Department of Environment and Geography

University of York

Assessment Submission Cover Sheet 2018/19

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Environmental and socio-economic impacts of an offshore gas development in the Romania Black Sea

1. INTRODUCTION

Over the last 50 years, there has been an increasing pressure for the exploitation of energy resources, due to a rise in energy needs (Elbisy, 2016). The rise in demand has stemmed from an increasing human population and energy being an essential service that is required to ensure that basic human needs are met (Endhofer et al., 2011). It is these demands that have led to the exploitation and exploration of non-renewable energy resources being a global industrial activity (Cordes et al., 2016).

The demand have also led to the exploration of gas reserves in deep seas, where vast amounts of natural gas are stored. There is now around a quarter of the worlds gas supplies being produced offshore, with gas output rising by 50% since 2000 alone (IEA, 2018).

Many countries within the EU receive their gas supplies from Russia, with 50% of Europe's gas supplies shipped through the Ukraine (Godzimirski, 2014). However, in recent years many European countries are moving away from importing natural gas from Russia, as Russia stopped delivering gas to the Ukraine in 2015 (Yapici, 2015). This change lead to the risks in energy security throughout Europe.

Although many European countries rely on gas supplies from imports, Romania is largely energy independent and has not needed to import natural gas since 2015. This makes Romania the third most successful country in the EU and has a dependence rate of 22.7% (Yapici, 2015). Additional to its large on land natural gas reserves, recent exploration of deep-sea gas reserves has revealed that there is natural gas reserves with an estimated capacity of around 42 to 84 billion cubic metres (Yapici, 2015).

Therefore, offshore gas reserves found in the Romania Black Sea could play a vital role in ensuring energy security in Central and Eastern Europe, as well as the possibility of Romania being an energy transit state (Yapici, 2015). Additionally,

exporting gas supplies to other EU countries can be identified as an opportunity to create revenue for the Romanian economy as well as increased interdependence.

2. PROPOSED PROJECT

Rising consumer demand for energy and the need for energy security across Europe has led to the proposal of a multibillion Euro development in the Romania Black Sea. Although at this stage of the proposal the operator is unknown, the basic location of the proposed development can be seen. A large acreage of deep sea has already gained its license, so the development will occur in one of those areas (**Figure 1**), but in which area of that licensed acreage the exploration will occur is fully dependant on the owner and operator.

