot" both in terms of biodiversity and with regard to the characteristics of its marine ecosystems, as well as in terms of vulnerability to climate change impacts. So, in this semi-enclosed sea with hundreds of millions of people depending on it for their livelihood, with tremendous environmental pressure and pollution from the multitude of activities, more than 40% of its surface has already been granted or is destined for oil and gas extractions, with the pressure today being focused on the Eastern Mediterranean Sea (UNEP, 2017; EEA, 2015). Obviously, there is no need to comment on the risks involved in these plans.

In the whole of the Mediterranean Sea, for the 1999–2004 period, there were detected 9,299 possible oil spills (Ferraro et al., 2009, p.638). Thus, we understand that oil spills are an everyday phenomenon. In a 2002 study, it "has been estimated that up to some 100 000 tons of oil and oily waters enter the Mediterranean Sea every year due to operational pollution" (ibid., p.640).

Oil spills are connected with a variety of different reasons—e.g., accidents of cargo vessels such as collisions, explosions, and failures in platforms and pipelines, etc. According to an analysis of historical data regarding spills in excess of 100 tonnes (which is reliable due to the obligations of reporting spills of such quantities), Greece is the country with the highest number of such releases in the Mediterranean, between 1977 and 2010, accounting for 30% of the total amount (WWF, 2019).

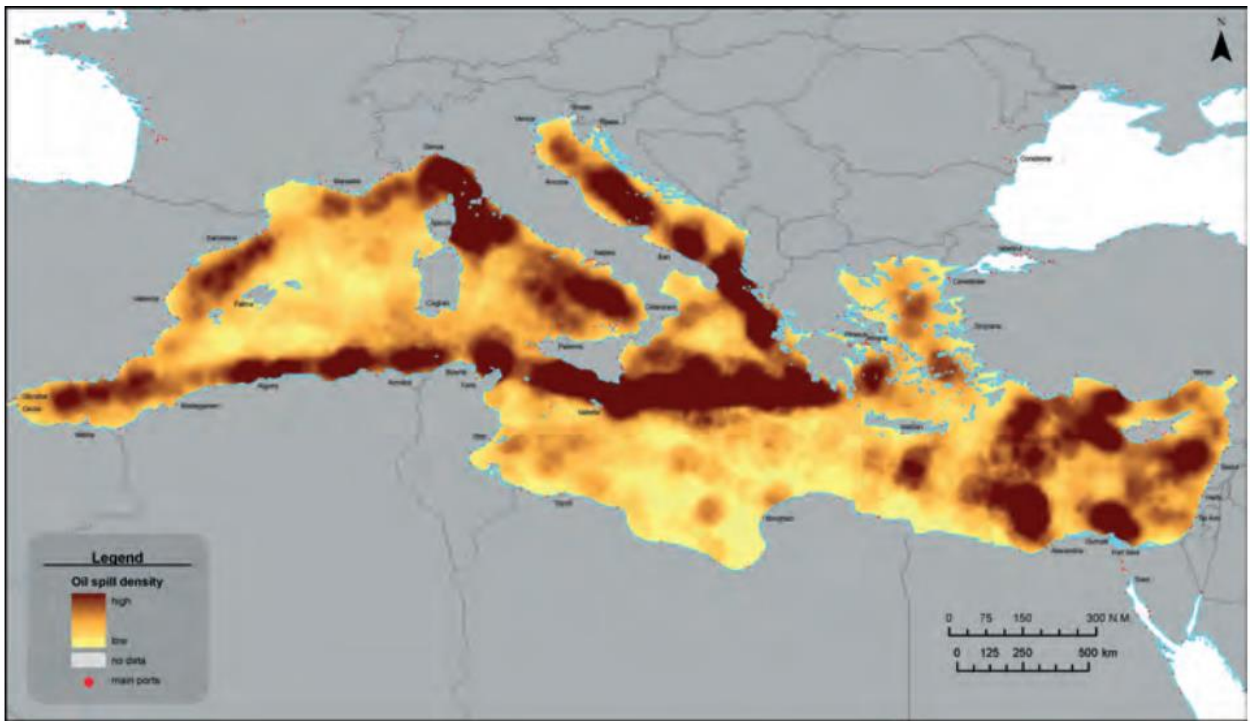


Figure 14: Oil spill density for the Mediterranean Sea during the 1999–2004 period (Ferraro et al., 2009)

