CYNERGY®

CYNERGY PROJECT- ACTIVITY 2
CYGAS – FSRU JETTY
VASSILIKOS CYPRUS

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Consultant	Approval Status ☐ 1 – Approved ☐ 3 – Not Approved Date: ☐ 2 – Approved except as noted ☐ 4 – For information only
Client	Title ***Environmental Impact Study (ΜΕΕΠ) for the Construction of a new Jetty that will host the permanent berthing as well as the loading/ unloading operations of a Floating Storage Regasification Unit (FSRU) and of Liquefied Natural Gas Carriers (LNGC) and the inland supporting infrastructures in the framework of the Project of Common Interest (PCI) Removing Internal Bottlenecks in Cyprus to end isolation and to allow for the transmission of gas from the eastern Mediterranean region (CyprusGas 2EU) – NON-TECHNICAL EXECUTIVE SUMMARY***
Document No.	
EGM Document No.	

00	November 2018				Issued for Approval
Index	Date	Drawn	Checked	Approved	Details of Revision

NON TECHNICAL DESCRIPTION

Introduction

The objective of the present study is the assessment of the Environmental and Social Impacts deriving from the construction and operation of the project: Construction of a new jetty / trestle that will host the permanent berthing as well as the loading/ unloading operations of a Floating Storage Regasification Unit (FSRU) and of Liquefied Natural Gas Carriers (LNGC) in the region of Vasilikos, in Cyprus.

The study identifies the existing environmental situation in the region, presents data of the natural and anthropogenic environment and investigates the pressure exerted on the environment by the activities taking place in the area. A detailed technical description of the project as well as of the examined alternatives is presented, in order to identify the potential impacts as well as the mitigation measures to the anthropogenic and natural environment, both for the construction and the operational phase. In addition, the supporting studies used for the preparation of this EIS are presented in the study's annex. Particular emphasis has also been given on Safety Issues, presented in the Hazard Identification Study (HAZID) and in Quantitative Risk Assessment Study (QRA), where the impact of the project during the operational phase for various accidental or non-accidental disaster scenaria is examined, prepared by the Lloyds Register.

Short Description of Alternative Solutions

Four (4) alternatives were examined regarding the site selection for the project as well as the construction technologies.

Aiming at the selection of the optimal solution, the examined alternatives are:

- Alternative 1

The first alternative examined the possibility of permanent berthing of the Floating Storage and Regasification Unit (FSRU) to an existing berthing position at the jetty belonging to VTTV

- Alternative 2

The specific alternative concerns the construction of a jetty/ trestle, which will serve the permanent berthing as well as loading and unloading operations of the FSRU and LNG Carriers (up to Qflex type)

This alternative constitutes the proposed solution.

- Alternative 3

This alternative is similar to the previous one. However, instead of the construction of the trestle, the construction of an underwater gas pipeline leading to a central loading and unloading platform is considered, where the permanent berthing of the FSRU and LNGC is being serviced as well as their loading/ unloading operations.

- Alternative 4

This alternative relates to the construction of an underwater gas pipeline leading to a single point mooring (SPM) for the ship, which will serve the permanent mooring as well as the loading/ unloading operations of the FSRU and LNG Carrier (Qflex).

Project Overview

The proposed works include the construction of a new jetty / trestle that will host the permanent berthing and mooring as well as the loading/ unloading operations of a Floating Storage Regasification Unit (FSRU) and of Liquefied Natural Gas Carriers (LNGC) in the region of Vasilikos, in Cyprus. All inland facilities related to the transfer of LNG from the FSRU unit to the plant belonging to Electricity Authority of Cyprus, are also included.

The jetty is located west of the main breakwater of Limassol Port – Terminal 2 (Vasiliko), at a distance of about 1,3km. The trestle runs offshore in a North – South direction for 752 meters before turning south-west (220^{o} N) for 436 meters to form the FSRU berth, where near its end the central loading platform and the berthing position of the ships are constructed. The berthing position includes breasting and mooring dolphins. It is noted that the specific jetty arrangement is also foreseen at the approved strategic plan for the development of the Vasilikos Energy Centre.

Main Environmental Impacts

The main environmental impact of the project is positive and concerns the drastic reduction of pollutant emissions due to replacing the use of heavy fuels with environmentally friendly natural gas.

The main negative environmental impacts are limited and are related to marine flora and fauna disturbed by construction work (sediment suspension / transfer and water turbidity) and the navigation and mooring of vessels at the operational stage.

