LNG TRUCK LOADING SERVICE IN REVITHOUSSA LNG TERMINAL

- Concept Paper -

MARCH 2022

European Union
European Regional Development Fund

HELLENIC REPUBLIC
MINISTRY OF DEVELOPMENT AND INVESTMENTS
SPECIAL SECRETARIAT FOR ERDF & CF PROGRAMMES
MANAGING AUTHORITY OF "COMPETITIVENESS" PROGRAMME

EPAnEK 2014-2020
OPERATIONAL PROGRAMME
COMPETITIVENESS
ENTREPRENEURSHIP
INNOVATION

ΕΣΠΑ 2014-2020
ανάπτυξη - εργασία - αλληλεγγύη
Partnership Agreement 2014 - 2020

Co-financed by Greece and the European Union

ABBREVIATIONS

Abbreviation	Description
LNG	Liquified Natural Gas
NNGS	National Natural Gas System
ssLNG	Small Scale Liquified Natural Gas
TL-Station	Truck-Loading Station
TLS	Truck-Loading Station and the respective Services
TLS-Timeslot	Standardized product for reserving and using the Truck-Loading Service
TLS-User	User of the Truck-Loading Station and the respective Services

Disclaimer

The information contained in this presentation is indicative, non-contractual in nature, non-binding for DESFA and in no case should it be considered as exhaustive. The presentation is provided for general information purposes only. Therefore, DESFA bears no liability for the content of the present presentation, as well as for any claims, costs, damages and/or other losses that might be suffered or incurred by any person in consequence of any use of -or reliance on- the information hereby provided.

If in any respect the information contained herein is not consistent with the National Natural Gas System Network Code or any other piece of legislation, the National Natural Gas System Network Code or such other piece of legislation shall prevail.

All copyrights reserved.

Contents

1. Introduction

This document presents the conceptual design and the operational overview of the upcoming Truck-Loading Station ("TL-Station") and the respective Services ("TLS") to be provided in the Revithoussa Liquefied Natural Gas (LNG)-Terminal by DESFA.

LNG Truck-Loading is the process of filling specially designed tank trucks or trailers, in order to transport natural gas in liquefied form ("LNG"). Due to the high energy density of LNG, trucks can carry significant amounts of energy by road, simulating to a virtual pipeline, providing high versatility in natural gas supply.

The ever-increasing penetration of Natural Gas in the national primary energy consumption, allows and also dictates for LNG Services to adapt to the new trends. LNG has a significant role to play in the energy transition. Until today, LNG in Greece was utilized solely as an alternative supply source of Natural Gas to the high-pressure National Natural Gas System ("NNGS"). DESFA anticipates the potential benefit of utilizing LNG in applications of small scale, and has decided to construct a TL-Station at Revithoussa LNG Terminal, as well as a Small-Scale LNG ("SS-LNG") Jetty to accommodate bunkering services and supply of satellite LNG stations.

LNG Truck-Loading offers a versatile solution for transporting LNG quantities inland, that can serve industrial consumers, truck-to-ship bunkering, truck-to-vehicle fueling, or supply remote distribution grids, acting as virtual pipelines. Furthermore, Truck-Loading Services can be combined with other ssLNG Services, by creating a relatively flexible network of larger and smaller LNG distribution-hubs.

DESFA, being the owner and operator of the LNG Terminal in Revithoussa, is responsible for operating the facility in a safe, reliable and economically efficient manner and for providing Third Party Access on a transparent and non-discriminatory basis, in compliance with the Greek and EU Legislative framework. In this context, DESFA's objective is to rollout the new LNG services (TLS and ssLNG) in a modular way, in order to ensure minimal cross-dependence between existing and new Services, establishing a robust framework for the Terminal's Services options, always in a transparent, non-discriminatory and market-based manner.