Particularly in the case of Greece, a factor that has been silenced in recent years regarding hydrocarbon extractions is the fact that Greece has the highest seismicity in the Mediterranean and the sixth-largest in the world, mainly (though not only) due to the Hellenic arc. The main volume of the concessions is concentrated around that arc, precisely due to its “unique” geological structures. “From a geodynamics point of view, Greece and its surrounding areas constitute the most active region of the eastern Mediterranean and, indeed, of Europe” (Kassaras et al., 2020)

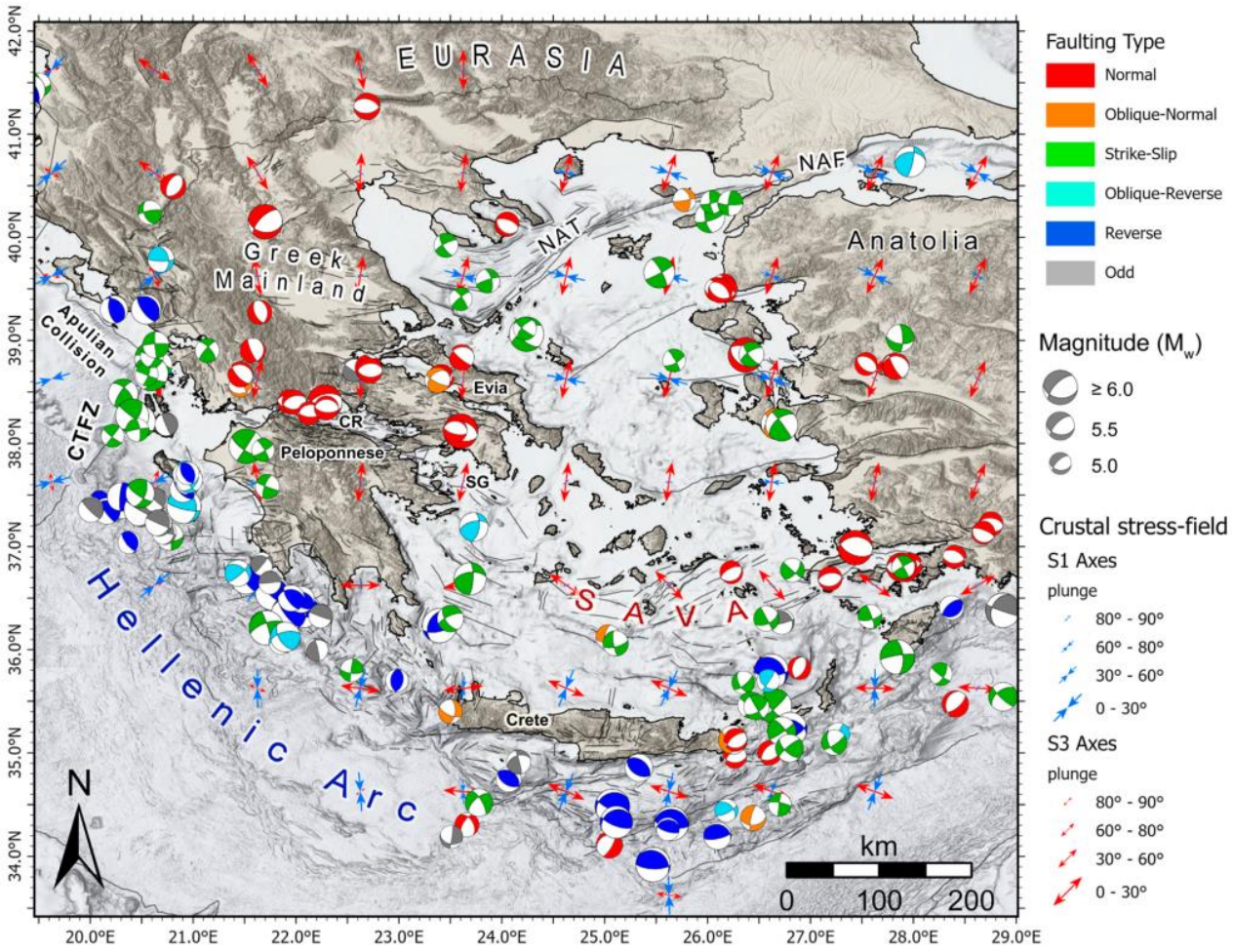


Figure 15: Summary map showing the main seismotectonic features of the Greek territory. Blue and red arrows indicate trend and plunge of the major (S1) and minor (S3) principal stress axes. Focal mechanisms with Mw ≥ 5.0 from the database of NKUA-SL are presented, with color corresponding to faulting type according to Zoback's classification criteria. CTFZ: Cephalonia Transform Fault Zone, NAT: North Aegean Trough, NAF: North Anatolian Fault, CR: Corinth Rift, SG: Saronikos Gulf, SAVA: South Aegean active Volcanic Arc. (Kassaras et al., 2020)

As it is obvious from the figure above the areas (offshore) included in the concessions present extremely high seismicity. Furthermore, the planned extractions (which are characterized as non-conventional, as the targets are located in great depths [deep-water extractions] and in high-pressure environments) have an increased risk of catastrophic accidents as well as of operational fails and deficiencies.

We have already mentioned that we consider ultra-deepwater extractions as unconventional. The latter is not the dominant view nowadays. Instead of arguing whether our perspective is justifiable, we will refer to four fundamental criteria in order to argue that such a

categorization is a matter of theoretical, historical, technological, and socio-economical interpretation. According to the IEA:

"Unconventional oil consists of a wider variety of liquid sources including oil sands, extra heavy oil, gas to liquids and other liquids. In general, conventional oil is easier and cheaper to produce than unconventional oil. However, the categories "conventional" and "unconventional" do not remain fixed, and over time, as economic and technological conditions evolve, resources hitherto considered unconventional can migrate into the conventional category" (IEA, 2013)

