



Draft Development Plan 2017-2026

July 2017

Table of Contents

ABBREVIATIONS	4
CHAPTER 1: INTRODUCTION	5
CHAPTER 1.1. COMPLIANCE OF NNGS DEVELOPMENT PLAN WITH ENTSOG'S TEN-YEAR DEVELOPMENT PLAN (TYNDP) AND GAS REGIONAL INVESTMENT PLAN (GRIP).....	7
CHAPTER 2: DEVELOPMENT PLAN 2017-2026.....	7
CHAPTER 2.1. PROJECTS INCLUDED FOR THE FIRST TIME IN DEVELOPMENT PLAN 2017-2026	7
CHAPTER 2.1.1. PROJECTS FOR USERS CONNECTION.....	7
2.1.1.1. M STATION AT SALFA ANTHOUSA	7
2.1.1.2. M STATION AT SALFA A. LIOSSIA.....	8
CHAPTER 2.1.2. PROJECTS FOR NNGS DEVELOPMENT	9
2.1.2.1. NEW JETTY FOR SMALL SCALE LNG.....	9
2.1.2.2. PIPELINE NEA MESSIMVRIA – EIDOMENE/GEVGELIJA AND M/R STATION	10
2.1.2.3. COMPRESSOR STATION IN AMPELIA	11
2.1.2.4. UPGRADING PROJECTS OF NNGS -3 RD GROUP	12
2.1.2.5. UPGRADE OF PHYSICAL PROTECTION OF DESFA FACILITIES - PHYSICAL SAFETY CONTROL CENTER.....	14
2.1.2.6 IMPROVEMENT OF METERING ACCURACY IN NNGTS STATIONS.....	15
2.1.2.7. REPLACEMENT OF METERING AND CONTROL SYSTEMS ON M/R STATIONS OF NNGTS.....	16
2.1.2.8 NEW BUILDING FOR DESFA'S HEADQUARTERS	17
CHAPTER 2.2. PLANNED PROJECTS.....	18
CHAPTER 2.2.1. PROJECTS INCLUDED IN THE APPROVED DEVELOPMENT PLAN AND THEIR IMPLEMENTATION IS ONGOING IN THE REFERENCE PERIOD OF THE CURRENT DEVELOPMENT PLAN	18
2.2.1.1. CONSTRUCTION OF HIGH PRESSURE PIPELINE FROM MANDRA ATTIKIS TO THE FACILITY OF ELPE IN ELEFSINA FOR THE CONNECTION WITH NNGS AND RELEVANT METERING STATION	18
2.2.1.2. CONSTRUCTION OF HIGH PRESSURE PIPELINE MAVROMATI (VAGIA)- LARYMNA AND NECESSARY METERING STATION FOR THE CONNECTION OF LARCO GMM SA WITH NNGS.....	19
2.2.1.3. COMPRESSION STATION IN KIPI	20
2.2.1.4. M/R STATION IN KOMOTINI	21
2.2.1.5. M/R STATION IN N. MESSIMVRIA FOR THE CONNECTION OF NNGTS TO TAP	21
2.2.1.6. KOMOTINI-THESPROTIA HIGH PRESSURE PIPELINE (PART OF NNGS) ...	22
2.2.1.7. 2 ND UPGRADE OF LNG TERMINAL ON THE ISLAND REVITHOUSA	23
2.2.1.8. 2 ND UPGRADE OF BOARDING METERING STATION (BMS) OF SIDIROKASTRO	25
2.2.1.9. UPGRADING OF ELECTRICAL AND ELECTRONIC EQUIPMENT, BILLING SYSTEM AND EQUIPMENT SCADA FIELD IN STATIONS M/R OF 1 ST GENERATION (1995-2000)	27

2.2.1.10. EXTENSIONS AND UPGRADES OF METERING STATIONS OF NORTH AND EAST THESSALONIKI	27
2.2.1.11. UPGRADE THE SYSTEM OF FIXED COMMUNICATION OF NNGS	28
2.2.1.12. IT & TELECOMMUNICATIONS PROJECTS	29
2.2.1.13. UPGRADING PROJECTS OF NNGS -1ST GROUP	32
2.2.1.14. UPGRADING PROJECTS OF NNGS -2ND GROUP	33
2.2.1. 15. INSTALLATION OF M/R KAVALA	35
2.2.1.16. UPGRADE OF LNG LOADING ARMS AT REVITHOUSSA LNG TERMINAL .35	
2.2.1.17. TRUCK LOADING PILOT STATION	36
2.2.1. 18. LNG TERMINAL BOIL-OFF GAS COMPRESSOR STATION	37
CHAPTER 2.2.2. PROJECTS THAT HAVE ALREADY BEEN INCLUDED IN THE LIST OF SMALL PROJECTS AND THEIR IMPLEMENTATION IS ONGOING IN THE REFERENCE PERIOD OF THE SUBMITTED DEVELOPMENT PLAN.	37
CHAPTER 2.3. PROJECTS OF THE THREE YEAR DEVELOPMENT PERIOD	37
CHAPTER 3. PLANNED PROJECTS THAT WERE NOT INCLUDED IN THE DRAFT DEVELOPMENT PLAN 2017-2026	38
ANNEX I	39

IMPORTANT NOTE: The English translation is not binding. In the event of discrepancies between the Greek and English version, the Greek text prevails.

ABBREVIATIONS

INGTS: Integrated Natural Gas System

L/V: Linevalve

DESFA: TSO of the Greek Natural Gas System

TSO: Transmission System Operator

NNGS: National Natural Gas System

NNGTS: National Natural Gas Transmission System

NSRF 2007-2013: National Strategic Reference Framework 2007-2013

PA 214-2020: Partnership Agreement for the Development Framework 2014-2020

EIB: European Investment Bank

CHP: Combined Heat and Power unit

P/P: Power Producer

O&M Centers: Centers of Operation and Maintenance

BMS: Boarding Metering Station

IISNG: Integrated IT System for Natural Gas

RAE: Regulatory Authority of Energy

RAB: Regulated Asset Base

LNG: Liquefied Natural Gas

HP: High Pressure

Bcma: Billion cubic meter per annum

BCC: Back up Control Center

CCTV: Closed Circuit Television

CNG: Compressed Natural Gas

DCS: Distributed Control System

GCC: Gas Control Center

IGB: Interconnector Greece Bulgaria

IGI: Interconnector Greece Italy

M/R: Metering/Regulating station

Nm³: Normal Cubic meter

PLC: Programmable Logic Controller

REM: Remote

RTU: Remote Terminal Unit

SCADA: Supervisory Control and Data Acquisition

TAP: Trans Adriatic Pipeline

TDM/PDH: Time Division Multiplexing/ Plesiochronous Digital Hierarchy

TM: Tele-metering

CHAPTER 1: INTRODUCTION

In accordance with paragraph 2g of Article 69 of Law 4001/2011 as valid, the Hellenic Gas Transmission System Operator (DESFA) conducts the Development Plan and the Regulatory Authority for Energy (RAE) approves and overviews the implementation of it, which establishes the projects for the development, enhancement and interconnections of the National Natural Gas System (NNGS) for the next ten (10) years.

The above mentioned clauses are specified within art. 92 of the NNGS Administration Code (Network Code).

For the preparation of the Development Plan, the Development Study is taken into consideration as well as:

- a) data of the current and the estimated supply and demand of natural gas
- b) the fulfillment of public service obligations and the assurance of natural gas supply in a credible and cost-effective way
- c) the improvement of the NNGS efficiency and the ensuring of its smooth operation aiming at the prevention of congestions, emergencies and refusal of access for new Users
- d) the supply of new areas with natural gas and the ensuring of new Users' potential access
- e) the protection of the environment
- f) the European development plan and the regional investment programs in accordance with the provisions of part (b) of paragraph 3 of Article 8 and of paragraph 1 of Article 12 of Regulation 715/2009
- g) the sustainability of projects that are included in the Plan and their potential financing outside the framework of the Development Plan.”

The Development Plan includes projects that their construction is scheduled to begin within the timeframe of the Plan (i.e. for the period 2017-2026) as well as the Planned Projects that their construction has not been completed yet.

The TSO substantiates the feasibility of the inclusion of the newly proposed projects in the Development Plan and includes information about the construction method, the estimated budget, the time schedule of the implementation, the way of financing the relevant investments as well as the cost recovery method.

In the following paragraphs the projects of the Development Plan of 2017-2026 are presented, including for each project all the necessary elements arising from the Network Code for the regulation of NNGS (Article 92).

The Development Plan is structured as follows:

- I. Projects that are included for the first time in the draft (Chapter 2.1)
 - i. Projects for the Connection of Users
 - ii. Projects for the Development of NNGS

II. Planned Projects (Chapter 2.2)

- i. Projects included in the approved Development Plan and their implementation is ongoing during the reference period of the current Development Plan
- ii. Projects included in the List of Small Projects and their implementation is ongoing during the reference period of the current Development Plan

III. Projects included in the Three-Year Development Period (Chapter 2.3)

According to par. 3 of article 92, the TSO is obliged to justify in the Development Plan any reasons for not including any planned project.

For each project a summary table of the following information is given, as presented below: type of project (Planned Project/New Project, the type of the investment (Pipeline, metering station, LNG/CNG, UGS, compressor, equipment for the transmission system and/or LNG facility), expected benefit (according to the criteria of art. 92 par. 2 of NNGS Administration Code as valid), the current status (under feasibility study, under technical study/authorization, under the process of award for the construction/ implementation, under construction), whether the Final Investment Decision has been taken or not, the current budget of the project and the part of which is considered maintenance capex, the estimated date that the project will be ready for operation¹.