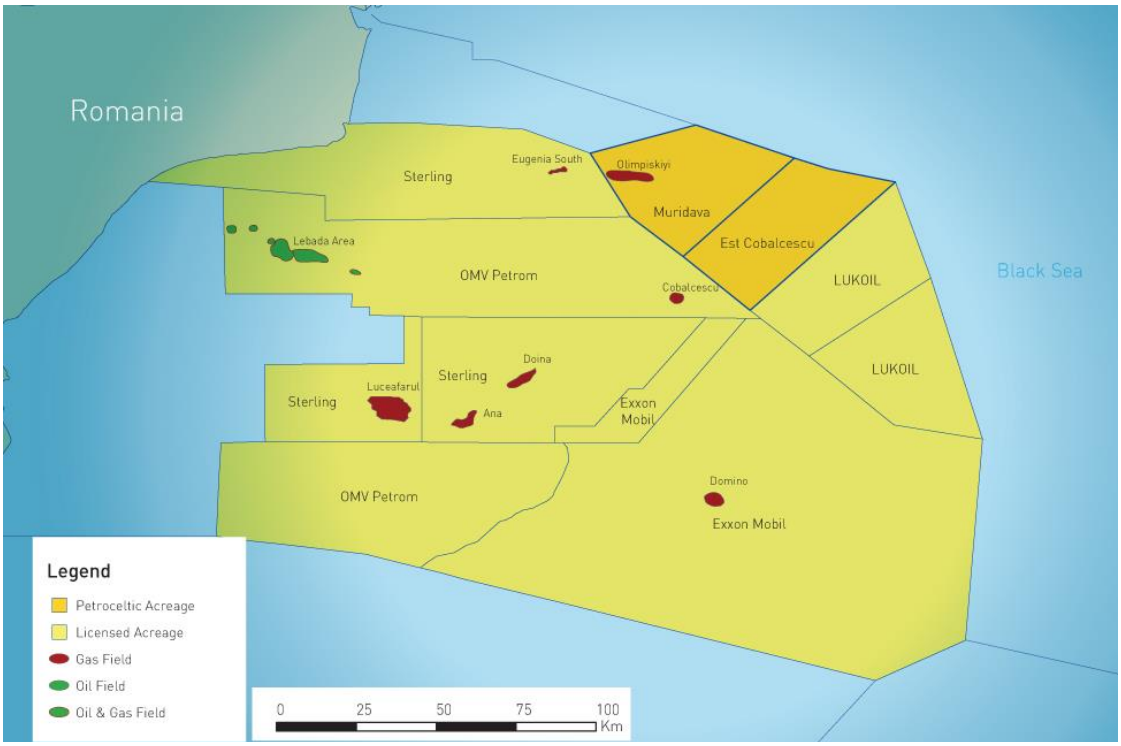

Figure 1. Known gas fields in the Romania Black Sea and the licensed acreage for exploration (Source: Petroceltic, 2013)

Based on other offshore gas drilling projects the one in the Romania Black Sea is likely to include the following infrastructure (BP, 2010; ERM, 2018):

- Artificial platform
- Drilling vessel
- Exclusion Zone
- Onshore logistics base
- Gas export pipelines

It is important to mention that other infrastructure may apply, depending on the design and location of the well.

This review will consider the environmental and socio-political aspects, which will most likely be impacted upon by the exploration, production and decommissioning stages of the proposed project. In this review, the statutory requirements that need to be take into consideration will be identified.

3. STATUTORY REQUIREMENTS

As partial funding is coming from the European Bank for Reconstruction and Development (EBRD), it is important that the project is designed and complies with the 10 performance requirements that cover all aspects of a project (**Table 1**). The aim of performance requirements is to ensure that clients are complying with the international practices of sustainable development.

Table 1 EBRD Performance requirements that have to be complied with

Performance requirements	Aim of requirement
Assessment and Management of Environmental and Social impacts and issues	Establishes the importance of assessment to identify environmental and social impacts. It outlines the responsibilities of the client in assessing the potential social and environmental impacts during the development
Labour and Working Conditions	Recognises that the work force is valuable asset and that a client is complying with national labour and health and safety laws.
Resource Efficiency and Pollution Prevention and Control	Acknowledged the threat to the environment that increased urbanisation may have. It acknowledged the best available technique in resource use, prevent, and control of pollutants.
Health and Safety	The importance of avoiding/mitigating adverse health and safety impacts.
Land Acquisition, Involuntary Resettlement and Economic Displacement	Ensure land rights are acquired through negotiated settlement, and projects will consider alternatives to avoid displacement.
Biodiversity Conservation and Sustainable Management of Living Natural Resources	Achieve conservation of biodiversity and sustainable management using a precautionary approach and adopting the mitigation hierarchy where appropriate.
Indigenous People	Applies when a projects is likely to affect indigenous people. Action will be taken to ensure that as little disruption as possible occurs. Clients may want to seek legal advice.
Cultural Heritage	Protect cultural heritage through mitigation or avoidance using the precautionary approach in the development plans
Financial Intermediaries	Enable FI's to manage any potential environmental or social risks and promote good practice
Information Disclosure and Stakeholder Engagement	Importance of open and transparent engagement between client, workers and local communities.

There are also several European Legislation currently inforce which will need to be considered and complied with during the proposed project (**Table 2**).

Table 2. EU legislation that is currently enforced and must be complied with when building and operating offshore gas exploration in the EU

EU Legislation
Environmental Impact Assessment Directive (2014/52/EU)
Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora
Council Directive 2009/147/EC on the conservation of wild birds
Marine Strategy Framework Directive
Directive 2006/113/EC on the Environmental quality of shellfish waters
Directive on Safety of Offshore Oil and Gas Operations (2013/30/EU)
Prospection, Exploration and Production of Hydrocarbon Directive (94/22/EC)

During the building and operating process of the project, it would be beneficial to engage with different stakeholders. This will include the regulator, statutory consultees and the stakeholder organisations.

4. ENVIRONMENTAL IMPACTS

The exploitation of offshore gas reserves as proposed in the Romania Black Sea could potentially have detrimental effects for the environment. It is likely that environmental effects will occur in the exploration, production and decommissioning stages of the project (Cordees et al., 2016). However, the seriousness of the threat to environment at each stage is dependent on a variety of factors including the surrounding environments sensitivity and nature (Elbisy, 2016). This review will focus on the specific environmental aspects that are at risk.