According to the U.S. Energy Department, "unconventional oils have yet to be strictly defined." As Deborah Gordon points out, "[i]n reality, new oils are emerging along a continuum from conventional crudes to transitional oils to unconventional oils, with their classification varying according to the ease of extraction and processing […] From extraction through final use, these new oils will require a greater amount of energy to produce than conventional oil." (Gordon, 2012).

Furthermore, according to Gordon:

> Unconventional oils tend to be heavy, complex, carbon laden, and locked up deep in the earth, tightly trapped between or bound to sand, tar, and rock. Unconventional oils are nature's own carbon-capture and storage device, so when they are tapped, we risk breaking open this natural carbon-fixing system. Generally speaking: the heavier the oil, the larger the expected carbon footprint. (ibid., 2012)

Therefore, having in mind that the classification is changing with the development of new technologies and methods of extractions and the ratio between conventional and former unconventional sources – socioeconomic factor – (cannot be characterized something unconventional if it accounts more than 50% of the total), the four main factors remain: a) the ease of extraction and processing and, hence, the carbon footprint, b) the cost (technologies, investments, transport, etc.), c) the target *"locked up deep in the earth",* and d) of course, the geological structure and the type of hydrocarbon. We think that ultra deep-water extractions should be categorized as unconventional hydrocarbons according to the above criteria.

Returning to Greece and the Eastern Mediterranean, the former President and CEO of HHRM, Yannis Bassias, pointed out that there is a significant difference between western Greece offshore and the Eastern Mediterranean—i.e., the fact that "water depths in the south Ionian Sea and South of Crete are much deeper […]This has an important technical and financial impact on exploration and production since it will demand long-term research, solid financial capacity, international technical experience and environmental awareness." (HHRM, 2020, p 16).