Maintenance capex is considered to be any addition or replacement to NNGS assets in order the latter to be maintained in their initial operational capability as long as possible.

When new projects are included in the Draft Development Plan, their impact on the average usage tariff of the NNGS is calculated.

Furthermore, the financing plan and the recovery method of the investment are presented for each project.

Project Summary	
Type of project	
Type of investment	
Current Budget	
<i>Of which Maintenance Capex</i>	
Expected benefit	
Start date	
End date	
Connection Agreement with User (Projects for the connection of Users only)	
Resolution to Construct/FID	
Current Status of Project	

¹ The above mentioned definitions are described in the NNGS Network Code (Gov. Gazette 1549 B' /5-5-17)

Financing plan	
Recovery method	
Impact on the average tariff for the usage of NNGS (for new projects only ²)	

Following the project summary of each project, a short description of the scope of it and any other necessary relevant information is given.

CHAPTER 1.1. COMPLIANCE OF NNGS DEVELOPMENT PLAN WITH ENTSOG'S TEN-YEAR DEVELOPMENT PLAN (TYNDP) AND GAS REGIONAL INVESTMENT PLAN (GRIP)

In compliance with Regulation 715/2009/EC Transmission System Operators are obliged to establish a regional cooperation in the framework of European Network of Transmission System Operators for Gas (ENTSO-G). Specifically, the TSO publishes every two years a non-binding ten years system development plan, as well as the gas regional investment plan (GRIP).

The purpose of these documents is to provide information to stakeholders about the new projects that will create opportunities for transporting natural gas in each country.

DESFA has taken into consideration the currently approved TYNDP 2017 as well as the latest GRIP for the NNGS Development Plan for 2017-2026 is compatible with the latest approved TYNDP as well as the approved regional investment plan.

CHAPTER 2: DEVELOPMENT PLAN 2017-2026

CHAPTER 2.1. PROJECTS INCLUDED FOR THE FIRST TIME IN DEVELOPMENT PLAN 2017-2026

CHAPTER 2.1.1. PROJECTS FOR USERS CONNECTION

(art. 92 par. 4A(i) of the Network Code of the NNGS as applicable)

2.1.1.1. M station at SALFA Anthousa

Project Summary	
Type of Project	New Project
Type of investment	Metering station
Current budget	0.45 million €

² Projects that are part of the Development Plan for the first time

Expected benefit	Enabling access to new Users
Start date	Jun-17
End date	May-18
Connection Agreement with User (Projects for the connection of Users only)	Yes
Resolution to Construct/FID	Yes
Current Status	Under study
Financing plan	DESFA's own equity
Recovery method	Connection Fee
Impact on the average usage tariff of the NNGS	0%

The project is necessary according to the provisions of art. 5 par. 7 of Tariff Regulation (RAE decision 339/2016) as well as the relevant agreement of Public Gas Corporation "DEPA SA". The project refers to the construction of a metering station which will be owned by DESFA in Anthousa. The estimated cost of the project is 450.000 €, and it will be ready for operation in May 2018.

2.1.1.2. M station at SALFA A. Liossia

Project Summary	
Type of Project	New Project
Type of investment	Metering station
Current budget	0.68 million €
Expected benefit	Enabling access to new Users
Start date	Jun-17
End date	Sep-18
Connection Agreement with User (Projects for the connection of Users only)	Yes
Resolution to Construct/FID	Yes
Current Status	Under study
Financing plan	DESFA's own equity
Recovery method	Connection Fee
Impact on the average usage tariff of the NNGS	0%

The project is necessary according to the provisions of art. 5 par. 7 of Tariff Regulation (RAE decision 339/2016) as well as the relevant agreement of Public Gas Corporation "DEPA SA".

The project refers to the construction of a metering station which will be owned by DESFA in A. Liossia. The estimated cost of the project is 680.000 €, and it will be ready for operation in September 2018.

CHAPTER 2.1.2. PROJECTS FOR NNGS DEVELOPMENT

(art. 92 par. 4A(ii) of the Network Code of the NNGS as applicable)

2.1.2.1. New jetty for small Scale LNG in Revithoussa

Project Summary	
Type of Project	New Project
Type of investment	Equipment for LNG facility
Current budget	30 million €
Expected benefit	Provisions of Directive 94/2014 for LNG fuel in shipping, development of NNGS
Start date	Jun-17
End date	2020
Resolution to Construct/FID	No ³
Current Status	Under study
Financing plan	DESFA's own equity, CEF and NSRF ⁴ grants, EIB loan ⁵
Recovery method	Inclusion in RAB(excluding possible grants)
Impact on the average usage tariff of the NNGS	0%

The project will be an implementation of the ongoing studies under POSEIDON MED II.

POSEIDON MED II, under the auspices of the INEA(Innovation and Network Executive Agency), is part of the necessary steps towards adopting liquefied natural gas as a marine fuel in the Eastern Mediterranean, making Greece the focal point for supplying and distributing liquefied natural gas In Southeast Europe, implementing Directive 94/2014 / EU and Law 4439/2016 incorporating the above Directive into Greek law. In this action 26 partners from shipping and gas industry from three EU Member States are involved (Cyprus, Greece, Italy).

The new jetty is planned to be constructed in the northern eastern part of Revithoussa and will serve the operation of the loading to small ships (1.000 m³ and up to 20.000 m³). The smallest of them will supply boats, either coastal or seagoing shipping, to the port of Piraeus. The larger ones will supply satellite LNG storage and distribution stations to other ports in Greece or abroad.

The new jetty will provide for the mooring and simultaneous refueling of two ships.

³ To be taken after the approval of Development Plan and the decision for the financing of the project

⁴ Grants will be pursued

⁵ Loan will be pursued

In the same project the addition of a small LNG loading arm and of relevant mooring equipment is included in order to allow the loading and unloading of small LNG ships from the existing jetty. The possibility of using the existing facility initially for the loading of small vessels will increase the relevant capacity of Revithoussa, with relatively low cost and will increase the operational flexibility of the installation.

The basic design of the project is programmed to begin by the end of 2017 and the construction within 2019. The project is estimated to be in operation by the end of 2020.

The cost of the project that will be included in the RAB is estimated at 30 mil. € and is not expected to increase the average usage tariff taking into consideration the preliminary demand estimations for the loading of vessels for the supply with gas of ships to the port of Piraeus or the supply of distribution networks in coastal areas as well as the expected grant. The grant amount is estimated at 40% (the exact amount will stem from the relevant study according to the procedures of PA).

2.1.2.2. Pipeline Nea Messimvria – Eidomene/Gevgelija and M/R station

Project Summary	
Type of Project	New Project
Type of investment	Pipeline Metering station
Current budget	48.7 million €
Expected benefit	Development SEE market, increase of usage of NNGS
Start date	Jun-17
End date	2020
Resolution to Construct/FID	No ⁶
Current Status	Under study
Financing plan	DESFA's own equity , Grants ⁷ , EIB loan ⁸
Recovery method	Inclusion in RAB(excluding grants)
Impact on the average usage tariff of the NNGS	0%

The project aims at the interconnection of natural gas transmission systems of Greece and FYRoM

which will enhance the diversification of supply sources for FYRoM. The latter one is currently solely dependent for the supply of gas from Trans Balkan Pipeline.

DESFA and MER have signed a Memorandum of Understanding for the project in October 2016.

Access to NNGS, and especially to the LNG terminal of Revithoussa can benefit market competition thus leading to lower prices for the supply of natural gas. Meanwhile the

⁶ To be taken after a) appropriate booking for transmission capacity by users b) the approval of Development Plan and c) the decision for the financing of the project

⁷ Grants will be pursued

⁸ Loan will be pursued

project enhances the role of Greece as a hub and enables the participation of more natural gas users in the region.

The required project within Greece is constituted from

- A 55 km pipeline of 28 in with 70 barg design pressure and 66.4 barg maximum operating pressure starting from Nea Messimvria (downstream of the current compressor station) an ending to the Greek/FYRoM borders near Customs station of Evzoni.
- A Metering/Regulating border Station, 2 Launcher Scraper Stations and 1 Receiver Scraper Station



Picture 1: Routing of the pipeline form Nea Messimvria to the boarder with FYRoM

The project is estimated to be in operation in 2020. The cost of the project that will be included in RAB is 48.7 M€, while the above inclusion does not increase the Average Tariff for the usage of NNGS with the assumption of appropriate grant for the project and booking of sufficient capacity from users.

2.1.2.3. Compressor Station in Ampelia

Project Summary	
Type of Project	New Project
Type of investment	Compressor Station
Current budget	49 million €
Expected benefit	Efficiency of NNGS, effective operation in respect to prevent congestion
Start date	Jun-17
End date	2020
Resolution to Construct/FID	No ⁹
Current Status	Under study
Financing plan	DESFA's own equity, Grants ¹⁰ , EIB loan ¹¹
Recovery method	Inclusion in RAB (excluding grants)
Impact on the average usage tariff of the NNGS ¹²	1.630%

⁹ To be taken after the approval of Development Plan and the decision for the financing of the project

¹⁰ Grants will be pursued

¹¹ Loan will be pursued

¹² With grant assumption of 50%

The project is necessary on the basis of the hydraulic simulation studies carried out by DESFA and given the expected increase in the transported quantities of natural gas from north to south with the start of the TAP pipeline and its interconnection with NNGTS in New Messimvria.