4.1 Marine Environment & Ecology

The principle problems that will occur in the marine environment, are related to the offshore platforms used for exploration and the waste streams that occur (**Figure 2**). These waste streams include drilling fluids, cuttings, treatment chemicals and the produced water (Manoukian et al., 2010).

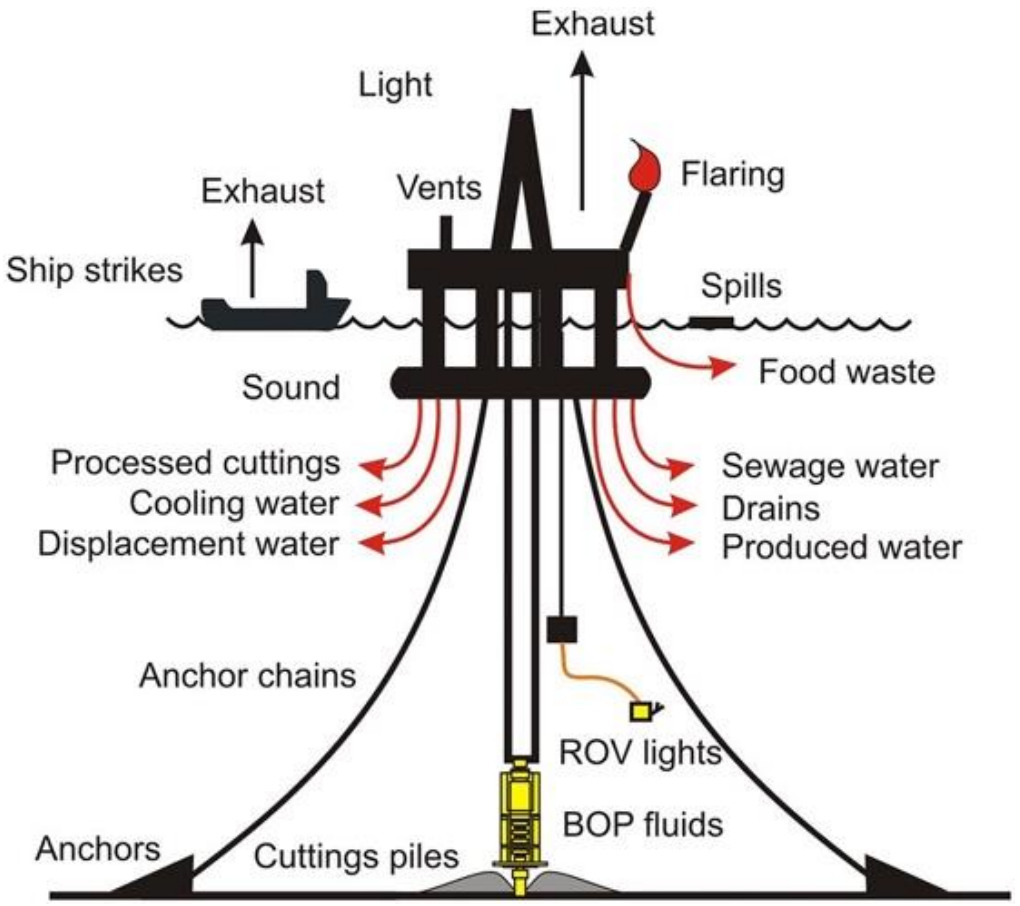

Figure 2 Potential outputs to the environment during the drilling process. (Source: Cordes et al., 2016)

After the drilling process has occurred, drilling waste consisting of drill mud and crushed rock cuttings is left behind. The drilling mud that is injected during this process will vary throughout the wells (Bakke et al., 2013), however all drill mud left behind is likely to have a negative impact on the marine environment. It is possible that the drill mud will significantly affect the ability for macrofauna to recolonise, due to the aromatic hydrocarbons that are not removed (Bakke et al., 1986b).

Cuttings piles, deposited during the drilling process, may also pose as a possible threat to the marine environment, as they have been found to be resistant to chemical change (Breuer et al., 2004; Hartley et al., 2003). It has been studied that only physical disturbance from platform activities and trawling disperse the material (Bakke et al., 2013). However, this continued erosion could be the cause of continuous contamination, as the more the deeper layers of cuttings are revealed the more leakage of possible contaminants (Bakke et al., 2013).