The environmental impacts on the **natural** and **man-made environment** that may be caused during the construction and operation of the project concern the following:

Soil: The impacts on the morphology of the area in the marine environment during the construction, are expected to be limited, as the project mainly concerns the construction of a pipeline on a jetty / trestle and the permanent berthing of a Floating Storage Regasification Unit (FSRU) in the region of Vasilikos***.***

The jetty / trestle during the operational stage, is not expected to cause any negative impact on the soil quality given the proper design (e.g. before the construction all the necessary studies will have been undertaken) and the appropriate construction methods (selection of the suitable construction materials etc.).

Atmosphere: Emissions of gaseous pollutants are low and dispersed in a large marine area. Therefore, the dispersion of gaseous pollutants will involve negligible concentrations inland.

According to the results of the atmospheric model, the SO2, NOx, CO emissions as well as the particles produced by the FSRU will not affect the air quality as the produced quantites are much lower than the permitted levels. Consequently, during the operation of the proposed project no impact is expected at the atmosphere of the land area close to Vasilikos port.

Water Resources: The water resources of the study area may be affected during the construction phase, mainly because of the floating means (barges) that will be used. Also the surface waters will be affected in the case of an accident involving uncontrolled spillage of fuels, lubricants or and by-products of construction works. The impacts on water resources during the operation phase of the project are expected to be mild and reversible by taking appropriate measures.

Noise: The noise generated during the construction phase will only come from the installation of the jetty, the pipelines and the rest of the system equipment.

It is generally noticed that the noise level from the LNG terminal is low at a distance of more than 1km, therefore the acoustic environment in the inhabited terrestrial areas will not be burdened, under normal operating conditions.

Coastal Processes: No impact is expected from the construction and operation of the Floating Storage Regasification Unit (FSRU). The jetty / trestle and the FSRU do not transform the wave and hydrodynamic field, or the littoral processes, and therefore no impacts are expected in the coastal zone.

Flora - fauna: No significant negative impacts are expected during the construction and operation phase of the project in the flora and fauna of the land area, due to the fact that the project is mainly constructed in the marine environment. In addition, industrial facilities (EAC – Vasilikos power plant, VTTV tank farm and jetty, Cement factory etc) are already located in the area of consideration.

Marine ecosystems: The effects of water discharge on the marine environment are limited in a small area close to the works. During the operational phase, the water temperature will vary by 0.75^{o}C at a distance of 155m from the FSRU's water discharge point.

Land use: No impacts on the land uses are expected during the construction and operation phases of the project.

Natural resources: The proposed projects will not cause any increase in the rate of use or depletion of any renewable or non-natural resource during the construction and operation phases.

Transportation - Traffic: During the construction phase, there will be a slight increase in the traffic load on the road network of the study area due to the use of vehicles and machinery. The temporary increase in road traffic in the study area is considered to be of minor importance and the impact will be reversible.

During the operational phase, the number of ships which unload Natural Gas in the area of Vasilikos will be increased, while the number of the ships that discharge other liquid fuels will be reduced. Increased traffic is not expected to have a significant impact on navigation, since the position of the jetty does not affect the navigation of the rest of the ships.

Economy - Employment: The construction and operation of the project will create new direct and indirect jobs for the local population, cooperation with local companies and professionals of various specialities.

The proposed project has significant positive effects on the economy and employment during its operation phase.

The main positive impact on the environment is the significant reduction of emissions of gaseous pollutants (SOx, NOx, PM10, CO2), due to the change in the fuel use from petroleum products to Natural Gas adopted by the Electricity Authority of Cyprus plant.

- **Mitigation measures**

For the examined categories of anthropogenic and natural environment, the corresponding mitigation measures are proposed. The most important mitigation measures for each category are briefly presented.

Soil: The required measures for soil protection against sources of pollution during the construction phase of the project under consideration are directly related to the mitigation measures of liquid, solid and hazardous waste. Such are:

- Collection of used materials and waste and their disposal in approved appropriate sites
- Hazardous waste will be collected separately and will be disposed by licensed operator for the management of hazardous waste.
- The mineral oils used by the construction site equipment will be collected in containers and will be disposed in accordance to the provisions of Cypriot legislation
- Measures to prevent oil spills from leaks, negligence, etc., and take appropriate action to minimize such incidents.

Regarding the management of excavation and aggregate materials in general, the following are proposed:

- Secure disposal of unused excavation materials
- Reuse of surplus aggregate material or disposal of them in approved areas upon request of the Competent Authority.