The existing technical capacities at North Entry Points (Sidirokastro + Kipi) are considered to remain as of today.

In order to ensure the stability and efficiency of the system, it is necessary to progressively increase its technical capacity with the installation of a compressor station at the southern part of Greece, which concentrates the larger part of the demand.

The characteristics of the compressor station were preliminary identified to 10 MW (1+1) with the appropriate stab outs for a 3rd unit to be installed in the future if the natural gas demand justifies it. The detailed characteristics of the unit will be defined during the basic design. The compressor will be designed to provide reverse flow as well. The cost of the project is preliminary identified at 49 M€. The cost will be included in RAB, and the above inclusion will increase the average tariff for the usage of the system by 1.630% assuming 50% financing from grant (the exact amount will stem from the relevant study according to the PA procedures).

2.1.2.4. Upgrading Projects of NNGS -3rd group

Project Summary	
Type of Project	New Project
Type of investment	Equipment on NNGS
Current budget	2,12 million €
Expected benefit	Efficiency of NNGS, effective operation in order to prevent emergency situations
Start date	Jun-17
End date	Mar-19 (projects 1,2 Table 1) Dec-19 (projects 3,6 Table 1) Dec-17 (projects 4,5 Table 1)
Resolution to Construct/FID	No
Current Status	(see Table 1)
Financing plan	DESFA's own equity, NSRF grant ¹³ (for project no.1)
Recovery method	Inclusion in RAB
Impact on the average usage tariff of the NNGS	0.132%

Table 1: Projects for the upgrade of NNGS operation

No.	Investments	Estimated cost(€)	Completion date	Current status
1	Implementation of training centre	600.000	Mar-19	Under study

¹³ Will be pursued

2	Procurement and installation of Pipeline Integrity Management System	300.000	Mar-19	Under study
3	Upgrade of electrical switches for medium voltage and internal lighting in the control room of LNG facility	1.000.000	Dec-19	Under study
4	Procurement of special equipment for detecting corrosion and irregularities in natural gas pipeline	40.000	Dec-17	Under award for procurement
5	Upgrade of DCS in CHP unit	80.000	Dec-17	Under award for procurement
6	Upgrade of Geographical Information System (GIS) system	100.000	Dec-19	Under implementation
TOTAL		2.120.000 €		

The following paragraphs analyze the feasibility and the technical characteristics of the projects presented in table 1 above.

1. Implementation of training centre

In order to accommodate the training needs of his staff, DESFA plans to set up a Training Center for theoretical and practical practice of natural gas techniques. The development of such an infrastructure is the first in the Balkan region and can be used for the training of staff of other Operators with whom there will be cooperation. The cost of the project is estimated at € 600,000 with projected completion in March 2019.

2. Procurement and installation of Pipeline Integrity Management System

In order to prevent the potential risks of the facilities (Risk Management), the company will proceed with the development of a system for the integrity of the NNGTS transport network by supplying a Pipeline Integrity Management System (PIMS) based on the need and the requirements of DESFA and the possibility of updates and extensions. From 1 September 2017 and over a period of 6-7 months, the completion of the first phase of the project is expected, which includes the installing of software, the integration of data on a single basis for an initial number of NNGTS sections, and the pilot implementation of a risk model. For the next year, from March 1, 2018 to March 1, 2019, the installed PIMS will be extended to the entire transport network.

The total amount required for the PIMS (Pipeline Integrity Management System) procurement and installation project is € 300,000.

3. Upgrade of electrical switches for medium voltage and internal lighting in the control room of LNG facility

It concerns the supply and replacement of medium voltage (6 kV) electrical switches at the LNG facility (60 pcs.) aiming at the smooth operation of the automation in the distribution of electricity and supply of medium voltage loads (motors and pumps). The upgrade study is in progress. The cost of the project is estimated at 1,000,000 with anticipated completion in December 2019.

4. Procurement of special equipment for detecting corrosion and irregularities in natural gas pipeline

It concerns the procurement of special Portable Non - Destructive Testing (NDT) equipment for field - specific detection and assessment of corrosion and discontinuities such as cracks, stresscorrosioncracking (SSC), lamination, inclusions, etc. in the pipelines and containers of the NNGTS, which will contribute to the upgrading of the NNGTS integrity inspection and evaluation services. The cost of the project is estimated at € 40,000 and will be completed by December 2017.

5. Upgrade of DCS in CHP unit

It concerns the upgrading of the DCS of CHP in Revithoussa in hardware and software, the installation, programming and commissioning. The addition of the third tank substation and the new equipment of the 2nd LNG upgrade will make the upgrading necessary until the end of 2017. The cost of the project is estimated at € 80,000.

6. Upgrade of Geographical Information System (GIS) system

The project will further develop DESFA's geographic database in order to fully integrate assets and their efficient performance through gis-web applications to the end users.

The cost of the above projects that will be included in RAB is 2.12 mil. € and the above inclusion will increase the average tariff for the usage of the system by **0.132%**.

2.1.2.5. Upgrade of physical protection of DESFA facilities - Physical Safety Control Center

Project Summary	
Type of Project	New Project
Type of investment	Equipment of NNGS
Current budget	1.2 million €
Expected benefit	Efficiency of NNGS, effective operation
Start date	Jun-17
End date	Dec-19
Resolution to Construct/FID	No
Current Status	Under study

Financing plan	DESFA's own equity
Recovery method	Inclusion in RAB
Impact on the average usage tariff of the NNGS	0.080%

NNGS facilities are considered as European critical infrastructure. Possible shutdown or destruction would have a significant impact on the country and Europe-wide.

The aim of the project is to upgrade the physical security of all DESFA infrastructure due to the rapid development of the technological applications in the sector and the establishment of a Physical Security Control Center covering the requirements of the Directive 2008/114/EC concerning critical infrastructure security, which was incorporated into the Greek law with Presidential Decree 39/2011.

The aim is to prevent, mitigate and eliminate risk threats (examples include theft, sabotage, terrorism, accidents, and natural phenomena).

The project includes:

- Implementing a vulnerability study of all DESFA installations and developing an Infrastructure Safety Management Plan
- Compilation of Technical Specifications of Safety Systems and Physical Security Control Center
- Installation of security systems in DESFA infrastructure including pipelines (eg CCTV systems, tamper detectors, alarms, headlamps, access control, DAS, drones, etc.)
- Development and operation of a Physical Security Control Center for the management and coordination of the security systems of the Infrastructure.

The cost of the above projects that will be included in RAB is 1.2 mil.€ and the above inclusion will increase the average tariff for the usage of the system by 0.080%.

2.1.2.6 Improvement of metering accuracy in NNGTS stations

Project Summary	
Type of Project	New Project
Type of investment	Equipment of NNGS
Current budget	0,2 million €
<i>Of which Maintenance Capex</i>	<i>0,2 million €</i>
Expected benefit	Efficiency of NNGS, effective operation
Start date	Jun-17
End date	Nov-18
Resolution to Construct/FID	No
Current Status	Under study
Financing plan	DESFA's own equity
Recovery method	Inclusion in RAB
Impact on the average usage tariff of the NNGS	0.014 %

In the context of the public consultation of the Development Plan 2016-2025 it was pointed out that in some distribution networks due to reduced consumption there are differences between the amount of gas resulting from the sum of the metering systems of the distribution networks and the quantity of gas measured in the Metering/ Regulating stations that make up the corresponding Distributed Network Exit Point (SIDD) of the NNGTS.

DESFA, as stated with no. 100240 / 13.12.2016 letter to RAE, pledged to examine the matter and come back with a project proposal to a next Development Plan or List of Small Projects.

DESFA examined the issue and it results in 17 Metering/Regulating stations the turbine meters operate for a substantial amount of time outside of their approved metering rates. This occurs due to the low consumption rates in the distribution networks that are connected to the relevant SIDDs' of NNGTS.

In order to resolve the problem it is proposed to replace said turbine meters in 17 stations with new ones that combine improved operational features such as lower Qmin requirement and improved minimum / maximum flow ratio-from 1:20 to 1:50.

The project will be in operation in November 2018. The cost of the project that will be included in RAB is 0.2 million € and said inclusion will increase the average tariff for the usage of NNGS by 0.014 %

2.1.2.7. Replacement of Metering and control systems on M/R stations of NNGTS

Project Summary	
Type of Project	New Project
Type of investment	Equipment of NNGS
Current budget	4,5 million €
<i>Of which Maintenance Capex</i>	<i>4,5 million €</i>
Expected benefit	Efficiency of NNGS, effective operation
Start date	Jun-17
End date	Dec-19
Resolution to Construct/FID	No ¹⁴
Current Status	Under fstudy
Financing plan	DESFA's own equity,
Recovery method	Inclusion in RAB
Impact on the average usage tariff of the NNGS	0.252%

The proposed project concerns the replacement of the Measurement Management and Supervision / Control Systems in thirty (30) existing Metering (M) and Metering / Regulating (M / R) Stations, in order to achieve:

- the compatibility with each other as well as with the under upgrade stations as presented in the planned projects 2.2.1.10 and 2.2.1.11 herein, through similar equipment and software as well as similar architecture, achieving on the one hand direct economies of scale on the one hand by maintaining a smaller number of required spare parts and

¹⁴ To be taken after approval of Development Plan

consumables and on the other hand by the support services of these systems during their operational phase,

- the separation to the maximum extent of the Measurement Management System from the Supervision /Control System at NNGTS Stations, achieving (a) the stations' measurement data to be collected in the SCADA of the Control and Load Distribution Centers (KEKF) of DESFA directly - without intermediate processing - by the certified Multi-Stream Flow Computers which will be installed in the framework of this project at the NNGTS stations and (b) by extension the optimization of the services provided by DESFA under the requirements of european and national regulatory framework (publication of data, quantities distributions Natural Gas Users, pricing), and

- to ensure the operation of the Measurement Management and Supervision / Control Systems of the Stations for the next decade as the equipment and software at these Stations operate on average for a decade and is expected not to be supported by the manufacturers in the coming period.