Production water has been linked to particular environment concern due to it often containing dispersed oil, alkylphenols, aromatic hydrocarbons and heavy metals (Neff et al., 2011). The production water released into the ocean waters usually contains organic material, organic acids and often has high levels of sulphur and sulphide (Bakke et al., 2013). The large volumes of chemicals that are released through production water may pose as a threat to fish, as alkylphenols have been seen to effect reproductive parameters such as gonadal development (Meier et al., 2007).

In relation to the area that is going, to be used for the project it is relatively small compared to the overall area that is inhabited by marine life, although it is still essential to take into consideration all possible impacts that the project will have. Fish and marine mammals are likely to be affected by different processes of the project. They are most likely to be affected by the noise that occurs from the seismic surveys during exploration, the sediment deposition from drilling and construction, the increase of maritime traffic during the production and construction stages, and collisions with vessels was constructed (Carroll et al., 2017; Moore et al., 2012).

Although fish can be effected by the activity of the project, fish can also see the drilling platforms as artificial reefs (Fabi et al., 2004). Although this may be beneficial to fish populations, they are easier targets to prey, especially to birds who nest on the platforms above (Ronconi et al.,2015).

4.2 Birds

There are a number of birds present on the Romanian Coast that reside there for breeding, feeding or passage purposes. The proposal of offshore gas exploration could cause a variety of direct and indirect impacts on these birds. There could potentially be a rise in the number of bird mortalities due to the collision with offshore platforms and the exposure to flares (Ronconi et al., 2015).

There is also the potential for birds to be negatively impacted upon by the release of produced water or potential spills/leakages. The oil released in produced water creates a sheen, which ultimately effects the structure and the use of their feathers. The potential consequences of this occurring are mortality in the bird as they cannot regulate and maintain its core internal temperature.

It is also important to consider that offshore platforms may interrupt with migrating birds flight paths, although the offshore platforms may provide as temporary resting location during migration periods (Russell, 2005).

Although the project is likely to cause disruption to birds' natural environment, the platforms will also provide sea birds with different roosting and nesting opportunities (Ronconi et al., 2015). This is a particular benefit to gulls, who prefer to roost somewhere where they have access to on and off water resting during the night (Burke et al., 2012).

4.3 Protected areas

There is the potential for the proposed project to impact upon protected areas whether it marine or terrestrial. Although the exact locations of the project and the potential pipelines are unknown, it is likely that disturbance to habitats and species

will occur. This disturbance is most likely to occur due to increased vehicle traffic, maritime traffic and the destruction of habitats when pipelines need to be added. There are a variety of national parks, nature reserves and scientific reserves located