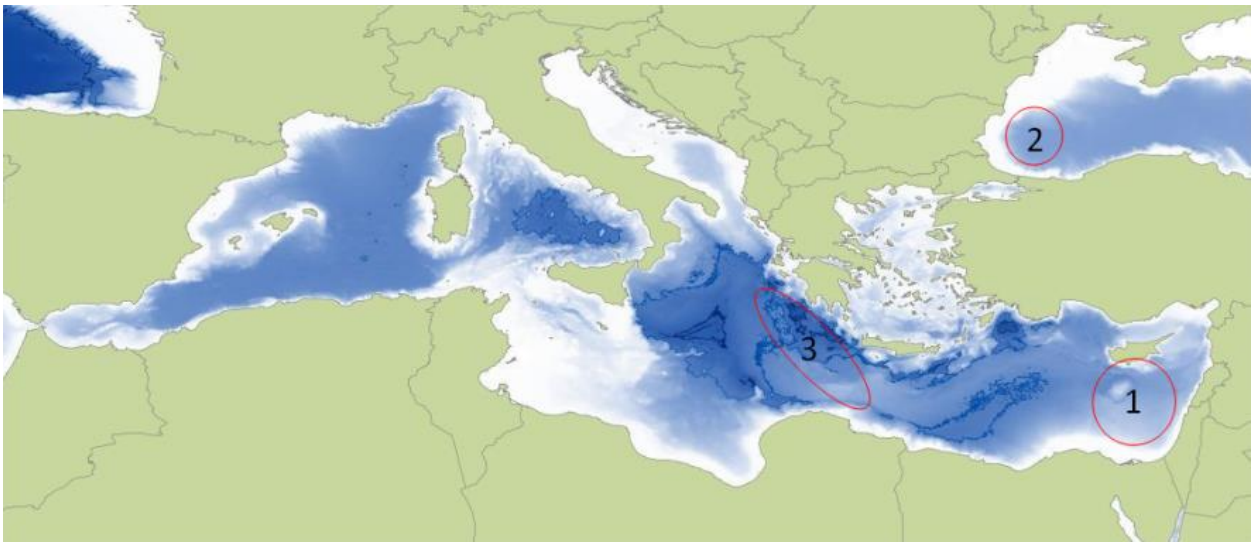


Figure 16: From 1 to 3, the average water depth increases from 1,600 meters (1: Southeast Mediterranean), to 2,000 meters (2: Black Sea), and 2,900 meters (3: Central Ionian Sea and West and South of Crete). Gas discoveries are on production (1), under development for production (2), and on the exploration phase (3).

In the literature, ultra-deepwater extractions are considered depths greater than 1,500 m or 5,000 ft (U.S.EIA, 2016; Cummings et al., 2014). Bassias emphasizes that offshore exploration for oil and gas in depths ranging between 2,500 and 3,500 m (which was impossible ten years ago) will place Greece on top of the newest technological application and offshore installations, as ultra-deep waters (below 3,000 m) are considered groundbreaking (HHRM, 2020, p 17). As a result, without a doubt, we can suppose that the increased risk that is associated with immature technological innovation and advances —which they will be applied and tested— will be investigated in the ultra-deep waters of the Ionian Sea and South of Crete in the years to come!

Finally, the Greek peninsula is characterized by a multitude of important and sensitive ecosystems (whether terrestrial or coastal and marine), which have various levels/degrees of

protection—a fact that is related to the geographical and geomorphological characteristics of the country (geographical position, intense anaglyph [whether mountainous or hilly], island complexes, extremely long coastline, etc.), as well as to the numerous monuments of cultural heritage. Concessions for exploration and exploitation of hydrocarbons affect more than 100 areas included in the National System of Protected Areas. WWF points out that *"[t]he* increased risk of oil spill in Greece, and its impact is pertinent due to the critical importance of the Greek landscape to biodiversity. There are over 400 Natura 2000 Network18 sites in Greece19, representing a coordinated network of protected areas for biodiversity and conservation. Furthermore, the Greek *peninsula* is a highly heterogeneous environment, hosting a high diversity of species and ecosystem types" (WWF, 2019, p.13).