The present Concept Paper focuses on Truck-Loading Services. The document is structured as follows:

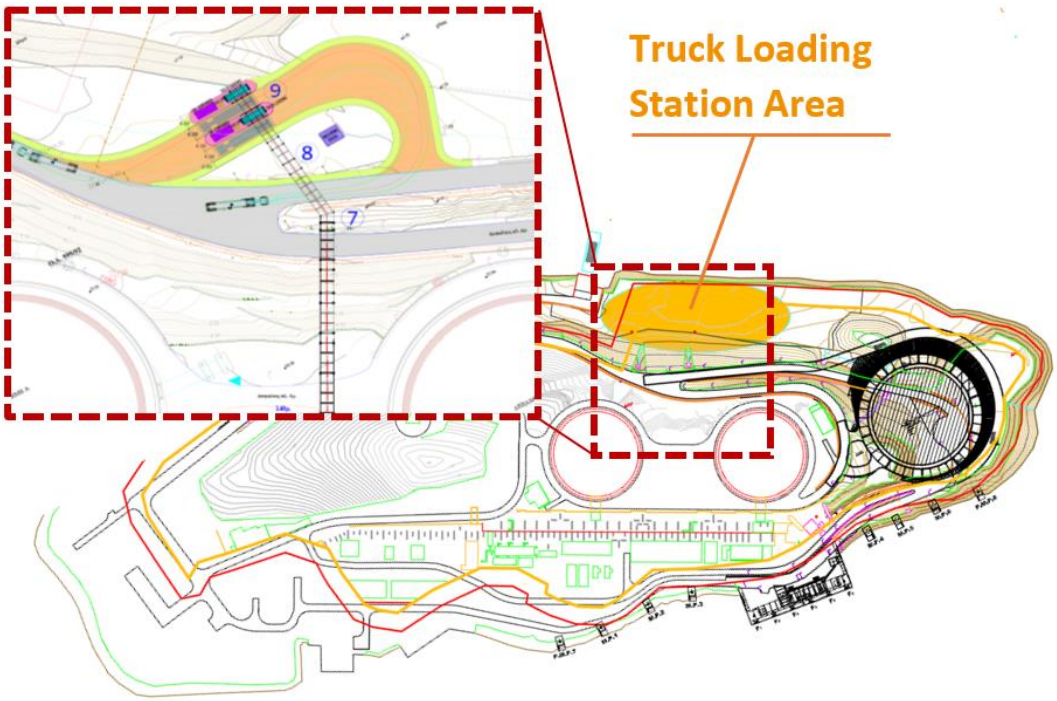
- Section 2, presents several important aspects of the Revithoussa Truck-Loading Station, including technical characteristics and offered services.
- Section 3, gives a high-level description of the capacity reservation and assignment mechanisms and regulatory framework.
- Section 4, gives a high-level overview of the operational procedures.
- Finally, Section 5 sets out the main milestones of the Truck-Loading Station, in a chronological order, up to the Commercial Operation Date.

2. The Truck-Loading Station of Revithoussa

2.1. Technical Description

The TL-Station will be integrated to the LNG terminal operating on the island of Revithoussa. A new, dedicated overhead pipeline network is constructed in order to supply LNG from the LNG storage tanks to the TL-Station, as demonstrated in Figure 1.

Figure 1: The location of the new Truck-Loading Station of Revithoussa



The TL-Station will initially have a single loading bay with flexible cryogenic hoses, with a peak flow of $100\ \frac{m^3\ LNG}{h}$. The technical loading capacity is sufficient to fill an LNG Truck within approximately one hour[1], taking also into account the necessary preparatory activities. It is also worth mentioning that all necessary provisions for a potential capacity upgrade (addition of loading-bays) have been taken into consideration during the design process, with the view to minimize the required construction time of additional loading bays, should the market so require

2.2. Transit Ports

The LNG-trucks will be transported to Revithoussa by ferry. The transit ports that will facilitate the transportation service to Revithoussa will be developed as follows:

[1] *During the first phase (2nd semester 2022), this number will be approx. 1h 20min in order to accommodate any technical adjustments.*

Three ports will be used throughout the project lifetime, the first in Elefsina (Kronos Jetty), the second in Perama Megaridos and the third and permanent one in Almira (Figure 2). The port of Elefsina will be the first operational port, which will serve as a transitional solution starting from June 2022. The one-way trip from Elefsina to Revithoussa is approximately 11 miles and lasts approx. 1 hour.

Perama Megaridos port will be used as an intermediate solution, until the permanent solution, the Almira port, becomes operational. The Perama Megaridos port will also act as a back-up solution throughout the lifetime of the project. The one-way trip to Revithoussa is approximately 3.7 miles.

When the Almira port will become operational will serve as the permanent transit port. Its distance from Revithoussa is less than 1.0 mile.