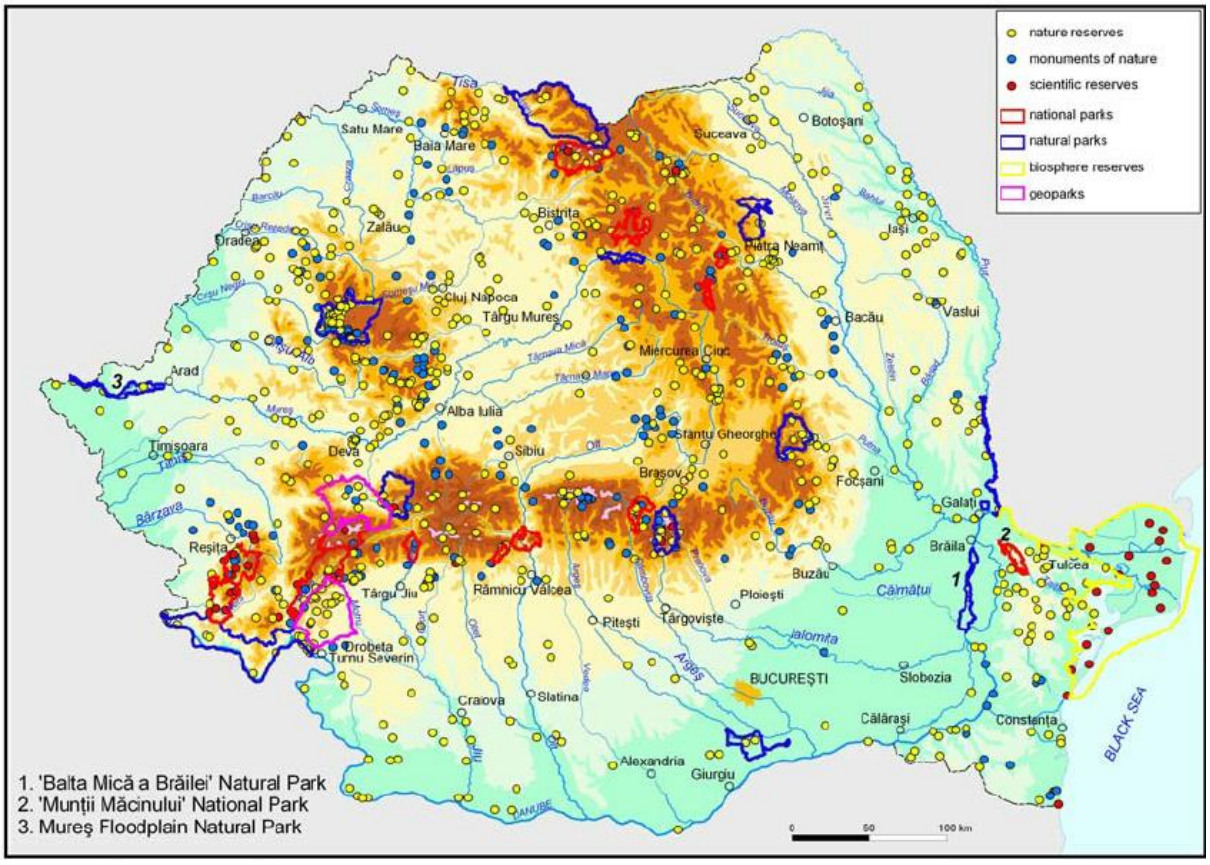

Figure 3. Protected areas in Romania that have the potential to be negatively impacted upon by the proposed project. (Source: Dumitraşcu et al., 2010)

through Romania that may be affected by the potential destruction and activity (**Figure 3**).

5. SOCIO-ECONOMIC IMPACTS

5.1 Commercial fishing and Trade

Seismic surveys used for testing have the potential to disrupt fishing patterns, due to certain fish's sensitivity to noise. Fishermen all over the globe have complained about the impacts that it has on captures as they are often finding that catch numbers reduce significantly (Prideaux & Prideaux, 2016). This lack of fish and lower catch levels has a knock on effect and in turn impacts the price of the fish as well as fishermen spending more time at sea in order to the same amount of catch levels as

they did before the surveys. Throughout the proposed project it would be beneficial to consider the fishing grounds during the construction period, particularly there is going to be an increase in vessels.

The increase of vessels will not just effect fishing but will also impact shipping routes. There is the potential for the project to cause temporary disturbance to the current routes of ships and cargo that pass through the Black Sea. Temporary disturbance is most likely to occur in the West of the Black Sea, not only because this is where the proposed project is to be located but also because this is the area with the highest density for maritime transport.