Chapter 7: Conclusion and suggestions for further research

Conclusion

In conclusion, we will try to summarize the interconnections that hopefully emerged between this thesis's objectives, research questions, and theoretical framework on the one side and case study analysis on the other.

According to the level of abstraction and our research object, as it was described in the introduction, we tried to present several aspects of the Greek hydrocarbon extraction program, ranging from strategic, theoretical, political, legal, and regulatory issues to environmental, economic, social, and technical aspects, which we consider that contributed significant insights in the overall study.

The megaproject of hydrocarbon extractions constitutes a socio-technical system that, as Winner has identified, is in some sense inherently political. In addition, in the case of Greece, it required a social environment that would be not just compatible but, rather, structured in a specific way. It strictly required certain social and political conditions to be enforced as a dominant policy. That specific conclusion emerged through the analysis of the domestic political, socioeconomic, and institutional conditions that were established during (almost) the whole decade of crisis, MoUs and neoliberal experimentation which were implemented on an unprecedented scale characterizing an entire period.

There are also significant analogies with Hecht's seminal analysis of the nuclear program in France. In the case of France, technocrats took political decisions through technological design, while in the case of Greece, technocrats predicted and, at the same time, both persuaded and served political elites (in search for a similar "political project") with handy propaganda regarding enormous revenues, fast economic growth, geopolitical gains and an improved standing in international politics. Furthermore, another critical analogy for adopting such programs lies on the common ground concerning the common interpretation of public interest that horizontally connects extended parts of the political spectrum. For example, the hydrocarbon extraction program was strongly promoted both from the traditional right government of N.D. and PM A. Samaras but, at the same time, also from the alleged (at least in the beginning) radical left government of SYRIZA and PM A. Tsipras, who signed and ratified several lease agreements.

Indeed, former Minister of Environment and Energy G. Stathakis signed the Greek state's lease for the joint venture of Exxon Mobil, Total, and HELPE regarding the offshore area in the west and southwest of Crete, just ten days before the elections (Ethnos, 2019).

The characteristic mentioned above and the alignment of state, scientific and technological institutions, big corporations, local authorities, and mass media to "*act as one*" offered excellent stability to the project, even when essential parts of it collapsed.

For the emergence of the specific megaproject, they had to meet various factors and elements. This result was not a priori certain and neither constitutes a deterministic process based on sheer will and planning. To be more precise, many different elements-factors they had to be coordinated (aligned), as we have shown, and specifically the international crisis and the adaptation of the global, EU and US energy strategies (concerning fossil fuels and the financial crisis), the discovery of two massive natural gas deposits in the Eastern Mediterranean and, of course, the socioeconomic transformation of the Greek society through MOUs and the neoliberal experiment that was applied. All the above, along with the activation of a variety of forces (whether political, scientific, technical, financial or in the media), enforced an ideological framework that already existed. However, this time it was reinforced concerning a specific "*imaginary*" that spread in the society. As it was expected, that imaginary has its own degrees of autonomy. Specifically, from the time that extraction imaginary is connected, apart from the national wealth, public revenues, pension funds, and so on, also with the national antagonisms in the Eastern Mediterranean through EEZs which express "the sovereign rights for the purposes of exploring and exploiting conserving and managing the natural resources […]" (UN, 1982, Article 56), it became an organic part of nationalism's ideas, priorities, and political agenda, also connected with the military armaments program and so on. As a result, the abandonment of such programs could also be conceived as a "betrayal" of a specific imaginary and, hence, imply high political cost.