According to the final design, the ferry will transfer up to two LNG-Trucks per trip. Taking into consideration the round-trip transportation duration, the necessary safety checks and measurements before and after the loading, the loading time itself, the relevant shipping regulations and the daily hours of operation, the TL-Station will be capable of offering up to approximately 4,300 loadings on an annual basis[2].

Figure 2: The three transit ports that will be used for the TLS

2.3. Offered Services

There is a single offered service (the "Truck-Loading Service" – "Υπηρεσία Φόρτωσης Φορτηγού-ΥΦΑ" as included in the Code), offered through Standard Truck-Loading Timeslots.

[2] *Initially, (2nd semester 2022) the loading time envisaged is 1h 20min, in order to accommodate any technical adjustments. From 2023 onwards, the loading time will be reduced to 1hour. Should market conditions impose so, operating hours can be further increased. A second truck loading bay can be also added to accommodate additional demand - if any.*

Each Standard Timeslot includes the Truck-Loading Service, which comprises of the following elements:

- Inspection of the necessary documents of the TLS-User, the LNG Truck and its driver at the Transit Port,
- Sea-transportation of the LNG Truck (and driver) from the Transit Port to the LNG Facility,
- Entrance of the LNG Truck to the TL-Station and filling of the LNG Truck with LNG,
- Sea-transportation of the LNG Truck from the LNG Facility back to the Transit Port,
- Conducting all necessary measurements and procedures required, according to the Network Code, the TLS Framework Agreement and the Technical Specifications for LNG-Trucks and Drivers including also the issuance of the loading bill.

If the TLS-User is not an LNG User (so he does not have its own LNG reserves in Revithoussa LNG Terminal), then the TLS-User must agree bilaterally for the supply of the LNG quantity with an LNG-User for every TLS-Timeslot he has booked. DESFA has no active participation (no dedicated platform will be developed) for these bilateral agreements. Otherwise, the TLS-User acting as an LNG User may acquire the necessary LNG quantity through an LNG transaction with another LNG User, as described in the Network Code. In such case the transaction must be notified to and confirmed by DESFA just like any other LNG transaction.

For the time being, a cooling-down service is not provisioned to be offered by DESFA. LNG-Trucks must ensure, on their own responsibility, to meet the specified temperature and chemical composition margins (inert / gas atmosphere, oxygen allowances) set out by DESFA in the LNG Truck-Loading Manual in order to be allowed to load LNG quantities.

2.4. Truck-Loading Timeslots

LNG Truck-Loading Capacity is reserved through standard TLS-Timeslots. The duration of the timeslot shall depend on the transportation time via ferry to and from the Revithoussa island, loading time and duration of respective checks, as applicable. Specifically, during the first phase of providing the service via Elefsina (Kronos Jetty) port, each TLS-Timeslot will have a duration of approx. 4 hours[3]. Subsequently, when other ports will become operational, the duration will be decreased. The exact duration of the TLS-Timeslots will be publicized by DESFA, on a timely manner.

It is worth noting, that up to two Timeslots can have the exact same opening time (and duration), since up to two LNG Trucks can be transported by ferry simultaneously, loaded sequentially in the TL-Station, and then returned back to the Transit port.

The procedure for booking TLS-Timeslots is described in Section 3 of this document.

2.5. Technical Specifications

DESFA shall issue technical manuals that provide detailed descriptions of the Truck and Driver Certification procedures and requirements, as well as operational specifications that must be

[3] *Initially, (2nd semester 2022) the loading time envisaged is 1h 20min, in order to accommodate any technical adjustments, so the total TLS-Timeslot time will be increased accordingly.*

followed during arrival on port, transportation, stand-by in Revithoussa and loading procedures.

The two pertinent technical manuals are the "**Technical Specifications for LNG-Trucks and Drivers"** and the **"LNG Truck-Loading Manual"**, will be uploaded in DESFA's website. The two technical manuals will be accepted by the TLS-Users with the signing the TLS Framework Agreement.

2.6. Summary

In this section, the main parameters regarding the Truck-Loading Station and the overall coordination and logistics of the Truck-Loading Service are summarized in a tabular form. *Table 1* presents the main characteristics of the Truck-Loading Station*, Table 2* summarizes the main operational/logistics information, *and*

Table 3 lists the documents relevant to the truck-loading service.

It is worth clarifying that all operational assumptions presented are based on the latest data available at the time of drafting, and are subject to re-evaluation up to the commercial operation day. DESFA will make readily available and publish on its website any relevant updates.