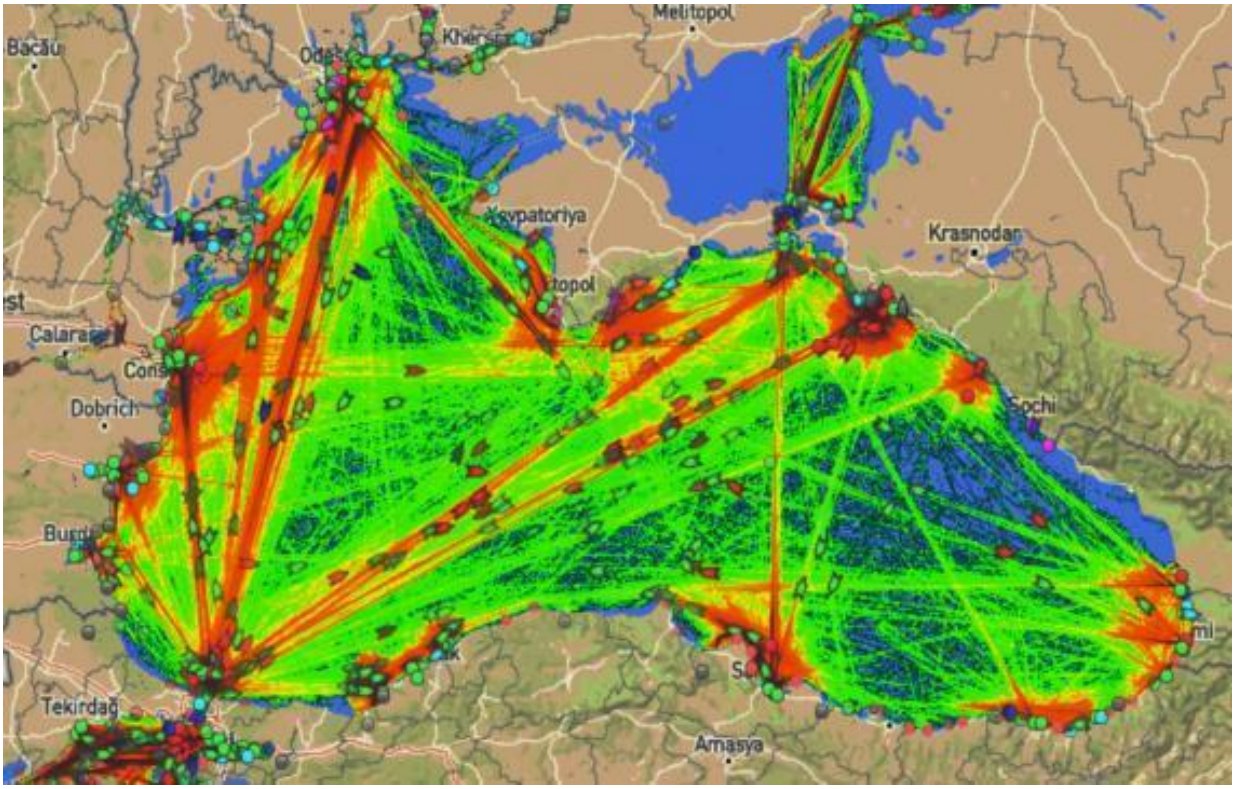

Figure 4. Maritime transport routes of the Black Sea, where Red=High Density, Yellow=Medium Density, Green= Low density (Source: Rata et al., 2017).

5.2 Traffic

Traffic is likely to increase on the roads throughout Romania. This can have the potential to increase noise and cause disruption to traffic flows. Increased traffic puts pressures on existing roads, which potentially will lead to them being replaced. Some roads may not be suitable to drive on with heavy loads so this should be taken into consideration when transporting. However, the increased traffic on roads throughout Romania will only be during the construction and decommissioning stages with little to no traffic being during the production phase.

5.3 Employment

With a new development like the one proposed, there is the potential to create and maintain jobs. The jobs created will be through direct, indirect or induced employment, with an expected 30,605 jobs in total due to offshore projects. Direct jobs are all those that are generated during the construction, production and, maintenance stages. Indirect employment is all the jobs created in transportation, the service sectors and the mining of any raw materials, whilst induced employment is the employment that occurs form the employees in the direct and indirect employment spending their wages on every day, essential goods such as food. This process of employment creates benefits not just in the project and the sectors involved with the project but with the wider economy. A breakdown of the impact of offshore projects in the Romanian labour market is explained in **Figure 5**.

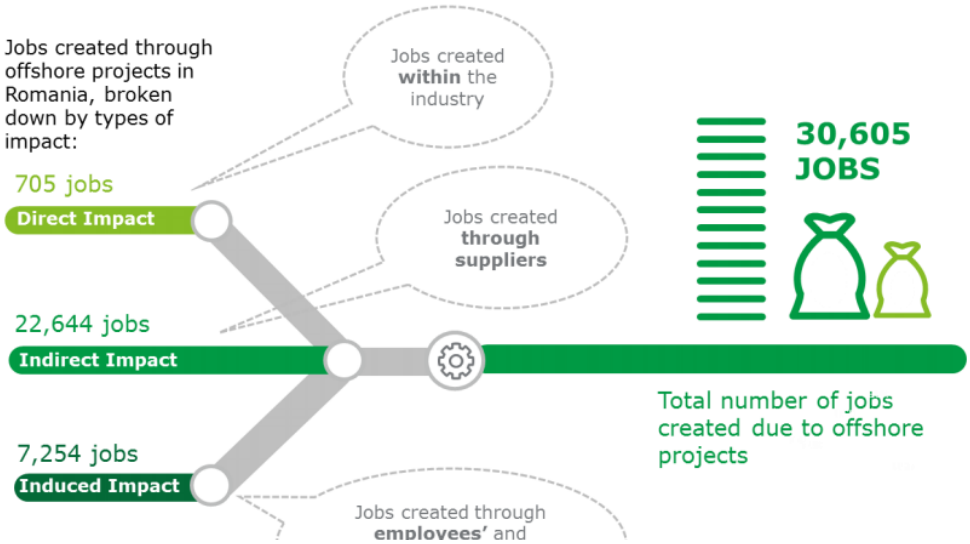

Figure 5. Breakdown of the impact of offshore projects on the Romanian labour market (Source: Deloitte, 2018)

5.4 State Revenues

The proposed project has the potential to not only increase employment throughout Romania, but also the potential to produce up to 26 billion USD in state revenues (Romanian Insider, 2018). Public revenues will also be increased as jobs are created and higher wages are paid as a result of the offshore project. This could potentially lead to a figure of 11.9 billion USD of the state revenue through tax contributions (**Figure 6**).