The replacement of the Measurement Management and Supervision / Control Systems in the Stations of DESFA refers to the following elements:

- SCADA
- programmable Logic Controller – PLC
- flow computer
- gas chromatograph, and
- equipment of local stations network

The project is expected to be completed in December 2010. The cost of the project which will be included in the RAB is equal to 4.5 mil. € and said inclusion will increase the average tariff for the usage of NNGS by 0.252 %.

2.1.2.8 New building for DESFA's headquarters

Project Summary	
Type of Project	New Project
Type of investment	Equipment of NNGS and LNG
Current budget	11 million €
Expected benefit	Efficiency of NNGS
Start date	Jun-17
End date	Dec-19
Resolution to Construct/FID	No ¹⁵
Current Status	Under study
Financing plan	DESFA's own equity
Recovery method	Inclusion in RAB
Impact on the average usage tariff of the NNGS	0 %

¹⁵ To be taken after approval of Development Plan and when an appropriate building is found.

DESFA headquarters are now housed in a rented building. It is considered that today, due to the conditions prevailing in the Greek real estate market, that it becomes economically desirable for DESFA to acquire a privately-owned headquarters building, which will constitute a company's fixed asset, contribute to the saving of operating expenses and ensure improved health and safety of work.

The office area is planned to be approximately 6,500 square meters in line with the existing DESFA headquarters.

The goal is to avoid burdening the NNGS users due to the savings that will be achieved, mainly by the rental cost. It is also estimated that there will be energy savings due to higher energy specifications of the new building.

From the quantification of the above in a timeline of 20 years, according to the Billing Regulation, it is considered possible to purchase a building with a total cost of up to 11.000.000 € including possible modifications, and not lead to an increase in the Average NNGS usage fee.

The purchase will be completed within 2019, including possible modification works.

Effect on the Average Tariff for the Usage of NNGS

The inclusion in the RAB of the above mentioned projects (2.1.2.1- 2.1.2.3) increases the Average Tariff for the usage of NNGS by 3.53%.

The benefit achieved from the above mentioned projects compensates for the increase.

CHAPTER 2.2. PLANNED PROJECTS

CHAPTER 2.2.1. PROJECTS INCLUDED IN THE APPROVED DEVELOPMENT PLAN¹⁶ AND THEIR IMPLEMENTATION IS ONGOING IN THE REFERENCE PERIOD OF THE CURRENT DEVELOPMENT PLAN

2.2.1.1. Construction of High Pressure Pipeline from Mandra Attikis to the Facility of ELPE in Elefsina for the Connection with NNGS and Relevant Metering Station

Project Summary	
Type of Project	Planned Project
Type of investment	Pipeline Metering Station
Current budget	5.9 million €
Expected benefit	Enabling access to new Users
Start date	Nov-12
End date	Sep-18 (for M/R)
Connection Agreement with User	Yes
Resolution to Construct/FID	Yes
Current Status	Under construction (for M/R) Completed (for the pipeline)

¹⁶ Decision No 64/2017/27-1-2016 by RAE concerning the “Approval of NNGS Development Plan 2016-2025”.

Financing plan	DESFA's own equity
Recovery method	-Connection Fee by User -Inclusion of the remaining amount to RAB

The project consists of the construction of a:

- Pipeline of 6.5 km and 10 inch diameter which will start from line valve “Mandra” of the main pipeline and will end in the facility of Elefsina Refinery of ELPE SA
- Metering station that is currently installed in an area provided by ELPE within the Elefsina Refinery.

2.2.1.2. Construction of High Pressure Pipeline Mavromati (Vagia)-Larymna and necessary Metering Station for the Connection of LARCO GMM SA with NNGS.

Project Summary	
Type of Project	Planned Project
Type of investment	Pipeline Metering Station
Current budget	17,5 million €
Expected benefit	Enabling access to new Users
Start date	Jun-13
End date	Dec-20 ¹⁷
Connection Agreement with User	Pending
Resolution to Construct/FID	No ¹⁸
Current Status	Under technical study/permitting
Financing plan	DESFA's own equity, possible EIB loan, possible grant
Recovery method	-Connection Fee by User -Inclusion in RAB (excluding grants)

The project consists of:

- Pipeline of 36 km and 10 inch diameter which will start from the main natural gas pipeline line valve station “Mavromati (Vagia)” and ends up in the facility of LARCO in Larymna.
- Metering station that will be installed in land provided by LARCO

Technical studies as well as licenses procedures for the project are expected to be finalized in January 2019 in order for the project to be in operation by the end of 2020. These studies are carried out under DESFA's contract with LARCO for the “Elaboration of studies for the connection of the installations of LARCO SA with NNGS”.

¹⁷ Connection Agreement has not been signed yet

¹⁸ Pending necessary contractual commitments by the applicant User .Until then the project is not included in RAB

2.2.1.3. Compression Station in Kipi

Project Summary	
Type of Project	Planned Project
Type of investment	Compressor
Current budget	70 million €
Expected benefit	Technical adequacy of NNGS, increase of flexibility of NNGS
Start date	19-Jul-07 ¹⁹
End date	_ ²⁰
Resolution to Construct/FID	No ²¹
Current Status	Under technical study ²²
Financing plan	Not defined yet
Recovery method	Not defined yet

The project aims at increasing the Transmission Capacity of NNGS and to enable supply of larger natural gas quantities to the greek market as well as to transit gas to european markets via NNGS to the region of Komotini and/or via new gas projects which are foreseen to be developed in the region (IGI, IGB).

The project is included in the PCI list that was elaborated by the EC of November 2015 (Delegated Regulation 89/2016).

Considering that the market needs are not defined yet the size of the compressor station is indicative. However in the case of maximum flow for transit projects 3 compression units with centrifugal compressor and a turbine (2+1) of 9,7 MW each will be installed.

As DESFA has stated in previous Development Plans, the compressor could operate with smaller capacity. This could be required to serve only the Greek market west of Komotini and for requests for import of gas from Turkey for quantities above the current technical capacity of the 4.3 mNm³/ day, and / or to ensure reverse flow to the Sidirokastro in cases of increased flow or increased delivery pressure, according to the relevant simulation studies.

The preliminary budget for the project is 70 million € including the upgrade of the current existing metering station in “Kipi”, as well as a regulating station at Komotini for the regulation of pressure. This station is necessary to be installed along with the compressor in order to protect NNGTS from the change of maximum operating pressure at Komotini. The time schedule of the project depends on the request of the market for imports of gas through Entry Point Kipi or the request for reverse flow quantities.

¹⁹ Approval time of basic design

²⁰ Construction decision t has not been taken

²¹ Final construction decision will be taken when there will be strong data supporting the necessity of the project, and especially commitments from the Users of the infrastructure. The cost of the project is not included in the RAB

²² The technical study has been completed / preliminary authorization for the case of maximum flow

It is obvious that the implementation and the time of the project's completion are dependent from the import of gas through the Entry Point Kipi or the possibilities for reverse flow in NNGS. At the moment there are no indications for the necessity of the project.

2.1.1.4. M/R Station in Komotini

Project Summary	
Type of Project	Planned Project
Type of investment	Metering Station
Current budget	7.5 million €
Expected benefit	Security of supply
Start date	19-Jul-07 ²³
End date	_ ²⁴
Resolution to Construct/FID	No ²⁵
Current Status	Under technical study
Financing plan	Not defined yet
Recovery method	Not defined yet

The project consists of Metering/Regulating station in Komotini for the foreseen connection of NNGTS with transit projects (IGB, IGI etc.) in case these are implemented.

The preliminary budget of the project is 7.5 million €. The time schedule for the completion of the project is dependent to the request of the Users and the booking of Transmission Capacity according to the provisions of the NNGS Network Code.

2.2.1.5. M/R Station in N. Messimvria for the Connection of NNGTS to TAP

Project Summary	
Type of Project	Planned Project
Type of investment	Pipeline, Metering Station
Current budget	10 million €
Expected benefit	Security of supply
Start date	19-Jul-07 ²⁶
End date	2019
Resolution to Construct/FID	No ²⁷
Current Status	Under award for the basic design study
Financing plan	EIB loan, own equity, possible grants
Recovery method	Inclusion in RAB (excluding possible grants)

²³ Approval time for the basic design

²⁴ Resolution to construct has not been taken yet

²⁵ Same as before. The project's cost has not been added to RAB

²⁶ Approval time for the basic design

²⁷ To be taken after the decision for the co-financing of the project

According to the provisions of the Host Government Agreement (HGA) in section 7.2a and those in paragraph 4.7.4 of Joint Decision of Greek, Albanian and Italian Regulators for the exemption of TAP from articles 9, 32, 41(6), (8) and (10) of Directive 2009/73/EC (Decision of RAE 269/2013 Gov. Gaz. 1833/29.07.2013) at least one (1) Tie In Point between NNGS and TAP pipeline should be realized, with a technical capacity of 10 mil. Nm³/ day and bi-directional flow capability. The cost of construction of the above mentioned investment, based on the exception decision, will be covered by DESFA and will be recovered through the tariffs of the Users of the National Natural Gas System.