Examining the "*glass-boxing*" of the extraction program and, at the same, time trying to discern its extractivist aspects, we moved back and forward in time to shed light both on the necessary conditions and the impacts of such programs that have been analyzed in the relevant literature and, simultaneously, on the rapidly changing conditions in the third decade of the 21st

century that alter the energy framework and, in a way, are dismantling the established glass boxes of the past.

According to our hypothetical glass box (as demonstrated in Figure 1), we examined whether the promoted process of transforming the inputs into specific outputs is “accurate”. We believe that we have proved that it is not, as the outputs neither meet the promoted quantitative and qualitative characteristics nor are only those alleged and described but also many (or even primarily) others (various impacts and consequences). Furthermore, the seemingly transparent glass box, on the one hand, remains inaccessible to public understanding through its complexity of the various legal, scientific, technical, and political documents, agreements, etc. and, on the other, supports its performative function to serve its objectives; mainly to persuade through a standardized and “*black-boxed*” work of experts for the reliability of the alleged transformation. However, when this performance collapses in public sight, either because of the fact that several companies are withdrawn from various fields or due to the fact that the Greek Minister of Foreign Affairs Nikos Dendias, in official speech, supported central arguments of the anti-extractivist movement (see "Something has changed or not?"), nothing in the “glass box” framework promised those possibilities. Now it is revealed that with the same inputs, the outputs were not secured, were depended on several factors beyond sight. Hence, the "*glass box*" is starting to be dismantled and to reveal elements behind its performative "nature" or its "*semitransparent*" walls. In terms of political and social legitimacy, the extraction program is seriously affected.

Another critical issue that we have to keep in mind is that, apart from the propaganda of enormous revenues from imaginary deposits, the combined process of the financialization of natural resources, land dispossession, and land grabbing has a significant role in today's corporate methods of resource exploitation.

Finally, it is argued that the apparent contradiction between climate change mitigation and fossil fuels extractions does not constitute an actual antithesis on the dominant socioeconomic framework. On the contrary, it forms a functional antithesis as it is "resolved" on a different level: that of constant growth, profitability, and economic efficiency imperatives, intermediated by market mechanisms. The specific element becomes "tangible" by analyzing, inter alia, the flow of investments over time that determines the energy efficiency of alternative

technologies, the energy transition path, the corporate master plans, etc. In short, the climate crisis is primarily the result of these dominant factors, priorities, and values and not of political mistakes, wrong estimations, or lack of political will.

Limitations and suggestions for further research

The thesis design, per se, determined the limitations of the analysis in several ways. Following our assumptions and our level of abstraction, we tried to examine our theme from several aspects to offer, as far as possible, a complete and integrated approach. Instead of focusing on general descriptions and assumptions, we tried to examine extensive research material, often emphasizing specific facts that we found crucial for our analysis. However, it was not possible to review and discuss in detail several elements that we think are particularly interesting. For instance, a comparative, detailed analysis of legal documents like lease agreements, regulatory frameworks, domestic, international, and EU legal frameworks would be quite interesting. In addition, a study focused on the development of ultra deep-water drilling technologies in the case of the East Mediterranean—taking into account the related risks and the possible irreversible impacts both socially and in the local ecosystems—would be pretty useful.

An issue that could also be studied from an STS perspective is the relation between public opinion and the mass media regarding hydrocarbon extractions. An analysis—both quantitive and qualitative—of media coverage, supported by a questionnaire focused both on targeted groups—i.e., engineers, economists, social and environmental scientists—as well as the general public, could result in valuable findings.

Last but not least, the present thesis does not make any reference to social movements and political activists or to the few exceptions of academics and officials that opposed the hydrocarbon megaproject. Although that the struggle did not finish yet, and the corresponding positive developments are not a direct result of the movement against hydrocarbon extractions, we think that a study exclusively focused on these processes and efforts, namely to stand against a megaproject like that —scientifically, technically, ideologically, locally and socially with all the different elements, dimensions even the contradictions that such an effort entails—, would be essential for future analysis.

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