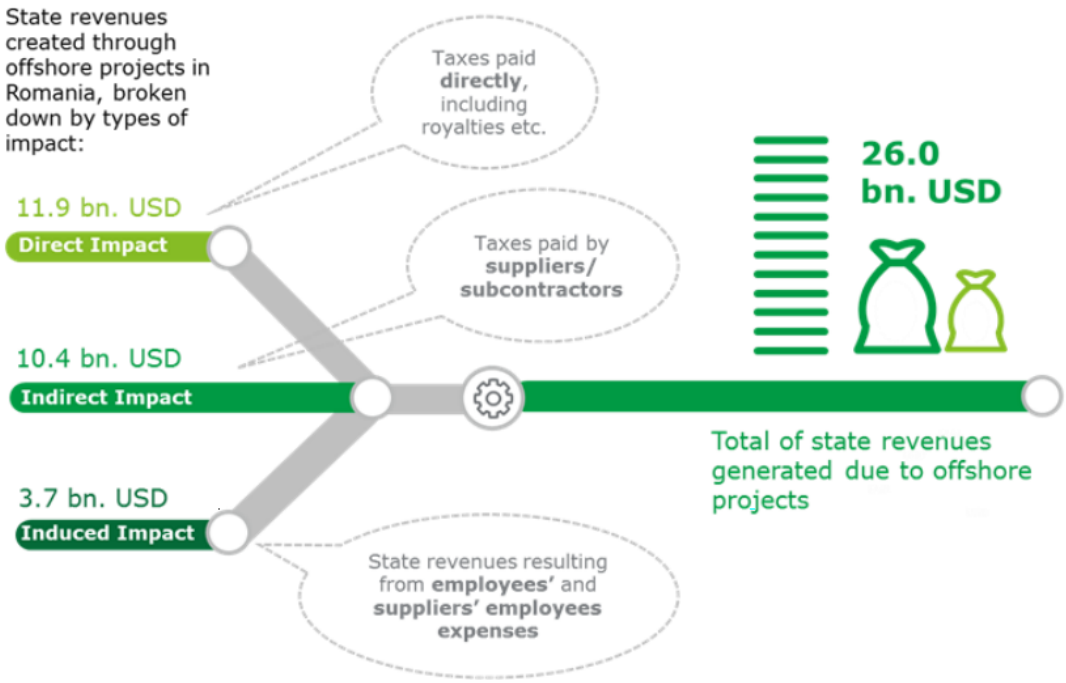

Figure 6. Inputs to state revenue due to the proposed offshore development. (Source: Deloitte, 2018).

6. MITIGATION

For environmental impacts, mitigation methods may include selecting a site that aims to avoid adverse environmental impacts, but at the same time, ensuring the project is a success. It will also be worth looking at different platform structures with the aim of reducing seafloor disruption. The construction phase should take into consideration the breeding periods of birds, fish and marine mammals and avoid construction during the breeding seasons where possible.

In terms of socio-economic, mitigation methods may include consulting with stakeholders and the public so they feel involved with decisions made. In relation to the fishing industry, fishermen should be kept informed of all processes occurring during the project so that they are aware if any type of activity might affect fish stocks. It may also be beneficial to consider the access restrictions that the project may have on the fishing and maritime industry. It would also be worth mentioning the financial benefit that will come from the project such as income into the country through exports but also the jobs that will be available. This could potentially improve local livelihoods and reduce some of the negative stigma surrounding the project.

7. CONCLUSION

Overall it is essential that the economic benefits that come with offshore gas exploitation are weighed against the potential for environmental harm (Elbisy,2016). There are legal requirements that should be complied with before work on the project starts to prevent significant environmental effects from occurring. The information gathered throughout this review could be used to support the development, as the most significant environmental, social and economic impacts have been discussed.

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