In this contexts, a study was conducted by DESFA to find the optimal interconnection point from a technical and economic point of view, which resulted to be Nea Messimvria. The study was submitted to RAE.

According to the regulatory framework the tie in point must be bidirectional. Flow from TAP to NNGTS due to the difference in the operating pressure (93 barg and 66,4 barg accordingly) requires only the installation of a Metering/Station. However, flow from NNGTS to TAP requires also the installation of a compressor station. The preliminary budget of the project is 10 million € and includes a) engineering-procurement-construction of the Metering/Regulating station b) engineering-procurement-construction of a small connecting pipeline between the two systems c) purchase of land for the M/R and compressor station in the long-term.

With the proposed investment the uni-directional flow from TAP to NNGTS is secured (1st phase of the project) and it is foreseen the land acquisition where the compressor station will be installed in the future (2nd phase of the project) enabling full bi-directional flow in the interconnection.

The project is included in the PCI list of November 2015. The FEED study is co-financed from Connecting Europe Facility (CEF). The detailed time schedule and cost will be available during the execution of the FEED study, which is ongoing. EPC of the project will be awarded after the approval of the co-financing of the project from Partnership Agreement 2014-2020.

2.2.1.6. Komotini-Thesprotia High Pressure Pipeline (part of NNGS)

Project Summary	
Type of Project	Planned Project
Type of investment	Pipeline
Current budget	1100 million € ²⁸
Expected benefit	Diversification of supply sources, security of supply
Start date	19-Jul-07 ²⁹
End date	_ ³⁰
Resolution to Construct/FID	No ³¹
Current Status	Under technical study ³²

²⁸ Preliminary estimation for the case of maximum flow

²⁹ Approval date of basic design

³⁰ Resolution to construct has not been taken yet

³¹ Same as before. The project's cost has not been added to RAB

Financing plan	Not defined yet
Recovery method	Not defined yet

Komotini-Thesprotia pipeline project consists of high pressure pipeline (80 barg), 613 km length and 42 inch diameter. The proposed routing of the pipeline starts from the industrial area of Komotini in Rodopi Prefecture and ends near the coast of Thesprotia Prefecture. The project consists also of above-ground facilities that are necessary for the safe operation such as Operation & Maintenance center, two compressor stations (one in Komotini and one in N. Mesimvria), metering and regulating stations, line valves stations, scrapper trap stations and telecommunication equipment. The pipeline is designed in a way to enable a potential future supply of customers in the adjacent urban areas along the routing.

2.2.1.7. 2nd Upgrade of LNG Terminal on the Island Revithousa

Project Summary	
Project Type	Planned Project
Type of investment	LNG facility
Current budget	147 million €
<i>Of which Maintenance Capex</i>	<i>1 million €</i>
Expected benefit	Increase of NNGS flexibility, security of supply, enhancement of competition
Start date	09-Apr-10
End date	Sep-18
Resolution to Construct/FID	Yes
Current Status	-Under engineering-procurement-construction (3rd tank) Under engineering-procurement-construction (send out rate, M/R Ag. Triada) - Under a tender procedure for the supply and installation of buffers and a competitive tender for the construction of the bases and other infrastructures for the installation of two (2) binders (QRMHs) of ships (marine facilities)
Financing plan	-Grants NSRF 2007-2013 (35%) -EIB loan (80 M€)- Own equity (remaining cost)
Recovery method	Inclusion in RAB (excluding grants)

The scope of the project includes:

³² The technical study has been completed/ preliminary authorization for the case of maximum flow. Environmental terms are not approved yet. An update of the studies is required.

a. Increase of storage space of the station with the installment of a new tank of 95.000 m³ capacity

With the addition of the 3rd tank the total storage space will be increased, from 130.000 m³ to 225.000 m³ and the available storage space for Users will be increased from 110.000 m³ to about 200.000 m³ (i.e. 82%)

The installation of the 3rd tank will enhance the safety in the case of a cut-off for the northern entry points. The technical solution that is chosen to be constructed is the one with the highest safety standards and the minimum visual disturbance.

b. Upgrade of marine to accommodate larger ships

The marine works will enable the mooring of larger ships with a capacity of up to 260.000 m³ (Q-max) in comparison to the up to date capacity equal to 140.000 m³. As a result it will be feasible the mooring of all types of ships.

The project is expected to enhance competition due to the realization of increased LNG transportations. Further to that Users will be benefitted from the fact that greater range of LNG carriers will be able to be accommodated while the transportation cost per unit of LNG will be decreased as the cargo volume is increased. Consequently, the project is expected to lead to lower gas prices for consumers.

c. Upgrade of gasification rate

The project will include the installation of cryogenic equipment that will increase the rate of gasification in normal conditions (Sustained Maximum Send-out Rate) (i.e. without the use of backup equipment), from 1.000 Nm³/h LNG³³ that is today, to 1.400 Nm³/h LNG (i.e. an increase of 40%). The auxiliary equipment of 250 Nm³/h LNG will remain in use.

The proposed upgrade of the gasification rate will increase the rate of gasification in normal operating conditions (Sustained Maximum Send-out Rate) from 12,47 million Nm³/d to 19,15 million Nm³/d, while in a case of emergency (i.e. use of backup equipment), this rate can be up to 22,57 million Nm³/d.

The technical solution that is chosen for the increase of the gasification send-out rate is the addition of an Open Rack Vaporizer, which is the most environmentally friendly solution. Also three sea water pumps will be replaced, and other works will be performed on piping facilities.

The project includes the necessary mechanical modifications in the existing unloading arms in order to be able to reload LNG to large ships (at least 20.000 m³). The above reloading rate is 2.400 m³ LNG/hr.

³³ 1 m³ of LNG= 570 Nm³ of Natural Gas



Picture 2: Aerial view of terminal station with the installation of the 3rd tank

d. Upgrade of Ag. Triada Metering Station

This project is considered to be a necessary complement to the upgrade of the gasification rate as stated above and refers to the upgrade of the metering station in Ag. Triada

Progress of the project

Construction works of the third tank started on 1st of June 2014 while the EPC contract has been awarded. Also, the upgrade of the gasification rate and the metering station in Ag. Triada has been started. The upgrade of the marine facility is under tender procedure for engineering-procurement-construction.

The completion of the entire project is expected in September 2018 according to the current time schedule. The expected budget is 147 million €.

DESFA has requested financing of the project from NSRF in order to minimize the impact on tariffs of the investment. The approved grant rate (public expenditure) is 35% of the eligible costs via Public Investment Program (PIP) under NSRF. The amount of the total budget that will not be co-financed by NSRF (65%) will be covered by own equity and loan. DESFA has received a loan from EIB. The cost of the investment that will not be subsidized will be added to the RAB.

2.2.1.8. 2nd Upgrade of Boarding Metering Station (BMS) of Sidirokastro

Project Summary

Project Type	Planned Project
Type of investment	Equipment of transmission system
Current budget	3.3 million €
<i>Of which Maintenance Capex</i>	<i>2.3 million €</i>
Expected benefit	Security of Supply, Efficiency of NNGS, effective operation, enhance of competition
Start date	15-May-12
End date	Sep-17 (for item i)
Resolution to Construct/FID	Yes
Current Status	Under construction (i) Completed -In operation ii, iii iv)
Financing plan	DESFA's own equity
Recovery method	Inclusion in RAB

The project includes:

- i) the remote control of Border Metering Station (BMS) in Sidirokastro through Supervisory Control and Data Acquisition (SCADA) system from the Gas Control Center in Patima and the Back up Control Center in Nea Messimvria. The remote control is possible by upgrading and automating sub-systems of the Station, that are considered to be technologically out of time and by upgrading the local monitoring & control system (Distributed Control System).
- ii) the replacement of the existing orifice meters with ultrasonic meters in order to be compatible with the requirements of measurement standards. The metering system has been constructed based on the standard ISO 5167:1991
- iii) the upgrade of the supporting station utilities in accordance with the requirements of remote controlling, taking into consideration the life cycle of the installed equipment
- iv) the possibility of permanent reverse flow through BMS Sidirokastro, so that exporting of volumes from NNGS to Bulgaria will be possible in respect to either the European legal framework, concerning security of supply 994/2010/EC, or the 3rd energy package for the liberalization of the energy markets.

The current budget of the project is 3.3 million €. Item (i) of the project as described above is expected to be finalized in September 2017. Items (ii) and (iii) were completed in 2016. The scope of work (iv) is completed and is ready to operate from late May 2014.

RAE based on this decision 452/2013 has approved the joint proposal of DESFA and Bulgartransgaz for the reverse flow in Sidirokastro interconnection point, according to ar. 7 of Reg. 994/2010/EC. According to that proposal the cost of the investment for the reverse flow (abovementioned item iv) regarding the Greek system is 1 million € and relevant cost for the Bulgarian system is 0.5 million € (this will be performed by Bulgartransgaz).