During the **operational phase** of the project mainly urban solid waste is expected from the staff, which will be collected in containers, with final disposal in appropriate sites by the competent department.

Atmosphere: In order to reduce the impact on the atmosphere during the **construction phase,** the equipment and machinery to be used must comply with the existing emission standards for gaseous pollutants, meet the manufacturer's specifications and be regularly maintained.

During the **operational phase** of the project, effort is being made to reduce the emission of gaseous pollutants and the MARPOL Convention on atmospheric emissions from ships' engines applies.

It is also necessary to regularly check and maintain the power generators in accordance to the manufacturer's specifications in order to ensure optimum combustion conditions in the facility's generators.

Finally, it is recommended to carry out periodic measurements (every six months) of the main pollutants from the combustion of natural gas or petroleum (nitrogen oxides, carbon monoxide, sulphur, particulates) in the exhaust duct of the generators' exhaust gas.

Water Resources: In order to reduce the environmental impact on water resources during the construction phase of the proposed project, the following are proposed:

- Particular attention should be paid to the disposal of by-products in the environment.
- Any toxic and hazardous waste, excavation and aggregate materials should be properly handled and the sewage disposal at sea and at the surrounding area should be in compliance with the applicable legislation.
- Applicable law applies relevant to any accidental leakage at the construction site.
- Proper management and maintenance of construction materials and machinery within the defined area of the construction site.
- Use of chemical toilets and relevant hygiene measures for staff needs.
- Establishment of an appropriate diffusion / dispersal system of the water used for the gasification of LNG in order to minimize the impact of sea water temperature pollution, which is expected to be extremely limited and on a local scale.

Noise: No significant impact on the acoustic environment of the study area is expected and no action is required during the construction phase. However, during the operational phase, the project operator should operate and maintain all his equipment in accordance with the

manufacturer's specifications and will take all necessary measures to reduce machine noise during normal operation.

Terrestrial Flora - Fauna: No specific measures are proposed for the protection of the flora and fauna at the study area since no impact is expected during the construction and operation phase of the proposed project.

Marine Ecosystems: In order to cope with possible impacts on the marine ecosystem during the construction phase of the land works it is necessary to:

- Make good management of the produced solid and liquid waste as well as the used mineral oils and the rest petroleum products
- Place special marks/signs to prohibit the disposal of solid and liquid waste in the marine environment
- Enact rules regarding recycling processes and waste disposal in specially designed areas.

To cope with any impacts on the marine ecosystem during the operational phase of the foreseen works, the waste flows coming from the ships to the final receiver must be distinctive and safe according to the applicable legislation.

Therefore, during both the construction and operational phase of the suggested works, no significant impacts are expected on the marine ecosystems of the study area, as long as the works and actions are conducted according to the national and European legislation in regards to the solid and liquid waste management.

Natural resources: No significant impacts are expected on the natural resources of the study area during both the construction and operational phase, thus no other protection measures are suggested.

Transportation: During the construction phase of the suggested works, a series of mitigation measures are suggested that apply to such large scale projects and are extensively analyzed in the EIS.

During the operational phase of the suggested project no negative impacts are expected.

Human health: To prevent any impacts on human health, it is necessary that all the operations taking place at the construction sites are in compliance with the safety measures provided by the applicable legislation in order to avoid accidents.

Regarding the construction works in the marine environment, mitigation measures include regulation of the regional marine transportation during the construction works, regulation of the public via the publication of the construction schedule and the presence of security vessel in the area of the construction works.

Hazards regarding the human health connected with the operation of the facility are accidents that may be caused by leakage of hazardous substances, injuries etc.

At the plant there will be living spaces for the personnel and medical provisions. The health of the personnel will be examined periodically according to the applicable legislation for Health and Safety at work, keeping the relevant records.

Abnormal Situation Hazard: During the construction phase of the suggested project measures to restrict abnormal situations are necessary. It is important to take measures in order to protect the personnel as well as the marine and terrestrial environment in compliance with the applicable national and European legislation.

During the operational phase of the suggested project several actions must be taken, such as the adoption of necessary operating procedures, education, implementation of emergency systems and regular maintenance in order to protect human lives, materials and the environment from possible leakages. It is noted that, before the facility starts operating, the operator of the project has the obligation to submit a Safety Study, as well as an Emergency Plan to the relevant authorities, which should be applied with precision during the operational phase of the facility.