Table 1: Truck-Loading Station Summary

Truck-Loading Station	
Operational days per week	*7*
Anticipated operational window	*08:00 – 20:00*
Peak loading capacity	*100 m^3_{LNG}/hr*
Number of loading bays	*1*
Maximum estimated truck loadings annually	*4,300‡*
‡For 2022, the maximum available annual loading slots are estimated at approx. 1780	

Table 2: Logistics and Operational Summary

Operation & Logistics	
Max number of trucks onboard	*2*
*Anticipated TLS-Timeslots per day **	*12*
*Timeslot duration (for Elefsina port) *, ***	*4 hours*
One-way trip duration (Elefsina-Revithoussa)	*60'*
One-way trip duration (Perama Megaridos-Revithoussa)	*20'*
One-way trip duration (Almyra jetty-Revithoussa)	*10'*
*Truck loading duration (including preparatory activities) **	*~ 60'per truck*
** Only for the first year of operation (2022) the truck loading duration time might be over 60' for technical reasons, leading to timeslots larger than 4 hours. Anticipated daily number of TLS-timeslots may be reduced accordingly.*	
*** The Timeslot's duration depends on the actual Transit Port. Timeslot duration will be reduced for Perama Megaridos and Almyra ports*	

Table 3: Relevant documents

	Document	Status
Access Rules & Regulatory Framework	Chapter 11[A] of the Amendment of the NNGS Network Code	Submitted to RAE. Consultation ended at Feb. 10th Decision pending
Technical Specifications for Trucks & Drivers[4]	"Technical Specifications for LNG-Trucks and Drivers"	final draft
Technical Manual of Truck-Loading[5]	"LNG Truck-Loading Manual"	final draft
Truck Loading Service tariff principles and tariff range	"Truck-Loading Tariff Proposal"	Submitted to RAE on December 2021
Truck Loading Contract	"Framework-Agreement Template"	final draft

3. Reservation Process

3.1. Timeslot Reservation

Until November 20th of each year Y-1, DESFA announces the list of all available timeslots for the following Gas Year (Y). In order to define the number and distribution of the offered TLS-Timeslots, DESFA takes into account all relevant technical, regulatory and legal aspects of the LNG and Truck-Loading facilities, such as maintenance plans, demand estimations, duration of TLS Timeslots, in order to provide the LNG Services in the most efficient and secure way.

Any available timeslot of Year Y can be reserved by interested TLS-Users during the interval starting from November 21st of Y-1, and up to 13:00 of Day D-1 (D: delivery day). The TLS-User must have an active TLS Framework Agreement, which has not been derogated by DESFA for any reason at the time of the reservation request.

TLS-Users, shall submit requests for each Timeslot they wish to reserve through DESFA's Electronic Information System, starting from the first available timeslot of each Day D to ensure that timeslots of that Day, are filled in sequentially and that each ferry always transports two trucks to the extent possible. Requests are evaluated on a first-come first-served basis. Each approved by DESFA request for the reservation of a specific TLS-Timeslot leads to an allocation of this Timeslot to the corresponding TLS-User, and the Timeslot is removed from the list of Available Timeslots.

Reservation requests are binding for TLS-Users, meaning that if their requests are accepted, they are bound with take-or-pay obligations.

[4] "Technical Specifications for LNG-Trucks and Drivers" manual will be uploaded at DESFA's webpage
[5] "LNG Truck-Loading Manual" manual will be uploaded at DESFA's webpage

3.2. Secondary Market | Timeslot Assignment

Standard TLS Timeslots reserved by a TLS-User can be assigned to other TLS-Users. Under a Timeslot assignment, the assigner-User transfers all rights and obligations associated with a TLS-Timeslot to the assignee-User. In order for an assignment to take place, a joint application from the two parties must be submitted to DESFA's Information System, up to 13:00 of *D-1* (where *D* is the transferred Timeslot's opening day) and is validated subject to DESFA's approval.

3.3. Truck-Loading Nomination

TLS-Users with reserved Timeslots and LNG-Users supplying the LNG quantities for TLS-Timeslots of a Day *D*, must submit a Loading Nomination for each Timeslot they have reserved (TLS-Users) or they are supplying (LNG-Users), upon 15:00 of Day *D-1*.