The investment cost relating to the NNGS (for the whole project including scope of work (iv)) will be covered by DESFA's own equity while the recovery of the investment will be made through the transmission tariffs.

2.2.1.9. Upgrading of Electrical and Electronic Equipment, Billing System and Equipment SCADA Field in Stations M/R of 1st generation (1995-2000)

Project Summary	
Project Type	Planned Project
Type of investment	Equipment of transmission system
Current cost	3.5 million €
<i>Of which Maintenance Capex</i>	3.5 million €
Expected benefit	Efficiency of NNGS, effective operation
Start date	16-May-12
End date	Dec-17
Resolution to Construct/FID	Yes
Current Status	Under engineering-procurement-construction
Financing plan	DESFA's own equity
Recovery method	Inclusion in RAB

The project refers to 15 stations of NNGS (M VFL, M/R PPC Komotini, M/R EKO, M/R Platy, M/R Larissa North, M/R Larissa South, M/R Volos, M/R Athens North, R Ano Liossia, M/R Athens East, M PPC Lavrio, M/R Thriassio, M/R Athens West, M Agia Triada, M/R Inofita) of which the existing equipment for metering and managing invoicing and signaling has overpassed a 10 year operation period thereby creating maintenance problems due to both unavailability of spare parts from manufacturers and equipment compatibility issues.

The SCADA Field equipment in these Stations is non-merchantable (available) by the manufacturing company, which has no longer stock of spare parts, making the maintenance of equipment costly or impossible in some cases.

This results to the increase of operating costs and the low efficiency of the equipment.

The investment will combine the use of common equipment to serve at the same time the operational needs of both the station and the system SCADA and will ensure the smooth operation of the equipment at the lowest possible operating cost, thus satisfying the main objective of the company for safe and reliable transport of natural gas.

The current budget of the project is 3.5 million € and the project is expected to be ready for operation in December 2017. The investment cost will be covered by DESFA's own equity while the recovery of the investment will be made through the transmission tariffs.

2.2.1.10. Extensions and Upgrades of Metering Stations of North and East Thessaloniki

Project Summary	
Project Type	Planned Project
Type of investment	Equipment of transmission system
Current cost	2 million €
<i>Of which Maintenance Capex</i>	0.6 million €

Expected benefit	Efficiency of NNGS, effective operation
Start date	16-May 12
End date	Aug-17
Resolution to Construct/FID	Yes
Current Status	Under engineering-procurement-construction
Financing plan	DESFA's own equity
Recovery method	Inclusion in RAB

The metering - regulatory stations North and East of Thessaloniki are designed to be installed in two phases. The first phase (which has been implemented), included the installation of two lines for regulating and metering (one in operation and one in a standby mode), while the second phase provides installation and setup of a third-line of regulating and metering (two in operation and one in standby mode).

The maximum capacity that was created on the first phase has been used several times in peak loads and therefore the upgrade of the two stations is considered to be necessary, in order the back-up intended degree of the equipment to be ensured, assuring the security of supply of natural gas consumption.

The project includes the design, supply and installation of the third metering control line on the existing stab outs as well as all the electrical and electronic component equipment. It also includes the SCADA upgrade of North and East Thessaloniki metering stations, whose equipment is old resulting in the creation of maintenance problems.

The current budget of the project is 2 million € and the project is expected to be ready for operation in August 2017.

2.2.1.11. Upgrade the System of Fixed Communication of NNGS

Project Summary	
Project Type	Planned Project
Type of investment	Equipment of transmission system
Current budget	4.5 million €
<i>Of which Maintenance Capex</i>	<i>4.5 million €</i>
Expected benefit	Efficiency of NNGS, effective operation
Star date	30-Sep-11
End date	Dec-17
Resolution to Construct/FID	Yes
Current Status	Under engineering-procurement-construction
Financing plan	DESFA's own equity
Recovery method	Inclusion in RAB

The system of fixed communication of NNGS currently consists of fiber optic cable alongside the NNGS, eighty-four (84) knots multiplexing optical fiber gas stations to serve

local needs, communications (telephony, remote control & operation, computer field networks and offices), networking equipment in twenty-four (24) gas stations as well as seven (7) call centers located in the Centers of Operation and Maintenance (O&M) and the LNG terminal Revithousa.

Also, the management centers for multiplexing hubs, of telephone exchanges and network equipment are located in Patima's O&M Center.

Communications via fiber-optic are based on technology multiplex-type TDM / PDH and have a total capacity of 34 Mbps, that even though it was adequate when installed (1996), it marginally covers the current needs of DESFA and will not be able to meet the future ones. Indicatively, for the purposes of the internal computer network and closed circuit television channels of natural gas stations, the connection with agencies O&Ms 100 - 1000 Mbps is required.

Additionally, the call centers that serve today the NNGS are no longer commercially available and their support by the manufacturing company expires in the forthcoming years.

The new branches use IP (IP over Ethernet, VoIP, Modbus TCP / IP) systems (FTS, telephone network, SCADA). The choice of technology offers significantly cheaper solutions, with more development options and expansion capabilities, and better utilization of proprietary fiber optic network. IP technology is the one currently used in new telecommunications networks and will be used for the next 15 years.

To meet these needs, it is advisable to install new fiber optic multiplexing technology with a capacity of 1-10 Gbps. The capacity requirements are not the same in all parts of the NNGS.

The estimated total budget for the project is 4.5 million € and is expected to be ready for operation in December 2017.

2.2.1.12. IT & Telecommunications Projects

Project Summary	
Project Type	Planned Project
Type of investment	Equipment of transmission system
Current budget	1.6 million €
Expected benefit	Efficiency of NNGS, effective operation
Start date	31-May-10
End date	Dec-17(Project No. 1) Dec-18 (Project No. 2)
Resolution to Construct/FID	Yes
Current Status	Under award
Financing plan	DESFA's own equity
Recovery method	Inclusion in RAB (excluding grants)

These projects are related to investments for the development of applications that will facilitate the operation of the company and will upgrade the level of services provided by DESFA. Those projects are presented in Table 2.

Table 2: IT Development applications

No.	INVESTMENTS	COST(€)	COMPLETION DATE	CURRENT STATUS	FINAL INVESTMENT DECISION
1	Balancing platform	100.000	Dec-17	Under award procedure	Yes
2	Integrated IT System for Natural Gas - IISNG	1.500.000	Dec-18	Under award procedure	Yes
TOTAL		1.600.000			

In the following paragraphs the feasibility and technical characteristics of the applications that are presented in Table 1 are analyzed.

1. Balancing platform

In April 2014 the Regulation 312/14/EC concerning the balancing of natural gas in the transmission networks (Balancing Code), bookings of transmission users, balancing fees as well as information from/to the TSO. This includes, among other things, rules and measures relating to the operational balancing of the Transmission System, daily transmission Users' declarations, daily disruptive charges and the provision of information to and from DESFA.

The regulation at the stage of full implementation sets out the basic principles for the creation and development of a balancing scheme of the Transmission System, based on gas market rules. Transmission Users actively participate in the daily balancing of their portfolios by buying and selling standard products at marginal values defined in the Virtual Trading Point (VTP).

For the achievement of the above it is necessary to create an electronic balancing environment (balancing platform), and a Virtual Trading Point (VTP) in accordance with the provisions of Art. 47 of the Balancing Regulation.

Through this electronic environment, it will be possible to carry out transactions of natural gas between pure traders and between Transmission Users and Operators for balancing purposes, without being necessary the booking of transmission Capacity to the NNGS.

By enhancing liquidity on the market, the Balancing Platform will gradually evolve into a Trading Platform, as defined by the Balancing Code. The above actions aim at creating a "GasHub" with the transition to a new model of European specifications market.

The estimated budget is 100.000 € and it will be ready for operation in December 2017.

2. Integrated Information System for Natural Gas - IISNG

The purpose of the project is the development, installation and commissioning of the Integrated Natural Gas Information System (INGS), which is to be the main communication / transaction platform between DESFA and NNGS Users as well as between NNGS Users / Selected Customers based on the provisions of the Network Code.

The IISNG is a regulatory obligation for DESFA under National and European Regulatory Framework for the Gas Market.

The IISNG consists of:

- a) The Electronic Information through which the management of the primary market for NNGS capacity is implemented (eg booking of transmission capacity and gasification capacity, daily reporting, calculation and notification of quantity allocations, LNG facility storage management, tariffs for the usage of NNGTS and LNG etc.)
- b) the Electronic trading system, through which the secondary market is managed (eg. the transferring of Booked Transmission Capacity, submission of proposals, accepting the transfer of Booked Transmission Capacity or the transfer of Booked Gasification Capacity). Through IISNG, actions that must be daily conducted both by DESFA and Users are automated, resulting to the drastical reduction of the time of completion and of error occurrence.

Furthermore, through IISNG Users can be informed about the quantity transmitted through NNGS in order to balance their portfolio.

The budget of the project as described above is estimated at 1.5 million € and the completion date is December 2018.

2.2.1.13. Upgrading Projects of NNGS -1st group

Project Summary	
Project Type	Planned Project
Type of investment	Equipment on NNGS
Current budget	2.097 million €
<i>Of which Maintenance Capex</i>	<i>2.097 million €</i>
Expected benefit	Efficiency of NNGS, effective operation
Start date	31-May-10
End date	Mar-19 (project 1 Table 3) Sep-18 (project 2 Table 3)
Resolution to Construct/FID	Yes for the 2 nd subproject No for the 1 st subproject ³⁴
Current Status	Award of engineering-procurement-construction process (projects no. 1, 2 Table 3)
Financing plan	DESFA's own equity, PA 2014-2020 grants for the 1 st subproject
Recovery method	Inclusion of cost in RAB

These projects upgrade the operation of the NNGS. Table 3 presents these projects in a more analytical way.

Table 3. Projects for the upgrade of the operation of NNGS

No.	INVESTMENTS	COST (€)	READY FOR OPERATION DATE	CURRENT STATUS
1	Upgrade of SCADA in dispatching centers	1.900.000	Mar-19	Under award of engineering-procurement-construction process
2	Design, supply, installation, system design of daily gas flow	197.000	Sep-18	Under award of engineering-procurement-construction process
TOTAL		2.097.000 €		

³⁴ Except for project "Upgrade of graphical environment of SCADA in control centers". FID will be taken after the decision for the cofinancing of the project.

Each one of the proposed investments in Table 2 is described in the next paragraphs.

Project Summary

1. Upgrade of SCADA in dispatching centers

The project includes the procurement , installation and operation of a new SCADA system in the main dispatching center in Elefsina as well as in the back up dispatching center in Nea Messimvria.

The new SCADA system in the Control Centers will replace the current system, which began trading in 2006, and will provide DESFA with new tools for managing graphic images, database, system alarms, historical data, and so on. It is noted that the equipment of the existing SCADA Control Center system is not supported by the manufacturing company, which no longer holds a security reserve for it.

The investment will enhance the utilization of the system's capabilities (user friendliness, better display of parameters, ease of designing new graphic images, etc.), improve the management of NNGTS within the European and Greek regulatory framework and ensure the Telepresence and remote control of NNGTS and its extensions for the next decade.

2. Design, supply and installation of a daily gas flow system design

The establishment of a system for forecasting-planning-control of daily gas flow will provide DESFA the ability to:

- ✓ estimate the volume of gas that will be transmitted,
- ✓ increase the level of accuracy in the prediction of the volume
- ✓ embody a regular review of the progress of the daily planning of gas and
- ✓ adjust the levels of unexpected consumption or shortages in supply.

The investment will:

- ✓ unburden DESFA from operating costs (overtime of field staff, unnecessary start-up/shut-down of LNG terminal, Compressor N. Messimvria, etc.)
- ✓ optimize the management of Users' reports and
- ✓ provide daily justified gas flow plans.

2.2.1.14. Upgrading Projects of NNGS -2nd Group

Table 4. Projects for the upgrade of the operation of NNGGS -2nd group

Project Type	Planned Project
Type of investment	Equipment of transmission and LNG system
Current budget	0.345 million €
<i>of which Maintenance Capex</i>	<i>0.345 million €</i>
Expected benefit	Efficiency of NNGS, effective operation
Start date	28-Jun-12
End date	Jul-19 (project 1, Table 4) Oct-17 (project 2, Table 4)
Resolution to Construct/FID	Yes
Current Status	Under construction (i) Under Technical Study (ii)
Financing plan	DESFA's own equity
Recovery method	Inclusion of cost in RAB

No.	INVESTMENTS	COST (€)	READY FOR OPERATION DATE	CURRENT STATUS
1	Upgrade of the system for the corrosion protection of the NNGS	280.000	Jul-19	Under technical study
2	Restoration of the visual monitoring field system CCTV	65.000	Oct-17	Under award of construction /implementation process
TOTAL		345.000 €		

i. Upgrade of the system for the corrosion protection of the NNGS

The project refers to the installation of defusing induced voltages, metering sensors of the corrosion speed and extension of the existing telemetry system for recording relevant measurements. The estimated budget is 280.000 € and the project is expected to be ready for operation in July 2019.

ii. Restoration of the visual monitoring field system CCTV

The project refers to the installation of monitors, recording cameras in the Control Room of LNG terminal and their connection with the possibility of central management and recording. The estimated budget is 65.000 € and the expected completion date is October 2017.

2.2.1.15. Installation of M/R Kavala

Project Summary	
Project Type	Planned Project
Type of investment	Metering Station
Current budget	3.9 million €
Expected benefit	Supply on new areas
Start date	17-Oct-12
End date	-
Resolution to Construct/FID	No ³⁵
Current Status	Under feasibility study
Financing plan	DESFA's own equity ³⁶ , possible grants
Recovery method	Inclusion of cost in RAB (excluding possible grants)

The project refers to the installation of an M/R 70/19 station in the area of Kavala line valve. The aim of the project is to supply the city of Kavala and the nearby cities of Palaio and Eleftheroupoli.

2.2.1.16. Upgrade of LNG Loading Arms at Revithoussa LNG Terminal

Project Summary	
Type of Project	New Project
Type of investment	LNG facility
Current budget	1.2 million €
<i>Of which Maintenance Capex</i>	<i>1.2 million €</i>
Expected benefit	Efficiency of NNGS, effective operation
Start date	Jul-17
End date	Nov-18
Resolution to Construct/FID	Yes
Current Status	Under feasibility study
Financing plan	DESFA's own equity
Recovery method	Inclusion in RAB

The project scope is replacement of electrical and mechanical equipment of the LNG loading arms at Revithoussa LNG Terminal in order the LNG loading to be effected with equipment of modern technology. Latest technology electro pneumatic equipment shall be

³⁵ The project has not received Resolution to construct. Time schedule will be in coordination with downstream connected systems.

³⁶ DESFA will seek financing from EIB and PP for 2014-2020

installed as well. Additionally, maintenance of the existing cryogenic equipment shall be executed after 15 year operation. The project is deemed necessary for the safer and easier connection of the loading arms on the vessel (ship to shore connection) which is the most crucial and hazardous operation during LNG unloading.

The project will be completed and operational in November 2018 with total budget equal to 1.2 mil. €.

2.2.1.17. Truck Loading Pilot Station

Project Summary	
Type of Project	New Project
Type of investment	LNG facility
Current budget	6 million €
Expected benefit	Efficiency of NNGS, effective operation
Start date	Apr-16
End date	Jul-19
Resolution to Construct/FID	No
Current Status	Under engineering-procurement-construction
Financing plan	DESFA's own equity, possible grant from PA 2014-2020
Recovery method	Inclusion in RAB (excluding grants)

The construction of a truck loading station will give the possibility to use natural gas in areas where the transmission system has not been developed yet (ex. West Greece). The result will be an increased gas consumption and more efficient use of the NNGS.

The market has soundly expressed interest for the said application during the public consultation of NNGS Development Plan for period 2013-2022.

The station will be one point for trucks loading with a capacity of 50 m³ and loading flow of 100 m³/h.

The project also includes:

- Measurement of LNG loaded via weighbridge
- Control of the truck loading station from the LNG Terminal Control Room and DESFA SAP system for the issuance of invoices and other required documentation
- Traffic arrangements within DESFA property as well as on the access road to Revithoussa.

DESFA has performed a separate techno- economic assessment study, by an external consultant, in order to identify the optimum route for long trucks (approx. 16 m) from the LNG truck loading station in Revithoussa to a suitable point in the mainland.

Demand study for this new service is in the published NNGS Development Study for 2015-2024.

The estimated cost of the project derives from the Basic Design study.

The station is programmed to be completed in the end of 2018. The latter depends on the approval of the Development Plan and timely approval for the co-financing of the project from PA 2014-2020.

2.2.1.18. LNG Terminal Boil-off Gas Compressor Station

Project Summary	
Type of Project	New Project
Type of investment	LNG facility
Current budget	5 million €
Expected benefit	Efficiency of NNGS, effective operation
Start date	Apr-16
End date	Jul -19
Resolution to Construct/FID	No
Current Status	Under study
Financing plan	DESFA's own equity, possible grant
Recovery method	Inclusion in RAB(excluding possible grant)

The compressor will be installed at Revithousa LNG Terminal in order to receive boil off gas from LNG process in the tanks and piping instrumentation, convey via Ag.Triada Metering Station and inject them into the NNGTS.

The current necessary combustion of boil off gas in the flare when the LNG Terminal is not in operation will be terminated with this environmental friendly project.

The gas that is conveyed to the flare for combustion is approx. 3.500 kg LNG / h. The proposed project, apart from saving of LNG significantly for the users of the station is an important environmental benefit by eliminating the carbon dioxide emissions during the period of non- operation of the Terminal.

The budget of the project is 5 million € for the installation of a 400 kW reciprocating compressor, which will receive boil off gas from the two existing LNG tanks and the third tank which is being constructed. The project is estimated the project to be operational in December 2018, depending also on the approval for co-funding of the project.

CHAPTER 2.2.2. PROJECTS THAT HAVE ALREADY BEEN INCLUDED IN THE LIST OF SMALL PROJECTS AND THEIR IMPLEMENTATION IS ONGOING IN THE REFERENCE PERIOD OF THE SUBMITTED DEVELOPMENT PLAN

There are no projects in this category.

CHAPTER 2.3. PROJECTS OF THE THREE YEAR DEVELOPMENT PERIOD

According to the provisions of ar. 92 of the revision of Network Code (DESFA's proposal Nov. 2015), Three Year Development period applies to projects for which the final Investment Decision (i) has been taken, (ii) is considered possible to be taken within three (3) years from the publication of the draft Development Plan in DESFA's website. These projects are mentioned in Annex I.