DESFA checks the validity of the submitted Loading Nomination according to Article 89^{A} of the Code, and especially whether or not the daily LNG reserves of the LNG-User who supplied the TLS-User for each TLS-Timeslot are sufficient to provide the respective LNG-Quantity. If all the required criteria are fulfilled (financial guarantee, validity of nominations, valid representative, etc.) DESFA confirms the Loading Nomination. In case of rejection, the LNG User may submit a new Nomination until 16:00 of Day D-1. After the approval of the Nomination, at a later stage, the User must also declare the name of the driver and the vehicle registration plate of the truck that will arrive at the port on behalf of him.

3.4. Regulatory Framework and Tariffs

The Truck-Loading Service offered by DESFA, is a regulated service. The access rules for the Service are to be found in the NNGS Network Code Amendment (chapter 11^{A}).

All natural and legal entities that are members of RAE's NNGS Registry are eligible for becoming TLS Users. Interested parties must sign a TLS Framework Agreement with DESFA in order to be able to use the Truck-Loading Station and reserve LNG capacity through standardized TLS-Timeslots. The TLS Framework-Agreement template, shall be found in DESFA's website in due time. Each eligible interested party can apply for a TLS Framework Agreement at any time.

Each TLS-User that enters into a TLS Framework Agreement with DESFA, must submit a Guarantee to ensure the fulfillment of the User's financial obligations towards DESFA. The exact amount and timing of the Guarantee's submission is stated in the Code and is set at 20.000 €.

The User's balance will be monitored and kept at least at the nominal Guarantee level, in order for a TLS-User to make use of the Truck-Loading Services, as provisioned by the Code and by the TLS Framework Agreement.

The applicable Tariff Methodology and tariff level is set out by DESFA after RAE's approval. The proposed Tariff is in the form of a fixed amount per Timeslot including, as mentioned, the necessary safety checks and measurements, transportation by ferry and the loading service itself (not including the commodity). According to the proposal DESFA has submitted, and subject to the approval of RAE, the level of tariff is not anticipated to exceed €700 per truck loading. The users of the TL-Station are bound with take-or-pay obligations for any Timeslots they have reserved.

4. Operational Procedures

In this section, the typical communicational and operational workflow for the Truck-Loading Service is presented.

4.1. Arrival of LNG-Truck at the Transit-Port

LNG-Trucks must reach the Transit Port, respecting the provisioned lead-times specified in the Truck-Loading Manual. Upon arrival, the driver must present the Certifications for the Truck and himself as well as the confirmation of the Loading Nomination for a timeslot, in order to receive a boarding approval according to the process described in the Truck Loading Manual.

However, there are special provisions foreseen in the Network Code, for the case of an early or a late arrival at the Transit Port. As stated in the Access Rules for Truck-Loading (Chapter 11A of the Network Code), DESFA will try to rearrange timeslots, to the extent that no-conflicts with other TLS-Users occur.

4.2. Sea Transportation

As mentioned in Section 2.2, the first Transit Port to accommodate the LNG-Truck sea transportation operations, is the port of Elefsina (Kronos Jetty). The port of Elefsina shall be used until the transitional solution of Perama Megaridos port or the permanent solution of Almyra's port become operational. A maximum of two trucks shall be simultaneously onboard of an LNG-Truck ferry.

4.3. Truck-Loading

The Truck-Loading process lasts up to one (1) hour per truck, in total[6]. According to the specified LNG capacity of the LNG-trucks, two trucks can be fully loaded (sequentially from the single loading bay) within the two-hours interval.

In case that there is only one truck to be loaded within the two-hours duration, DESFA may allow, if a TLS-User requests so, that the LNG-Truck returns to the Transit Port earlier than the Timeslot's closing time, but has no legal obligation to do so.

5. Project Status and Timeline

As per time-plan DESFA's official proposal for the access rules and the relevant Amendment of Network Code as well as the proposal on tariff methodology and tariff level were submitted to RAE in December 2021. Assuming that the regulatory documents (Tariffs and Code and the relevant Agreement) will have been approved by mid-April 2022, the booking platform is expected to be launched by May 2022 and the Commercial Operation Date is expected to begin in June 2022.

[6] *Initially, (2nd semester 2022) the loading time envisaged is 1h 20min, in order to accommodate any technical adjustments*

6. Contact information

Interested parties may address any questions to the following email address: services@desfa.gr