CHAPTER 3. PLANNED PROJECTS THAT WERE NOT INCLUDED IN THE DRAFT DEVELOPMENT PLAN 2017-2026

DESFA, taking into account:

- developments in the field of enterprise recovery of corporate information systems after physical or malicious disaster,
- the operational advantages and disadvantages of using cloud technology against the creation of a mirror site of the central Data Center in Patima in order to recover data and to have a business continuity of the company in the event of a disaster.
- the cost of running, maintaining, and committing resources that will be created by mirror site creation,
- the operational depreciation of the hardware that the company will acquire for the implementation of the mirror site of the central Data Center over time

has decided to explore the possibility of using cloud services offered through an existing software licensing agreement to create a mirror site and not to include the project "*Development of a disaster recovery plan and a mirror site*" in the Draft Development Plan for 2017 -2026.

Annex I
Summary Table of the Projects of the NNGS Development Plan 2017-2026, with distinct reference to the Three-Year Development Period
(Article 92, par. 4D of the Network Code of NNGS)

<i>No</i>	<i>INVESTMENT</i>	<i>COST (€)</i>	<i>INCLUDED IN THE 3-YR DEVELOPMENT PERIOD</i>	<i>START DATE³⁷</i>	<i>READY FOR OPERATION DATE</i>	<i>NOTES</i>
<i>I. PROJECTS INCLUDED FOR THE FIRST TIME IN THE DEVELOPMENT PLAN</i>						
<i>A. Projects for the connection of Users (art. 92 par.4Ai. of NNGS Administration Code as applicable)</i>						
<i>1</i>	<i>M station at SALFA Anthousa</i>	<i>450.000</i>	<i>Yes</i>	<i>Jun-17</i>	<i>May-18</i>	
<i>2</i>	<i>M station at SALFA A. Liossia</i>	<i>680.000</i>	<i>Yes</i>	<i>Jun-17</i>	<i>Sep-18</i>	
<i>B. Projects for the Development of NNGS (art. 92 par.4Aii. of NNGS Administration Code as applicable)</i>						
<i>1</i>	<i>New jetty for small Scale LNG in the LNG terminal at Revithoussa</i>	<i>30.000.000</i>	<i>Yes</i>	<i>Jun-17</i>	<i>2020</i>	
<i>2</i>	<i>Pipeline Nea Messimvria – Eidomene/Gevgelija and M/R station</i>	<i>48.7000.000</i>	<i>Yes</i>	<i>Jun-17</i>	<i>2020</i>	
<i>3</i>	<i>Compressor Station in Ampelia</i>	<i>49.000.000</i>	<i>Yes</i>	<i>Jun-17</i>	<i>Dec- 20</i>	
<i>4</i>	<i>Implementation of training centre</i>	<i>600.000</i>	<i>Yes</i>	<i>Jun-17</i>	<i>Mar-19</i>	
<i>5</i>	<i>Procurement and installation of Pipeline Integrity</i>	<i>300.000</i>	<i>Yes</i>	<i>Jun-17</i>	<i>Mar-19</i>	

³⁷ The date a project is included in a Development Plan or List of Small projects

	<i>Management System</i>					
6	<i>Upgrade of electrical switches for medium voltage and internal lighting in the control room of LNG facility</i>	<i>1.000.000</i>	<i>Yes</i>	<i>Jun-17</i>	<i>Dec-19</i>	
7	<i>Procurement of special equipment for detecting corrosion and irregularities in natural gas pipeline</i>	<i>40.000</i>	<i>Yes</i>	<i>Jun-17</i>	<i>Dec-17</i>	
8	<i>Upgrade of DCS in CHP unit</i>	<i>80.000</i>	<i>Yes</i>	<i>Jun-17</i>	<i>Dec-17</i>	
9	<i>Upgrade of Geographical Information System (GIS)</i>	<i>100.000</i>	<i>Yes</i>	<i>Jun-17</i>	<i>Dec-19</i>	
10	<i>Upgrade of physical protection of DESFA facilities - Physical Safety Control Center</i>	<i>1.200.000</i>	<i>Yes</i>	<i>Jun-17</i>	<i>Dec-19</i>	
11	<i>Improvement of metering accuracy in NNGTS stations</i>	<i>200.000</i>	<i>Yes</i>	<i>Jun-17</i>	<i>Dec-18</i>	
12	<i>Replacement of Metering and control systems on M/R stations of NNGTS</i>	<i>4.500.00</i>	<i>Yes</i>	<i>Jun-17</i>	<i>Dec-19</i>	

13	<i>New building for DESFA's headquarters</i>	<i>11.000.000</i>	<i>Yes</i>	<i>Jun-17</i>	<i>Dec-19</i>	
II. PLANNED PROJECTS						
A. Projects included in the approved Development Plan and their implementation is ongoing in the reference period of the current Development Plan						
1	<i>Construction of a high pressure pipeline from Mandra Attikis to the facility of ELPE in Elefsina for the connection with NNGS and of the relevant metering station</i>	<i>5.900.000</i>	<i>Yes</i>	<i>Nov-12</i>	<i>Sep-18</i>	
2	<i>Construction of high pressure pipeline Mavromati (Vagia) - Larymna and the necessary Metering Station for the connection of LARCO GMM SA with NNGS.</i>	<i>17.500.000</i>	<i>No</i>	<i>Jun-13</i>	<i>Dec-20</i>	
3	<i>Compression Station in Kipi</i>	<i>70.000.000</i>	<i>No</i>	<i>19-Jul-07</i>	<i>-</i>	<i>Implementation dependent on the interest of Users</i>
4	<i>M/R Station in Komotini</i>	<i>7.500.000</i>	<i>No</i>	<i>19-Jul-07</i>	<i>-</i>	<i>Implementation dependent on the interest of Users</i>

5	<i>M/R Station in N.Messimvria for the connection of TAP to the NNGS</i>	<i>10.000.000</i>	<i>No</i>	<i>19-Jul-07</i>	<i>2019</i>	<i>FID has not been taken yet</i>
6	<i>Komotini Thepsrotia H.P. pipeline (part of NNFS)</i>	<i>1.100.000.000</i>	<i>No</i>	<i>19-Jul-07</i>	<i>-</i>	<i>Implementation dependent on the interest of Users</i>
7	<i>2nd Upgrade of the LNG Terminal on the island of Revithoussa</i>	<i>147.000.000</i>	<i>Yes</i>	<i>09-Apr-10</i>	<i>Sep-18</i>	
8	<i>Upgrade of Boarding Metering Station (BMS) of Sidirokastro</i>	<i>3.300.000</i>	<i>Yes</i>	<i>15-May-12</i>	<i>Sep-17</i>	
9	<i>Upgrade of electrical and electronic equipment, billing system and SCADA field equipment in M/R stations of 1st generation (1995-2000)</i>	<i>3.500.000</i>	<i>Yes</i>	<i>16-May-12</i>	<i>Dec-17</i>	
10	<i>Extensions and upgrades of metering stations in Thessaloniki</i>	<i>2.000.000</i>	<i>Yes</i>	<i>16-May-12</i>	<i>Aug-17</i>	
11	<i>Upgrade of the system of fixed communication of the NNGS</i>	<i>4.500.000</i>	<i>Yes</i>	<i>30-Sep-11</i>	<i>Dec-17</i>	

12	<i>Balancing platform</i>	<i>100.000</i>	<i>Yes</i>	<i>Jul- 16</i>	<i>Dec-17</i>	
13	<i>Integrated IT System for Natural Gas</i>	<i>1.500.000</i>	<i>Yes</i>	<i>31-May-10</i>	<i>Dec -18</i>	
14	<i>Upgrade of SCADA graphical environment in control centers</i>	<i>1.900.000</i>	<i>Yes</i>	<i>31-May-10</i>	<i>Mar-19</i>	
15	<i>Design, supply and installation of a programming system for the daily gas flow</i>	<i>197.000</i>	<i>Yes</i>	<i>31-May-10</i>	<i>Sep-18</i>	
16	<i>Upgrade of the system for the corrosion protection of the NNGS</i>	<i>280.000</i>	<i>Yes</i>	<i>28-Jun-12</i>	<i>Jul-19</i>	
17	<i>Restoration of the visual monitoring field system CCTV</i>	<i>65.000</i>	<i>Yes</i>	<i>28-Jun-12</i>	<i>Oct-17</i>	
18	<i>Installation of M/R in Kavala</i>	<i>3.900.000</i>	<i>No</i>	<i>17-Oct-12</i>	<i>-</i>	<i>Time schedule is dependent on the time schedule of the downstream Connected System</i>
19	<i>Upgrade of LNG Loading Arms at Revithoussa LNG Terminal</i>	<i>1.200.000</i>	<i>Yes</i>	<i>Mar-16</i>	<i>Nov-18</i>	
20	<i>Truck Loading Pilot Station</i>	<i>6.000.000</i>	<i>Yes</i>	<i>Mar-16</i>	<i>Dec-18</i>	
21	<i>LNG Terminal Boil-off Gas Compressor Station</i>	<i>5.000.000</i>	<i>Yes</i>	<i>Mar-16</i>	<i>Dec-18</i>	

	<i>B. Projects that have already been included in the list of small projects and their implementation is ongoing in the reference period of the submitted Development Plan</i>				
	-				
<i>Total</i>	<i>1.539.192.000 €</i>				